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# PERSONAL STUDIO 2002 BUYER'S GUIDE

## Our Best Gear Guide Ever!

COMPLETE INFO ON

**2,127** RECORDING PRODUCTS

FROM **322**

MANUFACTURERS

# BONUS!

- DOZENS OF RECORDING TIPS AND IN-DEPTH FEATURES
- MASTERING SECRETS OF THE PROS
- CREATING THE ULTIMATE MIX





# RECORD! EDIT! CREATE!

**P**lug in the HDR24/96 Recorder/Editor and start recording. No computer to boot up. No hardware and software configuration nightmares. No compromises like settling for 20-bit audio or just eight tracks at a time.

## Recording's easy with the HDR24/96.

Simultaneously record twenty-four tracks of 24-bit digital audio...without waiting for lock-up, tape shuttle or CPU lag. Drop up to 192 alternate takes into "virtual tracks." Record onto affordable, removable media that you can swap in and out for each project.

And do it all with your hands on a familiar, analog-style machine (or choose from two sizes of wired remotes) instead of resorting to myriad mouse clicks. All basic functions are right on the HDR24/96 front panel including transport buttons and a Record Enable button for each track.

## Editing is easy with the HDR24/96.

Plug in an SVGA monitor, keyboard and mouse, choose from 2x, 4x, 8x, 12x or 24-track views and then watch them scroll smoothly past a centerline.

Mark hundreds of cue points and four locate points for looping and auto-punch-in modes.

Use the mouse to "scrub" individual tracks, Cue, Punch and Loop points with continuously variable velocity.

You can mark a segment (or multiple non-adjacent segments) as a *region* and then cut, copy and paste it anywhere — onto a blank track or right in the middle of an existing track

without erasing anything (the part of the track after the insert just "slides down").

You can audition regions or modify their start/end points instantly, capture them as "sound elements" for later use or quantize them to user-defined time grids.

Create fade-ins, fade-outs and cross-fades just by dragging and dropping them...and then set their length by dragging the mouse.

Add volume envelopes for simple level automation of regions or whole tracks.

Then use Render Track to combine all or selected regions of a track just as you hear it complete with cross-fades, volume envelopes, mutes, etc.

## Play with the HDR24/96.

Play back twenty-four tracks of pristine digital audio — instantly without any pause or lag time. It will be synched rock-solidly to everything in your studio — from MIDI-based sequencers to VTRs (via SMPTE or video sync).

Then let your partners, clients and friends "play" with your tracks anywhere in the world, thanks to the HDR24/96's Ethernet port and FTP server capability.

## The non-linear HDR24/96 vs. linear hard disk recorders.

Ever since the invention of magnetic tape, recording over something means it's

**"...the HDR24/96 is a stunning development with excellent sonic quality, an extensive feature set and versatile file management... it's easy to use and priced right. This one rocks!"**

**George Petersen**  
**Mix Magazine March 2001**







# SAVE YOUR COMPUTER FOR E-MAIL.

**Need to back up just one song? Plug a Mackie Media Project drive into the HDR24/96 external bay and transfer over 2GB to an ORB™ disk.**

gone...which makes doing "punch-ins" a dicey gamble. This is called linear (destructive) recording. Even some current hard disk recorders use this old-fashioned technology!

The HDR24/96 employs true, non-destructive, non-linear recording and editing. That means you can record as many versions of a track or track segment as you want without destroying the original. During playback, the recorder recombines the non-linear segments into a seamless soundstream.

And unlike linear-style recorders that treat disk space like digital tape, the HDR24/96 doesn't automatically eat up 24 tracks of disk space when you're just recording one or two tracks. Because it uses only the space needed for actual audio, you get far more recording time per gigabyte of hard disk space.

**Professional performance and affordable creativity with the HDR24/96.**

Non-linear hard disk recording is possible to do with a computer-based system. But to achieve what the HDR24/96 delivers – simultaneous, lag-free 24-track/24-bit recording and playback and waveform accurate

editing – requires major investment in a very expensive digital audio workstation system. Cheap "recorders-on-a-computer card" just don't have the horsepower for multi-track, twenty-four-bit 48kHz recording, much less twelve-channel 96kHz capability like the HDR24/96.

**Listen to somebody else instead of us.**

Here's what *Mix* magazine had to say about the HDR24/96:

*"...The HDR24/96 is a stunning development with excellent sonic quality... The unit offers an ease of use that should make disk-recording novices comfortable while including an impressive feature set that will appeal to seasoned pros."*

*"The recorder's faceplate holds few mysteries and most users can be up and recording just minutes after unpacking the HDR24/96."*

According to Britain's

*Audio Media, "As a recorder (the HDR24/96) is transparent. As a tool, it's powerful. As a creative helper it's perfect. With focus on functional,*

*inexpensive, simple-to-use 24-track recording, Mackie has hit the mark."*

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There are a bewildering array of digital recording options on the market right now. You've heard our two cents worth.

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Then get your hands on an HDR24/96 and track some hits.



**T**wenty-four track masters for under ten bucks each!! Divide the cost of a MackieMedia M90 into the 20+ pop tunes you can record on it and you're looking at under a ten-spot for each 24-track master\*. Remember, non-linear hard drives store audio data only, not silence. Tape (and linear hard disk recorders) just roll merrily along...eating oxide and costing money.



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\*\*With optional VS-CDRII/CD-Rack CD Recording Systems



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and archive data  
using the optional  
VS-CDRII or  
CD-Rack.



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playlist, mixer settings,  
routing and more using  
an optional computer  
monitor.



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FaxBack Information: (323) 890-3780 (Doc.#10522). Specifications and appearance are subject to change without notice.



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A SUPPLEMENT TO ELECTRONIC MUSICIAN MAGAZINE

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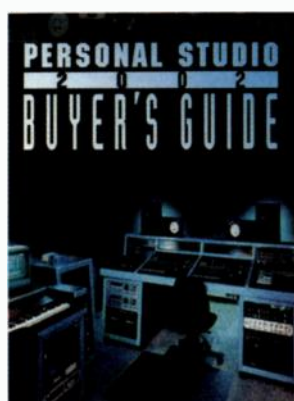
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## It does more than burn. It sizzles.

Introducing the new Korg D1600 Digital Recording Studio, the most complete and affordable solution for home and project recording. This 16-track digital recorder packs recording, mixing and final CD mastering into a professional quality all-in-one unit. With even more features and capabilities, the D1600 has everything for your music-making needs.

The D1600 comes with a massive 20 GB hard drive for more recording time and less worry about running out of time or space. And thanks to its unique user-swappable design you can easily change drives from session to session using standard IDE mechanisms. The D1600 supports the largest drives possible, so say goodbye to making backups and clearing your drive for the next project. Simply swap it!

When it comes time to master or backup a project to CD you'll appreciate the D1600's internal CD-RW drive bay. (The Korg model CDRW-2 and many ATAPI-compatible devices can be used.) No cables. No additional power supplies. You can even record audio directly from the internal CD-RW drive. Try doing that with an external unit!

The effects power of the D1600 really shines when recording and mixing. Have up to eight Insert effects configured any way you like, plus two Master and one Final effect. It's like having a professional rack of high-quality effects processors with everything from reverbs and delays to compressors, limiters and EQs. Plus, our special REMS™ models of mics, guitar amps and speaker cabinets.

With its user-friendly TouchView graphic display and intuitive operating system, the D1600 is just begging to be touched. Lay your hands on it and let your creativity take over. Once you heat things up, there's no telling what you'll be able to burn.

# KORG



# D1600



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# PERSONAL STUDIO

2 0 0 2

# BUYER'S GUIDE

Every year we look for ways to improve the *Personal Studio Buyer's Guide*, and we always think we really have it nailed "this time." In fact, our cover claims as it did last year that this is the "ultimate guide to home studio gear." Indeed, each year we publish what we consider to be the best guide of its type. But the truth is, the "ultimate" guide is always next year's edition, because we don't rest on our laurels.

When we looked back at the 2001 edition of PSBG, we liked what we saw, but we knew we could do better—so we did. This year we brought in directories specialist Tom Fulton to help us clean up problems in the charts, add a lot of new gear, and cut out not only discontinued products but also some that are so high end that few personal-studio owners can buy them. We also hired art director Linda Gough to make the design even more attractive and considerably more efficient by condensing and eliminating wasted space. In short, this guide has not just been updated; it's cleaner and more tightly focused than previous editions.

The biggest improvement is the way we took advantage of the space gained in our cleanup: we filled it with more feature stories and tips. Last year we offered just three stories; this year we provided nine features gleaned from a variety of sources.

In response to popular demand, we revived a story by yours truly, previously published in the 1999 edition of PSBG, about how power conditioners work and what to look for when shopping for them. From our sister publication, *Mix*, we borrowed Randy Alberts's fine article about recording drums. Special thanks go to the *Mix* editors for turning us on to this story.

Several of the features presented in this year's edition were drawn from the *MixBooks* and *EMBooks* series. From Gino Robair's *EMBook Making the Ultimate Demo*, we included a piece about getting the most from your mixer and a guide to mixdown techniques. Scott Wilkinson's *EMBook The Anatomy of a Home Studio* was the source for three minifeatures that explain the basics of reverb, delay, and pitch shifting. To top it off, we've given you two sets of recording and mastering tips from Bobby Owsinski's *MixBook The Mastering Engineer's Handbook*. Here's a big thank you to Mike Lawson and his staff at Artistpro.com, the current publisher of *MixBooks* and *EMBooks*, for helping us make this happen.

As a close friend of mine is fond of saying, "It's all good, and it all counts!" I hope you'll agree that this year's guide is the best yet.

Steve Oppenheimer



Editor in Chief

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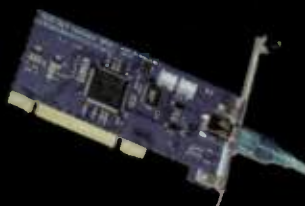
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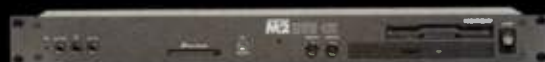
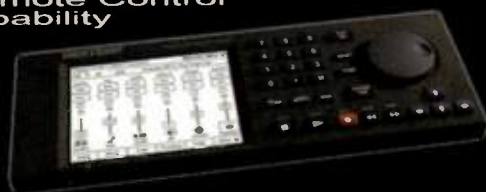
Song Lyrics on  
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### STORAGE

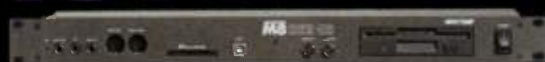
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M2



M8



## multistation

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# MAXimizing your Mixer

**I**n the typical home studio, the choice of mixer often is dictated by price. Fiscal compromises usually rate the model with just enough features (i.e., no frills) the winner. For example, MIDI musicians often emphasize quantity of mixer inputs over features such as parametric EQ. *By Larry the O with Gino Robair*

In high-ticket consoles, the money tends to go toward highly refined circuitry for critical functions such as microphone pre-amps and equalizers, as well as quality connectors and pots. Modern technology allows manufacturers to expand features yet save money by sacrificing circuit sophistication and component quality. Sometimes the most inexpensive console sounds good if pushed to its peak performance. The key is to identify weak spots and find ways to avoid them.

This article was previously published in the EM Book *Making the Ultimate Demo*, a product of [artistpro.com](http://artistpro.com), and is reprinted by permission of the publisher.





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## PRIME POSITION

The best place to start is with the placement and connection of your mixer. Avoid putting the mixer near any source that radiates magnetic or radio-frequency waves, such as a power amplifier, speaker, computer, digital signal processor, or video monitor. The most sensitive area of the mixer is near the top of the channel strip where the input preamps are located, as they provide the highest gain.

Be sure your mixer has a solid ground and clean AC power, or you may end up with noise and distortion that can't be eliminated. Neatness counts: careful wiring and quality cable make a drastic difference in the number of hums, buzzes, and assorted nasty noises a system picks up. Using balanced inputs whenever possible helps avoid these problems, and minimizes ground loops, too. If you plan to bring an unbalanced signal into the board, use a direct box to make the signal balanced.

## GAIN STRUCTURING AND NOISE

Once the mixer is situated and hooked up, the most critical aspect of the sonic performance in virtually any audio chain is gain structuring. Proper gain structuring minimizes the noise and distortion that identifies an amateur demo tape. A signal passing through a typical mixer traverses at least three gain stages: the preamp, the summing buses, and the output section. Typically, each of these stages offers a level control: a preamp trim (usually found at the top of the channel strip), a channel fader, and a master fader.

The preamp section of the mixer has the most gain, and its behavior largely dictates the gain structure. Some preamps are noisy when turned up near maximum, while others are noisiest when set low. This may be due to a combination of component quality, shielding, grounding, and topology. (Some preamp trims are attenuators that act on



The Panasonic/Ramsa WR-DA7 digital mixer has a friendly user interface and many expansion options.

the signal before, or even after, a fixed-gain op-amp stage, while others are in the feedback loop of the op-amp, varying the circuit's gain.) The objective is to familiarize yourself with the noise and distortion characteristics of the different stages and find optimal settings.

To get a feel for your system's quiescent noise (the noise level when there's no signal), turn the mixer preamp trim all the way down, leave the EQ flat, and set the channel and master faders at about 70 percent. Listen closely to the noise level as you slowly raise the preamp trim, to see if there is a particular spot where noise takes a jump, as often in the last 10 percent of the pot's rotation. Because this test requires high monitor levels to reveal subtle noise differences, exercise extreme caution; one tiny pop can destroy your speakers (as well as your ears).

## CLIPPING

The most common preventable source of distortion in inexpensive mixers is clipping. This occurs when the circuit runs out of available headroom, so it is important to know the dynamic limits of your mixer's gain stages. Send a signal from a test oscillator, or a simple, steady tone from a synthesizer (a sine wave is ideal), calibrated to the mixer's specified nominal input level (see the manual for this figure), into a channel. Then perform the same exercise used to check

quiescent noise levels. As you increase the gain, be careful to lower channel or master fader levels as necessary to avoid overloading any stage other than the one being tested. Listen closely for the first hint of distortion. While listening for distortion, watch the level indicators (channel-overload LEDs and channel or master meters) to get an idea of the correlation between their readings and the aural onset of distortion.

A single tone isn't a comprehensive test, as practical use often requires multiple sources to be routed through the mixer simultaneously. While this operation has no effect on the individual preamps, the summing buses are impacted, as each individual signal contributes noise and reduces headroom. You may need to adjust channel faders, and occasionally even preamp trims, to avoid overloading summing buses and master output stages.

When tracking, less is often more. If your mixer has direct channel outputs, feeding your tape deck from those eliminates several stages of electronics and the accompanying noise and distortion.

## EQUALIZATION

Moving beyond the primary issues of noise and headroom, the next most pressing concern about mixers is the sound of the equalization. Circuit design and component quality are the determinants here. Most inexpensive

—continued on page 134



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# CREATING The ULTIMATE MIX

*By Gino Robair with Michael Molenda, Scott Mathews, and Jeff Casey*

**W**hether the listener is aware of it or not, his or her response to a recording depends greatly on the mix. No matter how well the instruments were recorded, if they're not well placed in relation to one another, the results will be boring and lifeless.

In the world of major-label projects, it's common for a project to be recorded by one engineer, mixed by another engineer, and mastered by yet another. Because each stage requires highly specialized skills, it makes sense to let the experts do the work.

If you're producing anything mainstream, from alternative to Top 40, the mix needs to be aggressive and have an attitude. It needs to be in your face. Whether you're recording a demo for record labels or to get gigs, the bottom line is the same: you're trying to sell your music to someone, and your music needs to get their attention. So what is it that the pros do that makes even an average song sound great? This chapter will give you some insight.

## THE THREE-DIMENSIONAL SPACE

Because the first recordings were recorded with a single microphone and without the benefits of overdubbing and mixing, the first recording engineers relied on the placement of the musicians in a room, relative to the microphone, to get the right mix. For example, the instruments that needed to be "up front" in the mix were placed closer to the mic. To get a natural blend from an orchestra, the softer instruments (such as the string section) were placed nearer to the mic than the louder instruments (such as the brass and percussion). If the music included vocals, the singer needed to be as close to the microphone as possible for maximum vocal intelligibility.

In the modern multitrack recording environment, it is no longer necessary to record this way. However, when it comes time to mix a multitrack project, it is helpful to imagine the instruments placed in a three-dimensional space right behind your monitors (see Fig. 1). Whether the final mix duplicates the realism of a stage

setup or creates a surrealistic one, you need to visualize the exact position of each instrument in front of you. If you spent time tuning your room, acquiring sonically accurate gear, and placing it in the sweet spot of the room, everything should be in place and ready for you to visualize as you mix.

## ANATOMY OF A MIX

Producing pristine master tapes requires "transparent mixing." This means that all the elements of a recording must be sonically well defined and subservient to the demands of the music.

What defines a good mix? Unfortunately, there are no absolute guidelines. Music is a subjective medium, and arguments regarding a production's sonic quality can rage for hours. However, a professional mix is easy to identify: you can hear everything. The rhythm section is tight, the vocals are crisp, and the background material (such as keyboard pads and counterpoint lines) is clear and well articulated.



In a pro mix, the ear is drawn to certain elements deemed by the artist or producer to be the work's focal points. On a pop record, these elements often are the lead vocal, rhythm section, and instrumental hooks. Jazz producers typically highlight the soloists. In every case, a professional mixer ensures that the appropriate musical hooks are loud, clear, and unfettered by competing sonic elements.

It takes years of practice, ear training, and intensive study before you can begin churning out "hot" mixes. The first step to producing transparent, professional mixes is to keep an open mind about learning new things and unlearning old habits. Be prepared to change the way you do things in order to get your mixes to the next level. Begin by listening to classic and contemporary recordings. Try to identify the elements that comprise a sharp, clean mix: What sounds are generally mixed up front? How many different instrumental and vocal parts are featured, and what tonal ranges do they fill? What is the basic sonic personality of the mix (a full tonal spectrum, predominant midrange frequencies, etc.)?

Once you've developed an ear for the components of professional mixes, refer-

ence your own mixes to commercial CDs within your stylistic genre. By critically assessing how your mixes stack up against professional products, you will begin to develop ideas of how you want your mixes to sound and how to get them there.

### ANALYZING YOUR FAVORITE RECORDINGS

Every musician has their favorite recordings. As you begin thinking about mixing your own tracks, reference these classic recordings. If your music fits into a specific genre, listen to other recordings in that style and think about what makes each track sound unique. To get the process rolling, here are a few questions to ask yourself:

1. How do the vocals sit in the mix? Are they up front or do they sit back within the accompaniment?
2. What is the overall blend like? Can you hear the "room" around each instrument, or is everything in the same "room"?
3. Where are the various instruments placed in the stereo field? Which instruments appear in the center, which instruments appear on the sides, and which have a stereo spread? Does this sound natural or artificial? Which do you prefer?
4. What is the over-all feel of the track? Does it sound large and "live" as if it were recorded in an arena, or is it more intimate?

Different effects such as panning, reverb, and echo often are the defining characteristics of a musical genre. Before you begin mixing, it is useful to be able to identify both the obvious and the subtle effects that pertain to the style of music you make.

A useful exercise is to pick a musical genre and compare a record that was mixed 20 years ago with one that was mixed last year. Begin by focusing on one instrument. For now,

let's look at the drums. Many drummers in the mid- to late-1970s used some degree of dampening on their drums. This gave the instrument a tight, dry sound but with good projection. As you go through records in your collection, notice whether the drums sound dry and muffled, or have a tone and are ringy.

Compare your findings with well-produced records from the '90s. Do the drums sound larger and more resonant? Do you hear different reverb characteristics in comparison to the earlier tracks?

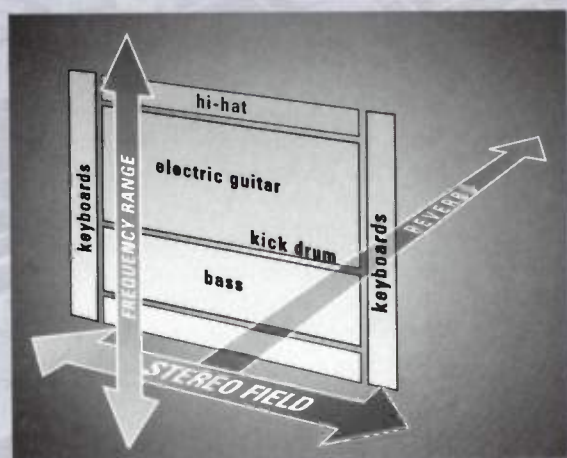
It's also a good idea to step out of the genre you're most familiar with and listen to how different styles are recorded and mixed. You may not like the sound of rap, the feel of country and western, or the intensity of heavy metal, but major releases in these genres are often recorded and mixed by the same people. You may find one particular element in this unfamiliar music that you can use in your own music, whether it's the sound of a bass drum or an effect used on a voice. The more you listen to unfamiliar styles, the more likely that you will be able to bring new ideas to your own.

### REFERENCING

If you're planning on mixing a project that will be heard by anyone other than yourself, in any environment other than your own studio, you need to reference through a variety of monitor speakers. Most professional studios have two or three sets of monitors set up, and mixing engineers routinely check the mix through each set of monitors as they progress.

Begin by working on your favorite speakers. Then, check the relative levels of the instruments using a set of smaller, inexpensive speakers. Make sure they are positioned next to your favorite monitors so that you're sitting in the sweet spot for both sets of speakers. If the tracks sound good on the low-quality speakers, and you can hear everything clearly, the mix will probably translate well on any system.

Mono compatibility is another big part of a successful mix. Keep in mind



**FIG. 1:** By conceptualizing the mix as a three-dimensional stage where the vertical axis represents frequency range, you can graph the soundstage from the front or above and see the frequency/pan position or volume/pan position, respectively. Make sure no two components are in the exact same place in either axis."

that people often listen to music without the benefit of true stereo: FM radio is not true stereo, car speakers don't give you a great stereo image, and boom boxes essentially produce a mono signal as soon as you step away from them. It's a good idea to flip the mono switch on your console frequently, or pan the tracks to the center, to ensure that your mix is mono compatible. If your mix sounds just as good in mono as it does in stereo, you're going in the right direction. If portions of the audio spectrum become quieter or disappear, you may have some phase problems within the tracks.

### FROM THE TOP

When you first bring up all the tracks on a song, listen closely to how the various parts are blending. Don't immediately assume that everything needs tweaking. If you did a good job of recording the basic tracks, you may find that you have the beginnings of a decent mix right away.

Remember that a good mix is mainly subtractive: you should try to clean it up rather than add things to mask problems. If you're not satisfied with your progress at any point during the mix, don't be afraid to go back and change things. Inevitably, the first tracks you tweak won't sit right with the other instruments, no matter how good they sounded by themselves.

Although soloing tracks is great for fixing problems, creating your individual tracks in solo mode is generally a bad practice. Only solo a track if you hear a problem. For the most part, you want to listen to a track in context with the other instruments in the mix. For example, you could work on a soloed bass sound for hours only to find it doesn't sit right with the kick drum in the mix. Then you're back to square one.

Another important element in doing a good mix is the ability to relate to all of the instruments. If you play a particular instrument, it's important that you don't favor that instrument in the mix. Many engineers fall into this trap. You need to appreciate what each track has to offer. That's why it is always a good idea to have an extra set of ears, such as a band member, present for input.

### THE BIG PICTURE

Savvy producers conceptualize the final mix as the project is being recorded. This means they have an idea of how the end product should sound as they go through the entire recording process, from tracking basics to doing overdubs.

If you prepare supportive musical and sonic arrangements before committing a single sound to tape, the technical aspects of the mixing process—issues such as equalization tweaks and the relative



Light compression with a unit like the Joemeek SC2.2 stereo compressor works well with electronic instruments in a mix.

volume of instruments—should be almost automatic. Such preparation is rewarded by allowing you more time to concentrate on the creative aspects of mixing, such as imaging (the placement of instruments within the stereo spectrum) and signal processing. All of this pre-production is important because the “fix it in the mix” scenario is a myth. Therefore, a little pre-production planning can save you hours of mixing frustration.

### THE MIX ELEMENTS

Every mix decision should be committed to creating a supportive environment for the lead vocal, solo instrument, or other musical hook. When you begin playing with track levels and EQ, make sure that nothing interferes with these critical elements.

You can achieve a transparent mix only with slavish attention to detail. Only after you've identified a production's musical focal points, however, should you risk obsessing over the individual components of your multitrack master.

For a good pop-music mix, you must find the optimal balance between the rhythm instruments and the vocal. Let's break the mix down into four sections that represent the most important elements of a top-notch mix, and then we'll discuss some techniques to make

your tracks sound as good as they can.

**Drums.** The most critical relationship in the rhythm section is between the kick drum and the bass guitar. These two things drive the song. Although what you want your kick drum to sound like largely depends on the style of music you're mixing, you must make sure that its punchiness does not interfere with any of the frequencies generated by the bass. Therefore, you should always tweak it while listening to the bass track as well.

Sometimes you'll hear something wrong in the mix but you can't put your finger on it. Often, the snare is the culprit. The snare acts as the song's metronome. As with a tambourine, it's very noticeable when the snare is either too soft or too loud. Don't just assume that a quick level adjustment is the solution. Many times EQ can bring out the snare, by either adding some mid frequencies or subtracting some low end. Try that before boosting the level.

Many people also like to use a bit of compression on the snare drum, especially if the dynamics of the performance are uneven. Overcompression can be used to create a particular effect. By playing with the attack and release times on your compressor (adjusting them relative to the song's tempo), you can get a snare hit that sustains the resolution of the note, creating a more full-bodied sound.

You can also use a noise gate to produce a well-defined snare sound. Set the gate so that it cuts out everything except the actual snare hit. Then, send the signal to a compressor to even out the dynamics and produce more impact. Be sure that the noise gate eradicates any stray cymbal crashes, as compression can noticeably raise their relative levels.

Another popular approach is to pre-mix the drum kit and bounce the original drum tracks down to four new ones: kick, snare, and a left-right pair. By pre-mixing the toms and overheads, you have the opportunity to blend the kit well, but you haven't committed yourself to just a left-right pair of drum tracks; you still have the kick and the snare tracks to play with, and these are the instruments that usually require extra



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tweaking once the rest of the mix comes in.

Finally, keep in mind that people love percussion. Almost any song can be improved and any mix fattened up by adding percussion. Tambourines and shakers are always good additives. If you have done everything you can to a mix and it still sounds empty, try throwing in these two instruments as a quick fix. By panning them left and right (nine o'clock and three o'clock), you can often improve a mix dramatically.

**Bass.** Compression and EQ are used to fatten up a bass track. Compression is usually needed because each string on the bass guitar produces different dynamics, and the dynamic range of the track can be pretty large. Smooth compression will tame flabby dynamic levels and allow you to bring up the level so that the track provides the desired sonic backbone.

A compression ratio of 2:1 or 4:1 at a threshold level of -10 dB usually tightens up the low end quite nicely. If you're going for "big bottom," boost 100 Hz by 5 to 10 dB, and cut the low mids to keep the lowest information from muddying up the track. If a funkier bass is needed, cut 100 Hz by about 7 dB, and boost the mids to taste.

Typically, the bass signal is routed to an EQ and then through a dynamics processor. You may want to patch in a second EQ after the compressor/limiter. This will allow you to make minor adjustments to the sound after it has been dynamically processed. Sometimes compression will sustain certain frequencies that may clash with other instruments. The second EQ lets you find those frequencies and cut them from the mix.

The bass provides the fundamental pitches for a song, so always listen to how the bass fits into the mix. In order to hear the instrument's low pitches clearly, you need to find a balance between the low- and high-end frequencies. Having the right balance gives the bass the definition needed so that pitches, rather than "woofs" or rumble, are clearly heard.

**Guitars.** Guitars should sound natural and unobtrusive. Except for the lead solo, the guitar tracks should be mixed in

well with the other instruments. A slight amount of compression is generally added to help accomplish this. Depending on how many rhythm-guitar tracks you have, you may want to group them to a stereo pair and add the compression at the bus insert.

A common practice is to double the rhythm guitars. This sounds most natural when the guitarist simply plays the part twice on two separate tracks. However, many tracking engineers mic the cabinet from two distances, using a close mic and an ambient mic. This creates a natural delay that fattens up the sound.

It's also very important to consider the tonal characteristics of the guitars when you blend them with the other instruments. Make sure that your guitar tracks are not laden with unnecessary low frequencies that will clash with the bass. Sure, the tracks may sound fat when soloed, but when you mix them in, you'll have a muddy bottom end. Also, try not to make the guitars too bright; nothing is more annoying than screeching guitars.

A noise gate is essential for shutting down ugly amp-related noises when the guitarist is not playing. Compressing the guitar brings out hums and hisses; gating or downward expansion can be used to minimize the unwanted sounds.

**Vocal Intelligibility.** Undoubtedly, the lead vocal is the most important track in almost any song. It needs to stand out because, like it or not, the singer usually sells the song or band. However, the vocal is also one of the most difficult things to get to work because of the frequency content of the voice.

A vocal track needs to have body, presence, and air, but not so much that it interferes with the rest of the mix. Compression is often necessary to keep the level constant and to assist in separating the vocal from the rest of the music. Subtle boosting of the midrange also helps the vocals move to the front of a mix. This is the most sensitive track you will have to EQ, and because there are so many variables, making categorical statements about it is difficult. You'll have to listen carefully and make EQ decisions based on the sound of the particular voice you're working on.

Among the trickiest songs to sit vocals in are ballads. Ballads usually begin with just the vocal and a simple accompaniment, with the full band coming in midsong. This is when the singer's dynamic range is typically the largest. You should isolate the two sections and address them as separate entities. If you have more than one compressor available, try setting up individual ones for different parts of the song.

A common trick that many mix engineers use to fatten a vocal track is to route the track to a delay unit through an aux send, process it with a slight amount of delay (10 to 15 ms), and bring it back into a separate channel fader. The delay is not long enough to hear as a discrete sound, but it increases the fatness of the vocal track.

Background vocals are another matter, and there are two major types: the simple harmony and the chorus. The first is your standard harmony that moves along with the lead vocal. Since this is almost like another lead vocal, you can EQ it in a similar fashion if you want them to blend. If you want the harmony to stand out more, give it a slightly different EQ and perhaps give it its own place in the stereo field.

The other type of background vocal is the choral effect, where you may have three or more vocalists in various octaves. These vocals typically sound better when they have a bit of "air" to them.

Begin by rolling off low frequencies, around 400 Hz, on the high harmonies and attenuate the extremely low frequencies, around 100 Hz, on low harmonies. Then, remove as much midrange as you can, usually between 1 and 4 kHz, without losing the clarity of the voice. Finally, add some upper mids and high frequencies with a shelving EQ set around 8 or 9 kHz until you get that angelic effect. It also helps to pan the voices across the soundstage.

### THE STEREO SPREAD

Creating a believable stereo image is one of the hardest things to do. The soundstage needs to be wide, but the mix must sound good in mono. In addition, the spread shouldn't be so wide that the image is unrealistic. The rule of thumb has



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traditionally been to position the instruments as you might hear them onstage from the audience. Many engineers will pan things hard left or right, especially guitars and drum toms. But then again, you can take a different approach.

For example, you might pan everything from the drummer's perspective, as if the listener were sitting on the drummer's stool. To do this, you would put the kick in the middle, the snare left of center, the hi-hat slightly left of the snare, and the cymbals and toms exactly where they appear on the kit. Next, pan the guitars at ten and two o'clock, and put the bass and vocals in the middle, with any background vocals just left and right of center. With this setup, you have all of your important information in the center (and in mono), while the supporting cast is on the outside.

But this is only one way to do it, and like everything else in mixing, there are no set rules. Remember the listening exercises I talked about earlier? This is where you can put to good use the information you gleaned from analyzing the stereo image of your favorite records.

Regardless of where you place everything, it's crucial to maintain an accurate representation of the instruments. Remember that panning instruments to the outermost edges of the left or right (farther than three o'clock or nine o'clock) invites phase problems when the mix is played in a mono or pseudostereo format (such as FM radio).

### MIXING WITH EQ

There are two basic reasons to use your console EQ during a mix: to shape an instrument's tone so that it "sits" better in the overall track, or to alter the tone because you want the instrument to sound different. The first reason can be thought of as corrective EQ and the second as creative EQ. Often a combination of the two yields the best results.

However, creative EQ is particularly useful when you have a tone in mind that's more appropriate to a groove or style of music than what's actually recorded on tape. As long as your board offers at least one (though preferably two) sweepable mid-range bands, as well as low and high shelving, you can usually

tailor the sound of an existing track to better match the mood and style of a song. Of course, you can also get creative and dial in unusual or bizarre sounds.

### BASS-IC EQ

Obviously, even the most creative equalization can't alter a bass player's style, technique, or musicality. For example, if you record a heavy-metal bassist playing a Gibson Ripper with a pick, no amount of tweaking in the world is going to make the track sound like Jaco Pastorius playing a fretless Fender. But if your bass track is just shy of hitting the yummy mark, twisting a few knobs can slam home a great tone. Of course, it helps if you have a general idea of which frequencies to boost or cut for some classic bass sounds.

**Beatle bass.** Paul McCartney's bass sound evolved over the years, but whether it was the early Hofner thump or the Rickenbacker rumble of Wings, his tone was always round and fat. Low-mids often predominated and the attack was very articulate because McCartney usually played with a plectrum. To push a track towards the Beatle zone, start by

boosting 80 or 100 Hz (depending on your board's EQ configuration) by 2 or 3 dB. If the bassist used a pick, there's probably sufficient midrange "pluck" already; if not, try boosting 3 to 6 dB at 3 kHz. This should increase string intelligibility and punch.

If your mixer has high-shelving EQ in the 12 to 18 kHz range, you can make the sound a bit smoother and warmer by cutting 6 dB up there. But if all you have is a 10 kHz shelf, take care when cutting or you may dull the sound too much.

For a similar sound with a little more warmth, again boost the 80 Hz range a few decibels, then boost 500 Hz by 6 dB or so. Next, cut 300 Hz by about 3 dB and 12 kHz by 6 dB. (Obviously, this application requires 4-band EQ with two sweepable mids.) Cutting at 300 Hz gets rid of any hollow, tin-can tones, and—in combination with the boosts—yields a warmth that can complement a ballad while retaining enough authority to drive a rockin' blues or clubhouse shuffle.

**In your face.** If the tune calls for an aggressive Chris Squire or John Entwistle sound, you'll need to roll off some low end and crank up the mids. First, add 6 to 9 dB of high-mids and sweep between 1

## Mixing Mandates

**Don't disregard rough mixes.** More often than not, any rough mixes you've made throughout the recording process will have desirable qualities that should be considered at the final mix session. Roughs are fresh and intuitive, and they often expose the raw truth of a performance. That's a rare and beautiful thing. Be careful not to "mix out" the passion by putting a magnifying glass over each and every track.

**Mix with fresh ears.** Morning mix sessions are ideal because your ears have not been abused by a typical day's activities. Ear fatigue is a real thing and can easily happen after a few hours of near-field monitoring.

**Monitor at reasonable levels.** Occasionally it's good to blast the speakers to check bass frequencies, but for the most part, soft playback levels tell the truth. Monitoring at lower levels also helps protect your hearing.

**Know when to quit.** When the fatigue factor reaches the point of diminishing returns, bail out. There's no sense in forcing yourself to finish something that you'll probably end up remixing later when you've come back to your senses. Also, take short breaks throughout the mix session to rest your battered ears.

**Put the mix in context.** Be sure to mix on familiar speakers to ensure critical listening. However once the mix is finished, see if the sound translates well to the outside world. Check the mix on different home stereo systems, portable "headphone" cassette players, car stereos, and boom boxes. After all, these are the means by which the public will hear your work.

**Keep detailed notes.** Don't rely on your memory to recall how much you compressed the snare track or gated the lead guitar. Keep detailed notes on every aspect of the mix, just in case you have to revisit the track for a remix. You can also refer to your notes later on as you tackle new projects and want to find out how you got a specific sound or effect.

**Be open to remixing.** From band members to band managers, everyone has a vision of how a record should sound. Be prepared to remix a track if some of those involved aren't happy with the sound. Fortunately, your copious notes will allow you to recreate the mix in a minimum amount of time.



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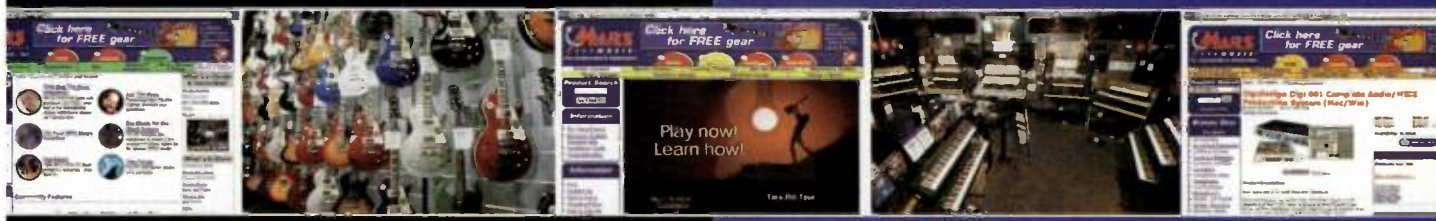
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and 2 kHz until you find the appropriate flavor of honk. Next, cut 200 Hz by 6 dB. If you want an even more brittle sound, cut 80 Hz by another 2 or 3 dB. The result is a trebly, piano-string sound with enough attack to help a busy bass line slice through the mix.

**Twang.** If you want to accentuate the twang in a bass track, give this a try. First, cut 200 to 250 Hz by 6 dB or so. This is a good cut for reducing “mud.” Now, boost an equivalent amount of 1 kHz for the

twang. Finally, beef up the low end just a little bit by boosting a decibel or two at 80 Hz.

**Motown.** Legend has it that the classic “dead string” bass sound of Motown groove king James Jamerson depended on, well, dead strings. To achieve a similarly smooth, muted tone without dumpster-diving for discarded bass strings, simply cut 1 kHz by 5 or 6 dB, boost 200 Hz by 3 dB, and pump up the lows with a slight boost at 80 or 100 Hz. Then, cut the high

end (preferably 18 kHz, but 12 kHz will work) by 6 dB or so. Also, note that by boosting a few more decibels of low end, you can achieve a passable reggae bass sound as well.

**Stax/Volt.** This is basically a variation on the Motown sound—which is not surprising when you consider that Duck Dunn (of Booker T. and the MGs) was also known for never changing his strings. But rather than cutting at 1 kHz, go for a more punchy, aggressive sound by scooping out 6 or more decibels at around 5 kHz. By staying “down in the basement,” either the Motown or Stax/Volt sound works nicely in a mix cluttered with midrange elements such as guitar, piano, and horns.

**Jaco jazz.** The bass sound of jazz legend Jaco Pastorius has been described alternately as tight, animalistic, and hornlike. But however you describe it, the bottom line is that it takes a Jaco Pastorius (or a darn good clone) to get a true Jaco tone, since much of his sound was in his fingers.

But you can approach the Jaco sound, especially if working with a fretless bass, by boosting the midrange while reducing low mids. Begin by cranking 1 kHz by 6 dB or so to get some honk. Then, carve out a big dose of 200 Hz, cutting as much as 9 dB or more. Finally, boost the low end and cut the highs by 1 or 2 dB. Actually, this sound works well in a variety of progressive jazz applications. To get more of a Marcus Miller sound, cut the low mids around 800 Hz rather than at the 200 Hz level.

#### BASS-IN-THE-MIX TIPS

Keep in mind that small, close-field monitors don't provide subsonic bass response. If your monitors can't accurately reproduce frequencies below, say, 60 Hz, the plain fact is that you'll be stuck guessing what's going on below that point. This is another reason why it's very important to reference your mixes on several different playback systems.

In addition, as anyone who has done much mixing knows, there's a fine line between too much bass and too little. Finding that line is complicated by the fact that we typically perceive certain tones differently when we hear them at

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different volume levels. As it turns out, our ears have a flatter response at high volumes than they do at low. The lower the volume, the quieter low frequencies (from 20 to 200 Hz) sound in relation to mids and high mids (from 1 to 6 kHz). In other words, what sounded like tons of bass while you were mixing at 100 dB will likely sound puny at 70 dB. That's why it's also vitally important to check your mixes at several different volume levels.

### CREATIVE DRUM EQ

With EQ you can improve the drum sound without ever going near the drums, and equalization can go a long way toward salvaging lousy-sounding tracks while still giving you a natural sound. Even if you're blessed with a drum kit that sounds splendid, a few tonal tweaks may still be in order to make what's recorded on tape better suit the style and mood of the song. Of course, there are also those times when

you just feel like reshaping the sound for creative reasons.

Let's look at equalizer settings for the kick and snare, the two drums that are the driving force behind most styles of pop music. Armed only with console EQ that offers one or two sweepable mid-range bands as well as high and low shelving, you can subtly enhance or drastically alter the sound of these two all-important instruments.

### KICK TRICKS

Before delving into problem-solving applications, let's map out some critical frequencies for the kick drum and specify how they affect the sound. This will also ensure that we're on the same page vocabularywise.

Boom, of course, is the low end, and you can boost or cut it with the low-shelving control (usually 80 or 100 Hz). Click, on the other hand, refers to the sound of the beater (specifically, a wood one) hitting the head, and is the highest part of the sound. You can boost or cut click with the high-shelving EQ (typically 10 or 12 kHz).

Attack refers to the impact of a felt beater laying into the head. This could also be called definition. You can increase attack, or definition, by boosting at 5 kHz (or, obviously, decrease it by cutting at that frequency). Punch is the tight thud or thump in the sound and can be increased by boosting 1 kHz. Wallop is a visceral, chest-hitting whomp that can be increased by boosting around 220 Hz. However, cutting at 220 Hz will thin out the sound of the kick drum and make it more dry.

**Rock sculpting.** First, let's EQ a double-headed kick drum with no muffling. If the drum is too boomy, begin by cutting 3 to 6 dB at 80 Hz (or wherever your console's low EQ shelves) to roll off the lowest of the lows. Then make an even steeper cut—for example, 9 to 12 dB—at 200 Hz. At this point you should definitely hear more of the head itself and far less resonance. Now, add 3 to 9 dB at 500 Hz to contribute a bit of “flap.” If necessary, add a touch of 12 kHz (or whatever the high-shelving frequency is on your board) for beater definition. These settings should give

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you a slightly wet, flappy kind of sound.

**Funk it up.** Let's say you have the same problem, a kick drum that's too boomy. But rather than a wet and flappy sound, you'd prefer a dry and funky sounding kick, say a James Brown "Get On Up" kind of thing. Again, start by cutting 6 dB or so at 80 Hz to lose the boom. Now, add 6 dB at 350 Hz for some midrange thud. Next, to impart definition, boost another 3 to 6 dB at 3 kHz. If necessary, add a bit of 12 kHz. As a finishing touch, add some compression with a 4:1 ratio, medium attack, and slow release.

**Kick it down.** Of course, you're just as likely to encounter a kick drum with no front head and a pillow and several packing blankets crammed as tightly as possible against the batter head. The sound? More like an oatmeal box than a drum.

The trick here is to inject some of those missing lows without overwhelming that nice, dry punch. This is easily accomplished by adding 1 or 2 dB at 80 Hz. If you need a rounder, darker sound, try cutting 3 to 6 dB at 1 kHz. However, if you're starting to lose definition at this point, you can always roll off a few decibels at 220 Hz.

**Long tones.** To approximate the sound of the Roland TR-808 "long" kick, first turn down your monitors and boost 80 Hz by 9 dB or more, depending on how much boom is already present in the signal. (The less that's there, the more boost you'll need.) Next, cut 9 dB at 300 Hz and another 9 dB at 1 kHz. Now add the signature beater click by cranking up 12 kHz. Finally, add a hall reverb with medium delay and long decay to provide some sustain.

**Subtle tweaks.** So far we've looked at major overhauls, but sometimes all you need is enhancement. If the kick already sounds pretty good as is, you might just want to tighten up and clarify the sound a bit with a few slight adjustments. First, using the high-mid band, boost 4.5 or 5 kHz anywhere from 2 to 6 dB. (If there's a Q control, put it at the widest setting.) Now, with the low-mid band, either boost 350 Hz by 2 to 3 dB or cut 220 Hz by 2 to 3 dB. Try both and see which works best.

Next, depending on the mix, either

boost or cut 1 to 2 dB of 80 Hz shelving. Solo the kick with the bass guitar to determine which direction sounds best. Also, play with the relationship between the 5 kHz and 80 Hz frequencies. For example, if you add more 5 kHz, compensate with more 80 Hz. Finally, touch the sound off with a 1 to 2 dB boost of high shelving.

## SNARE DRUM SPECIFICS

Again, before getting into specific applications, let's first map out critical tonalities and corresponding frequencies for snare drum. Think of snare in terms of four qualities: snap, crack, pop, and body.

Snap is the high, snappy sound of the snares, as well as the stick hit, and is centered around 5 kHz. Crack is just how it sounds and can be boosted or cut at 3 kHz. (Some people call this bang.) Pop is a throaty, honking kind of sound, centered at 1 kHz, which tends to emphasize the tonality of the drum shell (wood, stainless steel, brass, etc.). Body is located anywhere from 240 Hz down to 100 Hz. Because it makes the speaker move a lot of air, it can be very visceral and bone-shaking, especially in the lower realm.

To get a quick hit of the possibilities, try some basic combinations: for a military snare sound, combine body and snap; for a funky backbeat, combine body and crack; for rock, combine body and pop. Or, to get more precise, check out the following tailor-made applications.

**Fatback.** For a really fat but shredding backbeat, first boost 300 to 350 Hz by 6 or more decibels to lay in some "thunk." For the shred, boost 5 kHz by 3 to 6 dB and maybe add a touch of 12 kHz. Finally, depending on the sound that works best in the mix, either cut or boost the low-shelving frequency by 2 or 3 dB. Try both. I tend to like it with a cut at 80 Hz.

**Paper trail.** For a distinctive, post-modern tone, make the snare drum sound like paper tearing. Start with a radical 12 dB cut at 80 Hz. Then make another deep cut of 9 dB or so at 250 Hz. Now, using a 2-octave Q, boost 6 kHz by 3 or 4 dB. If desired, add a decibel or two of high shelving. Now run the whole thing through a flanger and your ready for the European trip-hop scene.

**Deeper down.** To make a standard, 5-inch snare sound like a deep-shell, parade drum—once again a popular sound for certain flavors of pop—first add some body to the sound by boosting 220 Hz by 6 dB or so. Now, cut 1 kHz by 6 to 9 dB and 80 Hz by 3 dB. Finish off with a 3 dB boost at 12 kHz.

**Pseudo piccolo.** With a few easy tweaks, you can simulate piccolo snare. First, boost 1 kHz by 3 to 6 dB to attain the characteristic piccolo pop. Next, shave off 9 to 12 dB at 230 Hz, and another 9 dB at 80 Hz. To go the extra mile, use a pitch shifter and bring the sound up a fifth or so.

## WATCH WHERE YOU NOTCH

Whether or not you like the sound of these EQ templates for kick and snare, by giving them a whirl you may come across some sounds that you do like. Also, as you experiment with the different EQ combinations, you'll find that there are more ways than one to achieve a particular result. That can be a useful thing to know if, for example, a certain EQ setting adds too much noise to the mix—because, generally, it's best to favor a combination that has more cuts than boosts.

Remember, the point of equalizing kick and snare is to define and clarify them so they can do a better job of driving the song. It's fun to dial up "out there" settings, and on some songs a radical drum tone can work wonders. But remember that context is king. While equalizing, bring in the rest of the instruments frequently—or else you may end up with a killer sound in solo mode that doesn't work at all in the mix.

## ELECTRIC GUITAR

As with the bass and drums, how you treat the electric guitar depends on the other elements of the mix. For example, if you have only one electric guitar in a mix with just drums and bass, you can make the track sound large. However, if you have three other electric guitars, a piano, keyboards, percussion—the works—then you have to fit it nicely into a spot on the soundstage. Let's look more closely at a couple of these scenarios.

**Lone guitar.** Let's say that you can

—continued on page 111





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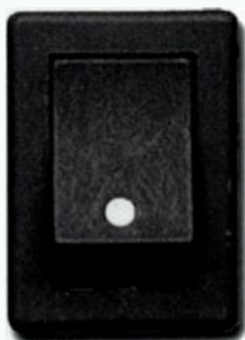
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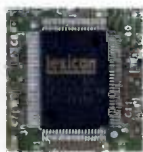
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By Randy Alberts

# Getting a Drum Sound

## Four Engineers Talk About The Challenge

**W**ith all due respect to drummers—having endured years of bad jokes like that one—their style, touch, and hardware have more to do with how they sound during playback than any other musician in the room. So when engineers discuss getting a drum sound, they're likely to talk about consistent touch, a well-tuned kit, torn heads and dealing with squeaky pedal noise before even mentioning a microphone. Keeping that in mind, we talked to a control room's worth of engineer/producers with more than 75 years of collective experience recording everything from Warwick and Bacharach to drum 'n' bass.

Oliver DiCicco owns and operates Mobius Music, a warm San Francisco studio with credits including the Charlie Hunter Quartet, Bill Frisell and Fred Frith. Gary Chester, co-owner and chief engineer at The Edison Studios in New York City for 13 years, began engineering in 1969 and has heard drum sounds come

full circle since the days of The Belmonts and Jay and the Americans. Specializing in drum 'n' bass, jazz and funk is Paul Sriver's Square Peg Productions, a cozy project room in San Francisco, integrating the edge of modern music with old-school jazz recording styles. Jim Mitchell also added his insights on capturing a great drum sound. His credits include Guns N' Roses, Brother Cane and Thee Hypnotics, and his recent experiences recording the drums of G N' R and Slash's Snakepit give new meaning to the term "leakage control."

### RETURN OF THE ROOM

Mitchell has toured with Guns N' Roses to record a live album, and he may be the king of making mic leakage a friend. "[Guns N' Roses'] Matt Sorum's kit had four 18-inch subwoofers under the riser," he laughs, "two Marshall half-stacks for the guitars facing in and upward from his left and right, plus four 15-inch, four

12-inch and two 2-inch compression drivers behind him for his monitor mix. Everything was just blowing into the kit mics, but you have to use that to your advantage to capture the live vibe."

The live vibe is prevalent in the studio these days, too. From the original big-band room sound to '70s dead and back again, miking drums today has perhaps more to do with old-school miking savvy than ever before. "I starting recording professionally in the mid-'70s," DiCicco says, "and people were going for that tight, deader L.A. sound using heavily taped drums without much tone. The tendency now is a more natural, open sound, so a lot of rock and pop drummers are leaving the front heads on the kick now and using smaller snares tuned higher."

Chester followed his session drummer father from one classic New York gig to another as a kid in the late '50s and early '60s. After recording drums for

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## •Getting a Drum Sound

25 years, he hears a familiar tone today. "The sound of drums have really changed full circle," he says. "Everything was done with three room mics mixed to mono when I first started. Then as 16-tracks came, we started miking the drums closer, miking inside each tom to get separation and depending more on outboard equipment for ambience. The Record Plant sound came along, and the drum rooms and the drums themselves got so dead, there was no sound to them at all. Now the drums are coming back out of the iso booth and into the main room to get all that room sound and all that leakage. The new salsa and swing have reinvigorated that live, open sound."

Scriver believes miking techniques from classic, old jazz recordings are enjoying a rebirth, too, thanks to the live drum aesthetic of some new musical styles. "There's some eclectic jazz recordings where the drums are miked with just two PZM boundary mics mounted on Plexiglas and angled at 90 degrees as a stereo pair," he says. "That technique works great for drum 'n' bass, to get that really open room sound instead of just a dull thud on the kit."

### SPEED IS STILL EN VOGUE

A quality that's never been out of style is being fast around a drum kit. As important to capturing live studio moments as it is to watching the clock, setting up quickly and getting a good sound is more significant with drums than with any other instrument. Whether it's with a pair of PZMs or a cabinet's worth of mics, knowing when to say when is important.

"Setting up quickly doesn't mean you do that at the expense of getting a good sound," DiCicco says. "You develop a baseline approach in a room you're familiar with to get a fairly consistent result every time. I'm a firm believer in not having the client sitting around waiting, and I don't want the drummer to get tired from playing quarter notes for six hours until any desire to play is completely sucked out. If you can get a good sound, just keep the flow of the session happening."

Time is money, so minimizing the number of mics needed to record a kit is a good idea. "I usually don't mic both heads of the toms, but some engineers

do," Scriver says. "It's all about time in the studio, and it takes time for each additional mic to be checked for levels, connections, phase cancellation, EQ and panning. Even a simple three-tom kit—miking both heads requires setting up six mics."

"If you're scheduled to start a session at 10 and the drummer's late, you're lucky to get any setup time at all," says Chester. "A few New York drummers are famous for that! They come in, sit down and they're ready to do the take. Having an assistant go out and hit the drums for hours beforehand to get a sound means nothing, because it's all in the drummer's touch. If you're recording a basic cross-stick thing and it's just a wonderful feel, how much time should you spend on that sound? Doing jingle work teaches you to be pretty fast because you're typically recording drums for a country, rock and R&B spot all in one day. In the early days, we had this one drum kit miked and set up that we used for years, and you never wanted anyone to touch it."

### THE ULTIMATE DRUMMER?

But before one mic or baffle is even touched, getting a great sound starts with the kit—a quality as varied as the ways there are to play drums. A vocalist's cough can be edited, and guitarists get away with a little line buzz, but nothing sends an engineer out for a cigarette break faster than ill-prepared drums in the studio. Excessively detuned drums, cracked heads and a rattling hat stand won't make you popular with the engineer, but by the same token, nothing perks up a day's drum session more than a drummer showing up with a studio-ready kit.

According to Mitchell, one of the best drummers in this department is Simon Phillips. Not only are his drums tuned to perfection, they're premiked. "Simon has this huge kit with like three kick drums, a gong drum, six toms, a set of octabongs, couple of snares, two hi-hats and tons of cymbals. But he comes in with the whole kit miked with Shure Beta 98 clip-ons that are hard-wired to a patch bay, real impressive. Simon says, 'Trust me. Take these mic leads and do what you want from there.' If you just listen to what he's going for and just bring his



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## •Getting a Drum Sound

mics up to the board, it sounds great and sounds just like Simon Phillips in every studio, every time. It's very easy when you get to work with drummers like that."

DiCicco agrees: "The set has to sound good, the heads have to have the right tension for the size of the particular drum. One drummer once showed up without any spurs for his kick drum, so we ended up having to use screwdrivers and duct tape just so the kit wouldn't walk all over the room!"

"It's amazing how ill-prepared some people can be, but most drummers these days are pretty sophisticated with their kits," DiCicco continues. "Every drum has a certain resonant frequency that it wants to be around. If you try to make it create frequencies lower than it's really capable of producing, you end up with a flabby drum head that sounds like you're dribbling a basketball in a gymnasium."

Chester recalls the period when no one used bottom heads: "There were Evans oil heads so loose they had wrinkles on 'em. You have to go with what the drummer or producer wants, but if they tune down too much, you start to get a lot of ringing and you have to overcompensate for that."

Scriver believes that, above all, the key to a good drum sound is tuning. "If the bass drum is tuned properly, it'll sound much better, but you can't do much if it's not," he says. "It's not as important with the lower frequencies of the kick, but I've spent hours adjusting snares and toms that are out of tune if the drummer is too lazy to tune them. Some drummers are totally together, with their toms tuned in a chord with octave, fifth, third, octave, and the kick drum maybe a fifth below that chord."

## DRUM BY DRUM

With more ways to mic a drum kit than there are days in a year, there's no universal "Miking 101" approach. Each engineer was more than willing to share some basic and not-so-basic ways to let a drum kit speak with the caveat that no single technique is nearly as important as listening to what the music and the musicians are trying to say.

Mitchell says he likes to use a lot of

—continued on page 81

The advertisement for wizoo.com features a blue, textured background with a large, stylized "wizoo!" logo in the center. The logo is white with a blue outline and a blue shadow. Below the logo, the tagline "releasing creativity" is written in a white, cursive font. At the bottom, the website address "www.wizoo.com" is displayed in a large, white, sans-serif font, followed by "books.samples.sounds.online" in a smaller, white, sans-serif font. The background also includes some faint, illegible text and a small, stylized graphic of a drum kit.

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- Cumulative time is important because the mastering engineer must know the total time per side before he starts cutting, due to the physical limitations of the disc. You are limited to a maximum of about 25 minutes per side (although its better if you use less) if you want the record to sound nice and loud.

- Your sequencing for a record will be different from the CD because it's split into two sides. Prepare for this ahead of time.

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By Steve Oppenheimer

# POWER FILTERS

## How to choose and use an AC power conditioner.

**P**owering your studio gear directly from an unprotected AC outlet is like running a fine car without fuel and air filters: it's courting disaster. So many things can go wrong—especially with sensitive digital circuits—that we can only discuss them superficially here, but the bottom line is that you can and should protect your equipment with power conditioners. But not all power conditioners are created equal; let's take a look at the key problems and solutions.

### HASH IS TRASH

Radio-frequency interference (RFI) and electromagnetic interference (EMI) can be caused by electrical appliances, radio transmitters (including cell phones), fluorescent lights, DC switching power supplies, AC cables, computer monitors, televisions, and a host of other sources. Basically, this is high-frequency interference (say, more than 10 kHz) that can travel

through power lines, through the air, or through various cables in the studio. To put it mildly, this electronic hash can really trash your studio.

Digital circuits, in particular, suffer badly from these various forms of hash. So do audio signals, even when traveling through well-insulated cables. Eliminating this entire mess is a complex art that is beyond the scope of this article. But using a power conditioner to reduce RFI and EMI in the AC power system is relatively simple and a good place to start.

Most power conditioners use one of two approaches to filtering out RFI and EMI. The simplest filter uses one or more capacitors between the power buses and ground (see Fig. 1). A more effective approach is to use a multistage low-pass filter. In either case, the cutoff frequency is set above 60 Hz. These filters shunt the high-frequency interference to ground, providing a clean sine-wave power signal.

The down side is that this method can generate extraneous

This article was previously published in the 1999 edition of the *Personal Studio Buyer's Guide*, a product of Intertec Publishing, and is reprinted by permission of the publisher.





**Artist:** Katrina Carlson  
**Genre:** Pop

**Song:** I Know You By Heart

LO-FI MP3 HI-FI MP3 REAL AUDIO



**Artist:** Kodac Harrison  
**Genre:** Blues

**Song:** Love Turned On The Light

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**Artist:** Faye  
**Genre:** Alternative

**Song:** What's Right

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**Artist:** Bill Epps  
**Genre:** R & B

**Song:** Sign On In

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**Artist:** Derrick Procell  
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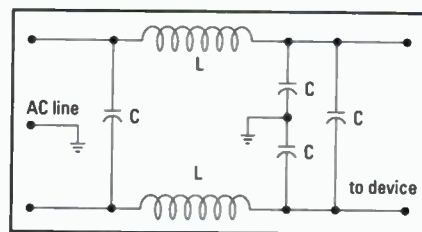
# POWER HITTERS

currents in the system ground. Engineers disagree about the seriousness of this problem, but thanks to a new approach to AC power systems, it can be dealt with fairly simply.

## BALANCED THINKING

Balanced power is a relatively new solution to AC hash problems. With this approach, the hot and neutral wires from a balanced power supply each carry a power signal of 60 VAC instead of 120 and 0 VAC. The total is still 120 VAC, but the signals are 180 degrees out of phase with respect to each other, so any current in the ground (such as that caused by a line filter) is canceled out.

To top it off, the EMI radiated from



**FIG. 1:** This simple lowpass filter uses capacitors to shunt frequencies above 60 Hz to ground, filtering out high-frequency RFI and EMI.

the two conductors gets canceled out. This is especially great in the studio because it eliminates noise that might otherwise get into the audio signal when power cords are adjacent to audio cables.

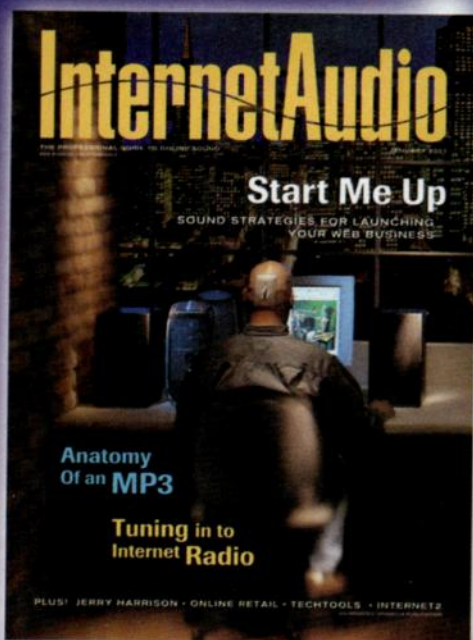
## SURGES, SPIKES, AND SAGS

Power grids are complex beasts, and the demands placed on them vary constantly. Such problems as a nearby lightning strike, unusual levels of demand (say, when everyone in the area turns on their air conditioning due to a heat wave), or a problem at a power station can cause the system's power to fluctuate. You are more likely to experience these fluctuations the further you live from a power substation or plant.

If the demand on your local power utility suddenly drops, a temporary over-voltage condition, or power surge, can result. Conversely, a sudden increase in demand can cause an undervoltage condition, or sag. In addition, power companies in high-demand areas often avert larger problems by intentionally creating brownouts (voltage reductions of 5 to 15 percent) within a specified area. The power utility eventually compensates for the change, but in the meantime, your gear's performance can be affected, and some equipment could be permanently damaged.

A spike is a sudden, extreme increase in voltage that immediately subsides. Whereas a surge can last for a few hundred ms or more, a spike hits quickly, lasts approximately 100  $\mu$ s or less, and then is gone. But it can hit very hard. A lightning strike somewhere in the utility network (not necessarily a direct hit) could easily cause a 5,000V spike. Even if your gear is not immediately fried, components could be damaged

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to the point that they will fail soon thereafter.

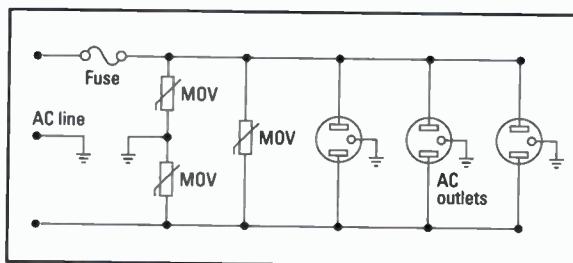
Sometimes a voltage fluctuation can be caused within your building or neighborhood. For instance, motors require extra current to get started, and when a refrigerator or air conditioner switches on it can cause a brief sag of as much

Below the threshold voltage, the MOV is an open circuit. But if the voltage exceeds the threshold, the device conducts and absorbs the transient, releasing the energy as heat. Typically, an MOV can respond quickly—say, within a few nanoseconds. That's enough to handle most surges and spikes.

The problem is that one good, stiff spike can demolish an MOV; if that happens, you are protected from that one spike, but thereafter your power strip or conditioner is unprotected, even though it still supplies power. Some power strips have indicator lights that

go out if the MOV blows, but in many cases you won't have a clue that you are vulnerable. Furthermore, MOVs don't do anything to protect you from sags and are insufficient for handling extended overvoltages.

Therefore, I recommend using MOV-based power protection as a second line of defense. Install one of these relatively inexpensive units in each rack; however, instead of plugging them directly into the wall outlet, plug them into a higher-end power conditioner that uses an isolation transformer and offers complete line regulation, rather than just surge and spike protection. We'll discuss these higher-end devices next.



**FIG. 2: Many line conditioners use three MOV voltage-clamping circuits, as shown in this AC outlet-box schematic. However, the lowest-end power strips and line conditioners often use only one MOV.**

as 20 percent. The sag might only last a few hundred milliseconds, but that's enough to cause damage. When a transformer or large motor—say, a vacuum cleaner—is turned off, a significant spike can result. If you want your precious studio electronics to last, you need to protect them against these electrical horrors.

## COST-EFFECTIVE SOLUTIONS

Many power strips and all of the power conditioners listed in the *Personal Studio Buyer's Guide* contain some form of surge and spike protection. Probably the most common and inexpensive way to accomplish this is a metal-oxide varistor (MOV), which is a voltage-clamping device. If you know what you're doing, you can even buy these devices at electrical parts houses and catalogs and install them into your existing power strips. Some inexpensive units use one MOV but the better units use as many as three (see Fig. 2).

## FIRST LINE OF DEFENSE

Line regulators provide a professional solution to surges, spikes, and sags. These devices use constant-voltage isolation transformers that deliver a steady 117 or 120 VAC as long as the input voltage doesn't sag below a minimum tolerance (commonly 90V) or surge above the maximum (generally 130 to 140 VAC, but sometimes as high as 300V). With a well-designed unit, if the voltage drops or surges outside the tolerance range, an internal circuit breaker is tripped to shut everything down rather than expose your gear to damage. This kind of device should be your first line of defense.

With this type of protection, surges.

—continued on page 105

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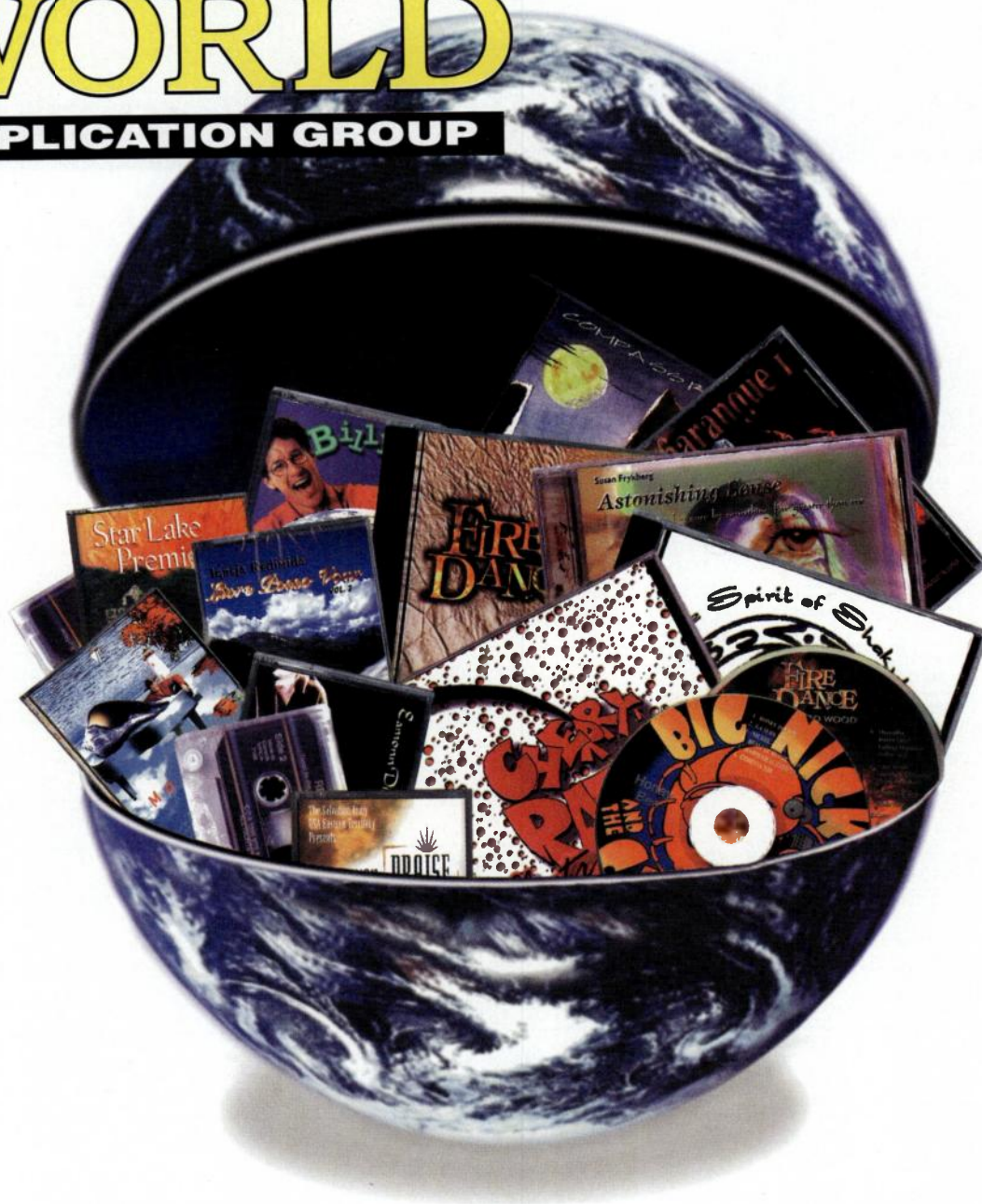
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Alesis	Studio 32	16x4x2: 40x2	16/40	16/16	6/4/ 1/4"	4/ 1/4" TRS	High/low shelving	Yes ±0.5 dB	Yes	20 Hz–50 kHz
Alesis	Studio 12R	14x2	8/14	8/0	2/1/ 1/4"	N/A	High/low shelving	No	No	20 Hz–50 kHz; ±0.5 dB
API	7600	1x4	Mic XLR: 1/4"	4/1	4 sends	N/A	HP/LP filters	Yes	Yes	30 Hz–20 kHz
Ashly Audio	MX-508	8x2	8/8	8/8	2/2/ 1/4"	N/A	3-band w/sweepable mid	Yes	No	20 Hz–20 kHz; +0/-0.5 dB
Behringer	Eurodesk MX9000	24x8x2	24/24	24/24	6/6	3	4-band	Yes	Yes	20 Hz–40 kHz; ± 1 dB
Behringer	Eurodesk MX3282A	24x8x2	24/24	24 mic	8/4	8	3-band parametric	Yes	Yes	20 Hz–40k kHz; ± 1 dB
Behringer	Eurodesk MX2442A	24x8x2	16/16; stereo inputs	20 mic	6/2	4	3-band parametric	Yes	Yes	20 Hz–40 kHz; ± 1 dB
Behringer	Eurorack MX3242X	14-input 4-bus mixer	6/8	24 mic	7/7	2/ 1/4"	3-band	Yes	Yes	10 Hz–60 kHz
Behringer	Eurorack MX2642A	24x4x8	8/8; 4 stereo channels	10/8	6/4	4	3-band parametric	Yes	Yes	20 Hz–40 kHz; ± 1 dB
Behringer	Eurorack MX2004A	20 input alt. 4-bus mixer	8/8; 4 stereo ch	8 inserts	2/2	N/A	3-band parametric mids	Yes	Yes	20 Hz–40 kHz; ± 1 dB
Behringer	Eurorack MX1604A	16 input alt. 4-bus mixer	4/4; 4 stereo ch	N/N	2/2	N/A	3-band parametric mids	Yes	Yes	10 Hz–60 kHz; ± 3 dB
Behringer	Eurorack MX802A	8 input 2-bus mixer	4/4; 2 stereo inputs	N/N	2/2	N/A	3-band	N/A	N/A	10 Hz–120 kHz; ±3 dB
Behringer	Eurorack MX602A	6 input 2-bus mixer	2/2; 2 stereo ch	N/A	2/2	N/A	3-band	N/A	N/A	10 Hz–60 kHz; ± 3 dB
Behringer	Pro Mixer DX100	4x1	1/3	N/A	N/A	2	3-band	N/A	PFL	10 Hz–80 kHz; ±3 dB
Behringer	Pro Mixer DX500	8x1	1/7	N/A	1/1	3	3-band	N/A	PFL	10 Hz–60 kHz; ±3 dB
Behringer	Pro Mixer DX1000	12x2	2/10	N/A	1/2	2	3-band	Yes	PFL	10 Hz–100 kHz; ± 3 dB
Carvin	Studiomate	16x2	8/16	8	2/2/ 1/4"	2/ 1/4"; 2/RCA	3-band	No	No	20 Hz–20 kHz
Carvin	C2440	24x4x2	24/24	24/24	2/2/ 1/4"	2/ 1/4"; 2/RCA	Lo cut; mid shift	Yes	Yes	20 Hz–20 kHz
Carvin	C3240	32x4x2	32/32	32/32	2/2/ 1/4"	2/ 1/4"; 2/RCA	Lo cut; mid shift	Yes	Yes	20 Hz–20 kHz
Carvin	SL/24	24x8x2	24/32	24/32	2/2/ 1/4"	2/ 1/4"; 2/RCA	Sweep mid/lo	Yes	Yes	20 Hz–20 kHz
Carvin	SL/40	40x8x2	40/48	40/48	2/2/ 1/4"	2/ 1/4"; 2/RCA	Sweep mid/lo	Yes	Yes	20 Hz–20 kHz
Carvin	S/L 56	56x8x2	50/58	50/58	2/2/ 1/4"	2/ 1/4"; 2/RCA	Sweep mid/lo	Yes	Yes	20 Hz–20 kHz
Carvin	C800	8x2x1	8/8	8	5/4/ 1/4"	3/XLR	3-band w/mid	Yes	No	20 Hz–20 kHz
Carvin	C1600	16x2x1	16	16	5/4/ 1/4"	3/XLR	3-band w/mid	Yes	No	20 Hz–20 kHz
Carvin	C2400	24x2x1	24	24	5/4/ 1/4"	3/XLR	3-band w/mid	Yes	No	20 Hz–20 kHz
Crate	CSM8	8x2x1	8/8	8/8	4/2	2/XLR; 1/4"	3-band	Yes	PFL solo / mono	20 Hz–20 kHz
Crate	CSM12	12x2x1	12/12	12/12	4/2	2/XLR; 1/4"	3-band	Yes	PFL solo / mono	20 Hz–20 kHz
Crate	CSM16	16x2x1	16/16	16/16	4/2	2/XLR; 1/4"	3-band	Yes	PFL solo / mono	20 Hz–20 kHz
Crate	CSM24	24x2x1	24/24	24/24	4/2	2/XLR; 1/4"	3-band	Yes	PFL solo / mono	20 Hz–20 kHz
Crate	CSM1402	18x2x1	6/18	6/0	2/2	None	3-band	Yes	Yes	70 Hz–120 kHz
D&R	Vision 8	8x4x2	8	8/8	4/4	8/+ 4/-10 dBv	3-band	Yes	N/A	20 Hz–120 kHz; -0.5 dB
FBT	Pickup 8E	8x2	4/4	2	2/2	2	3-band	No	No	20 Hz–90 kHz
FBT	Pickup 8X	8x2	4/4	2	2/2	2	3-band	No	No	20 Hz–90 kHz
FBT	Pickup 14E	14x2	6/8	4	2/2	2	3-band	No	Yes	20 Hz–90 kHz



SIGNAL-TO-NOISE RATIO	TOTAL HARMONIC DISTORTION	DYNAMIC RANGE	CHANNEL CROSSTALK (@ 1 kHz)	PHANTOM POWER	TALKBACK/ ONBOARD OSCILLATOR	DEDICATED 2-TRACK RETURNS	SPECIAL FEATURES	DIMENSIONS	PRICE
90 dB	<0.0025% @ 1 kHz	108 dB	>80 dB	Global	N/N	Yes	Inline monitor w/FX and control room sections	17.5x16.5x6	\$1,149
90 dB	<0.005% @ 1 kHz	108 dB	>35 dB	Global	N/N	Yes	Rackmount; head/control room outs	19x6x5.25	\$449
-128 dB	<0.05%	N/A	N/A	48V	N/A	N/A	Units stack to build 4-buss console/sidecards	1U	\$2,995
-90 dBu	<0.05%	-128 dBu	-35 dB	Yes	N/N	Yes	Rackmount	19.0x5.25x9.6	\$1,519
>129.0 dBu	0.007%	125 dB	-35 dB	48V	Y/N	Yes	24 inputs with 2-band EQ; built-in meter bridge	8.6x37x29.5	\$2,599
>129.0 dB	0.007%	125 dB	-95 dB	48V	Y/N	Yes		4x41x21	\$1,599
>129.5 dBu	0.007%	125 dB	-95 dB	48V	Y/N	Yes		4x28.5x18	\$1,099
-112 dB	0.007%	N/A	-95 dB	48V	N/N	Yes	7-band master graphic EQ; 24-bit digital FX	16.06x15.09x3.125	\$1,399
-129.0 dBu	0.007%	125 dB	-95 dB	48V	N/N	Yes	Rackmount kit included	6x19x14	\$499
-129.5 dBu	0.007%	125 dB	-95 dB	48V	N/N	Yes	Alternate 3/4 bus; rackmount kit included	3.5x16x15	\$379
113.6 dB	0.007%	125 dB	-95 dB	48V	N/N	Yes	Alternate 3/4-bus; rackmount kit included	3.5x16x15	\$249
-129.5 dBu	0.007%	125 dB	-95 dB	48V	N/N	Yes		3x9x10.6	\$179
-129.5 dBu	0.007%	N/A	N/A	48V	N/N	Yes		1.3x6.3x8.2	\$119
115 dB	0.004%	N/A	N/A	No	N/N	—	Punch buttons for creative mixing	8x10x2.75	\$69
115 dB	0.002%	N/A	N/A	No	N/N	—	Loopable internal 12-second digital sampler	14x11x5	\$199
115 dB	0.003%	N/A	N/A	No	N/N	—	Talkover mic function; remote start buttons	6x17.5x6	\$459
90 dB	<0.01%	104 dB	N/A	Yes	N/N	Yes	Low-noise toroid transformer	16x12x3	\$300
90 dB	<0.01%	104 dB	N/A	Yes	N/N	Yes	Low-noise toroid transformer	30x14.5x3.5	\$900
90 dB	<0.01%	104 dB	N/A	Yes	N/N	Yes	Low-noise toroid transformer	38x14.5x3.5	\$1,200
90 dB	<0.01%	104 dB	N/A	Yes	N/N	Yes	Low-noise toroid transformer	34.5x22.7x8	\$2,400
90 dB	<0.01%	104 dB	N/A	Yes	N/N	Yes	Low-noise toroid transformer	52x22.1x8	\$3,400
90 dB	<0.01%	104 dB	N/A	Yes	N/N	Yes	Low-noise toroid transformer	69.5x22.7x8	\$5,000 direct
90 dB	<0.009%	104 dB	N/A	Yes	N/N	Yes	24-bit digital FX; 9-band graphic EQ	14x14.5x3.5	\$500
90 dB	<0.009%	104 dB	N/A	Yes	N/N	Yes	24-bit digital FX; 9-band graphic EQ	22x14.5x3.5	\$700
90 dB	<0.009%	104 dB	N/A	Yes	N/N	Yes	24-bit digital FX; 9-band graphic EQ	30x14.5x3.5	\$900
94 dB	<0.1%	N/A	-70 dB	48V	N/A	N/A	Balanced XLR & 1/4" outs; PFL output	20.25x4.25	\$480
94 dB	<0.1%	N/A	-70 dB	48 V	N/A	N/A	Balanced XLR & 1/4" outs; PFL output	25.13x4.25	\$600
94 dB	<0.1%	N/A	-70 dB	48V	N/A	N/A	Balanced XLR & 1/4" outs; PFL output	29.75x4.25x16.5	\$750
94 dB	<0.1%	N/A	-70 dB	48V	N/A	N/A	Balanced XLR & 1/4" outs; PFL output	40.75x4.25x16.5	\$950
N/A	N/A	N/A	N/A	Yes	N/A	Yes		N/A	\$580
N/A	0.015%	Hdmi >22dB; max output 26dBu	>90 dB	Per channel	Y/Y	Yes	Fully modular; optional meter bridge	19" frame (can be rack-mounted)	\$3,748
110 dB	0.003%	>129.5 dB	-85 dB	Yes	N/N	Yes	Built-in 256 multi-effects DSP 32-bit processor. Rack mountable (rack mounts incl)	9.75x3.33x10.25	\$650
110 dB	0.003%	>129.5 dB	-85 dB	Yes	N/N	Yes	Rack mountable (rack mounts incl)	9.75x3.33x10.25	\$450
110 dB	0.003%	>129.5 dB	-85 dB	Yes	N/N	Yes	Built-in 256 multi-effects DSP 32-bit processor. Rack mountable (rack mounts incl)	12.33x3.33x13	\$830

# ANALOG MIXING CONSOLES

MANUFACTURER	PRODUCT	MIXER CONFIGURATION	MIC INPUTS (XLR) LINE INPUTS	# OF INSERTS / DIRECT OUTS	# OF AUX SENDS / RETURNS / TYPE	# OF BUS OUTPUTS / TYPE	EQ	MUTE	SOLO-IN-PLACE	FREQUENCY RESPONSE
iBT	Pickup 14X	1-2	6/8	4	2/2	2	3-band	No	Yes	20 Hz-90 kHz
FBT	Pickup 18E		10/8	6	3/3	2	3-band	Yes	Yes	20 Hz-90 kHz
FBT	Pickup 18X		10/8	6	3/3	2	3-band	Yes	Yes	20 Hz-90 kHz
Geoffrey Daking	2981 Mixer	6x2	1/4" TRS	N/A	1 TRS	2	N/A	Yes	N/A	10 Hz-56 kHz
Mackie Designs	24.8/32.8	24x32x8x2	24/32	24/32	6 mon/6 ster	24/ 1/4"	4-band + low cut filter	Yes	Yes	20 Hz-60 kHz; +0/-1 dB
Mackie Designs	CFX 12	12x4x2	12/4	8/8	4/2/TRS	4/TRS	3-band; 9-band stereo graphic	Yes	Yes	32 Hz-20 kHz; +0/-1 dB
Mackie Designs	CFX 16	16x4x2	16/4	12/12	4/2/TRS	4/TRS	3-band; 9-band stereo graphic	Yes	Yes	32 Hz-20 kHz; +0/-1 dB
Mackie Designs	CFX 20	20x4x2	16/4	16/16	4/2/TRS	4/TRS	3-band; 9-band stereo graphic	Yes	Yes	32 Hz-20 kHz; +0/-1 dB
Mackie Designs	808S Powered Mixer	10x2	8/12	6/6	4/2/TRS	None	3-band fixed; 9-band graphic	Ch 1-6	No	32 Hz-20 kHz; +0/-1 dB
Mackie Designs	408S Powered Mixer	10x2x2	8/12	6/6	2/2/TRS	None	3-band fixed; 9-band graphic	Ch 1-6	No	1 Hz-30 kHz; +0/-1 dB
Mackie Designs	808M Powered Mixer	10x2x2	8/12	6/6	2/2/TRS	None	3-band fixed; 9-band graphic	Chan. 1-6	No	10 Hz-30 kHz; +0/-1 dB
Mackie Designs	408M Powered Mixer	10x2x2	8/12	6/6	2/2/TRS	None	3-band fixed; 9-band mono	Chan. 1-6	No	10 Hz-30 kHz; +0/-1 dB
Mackie Designs	408M Powered Mixer	8x2x2	6/6	6/6	2/2/TRS	None	3-band fixed; 9-band mono	Ch 1-6	No	10 Hz-30 kHz; +0/-1 dB
Mackie Designs	1604 VLZ Pro	16x4x2	16/16	16/8	6/8/TRS	4/TRS	3-band w/swept mid	Yes per channel	Yes per channel	5 Hz-100 kHz; +0/-1 dB
Mackie Designs	1642 VLZ Pro	16x4x2	10/16	8/8	4/8/TRS	4/TRS	3-band w/swept mid	Yes per channel	Yes per channel	20 Hz-60 kHz; +0/-1 dB
Mackie Designs	1402 VLZ Pro	14x2x2 channel	6/14 channel	6/6 +0/-1 dB	2/4/TRS	2/TRS	3-band fixed	Yes per	Yes per	20 Hz-60 kHz; +0/-1 dB
Mackie Designs	1202 VLZ Pro	12x2x2	4/12	4/4	2/4/TRS	2/TRS	3-band fixed	Yes all channels	Yes all channels	20 Hz-60 kHz; +0/-1 dB
Mackie Designs	SR24.4 VLZ Pro	24x4x2	20/24	20/20	6/8/TRS	8/TRS	3-band w/swept mid	Yes per channel	Yes per channel	20 Hz-50 kHz; +0/-1 dB
Mackie Designs	SR32.4 VLZ Pro	32x4x2	28/32	28/28	6/8/TRS	8/TRS	3-band w/swept mid	Yes per channel	Yes per channel	20 Hz-50 kHz; +0/-1 dB
NHT Pro	PVC	N/A	0/2	2 inserts	N/A	N/A	N/A	N/A	N/A	1 Hz-50 kHz
Oram Pro	Octamix	8x2x1	8	N/A	N/A	2/XLR	N/A	N/A	N/A	18 Hz-73 kHz
Peavey	16-LM	8x2	8 stereo	No	No	2/L-R; headphones	No	No	No	20 Hz-20 kHz; +0/-1 dB
Peavey	RQ-200	6x2	6/6 (4 stereo)	2	2	4/L-R mono; EFX	2-band; shelving	No	No	20 Hz-20 kHz; +0/-0.5 dB
Peavey	RQ-2310	10x2x2	8/8 (2 stereo)	4/2	4/2	3/L-R mono	3-band; mid-sweep	Yes	PFL	20 Hz-20 kHz; +0/-0.5 dB
Peavey	RQ-2818	16x2x2	16/16	12/0	4/2	3/L-R mono	3-band; mid-sweep	Yes	PFL	20 Hz-20 kHz; +0/-0.5 dB
Peavey	RQ 3014	10x2x2	6/4	6	3/2	2	2-band; mid sweep	Yes	PFL	20 Hz-20 kHz; +0/-3 dB
Peavey	RQ 3314	12x2x2	12/12 (2 stereo)	8/0	4/2	3/L-R mono	3-band; mid sweep	Yes	PFL	20 Hz-20 kHz; +0/-0.5 dB
Peavey	RSM-4062	16x4x2	16/16 (8 stereo)	8/8	8/6	6/Group 1-4; L-R	3-band; mid-sweep	Yes	PFL/solo	20 Hz-20 kHz; +0/-0.5 dB
Peavey	RQ-4324	24x4x3	24/24	24/0	6/2	7/Group 1-4; L-R; mono	3-band; mid-sweep	Yes	PFL/AFL	20 Hz-20 kHz; +0/-0.5 dB
Peavey	RQ-4332	32x4x3	32x32 (2 stereo)	32/0	6/2	7/Group 1-4; L-R; mono	3-band; mid-sweep	Yes	PFL/AFL	20 Hz-20 kHz; +0/-0.5 dB
Peavey	Unity 1002-8 RQ	8x2	8	0	2/0	2	3-band	No	No	20 Hz-20 kHz



SIGNAL-TO-NOISE RATIO	TOTAL HARMONIC DISTORTION	DYNAMIC RANGE	CHANNEL CROSSTALK (@ 1 KHz)	PHANTOM POWER	TALKBACK / ONBOARD OSCILLATOR	DEDICATED 2-TRACK RETURNS	SPECIAL FEATURES	DIMENSIONS	PRICE
110 dB	0.003%	>129.5 dB	-85 dB	Yes	N/N	Yes	Rack mountable (rack mounts incl)	12.33x3.33x13	\$626
110 dB	0.003%	>129.5 dB	85 dB	Yes	N/N	Yes	Built in dual 256 multi-effects DSP w/32-bit processors Rack mountable (rack mounts incl)	17.25x3.33x15	\$1,350
110 dB	0.003%	>129.5 dB	85 dB	Yes	N/N	Yes	Rack mountable (rack mounts incl)	17.25x3.33x15	\$1,050
-96 dB	0.0033%	96 dB	-86 dB	N/A	N/A	N/A	Stereo limiter built-in	1RU	\$1,495
90 dBu	0.0013%	114 dBu	-91 dBu	Yes	Y/N	Yes	Inline monitoring	Depends on configuration	\$3,399-\$4,249
>105 dB	<0.05%	120 dB	-90 dB	48V	N/N	Yes	Built-in effects; 75Hz/XLR subwoofer output	4.6x17.2x15.7	\$699
>105 dB	<0.05%	120 dB	-90 dB	48V	N/N	Yes	Built-in effects; 75Hz/XLR subwoofer output	4.6x21.4x15.7	\$899
>105 dB	<0.05%	120 dB	-90 dB	48V	N/N	Yes	Built-in effects; 75Hz/XLR subwoofer output	4.6x25.6x15.7	\$1,099
>105 dB	<0.10% @ 8Ω	120 dB	>75 dB	15V	N/N	Yes	Built-in effects; switchable stereo/mon. mains	11.7x20.5x13	\$999
>105 dB	<0.10%	120 dB	75 dB	15V	N/N	Yes	Built-in effects; switchable stereo/mon. mains	11.7x 20.5x3	\$899
>105 dB	<0.10%	120 dB	75 dB	15V	N/N	Yes	Built-in effects; switchable stereo/mon. mains	11.7x 20.5x13	\$899
>105 dB	<0.10%	120 dB	75 dB	15V	N/N	Yes	Built-in effects; switchable stereo/mon. mains	11.7x20.5x13	\$799
>105 dB	<0.10%	120 dB	75 dB	15V	N/N	Yes	Built-in effects; switchable stereo/mon. mains	11.7x20.5x13	\$699
>107 dB	0.0007%	130 dB	-84 dBu	48V	N/N	Yes	XDR mic preamps; rotatable patchbay	5x19x17.6	\$1,249
>107 dB	0.0007%	130 dB	-84 dBu	48V	N/N	Yes	XDR mic preamps	5.45x16.63x17.28	\$999
>107 dB	0.0007%	130 dB	-84 dBu	48V	N/N	Yes	XDR mic preamps; alternate 3/4 bus	2.9x14x12.9	\$649
>107 dB	0.0007%	130 dB	-84 dBu	48V	N/N	Yes	XDR mic preamps; alternate 3/4 bus	2.6x11.8x11.2	\$459
>105 dB	<0.0007%	120 dB	89.5 dB	48V	Y/N	Yes	XDR mic preamps	5.6x31x19.2	\$1,599
>105 dB	0.0007%	130 dB	89.5 dBu	48V	Y/N	Yes	XDR mic preamps	5.6x39.25x19.2	\$1,999
120 dB	N/A	120 dB	-100 dB	N/A	N/A	N/A	Passive line level control; rackmounted	1.75x5.5x4.5	\$175
N/A	>0.005%	N/A	N/A	N/A	N/A	N/A	Pan; 2 stereo XLR mix outs; headphone cue	1 RU	\$1,295
92 dB	<0.01%	110 dB	N/A	No	N/N	No	1U	19x7x1.7	\$125
128 dBu EIN	<0.01%	102 dB	N/A	Yes	N/N	No	AC/battery power	14x10x3	\$200
128 dBu EIN	<0.005%	110 dB	> 80 dB	Yes	N/N	Yes	2 "super channels"	16.2x19x4.5	\$450
128 dBu EIN	<0.005%	110 dB	> 80 dB	Yes	N/N	Yes	2 "super channels"	24.2x19x4.5	\$700
N/A	<0.01%	110 dB	90 dB	Yes	N/N	Yes	2 "super channels"	15x16x4.3	\$630
128 dBu EIN	<0.005%	110 dB	>80 dB	Yes	N/N	Yes	2 "super channels"	20.2x19x4.5	\$600
128 dBu EIN	<0.005%	110 dB	> 85 dB	Yes	N/N	Yes	2 "super channels"	19x14x8	\$1,250
128 dBu EIN	<0.005%	110 dB	> 85 dB	Yes	N/N	No	2 "super channels"	36.5x19x9	\$1,600
128 dBu EIN	<0.005%	110 dB	> 85 dB	Yes	N/N	No	2 "super channels"	44.5x19x9	\$2,000
N/A	<0.01%	110 dB	90 dB	Yes	N/N	Yes		17x16x3.2	\$400

# ANALOG MIXING CONSOLES

MANUFACTURER	PRODUCT	MIXER CONFIGURATION	MIC INPUTS (XLR) LINE INPUTS	# OF INSERTS/DIRECT OUTS	# OF AUX SENDS/RETURNS /TYPE	# OF BUS OUTPUTS /TYPE	EQ	MUTE	SOLO-IN-PLACE	FREQUENCY RESPONSE
Peavey	Unity 2002-12 RQ	12x2	1/2	0	4/0	2	3-band	No	No	20 Hz–20 kHz
Rolls	MX56s Playmate	4x2	1/3	N/A	N/A	1/ 1/4"	N/A	No	No	20 Hz–20 kHz
Rolls	MX54 ProMixPlus	3x2	3	N/A	N/A	1/ 1/4"	No	No	No	25 Hz–16 kHz
Samson	MPL 1204 Rackmount Mixer	12x4	12/12	12/12	24	N/A	3-band	Yes	Switchable PFL/AFL	<10 Hz–60 kHz
Sony	SRP-V110	34x8	10/24	10/8	8/8/ 1/4"	8/RCA	3-band; mid-sweep	Yes	PFL	20 Hz–20 kHz; ±0.5 dB
Soundcraft	Folio Notepad	8x2	4/8	0/0	1/ 1/4"	N/A	2-band; fixed	No	No	20 Hz–20 kHz
Soundcraft	Folio Powerpad	8x2	4/8	0/0	1/ 1/4"	N/A	2-band; fixed	No	No	20 Hz–20 kHz
Soundcraft	Folio FX8	16x2x2	8/16	8/8	3/ 1/4"	4/ 1/4"	3-band; mid-sweep	Yes	PFL	20 Hz–20 kHz
Soundcraft	Folio FX16	16x2x2	16/16	16/16	3/ 1/4"	4/ 1/4"	3-band; mid-sweep	Yes	PFL	20 Hz–30 kHz
Soundcraft	Folio SX	12x2x2	16/20	12/8	3/ 1/4"	4/ 1/4"	3-band; mid-sweep	Yes	SIP/PFL	20 Hz–30 kHz
Soundcraft	LX 7/16	16x4x2x1	16/16	16/8	6/ 1/4"	7/ 1/4"	4-band; 2 mid-sweep	Yes	SIP/PFL	20 Hz–20 kHz
Soundcraft	LX 7/24	24x4x2x1	24/24	24/16	6/ 1/4"	7/ 1/4"	4-band; 2 mid-sweep	Yes	SIP/PFL	20 Hz–20 kHz
Soundcraft	LX 7/32	32x4x2x1	32/32	32/24	6/ 1/4"	7/ 1/4"	4-band; 2 mid-sweep	Yes	SIP/PFL	20 Hz–20 kHz
Soundcraft	Spirit M4	12x2	4/16	8/8	4/8/RCA	2	4-band; 3 mid-sweep	Yes	No	20 Hz–20 kHz ± 1dB
Soundcraft	Spirit M8	16x2	8/16	8/8	4/8/RCA	2	4-band; 3 mid-sweep	Yes	No	20 Hz–20 kHz ± 1dB
Soundcraft	Spirit M12	20x2	12/16	8/8	4/8/RCA	2	4-band; 3 mid-sweep	Yes	No	20 Hz–20 kHz ± 1dB
Speck	XTRAMIXcniV5	40x8x2	76 line	8	8/8	8/TRS	N/A	N/A	Yes	4 Hz–154 kHz
Studiomaster	Trilogy T 326	24x4x2x1	24/28	24/20	6/8	4/ 1/4"	3-band w/sweep mids	Yes	Yes	20 Hz–20 kHz
Studiomaster	Trilogy T-406	32x4x2x1	32/28/4	32/28	6/4	4/ 1/4"	3-band w/mid sweeps	Yes	Yes	20 Hz–20 kHz
Studiomaster	Mixdown Classic 24	24x8x16x2	24/24	34/24	6/18/ 1/4"	8/ 1/4"	3-band	Yes	PFL	30 Hz–20 kHz
Studiomaster	Mixdown Classic 32	32x8x16x2	32/32	42/32	6/18/ 1/4"	8/ 1/4"	3-band	Yes	PFL	30 Hz–20 kHz
Studiomaster	Trilogy T 166	12x4x2x1	12/14	14/10	6/18/ 1/4"	4 / 1/4"	3-band w/mid sweep	Yes	Yes	20 Hz–20 kHz
Studiomaster	Trilogy T 206	16x4x2x1	16/18	18/14	6/18/ 1/4"	4/ 1/4"	3-band w/mid sweep	Yes	Yes	20 Hz–20 kHz
Studiomaster	Trilogy T 140	10 ch expander	10/12	8/8	6/4	4/ 1/4"	3-band w/mid sweep	Yes	Yes	20 Hz–20 kHz
Studiomaster	Pro 2 163	12x2x1	12/14	12/0	5 /2/ 1/4"	3/XLR	3-band w/mid sweep	Yes	Yes	20 Hz–20 kHz
Studiomaster	Pro 2 203	16x2x1	16/18	10/0	5 /2/ 1/4"	3/XLR	3-band w/mid sweep	Yes	Yes	20 Hz–20 kHz
Studiomaster	16-2BP	16x2	16/14/2	16/14	2/1	2/XLR	3-band; mid sweep	No	PFL	20 Hz–20 kHz
Summit Audio	TMX-420	4x2	4/4	0	4/0/ 1/4"	2/ 1/4"	No	Yes	Yes	5 Hz–55 kHz
Yamaha	GF 12/12	12x4x2	8/12	8/8	6/4 1/4"	4/ 1/4"	3-band; mid-sweep	Yes	Yes	20 Hz–20 kHz
Yamaha	GF 16/12	16x4x2	12/16	12/12	6/4/ 1/4"	4/ 1/4"	3-band; mid-sweep	Yes	Yes	20 Hz–20 kHz
Yamaha	GF 24/12	24x4x2	20/24	20/20	6/4/ 1/4"	4/ 1/4"	3-band; mid-sweep	Yes	Yes	20 Hz–20 kHz
Yamaha	MX 12/4	12x4x2	8/12	4/0	2/2/ 1/4"	4/ 1/4"; 2/XLR stereo	3-band	No	No	20 Hz–20 kHz
Yamaha	MX 20/6	20x4x2	16/20	8/8	3/2/ 1/4"	4/ 1/4"	3-band	Yes	No	20 Hz–20 kHz
Yamaha	MX 12/6	12x4x2	8/12	4/4	3/2/ 1/4"	4/ 1/4"	3-band	Yes	No	20 Hz–20 kHz



SIGNAL-TO-NOISE RATIO	TOTAL HARMONIC DISTORTION	DYNAMIC RANGE	CHANNEL CROSSTALK (@ 1 KHz)	PHANTOM POWER	TALKBACK/ONBOARD OSCILLATOR	DEDICATED 2-TRACK RETURNS	SPECIAL FEATURES	DIMENSIONS	PRICE
N/A	<0.01%	110 dB	90 dB	Yes	N/N	Yes		23x16x3.2	\$500
>80 dB	0.05%	84 dB	-70 dB	12VDC	N/N	No		19x2.5x1.75	\$100
84 dB	0.02%	84 dB	-70 dB	+18VDC	N/N	N/N		5.3x3.7x2	\$150
-90 dB	0.056%		80 dB	48V	N/N		10-segment LED meters; headphone out; 56mm faders	7x19x7.1	\$600
-95 dB	<0.005%	>95 dB	90 dB	Yes	N/A	N/A	Rackmounts optional	17x4.75x 5.625	\$2,180
N/A	<0.005%	N/A	>90 dB	Global	N/N	Yes	Optional mic stand adapter	8.7x9.6x2	\$230
N/A	<0.005%	N/A	>90 dB	Global	N/N	Yes	Built-in 30W x 2 power amp	9.8x9.3x4	\$430
N/A	<0.009%	N/A	>96 dB	Global	N/N	Yes	Built-in Lexicon lx	17.5x16.5x4.1	\$760
N/A	<0.009%	N/A	>96 dB	Global	N/N	Yes	Built-in Lexicon FX; rotatable patch bay	17.5x18x6.3	\$1,300
N/A	<0.006%	N/A	>95 dB	Global	N/N	Yes	100mm faders	19x20x2.8	\$850
N/A	<0.006%	N/A	>95 dB	Global	Y/N	Yes	Left, right and mono outputs	19.5x26x7	\$1,700
N/A	<0.006%	N/A	>95 dB	Global	Y/N	Yes	Left, right and mono outputs	19.5x34x7	\$2,100
N/A	<0.006%	N/A	>95 dB	Global	Y/N	Yes	Left, right and mono outputs	19.5x42x7	\$2,800
N/A	<0.008% @ 1kHz	N/A	<90 dB	Global	N/N	Yes	S/PDIF digital output; integral rack rails	20.9x16x5	\$700
N/A	<0.008% @ 1kHz	N/A	<90 dB	Global	N/N	Yes	S/PDIF digital output; integral rack rails	20.9x20.2x5	\$850
N/A	<0.008% @ 1kHz	N/A	<90 dB	Global	N/N	Yes	S/PDIF digital output; integral rack rails	20.9x20.2x5	\$1,000
-92 dB	<0.0032%	N/A	-82 dB	No	Y/N	Yes	Expandable to 148 inputs	4 RU	\$4,890
89 dB	0.0085%	112 dB	90 dB	48V	N/N	Yes	Combo XLR/stereo, monitor/stereo channels	34x21.125x3	\$1,595
89 dB	0.0085%	112 dB	90 dB	48V global	N/N	Yes	Expandable to 42 & 52 channels	42.6x21.125x3	\$1,895
92 dB	0.005%	N/A	-95 dB	48V per ch	Y/Y	Yes	MIDI muting; split design; meter bridge	47.2x25.5x5	\$2,995
92 dB	0.005%	N/A	-95 dB	48V per ch	Y/Y	Yes	MIDI muting; split design; opt. meter bridge	58.5x25.5x5	\$3,595
89 dB	0.0085%	112 dB	90 dB	48V	N/N	Yes	Expandable to 22 channels; rackmountable	21.19x2.13x3	\$995
89 dB	0.0085%	112 dB	90 dB	48V	N/N	Yes	Expandable to 26 channels	24.19x21.13x3	\$1,195
89 dB	0.0085%	112 dB	90 dB	48V	N/N	Yes	Rackmountable	15.75x21.13xH: 3	\$449
89 dB	0.0085%	112 dB	90 dB	48V	N/N	No	100 Hz channel HPF; rackmountable	21.19x2.13x 3	\$870
89 dB	0.0085%	112 dB	90 dB	48V	N/N	No	100 Hz channel HPF	24.19x21.13x3	\$1,070
85 dB	0.006%	108 dB	85 dB	48V global	N/N	Yes	Rack mount, internally modular; rear patching	19x4.8x10.5	\$649
>90 dB	<0.2%	>90 dB	N/A	No	N/N	No	Tube	19x14x3.5	\$3,695
-128 dB	>0.1%	-95 dB	70 dB	48V global	N/N	Yes	Aux masters on faders	23x19x6.25	\$1,049
-128 dB	>0.1%	-95 dB	70 dB	48V global	N/N	Yes	Aux masters on faders	27.5x19x6.25	\$1,249
-128 dB	>0.1%	-95 dB	70 dB	48V global	N/N	Yes	All aux busses have master faders	37x19x6.25	\$1,679
95 dB	<0.1	N/A	70 dB	Yes	N/N	Yes	Built-in digital effects	3.25x15.75x17.13	\$600
93 dB	0.1%	128 dB	-70 dB	48V global	N/N	Yes	Built-in effects	25.88x15.13x3.38	\$949
93 dB	0.1%	128 dB	-70 dB	48V global	N/N	Yes	Built-in effects	17.25x15.13x3.38	\$649

# AUDIO PATCH BAYS

MANUFACTURER	PRODUCT	CONNECTOR TYPE	# OF PATCH-BAY POINTS	PREWIRED	MODULAR	PROGRAMMABLE	NORMALING	SPECIAL FEATURES	PRICE
AP Audio	APB-48S	1/4" balanced	48	Yes	Yes	No	Yes	Optional cable tester and other modules	\$130
AP Audio	APB-48SH	Balanced (hard-wired)	48	No	Yes	No	Yes	Optional cable tester and other modules	\$130
Bi-Tronics	Switchcraft, Neutrik, Rean Patch Bays	TT/Long frame	96,52,48	No	Yes	No	Full, half, open	EDAC and IDC terminations included	\$100-\$249
Carvin	PB 48	1/4" TRS	48	No	Yes	No	Full, half	Solderless	\$70
CM Automation	PM 64 Router/Level Controller	DB 25	32 x 32	N/A	Yes	Yes	N/A	Remote control via RS-232 port optional DB8 connector	\$2,499
CM Automation	PM 216 Automated Patch Bay/Mixer	DB 25	16 x 16	N/A	Yes	Yes	N/A	Multiple units networkable via MIDI; 2-bus mixer	\$699
Connectronics	JB24	1/4" TRS or mono	48	Yes	Yes	No	Full, half, through		\$775
Connectronics	XB16KV/XB32KV	Any combination	16/32	Yes	Yes	No	No	Wide range of connector types	\$94-\$174
dbx	PB48	1/4" TRS	48	No	Yes	No	Full, half		\$150
Fostex	3013	1/4"	16	Yes	No	No	Half		\$105
Fostex	DS-8 Digital Patch Bay	S/PDIF (6 optical + 2 coaxial)	8	No	No	No	N/A	Selectable 24-, 20-, 16- and 12-bit modes	\$340
Furman	PB-48 Balanced Patch Bay	1/4" TRS	48	No	Yes	No	Half	Denormalizable; 1/4" TRS on rear	\$169
Furman	PB-48D Balanced Patch Bay	1/4" TRS	48	No	No	No	Half	6 D-sub connectors on rear; denormalizable	\$229
M Audio	Digipatch 12x6 Digital Patch Bay	S/PDIF (coaxial/optical) ADAT optical	12 x 6	Yes	N/A	Yes	N/A	50 factory presets, 49 user	\$500
Neutrik	Easy Patch	TB	48	Yes	No	Yes	Full, half, no, parallel, double	Solderless construction	\$725
Neutrik	Easy Patch	TT	96	Yes	No	Yes	Full, half, no, parallel, double	Solderless construction; digital-capable	\$775
Neutrik	Patchlink SP-L	1/4" balanced	48	No	Yes	Yes	Full, half, isolated, parallel	Gray normaled jack for faster identification	\$125
Neutrik	Rean MA 96; XPM Series	TT or Bantam	96	No	No	Yes	All options	Black, silver, red, or blue	\$350-\$425
Neutrik	Rean LF48 Series	TB	48	No	Yes	Yes	All options	Black, silver, red, or blue front panels avail.	\$250-\$300
Neutrik Patch Panels	REAN RPM	1/4" balanced & unbalanced	48	No	Yes	Yes	Yes	Full/half normaled/hardwired/ RCA available	\$100-\$225
Pro-Co	PJ Series	1/4" TRS, PJ, WECC, Long frame	52	Yes	No	No	All options	Customized options available	\$250-\$1,600
Pro-Co	TT Series	Bantam (TT); TRS	96	Optional	No	No	Determined by jack loading/wiring	Customized options available	\$600-\$2,800
Radial Engineering	Radial	TT; 1/4"; 1/4" TRS	24-96	Optional	Optional	No	All options	Customized options available	\$130-\$1,200
Rapco	Rapco Patch Bay	TT; 1/4"; 1/4" TRS	48, 52, 96	Yes	Yes	No	All options	Customized options available	\$199 and up
Signal	AP Audio APB-48S Balanced Patchbay	1/4" balanced/silver-plated brass	48	Yes	Yes	Customizable	Rotate card 180 degrees	Add on modules (cable tester, combiner, splitter, Direct box)	\$130
Signal	AP Audio APB-48SH Balanced Patchbay	Balanced (hard-wired)	48	No	Yes	Customizable	Rotate card 180 degrees	Add on modules (cable tester, combiner, splitter, Direct box)	\$130
Switchcraft	Front Access Series	TT or MT	96 or 48	Yes	No	No	Normals strapped, normals out	Front-panel nickel-plated jacks gold contacts	\$1,100
Switchcraft	MTP Series	1/4" TRS	48	Yes	No	No	All options		\$700
Switchcraft	1/4" Kit Series	1/4" balanced	48, 52	No	No	No	Full, half, no	Cable tray; nickel-plated jacks	\$220
Switchcraft	MT48/52 Series	1/4" TRS	48, 52	No	No	No	Full, half, no	Tie bar; nickel-plated jacks	\$230
Switchcraft	TT96 EDAC Series	TT	96	Yes	No	No	Full, normals, out	EDAC-type rear panel connectors	\$1,300
Switchcraft	TT Kit Series	TT	96	No	No	No	Full, half, no	Cable tray; nickel-plated jacks; gold contacts	\$300
Switchcraft	TTP96 Series	TT	96	No	No	No	Full, half, no	Tie bar; nickel-plated jacks; gold contacts	\$300
Taylrix	Audio Patch Bay	TT	96	Yes	Yes	No	Full, half, none	Customized configurations available	\$1,500 and up
Whirlwind	WLF482	Long frame balanced	48	Optional	Yes	No	Full, half, no		\$440
Whirlwind	WPB-48S	1/4" TRS	48	Yes	Yes	No	Half or no each		\$160
Whirlwind	WPB-48S/R	1/4" TRS, RCA	N/A	Yes	Yes	No	Half or no each		\$190
Whirlwind	WTT961	TT	96	Optional	Yes	No	Full, half or user	1U rackspace	\$560
Z-Systems	Digital Detanglers	AES/EBU	8-64	Yes	N/A	Yes	N/A	Hardware remote; computer controllable	\$980-\$12,000



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# CD RECORDERS

CD RECORDERS

MANUFACTURER	PRODUCT	RECORD FORMATS	ANALOG I/O	DIGITAL I/O	SAMPLING RATES	DISC AT ONCE/ TRACK AT ONCE	INDIVIDUAL TRACK RECORD STOP/START	MANUAL TRACK INCREMENT	AUTO LEVEL RECORD	RECORD MUTE	TRACK NUMBERING
Fostex	CR-300	CD-R; CD-RW	RCA; XLR	S/PDIF(optical); AES/EBU	44.1 kHz	N/A	N/A	N/A	N/A	N/A	N/A
HHB	CDR 830 BurnIT	CD-R	RCA	S/PDIF (coaxial & optical)	44.1 kHz	Y/Y	Yes	Yes	No	Yes	Auto
HHB	CDR 850	Audio CD-R; CD-RW	RCA; XLR	S/PDIF(optical); AES/EBU	44.1 kHz	Y/Y	Yes	Yes	N/A	N/A	Yes
Microboards	AudioWrite Pro	CD-R	RCA	No	44.1 kHz	N/A	N/A	N/A	No	N/A	N/A
Microboards	Copywriter A2D	CD-R	RCA	No	44.1 kHz	N/A	N/A	N/A	N/A	N/A	N/A
Philips	200W Mini Shelf System with Integrated Audio CD Recorder	Audio CD-R; CD-RW	1/1	S/PDIF (RCA)	12-56 kHz	Y/Y	Yes	Yes	Yes	Yes, soft mute	Yes
Philips	Dual Deck Audio CD Recorder	Audio CD-R; CD-RW	1/2	S/PDIF (RCA, optical)	12-56 kHz	Y/Y	Yes	Yes	N/A	Yes, soft mute	Automatic or via manual increment
Philips	Integrated 3 CD-Changer/ CD Audio Recorder	Audio CD-R; CD-RW	1/1	S/PDIF (RCA, optical)	12-56 kHz	Y/Y	Yes	Yes	Yes	Yes, soft mute	Automatic or via manual increment
Philips	Mini 100W Shelf System with integrated CD Recorder	Audio CD-R; CD-RW	1/1 (1 mic in)	S/PDIF (RCA)	12-56 kHz	Y/Y	Yes	Yes	Yes	Yes, soft mute	Yes
Philips	Premium Audio CD Recorder	Audio CD-R; CD-RW	1 XLR/1	S/PDIF (RCA, optical)	12-56 kHz	Y/Y	Yes	Yes	N/A	Yes, soft mute	Yes
Philips	Single Deck Audio CD Recorder	Audio CD-R; CD-RW	1/1	S/PDIF (RCA, optical)	12-56 kHz	Y/Y	Yes	Yes	N/A	Yes, soft mute	Automatic or via manual increment
TASCAM	CD-RW2000	Audio CD-R; CD-RW	XLR; RCA	S/PDIF (RCA, optical)	44.1 kHz	N/Y	Yes	Yes	Yes	Yes	Auto, manual
TASCAM	CD-RW700	Audio CD-R; CD-RW	RCA	S/PDIF (RCA, optical)	44.1 kHz	N/Y	Yes	Yes	Yes	Yes	Auto or manual
TASCAM	CD-D4000MKII CD Duplicator	CD-R; discs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Yamaha	CDR1000	Audio CD-R; CD-RW	XLR	AES/EBU; S/PDIF	30-50 kHz	N/A	Yes	Yes	No	Yes	Auto or manual

## REVIEWING THE BASICS: PITCH SHIFTING *By Scott Wilkinson*

Pitch shifters are among the most useful and least understood signal processors in the electronic musician's arsenal. These devices take an input signal and shift its pitch up or down, in real time, by a user-specified amount. Accomplishing this with any degree of success requires some heavy-duty digital signal processing.

Basically, there is only one parameter to master: the amount by which the pitch is shifted. This is usually specified in terms of a musical interval, such as a major third, perfect fifth, octave, etc. You can also shift the pitch of the input signal by very small amounts, which are specified in cents. (One hundred cents equal a semitone or half-step.)

These days, most pitch shifters are within multi-effects units. In the recording studio, they are connected to the mixer's aux send and return loop in the same manner as other effects, such as reverb and delay. In this case, you would typically set the wet/dry mix to 100 percent wet and control the balance between the original and pitch-shifted signals with the aux send and return level controls on the mixer.

Alternatively, you can dedicate the pitch shifter to one instrument by patching it into one of the mixer's channel insert points and controlling the wet/dry mix from the processor.

You can also connect the output of a guitar or synth directly to a pitch shifter's input and connect its output to the input of another effects device, a P.A. mixer, or an amplifier. In this application, you control the wet/dry mix from the effects processor.

### DETUNING

Very small pitch shifts are collectively known as detuning. If you mix a piano sound at its normal pitch with the same sound detuned a few cents up or down, it resembles a honky-tonk piano. (The original honky-tonk pianos sounded that way because they weren't tuned very often; honky-tonk establishments had other priorities.) This technique is often used to "thicken" individual drum sounds, as well. As I mentioned in the section on delay, you can thicken an individual track by delaying it 30 to 50 ms and mixing it with

the unprocessed signal for a doubled effect. If you add a bit of detuning to the equation, the effect is even more pronounced. You can also simulate a stereo image by panning the unprocessed signal to one side of the stereo sound field and panning a slightly delayed signal to the other side. If you include a little pitch shifting, the results can be quite satisfying. Try one of these techniques on a bass part to fatten it up.

Bruce Springsteen, among others, often uses a modified version of this technique on his lead vocals. The vocal track is split; one signal remains unprocessed and is panned to the center, and the other signal is sent through two pitch shifters. One is set to shift upward by a few cents, the other shifts down by the same amount. The output from one shifter is panned hard right, and the other is panned hard left. (There are a number of devices that incorporate several pitch shifters and stereo audio outputs in one unit. In this case, the output of each shifter is panned hard right or left within the unit.)



SAMPLE RATE CONVERSION	SERIAL COPY MANAGEMENT SYSTEM	RECORDING TIME DISPLAY	ERROR REPORTING	HEADPHONE JACK	REMOTE CONTROL	SCSI	DIMENSIONS	WEIGHT (LBS.)	ADDITIONAL FEATURES	PRICE
Yes	Yes	Yes	N/A	Yes	N/A	Yes	3U rack-mount	N/A	Built-in data back-up	\$1,099
Yes	No	Yes	Yes	Yes	Yes	No	19x11.6x4.1	7.7	24-bit converters; CD text; digital input; gain control	\$795
Yes	Selectable	Yes	Yes	Yes	N/A	No	2U rack-mount	N/A	Timecode; adjustable auto-stop delay	\$995
Yes	N/A	Yes	Yes	Yes	No	Yes	11x7x4	10.5	Direct PC interface; MP3 download software incl.	\$649
No	N/A	N/A	Yes	Yes	No	Yes	17x10.6x9.8	11.7	Microphone input	\$2,695
Yes	Yes	Yes	Yes	Yes	Yes	N/A	10.4x12.2x13.2 (set); 9.4x12.2x9.8 (speakers)	48.5	Automatic volume equalization	\$499
Yes	Yes	Yes	Yes	Yes	Yes	N/A	17.1x3.46x12.2	11		\$399
Yes	Yes	Yes	Yes	Yes	Yes	N/A	17.1x5.6x14.5	16.8	Mic input; automatic equalizing of volume levels	\$449
Yes	Yes	Yes	Yes	Yes	Yes	N/A	10.4x12.2x13.2 (set); 9.4x12.2x9.8 (speaker)	48.5	Automatic volume level equalization	\$399
Yes	Yes	Yes	Yes	Yes	Yes	N/A	17.1x3.46x12.2	9.9		\$449
Yes	Yes	Yes	Yes	Yes	Yes	N/A	17.1x3.46x12.2	8.82		\$299
Yes	Yes	Yes	Yes	Yes	Yes	No	19x3.85x12.3	15.2	AES/EBU/coaxial/optical digital I/O; word clock	\$1,125
Yes	Yes (selectable)	Yes	Yes	Yes	Yes	No	19x3.85x12.3	14.5	Remote; coaxial/optical digital I/O; adjustable digital gain	\$749
N/A	N/A	Yes	Yes	Yes (Mini-jack)	N/A	N/A	19x3.85x12.3	14.5	1x, 2x, 4x, 6x, 8x copy speed	\$1,299
Yes	Yes/defeatable	Yes	No	Yes	Yes	No	19x3.5x14.63	17.6	Accepts external word clock input (Apogee UV22 equipped)	\$1,799

You might think that the same effect can be achieved by making copies of samples and delaying and detuning them. This is indeed a similar process, but the final result is noticeably different. All pitch shifters have an inherent, inconsistent processing delay because of the time it takes to identify the pitch of the input signal and shift it up or down. In general, low frequencies take longer to identify because they take longer to complete a full waveform cycle, resulting in a longer processing delay. This delay makes a qualitative difference in the final sound, which some people describe as "spread out."

Some engineers perform a neat trick with detuning and reverb. They send the 100 percent wet sound from a reverb unit into a pitch shifter set to detune a few cents flat. The output of the shifter is then sent to the aux return on the mixer. This is said to give the sound a more "poignant" quality. You can also detune upward for a more "excited" quality.

## PITCH CORRECTION

Another important application of detuning is pitch correction. If a singer or instrumentalist is consistently sharp or flat, it's relatively easy to run the signal through a pitch shifter to correct the problem. But



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what if only a few notes are out of tune? This is particularly irksome if the performance is otherwise great.

The traditional, and somewhat painful approach is to first bounce the offending track to an empty track, then send the original track through a pitch shifter set to correct the pitch of one bum note, and punch that one note into the bounced

track. Repeat the process for each bad note, setting the pitch shifter accordingly each time. This is tricky and tedious, but it gets the job done. It helps a great deal if you can automate the punch in and punch out using MIDI messages from a sequencer, which depends on the tape deck and sequencer you use.

If the pitch shifter responds to MIDI, it might be possible to correct the pitch of a performance by manipulating the pitch wheel on a synth or master keyboard. Make sure that MIDI Pitch Bend messages are assigned to control the amount of pitch shift. As you listen to the track, simply ride the wheel up or down to correct any notes that are out of tune. You can also automate this process by recording these movements into a sequencer that's synchronized to the audio recorder. Once the Pitch Bend data is recorded in the sequencer, you can tweak it to achieve a perfect take.

—continued on page 70

# CHANNEL STRIPS & VOICE PROCESSORS

MANUFACTURER	MODEL	# OF CHANNELS/ STEREO LINK	MIC PRE TYPES	ANALOG I/O	DIGITAL I/O	EQ TYPE	FILTERS	COMPRESSOR TYPE	EXPANDER	GATE	DE-ESSER
A.R.	Tube Channel	1/No	Tube	XLR; 1/4"	No	4-band parametric w/sweep mids	No	Optical tube	No	No	No
A.R.T.	Pro Channel	1/No	Tube	XLR; 1/4"	No	4-band w/sweepmids parametric	HP variable	Optical tube/variable mu	No	No	No
Avalon Design	VT-737SP	1/Yes	Discrete Class A tube	XLR; 1/4" TRS in; XLR out	N/A	4-band parametric	HP	Optical Class A tube	No	No	Yes
Barbetta	Channel One	1/No	Solid-state	XLR; 1/4" TRS in; XLR out	N/A	3-band parametric	Subsonic, ultrasonic	Full-function	No	Yes	No
dbx	286A	1/No	Solid-state	XLR; 1/4" TRS	N/A	2-band enhancer	HP	Overeasy	Yes	Yes	Yes
dbx	376 Tube Channel Strip	2/No	Tube	XLR; 1/4"	AES/EBU	3-band parametric	HP	VCA	No	No	Yes
dbx	586	2/No	Tube	XLR; 1/4" TRS	Optional	3-band w/sweep mid	LP	PeakPlus limiter	No	No	No
Drawmer	MX60 Front End One	1/No	Solid-state	XLR; 1/4" TRS	N/A	3-band high/low shelving; center parametric	100 Hz HP	Soft knee	Yes	Yes	Yes
Focusrite	Platinum 1 VoiceMaster	1/No	Class A	XLR; 1/4"	N/A	4-band	HP	Optical	Yes	Yes	Yes
Focusrite	Platinum 2 ToneFactory	1/No	Class A	XLR; 1/4"	N/A	Parametric	HP; LP	Optical	No	Yes	No
HHB	HHB Radius 40	1/No	Solid-state/tube	XLR; 1/4"	No	4-band parametric	HP @ 90 Hz	Analog	Yes	Yes	No
Joemeek	VC10 Studio Channel	1/No	Transformer-coupled	1/4"; XLR	Optional	3-band with mid sweep	HP	Photo-optical	Yes	No	Yes
Joemeek	VC30 Pro Channel	1/No	Solid-state	1/4"	N/A	3-band fixed	No	Photo-optical	No	No	No
Joemeek	VC60 British Channel	1/No	Solid-state	1/4"	N/A	3-band with mid sweep	HP	Photo-optical	No	No	No
LA Audio	MPX1 Mono Multi-Processor	1/No	Solid-state	XLR; 1/4" TRS	N/A	4-band w/sweep high/low;	HP @ 75 Hz; LP @ 12 kHz	Solid-state	Yes	No	Yes
LA Audio	MLX2 Mic/Line/DI Preamp	2/No	Solid-state	XLR; TRS	N/A	No	Sweepable HP	N/A	No	No	No
LA Audio	PS1 Professional Microphone Channel Strip	1/No	Solid-state	XLR; TRS	Optional	4-band w/sweep high/low; 2 parametric mids	HP @ 75 Hz; LP @ 12 kHz	Hard or soft knee w/variable rate	Yes	No	Yes
LA Audio	PS1D Professional Microphone Channel Strip	1/No	Solid-state	XLR; TRS	24-bit A/D	4-band w/sweep high/low; 2 parametric mids	HP @ 75 Hz; LP @ 12 kHz	Hard or soft knee w/variable rate	Yes	No	Yes
Langevin	Langevin Dual Vocal Combo	2/Yes	All-discrete	XLR; 1/4"	N/A	High/low shelving	No	Electro-optical	No	No	No
MindPrint	AN/DI Pro	2/2		AES/EBU; S/PDIF; (optical; coax)	N/A	No	No	No	No	No	No
MindPrint	DI Mod	2			SPDIF output		N/A	N/A	N/A	N/A	N/A
MindPrint	T-Comp	2/Yes	No	Frequency-dependent	Tube	No	No	No	No	No	No
MindPrint	EnVoice	1/No	Class A	XLR; 1/4" in	Optional	3-band parametric (2 semi)	Low cut @ 50 or 100 Hz	Tube	No	No	Yes
Oram Pro	MWS Microphone Work Station	2/No	Solid-state	XLR	N/A	Series 24 console EQ	HP; LP	N/A	No	No	No
PreSonus	VXP Dynamic Voice Processor	1/No	Class A, discrete	XLR; 1/4" TRS	N/A	4-band semi-parametric	HP	VCA; variable soft-knee to hard limit	Yes	No	Yes
Rane	VP12	2/No	Solid-state	XLR; 1/4" TRS	N/A	2-band parametric	HP; LP	Solid-state	Yes	Yes	Yes
SPL Electronics	Channel One	1/No	Tube preamplifier	XLR; 1/4"	N/A	3-band parametric	Proportional Q	SPL Double VCA	No	Yes	Yes
Steinberg	MindPrint EnVoice	1/No	Class A	XLR; 1/4"	Optional	3-band parametric	Low-cut	Tube	No	No	Yes
Steinberg	MindPrint AN/DI Pro	2/No		XLR; 1/4"	AES/EBU; S/PDIF	N/A	No	No	No	No	No
Steinberg	MindPrint T-Comp	2/Yes	No	XLR; 1/4"	Optional	No	Frequency-dependent	Tube	No	No	No
TC Electronic	Gold Channel	2/Yes	Digital	XLR	AES/EBU; S/PDIF; ADAT	5-band parametric w/analog	N/A	Digital	Yes	No	Yes
TL Audio	Ivory 5050	1/Yes	Tube	Mic, line, instrument	N/A	Low-cut filter	N/A	Tube	No	No	No
TL Audio	Ivory 5051	1/Yes	Tube	Mic, line, instrument	N/A	Tube 4 band	90 Hz low cut	Tube	Yes	No	No



SIDECHAIN	BYPASS	METER TYPE	FREQUENCY RESPONSE	DYNAMIC RANGE	THD	DIMENSIONS (INCHES)	WEIGHT (LBS.)	SPECIAL FEATURES	PRICE
No	Yes	LED; VU	20 Hz-20 kHz	>90 dB	<0.1%	19x5.25x1.75	8	Preamp/comp/EQ inserts; selectable metering	\$499
No	Yes	LED; VU	20 Hz-20 kHz	>100 dB	<0.1%	19x6.5x3.5	12	Preamp/comp/EQ inserts; selectable metering	\$799
Yes	No	VU; LEDs	1 Hz-200 kHz	148 dB	0.05%	19x12x3.5	26	Fully-discrete Class A tubes; EQ switch	\$2,295
No	Yes	VU; LED	3 Hz-20 kHz	>94 dB	0.001%	1RU	6.5	Phantom powered	\$2,699
Yes	Yes	LED	20 Hz-20 kHz	105 dB	0.005%	19x7.5x1.75	5	Phantom powered	\$250
Yes	No	LED	20 Hz-20 kHz	>107 dB	0.003%	19x8.25x1.75	N/A		\$600
Yes	Yes	LED; VU	10 Hz-200 kHz	N/A	0.004%	19x8x3.5	12	Phantom powered; pad; phase	\$1,000
No	Yes	LED	20 Hz-20 kHz	N/A	<0.01%	1RU	9	Inst. input w/20dB pad	\$699
No	Yes	LED	10 Hz-200 kHz	N/A	0.002%	1RU	N/A	Tube emulation circuitry	\$675
Yes	Yes	LED	10 Hz-200 kHz	>96 dB	0.002%	1RU	N/A		\$675
Yes	Yes	VU	10 Hz-40 kHz	106 dB	N/A	19x7.9x3.5	5.5	Gain control; 2 units stereo linkable	\$749
No	Yes	VU	10 Hz-50 kHz	N/A	0.01%	2RU	9	Phase reverse; phantom powered	\$800
No	Yes	LED	20 Hz-20 kHz	N/A	0.03%	8.25x 5x1.75	4.5	Phantom powered	\$300
No	Yes	LED	10 Hz-50 kHz	N/A	0.01%	1RU	6.5	Phantom powered; 20dB pad; dual voltage	\$600
No	Yes	LED	20 Hz-20 kHz	N/A	<0.05%	19x6x1.75	4.8	Phantom powered; -10/+4dB operation	\$400
No	No	LED	20 Hz-20 kHz	N/A	<0.05%	19x6x1.75	5	Phantom powered; -10/+4dB operation	\$320
No	Yes	LED	20 Hz-20 kHz	N/A	<0.05%	19x6x1.75	N/A	Phantom powered; -10/+4dB operation	\$850
No	Yes	LED	20 Hz-20 kHz	N/A	<0.05%	19x6x1.75	N/A	Phantom powered; -10/+4dB operation	\$1,150
No	Yes	VU	10 Hz-60 kHz	127 dB	<0.04%	19x3.5x10	12	All discrete; direct injection and limiter inputs	\$2000
No	No	12 Segment LCD	N/A	116 dB	N/A	19" wide 1 rack space	N/A	24 bit stereo converters, 44.1, 48, 96 kHz sample rates	TBA
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Digital output for MindPrint EnVoice	\$249
No	Yes	12-segment LCD, 6-segment LCD	10 Hz-22 kHz	106 dB	0.008%	1 rack space	N/A	Tube saturation, hard wire power switch bypass	\$1,099
No	Yes	12-segment	10 Hz-22 kHz	112 dB	0.001%	1 rack space	N/A	Tube saturation, optional digital outputs with DI Mod, frequency dependent filtering	\$749
No	Yes	LED	20 Hz-20 kHz	N/A	0.005%	N/A	N/A	Phantom; unity gain padless front end	\$2,195
No	Yes	LEDs	20 Hz-40 kHz	116 dB	0.001%	19x8x1.75	8	Class A, transformer coupled input with dual servo gain stage	\$800
No	Yes	LED;	20 Hz-20 kHz	N/A	0.01%	1RU	N/A	Phantom powered; mic/line mix control	\$599
Yes	Yes	Output PPM	10 Hz-100 kHz	119 dB	0.01855%	19x3.5x8	4.15 kg	Headphone jack; mic/line/instrument inputs	\$1,399
No	Yes	LCD	10 Hz-22 kHz	112 dB	0.04%	1RU	N/A	Digital outputs optional; freq-dependent filters	\$749
No	No	LCD	N/A	116 dB	N/A	1RU	N/A	24-bit converters; 44.1, 48, 96kHz	\$1099
No	Yes	LCD; LCD	10 Hz-22 kHz	106 dB	0.06%	1RU	N/A	Tube saturation circuitry	\$1,099
No	Yes	LED	10 Hz-20 kHz	>103 db	0.003%	1RU	5.5	Digital radiance generation; time alignment	\$2,495
No	Yes	Output	20 Hz-40 kHz	100 dB	0.05%	2RU	N/A		\$469
Yes	Yes	VU; LEDs	20 Hz-40 kHz	106 dB	0.05%	2RU	N/A	Includes three 12AX7 tubes	\$749

## COMPUTER-BASED DAWS

MANUFACTURER	PRODUCT	ANALOG I/O	DIGITAL I/O	PLATFORM VERSION	BUS TYPE	PLUG-IN FORMATS(S) SUPPORTED	SAMPLE RATE	A/D/A CONVERTER/ BIT RATE
Aardvark	Aark 24 - PC Interface	N/A	S/PDIF (RCA, optical), ADAT (optical)	Win 95/98	PCI	DirectX; GSIF; ASIO 2	32, 44.1, 48 kHz	24-bit
Aardvark	Direct Pro 24/96 Personal Studio	4 XLR, 4 1/4", 2 RCA	S/PDIF (RCA)	Win 95/98	PCI	DirectX; GSIF; ASIO 2	32, 44.1, 48, 96 kHz	24-bit
Aardvark	Direct Pro LX6	4 1/4" line inputs; 6 line outputs	S/PDIF (RCA)	Win 95/98	PCI	DirectX; GSIF; ASIO 2	32, 44.1, 48, 96 kHz	24-bit
Aardvark	Direct Pro Q-10	8 XLR mic/ 8 1/4" line inputs	S/PDIF (RCA)	Win 95/98	PCI	DirectX; GSIF; ASIO 2	32, 44.1, 48, 96 kHz	24-bit
Aardvark	Direct Mini USB3	2 1/4" line I/O, 1 1/4" mic/guitar input	N/A	Win 95/98; Mac OS 9.04	USB	N/A	44.1, 48 kHz	24-bit
Akai	DPS24 Digital Personal Studio	12xXLR combo jacks; 12x1/4" TRS; 4x1/4" direct inserts	RCA S/PDIF; optical multi-purpose lightpipe; ADAT inputs	N/A	N/A	DirectX; VST (requires SW update)	32, 44.1, 48, 88.2, 96 kHz	24-bit 96 kHz
Akai	DPS16 Digital Personal Studio	2 XLR w/phant pwr; 6 1/4" TRS; switchable Hi-Z input	RCA S/PDIF	N/A	N/A	N/A	32, 44.1, 48, 96 kHz	24-bit 96 kHz
Akai	DPS12i Digital Personal Studio	6 1/4" TRS inputs; 2 RCA master out; 2 1/4" aux out	1/1 RCA S/PDIF	N/A	N/A	N/A	32, 44.1, 48 kHz	18-bit 64x oversampling; 20-bit 8x oversampling
Alesis	ADAT/EDIT 2.0	ADAT Optical	ADAT optical	Win 98, Mac	PCI	N/A	44.1, 48 kHz	N/A
Antex	SC2000	4/4 XLR	1/1 XLR AES/EBU; S/PDIF	Win NT	PCI	N/A	6.25-50 kHz	20-bit
Anter	SC-22	2/2	N/A	Win 95/98/NT	PCI	N/A	6.25-50 kHz	20-bit
CreamWare	TripleDAT 2.5	2	2 channels S/PDIF	3.06	ISA	TripleDat	32, 44.1, 48 kHz	18-bit
CreamWare	Luna II	Stereo in/out	Stereo S/PDIF	36	PCI	Proprietary	22-96 kHz	24-bit/96 kHz
CreamWare	Elektra	Stereo in/out	Stereo S/PDIF	36	PCI	Proprietary	22-96 kHz	24-bit/96 kHz
CreamWare	PowerSampler	Stereo in/out	Stereo S/PDIF	2.5	PCI	Proprietary	22-96 kHz	24-bit/96 kHz
CreamWare	Pulsar 131	2	2 ADAT, 1 S/PDIF	Win	PCI	Proprietary	22, 32, 44.1, 48, 96 kHz	A/D 20-bit, D/A 24-bit
CreamWare	Pulsar II	2	2 ADAT, 1 S/PDIF	2.04a	PCI	Proprietary	22, 32, 44.1, 48, 96 kHz	A/D 20-bit, D/A 24-bit
CreamWare	Pulsar XTC	Optional	Optional	TBA	PCI	Proprietary	22-96 kHz	N/A
CreamWare	TripleDAT	2	2 channels S/PDIF	3.06	ISA	TripleDat	32, 44.1, 48 kHz	18-bit
Creative Labs	SBLive Value Edition	1/8" mic/line	N/A	Win 95/98/NT	PCI	EAX	8-48 kHz	16-bit
Creative Labs	Sound Blaster Live	1/8" mic/line	S/PDIF	Win 95/98/NT	PCI	EAX	8-48 kHz	16-bit
Digidesign	Digi 001	8 (2 w/ built-in mic preamps)	10/8 ADAT optical; 2 RCA S/PDIF	Mac, Win 98	PCI	RTAS	44.1, 48 kHz	24-bit
Digidesign	Digi ToolBox XP	Stereo inputs and outputs	Stereo S/PDIF	Mac; Win 98	PCI	RTAS	44.1, 48 kHz	18-bit
Digidesign	Pro Tools 24 Mix/Mix Plus	8-72 channels	8-72 channels	Mac; Win NT	PCI	RTAS; TDM; AudioSuite	48, 44.1 kHz	24-bit (with 888/24 I/O interface)
Digigram	VX Pocket Sound Card for Laptops	Stereo or dual mono, XLR	S/PDIF, coax	Win; Mac	PC CARD	DirectX	8-48 kHz	24-bit
Digigram	VX222 Professional Sound Card	2/2 XLR	2/2 S/PDIF; AES/EBU	Win; Mac	PCI	N/A	8-48 kHz	24-bit
Digital Audio Labs	CardDeluxe	2/2 1/4" TRS (gold tipped RCA)	Stereo S/PDIF	Win	PCI	Active Movie; DirectX	8-48 kHz	24-bit/128x/24-bit/64x
Digital Audio Labs	TDIF 2496 Pro 96 kHz	N/A	16	Win 95/98/NT	PCI	VST; AudioX	44.1, 48, 88.2 kHz	16-bit/24-bit
Echo	Mia	2/2 balanced 1/4", 8 virtual out	S/PDIF coaxial	Win 95/98/ME/2000; Mac	PCI	N/A	8-96 kHz	24-bit
Echo	Gina24	2/8 1/4"	S/PDIF; ADAT optical	Win 95/98/ME/NT/2000; Mac	PCI	N/A	8-96 kHz	24-bit
Echo	Layla24	8/8 1/4"	S/PDIF; ADAT optical	Win 95/98/ME/NT/2000; Mac	PCI	N/A	8-96 kHz	24-bit
Echo	Mona	4/6 universal XLR	S/PDIF; ADAT optical	Win 95/98/ME/NT/2000; Mac	PCI	N/A	8-96 kHz	24-bit
Edirol	ED U-8 USB Digital Studio	XLR; 1/4" guitar in, RCA in/out	Optical S/PDIF in/out	Win 98	USB	DirectX; VST	44.1 kHz	20-bit A/D D/A
Edirol	ED UA-100 Audio Canvas	RCA 1/4" (guitar/mic)	Optical S/PDIF out	Win 98	USB	DirectX; VST	44.1 kHz	20-bit A/D/A
Edirol	ED UA-30 USB Audio Interface	RCA in/out, 1/4" guitar/mic	Coaxial S/PDIF in/out, optical S/PDIF in/out	Win 98/2000	USB	DirectX; VST	44.1, 48 kHz	20-bit A/D/A



DIGITAL RECORDER RESOLUTIONS (MAX)	SYNC TYPES	MIDI CONTROL	TRACKS/VIRTUAL TRACKS	# OF LOCATE POINTS	EFFECTS/ DYNAMIC PROCESSING	ADDITIONAL FEATURES	PRICE
24-bit	Word clock; S/PDIF; ADAT	Yes	N/A	N/A	N/A	Shielded box & PCI card; Steinberg ASIO drivers; DSP monitor mixer	\$899
24-bit	MTC; S/PDIF	Yes	N/A	N/A	Y/Y	Including compressor, reverb, 3-band EQ	\$699
24-bit	MTC; S/PDIF	Yes	N/A	N/A	Y/Y	Digital patch bay; presets; 10 channel mixer; VU meters; 3-stage input trim	\$499
24-bit	MTC; S/PDIF; word clock	Yes	N/A	N/A	Y/Y	Digital patch bay; presets; 10 channel mixer; VU meters	\$999
24-bit	N/A	N/A	N/A	N/A	N/A	HIZ guitar/instrument input; headphone volume slider & jack	\$299
24-bit	MTC, MIDI clock; MMC, optional SMPTE/EBU	Yes	24/256	100	Y/Y	Support up to 5.1 surround; optional 30 GB internal IDE drive; CD-R, ASCII keyboard input, Ak Sys software for TrackView; USB port	\$4,995
24-bit	MIDI clock SPP; MMC, MTC	Yes	16/250	16 direct; 100 nameable	Y/Y	6-inch diag. tilting display; 0-link; real-time vocal pitch corrector; 20 GB internal hard drive; Mesa II PC remote software control	\$2,795
16-bit	MIDI clock SPP; MTC	Yes	12/250	12 direct; 100 nameable	Optional	20 GB internal hard drive; CD-R/CD-RW support; automated mixing; Mesa II Mac & PC remote software control	\$1,649
24-bit	ADAT sync in/out	Yes	16/8	16 (ADAT/ connect)	Y/Y	Sample-accurate transfer; zero latency monitoring; ASIO 2.0 support	\$399
N/A	SMPTE read/write; video	Yes	N/A	N/A	N/A	Video burning	\$895
N/A	LTC; VITC	No	4	N/A	N/A	Multi-card capability; Wintel & Alpha processor compatible	\$595
16-bit	MTC; MIDI clock; word clock	No	0/256	99	Y/Y	CD writing; moves effects presets to/from ext. devices; simul. digital/analog channels	\$920
24-bit/96 kHz	N/A	In/out	N/A	N/A	Y/Y	Ultra low latency interface with drivers; (3) SHARC DSPs; 24-ch mixer; 16-ch surround mixer	\$398
24-bit/96 kHz	N/A	In/out	N/A	N/A	Y/Y	Ultra low latency interface with drivers	\$598
24-bit/96 kHz	N/A	In/out	N/A	N/A	Y/Y	Resonant filters; editing features; Multi mode	\$598
24-bit	Optional sync. plate available	No	N/A	N/A	Y/N	Mixing and routing capabilities	\$1,298
24-bit	Optional sync. plate available	No	N/A	N/A	Y/N	Mixing and routing capabilities	\$1,398
N/A	N/A	N/A	N/A	N/A	Y/Y	Virtual synthesis; VST-based sampler	\$999
16-bit	MIDI time code; MIDI clock; word clock	No	0/256	99	Y/Y	CD writing; warp mode on analog and digital chans simul	\$920
16-bit	MIDI	No	N/A	N/A	Y/Y	Includes game software	\$99
16-bit	MIDI	No	N/A	N/A	Y/Y	Includes Cakewalk, Sound Forge, Mixman software and digital I/O card	\$199
N/A	ADAT; S/PDIF	Yes	N/A	Unlimited	Y/Y	MIDI I/O, sep. monitor and headphone outs, incl. Pro Tools LE and five DigiRack plug-ins	\$995
N/A	S/PDIF	Yes	N/A	Unlimited	Y/Y	Incl. Pro Tools LE and EQ, dynamics, delay, time comp/exp and pitch DigiRack plug-ins	\$545
N/A	LTC; VITC; MTC; Biphase; Pilot Tone; AES; EBU; S/PDIF; ADAT	Yes	64/128	Unlimited	Y/Y	ProControl support; Control/24 support; DigiRack plug-ins (EQ, dynamics, delay, time comp/exp, pitch shift) included	\$7,995-\$9,995
24-bit	SMPTE (LTR)	No	N/A	N/A	N/A		\$729
24-bit	N/A	No	N/A	N/A	N/A		\$549
24-bit	Internal; ext. digital	No	N/A	N/A	N/A	Multiple card support	\$595
24-bit	DTRS	No	N/A	2	N/A	Jog, shuttle & transport control of decks	\$495
24-bit	S/PDIF	No	N/A	N/A	N/A	8 virtual outputs; GSIF; WDM	\$249
24-bit	Esync; S/PDIF; ADAT	No	N/A	N/A	N/A	Headphone output; GSIF; WDM	\$495
24-bit	Word; MTC; S/PDIF; ADAT	Yes	N/A	N/A	N/A	Headphone output; GSIF; WDM	\$995
24-bit	Word; S/PDIF; ADAT	No	N/A	N/A	N/A	4 built-in m/c pre amps; phantom power; headphone	\$995
N/A	MIDI	Yes	Unlimited	N/A	Y/N		\$795
N/A	MIDI	Yes	Unlimited	N/A	Y/N	Built-in MIDI interface; includes software synthesizer	\$595
N/A	N/A	Yes	Unlimited	N/A	No	Includes Cool Edit Pro LE for Windows	\$325

# COMPUTER-BASED DAWS

MANUFACTURER	PRODUCT	ANALOG I/O	DIGITAL I/O	PLATFORM VERSION	BUS TYPE	PLUG-IN FORMATS SUPPORTED	SAMPLE RATE	A/D/A CONVERTER/ BIT RATE
Edirol	UA-3	RCA in/out, 1/4": guitar/mic 1/8" headphone	S/PDIF optical in/out	Win 98/2000/ME; Mac OS9	USB	N/A	44.1 kHz	20-bit A/D/A 20-bit D/A
EGO-Systems	Waveterminal U24	2 x 2, 1/4" phono jack	2 x 2, S/PDIF (coaxial, optical)	Win 98/2000	USB	DirectX	32, 44.1, 48 kHz	24-bit
EGO-Systems	Audioterminal 24	1/4" line/headphone; mic in	18/18 ADAT, AES/EBU; S/PDIF	Win 95/98/NT	PCI	DirectX	32-96 kHz	20-bit DAC
EGO-Systems	Audiotrak 2000	6 x 8 1/4"	2 S/PDIF (coaxial) out only	Win 95/98/2000	PCI	DirectX	32-48 kHz	A/D (20-bit); D/A (20-bit)
EGO-Systems	WaMi Rack 24	4 x 8 1/4" TRS bal/unbal	2 x 2, S/PDIF (coaxial, optical)	Win 95/98/2000; Mac	PCI	DirectX	32-96 kHz	24-bit
EGO-Systems	Waveterminal 2496	2 x 2, 1/4" TRS bal/unbal	2 x 2, S/PDIF (coaxial)	Win 95/98/2000; Mac	PCI	DirectX	8-96 kHz	24-bit
EGO-Systems	WaMi Box	2 x 4 RCA	2 x 2, S/PDIF (coaxial, optical)	Win 95/98/2000	PC CARD	DirectX	32, 44.1, 48 kHz	20-bit
Emagic	Audiowerk8 Surround kit	2/8 RCA	1/1 S/PDIF	Win, Mac	PCI	N/A	32-56 kHz	18-bit
Emagic	Audiowerk2	2/2 RCA (4 out with S/PDIF I/O)	S/PDIF	Win, Mac	PCI	N/A	44.1 kHz	D/A: 18-bit, A/D: 1-bit
Emagic	EMI 2/6	2/6 RCA	2/2 S/PDIF (coaxial)	Win ME/98/2000, Mac	USB	DirectX; VST	44.1, 48 kHz	D/A: 24-bit, A/D: 24-bit
E-mu Systems	Audio E-MU Production Studio	4/2	2 S/PDIF	Win 95/98	PCI	DirectX; VST via ASIO drivers	8-48 kHz	20-bit
E-mu Systems	PARIS Pro	8/8 TRS per module	S/PDIF, ADAT module	Mac; Win 95/98	PCI	DirectX; VST	44.1, 48 kHz	24-bit
Event Electronics	EZbus	XLR; 1/4" TRS all balanced	USB; ADAT optical; S/PDIF optical, S/PDIF coaxial	Mac; Win	USB	N/A	44.1-96 kHz	24-bit
Frontier Design	Dakota PCI card	8/8 (avail. with Tango 24)	16/16 ADAT optical; 2x2 S/PDIF	Win 95/98/ME	PCI	N/A	44.1 or 48 kHz	24-bit on Tango 24
Frontier Design	WaveCenter/PCI	8/8 (avail. with Tango 24)	8/8 ADAT optical; S/PDIF (Toslink or RCA)	Win 95/98/ME; Mac	PCI	N/A	44.1 or 48 kHz	24-bit on Tango 24
Gadget Labs	Wave624 Digital Interface	8/8	2/2	Win 95/98/NT; Mac	PCI	N/A	22, 32, 44.1, 48 kHz	24-bit
Guillemot	Maxi Studio Isis	8/4 1/4"	2/2 S/PDIF (optical and coaxial)	Win	PCI	DirectX	32, 44.1, 48 kHz	20-bit
Korg	OASYS PCI Version 2.0	24-bit stereo +4dBu, 1/4"	24-bit ADAT, S/PDIF; BNC word clock	Mac; Win	PCI	SynthKit; VST; MAS, DirectX	44.1, 48 kHz, external clock	24-bit
Lynx	LynxONE	Two-channels, balanced	Two-channels, 24-bit, AES/EBU or S/PDIF	Win 95/98/NT/2000; Mac; Linux	PCI	N/A	8-48 kHz (analog); 32-96 kHz (digital)	24-bit
Lynx	LynxTWO	4/4	4/4; ADAT, TDIF	Win 95/98/NT/2000; Mac; Linux	PCI	N/A	8-192 kHz (analog); 32-96 kHz (digital)	24-bit
M Audio	Audiosport Quattro	4x4 TRS	N/A	Mac; Win ME/ 2000, ASIO 1/2	USB	Direct X; VST	44.1, 48, 96 kHz	24-bit/128x
M Audio	Audiophile 2496	2x2 RCA	S/PDIF coaxial	Mac; Win 95/98/ 2000/NT; Linux; DirectX; GSIF	PCI	Direct X; VST	8-96 kHz	24-bit/128x
M Audio	Omni Studio	4x4 1/4" TRS	2x2 S/PDIF coaxial	Mac; Win 95/98/ 2000/NT; Linux; GSIF	PCI	Direct X; VST	8-96 kHz	24-bit/128x
M Audio	Delta TDIF	Analog stereo	TDIF, S/PDIF stereo, word clock out	Mac; Win 95/98/ 2000/NT; Linux; GSIF	PCI	Direct X; VST	8-96 kHz	24-bit/128x
Mark of the Unicorn	MOTU 2408mkII	8/2	S/PDIF, ADAT Lightpipe, TDIF, S/PDIF	Mac; Win	PCI	All native	44.1, 48 kHz	24-bit
Mark of the Unicorn	MOTU 1224	8 in/10 out; bal +1/4" TRS	AES/EBU	Mac; Win	PCI	All native	44.1, 48 kHz	24-bit
Mark of the Unicorn	MOTU 24i	24 bal +4 TRS inputs/ 2 bal +4 TRS outputs	S/PDIF (RCA and Toslink) out	Mac; Win	PCI	All native	44.1, 48 kHz	24-bit
Mark of the Unicorn	MOTU 3008	None	8 AES/EBU; 8 RCA coax S/PDIF; 8 optical S/PDIF (Toslink)	Mac; Win	PCI	All native	44.1, 48 kHz	N/A
Mark of the Unicorn	MOTU 828	8/8 TRS (2 XLR combo)	2/2 S/PDIF or optical 8/8 ADAT optical	Win ME/2000	Firewire (IEEE 1394)	All native	44.1, 48 kHz	24-bit A/D/A
Mark of the Unicorn	MOTU 1296	12 bal +4 XLR in/out	AES/EBU	Mac; Win	PCI	All native	44.1, 48, 88.2, 96	24-bit
Merging Technologies	Myerling PCI Audio Board	Optional 24-bit/96 kHz	ADAT; S/PDIF; MADI; AES/EBU, TDIF	Win NT/2000	PCI	Native; DirectX	32-192 kHz	



DIGITAL RECORDER RESOLUTIONS (MAX)	SYNC TYPES	MIDI CONTROL	TRACKS/VIRTUAL TRACKS	# OF LOCATE POINTS	EFFECTS/ DYNAMIC PROCESSING	ADDITIONAL FEATURES	PRICE
16-bit	None	N/A	2 mono/1 stereo	N/A	None	USB Powered	\$228
16/24-bit	S/PDIF	No	N/A	N/A	No	4-ch full duplex in and out (analog and digital)	\$270
24-bit	Word clock; S/PDIF; ADAT sync; MTC	Yes	N/A	N/A	No	Sound card and monitoring control panel; 32-ch MIDI support	\$6992
16-bit	MTC	Yes	N/A	N/A	Y/N	2 mic preamps w/phantom power, dual headphone amps	\$399
24-bit	Word clock; S/PDIF; SMPTE; MTC	Yes	N/A	N/A	N/N	MIDI I/O; 4 mic preamps w/ phantom; ASIO, 2.0, EASI and GSIF drivers; 4 units stackable	\$770
24-bit	Word clock; S/PDIF	No	N/A	N/A	N/N	ASIO 2.0, EASI, and GSIF drivers	\$430
16-bit	MTC	Yes	N/A	N/A	N/A	Mic preamp, headphone amp, internal digital mixer, MPU-401 MIDI interface, reverb, delay, chorus, EQ, more	\$600
N/A	Digital in	No	N/A	N/A	N/A	Bundled w/Logic Surround	\$499
N/A	Digital in	Yes	N/A	N/A	N/A	Incl. Logic Audio Composer (PC), MicroLogic AV (Mac), Waveburner & Zap (both platforms)	\$299
24-bit	Word clock	N/A	Software dependent	N/A	N/A	N/A	\$499
20-bit	MTC	Yes	N/A	N/A	Y/Y	Drive bay I/O; guitar/mic preamps	\$699
24-bit	MTC; SMPTE; ADAT (master only); word clock	Yes	128	99	Y/Y	Independently configurable pre/post; +48V phantom power; phase invert; automatic error detection/reporting; programmable footswitch	\$849
24-bit	Word clock	Yes	N/A	8	Y/Y	Independently configurable pre/post; +48V phantom power; phase invert; automatic error detection/reporting; programmable footswitch	\$849
24-bit	ADAT; MTC; SoDA (SMPTE on digital audio);	No	N/A	N/A	N/A	ASIO 2.0, GigaSampler drivers; optional 8x8 MIDI I/O; includes Cool Edit Pro SE, ADAT optical exp. from 16 to 32 channels	\$449-\$899
24-bit	MTC	No	N/A	N/A	N/A	2x2 MIDI I/O; ASIO 2.0 and GigaSampler drivers	\$329-\$789
24-bit	MTC; word clock	Yes	N/A	N/A	N/A	MIDI port included; optional S/PDIF card	\$500 and up
16-bit	MTC; MC	Yes	8/infinite	N/A	Y/N	MIDI I/O thru via external rack	\$399
24-bit	BNC word clock; MIDI clock; timecode	Modulatable via MIDI	Host dependent	Host dependent	Y/Y	Current OASYS owners will be able to update their existing OASYS to 2.0 with new driver when available	\$2,200
24-bit	AES/EBU; word clock; superclock	Yes	N/A	N/A	N/N	XLR audio and MIDI/clock I/O cables included	\$549
24-bit	AES/EBU; word clock; superclock; SMPTE; NTSC	Yes	N/A	N/A	Low latency 32 ch	6-foot XLR audio cable; 2-foot sync cable; LS-ADAT; LS-TDIF	\$1,095
24-bit	N/A	N/A	N/A	N/A	N/A	Hardware monitoring; ASIO 1/2, Mac & Win support	\$400
24-bit	Multicard sync	MIDI 1x1	N/A	N/A	N/A	On-board digital mixing; routing and monitor controls; SCMS, ASIO 1/2, EASI, GSIF; DirectX	\$230
24-bit	Multicard sync	N/A	N/A	N/A	N/A	Split console design; 2 mic pres have inserts; 2 line inputs; 4 stereo aux inputs; effects send; monitor outs; 4 direct outs; stereo record outs; 2 headphone outs	\$700
24-bit	Multicard sync	N/A	N/A	N/A	N/A	On-board digital mixing; routing and monitor controls; SCMS, ASIO 1/2, EASI, GSIF; DirectX Multi card for Mac and Win includes breakout cable LR sync	\$350
24-bit	Word clock; lightpipe; ADAT sync; DTP sync	N/A	Host dependent	Host dependent	Y/Y	Works as standalone format converter; sample-accurate ADAT/Tascam transfers	\$695-\$995
24-bit	Word clock ADAT sync, AES/EBU	N/A	Host dependent	Host dependent	Y/Y	116dB S/N A-weighted on inputs and XLR main outs; front-panel headphone control	\$1,295
24-bit	Internal; word clock (in/out); ADAT sync (in)	N/A	Host dependent	Host dependent	Y/Y	111dB S/N A-weighted; accepts -10dB input w/software boost; front-panel headphone	\$1,195-\$1,495
24-bit	Internal; word clock; AES/EBU; S/PDIF; Toslink	N/A	Host dependent	Host dependent	N/A	Standalone format conversion of up to 8 ch at a time	\$695
24-bit	ADAT sync (sample- accurate, lightpipe	N/A	Host dependent	N/A	Host dependent	CueMix Plus™ no-latency monitoring; 2 mic inputs with mic pre-amps; front panel trims; main out volume knob	\$795
24-bit	Internal; word clock; AES/EBU; independent AES word in	N/A	Host dependent	Host dependent	Y/Y	117dB S/N A-weighted; supports 5.1 surround I/O; AES/EBU I/O rate converters	\$1,795-\$2,095
32-, 24-, 16-bit	SMPTE, VITC, MTC	Yes	64/64	N/A	Yes	Built-in 2-bit/96 kHz output monitoring	\$1,995

# COMPUTER-BASED DAWs

MANUFACTURER	PRODUCT	ANALOG I/O	DIGITAL I/O	PLATFORM VERSION	BUS TYPE	PLUG-IN FORMATS(S) SUPPORTED	SAMPLE RATE	A/D/A CONVERTER / BIT RATE
Merging Technologies	PyraMix Virtual Studio 3.3	Optional 24-bit/96 kHz	ADAT, S/PDIF, MADI, AES/EBU, TDIF	Win NT/2000	PCI	Native, DirectX	32-92 kHz	24-bit
Micro Technology	MicroSound/Krystal	2/2	AES/EBU, S/PDIF	Win	PCI	DirectX	8-48 kHz	16-bit
Midiman	DMan PCI	2/2 RCA gold	N/A	Win 95/98/NT	PCI	MME, DirectX	44.1, 48 kHz	18-bit
Mytek Digital	DAW 9624	8/8 XLR (expandable)	4 pairs AES/EBU, ADAT (optional TDIF)	Mac, Win 95/NT, BeOS, Linux	PCI	VST, DirectX	44.1, 48, 88.2, 96 kHz	24-bit
SADiE	Artemis	8/16/24/32 ch	8/1624/32 AES/EBU	Win	N/A	Cedar, Syncroarts, DirectX, POW-r, Apogee	Up to 192 kHz	24-bit
SADiE	SADiE 24 96	8/16/24/32 ch	8/16/24/32 AES/EBU	Win	N/A	Cedar, Syncroarts, DirectX, POW-r, Apogee	Up to 192 kHz	24-bit
SeaSound	Solo Ex	2x2	2x2	Mac, Win	PCI	VST, DirectX	96 kHz	All rates 8-bit to 24-bit
SeaSound	Soloist	2x2	2x2	Mac, Win	PCI	VST, DirectX	96 kHz	All rates 8-bit to 24-bit
SeaSound	Solo Expander	6x6	N/A	Mac, Win	PCI	VST, DirectX	44.1 to 96 kHz	All rates 8-bit to 24-bit
SEK'D	SampleRate 2496	N/A	N/A	N/A	N/A	DirectX	N/A	N/A
SEK'D	Prodiif 24	1 TRS out	1 Toslink, 1 TRS, 1 AES/EBU	Win 95/98	ISA	N/A	32, 44.1, 48 kHz	18-bit
SEK'D	ARC88	8/8	1 Toslink, S/PDIF	Win 95/98/NT, Mac	PCI	N/A	32, 44.1, 48 kHz	16-bit
SEK'D	Prodiif 88	2x balanced out	8x AES/EBU in/out on XLR	Win 95/98/NT/2000/ME	PCI	N/A	44.1, 48, 88.2, 96 kHz	24-bit/96 kHz
SEK'D	Prodiif 96 Pro	1/1 stereo 96 kHz	S/PDIF, AES/EBU, ADAT	Win 95/98/NT/2000, Mac	PCI	N/A	11-96 kHz	20-bit
SEK'D	Prodiif Plus	1/1 stereo 48 kHz	S/PDIF, AES/EBU, ADAT	Win 95, 98, NT, Mac	PCI	N/A	11-96 kHz	20-bit
SEK'D	Prodiif T 2496	N/A	2xTDIF I/O	Win 95/98/ME/NT/2000/MME/AS10	PCI	N/A	44.1, 48, 96 kHz	N/A
SEK'D	Siena	8	No	Win NT/95/98, Mac	PCI	DirectX	96 kHz	24-bit
SEK'D	Sequolia	N/A	N/A	Win 95/98/ME/NT	N/A	DirectX	22-192 kHz	N/A
Sonorus	STUDIO	Stereo monitor output	16 via 2x8 ADAT optical interfaces	Win 98/NT/2000, Mac, BeOS, Linux	PCI	N/A	44.1, 48, 88.2, 96 kHz	N/A
Sonorus	USB Studio/USB Studio D	2 mic; 2 instrument; 2 phono; 4 line in; 2 line out; phone out	USB Studio D w/2 S/PDIF I/O	Win, Mac	USB	N/A	44.1, 48 kHz	20-bit/128x
Soundscape	REd Recorder/Editor/Digital Audio Workstation	2in/4out 24/96 XLR board (option)	24 TDIF, 2x4 AES/EBU	Win 95/98/NT4/2000/ME	ISA, PSI	Soundscape real-time DSP and XPro	Up to 96 kHz	24-bit
Soundscape	Mixtreme PCI Card	Up to 16 with optional 'iBox' AD/DA interfaces	2 TDIF, S/PDIF optional	Win 95/98/NT4/2000	PCI	Soundscape proprietary real-time DSP	Up to 48 kHz 96kHz with external superclock	24-bit with converter boxes
Soundscape	Mixtreme 2000 Digital PowerPAK	2 in/out via 'iBox 2-Line' interface	16 TDIF	Win 95/98/NT/2000	PCI	Soundscape real-time DSP	Up to 48kHz 96kHz with external superclock	24-bit
Steinberg	Nuendo 1.5	Depends on soundcard	Depends on soundcard	Win, Mac	N/A	VST, Direct X	Up to 96 k, Depends on Soundcard	24-bit, Depends on Soundcard
Steinberg	Nuendo Surround Bundle 1.5	Depends on soundcard	Depends on soundcard	Win, Mac	N/A	VST, Direct X	Up to 96 k, Depends on Soundcard	24-bit, Depends on Soundcard
Swissonic	USB Studio D USB Studio	16/4 Stereo TRS in; 2 mic	S/PDIF	Win, Mac	N/A	N/A	N/A	16-bit
TASCAM	US-428	2/XLR; 4/ 1/4" bal; unbalanced out	S/PDIF	Mac, Win	USB	N/A	44.1 kHz	24-bit A/D/A
TerraTec	EWS88MT AudioSystem	8 simultaneous inputs/outputs	2 S/PDIF	Win	PCI	DirectX	96 kHz	24-bit
TerraTec	EWS64XXL	2 stereo inputs/outputs; 1 stereo mic input	1 coax/1 optical in; 2 coax outs	Win	ISA	DirectX	48 kHz	18-bit
TerraTec	EWS64X AudioSystem	2 stereo inputs/outputs; 1 stereo mic input	2 in (opt & coax), 2 out (coaxial)	Win	ISA	DirectX	48 kHz	18-bit



DIGITAL RECORDER RESOLUTIONS (MAX)	SYNC TYPES	MIDI CONTROL	TRACKS/VIRTUAL TRACKS	# OF LOCATE POINTS	EFFECTS/DYNAMIC PROCESSING	ADDITIONAL FEATURES	PRICE
32-, 24-, 16-bit	SMPTE; VITC; MTC; word clock	Yes	Unlimited	Unlimited	Y/Y	Built-in CD mastering tools; automatable surround mixing grid; DSP pack	\$3,990
24-bit	Video black burst; SMPTE (all, optional)	No	Infinite	32,767	Y/Y	Can edit and mix CD-ROM master files	\$1,595 and up
16-bit	MIDI Clock	Yes	N/A	N/A	Y/N	Internal CD-ROM connector	\$180
32-bit, depending on 3rd party shwr	Word clock; video; (SMPTE w/extra hardware)	Yes	8 (expandable)/64	N/A	Optional	Various format DIO cards for 8x96	\$6,495
32-bit floating point	SMPTE; VITC; AES sync	No	Variable/unlimited	Unlimited	Y/Y	Surround panning; clip-based automation; standard PQ editing	\$15,495 (turnkey incl. PC and hard drive)
32-bit floating point	SMPTE; VITC; AES sync	No	Variable/unlimited	Unlimited	Y/Y	Surround panning; clip-based automation; standard PQ editing	\$12,995 (turnkey incl. PC and hard drive)
N/A	S/PDIF clock; MIDI Time Code	No	Depends on computer and software of choice	N/A	N/N	4 mic/guitar preamps; dual headphone amps; MIDI I/O/Thru; S/PDIF I/O	\$850
N/A	S/PDIF clock; MIDI Time Code	No	Depends on computer and software of choice	N/A	N/N	1 mic pre-amp; 1 guitar pre-amp; monitor mixer; 1 headphone amp; MIDI I/O	\$500
N/A	S/PDIF clock; MIDI Time Code	No	Depends on computer and software of choice	N/A	N/N	Built-in monitoring; front-panel +/-10 switches; 6-segment VU's w/source switching	\$430
999	N/A	N/A	N/A	N/A	N/A	5.1 surround; CD burning; multiband dynamics; diiter/noiseshaping; FFT analysis	\$319
24-bit	AES/EBU; S/PDIF (dual card)	No	1 stereo track	N/A	N/A		\$599
24-bit	S/PDIF (dual card)	No	8	N/A	N/A	Input gain amplifier	\$599
24-bit	Word clock	No	N/A	N/A	N/A	N/A	\$699
24-bit	Word clock in; ADAT PLL Lock; AES; S/PDIF	No	10 tracks	N/A	N/A	Direct digital input from CD-ROM	\$799
24-bit	ADAT PLL Lock; AES; S/PDIF	No	10 tracks	N/A	N/A	Direct digital input from CD-ROM	\$549
24-bit	DTRS	No	N/A	N/A	N/A		\$599
24-bit	MTC; MIDI Clock	Yes	Unlimited	Unlimited	N/N	Built-in MIDI data filter driver	\$599
32-bit	MTC; MC	Yes	System/999	Unlimited	N/A	EQ; comp; echo; reverb; FFT; convolution; declipping; denoising; stereo enhance; MIDI; CD burning; surround	\$2,999
24-bit	MTC	No		N/A	N/A		\$849
N/A	N/A	N/A	N/A	N/A	N/A	Stereo input VU meter; phantom powered; insert jacks	\$699 (Studio); \$849 (Studio D)
24-bit	LTC; VITC; BITC and video; RS 422; word clock/superclock; TDIF & AES/EBU	Yes	32/256	999	Y/Y	Optional terabyte storage; networkable; dynamic mix automation; cue sheet print; R.Ed. sync board optional	\$6,295
24-bit	Word clock/Superclock I/O; video sync (option); TDIF sync; S/PDIF sync (option)	Yes	32/256	0	Y/Y	Includes multimedia drivers; ASIO 2.0 and Gigasampler drivers; real-time mixing/effects	\$549
24-bit	Word clock/Superclock I/O; video sync (option); TDIF sync; S/PDIF sync (option)	Yes	32/128	0	Y/Y	Incl. Gigasampler LE, Gigapiano, Sound Forge XP, Acid Style, Seer Surreal & more	\$999
24-bit	VITC, LTC, Word Clock, SMPTE, MIDI Timecode	Yes	128	Unlimited	Y/Y	Surround sound built in, EDL, Unlimited undo with history, VST Instruments, Import OMF files, Import REX files, Import Cubase Songs, Open TL	\$1,299
24-bit	VITC, LTC, Word Clock, SMPTE, MIDI Timecode	Yes	128	Unlimited	Y/Y	8 Channel Surround Plug-ins	\$1,299
N/A	N/A	N/A	N/A	N/A	N/A	19" rack-mount mixer with USB interface for Mac or Windows	\$699-\$849
24-bit	N/A	Yes	N/A	N/A	N/A		\$625
24-bit	N/A	Yes	N/A	N/A	N/N	Includes internal/external breakout box; fully routable I/O	\$599
N/A	N/A	Yes	N/A	N/A	Y/N	Sample RAM upgradable to 64 MB	\$1,199
N/A	N/A	Yes	N/A	N/A	Y/N	Sample RAM upgradable to 64 MB	\$599

# COMPUTER-BASED DAWs

MANUFACTURER	PRODUCT	ANALOG I/O	DIGITAL I/O	PLATFORM VERSION	BUS TYPE	PLUG-IN FORMATS(S) SUPPORTED	SAMPLE RATE	A/D/A CONVERTER/ BIT RATE
TerraTec	EWS64L AudioSystem	2 stereo inputs/outputs; 1 stereo mic input	No	Win	ISA	DirectX	5-48 kHz	18-bit
TerraTec	SoundSystem DMX	1 stereo line input; 2 stereo outputs	Coaxial and optical	Win	PCI	DirectX	32, 44.1, and 48 kHz	8/16-bit
TerraTec	SoundSystem XLerate PRO	1 stereo line input; 2 stereo outputs	1 optical output	Win	PCI	DirectX	32, 44.1, 48 kHz	8/16-bit
TerraTec	SoundSystem XLerate	Stereo line input; stereo mic input; switchable stereo speaker/line output	No	Win	PCI	DirectX	Up to 48 kHz	8/16-bit
TerraTec	SoundSystem Base 2	1 stereo line input; 1 stereo mic input; switchable stereo speaker/line output	No	Win	PCI	DirectX	Up to 48 kHz	8/16-bit
Voyetra	Pinnacle Project Studio	3/1	Coaxial S/PDIF	Win 3.1/95/98/NT	ISA	N/A	Up to 48 kHz	20-bit
Voyetra	Montego II Home Studio	1/2	S/PDIF (RCA or optical)	Win 95/98/NT	PCI	N/A	Up to 48 kHz	18-bit
Xyitar	Audio Digital Mastering System (ADMS32)	8/8	S/PDIF; AES/EBU; ADAT optical	Win	PCI	Proprietary; DirectX	11.025-48 kHz	20-bit
Yamaha	DSP Factory	2/2 RCA	2/2 S/PDIF or AES/EBU (coaxial)	Win 95/98/NT; Mac	PCI	Software-dependent	44.1, 48 kHz	20-bit
YRS MIDI Systems	Digital Audio Workstation	8/8 RCA	2/2 S/PDIF (coaxial)	Win 98	PCI	VST; Direct X	8-96 kHz	A/D 24-bit; D/A 24-bit
Zoom	PS-02	2/1 mini, 1/4"/1/4"	N/A	Zoom OS	N/A	N/A	31.25	A/D 20-bit; D/A 20-bit

## From page 61—PITCH SHIFTING

If you have enough dough, you can buy an intelligent pitch shifter, which includes the Eventide Harmonizer brand of effects processors (such as the H3000, H3500, and H4000), DigiTech's Vocalist line, and Lexicon's PCM 80 with pitch-shifting card. These devices can actually "quantize" the pitch of all incoming notes to the nearest pitches within a specified scale. This automatically corrects the pitch of all notes in a performance, which is a lot easier than the note-by-note process described previously.

Intelligent pitch-correction works well if there are only a few bad notes; set the shifter to correct only those notes, leaving other notes untouched. However, if most of the notes need correction, the end result can sound pretty artificial. This is more problematic for lead tracks than background parts.

The latest and greatest approach to pitch correction is to use software plug-ins with a DAW. For example, several pitch-shifter plug-ins are available for such digital audio editing programs as Sonic Foundry's Sound Forge for Windows

(which supports the Microsoft DirectX plug-in format) and Digidesign's Pro Tools for Macintosh (which supports the company's TDM and AudioSuite formats). These plug-ins generally let you correct pitch problems precisely, and in many cases you can automate the process.

## TRANSPPOSITION

Pitch shifting by intervals larger than a semitone is called transposition. Octave doubling is one of the most common forms of parallel transposition. Most people double a part an octave below the original pitch, which sounds less artificial than shifting an octave higher. In fact, the ear is much more sensitive to artifacts in signals that are up-shifted, so it's a good idea to keep large upward shifts to a minimum (unless you like a helium-inspired chipmunk effect). This is another situation in which pitch-shifting software offers an advantage. Many pitch-shifting programs

can preserve the formants of the original signal during transposition, thus avoiding the chipmunk effect.



Guitarists and keyboardists can produce some wild effects by using this Boss PS-3 Digital Pitch Shifter/Delay stompbox.

Most pitch shifters can also produce parallel lines at intervals other than the octave. For example, trumpeter Jon Hassell often uses a pitch shifter to double his melodies a perfect fourth below the original pitch. He also uses a unit with several shifters so that he can produce parallel chords, which is a wonderful effect. Some multishifters also let you specify a different set of transpositions for all 12 chromatic notes.

At the next level of sophistication, intelligent pitch shifters can do much more than automatically correct out-of-tune performances. In most cases, they can



DIGITAL RECORDER RESOLUTIONS (MAX)	SYNC TYPES	MIDI CONTROL	TRACKS/VIRTUAL TRACKS	# OF LOCATE POINTS	EFFECTS/DYNAMIC PROCESSING	ADDITIONAL FEATURES	PRICE
N/A	N/A	Yes	N/A	N/A	Y/N	Sample RAM upgradable to 64 MB	\$449
N/A	N/A	Yes	N/A	N/A	Y/N		\$199
N/A	N/A	Yes	N/A	N/A	Y/Y		\$99
N/A	N/A	Yes	N/A	N/A	Y/N		\$80
N/A	N/A	Yes	N/A	N/A	N/N		\$60
20-bit	SMPTE; MTC	Yes	System dependent	N/A	Y/N	Includes Digital Orchestrator Pro, wavetable sampler, patch editor/librarian software	\$460
18-bit	SMPTE; MTC	Yes	System dependent	N/A	Y/Y	Includes Digital Orchestrator Pro; Roland GS-compliant wavetable daughter card	\$299
16-bit	SMPTE; MTC; 30d; 30nd; 29.97d; 29.97nd	Optional	32/unlimited	Unlimited	Y/Y	Incl. 17" monitor, 32-ch mic mixer, CD-R burner, Jaz drive, MP3 encoder/decoder	\$7,499
32-bit (16- and 20-bit available)	Software/hardware-dependent	Yes	16/software-dependent	N/A	Y/Y	Real-time mixing; 2 card cascade for 32-track playback; all parameters can be automated	\$999
24-bit	All	Yes	128	9	Y/Y	Customized to your specifications	\$1,200-\$2,400
N/A	N/A	N/A	3/10 each	N/A	Y/Y	50 effects, 6 at once; built in mic; SMART media card	\$625

also transpose intelligently. To use such a device, specify a key and the type of intervals you want, and the shifter transposes each input note appropriately for that key.

For example, suppose you specify the key of C major and the intervals of a third up and a fourth down. If you play a C, the shifter produces an E (a major third above) and a G (a perfect fourth below); if you play a B, the shifter produces a D (a minor third above) and an F (an augmented fourth below). Both chords are diatonic to the key of C major.

Intelligent pitch shifters let you do some remarkable things. For example, you can create an entire vocal harmony part in real time with a single singer. A horn player can become a horn section with appropriate chord voicings on each note. (No horn section has absolutely perfect timing, however. If your pitch shifter has multiple outputs or internal delay lines, you can make the horn-section effect more realistic by adding slightly different, very short delays to each note.) Even if the musician hits a note slightly sharp or flat, the harmonies re-

main in tune, thanks to pitch quantization.

Some intelligent shifters also let you specify the intervals on the fly from a MIDI keyboard. As each note in the audio track enters the shifter, you can play a chord on the keyboard, which tells the shifter what intervals to produce. The



**DigiTech's The Vocalist is an intelligent pitch shifter designed specifically for vocals.**

actual notes you play on the keyboard are not used; only the intervals between them. This lets you create any chords you want in real time, even different chords for the same input note at different times.

Combining transposing pitch shifters and delays can be lots of fun. Most multi-

effects processors include both types of signal processing, as do some stompboxes, such as the Boss PS-3. Sending a delayed signal into a pitch shifter can create some great arpeggiation or "stairstep" effects if there is a feedback path from the output of the pitch shifter to the input of the delay.

For example, if you specify a delay time of a few hundred milliseconds and a shift interval of a minor third upward with some feedback, you get an upwardly arpeggiating diminished chord that fades out over time. You could also try this with a shift interval of a perfect fourth or fifth upward for soothing quartal or quintal arpeggios. In multi-shifter units, you can specify simultaneous upward and downward shifts for an even wilder effect.

Clearly, pitch shifters are powerful creative tools for studio recording or live performance. However, they require some experimentation to get the most out of them. So find the pitch shifter in your multi-effects box and get to know its capabilities. A wonderful world of sonic manipulation awaits. ■

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# DIGITAL AUDIO CONVERTERS

MANUFACTURER	PRODUCT	CONVERTER TYPE/#	ADC RESOLUTION, OVER SAMPLING	DAC RESOLUTION	SAMPLE RATE(S)	SAMPLE RATE CONVERSION	OTHER	ANALOG I/O #/TYPE
Alis	AI3	A/D (8); D/A (8)	24-bit/128x	24-bit/128x	48 kHz	No	No	8/ 1/4" TRS
Apogee Electronics	PSX-100	2-channel A/D; D/A	24-bit Delta-Sigma	24-bit Delta-Sigma	44.1, 48, 88.2, 96 kHz	No	UV 22HR	XLR
Apogee Electronics	Rosetta AD	2-channel A/D conversion	24-bit Delta-Sigma	N/A	44.1, 48 kHz (Rosetta 48); 44.1, 48, 88.2, 96 kHz (Rosetta 96)	No	UV 22HR	XLR bal/unbal
Apogee Electronics	Trak2	2-channel mic pre w/24/96 A/D, 8-ch routing & dig I/O	24-bit Delta-Sigma	24-bit (optional)	44.1, 48, 88.2, 96 kHz	No	UV 22HR	XLR bal/unbal
Apogee Electronics	8-ch Converter Cards for Yamaha Systems	N/A	24-bit Delta-Sigma	24-bit	44.1, 48, 88.2, 96 kHz	No	N/A	4 dBv; 18 dBu; 24 dBu
Behringer	Ultramatch SRC2000	N/A	N/A	N/A	N/A	Yes	N/A	N/A
Benchmark	ADA 2008	A/D; D/A	20-bit/64x	20-bit	44.1, 48 kHz; varispeed (28-54 kHz)	N/A	No	XLR
Benchmark	AD2404-96	A/D (4)	24-bit/128x	N/A	44.1, 48, 88.2, 96 kHz; varispeed	N/A	Yes	4/XLR
Benchmark	AD2408-96	A/D	24-bit/128x	N/A	44.1, 48, 88.2, 96 kHz; varispeed	N/A	Yes	8/XLR
Crane Song	HEDD-192	A/D; D/A	24-bit	24-bit	44.1, 48 kHz	No	N/A	XLR
dB Technologies	MAD•824	A/D	24-bit/128X	N/A	40-100 kHz	Yes	Yes	XLR
dB Technologies	MDA•824	D/A	N/A	24-bit/64X	40-100 kHz	Yes	Yes	XLR
Denecke Inc	Denecke AD-20	A/D	20-bit/128x	No	44.1 kHz	N/A	Yes	XLR in; RCA line in (optional)
Fostex	COP-1/96k	A/D; D/A	N/A	N/A	32-96 kHz	N/A	N/A	None
Fostex	VC-8	ADAT optical to analog	20-bit	20-bit	32, 44.1 and 48 kHz	N/A	N/A	8/ 1/4"
Frontier Design	Tango24	A/D (8); D/A (8)	24-bit/128x	24-bit/128x	44.1, 48 kHz; 39-51 kHz from external clock	N/A	N/A	8/ 1/4" balanced TRS
Genex	GXA8 ADC	A/D (8)	24-bit	24-bit	192	No	Yes	8/XLR
Genex	GXD8 DAC	D/A (8)	24-bit	24-bit	192	No	Yes	8/XLR
iZ Technology Corp.	VFC-24	Digital format converter	N/A	N/A	32-48 kHz	No	No	N/A
Lucid	DA9624	D/A (2)	N/A	24-bit/128x	96, 88.2, 48, 44.1, 32 kHz	Yes	No	2/TRS; XLR
Lucid	AD9624	A/D (2)	24-bit/128x	N/A	96, 88.2, 48, 44.1, 32 kHz	Yes	Yes	2/XLR
Lucid	ADA8824 (Sonic)	A/D/A (8 ch)	24-bit/128x	24-bit/128x	44.1, 48 kHz	Yes	No	8/XLR
Lucid	ADA8824 (ADAT)	A/D/A (8 ch)	24-bit/128x	24-bit/128x	44.1, 48 kHz	Yes	No	8/XLR
Lucid	SRC9624	Sample rate converter	N/A	N/A	32-100 kHz	Yes	Yes	N/A
M-Audio	C03	Format converter: S/PDIF; Toslink; AES/EBU	N/A	N/A	All	all	N/A	N/A
M-Audio	SuperDAC 24/96	D/A	N/A	24-bit/128x	22-100 kHz	N/A	N/A	2/TRS; 2/XLR
Merging Technologies	Sphynx Modular High Resolution Audio Interface	N/A	24-bit	24-bit	32, 44.1, 48, 64, 88, 96 kHz	Yes	Yes	8/ 1/4"; ADAT
Midiman	Flying Calf DA/24bit	D/A	N/A	24-bit/128x	All	No	No	2/ 1/4" out



DIGITAL I/O #/TYPE	WORD CLOCK I/O	VIDEO INPUT SYNC	RF FILTERING	THD	DYNAMIC RANGE	SPECIAL FEATURES	PRICE
ADAT (optical)	No	No	Yes	0.0025%	96 dB	Signal/clip mtrng; optical out source switch	\$499
AES/EBU; S/PDIF; ADAT; TDIF	Yes	Optional	Yes	-112 dB (-0.1 dBFS A-weighted)	> 119 dB (-60 dB A-weighted)	3 modes enable cross-connection of A/D & D/A; format conversion; ABS/ABS96 bit-splitting; low jitter clock	\$1,995–\$2,995
AES/EBU; S/PDIF (coax/opt); ADAT; TDIF	Yes (out only)	No	Yes	-112 dB (-0.1 dBFS A-weighted)	> 119 dB (-60 dB A-weighted)	Upgradable from 44.1/48 to add 88.2/96 kHz; pro/cnsmr analog in	\$2,995
2-ch AES/EBU; S/PDIF; other interfaces on plug-in cards	Yes	Optional	Yes	-112 dB A-weighted (A/D)	> 119 dB -60 dB A-weighted (A/D)	2-ch mic pre; phantom power; line mic and instrument level inputs; format conversion; AMBus digital I/O cards; low jitter clock	\$3,995
4 dBv; 18 dBu; 24 dBu	N/A	N/A	Yes	-105 dB (A/D), -103 dB (A/D)	117 dB A-weighted (A/D); 116 dB A-weighted (D/A)	8 ch converters; same cards fit both YGDAI (02R) and Mini-Y (01V) slots; AP8AD card features soft limit	\$1,495 (AP8AD) \$1,195 (AP8DA)
AES/EBU; S/PDIF	Yes	N/A	N/A	0.001%	95 dBFS	SCMS copy-bit and emphasis-bit removal	\$169
AES; ALR; BNC	No	No	Yes	0.0004% @ -1 dB FSD (20 Hz-20 kHz)	110 dB (20 Hz-20 kHz)	128 dBFS (0.00004%) @ -1 dBFS DCCIF IM	\$4,285
2/AES; 3/XLR; S/PDIF	No	No	Yes	0.00003% @ 1dB FSD (20 Hz-20 kHz)	117 dB (20 Hz-20 kHz)	Jitter reducing phase-locked-loop circuitry, (4) 9-segment digital monitors	\$2,850
4/AES XLR; AES2id BNC; S/PDIF	No	No	Yes	0.00003% @ 1 dB FSD (20 Hz-20 kHz)	117 dB (20 Hz-20 kHz)	Jitter reducing phase-locked-loop circuitry, (4) 9-segment digital monitors	\$5,095
AES; S/PDIF	Yes	No	Yes	Depends on process	>117 dB	DSP generates triode/pentode tube sound in the digital domain	\$3,495
XLR	Yes	No	Yes	0.001% unweighted	113 dB unweighted	Analog soft saturation and digital tap saturation; word length control—24, 20 or 16 bits; settings stored in non-volatile RAM, 112 dB channel separation	\$1,495 and up
XLR	Yes	No	Yes	0.0014% unweighted	112 dB unweighted	Jitter removal; DSP based up-sampling; 96 kHz capable, 112 dB channel separation	\$1,395 and up
S/PDIF (optical/coax) out	No	No	Yes	0.0016%	> 99 dB	Built-in mic preamp	\$325
Coaxial RCA; optical in & out	N/A	No	N/A	N/A	N/A	96 kHz compatible	\$94
ADAT; S/PDIF	Yes	N/A	N/A	N/A	N/A	Selectable clock; adds analog I/Os to digital recs. or 8 analog ins to PCs	\$339
8/ADAT optical in & out	Yes	N/A	Yes	0.002% A-weighted	105 dB A-weighted	+4 dBu or -10 dBV, selectable per channel	\$699
4 XLR/8 AES	Yes	No	N/A	N/A	123 dB	DSD support; bit-splitting; support for ADAT, TDIF, SDIF2	\$3,649
4 XLR/8 AES	Yes	No	N/A	N/A	120 dB	DSD support; bit-splitting; support for ADAT, TDIF, SDIF2	\$3,049
24 AES/EBU; TDIF; Lightpipe; SDIF-2	Yes	N/A	N/A	N/A	>117 dB	Configuration presets recalled via MIDI; formats output simultaneously	\$3,049
2/AES/EBU; 1/S/PDIF (coax); Toslink	No	No	Yes	<0.002%	>114 dB	Sep hdpn vol cntrl; front panel out; 20-seg output lvl LED ladders	\$749
2/AES/EBU; 1/S/PDIF (coax); Toslink	Yes	No	Yes	<0.002%	>115 dB	User-selectable 16-bit noise shaping; 20-seg input lvl LED ladders w/pk/hld/clip indctr	\$899
4/AES/EBU; 1/S/PDIF; 1/RCA (coax); 2/Sonic US	Yes	No	Yes	<0.005%	>117 dB; >113 dB A/D; >105 dB D/AP	Works with Sonic Solutions DAW using SonicStudio 16.24 card	\$3,295
4/AES/EBU; 1/S/PDIF; 2/ADAT sync	Yes	No	Yes	<0.005%	>113 dB A/D; >105 dB D/A	ADAT-optical (light pipe) I/O; ADAT sync I/O connectors	\$3,295
2/XLR/AES3; 2/RCA coaxial; 2/optical (Toslink)	Yes	Yes	N/A	-117 dB max	120 dB min, 128 dB typical	Single & double wire 96kHz I/O; 5 internal and 3 external master clock options	\$1,995
1/S/PDIF; 1/Toslink; 1/AES/EBU	N/A	N/A	N/A	N/A	N/A	SCMS bit management	\$250
AES/EBU; S/PDIF coaxial and optical (Toslink)	N/A	N/A	Yes	<0.0015%	115.5 dB		\$300
up to 8/AES/EBU; ADAT; S/PDIF	Yes	Yes	Yes	THD+N 1 kHz @ 0 dBFS -101dB 1 kHz @dBFS -90dB	A-weighted 117 dB; unweighted 111 dB	Extended modularity with up to 8 ch of 24-bit/96 kHz I/O	\$3,995 and up
1/S/PDIF (coaxial) in	No	No	No	0.002%	103 dB (A-weighted)		\$200

# DIGITAL AUDIO CONVERTERS

MANUFACTURER	PRODUCT	CONVERTER TYPE / #	ADC RESOLUTION, OVER SAMPLING	DAC RESOLUTION	SAMPLE RATE(S)	SAMPLE RATE CONVERSION	DITHER	ANALOG I/O # / TYPE
Midiman	Flying Calf AD/24bit	A/D	24-bit/128x	N/A	44.1, 48 kHz	No	No	2/ 1/4" out
Midiman	Flying Cow 24-bit	A/D (2); D/A (2)	24-bit/128x	24-bit/128x	32, 44.1, 48 kHz	No	No	2/ 1/4"
Mytek Digital	8x96 Series ADC and DAC	A/D; D/A	24-bit/64x/128x	24-bit	44.1, 48, 88.2, 96 kHz	No	Yes	8/XLR (+4 dBm to -10 dBm)
Mytek Digital	Workstation 24 AD/DA Interface	N/A	24-bit/64x	24-bit	44.1, 48 kHz	No	Yes	+4 dBm XLR
Panasonic	96 kHz Series	A/D	24-bit/128 X	24-bit	44.1, 48, 88.2, 96 kHz	N/A	Yes	8
Panasonic	96 kHz Series	A/D	24-bit/128x	24-bit	44.1, 48, 88.2, 96 kHz	N/A	Yes	8/XLR balanced
Precision	SRD-1	N/A	N/A	N/A	N/A	N/A	No	N/A
Radio Design Labs	RU-AEC1	N/A	24-bit	N/A	32, 44.1, 48, 88.2, 96 kHz	N/A	N/A	XLR
Sonifex	Sonifex RedBox A/D and D/A Converter	A/D; D/A	N/A	24-bit	32, 44.1, 48, 64, 88.2, 96 kHz	No	No	XLR bal; RCA unbalanced
Sonifex	Sonifex Sample Rate Converter	A/D; D/A	N/A	No	32, 44.1, 48, 64, 88.2, 96 kHz	Yes	No	No
Sonus	AUDI/O AD/24	N/A	24-bit/128x	N/A	44.1, 48 kHz	No	No	8/XLR
Sonus	AUDI/O DA/24	N/A	N/A	24-bit/128x	44.1, 48 kHz	No	No	8/XLR
Sonus	AUDI/O AD/96	N/A	16, 18, 20, 24-bit	N/A	44.1, 48, 88.2, 96 kHz internal; 42-50, 84-100 kHz external	No	Yes	4/XLR
Sonus	AUDI/O DA/96	N/A	N/A	24-bit	44.1, 48, 88.2, 96 kHz internal; 42-50, 84-100 kHz external	No	Yes	4/XLR
Sonus	AUDI/O AD/8	N/A	24 bits or dithered to 16 or 20 bits	N/A	44.1, 48, 88.2, 96 kHz	N/A	Yes	8/XLR-1/4" comb
Soundscape	iBox 8-XLR/24	A/D (8); D/A (8)	24-bit/128x	24-bit	44.1, 48 kHz	N/A	N/A	8/XLR
Soundscape	iBox 8-Fibre	A/D (8); D/A (8)	20-bit/64x	20-bit	44.1, 48 kHz	N/A	N/A	8/XLR
Soundscape	iBox 8-XLR	A/D (8); D/A (8)	20-bit/64x	20-bit	44.1, 48 kHz	N/A	N/A	8/XLR
Soundscape	iBox 8-ADAT	TDIF to ADAT converter	N/A	N/A	44.1, 48 kHz	N/A	N/A	N/A
Soundscape	iBox 8-Line	Analog to TDIF converter	20-bit AKM	20-bit AKM	44.1, 48 kHz	N/A	N/A	8/RCA
Soundscape	iBox 2-Line	Analog to TDIF converter	20-bit AKM	20-bit AKM	44.1, 48 kHz	N/A	N/A	N/A
Studer	Studer MicValve A/D Converter	N/A	22-bit	N/A	44.1, 48 kHz	N/A	16-bit	XLR
Swissonic	AD24	N/A	24-bit/64x	N/A	44.1, 48 kHz	N/A	N/A	Balanced high CMR; XLR in
Swissonic	DA24	N/A	N/A	24/16-bit	44.1, 48 kHz	N/A	N/A	8/bal. XLR
Swissonic	AD96	N/A	16, 18, 20, 24-bit	N/A	44.1, 48, 88.2, 96 kHz	N/A	Yes	4/CMR
Swissonic	DA96	N/A	N/A	24-bit	N/A	Yes	Yes	4/XLR
Swissonic	AD8 / AD8 Pro	A/D (8)	24-bit	N/A	44.1, 48, 88.2, 96 kHz	N/A	Yes	Neutrik XLR/jack combi inputs
Z-Systems	Digital Sample Rate Converters	N/A	N/A	N/A	N/A	Yes	N/A	N/A



DIGITAL I/O #/TYPE	WORD CLOCK I/O	VIDEO INPUT SYNC	RF FILTERING	THD	DYNAMIC RANGE	SPECIAL FEATURES	PRICE
1/S/PDIF	No	No	No	0.005%	103 dB (A-weighted)		\$250
2/AES/EBU; 2/S/PDIF	No	No	N/A	0.003%	103 dB		\$400
4/AES/EBU; 2/ADAT; ProTools; Sonic; TDIF	Yes	No	Yes	-106 dB	120 dB	S/MUX and MRX bit-splitting; digital format conversion; 96 kHz	\$2,795
S/PDIF; AES/EBU; Toslink	Yes	No	Yes	-103 dB THD	117 dB	Digital format conversion; signal routing	\$1,995
AES/EBU; ADAT; TDIF optional	Yes	No	Yes	0.003	117 dB	Support all current and proposed digital output; mic preamp w/ A/D converter	\$2,496
AES/EBU; Lightpipe	Yes	No	Yes	0.003	118 dB	Precision metering with selectable ref. levels	\$2,195
N/A	Yes	N/A	No	N/A	N/A		\$150
N/A	N/A	N/A	Yes	< 0.04%	> 90 dB	Sure-Lok auto recovery system	\$443
AES/EBU; S/PDIF	Yes	No	No	96 dB THD + N at 1 kHz	110 dB		\$665
AES/EBU; S/PDIF	No	No	No	-114 dB THD + N at 1 kHz	120 dB		\$575
ADAT; Toslink	Yes	No	Yes	99 dB THD +N	115 dB SNR (A-weighted)	Half-rack space	\$749
ADAT; Toslink	Yes	No	Yes	97 dB THD +N	106 dB (A-weighted)	Half-rack space	\$599
AES/EBU; S/MUX ADAT	Yes	No	Yes	100 dB	115 dB (A-weighted)	Half-rack size; high-res; multi-mode meters; bit word-packing	\$999
AES/EBU; S/MUX ADAT optical	Yes	No	Yes	96 dB	110 dB (A-weighted)	Half-rack size; supports bit- and sample-packing	\$999
2/ADAT optical; 4 AES/EBU (Pro version)	Yes	No	Yes	0.007% at min gain	115 dB at min gain	Neutrik XLR/jack combi-inputs; phantom power; 40 dB gain	\$1,499
1/ADAT; 1/TDIF w/ TDIF-ADAT conversion	Yes	N/A	N/A	< 92 dB	113 dB (A-weighted)	Fully adjustable input and output levels to +24dBu	\$1,999
ST Fibre in/out; ADAT; TDIF	Yes	N/A	N/A	< 90 dB	107 dB (A-weighted)	ST type connectors for 8 ch digital I/O; switchable output and adjustable input level; TDIF/ADAT interface	\$1,999
1/ADAT; 1/TDIF w/ TDIF-ADAT conversion	Yes	N/A	N/A	< 90 dB	107 dB (A-weighted)	8 ch metering; programmable routing; TDIF/ADAT interface	\$1,499
1/ADAT; 1/TDIF w/ TDIF-ADAT conversion	Yes	N/A	N/A	N/A	N/A	24-bit ADAT-TDIF conversion; clocks over TDIF or ADAT	\$199
1/TDIF	Yes	N/A	N/A	< -94 dB	100 dB (A-weighted)	8 ch LED input level metering at -30 dBFS and -3 dBFS	\$449
1/TDIF; TDIF cascade port	Yes	N/A	N/A	Output < -94 dB; input > 0.01% (@ 1 kHz -1 dBFS)	100 dB (A-weighted)	Cascade up to 4 units via cascade TDIF port; 2-ch LED input level metering at -30 dBFS and -3 dBFS	\$199
AES/EBU out (opt ADAT, TDIF)	Yes	AES/EBU sync in	Yes	> 104 dB	106 dB	Tube gain stage (switchbl) with drive cntrl/EQ	\$3,025
Toslink optical; ADAT	Yes	N/A	N/A	0.001% (-1 dBFS input level)	115 dB (A-weighted) 113 dB (unweighted)	Half-rack space design (rack-shelf available)	\$749
Toslink optical;	Yes	N/A	N/A	< -97dB	115dB	Half-rack design	\$599
2/XLR	Yes	N/A	N/A	0.003% (@ -1 dBFS)	115 dB (A-weighted)	For bit-packed/sample-packed ADAT formats	\$999
AES/EBU types: professional or consumer (jumper selectable) XLR; ADAT Toslink optical	Yes	N/A	N/A	0.003% (@ -1 dBFS)	110 dB (A-weighted)	Support for bitpacked/sample-packed ADAT formats enables recording of 24/96 data on conventional 16/48 MDM's; half-rack design	\$999
2/Toslink or 4/AES/EBU	Yes	N/A	N/A	< 0.007%	115 dB	Internal/external sync; gain pots; 19" rackmount; 8 mic preamps w/ phantom	\$1,499-\$1,899
AES/EBU (XLR); S/PDIF (BNC); optical (Toslink)	Yes	N/A	N/A	N/A	N/A	Format conversion	\$450 and up

# DIGITAL MIXDOWN MACHINES

MANUFACTURER	MODEL	TYPE	SAMPLING FREQUENCY	PLAYBACK FREQUENCY	ADC	DAC	ANALOG I/O	DIGITAL I/O	TIME CODE	SCMS	SEPARATE MIC INPUT
Alesis	MasterLink ML-9600	Hard disk; CD-R	44.1, 48, 88.2, 96 kHz	44.1, 48, 88.2, 96 kHz	24-bit/128x	24-bit/128x	XLR; RCA	XLR AES; RCA-S/PDIF	N/A	N/A	No
Denon	DMD-1300P	MiniDisc	32, 44.1, 48 kHz	44.1 kHz	16-bit	18-bit	RCA	S/PDIF; Toslink	No	Yes	No
Denon	DN-M2000R	MiniDisc	44.1 kHz	44.1 kHz	16-bit	18-bit	RCA	RCA-S/PDIF input	No	Yes	No
Denon	DN-M1050R	MiniDisc	32, 44.1, 48 kHz	44.1 kHz	16-bit	18-bit	XLR; RCA	AES/EBU; RCA-S/PDIF	Optional	Yes	No
Denon	DN-M2300R	MiniDisc	44.1 kHz	44.1 kHz	16-bit	18-bit	RCA	RCA-S/PDIF	No	Yes	No
Denon	DN-M991R	MiniDisc	44.1 kHz	44.1 kHz	16-bit	18-bit	XLR	XLR	No	Yes	No
Fostex	D15	DAT	44.1, 48 kHz	44.1, 48 kHz	18-bit	18-bit	XLR	AES/EBU	Optional	No	No
Fostex	D5	DAT	32, 44.1, 48 kHz	44.1, 48 kHz	1-bit	1-bit	XLR	AES/EBU; S/PDIF (optical) RCA-S/PDIF	No	No	No
HHB	MDP500	Portable	44.1 kHz	44.1 kHz	N/A	N/A	XLR; RCA	S/PDIF (coax optional)	No	Yes	Yes
Marantz	PMD650	Portable	44.1 kHz	44.1 kHz	N/A	N/A	XLR; 1/4"; RCA	S/PDIF (coax)/XLR	No	No	Yes
Sony	CDR-W33	CDR/RW	44.1 kHz	Same	24-bit	24-bit	RCA	S/PDIF RCA; optical	No	No	No
Sony	CDR-W66	CDR/RW	44.1 kHz	Same	24-bit	24-bit	XLR; RCA	AES/EBU; S/PDIF RCA; optical	No	No	No
Sony	MDS-JE630	MiniDisc	44.1 kHz	Auto	24-bit	20-bit	RCA	S/PDIF (optical)	No	Yes	No
Sony	MZR	Portable MiniDisc	44.1 kHz	Auto	16-bit	16-bit	1/8" mini stereo	Optical/mini	No	Yes	Yes
Sony	PCM-M1	DAT	32, 44.1, 48 kHz	Auto	16-bit	16-bit	1/8" stereo mini	7-pin w/opt. cable	No	No	Yes
Sony	PCM-R300	DAT	32, 44.1, 48 kHz	Auto	20-bit	16-bit	RCA	S/PDIF	No	No	No
Sony	PCM-R500	DAT	32, 44.1, 48 kHz	Auto	20-bit	16-bit	XLR; RCA	AES/EBU; RCA-S/PDIF	No	No	No
Sony	TCD-D8	DAT	32, 44.1, 48 kHz	Auto	16-bit	16-bit	1/8" stereo mini	7-pin connector w/opt. cable	No	Yes	Yes
Sony	MDS-E10	MiniDisc	44.1 kHz	44.1 kHz	24-bit	20-bit	RCA	S/PDIF; optical	N/A	N/A	N/A
Sony	MDS-E12	MiniDisc	44.1 kHz	44.1 kHz	24-bit	20-bit	RCA	S/PDIF; optical	N/A	N/A	N/A
Tascam	DA-20MkII	DAT	32, 44.1, 48 kHz	32, 44.1, 48 kHz	1-bit Delta/ Sigma	1-bit Delta/ Sigma	RCA (unbal)	S/PDIF; optical	N/A	N/A	N/A
Tascam	DA-40	DAT	32, 44.1, 48 kHz	32, 44.1, 48 kHz	20-bit	20-bit	XLR (bal); RCA (unbal)	AES/EBU; S/PDIF	N/A	Yes	N/A
Tascam	DA-302 Dual	DAT	32, 44.1, 48 kHz	32, 44.1, 48 kHz	16-bit	16-bit	RCA (unbal)	S/PDIF	N/A	Yes	N/A
Tascam	DA-45HR	DAT	32, 44.1, 48 kHz	32, 44.1, 48 kHz	24-bit	24-bit	XLR (bal); RCA (unbal)	AES/EBU; S/PDIF	N/A	Yes	N/A
Tascam	MD-301MkII	MiniDisc	32, 44.1, 48 kHz	32, 44.1, 48 kHz	20-bit	20-bit	XLR (bal); RCA (unbal)	Optical	N/A	N/A	N/A
Tascam	MD-801MkII	MiniDisc	32, 44.1, 48 kHz	32, 44.1, 48 kHz	20-bit	20-bit	XLR (bal); RCA (unbal)	AES/EBU; S/PDIF	N/A	N/A	N/A
Yamaha	MD8	MiniDisc	44.1 kHz	44.1 kHz	N/A	N/A	N/A	N/A	MTC	No	Yes



WRITE/READ SPEED	SCSI CONNECTION	TRANSPORT DISC LOADING	BUNDLED SOFTWARE	DISC AT-ONCE	FREQUENCY RESPONSE	SIGNAL-TO-NOISE RATIO	TOTAL HARMONIC DISTORTION	SPECIAL FEATURES	PRICE
4x/8x	No	Front-loading CD-R drive	N/A	Yes	20 Hz–20 kHz	113 dB	<0.002%	Playlists; editing; CD24; audio CD	\$1,699
1 x	No	Motor driven	No	N/A	4 Hz–20 kHz	>105 dB	0.02%	Includes wireless remote	\$649
1 x	No	Manual	No	N/A	20 Hz–20 kHz	>92 dB	0.02%	Hot starts; A-B loop; pitch $\pm 8\%$ ; jg/shll; instnt strt; cue to music	\$699
1 x	N/A	Motor driven	No	N/A	20 Hz–20 kHz	>92 dB	0.012%	Extrnl sync option; hot-start option; RS232/422; PC kybrd cntrl; GPI interface	\$1,999
1 x	N/A	Manual	No	N/A	20 Hz–20 kHz	>92 dB	<0.012%	Keyboard connector; dual drives; disc copy; hot start; shock memory; disc tilling	\$1,499
1 x	No	Manual	Optional	N/A	20 Hz–20 kHz	>100 dB	0.02%	Hot start; shock memory; undo/redo; RS232/422; DN-M991RM; GPI interface	\$2,299
N/A	No	Drawer	No	N/A	20 Hz–20 kHz	92 dB	0.05%	Parallel port; time code w/video ref, RS422 rack optional	\$3,295
N/A	No	Tray	No	N/A	20 Hz–20 kHz	92 dB	N/A	Supplied infrared remote headphone matrix options	\$999
1 x	No	N/A	N/A	N/A	10 Hz–20 kHz; $\pm 0.5$ dB	>89 dB	<0.02%	USB; transportable; onboard editing	\$1,545
N/A	No	Top load	No	N/A	20 Hz–20 kHz	85 dB	N/A	Smping-frcncy cnvtr; phant pwr; audio buffr; dual mono rec	\$1,399
x2 finalize	No	N/A	No	No	20 Hz–20 kHz	98 dB	0.006%	DSP function; wired/wireless remote	\$799
x2 dupl. bus	No	N/A	No	No	20 Hz–20 kHz	>98 dB	N/A	DSP function; serial input; parallel remote interface; wired/wireless remote	\$1,275
N/A	No	N/A	No	N/A	5 Hz–20 kHz	>96 dB	N/A	Smlng-freq cnvtr allows dir rec from dgll srcls (48 kHz/32 kHz)	\$360
N/A	No	N/A	No	N/A	15 Hz–20 kHz	>96 dB	N/A	Editing/song srch; dgll smpl-rt cnvtr; hdpn/rmt; auto-lmtr	\$399
N/A	No	N/A	No	N/A	20 Hz–20 kHz	N/A	<0.008%	Adjustable level-sync; AGC/limiter circuit	\$1,040
N/A	No	N/A	No	N/A	20 Hz–20 kHz	>90 dB	<0.06%	20-bit A/D with super bit-mapping	\$1,025
N/A	No	N/A	No	N/A	20 Hz–20 kHz	>90 dB	<0.06%	20-bit A/D with super bit-mapping; 4 D.D. motor transport	\$1,765
N/A	No	N/A	No	N/A	20 Hz–20 kHz	>90 dB	<0.008%	High speed search/cue; auto-limiter; back-lit LCD	\$899
N/A	N/A	N/A	N/A	N/A	5 Hz–20 kHz	96 dB	N/A	Pitch control; 10 hot starts; scale factor & ram editing;	\$599
N/A	N/A	N/A	N/A	N/A	5 Hz–20 kHz	96 dB	N/A	Serial (RS-232C) & parallel (GPE) remote interfaces; rec/play cascade link; XLR balanced analog I/O	\$899
N/A	N/A	N/A	N/A	N/A	20 Hz–20 kHz	>91 dB	<0.0045%	Wireless remote; self diagnostic	\$1,060
N/A	N/A	N/A	N/A	N/A	20 Hz–20 kHz	>92 dB	<0.005%	Optional remote	\$1,399
N/A	N/A	N/A	N/A	N/A	20 Hz–20 kHz	>92 dB	<0.005%	Remote; continous recording between decks 1 & 2; simultaneous record capability	\$1,899
N/A	N/A	N/A	N/A	N/A	20 Hz–20 kHz	>112 dB (HR recording); >105 dB	<0.002% (HR recording); <0.004%	Optional remote; work sync in/thru	\$2,249
N/A	N/A	N/A	N/A	N/A	20 Hz–20 kHz	>94 dB	<0.013%	Wireless remote	\$585
N/A	N/A	N/A	N/A	Yes	20 Hz–20 kHz	>102 dB (playback) >96dB (playback)	<0.006%	Optional remote	\$1,399
N/A	No	N/A	No	N/A	20 Hz–20 kHz	96 dB	0.012%	Cut and paste editing	\$1,399

# DIGITAL MIXING CONSOLES

MANUFACTURER	PRODUCT	MIXER CONFIGURATION	MIC INPUTS (XLR)/ LINE INPUTS	# OF DIGITAL INPUTS/TYPE	# OF DIGITAL OUTPUTS/TYPE	# OF OPTION CARD SLOTS	ANALOG INSERTS/DIRECT OUTS	# OF ANALOG AUX SENDS/RETURNS	AD CONVERTERS	DA CONVERTERS
Electro-Voice	PSX1000	Stereo L/R bus w/mono	10/14	N/A	N/A	N/A	N/A	N/A	18-bit	18-bit
Electro-Voice	PSX1600	Stereo L/R bus w/mono	12/8	N/A	N/A	N/A	N/A	N/A	18-bit	18-bit
Fostex	VM08	8x2	4/4	No	1/ S/PDIF	No	N/A	2 internal	20-bit/64x	20-bit/128x
Fostex	VM-8	8x2	4/2	2/ADAT, S/PDIF	2/ADAT, S/PDIF	N/A	4/9	2	20-bit/64x	24-bit/128x
Fostex	VM04	4x2	2/2	No	1/ S/PDIF	N/A	N/A	Internal effects send	20-bit/64x	20-bit/64x
Panasonic	WR-DA7	36x8x2	8/8	1/AES/EBU, S/PDIF	1/AES/EBU, S/PDIF	4	16	2/6	24-bit	24-bit
Roland	VM-3100 V Mixing Station	12x8x2	8/10	1/S/PDIF (optical/coax)	2/ S/PDIF (optical/coax)	N/A	4	4	24-bit	24-bit
Roland	VM-3100 Pro V Mixing Station	20x8x2	2/10	1/S/PDIF (optical/coax)	2/ S/PDIF (optical/coax)	1	4	4	24-bit	24-bit
Roland	VM-7100/VM-C7100 V Mixing System	38x14x2	11/1	1/S/PDIF or AES/EBU	2/ S/PDIF, AES/EBU	7	Up to 8	0/up to 10	24-bit	24-bit
Roland	VM-7200/VM-C7200 V Mixing System	48x14x2	21/1	1/S/PDIF or AES/EBU	2/ S/PDIF, AES/EBU	3 FX, 3 ADAT/ TDIF, 1 cascade	Up to 18	0/up to 10	24-bit	24-bit
Roland	VM-7200 (x2)/ VM-C7200 V-Mixing System	94x14/28 flex bus x 2	41/1	2/S/PDIF or AES/EBU	4/AES/EBU, S/PDIF	13	24/16	Up to 34	24-bit	24-bit
Soundcraft	Digital 328	32x8x2	16/16	18/16 optical/TDIF, AES/EBU, S/PDIF	26/24 optical 16 TDIF, AES/ EBU, S/PDIF	2	16/16 1/4"	4/5 1/4"	24-bit/128x	24-bit/128x
Tascam	TM-D4000	36x8x2	8/12	2/AES/EBU, S/PDIF	2/AES/EBU, S/PDIF	3	8	6/4	24-bit	24-bit
Tascam	DM-24	24x8x2	16/16	24/TDIF: 8/ADAT; 2/stereo AES/EBU	24/TDIF: 8/ADAT; 2/stereo AES/EBU	2	16/16 1/4" TRS	4/4 1/4" TRS	24-bit	24-bit
Yamaha	01V	24x4	12/4	1/ S/PDIF	1/ S/PDIF	1	0/0 (4 using 1/4" omni outs)	0/0 (4 using 1/4" omni outs)	20-bit	20-bit
Yamaha	03D	16x4x2	8/8	8/AES/EBU, TDIF, ADAT	8/AES/EBU, TDIF, ADAT	1	2/0	4/0	20-bit	20-bit

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EQ TYPE	# OF DYNAMIC PROCESSORS	# OF EFFECTS PROCESSORS	AUTOMATION: SCENE/MIDI/DYNAMIC	FREQUENCY RESPONSE	SIGNAL-TO-NOISE RATIO	TOTAL HARMONIC DISTORTION	CHANNEL CROSSTALK (@ 1 KHz)	PHANTOM POWER	SPECIAL FEATURES	DIMENSIONS (INCHES)	PRICE
3-band w/ sweepable mids	N/A	2	NA	15 Hz-60 kHz	104 dB	< 0.006%	> 80 dB	+24V	Feedback notch filter vocal voicing filter	20x8x19	\$2,398
3-band, w/ sweepable mids	N/A	2	N/A	15 Hz-60 kHz	104 dB	< .006%	> 80 dB	+24V	Feedback notch filter on monitor aux	26x8x19	\$2,998
3-band	N/A	2	N/A	20 Hz-20 kHz	N/A	0.01%	70 dB	N/A	44.1 sampling rate; 20 user mix scene memory; Fostex A.S.P. effects	12x2.75x8.5	\$489
3-band	N/A	2	N/A	20 Hz-20 kHz	N/A	0.01%	70 dB	Yes	44.1 sampling rate; 24-bit stereo effects; 20-scene memory; stereo	10.75x3.75x11.75	\$599
2-band	N/A	1	N/A	20 Hz-20 kHz	>86 dB	< 0.08%	N/A	No	20 mix scene memory; 20 built-in A.S.P. effects; headphone out with rotary control; large backlit LCD and illuminated buttons	10x2x7.3	\$349
4-band parametric	42	N/A	Y/Y/Y	20 Hz-20 kHz	-96 dB	<1%	-90 dB	+48V	Moving fader automation; 1 step functionality; 5.1 surround sound panning	27.5x14x24	\$5,495
3-band	2	2	Y/Y/N	N/A	N/A	N/A	N/A	Yes	Dedicated Hi-Z guitar input	13.5x3.75x12	\$995
3-band	2	2	Y/Y/N	N/A	N/A	N/A	N/A	Yes	Dedicated Hi-Z guitar input; microphone modeling; speaker modeling	13.5x3.75x13.5	\$1,295
6-band	48	2 (up to 8)	Y/Y/Y	N/A	N/A	N/A	N/A	Yes	Modular; moving faders; 5.1 mixing; RTA; speaker modeling	17x5.25x16.5 (7100); 17x2.6x17 (C7100)	\$1,995/\$2,995
6-band	48	2 (up to 8)	Y/Y/Y	N/A	N/A	N/A	N/A	Yes	Modular; moving faders; 5.1 mixing; RTA; speaker modeling	17x5.25x16.2 (7200); 29.5x2.75x17(C7200)	\$2,795-\$3,695
5-band	94	4 (up to 16)	Y/Y/Y	N/A	N/A	N/A	N/A	Yes	Modular; moving faders; 5.1 mixing; RTA; speaker modeling ADAT/Tascam interfaces	17x5.25x16.2 (7200); 29.5x2.75x17(C7200)	\$6,590-\$3,695
3-band parametric	2	2	Y/Y/N	20Hz-20KHz	114 db	<0.005%	> 95 dB	Yes	ADAT optical (x3) & T/DIF (x2); monitor bridge; 2 Lexicon FX processors; AES/EBU S/PDIF, direct; software upgrade via internet	N/A	\$5,000
4-band parametric	35	1	Y/Y/Y	20 Hz-20 kHz	90 dB	<0.1%	90 dB	Yes	100 mm motorized faders; machine control-Tascam MMC, ADAT, RS-422; surr/cscd I/O; word clock I/O	28x9.5x26	\$3,699
4-band parametric	2 ea ch	2 ea ch	Y/Y/Y	N/A	N/A	N/A	N/A	Yes	24-bit/96 kHz performance; latency compensation		\$2,999
4-band parametric	22	2	Y/Y/N	20 Hz-20 kHz	98 dB	<0.1%	-70 dB	+48V		20.4x5.8x16.9	\$1,999
4-band parametric	40	2	Y/Y/N	20 Hz-20 kHz	98 dB	>0.1%	-70 dB	+48V	Total param recall; dyn/etx libraries	20.3x8x18.1	\$3,699

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# DIRECT BOXES

MANUFACTURER

PRODUCT

TYPE

POWER

# OF CHANNELS

INPUTS

OUTPUTS

GROUND LIFT

Aguilar	DB900 Tube Direct Box	Floor	AC 100V/120V/230V	1	1/4"	XLR bal; 1/4" unbal	Yes
Anthony DeMaria Labs	300 G	Floor or rackmount	External AC	2	1/4" (1)	1/4" (2); XLR (2)	Yes
Avalon Design	U5	Rackmount	Active AC	1	1/4" (2)	1/4" (1); XLR	Yes
BBE	DI-100	Floor	Battery; external; phantom	1	1/4" (1)	1/4" (1); XLR	Yes
Bellari	ADB3	Floor	External AC	2	1/4" (4)	XLR (2)	Yes
Behringer	Ultra DI Pro DI4000	4-ch DI box/peak converter	N/A	4	1/4" (1); XLR	XLR (1)	Yes
Behringer	ULTRA-DI DI100	Active DI box	Phantom	1	1/4" (1); XLR	XLR (1)	Yes
Boss	DI-1	Floor	Battery; phantom	1	1/4" (1)	1/4" (1); XLR	Yes
BSS Audio	AR133	Floor	Battery; phantom	1	1/4" (1); XLR	1/4" (1); XLR	Yes
BSS Audio	AR416	Rackmount	Internal AC	4	1/4" (4)	1/4" (4); XLR (4)	Yes
Carvin	FDR60	Floor	Passive; filter type	1	1/4"	XLR	Yes
Countryman	Type 85	Floor	Battery; phantom	1	1/4" (1)	1/4" (1); XLR	Yes
D.W. Fearn	VT-I/F Instrument Interface DI	Vacuum tube DI	N/A	2	1/4" (2)	1/4" (2)	Yes
Demeter	VTDB Tube Direct Box	Floor	AC	1	1/4" (1)	1/4" (1); XLR	Yes
Demeter	STDB-2 Stereo Direct Box	Rackmount	AC	2	1/4" (2)	1/4" (2); XLR	Yes
Demeter	H DI-1 Tube Direct Box/Line Driver	Rackmount	AC	2	1/4" (2)	1/4" (2); XLR (2)	Yes
Digital Music	Cab-Tone	Standalone	Battery	1	1/4" (1)	1/4" (1); XLR	Yes
DOD	AC275	Floor	AC; battery; phantom	1	1/4" (2); XLR	1/4" (2); XLR	Yes
DOD	AC260/AC265	Floor	Passive	1	1/4" (2); XLR	1/4" (2); XLR	No
E.M.O	E520	Floor	Passive	1	1/4" (5)	XLR (1)	Yes
E.M.O	E525	Floor	Passive	2	1/4" (10)	XLR (2)	Yes
E.M.O	E535	Rackmount	Passive	1	1/4" (10)	XLR (1)	Yes
E.M.O	E545	Rackmount	Passive	6	1/4" (30)	XLR (6)	Yes
E.M.O	E580	Rackmount	Passive	8	1/4" (8)	1/4" (1); XLR	Yes
E.M.O	E540	Floor	Passive	1	1/4" (5)	XLR (1)	Yes
Ebtech	LLS-8	Rackmount	Passive	8	1/4" (8)	1/4" (8)	No
Ebtech	HE-8	Rackmount	Passive	8	1/4" (8)	1/4" (8)	No
Ebtech	LLS-2 PKG	Table or equip. mount	Passive	2	1/4" (2)	1/4" (2)	No
Ebtech	Hum Eliminator	Table or equip. mount	Passive	2	1/4" (2)	1/4" (2)	No
Fishman	Fishman Dual Parametric D.I.	Floor	Battery; AC	1	1/4" (1)	1/4" (1); XLR	Yes
Fishman	Pro-EQ Platinum	Solid state preamp/DI/EQ	Battery; AC	1	1/4" (1)	1/4" (2); XLR	Yes
Gepco	GDB-1	Floor	Passive	1	1/4" (2)	XLR (1)	Yes
Horizon Music	Stereo Line Direct Box	Multimode	Passive	2	1/4" (2)	1/4" (2)	Yes
Horizon Music	Active Direct Box	Active DI box	Battery	1	1/4" (1)	1/4" (1)	Yes
Horizon Music	Straightline	Passive	Passive	1	1/4" (1)	1/4" (1)	Yes
Horizon Music	Speaker Line	Speaker level direct box	Passive	1	1/4" (1)	1/4" (1)	Yes
Jensen	Iso-Max DB-2PX	Standalone or rackmount	Passive	2	1/4" (2)	XLR (2)	Yes
Klark-Teknik	LBB100	Floor	Phantom	1	1/4" (2); XLR	XLR (1)	Yes
Manley Labs	Stereo Tube Direct Interface	Tube DI box	Passive	2	1/4" Hi-Z	1/4" (1); XLR	Yes
Manley Labs	Tube Direct Interface	Tube DI box	Passive	1	1/4" Hi-Z	1/4" (1); XLR	Yes
Palmer Direct	PAN-01 Mono Passive DI Box	Mono Passive DI Box	N/A	1	1/4"	XLR	Yes
Palmer Direct	PAN-02 Mono Active DI Box	Mono Active DI Box	9V battery/48V phantom	1	1/4"	XLR	Yes
Palmer Direct	PAN-03	Rackmount 1U	AC 110V	4	1/4"	XLR front to rear	Yes
Palmer Direct	PAN-04 Passive DI Box	Passive	N/A	2	1/4"	XLR	Yes
Palmer Direct	PDI-01 Passive DI Box	Passive	N/A	1	1/4"	XLR	Yes
Palmer Direct	PDI-02 Active DI Box	Active	9V battery/48V phantom	1	1/4"	XLR	Yes
Palmer Direct	PDI-09 Direct Recording Devices	Mono direct box	Passive	1	1/4" (1)	1/4" (1); XLR	Yes
Palmer Direct	PGA-04 Advanced Direct Injection for Guitar	Rackmount DI box	Passive	1	1/4" (1)	1/4" (1); XLR	Yes
Palmer Direct	PGA-03 Guitar Y Box	Guitar DI box	Battery; external AC	1	1/4" (1)	1/4" (2)	None required
Palmer Direct	PGA-05 Advanced Direct Injection for Guitar	Rackmount	Internal AC	2	1/4" (2)	1/4" (1); XLR	Yes
Peavey	EDI	Floor	Passive	1	1/4" (1)	1/4" (1); XLR	No
Peavey	ID-1G	Floor	Passive	1	1/4" (1)	XLR (2)	Yes
Peavey	1:1 Interface	Floor	Passive	1	1/4" (1); XLR	1/4" (1); XLR	Yes



## •Getting a Drum Sound

From page 40—GETTING A DRUM SOUND

old-school ribbon mics for overheads to get the main sound of the drums. “On Slash’s Snakepit we had a pair of mics in the corners of the room about ten feet high to pick up the distant air of the drums,” he explains. “I used a pair of RCA 77s as close mics that were maybe eight feet in the air and not spread quite as wide, just off the corners of the drum kit. Some compression to get them to pump a little bit and breathe with the tempo of the track.”

DiCicco is a big fan of using his mics efficiently, typically using a pair of overheads, a snare mic, kick, one on each tom and a hat mic he may or may not use. “When there’s a lot of toms, I’ll sometimes use one mic with a figure-8 pattern and put the mic between the two drums to pick up both. Ideally you can capture the entire kit with just a pair of mics, but the secret is just to work enough with any number of mics until it starts to become intuitive and you’re quick at it.”

“I think a lot of people probably like to mic their drums closer than I do, with the exception of toms,” admits Scriver. “But in the small iso-booth space I have here, it doesn’t matter as much if they’re too far away because I’m not picking up a whole lot of room reflections.”

Being a drummer and knowing how a drummer thinks also helps, as Chester has found. “A lot of jazz drummers don’t want to hear the bass drum all the time,” he says. “And they play so dynamically sometimes you wonder if they’re playing the kick at all. You’ve got to make sure the bass player isn’t washing out the bass drum. Somewhere between the two it really works because they’re really one instrument together.”

### SNARE

There’s one microphone in just about every engineer’s repertoire. “I always come back to the Shure SM57 for the snare,” DiCicco states. “I’ve tried condensers, but usually I’ll top mic it with a 57, and if I want more snap, I’ll use a bottom mic or mic the side of the shell. A friend of mine was into miking the hole, but I find you get too much air puffing out of the hole.”

Scriver agrees; he mics the top of the snare from different angles with an SM57

for sound and protective reasons on his projects. “It takes really high SPLs, and it’s not going to break if it gets bashed by a drumstick. I used to put it really close to the head on a slight angle, but I found lately I like it up higher at a steeper angle to get more of the actual snare drum instead of this microscopic skin sound. I used to put a condenser mic underneath the snares, but I was getting a little tired of that sound.”

Also an SM57 fan for snare, Mitchell mics the bottom and often mates two mics for the top, a 57 on a mic stand with an AKG 452 with a -20 dB pad to provide more options to work with back in the control room. “The 452 has a brighter pop to it, and the 57 is meatier,” he says. “If I don’t want to use the bottom snare and still want some bright splash on the top of the attack of the mic, I’ll use the 452 and 57 taped together above the snare to give me the attack I need. I also move the 452 in and out until I hear where it works best in tandem with the 57.”

### KICKS

Scriver says he likes hearing the shell of the drum but not necessarily its note, so he uses the AKG D112: “I like that sound, but it’s probably better for a two-headed kick without a port on the front,” he notes. “The Sennheiser 421 is a great kick mic, and I prefer the Audio-Technica ATM25 for picking up just the right amount of upper frequencies of the shell. It has a nice little bump around 250 Hz for all the extended lows, too, the thump of the kick.” DiCicco adds that he prefers “either the AKG D112 or 421, your standard kick drum mics. I usually don’t mic the beater side.”

### TOMS

The Sennheiser 421 is also popular for miking toms; it’s a solid dynamic mic that can take the occasional smack from an errant fill and still sound good. “I keep coming back to the 421s,” DiCicco says. “Some drummers like their cymbals right on top of the toms, especially jazz drummers, so I’ll get in really tight on the toms so that I can run the gain of the microphone down and pick up less leakage from the cymbals.” Scriver opts for some heavy-duty AKG C535 condenser

SPECIAL  
FEATURES

PRICE

Durable steel chassis; LED indicator; 10 year warranty	\$529
Gain	\$899
Variable gain; hi-cut filter; optional rack kits	\$595
Includes BBE process; input pad	\$159
Tube-based; 20 dB gain	\$200
Direct connection of amp outputs up to 3000W	\$229
Direct connection of amp outputs up to 3000W	\$79
Auto power-off; phase inverse	\$150
0/-20/-40 dB pads	\$185
0/-20/-40 dB pads; LP filter; phase reverse	\$899
Input attenuation -0, -20, -40 dB	\$25
Isolates ground even w/ phantom power	\$232
	\$1,500
Jensen output transformers; tube-buffered output	\$600
All tube construction; 27 Mohm input	\$1,100
Tube-buffered 1/4" outputs	\$899
Guitar cabinet simulator; bal/unbal I/O levels	\$150
Speaker/instrument level switch	\$95
Can be used as mic/instrument splitter; 3-position pads	\$65/260; \$85/265
20 Hz-40 kHz frequency response	\$124
20 Hz-40 kHz frequency response	\$360
20 Hz-40 kHz frequency response	\$130
20 Hz-40 kHz freq. response; uses E535 mods	\$745
Parallel unbalanced outputs	\$1,225
High isolation operation	\$190
Converts between -10/+4 dBu equipment	\$345
Breaks ground loops; converts bal/unbal inputs	\$285
Includes 4 RCA adapters; hum elimination	\$90
Converts automatically between bal/unbal inputs	\$75
2-band parametric EQ; phase reverse	\$260
Semiparametric EQ; sweepable mid w/notch	\$250
20 dB pad	\$28
Works as stereo or 2 in/1 out mono combiner	\$99
-20 dB pad switch; adjustable output gain trim	\$199
Accepts line level signals from consoles/keyboards	\$49
Accepts guitar amp outputs	\$49
Jensen JT-DB-EPC transformer	\$210
Switchable I/O attenuation; iso transformer	\$175
5-position EQ; all-tube architecture	\$875
5-position EQ; console boost-unity switch	\$575
0 dB/-30 dB switch	\$45
0 dB/-30 dB switch	\$56
30 dB pad/channel	\$198
0 dB/-30 dB switch	\$79
0/-20/-40 dB switch	\$91
0/-20/-40 dB switch	\$195
Variable tone and output attenuation switches	\$120
Integrated 8 ohm load box; filter section	\$460
Isolated transformer Y-box	\$110
Filter section	\$660
Includes timbre adjustment	\$60
	\$50
	\$60

# DIRECT BOXES

MANUFACTURER

PRODUCT

TYPE

POWER

# OF CHANNELS

INPUTS

OUTPUTS

GROUND LIFT

Peavey	EDB-1	Floor	Active; phantom; battery; 16 V AC/DC external	1	1/4" (1)	1/4" (1); XLR	No
Pro-Co	CB-1	Floor or rackmount	Passive	1	1/4" (1)	1/4" (1); XLR	Yes
Pro-Co	DB-1	Floor or rackmount	Passive	1	1/4" (1)	1/4" (1); XLR	Yes
Pro-Co	DB-4A	Rackmount	Passive	4	1/4" (1)	1/4" (1); XLR	Yes
Pro-Co	IT 1 Balancing Box/AV 1	Floor or rackmount	Passive	1	1/4" (1); XLR	1/4" (1); XLR	Yes
Pro-Co	AVP 1	Wall plate	Passive	1	1/4" (1); RCA; XLR	Barrier strip	Yes
Pro-Co	MS 3/MC 2/MS 1	Floor or rackmount	Passive	1	XLR (1)	XLR (3)	Yes
Pro-Co	MS 42A	Rackmount	Passive	4	XLR (1)	XLR (2)	Yes
Pro-Co	MS 43A	Rackmount	Passive	4	XLR (1)	XLR (3)	Yes
Pro-Co	MS 82	Rackmount	Passive	8	Barrier strip	Barrier strip	Yes
Pro-Co	MS 83	Rackmount	Passive	8	Barrier strip	Barrier strip	Yes
Radial Engineering	JD4	Rackmount	Passive	4	1/4" (16)	XLR (4)	Yes
Radial Engineering	JDI	Floor	Passive	1	1/4" (2)	XLR (1)	Yes
Radial Engineering	JDV	Floor	Active	1	1/4" (2)	XLR (1)	Yes
Rapco	ADB-8	Floor	Battery; phantom	1	1/4" (1)	1/4" (1); XLR	Yes
Rapco	DBR400	Rackmount	Passive	4	1/4" (4)	1/4" (4); XLR (4)	Yes
Rapco	DB-100	Floor	Passive	1	1/4" (1)	1/4" (4); XLR (4)	Yes
Rapco	DB-101SL	Floor	Passive	1	1/4" (1)	1/4" (4); XLR (4)	Yes
Raven Labs	APD-1 Active/Passive Direct	Floor	Battery; external AC	1	1/4" (2)	XLR (1)	Yes
Raven Labs	MDB-1 Mixer/Direct Box/Buffer	Active DI/3-channel mixer	Battery; external AC	3 in/1 out	1/4" (5)	XLR (1); 1/4"	Yes
Roland	DI-1	Floor	Battery; phantom	1	1/4" (1)	1/4" (1); XLR	Yes
Rolls	AD16 dB Max	Floor	9V; phantom	1	1/4"	XLR	Yes
Rolls	RDB104	Rackmount	Internal AC	4	1/4" (8)	XLR (4)	Yes
Rolls	RPB623 Phantom Hex	Rackmount	120 VAC	6	XLR	1/4"	N/A
Rolls	ADB2	Floor	Phantom	1	1/4" (2)	XLR (1)	Yes
Rolls	DB25	Floor	Passive	1	1/4" (2)	XLR (1)	Yes
Stedman	BA-18	Floor	Internal	1	1/4" (1)	1/4" (1); XLR	Yes
Stedman	GA-12	Floor	Internal	1	1/4" (1)	1/4" (1); XLR	Yes
Stewart Audio	ADB-1	Floor	N/A	1	1/4" (1)	1/4" (1); XLR	Yes
Stewart Audio	ADB-4	Floor or rackmount	External; phantom	4	XLR (4)	1/4" (1); XLR (4)	Yes
Summit Audio	TD-100	Rackmount or floor	AC 110V	1	1/4"	1/4" (1); XLR	Yes
Tech 21	SansAmp Classic	FET solid state	N/A	1	N/A	N/A	N/A
Tech 21	SansAmp GT2	FET solid state	N/A	1	N/A	N/A	N/A
Tech 21	TRI-O.D	FET solid state	N/A	3	N/A	N/A	N/A
Tech 21	SansAmp PSA-1	FET solid state	N/A	1	N/A	N/A	N/A
Tech 21	SansAmp Acoustic DI	Floor	Phant; 9V batt; opt DC pwr supp	1	1/4" (2)	1/4" (1); XLR	Yes
Tech 21	SansAmp Bass Driver DI	Floor	Phant; 9V batt; opt DC pwr supp	1	1/4" (1)	1/4" (2); XLR	Yes
Tech 21	SansAmp XDI	Floor	Phant; 9V batt; opt DC pwr supp	1	1/4" (2)	1/4"; XLR	No
The John Hardy Co.	AMB Tube Buffered Direct Injection Box	Tube buffered DI box	AC power 110/220VAC	1	1/4" (1)	1/4" (2); XLR	Yes
Tube Works	4001	Floor	External AC	1	1/4" (1)	1/4" (2); XLR	Yes
Tube Works	4002	Rackmount	External VAC	2	1/4" (2)	1/4" (2); XLR (2)	Yes
Whirlwind	HotBox	Floor	Battery; phantom	1	1/4" (1)	1/4" (1); XLR	Yes
Whirlwind	HotBox Quad	Rackmount	Internal AC; phantom	4	1/4" (4)	1/4" (4); XLR (4)	Yes
Whirlwind	Director	Floor	Passive	1	1/4" (1)	1/4" (1); XLR	Yes
Whirlwind	Multi Director	Rackmount	Passive	4	1/4" (4)	1/4" (4); XLR (4)	Yes
Whirlwind	Mic Eliminator	Floor	Battery; phantom	1	1/4" (1)	1/4" (1); XLR	Yes
Whirlwind	IMP 2	Floor	Passive	1	1/4" (1)	1/4" (1); XLR	Yes
Whirlwind	Line Balancer/Splitter	Floor	Passive	1	1/4" (1); XLR	XLR (2)	Yes
Whirlwind	Direct 2 Dual Direct Box	Dual direct box	Passive	2	1/4" (2)	XLR (2); 1/4" (2)	Yes, 1/ch
Whirlwind	EDB-1	Floor	Passive	1	1/4"	XLR; 1/4"	Yes



## •Getting a Drum Sound

mics for the toms. They can also withstand the kind of abuse that more fragile condensers wilt under, he says: "I've seen some pretty beat-up mic windscreens."

### PRINTING EFFECTS

It's common to print drums with EQ, compression or gating, although never to the point of overcompensating for what's going on in the room. "I like to use compression; I'm not afraid to hit the tape hard," Mitchell says. "I don't like to saturate with it. I like to keep it dynamic, getting some tape compression without everything being crushed to tape so hard that you lose the punch of the drums."

DiCicco uses EQ to shape his mic tones, especially on kick drum. "When I'm equalizing the kick, I'll EQ for a strong fundamental and then notch out around 300 cycles to clear out some of the wooliness of the instrument," he says. "Then I'll add some attack on the higher frequencies around 4k or 10k, depending on the drum and what frequencies are available on the EQ. I'll also use some low-frequency rolloff to clear up the low end so the kick isn't rumbling too much through everything."

"I do print EQ to tape," Scriver says. "But if a frequency-gain knob is turned way up, I've got to go back into the room. I'll add a little top to the snare drum or a point on the kick, add some bottom to the kick drum. I'll do as much of that as possible to tape. I never print gating to tape, because I like the drums to be open, and I don't mind some of the leakage of stuff into the other mics. I make it work to my advantage."

Compression is something Scriver also pays attention to. "Compressing to tape sounds totally different than compressing the signal coming back off the tape," he says. "It's the nature of the transients. Tape doesn't capture every single transient, so the compressor is working with a different set of parameters than when coming from tape. The compressor is going to react slower, because the tape sound is not quite as fast as the real snare; you just can't get the same sound."

### LIVE DRUMS AND NEW TRICKS

Chester says: "We work with a lot of drum samples, but not that many loops,

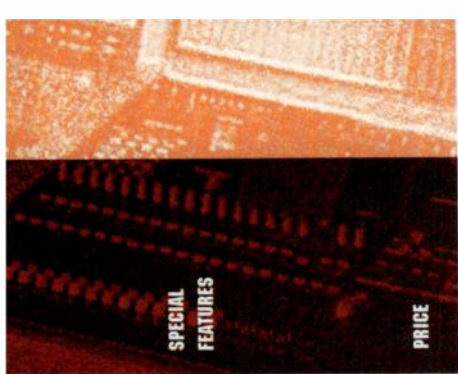
because this is primarily a live music recording studio. But it's really interesting to record live drums playing along with electronic and sampled drums—that's a challenge."

Mitchell would agree. "The great thing in mixing electronics with live open-miked drums is combining the two somewhere in the middle. We wanted to overdub a loop into the intro of a song on the new Snakepit record, but it was a free-time thing recorded without a click track, and we couldn't line up the original loop to it. So we sampled some of Matt Laug's live drum hits doing the same kind of stuff, cut them up in a sequencer and moved each note of the loop to match the open tempo of the intro. We did a similar thing with dual drum parts on another song where both things were played and recorded by the same drummer [*Laugh*] live, but one was deconstructed and rebuilt into a drum loop and the other's the real thing—an interesting mix that creates a great groove."

A trick that surely every engineer with a kid has tried is the baby drum set. Mitchell worked with Denny Fongheiser on the album *Lifted* by XC-NN, and they used the baby kit that belonged to Fongheiser's kid, filled with towels, miked with U47 tube mics and tricked-out with heavy compression to get some great 808-like hip hop grooves.

Another not-so-common trick is to reamplify a drum sound to beef up a snare or retrigger it all together. Like a ghost drummer in the iso booth, the original hit is sent back out to the room through a compact near-field monitor, the heavier the better. "I put the speaker right on top of a snare drum and re-record the snare vibrating from the original track," Scriver says. "It gets the snare rattling and puts some life back into it, or it can completely replace the original. I've heard tracks reamped with distortion or through a [Line 6] POD that sound great. I've had to reamp individual drums occasionally when I'm working with furnished tapes where the original track just wasn't recorded right, but it also offers many creative possibilities."

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SPECIAL FEATURES	PRICE
	\$70
	\$55
Line/speaker level in; high cut filter	\$122
Line/speaker level in; high cut filter	\$333
Line/speaker level in; high cut filter	\$122
Line/speaker level in	\$122
	\$122
Microphone splitting features	\$333
Microphone splitting features	\$444
Phantom buss available on P model	\$656-\$722
Phantom buss available on P model	\$878-\$944
Merged input pairs; ultrasonic noise filter	\$900
Merged inputs; -15 dB pad switch	\$240
Uses NiCad rechargeable batteries	\$300
Mic level/unity gain/+8 dB forward gain switch	\$208
4 units housed in 1U rackspace	\$249
Ground-lift jack	\$50
Accepts instrument/speaker level signals	\$60
Sidechain effects loop w/ assign switch	\$349
Mute; tuner send; effects loop; inst. presets	\$299
Auto power-off; phase inverse switch	\$150
	\$90
	\$200
Dynamic microphone; phantom power supply	\$150
3-position attenuation switch	\$50
3-position attenuation switch	\$35
Simulates 18" bass guitar speaker w/o battery	\$119
Simulates 12" guitar speaker w/o battery	\$119
Transformerless design	\$109
Selectable input sensitivity; ground lift on each channel	\$379
Instrument preamp & DI; phase control; power headphones; variable impedance	\$495
Tube amp emulations; mult preamp styles; 8 chrcr swtchs/4 knobs: contour	\$345
Streamlined vers of SansAmp Classic; sel amp type/mod/spkr cab/mic plcmnt configs	\$195
Tweed, Calif. British amp models; drive/level cntrls ea ch; spkr sim	\$245
Prog tube amp emul; buzz, punch, crunch, drive, level cntrls; 49 lctry presets/49 usr locs	\$795
Semi-parametric EQ; tube/mic emulation	\$225
Bass tube amp emulation; active bass/treble	\$225
Low noise FET technology	\$95
Switchable 15 dB boost circuit for Jensen output	\$595
Speaker/normal switch; XLR boost	\$219
Speaker/normal switch; transformerless DC out	\$395
Instrument/amplifier switch	\$171
Instrument/amplifier switch	\$720
Instrument/amplifier switch; LP switch	\$110
Instrument/amplifier switch; LP switch	\$400
Emulates SM57 in front of 12" guitar speaker	\$100
	\$60
Selectable 600/150 ohm output	\$120
-20 dB pad switch per channel	\$175
0, -20, -40 dB pad switch	\$28

# DRUM MACHINES

MANUFACTURER	PRODUCT	# OF PADS / TOUCH SENSITIVE	NON-PERCUSSION SOUNDS	ONBOARD EFFECTS	# OF SOUNDS	# OF PATTERNS PRESET / USER
Akai	MPC2000XL MIDI Production Center	16/Yes	Yes	Optional 4-bus effects processor	Unlimited	0/99
Alesis	SR-16	12/Yes	223	No	100	200/200
Alternate Mode	drumKAT MIDI Controller 3.8 7501	10/Yes	N/A	N/A	N/A	30 kits
Alternate Mode	trapKAT 3.0 7503	24/Yes	N/A	N/A	N/A	24 kits
Alternate Mode	dk10 7500	10/Yes	N/A	N/A	N/A	4
Alternate Mode	turbo drumKAT4.5 MIDI Controller	10/Yes	N/A	N/A	N/A	48 kits
Boss	DR-202	8/No	Yes (bass)	Reverb, chorus	256	400/100
Boss	Dr. Rhythm	12/No	N/A	No	91	64/64
Boss	Dr. Rhythm	16/Yes	4 (bass)	Reverb, delay, flanger	255	400/400
E-mu	XL-7 Command Station 7750	13/Yes	Yes	Yes	512 factory/512 user	100+
E-mu	MP-7 Command Station 7760	13/Yes	Yes	Yes	512 factory/512 user	100+
Jomox	XBase-09	4/Yes	Yes (white noise)	No	Unlimited	64
Jomox	AirBase-99	Yes	N/A	No	Unlimited	200
Korg	ER-1	8/No	N/A	delay, flange/chorus, ring mod.	Unlimited	224/32
Roland	MC-307 Groovebox	16/Yes	64	Reverb, chorus, multi	800	710/200
Yamaha	RY9	12/No	50	N/A	128	200/50
Yamaha	RY20	12/Yes	6 (bass)	Reverb, delay	300	300/600
Zoom	Rhythmtrak 123	13/Yes	Yes (bass)	Yes	80 drum kits; 25 bass programs	297/99
Zoom	Rhythmtrak 234	13/Yes	Yes (bass)	Yes	124 drum kits; 50 bass programs	99/99

## TEN RECORDING TIPS TO REMEMBER BEFORE MASTERING

**#1** Don't over-EQ when mixing. It's better to be a bit dull and let your mastering engineer brighten things up. In general, mastering engineers have an easier time and can do a better job if the master is on the dull side rather than the bright side.

**#2** When using DAT, print your mixes hot, but not too hot. Printing too hot robs the mastering engineer of room to work. Also, some DAT machines' analog circuitry can actually distort before a digital overload occurs. Levels that peak at -3 dBFS or so are usually sufficient.

**#3** Don't compress your mix too much. If you overcompress the whole mix, you'll rob the mastering engineer of a valuable tool. He might be able to reverse the effects of equalization in a mix, but there is no way for him to recover lost dynamics. A good rule of thumb for compression is "If you can hear it, then it's too much."

**#4** Don't trim your mixes before hand. There is no way for the mastering engineer to recover lost material if you clip an intro or make a bad fade at the outro. You're potentially making a lot more work that will ultimately cost you money. It's best to leave all count offs and tails alone and let the mastering engineer trim it.

**#5** Make sure you print tones. For analog tape, these should be done before mixdown on the same machine that you mix on rather than after the fact. Don't fudge these tones either. The mastering engineer couldn't care less if you had a perfect alignment or were 2 dB down on the left channel. All he wants to do is set up his playback machine to be a mirror image of your recorder so it plays back exactly the same. You must print 30 seconds or so of 1 kHz for channel balance, 10 kHz for azimuth adjust, and 50 Hz for low-frequency compensation. The last frequency is particularly important. The oscillator on many older con-

soles can only output 100 Hz, but this is usually way higher than the head bump of the recorder, and any small adjustment at this frequency will mean a huge adjustment in the head bump area. 50 Hz will provide a far more accurate alignment.

Print any Dolby alignment tones if Dolby was used.

For digital (such as DAT), a 1 kHz tone at any of the popular standard levels (depending who you talk to, -12, -14, -16 or -20 dBFS is used) can be printed but is not absolutely necessary.

**#6** Check your phase when mixing. It can be a real shock when you get to the mastering studio and the engineer begins to check for mono compatibility and the lead singer disappears. Even though this was more of a problem in the days of vinyl and AM radio, mono is still important since many so called stereo sources (such as television) are either pseudostereo or only stereo some of the time. Check it, and fix it if necessary before you get to mastering.





20	1/8, 1/16, 1/32 & triplets; 96	(2) 1/4"	Y/Y/N	Reads Roland & E-mu libraries; BPM matching time stretch; SE1, SE2, SE3 special edition w/enhanced graphics; automated mixing; 64 tracks; 300K note sequencer	\$1,749
100	96	(4) 1/4"	Y/Y/Y	Includes start/stop, A-B fill/count footswitches	\$269
8	1, 1/2, 1/4, 1/8, 1/16, 1/32 & triplets	1/4"	Y/Y/Y	8 note alternates, velocity switch & layering	\$945
N/A	N/A	N/A	Y/Y/Y	4 note layering, alternating & switching per pad	\$1,375
N/A	N/A	N/A	Y/Y/Y	percussion controller	\$440
8	1, 1/2, 1/4, 1/8, 1/16, 1/32 & triplets	1/4"	Y/Y/Y	128 note alternates, velocity switch & layering	\$1,212
50	96	(2) RCA	In/Out	Roll button	\$495
8	96	(2) 1/4"; phones	Y/N/N	Real-time & step programming entry modes	\$295
100	96	(3) 1/4"; phones	Y/Y/N	Search; 16 effects; 128 drum kits	\$495
128	1/4 to 1/64 w/swing; 384	(6) 1/4"; S/PDIF	Y/Y/Y	16 ARPS, 16 real-time knobs; aftertouch	\$1,695
128	1/4 to 1/64 w/swing; 384	(6) 1/4"; S/PDIF	Y/Y/Y	16 ARPS, 16 real-time knobs; aftertouch	\$1,695
64	N/A	(4) 1/4"	Y/Y/Y	Fully analog electronics; onboard sequencer	\$1,095
200	N/A	(10) 1/4"	Y/Y/Y	Fully analog electronics	\$995
16	12 triplet; 16; 16 swing; 32	(2) 1/4"; phones	Y/Y/Y	Motion sequencer; analog-modeled sounds	\$499
N/A	Grid; groove; shuffle; 8	(2) 1/4"	Y/Y/N	Grab switch; turntable emulation	\$995
100	16th note; 24	(2) 1/4"; phones	Y/Y/N	Guitar input w/ tuner and mono pitch-to-MIDI	\$300
50	Normal; swing; groove; 96	(2) 1/4"; phones	Y/Y/N	4 tracks /patterns; programmable bass lines	\$500
99	96	(2) 1/4"; phones	Y/N/N	External input for playing along with unit	\$300
99	96	(2) 1/4"; phones	Y/N/N	3 drum, 1 bass track	\$430

By Bobby Owsinski

**#7** Be careful when using Dolby Noise Reduction. Dolby (A, B, C, S, or SR) can be a godsend or it can be trouble if you're not careful. Don't double encode if you can help it. For instance, don't use Dolby for multitrack recording, then for mixing as well. This can cause some very distinctive phase anomalies that you will hear emphasized in the mastering studio. If you must mix with Dolby, it helps if you bring the original Dolby encoders with you since there are subtle calibration changes that are hard to duplicate from unit to unit.

**#8** Use caution when using DATs as a master. Make sure that all songs have IDs written and logged. Ideally, you want to be able to tell the mastering engineer to go to ID 3, 7, 14, and so on, for example. Nothing is more unprofessional than when a DAT has no IDs and the producer is unsure which take is the right one or where it is on the tape.

Also, it's usually best to not record on a DAT master for the first couple of min-

utes since if any major errors do occur, this is where they're likely to be. This is the reason some manufacturers have 32-, 62-, 92-, and 122-minute tapes instead of the standard 30, 60, 90, and 120s.

It goes without saying, but you recorded simultaneously on a second DAT for backup, didn't you?

**#9** Come prepared. Make sure documentation, shipping instructions and sequencing is complete before you get there. Always bring the most original material (earliest mixdown generation) to the session, even if you're going to work from copies or compiled copies. In fact, bring every version of every song you have just in case a fix is required.

Knowing the order of songs (sequencing) beforehand will save you a bunch of money in mastering time. This is especially important if you will be releasing in multiple formats such as CD and cassette or vinyl since they will probably require a different song order because of the two sides of cassettes and records.

Other things that should be documented include any tape flaws, digital errors, distortions, bad edits, fades, shipping instructions, and matrix (record company identification) numbers. Don't be afraid to put down any glitches, channel imbalances, or distortions. The mastering engineer won't think less of you if something got away (you wouldn't believe the number of times it happens to everybody), and it's a whole lot easier than wasting a billable hour by trying to track down a problem with the equipment when the problem is actually on the tape itself.

**#10** Have your songs timed out. This is important for a couple of reasons. First, you have to know how long a master tape or CD-R to use. CDs have a total time of just less than 80 minutes (74:33 to be exact) and 1/4-inch U-matics come in 60- or 80-minute lengths, while CD-Rs are available in 63- or 74-minute lengths. ■

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# DYNAMICS PROCESSORS

MANUFACTURER

MODEL

TYPE

THRESHOLD

RATIO

ATTACK TIMES

RELEASE TIMES

Alesis	3630 Compressor	Compressor/limiter/gate	-40 to 20 dB	1:1 to ∞:1	0.1 to 200 ms/prog dependent	50 ms to 3 sec
Alesis	NanoCompressor	Compressor/limiter	-40 to 8 dB	1:1 to ∞:1	Auto or man (0.1 to 200 ms)	Auto or man (50 ms to 3 sec)
Anthony DeMaria Labs	1000	Compressor/limiter	Fixed	3:1 to 12:1	Auto (10 µs)	Auto (0.07 sec)
Anthony DeMaria Labs	1500	Compressor/limiter	Fixed	3:1 to 12:1	Auto (10 µs)	Auto (0.07 sec)
Aphex Systems	105	Logic-assisted noise gate	-50 to 20 dB	∞:1	Manual (200 to 250 ms)	Manual (150 ms to 4 sec)
Aphex Systems	108 Easyrider	2-channel compressor	Fixed	1:1 to 5:1 (prog dep)	Auto	Auto w/2 sel. ranges
Aphex Systems	320A Compressor	Compressor/leveler/limiter	Fixed	Comp: 1:1-3:1; lim: ∞:1	Auto (1 µs to 2.5 sec)	Auto w/2 sel. ranges
Aphex Systems	622 Expander/Gate	Expander/gate	-50 to 20 dB	Gate: ∞:1; exp: 1.2:1-10:1	Manual (10 to 100 µs)	Manual (40 ms to 5 sec)
Aphex Systems	661 Expressor	Tube compressor	-30 to 20 dB	1.1:1 to 30:1 (manual); no-knee (auto)	Auto or manual (0.05 to 100 ms)	Auto or manual (40 ms to 4 sec)
Aphex Systems	720 Dominator II	Peak limiter	-9 to 25 dB	∞:1	Auto	Auto and manual
API	API 525	Single channel compressor	Variable: ∞ to 0 VU	2:1 or 20:1	15 ms	0.1 to 2.5 sec
A.R.T.	Tube Compressor	Tube compressor	-40 to 10 dB	Comp: 2.3:1; lim: 6:1	Auto/fast	Auto/fast
A.R.T.	Dual Leveler	Tube compressor	-40 to 10 dB	Comp: 2.3:1; lim: 6:1	Auto/fast	Auto/fast
A.R.T.	Pro VLA	Tube compressor	-20 to 15 dB	2:1 to ∞:1	Fast/slow	Fast/slow
A.R.T.	Tube PAC	Tube preamp/compressor	-20 to 20 dB	Comp: 2.3:1; lim: 6:1	Auto/fast	Auto/fast
Ashly Audio	CLX 51	Compressor/limiter	-40 to 22 dBu	2:1 to ∞:1	Manual (200 µs to 20 ms)	Manual (100 ms to 3 sec)
Ashly Audio	CLX 52	Dual-channel compressor/limiter	-40 to 22 dBu	2:1 to ∞:1	Manual (200 µs to 20 ms)	Manual (100 ms to 3 sec)
Avalon Design	VT-747SP	Class A oplo-compressor	-30 to 20 dB	1:1 to 20:1	2 to 200 ms	10 ms to 5 sec.
BBE	882 Sonic Maximizer	Audio enhancer	N/A	N/A	N/A	N/A
BBE	482 Sonic Maximizer	Audio enhancer	N/A	N/A	N/A	N/A
BBE	362 Sonic Maximizer	Audio enhancer	N/A	N/A	N/A	N/A
BBE	362NR Sonic Maximizer	Audio enhancer	N/A	N/A	N/A	N/A
BBE	362SW Sonic Maximizer	Audio enhancer	N/A	N/A	N/A	N/A
Behringer	Composer Pro MDX2200	2-channel compressor/ limiter/expander/gate	-40 to 20 dB	Variable (1:1 to >:1)	Variable (1 to 150 ms)	Variable (0.05 ms to 5 sec/20 dB)
Behringer	Autocom Pro MDX1400	2-channel compressor/ limiter/expander/enhancer/gate	(Comp) -40 to 20 dB (exp/gate) off to 10 dB	(Exp./gate) 1:1 to 1:8; (comp.) 1:1 to >1:8	Compressor: auto; 15 ms; 5 ms; 3 ms	Compressor: auto; program-dependent
Behringer	Multicom Pro MDX4400	4-channel compressor/limiter	-40 to 20 dB	Variable (1:1 to >:1)	15 ms at 10 dB, 5 ms at 20 dB, 3 ms at 30 dB	Program-dependent, typ. 125 dB
Behringer	Multigate Pro XR4400	4-channel expander/gate	Bypass to 10 dBu	Variable (1:1 to 1:4)	Program-dependent	Variable (50 ms to 4 sec)
Behringer	Intelligate XR2000	2-channel class-A expander/gate/ducker	-50 to 20 dBu	Variable (1.2:1 to 30:1)	Variable (3 µs to 90 ms)	Variable (10 ms to 2 sec)
Behringer	Multigate Pro XR4400	Interactive frequency- conscious 4-channel	Bypass to 10 dBu	Variable (1:1 to 1:4)	Program-dependent	Variable (50 ms to 4 sec)
Behringer	Dualflex Pro EX2200	Multiband spatial sound enhancement processor	N/A	N/A	N/A	N/A
Behringer	Ultraflex ProPRO EX3200	Multiband spatial sound enhancement processor	N/A	N/A	N/A	N/A
Behringer	Ultra-Dyne Pro DSP9024	6-band dynamic processor	-70 to 0 dB	1:1 to INF (90):1	0 to 255 ms	50-5,000 ms
Behringer	Ultramizer Pro DSP1400P	2-band compressor/ leveler/loudness ultramizer	-48 to 0 dB	Density 0 - 100	Speed 0 to 100	Speed 0 to 100
Behringer	Multiband Denoiser SNR2000	2-channel single-ended noise reduction system	Variable ) (-40 to 20 dBu	Variable (1:1 to 1:6)	N/A	variable (0.06 to 1.2 seconds)
Behringer	Super-X CX2310	Stereo/3-way mono crossover & xband limiters	-6 to 18 dBu	N/A	N/A	N/A
Bellari	RP583	Tube compressor/limiter	-20 to 20 dB	2:1 to ∞:1	Manual (0.5 to 100 ms)	Manual (1 to 2 sec)
Bellari	LA120	Tube compressor/limiter	-20 to 20 dB	Switchable 2:1; 10:1	Program dependent	Program dependent
BSS Audio	DPR402	Compressor/de-esser/limiter	-30 to 20 dBu	1:1 to ∞:1	Manual (50 µs to 80 ms)	Auto or manual (5 ms to 5 sec)
BSS Audio	DPR404	Quad compressor	-30 to 20 dBu	1:1 to ∞:1	Auto	Auto
BSS Audio	DPR422	Dual compressor/de-esser	-30 to 20 dB	1:1 to ∞:1	Auto or manual (50 µs to 400 ms)	Auto or manual (5 ms to 5 sec)
BSS Audio	DPR504	Quad gate	-50 to 20 dBu	N/A	Auto (20 µs or 40 µs to 5 ms) program dependent	Manual (1 ms to 3 sec)
BSS Audio	DPR522	Dual gate	-60 to 15 dB	N/A	Manual (20 µs to 1.5 sec)	Manual (1 ms to 3 sec)
BSS Audio	DPR901II	Dynamic equalizer	-30 to 20 dBu	N/A	Auto	Auto
BSS Audio	DPR944	Gate/compressor	Gate: -50 to 20 dB; comp: -30 to 20 dB	1:1 to ∞:1 comp. only	Auto	Auto
Crane Song	STC-8 Class A Compressor Limiter	Compressor/limiter	Auto	1:1 to 1:20	0.1 to 150 ms	Auto (40 to 10 sec)



GAIN CONTROL	BYPASS SWITCH	# OF CHANNELS/ STEREO LINK	METER TYPE	MAIN I/O	SIDECHAIN I/O	DIMENSIONS	SPECIAL FEATURES	PRICE
Output	Yes	2/Yes	12-seg LED	1/4"	1/4" TRS	19x1.7x4.5	Hard/soft knee; peak/RMS compression	\$199
Output	Yes	2/Yes	6-seg LED	1/4"	1/4" TRS	5.5x1.75x4.5	Hard/soft knee; peak/RMS compression	\$119
Input	No	1/No	VU	XLR	No	19x3.5x8	All tube architecture	\$1,695
Input	No	2/Yes	VU	XLR	No	19x3.5x9	All tube architecture	\$2,995
No	No	4/No	LED	1/4" TRS	External key input	19x1.7x5.2	Logic assist; uses VCA 1001	\$449
Input/output	Yes	2/Yes	LED	1/4" TRS	No	19x1.75x5.2	Waveform-dependent compression	\$299
Output	Yes	2/Yes	LED	XLR	No	19x1.75x10	Frequency-dependent leveler	\$1,350
None	Yes	2/Yes	LED	XLR	1/4"	19x1.75x9	Logic assist	\$795
Input/output	Yes	1/No	LED	XLR; 1/4"	1/4"	19x1.75x10.125	Auto-compression mode; hi-freq expander	\$749
Input	Yes	2/Yes	LED	XLR	No	19x1.75x10	Brickwall limiter; 3-band auto limit threshold	\$1,350
Yes	Yes	1/No	VU miniature GR meter	XLR when in API frame	No	N/A	Re-issue of early 70's API compressor	\$1,295
Output	Yes	1/No	LED	XLR; 1/4"	No	5.375x2x5.25	Vactrol electro-optical tube compression	\$139
Output	Yes	2/Yes	LED	XLR; 1/4"	No	19x1.75x6.5	Vactrol electro-optical tube compression	\$349
Output	Yes	2/Yes	LED; VU	XLR; 1/4" TRS	No	19x3.5x6.5	Vactrol electro-optical tube compression	\$649
Input/output	Yes	1/No	LED	XLR; 1/4"	No	8.5x1.65x5.25	Phantom power; 20 dB gain; phase control	\$279
Input/output	Yes	1/No	11-seg LED	XLR; 1/4"	1/4"	19x1.75x6	Infinite soft knee & timing based on comp. ratio	\$379
Input/output	Yes	2/Yes	11-seg LED	XLR; 1/4"	1/4"	19x1.75x6	Infinite soft knee & timing based on comp. ratio	\$539
Make-up/ output control	Yes	Yes	VU; (2) 20-seg LED	XLR	Yes	19x12x3.5	6-band graphic EQ; tube bypass	\$2,495
N/A	Yes	2/No	5-seg LED per ch	1/4" TRS; XLR	N/A	1U	Uses BBE process; hard-wire bypass	\$599
N/A	Yes	2/No	5-seg LED per ch	1/4" unbalanced; RCA	N/A	1U	Uses BBE process; hard-wire bypass	\$349
N/A	Yes	2/Yes	1 LED clip per ch	1/4"	N/A	1U	Uses BBE process	\$259
N/A	Yes	2/Yes	1 LED clip per ch	1/4"; RCA	N/A	1U	Uses BBE process; noise reduction	\$349
N/A	Yes	2/Yes	5-seg LED per ch	1/4"; RCA	N/A	1U	Uses BBE process; subwoofer filter	\$349
No	Yes	2/No	12 LEDs	XLR; phone	Yes	19x1.75x8.5	2-ch expander/gate/compressor/limiter	\$179
Yes	Yes	2/Yes	12 LEDs	XLR; phone	Yes	19x1.75x8.5	Link function; high-pass filter in sidechain	\$149
Interactive gain control	Yes	4/Yes	17 LED's per ch	XLR; phone	No	19x1.75x8.5	High-pass filter in sidechain; auto compressor	\$179
Gain reduction display	No	4/No	Traffic light display	XLR; phone	Yes	19x1.75x8.5	4 expander/gate circuits	\$269
No	Yes	2/Yes	Traffic light display	XLR; phone	Yes	19x1.75x8.5	Integrated high-pass filters	\$249
No	No	4/No	Traffic light display	XLR; phone	Yes	19x1.75x8.5	4 expander/gate circuits	\$249
N/A	Yes	2/No	N/A	RCA; 1/4"	N/A	19x1.75x8.5		\$119
N/A	Yes	N/A	N/A	XLR; 1/4"	N/A	19x1.25x8.5	Automatic noise reduction; bass processor	\$179
-24 to 24 dB	Yes	2/Yes	Digital RMS and peak	Balanced 1/4" and XLR	No	19x3.5x12	MIDI-controllable; optional AES/EBU con.	\$499
-10 dBV/4 dBu switch	Yes	2/Yes	8-segment LEDs	Balanced 1/4" and XLR	N/A	19x1.75x7.5	Includes PC remote control software	\$249
No	Yes	2/Yes	2x8 LED gain reduction/ 2x8 filter bandwidth	1/4"; XLR	No	19x1.75x8.5	Multiband frequency analysis; dynamic TAC	\$289
-12 to 12 dB variable	N/A	N/A	N/A	Servo balanced in; balanced outs	N/A	19x1.75x8.5	Adjustable delay for runtime/phase inversion	\$229
Output	Yes	2/Yes	VU	XLR; 1/4"	1/4"	19x3.5x6		\$650
Output	Yes	1/No	VU	XLR; 1/4"	N/A	7.6x1.6x5.4		\$160
Output	Yes	2/Yes	5/9/12-seg LED	XLR	Barrier strip	19x1.75x9	Variable knee w/comp. ratio; sidechain mon.	\$1,599
No	Yes	4/Yes	15/8-seg LED	XLR	1/4"	19x1.75x11	Variable HF de-essing; progressive knee	\$1,449
Output	Yes	2/Yes	5/6-seg LED	XLR	1/4"	19x1.75x8	Progressive knee; de-esser	\$899
No	Yes	4/Yes	12-seg LED	XLR	1/4" TRS	19x1.75x11	External key-source facility; sidechain filter	\$1,449
No	Yes	2/Yes	3/9-seg LED	XLR	1/4"	19x1.75x8	Automatic dynamics enhancement	\$799
No	Yes	2/Yes	10-seg LED	XLR	No	19x1.75x9	Shelving EQ; 1 & 2 ch split; filter width control	\$1,549
Output	Yes	4/Yes	12-seg LED	XLR	1/4" TRS (gate only)	19x1.75x7.1		\$899
Output	Yes	2/Yes	16-seg LED	XLR	DB15	19x3.5x12	Soft knee; dual sidechain	\$4,450

## DYNAMICS PROCESSORS

MANUFACTURER	MODEL	TYPE	THRESHOLD	RATIO	ATTACK TIMES	RELEASE TIMES
Crane Song	Trakler	Discrete Class A, single channel compressor/limiter	-40 to 24 dB	1.1:1 to 20:1	Manual 0.05 to 200 ms	Auto 40 to 10 ms
Crate	SM4-CL	Compressor/limiter	-20 to 20 dBu	5-position switch: 2:1, 4:1, 8:1, 12:1, 20:1	20 $\mu$ s to 1.1 sec, adjustable for 100% recovery	50 $\mu$ s to 1.1 sec, adjustable for 63% recovery
dbx	160A	Compressor	-40 to 20 dBu	1:1 to -1:1	Auto	Auto
dbx	166XL	Compressor/limiter	Comp: -40 to 20 dBu; lim: 0 to 20 dBu	1:1 to $\infty$ :1	Auto	Auto
dbx	266XL	Compressor/expander/gate	-40 to 20 dB; exp: -60 to 10 dB	1:1 to $\infty$ :1	Auto or manual	Auto or manual
dbx	1046	Quad compressor/limiter	-40 to 20 dBu	1:1 to $\infty$ :1	Auto	Auto
dbx	1066	Compressor/limiter/expander/gate	Exp. gate: 0 to 15 dBu; comp: -40 to +20 dBu; lim: 0 to 24 dBu	Expander/gate: 1:1 to 30:1; compressor: 1:1 to $\infty$ :1	Auto or man (0.05 to 100 ms)	Auto or man (0.05 ms to 5 sec)
Demeter	H CL-1 Mono Tube Optical Compressor	Compressor/limiter	-30 to 20 dBu	Optical/soft knee 2:1 to 30:1	1 to 200 ms	100 ms to 5 sec
Demeter	VTCL-2b Stereo Tube Optical Compressor Limiter	Compressor/limiter	-30 to 20 dBu	Optical/soft knee 2:1 to 30:1	1 to 200 ms	100 ms to 5 sec
Demeter	VTCL-2b Stereo Tube Optical Compressor Limiter	Compressor/limiter	-30 to 20 dBu	Optical/soft knee 2:1 to 30:1	1 to 200 ms	100 ms to 5 sec
DOD	SD66	Gated compressor/limiter	-40 to 20 dBu	1:1 to $\infty$ :1	Manual (0.1 to 100 ms)	Manual (50 ms to 2.5 sec)
Drawmer	DL241/DL241XLR	Dual gated compressor/limiter	Comp: -40 to +20 dB; exp/gate: -70 to +20 dB; lim: 0 to 18 dB	1.2:1 to $\infty$ :1	Auto or manual (0.5 to 100 ms)	Auto or manual (0.05 to 5 sec)
Drawmer	DL251	Dual-channel; spectral compressor	Comp: -40 to +20 dB; lim: 0 to 18 dB	1.2:1 to $\infty$ :1	Auto or manual (0.5 to 100 ms)	Auto or manual (0.05 to 5 sec)
Drawmer	DL441	Quad compressor/limiter	Comp: -40 to +20 dB; lim: 0 to 18 dB	1.2:1 to $\infty$ :1	Auto (0.5 to 100 ms)	Auto (0.05 to 4 sec)
Drawmer	DS201	Dual frequency conscious noise gate	-54 to $\infty$ dB	N/A	Manual (10 $\mu$ s to 1 sec)	Manual (2 ms to 4 sec)
Drawmer	DS404	Quad noise gate	-70 to +20 dB	N/A	Auto	Combines hold and decay 10 ms to 5 sec
Drawmer	MX30	Dual gated/auto compressor/limiter	Comp: -40 to +20 dB; exp/gt: -70 to +20 dB; lim: 0 to 18 dB	1.2:1 to $\infty$ :1	Auto or man (0.5 to 100 ms)	Auto (0.05 to 4 sec)
Drawmer	MX40	4 channel tuneable gate + peak punch	-60 to +20 dB	N/A	10 $\mu$ s	10 ms to 4 sec
Drawmer	1960	Dual channel tube compressor/tube preamp	$\infty$ to -24 dB	1.1:1 to 30:1	Man or auto (0.5 to 20 ms)	Man or auto (400 ms to 20 sec)
Drawmer	MX50	Dual channel de-esser	Auto	Auto	Auto	Auto
Empirical Labs	EL-8 Distressor	Compressor/limiter	Varies with input level	1:1 to $\infty$ :1	Manual (<40 $\mu$ s to 50 ms)	Manual (0.05 to 3.5 sec)
Focusrite	Red 3 Dual Compressor/Limiter	Compressor/limiter	Comp: -24 to +12 dB; Lim: 0 to 18 dB	Variable 1.5:1 to 10:1	Variable 300 $\mu$ s to 90 ms	Variable 100 ms to 4 sec
Focusrite	Platinum 3 ComPounder	Dual mono/comp/exp/lim/limit	Comp: -24 to +12 dB; Lim: 12 to 26 dBu	Variable 1.3:1 to $\infty$ ; soft/hard knee switchable	Variable 100 $\mu$ s to 100 ms	Variable 100 ms to 4 sec
Focusrite	Platinum 4 MixMaster	Multiband compressor/expander/limiter/equalizer/stereo imager	Comp: -20 to +10 dB	Variable 1.3:1 to 5:1	Auto	200 ms to 1.6 sec
FMR Audio	RNC 1773	Compressor	1	1.1 to 25:1	0.2 to 200 ms	0.05 to 5 sec
Furman	LC-6 Stereo Compressor/Gate	Compressor/noise gate	Compressor: -20 to +20 dB; gate: $\infty$ to 20 dB	1.4:1 to >50:1	Comp (100 $\mu$ s to 1 sec); gate: preset (1 ms)	Comp (0.05 to 5 sec); gate: preset (250 ms)
Galaxy Audio/Valley Audio	Valley 401	Microphone processor	-40 to +20 dB	Compression ratio fixed 20:1	Expander attack & gate attack: 100 $\mu$ s compression attack 1-15 ms	Comp, expand release: program dep, 25 sec/20 dB; gate release: prog dep, 1 sec, 20 dB
HHB	Classic 60	Tube compressor	-20 to +20 dB	1:1.5 to 1:30	0.5 to 50 ms	40 ms to 4 sec
HHB	Fat Man 2	Compressor/tube amp	10 dBu to -20 dB	1:1.5 to 1:30	Slow 5 ms; fast 0.5 ms	Slow 1.5 sec; fast 0.2 sec
HHB	Radius 30	Compressor/expander/limiter	-20 to +20 dB	1:1.5 to 1:30	0.5 to 20 ms, auto	40 ms to 2 sec, auto
HHB	Radius 3 Fat Man	Tube compressor/limiter	10 dBu to -20 dBu	1:1.5 to 1:30	Slow 5 ms; fast 0.5 ms	Slow 1.5 sec; fast 0.2 sec
Joemeek	SC-2	Compressor	Varies	4.5:1 to 7:1	Manual (1.5 to 10 ms)	Manual
Joemeek	SC2.2	Photo-optical compression	Varies	2:1 to 10:1	Variable between 0.5 and 10 ms	Variable
Klark-Teknik	DN500	Dual compressor/limiter/expander	Comp: -30 to 20 dB; exp: -40 to 20 dB; lim: 0 to 20 dB	Comp: 1:1 to 50:1; exp: 1:1 to 25:1	Comp: auto or man (50 $\mu$ s-20 ms); exp: auto or man	Comp: auto/man (60 $\mu$ s to 2 sec); exp: auto/man (40 ms to 2 sec)
Klark-Teknik	DN504	Quad compressor/limiter	-30 to 20 dBu	1:1 to 50:1	Auto or man (50 $\mu$ s to 20 ms)	Auto or man (60 ms to 2 sec)



GAIN CONTROL	BYPASS SWITCH	# OF CHANNELS/ STEREO LINK	METER TYPE	MAIN I/O	SIDECHAIN I/O	DIMENSIONS	SPECIAL FEATURES	PRICE
Output	Yes	1/No	23-seg LED	XLR	DB-9	1	Clean, vintage, clean/vintage VCA features	\$2,550
Yes	Yes	2/Yes	10-seg LED	Balanced 1/4"	N/A	1.6 x5.6x 5.5	Switchable level meters displays; 1/3rd rack unit	\$200
Output	Yes	1/No	LED	XLR; 1/4"	1/4" TRS	1U	Switchable hard/soft/OverEasy compression	\$460
Output	Yes	2/Yes	19-seg LED	XLR; 1/4" TRS	1/4" TRS	1U	Switchable hard knee/OverEasy compression; expander	\$330
Output	Yes	2/Yes	LED	XLR; 1/4" TRS	1/4" TRS	1U	Switchable hard knee; OverEasy compression	\$190
Output	Yes	4/Yes	LED	XLR; 1/4" TRS	No	1U	Switchable hard knee; OverEasy compression	\$650
Output	Yes	2/Yes	LED	XLR; 1/4" TRS	1/4" TRS	1U	Sidechain monitor; OverEasy compression	\$550
Yes	N/A	1/Yes	10 seg LED VU/cvrid LED	XLR; 1/4" TRS	XLR; 1/4" TRS	19x1.75x13	H series tube hybrid; variable attack/release	\$1,149
Yes	N/A	2/Yes	Overloaded/10-seg LED VU; 10-seg LED change	XLR; TT; 1/4"	No	19x3.5x12	All tube; adjustable input sensitivity	\$2,499
Yes	N/A	2/Yes	Overloaded/10-seg LED VU; 10-seg LED change	XLR; TT; 1/4"	No	19x3.5x12	Jensen transformers; all tube; variable attack/release	\$2,499
Input/output	Yes	2/Yes	LED	1/4" TRS; RCA	1/4"	19x1.75x9	Soft knee	\$280
Input/output	Yes	2/Yes	8-seg LED	1/4"; (DL241); XLR (DL241XLR)	No	19x1.75x7	Program adaptive expander/gate; peak limiter auto/manual attack/release	\$725-\$750
Input/output	Yes	2/Yes	10-seg LED out; 9-seg GR LED	XLR	1/4" TRS	19x1.75x7	Variable dynamic spectral enhancement hi-frequency dynamic expansion & compression; 0 response time peak limiter	\$1,099
Input/output	Yes	4/Yes	5-seg output LED; 8-seg gain reduction LED	XLR	No	19x1.75x7	0 response time peak limiter; variable hard/soft knee	\$1,199
No	Yes	2/Yes	3-seg LED	XLR	1/4"; key input	19x1.75x7	Frequency-sensitive gating w/ high-/low-pass filters; hold & decay controls; key-listen ducker	\$750
No	Yes	4/Yes	3-seg LED per channel	XLR	1/4"; key input	19x1.75x7	Frequency-sensitive gating w/high-/low-pass filters; hard/soft gate (downward expansion); 20/-90 range switch	\$1,125
Output	Yes	2/Yes	8-seg LED comp out; 9-seg GR LED; 2-seg LED gate on/off	XLR; 1/4"	No	19x1.75x7	Program-adaptive expander/gate 0 response time peak limiter	\$499
No	Yes	4/Yes	3-seg LED	XLR	1/4"; key input	19x1.75x7	Trigger stabilization; peak punch	\$725
Input/output	Yes	2/Yes	VU meter each channel	XLR	Yes	19x3.5x7	Tube comp w/tube-based VCA; instrument preamp w/EQ and variable gain	\$2,575
De-ess frequency	Yes	2/Yes	9-LED on each channel	XLR	No	19x1.75x8	-20 dB split/full band de-essing	\$599
Input/output	Yes	2/Yes	LED	XLR; 1/4"	1/4"	19x1.75x10	Emulates classic compressors (LA2, LN1176, others)	\$1,499-\$2,899
Output	Yes	2/Yes	VU	Transformer-balanced; XLR	Key inputs XLR	2U	Stereo switch; auto-release mode	\$3,295
Yes	Yes	2/Yes	LED	Balanced XLR or 1/4"	1/4"	1U	Class A amplifier design; inductor-powered bass expander; switchable 4dBu and -10dBV operation	\$775
Yes	Yes	2/Yes	LED	XLR; 1/4"; optional AES/EBU and S/PDIF digital output	N/A	2U	3-band stereo EQ; optional 24-bit/96K digital output	\$1,395 and up
Yes	Yes	2/Yes	8-seg LED	1/4" TRS	1/4"; TRS	5.5x5.5x1.6	Super nice mode	\$200
Input/output	No	2/Yes	5-seg LED	1/4"; XLR (optional)	1/4"	19x1.75x8	Adaptive knee	\$439
Mic preamp variable 20 to 60 dB; Output -15 to +15 dB	No	1/No	LED, VU and attenuation	Balanced XLR	1/4" TRS	19x1.75x9.6	Clip indicator for preamp/EQ/VCA; phantom power	\$680
Input/output	Yes	2/Yes	VU	XLR	1/4"	19x8.1x3.5	250 V heater voltage rail	\$2,395
Input/output	Yes	2/Yes	VU	1/4"	N/A	8.4x5.2x8.3	15 presets; mic or line	\$469
Gain make-up/output	Yes	2/No	VU	XLR; 1/4"	1/4" TRS	19x7.9x3.5	VU switchable between output & GR	\$749
Input/output	Yes	2/Yes	VU	1/4"	N/A	8.4x5.2x8.3	15 presets; manual mode	\$469
Input/output	Yes	2/Yes	VU	XLR; 1/4" TRS	None	19x3.5	Vintage photo-optical compressor sound	\$2,000
Input	Yes	2/Yes	VU	XLR	N/A	2U rack space	Dark switch for thicker sound	\$800
-10 to +30 dB	Yes	2/Yes	LED	XLR	1/4" TRS	19x1.75x11.5	Variable knee; VCA design; vari-ratio expander	\$1,425
-10 to +30 dB	Yes	4/Yes	LED	XLR	1/4" TRS	19x1.75x11.5	Switchable hard or soft knee compression	\$1,495

# DYNAMICS PROCESSORS

MANUFACTURER	MODEL	TYPE	THRESHOLD	RATIO	ATTACK TIMES	RELEASE TIMES
Klark-Teknik	DN514	Quad auto gate	-40 to 20 dBu	N/A	Prog dep, semi-automatic expand: auto/man (40 ms to 2 sec)	Man (40 ms to 2 sec) including hold
LA Audio	GCX2	Dual compressor/gate	-50 to 20 dB	1:1 to 20:1	Prog dep: 5 to 70 ms (fast) up to 3 sec (slow)	Prog dep: up to 1 sec (fast) and up to 3 sec (slow)
LA Audio	TCX2	Dual compressor/gate	-30 to 20 dB	1:1 to 20:1	Auto or man (0.1 to 100 ms)	Auto or man (0.04 to 4 sec)
LA Audio	BCL2	Dual compressor/limiter	-40 to 20 dB	1:1 to 20:1	Peak: (1 to 70 ms); RMS: prog dep	Peak: 100 ms to 3 sec; RMS: prog. dep.
LA Audio	FGC2	Dual split band compressor and frequency selective gate	-40 to 20 dB	1:1 to 20:1	Fast = 1 ms; slow = 20 ms	40 ms to 4 sec
Langevin	Langevin Electro-Optical L	Stereo limiter	22 dB	10:1	10 ms or 6 dB	2.5 ms or 6 dB
MindPrint	OCL-2	Stereo tube compressor	+2 to -28 dB	1:1 to ∞	0.1 to 150 ms	5 ms to 2.5 kms
Manley Labs	Stereo Electro-Optical Limiter	Stereo electrical-optical limiter	22 dB	10:1	10 ms for 6 dB GR	2.5 seconds for 6 dB GR
Oram Pro	Sonicamp 1	Solid state compressor	Yes	Yes	Yes	Yes
Oram Pro	Sonicamp 2	Solid state compressor	Yes	Yes	Yes	Yes
Pendulum	OCL-2	Compressor/limiter	Off to -20 dB	1.5:1 to 15:1	1 to 50 ms	50 ms to 20 sec
Phonic Hi-Tech	PCL3200	Compressor/limiter/gate	-40 to 20 dB	1:1 to 10:1	Manual (0.1 to 200 ms)	Manual (50 ms to 3 sec)
PreSonus	ACP-88	Compressor/limiter/gate	-0 to 20 dBu	1:1 to 20:1	Auto or man (0.01 to 100 ms)	Auto or man (0.02 ms to 2 sec)
PreSonus	Blue Max	Smart compressor/limiter	Fixed (-10 dB) manual mode	1:1 to 20:1	Manual (0.01 to 100 ms)	Manual (10 to 500 ms)
PreSonus	ACP-22	Stereo compressor/limiter/ spectral gate	-70 to 20 dB	1:1 to 20:1	Auto or man (comp: 0.1 to 100 ms; gate: 10 µs to 100 ms)	Auto or man (0.02 ms to 2 sec)
Rane	DC24	Compressor/limiter/expander/gate 2-way crossover	-50 to 20 dB	1:1 to 20:1	Auto	Auto
Rolls	CL 151 GLC	Comp/limiter w/mic preamp	-30 to 10 dB	1:1 to ∞:1	Auto	Auto
Rolls	RP252	Compressor/limiter/gate	-40 to 12 dB	1:1 to ∞:1	Man (0.2 to 10 ms)	Man (40 ms to 2 sec)
Samsom	S Com	Stereo compressor	-40 to 20 dB	1:1 to 1:∞	Variable (0.3 ms/20 dB to 300 ms/20 dB)	Variable (0.05 to 5 sec)
Samsom	S Com 4	4-ch compressor/gate	-40 to 20 dB	1:1 to 1:∞	Variable (0.3 ms/20 dB to 300 ms/20 dB)	Variable (0.05 to 5 sec)
Samsom	S Com Plus	Expander/gate compressor/limiter de-esser	-40 to 20 dB	1:1 to 1:∞	Variable (0.3 ms/20 dB to 300 ms/20 dB)	Variable (0.05 to 5 sec)
Sony	SRP-F300	Digital speaker system multi-processor	N/A	N/A	N/A	N/A
Steinberg	MindPrint T-Comp	Stereo tube compressor	2 to -28	1:1 to ∞	1 to 150 ms	5 ms to 2.5 sec
Summit Audio	TLA-100A Tube Leveling Amplifier	Tube compressor	-25 to 25 dBu	1:1 to 4:1	Sel (fst, med, slw)	Sel (fast, med, slow)
Summit Audio	TLA-50	Compressor/limiter/gate	-25 to 25 dBu	1:1 to 4:1	Sel (fast, med, slow)	Sel (fast, med, slow)
Symetrix	562E Windowing Expander/Gate	Gate/expander	-40 to 20 dB	Gate: ∞:1; exp: 1:1 to 3:1	Adj (auto to 300 ms)	Manual (30 ms to 2 sec)
Symetrix	565E Dual Comp/Limiter/Exp	Compressor/limiter/ expander	Comp: -40 to 20 dBu; exp: 10 to -40 dBu; lim: -10 to 20 dBu	Comp: 1:1 to 10:1; exp: 1:1.5; lim: 20:1	Comp: prst; lim: prst (100 µs); exp: prst (4 ms)	Comp: prog dep 180 ms to 2.55 sec; lim: 100 ms; expand: 250 ms to 5 sec
TC Electronic	Finalizer Express	Compressor	-25 to 0 dBu	1:1 to ∞:1	0.3 to 100 ms/band	20 ms to 7 sec/band
TC Electronic	Triple C Mono/Triple C Stereo	Compressor	-40 dB	1:1 to ∞:1	0.2-50 ms	20-2kms
TL Audio	Ivory 5021	Tube compressor	-20 to 20 dBu	1.5:1 to 30:1	Switchable fast/slow	Switchable fast/slow
TL Audio	Classic C1 Compressor	Tube	20 to 20 dB	Variable 1:1.5 to 1:30	Variable 0.5 to 50 ms	Variable 40 ms to 4 sec
Tube Tech	CL-1B	Opto-cell compressor	20 to -40 dBm	2:1 to 10:1	Fast; slow	Fast; slow
Tube Tech	LCA-2B	Stereo compressor/limiter	Off to -10 dBu	1.6:1 to 20:1	0.3 to 70 ms	0.07 to 2 sec
Tube Tech	CL-1B	Tube compressor	20 to -40 dBm	2:1 to ∞:1	Fixed or continuously variable	Fixed or continuously variable
Tube Tech	CL-2A	Tube compressor	20 to -40 dBm	2:1 to ∞:1	Fixed or continuously variable	Fixed or continuously variable
Tube Tech	SMC-2A	Stereo multiband compressor	Variable	1.6:1 to 20:1	0.3 to 70 ms	0.07 to 2 sec
Tube Tech	MEC-1A	Mic-preamp/EQ/compressor	-20 dB to off	1.5:1 to 10:1	0.3 to 70 ms	60 ms to 2 sec
Tube Tech	LCA-2B	Stereo tube compressor limiter	off to 10 dBu	1.6:1 to 20:1	0.3 to 70 ms	0.07 to 2 sec
Universal Audio	1176LN	Limiting amp	Set by input level control	4:1 to 20:1	20 to 800 ms	50 ms to 1.1 sec
Voce	EVC-1	Tube compressor	∞ to 20 dBu	1:1 to 10:1	Man (1 to 1000 ms)	Man (1 to 1,000 ms)



GAIN CONTROL	BYPASS SWITCH	# OF CHANNELS/ STEREO LINK	METER TYPE	MAIN I/O	SIDECHAIN I/O	DIMENSIONS	SPECIAL FEATURES	PRICE
No	Yes	No	LED	XLR	1/4"	19x1.75x11.5	Syncs audio tracks by interlocking gate release times	\$1,215
-16 to +20 dB	Yes	2/Yes	2x6-seg LED	XLR; TRS	N/A	19x61.75		\$300
Gain make-up: 20 dB	Yes	2/Yes	2x6-seg LED	XLR; TRS	N/A	19x6x1.75		\$500
-20 to +20 dB	Yes	2/Yes	12-seg LED	XLR	N/A	19x7.5x1.75	RMS/peak detection mix feature; broadcast specs; transformer balanced outs	\$1,200
-6 to +20 dB	Yes	2/Yes	2x8-seg LED	XLR	N/A	19x7.5x1.75	Frequency windowing filters in gate/sidechain/audio path	\$1,000
Output/gain reduction	Yes	2/Yes	VU and gain reduction modes	XLR, 1/4" balanced and unbalanced	No	19x1.75x10	All discrete	\$1,775
Input/output	Yes	2/Yes	6-seg input/output and 12-seg gain reduction	XLR; 1/4"	Yes	2U	Filter dependent compression switch, adaptive processing mode	\$1099
Threshold/output	Yes	2/Yes	VU & GR	XLR bal.; 1/4" unbalanced	No	19x3.5x10	LA-2A style; all-tube	\$2,500
Yes	Yes	2/Yes	LED; GR/input	1/4"; XLR	Yes	1U	Switchable light-dependent resistor	\$1,995
Yes	Yes	2/Yes	VU; GR/input	1/4"; XLR	Yes	2U	Solid state or light dependent resistor	\$2,590
Output	Yes	2/Yes	VU	XLR; 1/4"	1/4" TRS	19x3.5x12.5	All tube gain path; transformerless design	\$2,795
Output	Yes	2/Yes	LED	1/4"	1/4"	19x2x4.5	Hard/soft knee; peak RMS switch	\$249
Output	Yes	8/Yes	LED	1/4" TRS	1/4" TRS	19x3.5x6	Hard/soft knee; accepts 4/-10 dBu inputs	\$1,200
Input/output	Yes	2/Yes	LED	1/4" TRS	1/4" TRS	19x1.75x8	Includes 15 inst-specific preset comp. curves	\$200
Output	Yes	2/Yes	8-seg LED	XLR; 1/4"	1/4" TRS	19x1.75x5	Hard/soft knee; freq-dependent LP gate filter	\$400
Output	Yes	2/Yes	LED	XLR; 1/4" TRS	1/4" TRS	19x1.75x5.3	Combine crossover mode; -10/4 dBu inputs	\$599
Input/output	No	1/N	LED	XLR; 1/4"	1/4" TRS	4.15x2.46x1.55	Mic preamp; 40 dB total gain	\$120
Output	Yes	2/Yes	10-seg LED	XLR; 1/4"	1/4"	19x1.75x6		\$275
Output variable (-20 to 20 dB)	Yes	2/Yes	12-seg LED	XLR; 1/4" TRS	1/4"	1.75x19x7.75	Full featured, dual-channel dynamics processor incl comp/lim; expander/gate; de-esser; peak limiter	\$220
Output variable (-20 to 20 dB)	Yes	4/Yes	5-seg LED	XLR; 1/4" TRS	1/4"	1.75x19x7.75	Full featured, 4-ch dynamics processor incl comp/lim; expander/gate on each channel	\$290
Output variable (-20 to 20 dB)	Yes	2/Yes	12-seg LED	XLR; 1/4" TRS	1/4"	1.75x19x7.75	Full featured, dual-channel dynamics processor incl comp/lim; expander/gate de-esser; peak limiter	\$280
N/A	N/A	N/A	Peak-reading LED (x8)	Bal. XLR (analog); AES/EBU (digital)	N/A	19 x1.75x14.5	PC-controlled multi-processing w/included software	\$1,875
Input/output	Yes	2/Yes	6-seg. I/O; 12-seg. gain	XLR; 1/4"	Stereo inserts	1U	Filter-dependent compression switch	\$1,099
Output	Yes	1/linkable	VU meter; output/VGR	XLR	1/4" TRS	19x3.5x10.5	Soft-knee; Jensen 990 output; transformerless	\$1,700
Yes	Yes	1/linkable	VU	1/4"; XLR	1/4"; TRS	9.5x1.75 (1/2 rack)	Auto level switching (+4, -10) tube	\$695
No	Yes	2/No	LED	XLR; 1/4"	1/4"	19x1.75x8	Window advance; auto-windowing	\$599
Output	Yes	2/Yes	LED	XLR; 1/4"	1/4"	19x1.75x7.25		\$399
Input/Output	Yes	2/Yes	LED	S/PDIF; AES/EBU; Toslink	No	1U	24-bit AD/DA; soft clip; spectral balance	\$1,599
Output	Y/1/4"	1/2/Yes	36-seg LED	1/4"; S/PDIF; 1/4" TRS in stereo	1/4" TRS	19x8.2x1.75	MIDI; envelope compression	\$699/\$999
Input/output/gain make-up	Yes	2/Yes	VU	XLR; TRS	TRS	19x3.5x10	Expander/gate; instrument inputs	\$749
Variable; gain make-up	Yes	2/Yes	VU	XLR; TRS	TRS	19x3.5x10	Onboard mic preamps and direct inputs	\$2,395
Off to 30 dB	Yes	Yes	VU	Analog	N/A	2U	Balanced & fully floating I/O	\$2,195
-6 to 10 dB	Yes	Yes (internally or othr LCA-2Bs)	LED	Analog	Analog	2U	Fairchild 670 attack/release presets	\$3,495
Yes	Yes	1/No	VU	XLR	XLR	3U		\$2,195
Yes	Yes	1/No	VU	XLR	XLR	3U	2 channel version of CL-1B	\$3,295
Yes	Yes	2/Yes	LED	XLR	XLR	2U		\$4,395
10 to 50 dB	Yes	2/Yes	VU	XLR; 1/4"	N/A	2U	Gold-plated switches	\$3,995
Yes	Yes	2/Yes	LED	XLR	XLR	2U		\$3,495
Output	No	1/Linkable	VU	XLR; barrier strip	N/A	2U	True replica	\$2,295
Output	Yes	1/No	LED	XLR; 1/4" TRS	1/4" TRS	8x1.6x8.5	Soft knee; no solid-state devices in audio path	\$799

## EFFECTS PROCESSORS

MANUFACTURER	PRODUCT	PRESETS (FACTORY/USER)	ANALOG EFFECTS	DIGITAL EFFECTS	SIMULTANEOUS EFFECTS	PROGRAMMABLE WET/DRY MIX	COMPARE/ BYPASS	MAXIMUM DELAY TIME	MAXIMUM PITCH SHIFT RANGE	MIDI REAL- TIME CONTROL	SIMULTANEOUS MIDI CONTROLLERS
Alesis	AirFX	50/0	None	Vocodors, flangers, phasers, panners	1	No	Y/Y	N/A	N/A	No	No
Alesis	Ineko	48/0	N/A	revb, dly, phasers, flng, voco, tape em		Yes	Y/Y	N/A	N/A	No	No
Alesis	MicroVerb 4	100/100	N/A	Rvrb, chrs, dly, flng, rtry, ptch	3	Yes	N/Y	1,300 ms	±1 octave	Yes	2
Alesis	MidiVerb 4	128/128	N/A	Rvrb, chrs, dly, flng, rtry, ptch	3	Yes	Y/Y	1,300 ms	±1 octave	Yes	2
Alesis	NanoVerb	16/0	N/A	Rvrb, chrs, dly, flng, rtry	3	Yes	N/Y	1,300 ms	N/A	No	No
Antares	ATR-1A Auto-Tune	50/20	N/A	Real-time pitch correction	1	No	Y/Y	N/A	±1 octave	Yes	Yes
Antares	AMM-1 Microphone Modeler	100/100	N/A	Models the sonic characteristics of a various microphones	2	N/A	Y/Y	N/A	N/A	Yes	Yes
A.R.T.	FX-1	60/0	N/A	Rvrb, chrs, dly, flng, ptch, trml, pan, gate	3	No	N/Y	420 ms	1 octave	No	No
A.R.T.	DMV-Pro	100/100	N/A	Rvrb, chrs, flng, ptch, trml, rtry, phsr, pan, dly	4	Yes	Y/Y	5 sec	>2 octaves	Yes	16
Behringer	Ultrabass Pro EX1200	N/A	N/A	Enhancer, limiter, subharmonizer	3	N/A	N/Y	N/A	N/A	N/A	N/A
Behringer	Edison EX1	N/A	N/A	N/A	N/A	N/A	N/Y	N/A	N/A	N/A	N/A
Behringer	Virtualizer Pro DSP1024	N/A	No	32 effect types, 700 variations, 100 programs	2	Yes	Y/Y	5 sec	±12 semi-tones	Yes	11
Behringer	Modulizer Pro DSP1224P	N/A	No	24 effect types, 100 programs	1	Yes	Y/Y	N/A	N/A	Yes	13
Big Briar	Moogerfoager MF-101 Lowpass Filter	N/A	Two-/four-pole lowpass filter; envelope follower	None	N/A	Yes	Y/Y	N/A	N/A	N/A	N/A
Big Briar	Moogerfoager MF-102 Ring Modulator	N/A	Ring modulation; carrier oscillator; LFO	N/A	N/A	Yes	Y/Y	N/A	N/A	N/A	N/A
Big Briar	Moogerfoager MF-103 Twelve-Siagu Phaser	N/A	Six-stage/twelve- stage phase shifter	N/A	N/A	N/A	Y/Y	N/A	N/A	N/A	N/A
Big Briar	Moogerfoager MF-104 Analog Delay Limited Edition	N/A	Analog delay	N/A	N/A	Yes	Y/Y	0.8 sec	N/A	N/A	N/A
Big Briar	Moogerfoager CP-251 Control Processor	N/A	Control Voltage Processing	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Boss	ME-33	30/60	OD/DS	23	9	Yes	Y/Y	1800 ms	±1 oct	No	No
Carvin	XP 2	100/100	N/A	Choruses, flangers, phasers, echoes, delays, rotary speakers	2	Yes	Y/Y	2 sec/eng	N/A	Yes	Yes
Carvin	XP 4	100/100	N/A	Reverbs, choruses, flangers, phasers, echoes, delays, rotary speakers	4	Yes	Y/Y	4 sec/eng	N/A	Yes	Yes
Crate	SM1-SP	32/0	N/A	Reverb, delay, flange, chorus, gated rvrb, rotary	2	No	N/N	455 ms	N/A	No	No
Crate	SM2-SRS	2/0	N/A	N/A	1	N/A	Y/Y	N/A	N/A	No	No
DACS	Fws Series FREQue II	0	Ring module; oscillator; frqncy module	N/A	3	Yes	N/N	No	No	No	No
dbx	480 DriveRack	10/10	N/A	Delay, compressor/limiter, EQs, notch filters, RTA	Yes	N/A	N/A	600 ms	N/A	Yes	N/A
dbx	481S DriveRack	10/10	N/A	Delay, compressor/limiter, EQ, crossovers, RTA	Yes	N/A	N/A	N/A	N/A	Yes	N/A
dbx	482 DriveRack	10/10	N/A	Delay, compressor/limiter, crossovers, EQs, notch filters, RTA	Yes	N/A	N/A	600 ms	N/A	Yes	N/A
Demeter	Real Reverb	N/A	Stereo spring reverb	None	3	Yes	N/Y	3.5 sec	No	No	No
DigiTech	StudioQuad 4	100/100	N/A	57	4	Yes	N/Y	5 sec	±2 octaves	Yes	8
DigiTech	Studio S-200	99/99	N/A	25	2	Yes	N/Y	2 sec	-1 octave/+2 octaves	Yes	15



DISCRETE PROCESSING CHANNELS	ADC / DAC	OVERLOAD WARNING	INPUTS	OUTPUTS	POWER SUPPLY	SPECIAL FEATURES	PRICE
2	24-bit/24-bit	No	Stereo RCA -10 dBV	Stereo RCA -10 dBV	Alesis P3	Axyz infrared controller	\$249
2	24-bit/24-bit	Signal/clip LED	1/4" TS (2)	1/4" TS (2)	Alesis P3		\$199
2	18-bit/18-bit	4-seg LED	1/4" (2)	1/4" (2)	Alesis P3 adapter	Bypass/tap-tempo [foot]switch; 2 parameter knobs	\$249
2	18-bit/18-bit	18-seg LED; clip light	1/4" (2)	1/4" (2)	Alesis P3 adapter	Auto level sensing; tap tempo footswitch	\$329
No	18-bit/18-bit	Clip light	1/4" (2)	1/4" (2)	Alesis P3 adapter	Adjust knob; bypass footswitch	\$135
1	20-bit/24-bit	6-seg LED	1/4" TRS; XLR (1)	1/4" TS; XLR (1)	External	Speed control matches correction rate to performance; learn scale from MIDI; tracks down to 25 Hz set note via MIDI	\$849
1	20 bit/24 bit	5-seg LED AES/EBU	1/4"; XLR; AES/EBU	1/4"; XLR	External	Models tube saturation, downloadable models	\$995
2	16-bit/16-bit	Clip light	1/4" (2)	1/4" (2)	External		\$134
4	20-bit	5-seg LED	1/4" (4)	1/4" (4)	External	Twin LCD editing interfaces	\$499
N/A	N/A	N/A	1/4"; XLR	1/4"; XLR	Internal	Digital sub-harmonic bass synthesizer	\$229
N/A	N/A	N/A	1/4"; XLR	1/4"; XLR	Internal	Virtual stereo 3D processor; correlation meter for mono compatibility control; LED display	\$229
2	20-bit/18-bit	N/A	Balanced 1/4"; XLR	Balanced 1/4"; XLR	Internal	Software for remote control via PC; 24-bit dual engine multieffects	\$179
2	20-bit/20-bit	N/A	Balanced 1/4"; XLR	Balanced 1/4"; XLR	Internal	Software for remote control via PC	\$179
1	N/A	N/A	1/4"	1/4" (2)	External	Drive control; LFO and bypass LEDs; audio; cutoff/resonance; envelope amount; mix	\$299
1	N/A	N/A	1/4"	1/4" (3)	External	Drive control; LFO and bypass LEDs; audio; LFO rate; LFO amount; carrier frequency; mix; carrier	\$299
1	N/A	N/A	1/4"	1/4" (4)	External	Drive and output level controls; level; LFO and bypass LEDs; audio; sweep; resonance; LFO rate; LFO amount; sweep	\$399
1	N/A	N/A	1/4"	1/4" (3)	External	Drive, output and loop gain level controls; input/loop level and bypass LEDs; audio; delay time; mix; feedback; external loop	\$595
N/A	N/A	N/A	9 (for control signals)	10 (for control signals)	+9V external power adapter	Extensive control signal processing	\$299
1	24-bit DA	N/A	1/4"; 1/8" aux	1/4" (2); 1/8" phones	DC 9V	Amp, feedback and pickup modeling; pedal	\$299
2	24/24	N/A	2	2	N/A		\$200
4	24/24	N/A	4	4	N/A		\$300
2 in/out	1-bit/16-bit/64x	Signal/peak LED	1/4" (2)	1/4" (2)	External	Includes 32 presets	\$180
2 in/out	N/A	Signal/peak LED	1/4" (2)	1/4" (2)	External	Creates 3D surround from 2 speakers	\$130
2	No	LED	1/4" TRS	1/4" TRS	AC		\$1,490
Yes	N/A	N/A	XLR (4)	XLR (8)	Internal	GUI interface; optional remote controller	\$2,700
Yes	N/A	N/A	4 euroblock connectors	8 euroblock connectors	Internal	GUI interface; optional remote controller	\$2,100
Yes	N/A	N/A	XLR (4)	XLR (8)	Internal	GUI interface; optional remote controller	\$2,200
2	N/A	LED	TRS and 3-pin balanced inputs	TRS and 3 pin balanced outputs	Internal	Physical spring reverberation long or short decay times; low cut filter; phase switch; gain and mix controls; stereo or mono operation	\$700
4	20-bit	Clip (each input)	1/4" (4)	1/4" (4)	AC	Programmable signal routing; LFOs; dynamic filters	\$480
2	20-bit	Clip LED	1/4" (2)	1/4" (2)	Internal	User-selectable configurations; large display	\$340

## EFFECTS PROCESSORS

MANUFACTURER	PRODUCT	PRESETS (FACTORY/USER)	ANALOG EFFECTS	DIGITAL EFFECTS	SIMULTANEOUS EFFECTS	PROGRAMMABLE WET/DRY MIX	COMPARE/ BYPASS	MAXIMUM DELAY TIME	MAXIMUM PITCH SHIFT RANGE	MIDI REAL- TIME CONTROL	SIMULTANEOUS MIDI CONTROLLERS
DigiTech	Studio S-100	99/99	N/A	25	2	Yes	N/Y	2 sec	-1 octave/+2 octaves	Yes	1
DOD	D-12 Stereo Delay/ Sampler	0	N/A	Smpl, dly, chrs, flng	4	Yes	N/N	Up to 24 sec smplg	N/A	N/A	None
DOD	Dimension 3- Multi-Effects Processor	0	N/A	Dly, rvrb, chrs, flng, phs, ptch, trml, rtry, pan	4	No	N/N	370 ms	±1 octave	No	None
Electrix	FilterFactory	Real time control only	High order resonant filter, distortion block	Analog only	2	Yes via MIDI	Y/Y	N/A	N/A	Yes	Yes
Electrix	WarpFactory	Real time control only	N/A	Vocoding (morphing two sounds together)	N/A	Yes via MIDI	Y/Y	N/A	N/A	Yes	Yes
Electrix	Mo-FX	Real time control only	N/A	Distortion, flange, tremolo, delay	4	Yes via MIDI	Y/Y	2.6 sec	N/A	Yes	Yes
Electrix	FilterQueen	Real time control only	High order resonant filter	Analog only	N/A	N/A	Y/Y	N/A	N/A	N/A	N/A
Eventide	H3000D/SE Studio Enhanced Ultra-Harmonizer	572/407	N/A	Ptch, rvrb, dly, flng, phs, chrs, cmpr	Algorithm dep	Yes	N/Y	1,500 ms	±3 octaves	Yes	Yes
Eventide	Eclipse Harmonizer Brand Effects Processor	Over 200 (70-80 factory algorithms)/ unlim via PCMCIA SRAM cards	N/A	Dozens	2 presets, 1 per effect engine	Yes	Y/Y	20 sec in mono at 44.1 kHz (10 sec in stereo)	±4 octaves (chromatic mode); ±2 octaves (Diatonic mode)	Yes	Yes
Eventide	EVE/NET Network Remote Control	N/A	N/A	N/A	N/A	N/A	Y/Y	N/A	N/A	N/A	N/A
Fostex	DE-1	121	No	Yes	2	Yes	N/A	N/A	N/A	N/A	N/A
Korg	Pandora PX3 - Compact Guitar Processor	50/50	N/A	56	7	N	N/Y	2 sec	±24	N/A	N/A
Korg	Pandora PX3B - Compact Bass Processor	50/50	N/A	56	7	N	N/Y	2 sec	±24	N/A	N/A
Korg	AX1B	30/30	N/A	71	7	N	N/Y	1 sec	±24	N/A	N/A
Korg	AX1G	30/30	N/A	69	7	N	N/Y	1 sec	±24	N/A	N/A
Korg	Ax100G	40/40	N/A	63	7	N	N/Y	2 sec	±24	N/A	N/A
Korg	AX1000G	40/40	N/A	56	8	N	N/Y	3 sec	±24	N/A	N/A
Lexicon	MPX 100	240/16	N/A	Reverb, room, tremolo, rotary, chorus, flange, pitch, detune, delays, echoes, dual algorithms	2	Yes via MIDI	Y/Y	5.5 sec	2 octaves	Yes	24
Lexicon	MPX 500	240/30	No	Reverb, tremolo, rotary, chorus, flange, detune, pitch, delay, echo, dual algorithms	2	Yes	Y/Y	5.5 sec	2 octaves	Yes	24
Lexicon	MPX 1	200/50	N/A	56 pitch, chorus, EQ, modulation, delay, and reverb effects	6	Yes	Y/Y	2 sec	2 octaves per voice (2 voices)	Yes	24
Lexicon	MPX G2	200/50	6 analog distortion effects	68 pitch, EQ, gain, reverb, delay, JamMan, phase, filter, compression	7	Yes	Y/Y	20 sec	2 octaves	Yes	24
Line 6	Bass POD	36/36	N/A	16 bass amp models; 16 effects (incl. envelope follower, octave down, phaser, chorus, bass synth, compressor); 15 cabinet models	3	Yes	Y/Y	N/A	N/A	Yes	Yes
Line 6	Bass POD Pro	36/36	N/A	16 bass amp models; 16 effects (incl. Envelope follower, octave down, phaser, flanger, chorus, bass synth, compressor, noise gate, Wah); 15 cabinet models	3	Yes	Y/Y	N/A	N/A	Yes	Yes



DISCRETE PROCESSING CHANNELS	ADC/DAC	OVERLOAD WARNING	INPUTS	OUTPUTS	POWER SUPPLY	SPECIAL FEATURES	PRICE
2	20-bit	Clip LED	1/4" (2)	1/4" (2)	AC	User-selectable effects/signal routing configurations	\$220
4	16-bit/16-bit	Clip LED	2	2	External	Reverse playback; jog/shuttle wheel 24-second sampler	\$300
2	18-bit/16-bit	Clip LED	1/4" (2)	1/4" (2)	External	Noise reduction w/gate threshold	\$170
2	N/A	Clip LED input and output	1/4"; RCA stereo with RIAA preamp	1/4"; RCA stereo	Internal	Rackmount and tabletop models available	\$400
2	18-bit	Clip LED input and output	XLR mic, 1/4"; RCA Stereo with RIAA preamp	1/4"; RCA	Internal	Rackmount and tabletop models available	\$400
2	18-bit	Clip LED input and output	1/4"; RCA Stereo with RIAA preamp	1/4"; RCA stereo	Internal	Rackmount and tabletop models available	\$450
2	N/A	Clip LED input and output	1/4"; RCA Stereo with RIAA preamp	1/4"; RCA stereo	External	Modular rackmount and tabletop designs available	\$299
2 (algorithm dep)	16-bit	10-seg clip light	XLR (pin 3 hot)	XLR (pin 3 hot)	AC	3D spatial imaging presets; Steve Vai presets	\$2,695
2	24-bit	7-seg LED	Analog 1/4"; XLR; digital AES/EBU, S/PDIF	Analog XLR; digital AES/EBU, S/PDIF	AC	24-bit/96kHz processing; word clock; ADAT lightpipe	\$2,250
N/A	N/A	9-seg LED	N/A	N/A	via network connection from controlling unit	Remotes all front panel controls from any Orville, Orville/R, DSP7000 or DSP7500 model; incl 8 additional control knobs	\$1,595
2	20-bit	Peak LEDs	2	2	DC9V (exclusive AC adapter)	Half rackspace; rotary controls	\$199
1	N/A	N/A	1/4"; 1/8" aux. in	1/4" (2)	4 AAA batteries or adapter	Bass/rhythm tracks; intelligent harmonizer; amp modeling	\$250
1	N/A	N/A	1/4"; 1/8" aux. in	1/4" (2)	4 AAA batteries or adapter	4-band graphic EQ; 50 rhythm patterns; phrase trainer	\$250
1	N/A	N/A	1/4"	1/4" (2)	4 AA batteries or adapter	Sample & play function; tuner; built-in expression pedal	\$170
1	N/A	N/A	1/4"	1/4" (2)	4 AA batteries or adapter	Sample & play function; tuner; built-in expression pedal	\$160
1	N/A	N/A	1/4"; 1/8" aux. in	1/4" (2)	4 AA batteries or adapter	Virtual feedback function; phrase sampler; rhythm trainer mode	\$250
1	N/A	N/A	1/4"; 1/8" aux. in	1/4" L/R	9V adapter	Tuner; phrase trainer; sample play function; individual mode	\$350
2	20-bit/20-bit	N/A	1/4" (2)	1/4" (2); S/PDIF	External	Tap tempo input; multiple routings for two discrete simultaneous stereo effects	\$299
2	24-bit/24-bit	N/A	1/4" (2); XLR (2); S/PDIF	1/4" (2); XLR (2); S/PDIF	Internal, switching	Tap tempo input; 16 adjustable parameters; stand-alone 24-bit A/D converter	\$599
2	24-bit/24-bit	N/A	1/4" (2); XLR (2); S/PDIF	1/4" (2); XLR (2); S/PDIF	Internal, switching	Discrete reverb processor and separate effects processor elaborate patching & routing system	\$899
3	24-bit/24-bit	N/A	1/4" (3)	1/4" (3); XLR (2)	Internal, switching	Fully controllable/assignable MIDI; controllable via optional footswitch	\$1,499
2	20-bit	Clip light	1/4"	1/4" (2)	External	Fully parametric EQ; effects crossover; phase-accurate DI and amp model output	\$520
2	24-bit	Clip light	1/4"	1/4" (2); XLR (2); S/PDIF; AES/EBU; headphone	Internal	Live and studio modes; fully parametric EQ; effects crossover; dual outputs for phase-accurate DI and amp model; full-time compressor; tuner; cabinet select; Mix 'n Match amps/cabs; re-amping; effects loop; 44.1, 48 kHz selectable; word clock in; MIDI; FB4/floor board support; Emagic SoundDiver editor/lib	\$900

# EFFECTS PROCESSORS

MANUFACTURER	PRODUCT	PRESETS (FACTORY/USER)	ANALOG EFFECTS	DIGITAL EFFECTS	SIMULTANEOUS EFFECTS	PROGRAMMABLE WET/DRY MIX	COMPARE/ BYPASS	MAXIMUM DELAY TIME	MAXIMUM PITCH SHIFT RANGE	MIDI REAL- TIME CONTROL	SIMULTANEOUS MIDI CONTROLLERS
Line 6	DL4-Delay Modeler	15/3	Digital modeling of 15 vintage delay and echo effects	N/A	1	Yes	N/Y	2.5 sec	N/A	No	No
Line 6	DM4-Distortion Modeler	16/4	Digital modeling of 16 vintage distortion effects	N/A	1	No	N/Y	N/A	N/A	No	No
Line 6	FM4-Filter Modeler	16/4	Digital modeling of 16 new and vintage filter effects	N/A	1	Yes	N/Y	N/A	2 octaves	No	No
Line 6	MM4-Modulation Modeler	16/4	Digital modeling of 16 vintage modulation effects	N/A	1	Yes	N/Y	N/A	N/A	No	No
Line 6	POD	36/36	N/A	32 guitar amp models; 16 effects (incl. delay, chorus, reverb, flanger, tremolo, rotary); 15 cabinet models	3	Yes	Y/Y	3.2 sec	N/A	Yes	Yes
Line 6	POD 2.0	36/36	N/A	32 guitar amp models; 16 effects (incl. delay, chorus, reverb, flanger, tremolo, rotary); 15 cabinet models	3	Yes	Y/Y	3.2 sec	N/A	Yes	Yes
Line 6	POD Pro	36/36	N/A	32 guitar amp models; 16 effects (incl. delay, chorus, reverb, flanger, tremolo, rotary); 15 cabinet models	3	Yes	Y/Y	3.2 sec	N/A	Yes	Yes
Metasonix	TS-21 Hellfire Modulator	100/100	Wave Shaper	N/A	1	Yes	N/A	N/A	N/A	N/A	N/A
Metasonix	TS-22 Pentode Filterbank	None	Tube voltage-controlled filter	N/A	1	No	N/N	N/A	N/A	N/A	N/A
Miles Technology	MTI-3 TriSonic Imager	1	L/C/R sweet-spot enlarger, surround, spreadsound	N/A	2	N/A	N/N	N/A	N/A	No	No
Motion Sound	R3-147	N/A	Real rotary horn, 12AX7 tube overdrive	N/A	2	N/A	N/A	N/A	N/A	Yes	1
Mutronics	Mulator	0	Envelope follower	N/A	1	No	Y/Y	N/A	N/A	Yes	No
Pefftronics	RTSP-1600 MKII	30/69	Fingr, chrs, dblng	Delay	2	Yes	N/Y	700 ms	N/A	Yes	12
Phonic Hi-Tech	Verbiflex	256/0	N/A	Yes	1	Yes	Y/Y	N/A	N/A	No	No
Roland	VF-1	200/200	MFx	MFx	9	Yes	Y/Y	2,800 ms	±2 octave	Yes	Yes
Roland	VT-1	32/4	None	Voice transfer	2	Yes	N/Y	N/A	±1 octave	No	4
Roland	SRV-3030 & 3030D	N/A	N/A	Reverb	2	Yes	Y/Y	N/A	N/A	Yes	Yes
Roland	VG-88 V-Guitar System	160/100	None	Electric guitar models, acoustic guitar models, nylon string model, hex -pan, polyphonic pitch-shift, HRM synth sounds, poly oct	N/A	Yes	Y/Y	1.8 sec	±2 octaves	Yes	2
Roland	BOSS GT-3 Guitar Effects Processor	340 (200/140)	11	21	13	Yes/effect	Y/Y	1.8 sec	±2 octaves	Yes	N/A
Seekers	Seekers Voice Spectra	N/A	Vocoder	No	No	No	N/N	No	No	No	No
Sony	DPS-V55	200/200	N/A	45 algo; rrvrb, dly, flngr, chrs, ptch, EQ, comp, rtry	4	Yes	N/Y	2.72 sec	±2.4 octaves	No	N/A
Spatializer	Retro	N/A	3-D audio	N/A	1	N/A	N/Y	N/A	N/A	N/A	No
Symetrix	606 Delay F/x Machine	10/99	N/A	Dly, chrs, rm sim, flngr, aut pn, fltr	2	Yes	N/Y	2.5 sec	N/A	Yes	No
Technosaurus	Effexon	No	Overdrive, 2-stage parametric	N/A	3	No	N/N	N/A	N/A	No	No
TC Electronic	1210 Spatial Expander + Stereo Chorus Flanger	N/A	Fingr, ptch mod, expndr	N/A	3	No	N/Y	22 ms	N/A	No	No



DISCRETE PROCESSING CHANNELS	ADC/DAC	OVERLOAD WARNING	INPUTS	OUTPUTS	POWER SUPPLY	SPECIAL FEATURES	PRICE
Yes	24-bit	No	1/4" guitar input	1/4" guitar input	Battery/AC	Tap tempo; 14 second loop sampler; real time control	\$350
Yes	24-bit	No	1/4" guitar input	1/4" guitar input	Battery/AC	True bypass switching; expression pedal input; real time control	\$350
Yes (filters); No (synths)	24-bit	No	1/4" guitar input	1/4" guitar input	Battery/AC	True bypass switching; expression pedal input; real time control	\$350
No	24-bit	No	1/4" guitar input	1/4" guitar input	Battery/AC	True bypass switching; expression pedal input; real time control	\$350
2	24-bit/20-bit	Clip light	1/4" guitar input	1/4" TRS	External	Direct/ammodes; MIDI; tap tempo; tuner; cabinet select; includes edit/lib software	\$499
2	20-bit	Clip light	1/4" guitar input	1/4" TRS (2); headphone	External	Direct (A.I.R.) amp modes; MIDI; tap tempo; tuner; cabinet select; Mix 'n Match amps/cabs; FB4/Floor Board support; Emagic SoundDiver editor/librarian (2.0 upgrade available for POD owners)	\$520
2	24-bit	Clip light	1/4"	1/4" (2); XLR (2); S/PDIF; AES/EBU; headphone	Internal	Live and studio modes; re-amping, effects loop; word clock in; noise gate; software incl.	\$900
1	N/A	No	1/4" TS	1/4" TRS	50-60Hz; 90-250 VAC	Vacuum tubes; stereo pan and effects	\$700
1	N/A	No	1/4" TRS; XLR; 1/4" TS1	1/4" TRS	50-60Hz; 90-250 VAC	(4) 2-pole band pass filters	\$995
2	N/A	N/A	XLR (4); 1/4" TRS (2)	XLR (5); 1/4" TRS (3)	AC	Creates L/C/R & surround outputs frm 2-channel stereo input	\$599
1	N/A	LED	1/4" (2)	1/4" (2); XLR (2)	Internal	23 adjustable parameters; four horn mics.	\$1,095
2	None	None	1/4"	1/4"	AC	Stereo panning	\$1,315-\$1,425
1	16-bit/16-bit	N/A	1/4" (1)	1/4" (3)	Internal	Random modulation waveforms; hybrid analog/digital design without DSPs	\$549
2	16-bit	Dual color peak LEDs	1/4"	1/4"	Internal		\$269
2	24-bit/24-bit	3-segment LED; clip light	1/4" unbalanced	1/4" unbalanced	AC	S/PDIF output; all Roland effects	\$495
1	16-bit/16-bit	Clip light	1/4" (1)	1/4" (1); RCA (2)	AC	Realtime control over pitch and formant	\$395
Yes	24-bit	Yes	XLR/TRS (2)	XLR/TRS (2)	Internal	Dynamic separation; preview w/user samples; digital I/O	\$695-\$995
2	24-bit	N/A	13-pin; 1/4"	1/4" (2)	AC	COSM-modeled electric, acoustic, and nylon string guitars; built-in exp/control pedal	\$1,295
1	4-bit/20-bit	LED	1/4" (1); MIDI; 1/8" aux	1/4" (2); MIDI; 1/8" phones	External 14V	Unique FX: auto-riff, slicer, etc.; 10 simul real-time parameter control/built-in exp & control pedals; 14 COSM mod amps; all metal with modeled mics & mic placement	\$495
1	No	No	2	2	Internal	12-band analog vocoding; voice tracking	\$699
4	20-bit	Clip light	1/4" (4)	1/4" (4)	Internal	52-bit DSP engine; surround sound and other presets	\$600
2	N/A	LED	1/4" TRS	1/4" TRS	Internal	3-D audio; mono compatible	\$999
2	20-bit	4-seg LED; clip light	1/4" TRS	1/4" TRS	Internal	6 modulation sources; room simulations; tap tempo control	\$699
N/A	N/A	Clip light	1/4"	1/4"	9V	Multifunction unit	\$329
2	N/A	LED	1/4"; XLR	1/4"; XLR	AC	Utilizes Haas principle to create expansion	\$1,684

## EFFECTS PROCESSORS

MANUFACTURER	PRODUCT	PRESETS (FACTORY/USER)	ANALOG EFFECTS	DIGITAL EFFECTS	SIMULTANEOUS EFFECTS	PROGRAMMABLE WET/DRY MIX	COMPARE/ BYPASS	MAXIMUM DELAY TIME	MAXIMUM PITCH SHIFT RANGE	MIDI REAL- TIME CONTROL	SIMULTANEOUS MIDI CONTROLLERS
TC Electronic	1280 Stereo Digital Audio Delay	4/4	N/A	2 sep delay chans	2	No	Y/Y	2.5 sec with chip exp	N/A	Yes	1
TC Electronic	1380 Multitap Digital Audio Delay	4/4	N/A	1	1	No	Y/Y	5 sec with chip exp	N/A	Yes	1
TC Electronic	2290	100/00	N/A	1	2	Yes	Y/Y	8 sec	N/A	Yes	1
TC Electronic	FireworX	200/100	None	35	DSP space dependent	Yes	Y/Y	3 sec	±2 octaves	Yes	Yes
TC Electronic	G-Force	200/100	N/A	Rvrb, dly, pch, flngr, comp, pan/trml, mod, etc.	8	Yes	Y/Y	1,480 ms	2 octaves	Yes	8
TC Electronic	G-Major	100/100	N/A	Rvrb, dly, pch, chrs, flngr, comp, gate, filter/mod, etc.	7	Yes	Y/Y	N/A	N/A	Yes	Yes
TC Electronic	M2000	256/256	N/A	Rvrb, dly, chrs, flngr, comp, pan, trml, lim, de-es, exp, str enhnc	2	Yes	Y/Y	1,200 ms	2 octaves	Yes	16
TC Electronic	M3000	250/200	N/A	Rev, dly, chr, fln, EQ, comp, pan, trml, lim, de-es, exp, gate, str enhnc	2	Yes	N/Y	1,200 ms	2 octaves	Yes	16
TC Electronic	P22	4/20	Digital delay	Delay	1	Yes	Y/Y	2,600 ms	N/A	Yes	Yes
TC Electronic	UnitY	100/200	N/A	Rev, dly, chr, fln, comp, pan, trml, lim, de-es, exp, str enhnc	3	Yes	Y/Y	1,200 ms	2 octaves	Yes	16
TC Electronic	M•One	100/100	N/A	20+ effects	2	Yes	Y/Y	4,000 ms	1,200 cents	Yes	Yes
TC Electronic	D•Two	50/100	N/A	Stereo/mono, dynamic, rhythm, reverse, chorus, filter, spatial, ping-pong	1	Yes	Y/Y	10 sec	N/A	Yes	Yes
TC Electronic	Stereo Chorus Flange	N/A	Chorus, flange, pitch	N/A	1	Yes	N/N	N/A	N/A	No	No
TC Electronic	Voice Prism	128/128	Mic pre-A/D	Harmony, reverb, comp, EQ, delay, flange, chorus, human voice	8	Yes	Y/Y	399 ms	N/A	Yes	Yes
TC Electronic	Voice Prism Plus	128/128	Mic pre-A/D	Harmony, reverb, comp, EQ, delay, flange, chorus, human voice	8	Yes	Y/Y	399 ms	N/A	Yes	Yes
Voce	Spin II	N/A	Yes	No	1	No	N/Y	N/A	N/A	No	No
Yamaha	D5000	100	N/A	Sngl/dual dly, freeze rec/playback, sample & hold	2	N/A	Y/Y	5 sec (stereo), 10 sec (mono)	N/A	Yes	2
Yamaha	ProR3	90	N/A	Rvrb, rm sim, ech, chrs, symphnc, flngr, pch	3	Yes	Y/Y	N/A	±1 octave	Yes	2
Yamaha	REV100	99	N/A	Ster rvrb, rvrb, dly, flngr, chrs, symphnc	0	Yes	Y/Y	N/A	N/A	Yes	2
Yamaha	REV500	100	N/A	Rvrb, rm sim, ech	1	Yes	Y/Y	200 ms	N/A	Yes	4
Yamaha	SPX1000	40/59	N/A	Rvrb, chrs, ech, frz, dstrln, trig pan, dly, symphnc, trml	0	Yes	Y/Y	5,200 ms	±1 octaves	Yes	4
Yamaha	SPX990	80	N/A	Rvrb, dly, ech, erly rel, mod, pch, pan, frz, chrs, symphnc	3	Yes	Y/Y	1,480 ms	±2 octaves	Yes	4
Zoom	GM 200 Guitar Amp	0	N/A	11 amps; 11 character choices	3	No	N/N	N/A	N/A	N/A	N/A
Zoom	RFX-300	22/0	N/A	22	2	No	N/N	700 ms	±1 octave	No	No
Zoom	RFX-1000	121/0	N/A	33	1	No	N/Y	1486 ms	±1 octave	No	No
Zoom	RFX-2000	616/100	N/A	48	2	No	Y/Y	2972 ms	±2 octaves	Yes	No



DISCRETE  
PROCESSING CHANNELS

## ADC/DAC

OVERLOAD  
WARNING

## INPUTS

## OUTPUTS

## POWER SUPPLY

SPECIAL  
FEATURES

## PRICE

2	18-bit	Overload LED	XLR	XLR	AC	1 MHz sample rate	\$2,446
1	18-bit	Overload LED	XLR	XLR	AC	1 MHz sample rate	\$2,446
1	1-bit	LED	XLR; 1/4"	XLR; 1/4"	AC	1 MHz sample rate	\$1,999
2	24-bit	Overload LED	XLR	XLR	AC	Includes vocoder	\$2,195
2	24-bit	Clip light	1/4" (2); S/PDIF	1/4" (2); S/PDIF	Internal	Intelligent pitch shifting; large 5 x 14 LED display	\$1,795
1 stereo	24-bit/24-bit	8-seg LED	1/4"	1/4"	100V-240V 50-60 Hz	Built-in tuner	\$699
2	20-bit	LED	XLR (2); (XLR); AES/EBU; S/PDIF	XLR (2); (XLR); AES/EBU; S/PDIF	Internal	Dynamic morphing; preset glide control	\$1,500
2	24-bit	LED	(2) XLR; AES/EBU; S/PDIF; ADAT; Toslink	XLR (2); AES/EBU; S/PDIF; ADAT; Toslink	Internal	Dynamic morphing; preset glide control	\$2,495
1	24-bit/24-bit	8-seg LED	S/PDIF; wordclock; XLR; AES/EBU	S/PDIF; wordclock; XLR; AES/EBU	Auto sensing 100V-240V 50-60 Hz	Real-time, glitch free delay updates	\$1,999
3	24-bit	Meter	AES/EBU; S/PDIF; ADAT; Toslink	AES/EBU; S/PDIF; ADAT; Toslink	Internal	Software interface within the Yamaha 02R (sec sltw lic \$795)	\$1,495
2	24-bit	Yes	S/PDIF; L/R Balanced	S/PDIF; L/R Balanced	Internal auto-sensing	Dual engine routings; serial, parallel, stereo linked, dual mono, dual send/return	\$699
2	24-bit	Yes	S/PDIF; L/R Balanced	S/PDIF; L/R Balanced	Internal, auto-sensing	Rhythm tap; programmable number of repeats	\$699
1	N/A	N/A	1/4"	1/4"	Internal	Pedal	\$399
1 stereo	24-bit	10-seg LED	1/4" TRS, XLR, SPDIF	1/4" TRS; XLR; S/PDIF	100 VAC/240VAC		\$1,299
1 stereo	24-bit	10-seg LED	1/4" TRS, XLR, SPDIF AES/EBU	1/4" TRS; XLR; S/PDIF; AES/EBU	100 VAC/240VAC		TBA
1	N/A	No	1	2	Internal	4 knobs to control speed	\$525
2	20-bit	Clip light	XLR (2)	XLR (2)	Internal		\$1,499
2	20-bit	Clip light	XLR (2)	XLR (2)	Internal		\$1,299
2	16-bit	Clip light	1/4" (2)	1/4" (2)	External		\$299
2	20-bit/20-bit	Clip light	1/4" (2); XLR (2)	1/4" (2); XLR (2)	Internal	Audition switch	\$499
2	16-bit	Clip light	1/4" (2)	1/4" (2)	Internal	Digital I/O	\$1,829
2	20-bit/20 bit	Clip light	XLR (2)	XLR (2)	Internal		\$1,179
1	20-bit/20-bit	No	1/4"; MIDI (2)	1/4" TRS (2); RCA (3)	AC adapter		\$260
2	18-bit/18-bit	Peak LED	1/4" (2); RCA (2)	1/4" (2); RCA (2)	External	Power mix, wide mix, boost mix, vocal mix effects	\$170
2	18-bit/18-bit	4-seg LED	1/4" (2)	1/4" (2)	External	Vocoder; mix effects	\$280
2	20-bit/20-bit	6-seg LED	1/4" (2)	S/PDIF (2); 1/4" (2)	External	PC editing software included for Macintosh & Windows	\$400

# EQUALIZERS

MANUFACTURER	PRODUCT	ANALOG/DIGITAL	PROGRAMMABLE	TYPE/ BANDWIDTH	# OF CHANNELS/ # OF BANDS	FREQUENCY RANGE (PARAMETRIC)	CONSTANT Q	FILTERS	ANALOG I/O #/TYPE
Allesis	MEQ-230	Analog	No	Graphic 1/3 octave	2/30	20 Hz–20 kHz	No	No	(2) 1/4"; (2) phono
Aphex Systems	104	Analog	No	N/A	2	N/A	N/A	N/A	1/4" TRS
Aphex Systems	109	Analog	No	Parametric/variable 0.66–7.2 (or single 4-band)	Dual 2-band unit	20 Hz–2 kHz; 200 Hz–20 kHz	Yes/variable	Switchable shelving	1/4" TRS
API	API 550b EQ	Analog	No	Quasi-parametric, shelving	1/4	30 Hz–20 kHz	No	No	XLR
API	API 560 EQ	Analog	No	Graphic 1 octave	1/10	31 Hz–6 kHz	No	No	XLR
A.R.T.	HQ15	Analog	No	Graphic/15	2	N/A	Yes	HP; LP	XLR; 1/4"; RCA
Ashly Audio	Protea System II	Digital	Yes	Parametric	4/12	20 Hz–20 kHz	No	Digital state variable 1/25–3.3 octaves	N/A
Behringer	Feedback Destroyer Pro DSP1124	Digital	Yes	Parametric 1/60–120/60 octaves	2/24	20 Hz–20 kHz	Yes	Parametric	Balanced 1/4"; XLR
Behringer	Ultra-Curve Pro DSP8024	Digital	Yes	Graphic 1/-octave + 6 parametric/feedback filters	2/31	20 Hz–20 kHz	Yes	Graphic and parametric	Balanced 1/4"; XLR
Behringer	Ultra-Q Pro PEQ2200	Analog	No	Variable parametric 0.03 to 2 octaves	1/5	20 Hz–20 kHz	Yes/variable	N/A	(4) 1/4"; XLR
Behringer	Ultra-Graph Pro GEC3102	Analog	No	1/3 octave	2/31	10 Hz–30 kHz	Yes/ 12 dB/octave	N/A	(8) 1/4"; XLR
BSS Audio	FCS966	Analog	No	Constant Q/Q = 4	2/30	5 Hz–45 kHz	Yes	HP	XLR; 1/4"; barrier strip
BSS Audio	FDS366	Digital	Yes	Various slopes 0.025 to 3.00 octaves	N/A	20 Hz–16 kHz	Yes	20 Hz–16 kHz	(3) XLR balanced
BSS Audio	FDS334	Digital	Yes	Various slopes 0.025 to 3.00 octaves	2/4 over 35 filters	20 Hz–16 kHz	Yes	20 Hz–16 kHz	XLRF2
Carvin	EQ 2030	Analog	No	Graphic	2/30	N/A	Yes	Low-cut sweep/ high-cut sweep	(2) XLR; (2) 1/4"
Carvin	EQ 2015	Analog	No	Graphic	2/15	N/A	Yes	Low-cut sweep/ high-cut sweep	(2) XLR; (2) 1/4"
Crate	LS1-131	Analog	No	Graphic	1/31	20 Hz–20 kHz	Yes	ISO	XLR; 1/4"; RCA
Crate	LS2-215	Analog	N/A	Graphic	2/15	20 Hz–20 kHz	Yes	Constant	Balanced 1/4"; XLR; unbal. RCA
Crate	LS3-231	Analog	N/A	Graphic	1/31	20 Hz–20 kHz	Yes	Constant	Balanced 1/4"; XLR; unbal. RCA
Crate	SM3-PE	Analog	No	Parametric 0.05 to 3 octaves	1/3	15 Hz–22 kHz	N/A	N/A	Balanced 1/4"
dbx	1215 Dual 15 Band Graphic Equalizer	Analog	No	Graphic	2/15	N/A	No	N/A	1/4"; balanced XLR
dbx	1231 Dual 31 Band Graphic Equalizer	Analog	No	Graphic	2/31	20 Hz–20 kHz	N/A	N/A	1/4"; balanced XLR
dbx	2231 Dual 31 Band Graphic Equalizer	Analog	No	Graphic	2/31	N/A	No	N/A	1/4"; balanced XLR
dbx	2031 Single 31 Band Graphic Equalizer	Analog	N/A	Graphic	1/31	N/A	N/A	N/A	1/4"; balanced XLR
dbx	2215 Dual 15 Band Graphic Equalizer	Analog	No	Graphic	2/15	25 Hz–16 kHz	N/A	N/A	1/4"; balanced XLR
DOD	SR 430QX	Analog	No	2/3 octave	2/15	N/A	Yes	ISO	1/4"
DOD	SR 830QX	Analog	No	2/3 octave	2/15	N/A	Yes	ISO	1/4"
DOD	SR 831QX	Analog	No	1/3 octave	1/31	N/A	Yes	ISO	1/4"
DOD	SR 231QX	Analog	No	1/3 octave	2/31	N/A	Yes	ISO	1/4"
D.W. Fearn	VT-4	Analog	No	LC Passive	5	N/A	No	HP; LP	(2) XLR
Electrix	EQ Killer	Analog	N/A	3-way, 24 dB/oct summed crossover	2/3	N/A	N/A	24 dB/octave	(4) RCA
Focusrite	ISA 110 Mono Mic Pre and EQ	Analog	No	Parametric	1/4	40 Hz–18 kHz	Yes/variable	LP; HP	Balanced 1/4"; XLR
Furman	Q-151 and Q-151B	Analog	N/A	2/3 octave	1/15	N/A	Yes	Low cut	N/A
Furman	Q-301 and Q-301B	Analog	N/A	1/3 octave	1/30	N/A	Yes	N/A	N/A
Furman	Q-602 and Q-602B	N/A	N/A	1/3 octave	1/30	N/A	Yes	N/A	N/A



DIGITAL I/O # / TYPE	INPUT/OUTPUT GAIN CONTROL	MAX BOOST/CUT	OPERATING LEVEL	HARD BYPASS	DYNAMIC RANGE	THD	WEIGHT	DIMENSIONS	PRICE
No	N/Y	±12 dB	-10 dB	Yes	107 dB A-weighted	< 0.005% @ 0 dB (20 Hz–20 kHz)	2.5	19x1.75x4	\$299
N/A	No	N/A	+4/-10 dB switchable	No	108 dB	0.003%	4	N/A	\$299
No	Y/Y	±15 dB	+4 dB	Yes	108 dB @ +4 dB	> 0.15 @ +10 dB	3	19x1.75x5.75	\$449
No	N/N	±12 dB	+4 dB	Yes	130 dB	< 0.07%	21	N/A	\$1,295
No	N/N	±12 dB	+4 dB	Yes	130 dB	< 0.07%	21	N/A	\$795
N/A	Output	±12 dB	4-10	Yes	N/A	N/A	5	N/A	\$299
N/A	Y/Y	+10/-20 dB	+4 dB	No	>110 dB unweighted infinity to +6 dB	< 0.01% @ 1 kHz, +20 dBu	14	19x3.5x8	\$1,899
N/A	Y/Y	+16/-48 dB	-10 dBV/+4 dBu	No	104 dB	0.0075%	4.4	19x1.75x7	\$199
AES/EBU optional	N/N	graphic: ±16 dB; parametric: +16/-48 dB	+4 dBu	Yes	115 dB	0.004%	11	19x3.5x12	\$699
No	N/N	±15 dB	+4/-10 dB switchable	No	N/A	0.002% @ 1 kHz, +4 dBu	6.6	19x1.75x8.5	\$149
No	Y/Y	Filters: ±15 dB; graphic: ±6 or ±12 dB	N/A	Yes	N/A	0.004% @ 1 kHz, +4 dBu	5.5	19x3.5x5.3	\$229
N/A	N/Y	±15 dB	+4 dBu nominal	Yes	>115 dB	<0.005%	6.6	19x5.25x7.1	\$1,095
(1) XLR; AES/EBU	N/Y	±15 dB	+4 dBu nominal	No	>112 dB	<0.005%	12	19x1.75x11	\$3,699
None	N/Y	±15 dB	+4 dBu nominal	No	>106 dB	<0.005%	6.2	19x1.75x8	\$1,250
N/A	Y/N	±15 dB	-10/+4	Yes	104 dB	<0.01%	11	5.25x6x19	\$300
N/A	Y/N	±15 dB	-10/+4	Yes	104 dB	<0.01%	8	3.5x6x19	\$200
N/A	Y/Y	±6 dB or ±12 dB (switchable)	Variable	Yes	N/A	N/A	4.5	19x1.75 x8.5	\$200
N/A	Y/Y	±6 dB or ±12 dB (switchable)	Variable	Yes	N/A	N/A	4.5	19x1.75x8.5	\$200
N/A	Y/Y	±6 dB or ±12 dB	Variable	Yes	N/A	N/A	9	19x3.50 x8.5	\$300
N/A	Y/Y	+15 dB/-30 dB	Variable from +4/-10 dB	Yes	N/A	N/A	1.5	5.6x1.6x 5.5	\$30
No	Y/Y	Yes	+4/-10 dB	Yes	<112 dB unweighted	< 0.04%; 0.02% typical @ 1 kHz, +4 dBu	8.5	19x3.5x7.9	\$350
N/A	Y/N	Low cut	+4/-10 dB	Yes	115 dB	< 0.005%	10.6	199x5.25x7.9	\$470
N/A	Y/N	Low cut	+4/-10 dB	Yes	>108 dB unweighted	< 0.04%; 0.02% typical @ 1 kHz, +4 dBu	N/A	19x5.25x7.9	\$800
N/A	Y/N	Low cut	+4/-10 dB	Yes	>108 dB unweighted	< 0.04%; 0.02% typical @ 1 kHz, +4 dBu	8.5	19x3.5x7.9	\$550
N/A	Y/N	Low cut	+4/-10 dB	Yes	>112 dB unweighted	< 0.04%; 0.02% typical @ 1 kHz, +4 dBu	8.5	19x3.5x7.9	\$550
N/A	Y/Y	±12 dB	+4/-10 dB	Yes	N/A	0.004%	N/A	19x1.75x6	\$220
N/A	Y/Y	±12 dB	+4/-10 dB	Yes	N/A	0.004%	N/A	19x1.75x6	\$220
N/A	Y/Y	±12 dB	+4/-10 dB	Yes	N/A	0.004%	N/A	19x3.75x6	\$220
N/A	Y/Y	±12 dB	+4/-10 dB	Yes	N/A	0.004%	N/A	19x3.5x6	\$300
N/A	Y/Y	±16 dB	+4 dB	No	>90 dB	0.15%	18	19x5.25x18	
N/A	Y/Y	+6 dB	+4 dB	No	>90 dB	< 0.3%	2.5	10x3.5x3.5	\$300
N/A	Y/N	±18 dB	+4 dB	Yes	>98 dB	0.001%	N/A	2U	\$2,000
N/A	N/A	±6 dB or ±12 dB	N/A	N/A	N/A	N/A	N/A	N/A	\$399 and up
N/A	N/A	±6 dB or ±12 dB	N/A	N/A	N/A	N/A	N/A	N/A	\$389 and up
N/A	N/A	±6 dB or ±12 dB	N/A	N/A	N/A	N/A	N/A	N/A	\$699 and up

# EQUALIZERS

MANUFACTURER	PRODUCT	ANALOG/DIGITAL	PROGRAMMABLE	TYPE/ BANDWIDTH	# OF CHANNELS/ # OF BANDS	FREQUENCY RANGE (PARAMETRIC)	CONSTANT Q	FILTERS	ANALOG I/O #/TYPE
Fulman	Q-152 and Q-152B	N/A	N/A	2/3 octave	1/5	N/A	Yes	N/A	N/A
Furman	Q-302 and Q-302B	N/A	N/A	1/3 octave	1/30	N/A	Yes	N/A	N/A
Geoffrey Daking	52270 Mic-Pre & 4 Band Equalizer	Analog	No	Discrete -1@10 Hz-30 kHz	1/4	N/A	No	HP; LP	XLR
HHB	Classic 70	Analog	No	Parametric	2/4	30 Hz-20 kHz	Variable	HP; LP	(4) XLR; 1/4"
HHB	HHB Radius 20	Analog	No	Parametric; range 4.5	2/4	30 Hz-20 kHz	No	None	(4) XLR; 1/4"
Langwin	Langwin Pultec EQ	Analog	No	High/low	1/2	20 Hz-20 kHz	Yes/variable	No	XLR; unbalanced 1/4"
Manley Labs	EQP1-A Enhanced Pultec EQ	Analog	No	High/low	1/2	20 Hz-20 kHz	No	No	Balanced XLR; unbal. 1/4"
Nightpro	EQ3D	N/A	No	N/A	2/5	N/A	N/A	N/A	N/A
PreSonus	DEQ624	Digital w/analog control	No	Graphic/3 octave	2/31	N/A	Yes	HP, LP	(2) XLR; (2) 1/4"; (2) barrier strip
Raven Labs	True Blue EQ	Analog	No	Semi-parametric	1/5	30 Hz-10 kHz	Yes	None	(4) bal/unbal TS TRS
Roland	SRQ-2031 Digital Graphic EQ	Digital	Yes	1/3 octave	2/31	20 Hz-22.5 kHz	N/A	1/3 octave	(4) 1/4" TRS; XLR
Roland	SRQ-4015 Digital Graphic EQ	Digital	Yes	1/3 octave	4/15	20 Hz-22.5 kHz	N/A	1/3 octave	(4) 1/4" TRS; XLR
Sabine	GRAPHI-Q	Digital	Yes	Multigraphic: 1/3 oct ISO; para: 12 fltrs	2/31	20 Hz-20 kHz	Yes	HP; LP	(4) XLR; 1/4" TRS
Sabine	GRAPHI-Q	Digital	Yes	Multigraphic: 1/3 oct ISO; para: 12 fltrs	1/31	20 Hz-20 kHz	Yes	HP; LP	(3) XLR; (2) 1/4"
Sabine	Power-Q ADF-4000	Digital	Yes	Multigraphic: 1/3 oct ISO; para: 12 fltrs	1/31	20 Hz-20 kHz	Yes	HP; LP	(3) XLR; (3) 1/4" TRS
Sabine	Real-Q2	Digital	Yes	Multigraphic: 1/3 oct ISO	1/31	20 Hz-20 kHz	Yes	HP; LP	(3) XLR; (3) 1/4" TRS
Samson	E30i	Analog	No	Graphic 2/3 octave	2/15	N/A	Yes	Parallel	Balanced 1/4", XLR
Samson	E31i	Analog	No	Graphic 1/3 octave	1/31	N/A	Yes	Parallel	Balanced 1/4", XLR
Samson	E62i	Analog	No	Graphic 1/3 octave	2/31	N/A	Yes	Parallel	Balanced 1/4", XLR
Speck	Model ASC	Analog	No	Q: 0.5-4	4 bands	20 Hz-25 kHz	No	LF shelf	(2) XLR; (2) 1/4" TRS
Speck	Model ASC-T	Analog	No	Q: 0.5-4	4 bands	20 Hz-25 kHz	No	LF shelf	(2) XLR; (2) 1/4" TRS
Speck	Model EQ16-16	Analog	No	Semi-parametric	16/3	50 Hz-15 kHz	Yes/variable	No	(16) 1/4" TRS
SPL Electronics	Stereo Vitalizer MK2-T	Analog	No	Program EQ	2/5	20 Hz-100 kHz	N/A	Resonant	XLR; 1/4"
SPL Electronics	Classic Vitalizer	Analog	No	Program EQ	2/5	20 Hz-50 kHz	N/A	Resonant	XLR; 1/4"
SPL Electronics	Stereo Vitalizer 9215 MK2	Analog	No	Program EQ	2/5	20 Hz-50 kHz	N/A	Resonant	XLR; 1/4"
SPL Electronics	Stereo Vitalizer Jack	Analog	No	Program EQ	2/5	20 Hz-100 kHz	N/A	Resonant	XLR; 1/4"
SPL Electronics	Qure	Analog	No	Parametric 3-band	2/3	10 Hz-100 kHz	Yes	N/A	XLR; 1/4"
StuDiomaster	SEQ 152	Analog	No	Graphic	2/15	20 Hz-20 kHz	Yes	Butterworth	Balanced XLR; 1/4" RTS
StuDiomaster	SEQ 311	Analog	No	Graphic	1/31	20 Hz-20 kHz	N/A	Butterworth	Balanced XLR; 1/4" RTS
Summit Audio	EOP-200B	Analog	No	Program EQ	2/N/A	5 Hz-100 kHz	No	HP	(4) XLR
TC Electronic	2240	Analog	Yes	Parametric	2/4	20 Hz-20 kHz	N/A	N/A	(2) XLR
TL Audio	Ivory 5013	Analog	N/A	Parametric	2/4	30 Hz-20 kHz	Yes/variable 0.5-5	N/A	XLR; 1/4" TRS
TL Audio	Classic EQ2 Equalizer	Analog	N/A	Parametric	2/4	30 Hz-20 kHz	Yes/variable 0.5-5	High/low cut	XLR; 1/4" TRS
Tube Tech	ME-1B	Analog	No	Mid EQ	1/3	5 Hz-40 kHz	N/A	N/A	XLR
XTA	DP202	Digital	Yes	Parametric: 1/32 to 2 octave	2/8+	20 Hz-20 kHz	Yes/variable	HP; LP	XLR
XTA	GQ600 Dual Channel Graphic Equalizer	Analog	No	Graphic 1/3 octave	2/30	N/A	No	N/A	2



DIGITAL I/O # /TYPE	INPUT/OUTPUT GAIN CONTROL	MAX BOOST/CUT	OPERATING LEVEL	HARD BYPASS	DYNAMIC RANGE	THD	WEIGHT	DIMENSIONS	PRICE
N/A	N/A	15-35 kHz @ 12 dB per octave	N/A	N/A	N/A	N/A	N/A	N/A	\$489 and up
N/A	N/A	15-135 kHz @ 12 dB per octave	N/A	N/A	N/A	N/A	N/A	N/A	\$469 and up
N/A	Y/Y	±17.5 dB	+28 dB	Yes	96 dB	<0.0033%	7.5	12.25x1.75x10.5	\$1,495
No	Y/Y	-20 dB/30 dB	+4/-10	Yes	>100 dB	N/A	19.8	19x9.8x5.2	\$2,950
N/A	Y/Y	±15 dB	+4/-10 dB	Yes	106 dB, 0 dB gain	N/A	5.5	19x3.5x7.9	\$749
No	Y/Y	±10 dB (+17 HF boost)	+4/-10 dB	Yes	127 dB	<0.04%	11	19 x1.75x10	\$1,275
No	Y/Y	±10 dB - ±17 dB	+4/-10 dB	Yes	130 dB	<0.04%	11	19 x1.75x10	\$2,150
N/A	N/A	N/A	N/A	N/A	N/A	0.005%	7	19x1.75x7.5	\$1,050
No	N/Y	+12/-24 dB	+4	Yes	>107 dB	<0.007%	8	19x3.5x8	\$800
N/A	N/A	±15 dB	6v RMS	Yes	N/A	0.005%	3	2.25x6x6.7	\$349
N/A	Y/Y	N/A	+4/-20 dB	Yes	N/A	N/A	N/A	19x1.75x8.85	\$845
No	Y/Y	N/A	-20/+4 dB	Yes	N/A	N/A	N/A	19x8.85x1.75	\$945
RS 232 serial	Y/Y	Graphic: ±6 or ±12 dB; parametric: +12/-84 dB	+29 dB	Yes	>110 dB	<0.01% @ 1 kHz	9	19x3.5x9.5	\$1,099 and up
RS 232 serial	Y/Y	Graphic: ±6 or ±12 dB; parametric: +12/-84 dB	+29 dB	Yes	>110 dB	<0.01% @ 1 kHz, +22 dBv	9	19x3.5x9.5	\$700 and up
RS 232 serial	Y/Y	Graphic: ±6 or ±12 dB; parametric: +12/-84 dB	+29 dB	Yes	>110 dB	<0.01% @ 1 kHz, +22 dBv	9	19x3.5x9.5	\$1,799
RS 232 serial	Y/Y	Graphic: ±15 dB	+29 dB	Yes	>110 dB	<0.02% @ 1 kHz, +22 dBv	9	19x3.5x9.5	\$2,000
N/A	Y/Y	±12 dB	+4 dB	Yes	N/A	N/A	4.95	19x1.75x7.5	\$250
N/A	Y/Y	±12 dB	+4 dB	Yes	N/A	N/A	4.95	19x1.75x7.5	\$250
N/A	Y/Y	±12 dB	+4 dB	Yes	N/A	N/A	9.9	19x3.5x7.5	\$380
N/A	Variable	±15 dB/band	4 dBu/28 dBu	Yes	>120 dB	0.0014 @ 24 dBu	5	1/2 rack format	\$645
N/A	Variable	±15 dB/band	4 dBu/28 dBu	Yes	>120 dB	0.0014 @ 24 dBu	5	1/2 rack format	\$749
N/A	N/N	±15 dB	+4 dBu	Yes	>10 dB	0.003%	20	3U	\$1,745
N/A	Y/N	±20 dB	0 dB/+6 dB	Yes	110 dB	0.01855%	7.5	19x1.75x9	\$979
N/A	Y/N	±20 dB	0 dB/+6 dB	Yes	110 dB	0.002%	7.5	19x1.75x9	\$799
N/A	Y/N	±20 dB	0 dB/+6 dB	Yes	110 dB	0.002%	7.5	19x1.75x9	\$599
N/A	N/A	±20 dB	0 dB	Yes	103 dB	0.01855%	4.4	19x1.75x9	\$299
N/A	Y/Y	±15 dB; MF +15/-30 dB	0 dB/+6 dB	Yes	119 dB	0.01855%	10.8	19x3.4x9	\$1,799
N/A	Y/N	±15 dB	-10/+4 dB	Yes	110 dB	>0.1%	10	19x3.5x10	\$349
N/A	Y/N	±15 dB	-10/+4 dB	Yes	110 dB	>0.1%	10	19x3.5x10	\$329
N/A	N/N	±20 dB	+4 dB	Yes	105 dB	0.05% unweighted	19	19x3.5x10	\$2,500
N/A	Y/Y	N/A	N/A	Yes	>116 dB	0.015%	7.7	1U	\$1,288
N/A	Y/Y	±15 dB	-10/+4 dB	N/A	106 dB	0.05%	N/A	19x3.5x10	\$749
N/A	Y/Y	±15 dB	-10/+4 dB	N/A	100 dB	0.05%	N/A	19x 5.25x10	\$2,950
N/A	N/A	N/A	N/A	Yes	N/A	0.15%	12.3	2U	\$1,819
XLR; AES/EBU	Y/Y	-25/+155 dB	+4 dB	No	105 dB	0.02%	8	19x1.75x11.8	\$2,475
N/A	Y/Y	±10 dB	+23 dB	Yes	117 dB	0.01%	14	199x5.25x9.3	\$1,650

# HEADPHONES

MANUFACTURER	MODEL	TYPE	FREQUENCY RESPONSE	SENSITIVITY (DB PER MW)	IMPEDANCE ( $\Omega$ )	POWER HANDLING CAPACITY	EAR-CUP DESIGN
AKG	K 141	Dynamic	20 Hz–20 kHz	98 dB	600 $\Omega$	200 mW	Semi-open, supraural
AKG	K 240 DF	Dynamic	15 Hz–20 kHz	88 dB	600 $\Omega$	200 mW	Semi-open, circumaural
AKG	K 240 M	Dynamic	15 Hz–20 kHz	88 dB	600 $\Omega$	200 mW	Semi-open, circumaural
AKG	K 270 S	Dynamic	20 Hz–28 kHz	92 dB	75 $\Omega$	200 mW	Sealed, circumaural
AKG	K 301	Dynamic	20 Hz–25 kHz	94 dB	100 $\Omega$	200 mW	Open, circumaural
AKG	K 70	Dynamic	20 Hz–20 kHz	105 dB	100 $\Omega$	200 mW	Semi-open, circumaural
AKG	K 100	Dynamic	20 Hz–28 kHz	103 dB	100 $\Omega$	200 mW	Semi-open, supraural
Audio-Technica	ATH-910	Dynamic	20 Hz–22 kHz	90 dB	40 $\Omega$	120 mW	Circumaural
Audio-Technica	ATH-M40fs	Dynamic	5 Hz–28 kHz	100 dB	60 $\Omega$	1,600 mW	Circumaural
Audio-Technica	ATH-D40fs	Dynamic	20 Hz–28 kHz	102 dB	66 $\Omega$	1,600 mW	Circumaural
beyerdynamic	DT-131	Dynamic	30 Hz–18 kHz	N/A	40 $\Omega$	N/A	Open, supraural
beyerdynamic	DT-250	Dynamic	10 Hz–30 kHz	98 dB	80 $\Omega$	10 mW	Closed, circumaural
beyerdynamic	DT-770 Pro	Dynamic	5 Hz–35 kHz	N/A	600 $\Omega$	100 mW	Closed
beyerdynamic	DT-990 Pro	Dynamic	5 Hz–35 kHz	N/A	600 $\Omega$	100 mW	Open, diffuse
beyerdynamic	DT 231	Dynamic	20 Hz–18 kHz	112 dB	32 $\Omega$	N/A	Closed
Carvin	H40M	Dynamic	20 Hz–20 kHz	106 dB	64 $\Omega$	200 mW	Semi-open
Fostex	T-20RP	Printed ribbon	50 Hz–30 kHz	96 dB	50 $\Omega$	200 mW	Semi-open
Fostex	T-40RP	Printed ribbon	30 Hz–20 kHz	98 dB	50 $\Omega$	200 mW	Closed
Fostex	T-5	Dynamic	65 Hz–20 kHz	96 dB	50 $\Omega$	100 mW	Semi-open
Fostex	T-7	Dynamic	50 Hz–20 kHz	98 dB	50 $\Omega$	100 mW	Semi-open
Koss	A-130	Dynamic	16 Hz–23 kHz	98 dB	60 $\Omega$	100 mW	Closed
Koss	R-10	Dynamic	30 Hz–20 kHz	103 dB	60 $\Omega$	100 mW	Closed
Koss	R-200	Dynamic	18 Hz–23 kHz	84 dB	60 $\Omega$	100 mW	Open
Koss	R-30	Dynamic	18 Hz–20 kHz	106 dB	60 $\Omega$	100 mW	Closed
Koss	R-80	Dynamic	16 Hz–22 kHz	101 dB	60 $\Omega$	100 mW	Closed
Koss	TD/61	Dynamic	25 Hz–15 kHz	93.5 dB	38 $\Omega$	100 mW	Closed
Koss	TD/65	Dynamic	20 Hz–17 kHz	101 dB	90 $\Omega$	100 mW	Closed
Koss	TD/80	Dynamic	20 Hz–17 kHz	98 dB	60 $\Omega$	100 mW	Closed
Koss	A/250	Dynamic	16 Hz–25 kHz	98 dB	60 $\Omega$	100 mW	Open
Koss	UR30	Dynamic	18 Hz–20 kHz	101 dB	100 $\Omega$	100 mW	Closed
Koss	UR-20	Dynamic	30 Hz–20 kHz	97 dB	32 $\Omega$	100 mW	Closed
Koss	Pro-4AA	Dynamic	10 Hz–25 kHz	95 dB	250 $\Omega$	100 mW	Closed
Radial Engineering	MB Quart QP240	Dynamic	24 Hz–20.1 kHz	98 dB	100 $\Omega$	100 mW	Open
Radial Engineering	MB Quart QP250	Dynamic	13 Hz–20.4 kHz	98 dB	100 $\Omega$	100 mW	Closed
Radial Engineering	MB Quart QP400	Dynamic	14 Hz–24.1 kHz	93 dB	300 $\Omega$	100 mW	Circumaural
Radial Engineering	MB Quart QPH805	Dynamic	10 Hz–33.4 kHz	96 dB	300 $\Omega$	100 mW	Closed
Radial Engineering	MB Quart QP160	Dynamic	30 Hz–26.4 kHz	90 dB	40 $\Omega$	100 mW	Semi-open
Radial Engineering	MB Quart QP240	Dynamic	24 Hz–20.1 kHz	98 dB	100 $\Omega$	100 mW	Open
Roland	RH-120	Dynamic	20 Hz–20 kHz	100 dB	40 $\Omega$	1,300 mW	Closed
Roland	RH-80	Dynamic	20 Hz–20 kHz	94 dB	40 $\Omega$	100 mW	Open
Roland	RH-25	Dynamic	20 Hz–18 kHz	118 dB	32 $\Omega$	100 mW	Closed
Samson	CH 70	Dynamic	20 Hz–20 kHz	103 dB	32 $\Omega$	120 W	Closed back
Samson	CH 700	Dynamic	20 Hz–20 kHz	108 dB	64 $\Omega$	120 mW	Closed back
Sennheiser	HD 25	Dynamic	16 Hz–22 kHz	120 dB	70 $\Omega$	200 mW	Closed, supraural
Sennheiser	HD 25 SP	Dynamic	30 Hz–16 kHz	100 dB	85 $\Omega$	200 mW	Closed, supraural
Sennheiser	HD 265	Dynamic	10 Hz–25 kHz	94 dB	150 $\Omega$	200 mW	Closed, circumaural
Sennheiser	HD 433	Dynamic	18 Hz–20 kHz	100 dB	32 $\Omega$	100 mW	Open, supraural
Sennheiser	EH2200	Dynamic	12 Hz–22 kHz	106 dB	64 $\Omega$	200 mW	Circumaural, closed-back
Sennheiser	EH 2270	Dynamic	12 Hz–22 kHz	106 dB	64 $\Omega$	200 mW	Circumaural, closed
Sony	MDR-7506	Dynamic	10 Hz–20 kHz	106 dB	63 $\Omega$	1W	Closed
Sony	MDR-7509	Dynamic	5 Hz–30 kHz	107dB	24 $\Omega$	3,000 mW	Sealed, circum-aural design
Sony	MDR-7505	Dynamic	16 Hz–22 kHz	105 dB	24 $\Omega$	1,000 mW	Closed-back, supra-aural design
Yamaha	RH5Ma	Dynamic	20 Hz–20 kHz	98 dB	32 $\Omega$	N/A	Closed
Yorkville Sound	Apex HP 30	Dynamic	20 Hz–20 kHz	100 dB	40 $\Omega$	200 mW	Open back
Yorkville Sound	Apex HP 60	Dynamic	20 Hz–20 kHz	100 dB	40 $\Omega$	200 mW	Semi-open back
Yorkville Sound	HP90	Dynamic	20 Hz–20 kHz	102 dB	50 $\Omega$	200 mW	Closed





# POWER HITTERS

From page 50—POWER HITTERS

sags, and spikes are virtually eliminated, regardless of the source. The usual tolerance range of 90V to 130V should be enough to handle the vast majority of problems; if a fluctuation is outside of this range, it's time to shut down the studio and wait for the power system to stabilize.

## UPS DELIVERS THE GOODS

Line regulation works fine for most studio gear, but some equipment—especially computers—suffers if the power is suddenly cut off, whether due to a vigilant line regulator or a power-system blackout. As a result, I highly recommend that you protect your computer system with an uninterruptable power supply (UPS).

A UPS has a battery that takes over if the power drops too low or fails entirely. That gives you time to save your files and properly shut down your computer. (It's handy when you are editing on a RAM-based sampler or synth, too.) The amount of battery time depends on the UPS and the load you place on it, but most such units give you at least ten minutes.

Most uninterruptable power supplies have some form of surge and spike protection, but not all have line regulation. I strongly recommend you use a UPS that includes line regulation so that you are completely protected. (By the way, power spikes can be transferred through the telephone lines, frying your modem, so consider looking for a UPS that has phone-line protection, too.)

An important consideration is how quickly the UPS can detect a power failure and switch to the battery. The entire process should occur in less than 10 ms. Some systems also come with computer software that monitors the UPS and allows you to schedule power-saving computer shutdowns.

## OTHER CONSIDERATIONS

A few other factors should be considered when buying a power conditioner/regulator. The most obvious is that the number of outlets varies. These outlets are rated for a given amount of power, so be sure to match the power requirements of your devices with the appropriate outlets.

In addition, most power conditioners are designed for 15A, 120 VAC circuits, but some heavy-duty units are designed for 30A, 220V systems. Always use the appropriate power conditioner for your AC circuit, and don't overload the system. (To ensure a proper load, add up the current ratings of all connected units and allow some headroom. Power amps and devices with motors, tubes, and fans tend to draw the most current.)

Many power conditioners offer input-voltage meters, which can be analog (LEDs) or digital (LCDs or neon displays). These are useful because they show you approximately what the power conditions are at any given time.

Another extra is onboard lights. Many units offer slide-out light tubes (which may be metal or plastic); some have BNC connectors that accept Littlelite gooseneck lamps. These can be very handy, especially for live performance situations.

Two other factors merit mention. First, the mechanical assembly of the unit should feel solid, not flimsy, and the paint and screened markings should last. Remember, you want this unit to last for years, and it might have to withstand the rigors of live performance.

Finally, as with anything else you buy, check the warranty. Obviously, the length of the warranty is a factor, as is the completeness of what is covered. It's also nice if the warranty is transferrable, so that a second-hand unit is still covered.

As you'll see from the charts on pp. 132–137, you have plenty of choices. As with everything else in your studio, it pays to carefully evaluate your needs and plan an entire, integrated AC power-distribution system that can protect your gear now and can expand to meet your future needs.

EAR-CUP COVERING	CORD LENGTH	PRICE
Leatherette	10'	\$150
Leatherette	10'	\$220
Leatherette	10'	\$173
Leatherette	10'	\$340
Leatherette	10'	\$174
Foam	6'	\$65
Leatherette	10'	\$131
Leatherette	9'	\$115
Leatherette	11'	\$150
Leatherette	11'	\$150
Felt	10'	\$59
Felt	10'	\$199
Felt	10'	\$199
Felt	10'	\$199
Cloth-covered foam	10'	\$99
Leatherette	9'	\$50
Leather	8'	\$119
Leather	8'	\$139
Foam	6'	\$89
Foam	6'	\$89
Leatherette	8'	\$100
Leatherette	8'	\$30
Cloth	8'	\$70
Leatherette	8'	\$40
Leatherette	8'	\$50
Leatherette	8'	\$20
Leatherette	8'	\$30
Leatherette	8'	\$50
Leatherette	8'	\$150
Leatherette	8'	\$35
Leatherette	8'	\$25
Leatherette	8'	\$100
Velour	10'	\$190
Leatherette	10'	\$200
Velvet	10'	\$300
Leatherette	10'	\$90
Leatherette	10'	\$90
Velour	10'	\$190
Vinyl	8'	\$149
Vinyl	11.5'	\$99
N/A	8.9'	\$15
Plastic	10'	\$45
Plastic	10'	\$55
Padded vinyl	10'	\$260
Padded vinyl	10'	\$120
Padded vinyl	10'	\$250
Foam	10'	\$25
Padded vinyl	10'	\$130
Padded, vinyl	10'	\$200
Vinyl-covered foam	9.75'	\$177
Vinyl	9'	\$260
Vinyl	9'	\$135
Padded Vinyl	8'	\$50
Leatherette	10'	\$30
Leatherette	10'	\$40
Leatherette	10'	\$53

# KEYBOARD SYNTHESIZERS & SAMPLERS

MANUFACTURER	PRODUCT	POLYPHONY/ MULTITRACK PARTS	WAVEFORM MEMORY ROM/RAM	FILTER TYPES/ RESONANCE	SINGLE PROGRAMS ROM/RAM	MULTITRACK PERFORMANCES ROM/RAM	PORTAMENTO	GM/GS/XG COMPATIBLE	BUILT-IN COMPUTER INTERFACE/TYPE	DISK DRIVE TYPE	NUMBER OF KEYS	# OF KEYBOARD ZONES (MAX)	LEFT-HAND CONTROLLERS
Access (GSF)	Virus KB	24/16	N/A	24/12 dB LP; BP; HP; BS	512	128	Yes	N/N/N	No	N/A	61	16	Pitch; mod
Alesis	QS6.1	64/16	16/16 MB (w/flash cards)	LP/N	512/128	400/100	Yes	Y/N/N	Yes/serial	N/A	61 semi-weighted	16	Pitch; mod; 4 sliders
Alesis	QS8.1	64/16	16/16 MB (w/flash cards)	LP/N	512/128	400/100	Yes	Y/N/N	Yes/serial	N/A	88 weighted hammer-action	16	Pitch; mod; 4 sliders
Alesis	QS7.1	64/16	16/16 MB (w/flash cards)	LP/N	512/128	400/100	Yes	Y/N/N	Yes/serial	N/A	76 semi-weighted	16	Pitch; mod; 4 sliders
Alesis	Air Synth	5/1	N/A	Notch; LP; HP BP; comb/Y	50/0	0	Yes	N/N/N	No	No	None	N/A	WXYZ infrared 3-D
Ensoniq	Avista 7600	32/16	8 MB	N/A	128/N	16/0	No	Y/Y/Y	No	1.4 MB MS-DOS	76	1	N/A
Ensoniq	ZR-76	64/16	30/4 MB	LP/N	468/256	32	Yes	Y/N/N	No	1.4 MB MS-DOS	76 weighted	3	Pitch; mod
Generalmusic	Equinox	64/32	16/40 MB	HP; LP; BP; para cut/bst/Y	1200/1200	112/16	Yes	Y/Y/N	Yes/serial; SCSI (88 keys)	Floppy/ internal HD	61; 76; 88	16	Pitch; mod
Generalmusic	Equinox 61/76/88	32	16/40 MB	128 4 pole/ 24 dB w/resonance	1,000/2,000; over 2,000 grooves	128/128/16	Yes	Y/Y/N	Yes/serial; MIDI	Floppy/ up to 2 GB HD	61; 76; 88	32	Pitch; mod
Korg	Trinity	32/16	24/0 MB	HP; LP; BP; band reject/Y	0/256	0/256	No	N/N/N	No	3.5" HD/DD	61	16	Ribbon; X/Y joystick; (2) switches; slider
Korg	M5EX	64/32	18/0 MB	Resonant filter effect algorithm	1196/100	302/100	Yes	Y/Y/Y	Yes/serial; PC/Mac	N/A	61	32	Pitch; mod; (4) knobs
Korg	N364	64/16	8/0 MB	N/A	336/200	200/200	No	Y/N/N	No	3.5" HD/DD	61	16	X/Y joystick
Korg	N264	64/16	8/0 MB	N/A	336/200	200/200	No	Y/N/N	No	3.5" HD/DD	76	16	X/Y joystick
Korg	Karma	62/16	32 MB	HP; LP	0/640	0/512	Yes	Y/N/N	N/A	3.5" HD/DD	61	16	(2) switch; X/Y joystick; (4) assignable/fixed knobs
Korg	PA-80	62/16	32/0 MB	HP; LP/ Yes	0/660	0/up to 304	Yes	Y/N/N	Serial PCI/F	3.5" HD/DD	61	2	X/Y joystick
Korg	MS2000	4/1	N/A	LP/BP/HP	0/128	N/A	Yes	N/N/N	N/A	N/A	44	2	Pitch and mod wheels
Korg	Triton	62/16	32/32 MB	HP; LP	0/640	0/512	Yes	Y/N/N	Korg PCI/F	3.5" HD/DD	61	16	X/Y joystick; ribbon; (2) switch; (4) assignable/ fixed knobs
Korg	Triton Pro	62/16	32/32 MB	HP; LP	0/640	0/512	Yes	Y/N/N	Yes/serial; Mac/PC; Korg PCI/F	3.5" HD/DD	76	16	X/Y joystick; ribbon; (2) switch; (4) assignable/ fixed knobs
Korg	Triton Pro X	62/16	32/32 MB	HP; LP	0/640	0/512	Yes	Y/N/N	Yes/serial; Mac/PC; Korg PCI/F	3.5" HD/DD	88 weighted	16	X/Y joystick; ribbon; (2) switch; (4) assignable/ fixed knobs
Kurzweil	PC2X	64/16	0/16 MB	LP; HP; BP; notch	128/128	32/128	Yes	Y/N/N	N/A	None	88 weighted	4	(2) wheels; (4) sliders; (6) buttons
Kurzweil	PC2	64/16	0/16 MB	LP; HP; BP; notch	128/128	32/128	Yes	Y/N/N	N/A	None	76 semi-weighted	4	(2) wheels; (4) sliders; (6) buttons
Nemesys	Giga Studio 160	160/64	HD-based unlimited	LP; HP; BP; BR	User definable	User definable	N/A	Y/Y/Y	PC host based	CD/DVD HD	External	External	All
Nemesys	Giga Sampler 64	64	HD-based unlimited	LP; HP; BP; BR	User definable	User definable	N/A	Y/Y/Y	PC host based	CD/DVD HD	External	External	All
Nord	Lead2	16/4	N/A	BP; HP; LP/Y	59/40	100	Yes	N/A	No	N/A	49	2	Pitch stick; mod wheel



AFTERTOUCH (POLY/CHANNEL)	# AND TYPE OF CONTROLLER INPUTS	# OF SEQUENCER TRACKS/PPON	SEQUENCER MEMORY (NOTES)	TYPES OF QUANTIZATION	ARPEGGIATOR	# OF EFFECTS PROCESSORS/ EFFECTS PROGRAMS	# AND TYPE OF AUDIO OUTPUTS	SPECIAL FEATURES	OPTIONS	PRICE
N/Y	1 sustain; 1 pedal	N/A	N/A	N/A	Yes	1/82	(6) 1/4"	Stereo filter inputs; 3LFOs; 2 env.; 64 waveshapes; input follower efx	Free operating system updates via Web	\$2,295
Y/N	1 sustain; 1 assign	16	50 sequences	N/A	No	1/8	(2) 1/4"	CD-ROM; usr smpls/sqncs w/flash cards	Ocards; PCMCIA flash cards	\$1,099
Y/N	1 sustain; 2 assign	16	50 sequences	N/A	No	1/8	(4) 1/4"	CD-ROM; usr smpls/sqncs w/flash cards; dglt out	Ocards; PCMCIA flash cards	\$1,899
Y/N	1 sustain; 2 assign	16	50 sequences	N/A	No	1/8	(4) 1/4"	CD-ROM; usr smpls/sqncs w/flash cards; dglt out	Ocards; PCMCIA flash cards	\$1,299
XYZ	N/A	16 (4/4) step sequencer	N/A	N/A	N/A	1/50	N/A			\$249
N/N	1 sustain	2	25,000	N/A	No	1/2	(2) 1/4"; headphone	Built-in speakers; bench; music rack		\$929
Y/Y	5 FS; 1 pedal	16/384	N/A	64th triplet to whole note; 11 dif styles	Yes	6/40	(6) main L&R; aux L&R; headphone	Idea pad; drum machine	Sound cards; flash memory	\$2,495
Y/Y	1 pedal; 3 FS	16/192	125,000	96th; 1/8 groove; 1/16 groove	Yes	3/85	(4) 1/4"	Smpl trnsltr; groove machine; tonewheel organ w/physcl drwbrs; 8 prog MIDI ldrs/switchs	Pro upgrade includes 8 MB BBU memory 1.2 GB HD; SCSI; Pro2 piano samples	\$1,995-\$3,695
Y/Y	1 pedal; 3 FS	16/16	250,000	96th; 1/8 groove; 1/16 groove	Yes	3/85	(4) 1/4"	Groove machine; 16 programmable laders (8x2); 16 prog buttons (8x2) for MIDI control	(8 MB); RAM; HD; SCSI on 61/76 (stock on 88); VP-EQ 4-part stereo input vocal processor	61/\$1,995; 76/\$2,195; 88/\$3,695
N/Y	3 pedal; switch; damper	16/192	80,000	Hi; 32nd; 16th; 8th; 4th; triplet	No	10/114	(4) 1/4"; headphone	Touch sens screen; 4 outs	Digital audio interface; SCSI; ADAT optical out; 8 MB flash ROM; DSP analog upgrade board	\$2,100
N/Y	2 pedal; switch	0	N/A	N/A	Yes	2/48	(4) 1/4"; headphone	4 real-time knobs; layer/split buttons	No	\$1,099
N/Y	2 pedal; 2 switch; damper	16/96	32,000	Hi; 32nd; 16th; 8th; 4th; triplet	Yes	2/47	(4) 1/4"; headphone	RPPR-plays patterns back on keys	No	\$1,900
N/Y	2 pedal; 2 switch; damper	16/96	32,000	Hi; 32nd; 16th; 8th; 4th; triplet	Yes	2/47	(4) 1/4"; headphone	RPPR-plays patterns back on keys	No	\$2,400
N/A	Damper; assign switch/pedal	16/192	200,000	Hi; 32; 32T; 16; 16T; 8; 8T; 4; 4T	No	8/102	(4) 1/4"; headphone	Variable performance modeler; chord trigger buttons	E&B expansion boards (up to 2); physical modeling	\$2,250
N/A	EC5 input; damper; assign switch/pedal	40/192	50,000	Hi; 32; 32T; 16; 16T; 8; 8T; 4; 4T	No	4/89	(4) 1/4"; headphone; speaker	2 inputs for effective guitars & vocals; lyric display for SM	Internal HD; output for lyric display	\$2,200
No	Pedal; switch	Motion sequencer	16 steps	N/A	Yes	2	(8) 1/4"	16 band vocoder; 3 part motion sequencer		\$1,100
N/Y	1 ea damper, switch, pedal	16/192	200,000	Hi; 32; 32T; 16; 16T; 8; 8T; 4; 4T	Yes	8/102	(6) 1/4"; headphone	Sampler; touch screen; user expandable	SCSI; physical modeling; sound RAM expansion for sampling (up to 64 MB)	\$2,850
N/Y	1 ea damper, switch, pedal	16/192	200,000	Hi; 32; 32T; 16; 16T; 8; 8T; 4; 4T	Yes	8/102	(6) 1/4"; headphone	Sampler; touch screen; user expandable	SCSI; physical modeling; sound RAM expansion for sampling (up to 64 MB)	\$3,375
N/Y	1 ea damper, switch, pedal	16/192	200,000	Hi; 32; 32T; 16; 16T; 8; 8T; 4; 4T	Yes	8/102	(6) 1/4"; headphone	Sampler; touch screen; user expandable	SCSI; physical modeling; sound RAM expansion for sampling (up to 64 MB)	\$4,000
Y/Y	4 sliders; 5 switches; 2 pedal; 3 FS; breath; ribbon	Demo player	N/A	N/A	Yes	2/163	(2) 1/4"; stereo digital; headphone	24 bit stereo digital output; new sounds; 4 zone MIDI; stereo multi-strike recording	Polyphony expansion (128); ROM expansions	\$3,150
Y/Y	4 sliders; 5 switches; 2 pedal; 3 FS; breath; ribbon	Demo player	N/A	N/A	Yes	2/163	(2) 1/4"; stereo digital; headphone	24 bit stereo digital output; 4 zone MIDI; stereo multi-strike recording	Polyphony expansion (128); ROM expansions	\$2,650
N/Y	All	N/A	N/A	N/A	N/A	4/49	Up to 32	DSP sta; Quicksound database; dimen articulation switching/crossfading	No	\$699
N/Y	All	N/A	N/A	N/A	N/A	4/49	16	S-converter	LE version	\$299
N/N	1 each switch; exp. pedal	N/A	N/A	N/A	Yes	No	(4) 1/4"	Analog modeling synth	PCMCIA cards/1200 presets, 400 perf., etc	\$1,799

# KEYBOARD SYNTHESIZERS & SAMPLERS

MANUFACTURER	PRODUCT	POLYPHONY/ MULTITIMBRAL PARTS	WAVEFORM MEMORY ROM/RAM	FILTER TYPES/ RESONANCE	SINGLE PROGRAMS ROM/RAM	MULTITIMBRAL PERFORMANCES ROM/RAM	PORTAMENTO	GM/GS/XG COMPATIBLE	BUILT-IN COMPUTER INTERFACE/TYPE	DISK DRIVE TYPE	NUMBER OF KEYS	# OF KEYBOARD ZONES (MAX)	LEFT-HAND CONTROLLERS
Nord	Lead3	24/4	N/A	LP; BP; HP; Notch; dual; classic	768	128	Yes	N/N/I/I	No	N/A	49	2	Pitch stick; mod wheel
Nord	Nord Modular Keyboard	16/4	N/A	15 filter types	500	0/0	Yes	N/A	No	N/A	25	2	N/A
Oberheim	OB12	12/4	N/A	LP; BP; HP	256/256	256/256	Yes	N/A	N/A	N/A	49	4	Ribbon controller, pitch wheel, mod wheel
Quasimidi	Sirius	28/7	192/0 MB	LB; HP	672/480	N/A	Yes	N/N/N	N/A	No	49	N/A	2
Roland	JP-8000	8/2	N/A	LP; BP; HP/Y	128/128	64/64	Yes	N/N/N	No	N/A	49	0	Pitch; mod lever; ribbon
Roland	RS-5	64/16	32 MB	LP/Y	512/128	128/128	Yes	GM2	No	N/A	61	2	Mod/pitch hand lever; 6 real time control knobs
Roland	RS-9	64/16	32 MB	LP/Y	512/128	128/128	Yes	GM2	No	N/A	88	2	Mod/pitch lever; 6 real time control knobs
Roland	VK-7	N/A; 4	N/A	N/A	64/16	0/0	No	N/N/N	No	N/A	61	0	(9) drawbars; rotary speed; brake; bypass; drawbar select
Roland	VK-77	N/A; 64	8 MB	Wheel tables and types	128/128	N/A	N/A	N/A	N/A	N/A	61 upper; 61 lower	6	(21) drawbars
Roland	XP-10	28/16	8 MB	LP/Y	338/256	64/32	Yes	Y/N/N	Yes/Mac; PC-1; PC-2	N/A	61	0	Pitch; mod lever
Roland	XP-30	64/16	64/exp to 96	LP; BP; HP; peaking/Y	1,406/128	64/32	Yes	Y/N/N	Yes/Mac; PC-1; PC-2	N/A	61	16	Pitch; mod lever
Roland	XP-60	64/16	16/exp to 80 MB	LP; BP; HP; peaking/Y	512/128	64/32	Yes	Y/N/N	No	N/A	61	16	Pitch; mod; (2) sliders
Roland	XP-80	64/16	16/exp to 80 MB	LP; BP; HP; peaking/Y	512/128	64/32	Yes	Y/N/N	No	3.5" HD/DD	76	16	Pitch; mod lever; (2) sliders
Roland	XV-88	128/16	64/exp to 224 MB	LP; BP; HP; peaking/Y	1,024/128	64/64	Yes	GM2	Y/Mac; PC-1; PC-2	Smartmedia	88	16	D-Beam; pitch bend/ mod lever, 4 asgn. ctrl
Waldorf (GSF)	Q	16/16	N/A	LB; BP; HP; comb	0/300 MB	0/100 MB	Yes	N/N/N	N/A	Smartcard	61	16	(2) wheels; (2) buttons
Yamaha	S03	64/16	25/0	LP/Y	608/128	0/32	Yes	Y/Y/Y	Y/serial	N/A	61	16	PB/MV
Yamaha	S80	64/19	43/43 MB	12/Y	256/128	0/128	Yes	Optional	Yes	SmartMedia	88	4	PB; MOD
Yamaha	S30	64/17	43/43 MB	12/Y	256/128	0/128	Yes	Optional	Yes	SmartMedia	61	4	PB; mod
Yamaha	EX5	128/16	16/1 MB	8/Y	256/256	0/128	Yes	Optional	N/A	3.5" FDD	76	16	PB; (2) mod; ribbon
Yamaha	EX7	64/16	16/1 MB	8/Y	256/256	0/128	Yes	Optional	N/A	3.5" FDD	61	16	PB; (2) mod; ribbon
Yamaha	CS6x	64/19	28/28 MB	12/Y	256/128	0/128	Yes	Optional	Yes/serial Mac; PC	SmartMedia	61	4	PB; mod; ribbon
Yamaha	CS2	64/16	28/28 MB	3/Y	256/256	0/256	Yes	Y/Y/Y	Yes/serial	N/A	61	4	PB; mod; 8 knobs



AFTERTOUCH (POLY/CHANNEL)	# AND TYPE OF CONTROLLER INPUTS	# OF SEQUENCER TRACKS / PPON	SEQUENCER MEMORY (NOTES)	TYPES OF QUANTIZATION	ARPEGGIATOR	# OF EFFECTS PROCESSORS/ EFFECTS PROGRAMS	# AND TYPE OF AUDIO OUTPUTS	SPECIAL FEATURES	OPTIONS	PRICE
N/Y	(2) peda s	No	N	N/A	Yes	N/A	N/A			\$2,695
N/N	1 each switch; exp. pedal	Step sequencer	Infinite	N/A	Yes	4/30	(4) 1/4"	Editor for Mac & PC allows you to build a synth	16 note voice expansion board	\$1,999
N/Y	2 each pedals; exp pedals	1 /96	30,000	N/A	Yes	1/4	(4) 1/4"	Screen draws out edited parameters		\$1,999
N/N	1 FS	7/24	N/A	N/A	Yes	2	(2) RCA	Built-in vocoder		\$1,299
N/Y	2 pedal	0	23,000	Grid	Yes	3/18	(2) 1/4"	38 knobs & sliders; recordable motion cntrls	DP-2/6 damper pedal; EV-5 expr pedal	\$1,695
Y/Y	Hold; assign	N/A	N/A	N/A	Yes	3/51	(2) 1/4" (L mono, R)	Favorite bank, XV waveforms; category search	DP-2/6 damper pedal; EV-5 expr pedal	\$795
Y/Y	Assign; sustain	N/A	N/A	N/A	Yes	3/51	(2) 1/4" (L mono, R)	Dedicated piano button; XV waveforms; category search; favorite bank	DP-2/6 damper pedal; EV-5 expr pedal	\$1,295
N/N	3 pedal	0	N/A	N/A	No	1/4	(2) 1/4", headphone; 11-pin rotary cab	Bal outs; 2nd manual w/any MIDI hybrid; prog key click; prog pickup leakage	DP-DP-2/6 damper pedal; EV-5/7 expr pedal; PK-5/7 MIDI peds	\$2,495
Y/Y	1 each hold; exp; control; pk pedal input	N/A	N/A	N/A	N/A	7/41 incl amp	1/4"; XLR; Leslie 13-pin	Leslie simulator/tull poly/ external control	PK-25 & PK-7 bass pedals; EV-7 expression/KS-77 stand/ BNC-25 bench	\$5,795
Y/Y	2 pedal assgn/hold	0	N/A	Arpegg; groove; shuffle	Yes	2/16	Stereo L/R x2 headphone	Combination palette sliders	DP-2/6 damper pedal; EV-5 expr pedal	\$695
Y/Y	2 pedal assgn/hold	0	N/A	N/A	Yes	3/49	Stereo L/R; headphone	2 exp slots; patch finder; prog sound palette sliders; sync exp beatloops to MIDI	SR-JV80-series exp brds; SM-4 SmartMedia card; EV-5 expr ped; DP-2/6 dmptr pedal	\$1,395
Y/Y	5 pedal	16/96	60,000	Grid; groove; shuffle	Yes	3/49	Stereo L/R x2; headphone click out	4 exp slots; sound palette; disk quick- play; sync exp beatloops to MIDI	SR-JV80 exp brds; DP-2/6 damper pedal; EV-5 expr ped;	\$1,995
Y/Y	5 pedal	16/96	60,000	Grid; groove; shuffle	Yes	3/49	(4) 1/4"; headphone; click out	4 exp slots; sound palette; disk quickplay; sync exp beatloops to MIDI	SR-JV80 exp brds; DP-2/6 dmptr ped; EV-5 expr pedal	\$2,495
N/Y	3 sustain; 2 assign	N/A	N/A	N/A	Yes	3/69	(4) 1/4"	Seq start/stop button; 2x SRJV exp bd 2x SRX exp	Smartmedia; DP-2/6 sustain foot switch; EV-5 expr pedal	\$2,995
Y/Y	2 switch; 2 CV	Step sequencer	100 patterns	32 step	Yes	2	(3) 1/4"; S/PDIF	Stereo-analog-in; software-updates via MIDI	32-voice upgrade; RAM-cards	\$3,495
N/N	2/1 switch; 1 pedal	N/A	N/A	N/A	No	3/64	N/A			\$630
N/Y	2 FS; 2 foot; 1 breath	16/480	N/A	N/A	Yes	4/127	(4) 1/4"	A/D input; MIDI master keyboard funtion w/ 128 set-ups	Modular synthesis expansion system	\$1,995
Yes	2 FS	16/ 480	N/A	N/A	Yes	4/127	(2) 1/4"	MIDI master keyboard functions	PLG series plug-in boards 5 types	\$1,295
N/Y	2 FS; 2 foot; 1 breath	16/480	30,000	Percentage; non-destructive; groove	Yes	2/122	(4) 1/4"	5 types of synthesis	Flash ROM 8MB and 16MB; SCSI; analog x 4	\$2,695
N/Y	2 FS; 2 foot; 1 breath	16/480	30,000	Percentage; non-destructive; groove	Yes	2/122	(2) 1/4"	Extended synthesis (4 types); sampling	Flash ROM 8MB and 16MB; SCSI; analog x 4	\$2,195
N/Y	2 FS; 2 foot; 1 breath	16/80	N/A	N/A	Yes	2/135	(4) 1/4"	Phrase clip sampling; 4MB save/load to SmartMedia	PLG series expansion boards x 6 types	\$1,795
N/A	1 each volume foot; FS	N/A	N/A	N/A	Yes	1/88	(2) 1/4"; headphone	Scene controller with morphing, analog style knobs	FC4 foot switch; FC7 foot controller	\$900

# MICROPHONE & INSTRUMENT PREAMPS

MANUFACTURER	PRODUCT	TYPE	CHANNELS	EQ	OUTPUT LEVEL CONTROL	INSTRUMENT / LINE INPUT	OVERLOAD WARNING	FREQUENCY RESPONSE
Aguilar	DB680 Tube Bass Preamp	Tube	1	Dual fully parametric	Yes	Yes	No	20 Hz–20 kHz
Amek	9098 EQ	TLA (Transformer Like Amplifier)	1	4-band para; vari HP/LP	No	Yes	No	10 Hz–110 kHz, -1.5 dB
Amek	DMA	TLA (Transformer Like Amplifier)	2	HP filter	No	Yes	2-seg LED	10 Hz–110 kHz
Aphex Systems	107	Tube	2	Low-cut filter	Yes	No	Clip LED	20 Hz–30 kHz
Aphex Systems	1100	Class A discrete tube	2	Low-cut filter	3-turn trim pot	No	N/A	N/A
API	512C	Solid state	1	No	Yes	Yes	Yes	30 Hz–20 kHz, +0/-3 dB
A.R.T.	Digital MPA	DMPA	2	N/A	N/A	Yes	Analog meter	20Hz–20 kHz
A.R.T.	DI/O Preamp System	N/A	2	N/A	N/A	Yes	Analog meter	20Hz–20 kHz
A.R.T.	Tube Preamp System	Tube	2	N/A	N/A	Yes	Analog meter	20Hz–20 kHz
A.R.T.	Dual MP	Tube	2	No	Yes	Yes	3-seg LED, clip LED	10 Hz–20 kHz
A.R.T.	Pro MPA	Tube	2	Adjustable HP filter	Yes	Yes	10-seg LED	20 Hz–40 kHz
A.R.T.	Tube MP	Tube	1	No	Yes	Yes	Clip LED	10 Hz–20 kHz
ATI	8MX2	Solid state	8 mic/8 line	No	Yes	Yes	2x10-seg LED	20 Hz–20 kHz
Avalon Design	M5	Discrete; class A	1	Vari pass HP filter	Yes	Yes	Analog VU (2) signal peak LEDs	5 Hz–120 kHz
Behringer	UltragrainPro MIC2200	Tube	2	Parametric; low-cut	Variable -20 to +20 dB	Yes		10 Hz–200 kHz, ±3 dB
Behringer	Ultragrain T1953	Tube	2	Tuneable high-pass filter	Yes	Yes	Clip LED	18 Hz–30 kHz
Bellari	MP110 Direct Drive	Tube	1	No	Yes	Yes	Yes	20 Hz–40 kHz
Bellari	RP220	Tube	2	No	Yes	Yes	5-seg LED, clip LED	20 Hz–40 kHz
Bellari	RP520	Tube	2	No	Yes	Yes	Clip LED	20 Hz–40 kHz
Benchmark	Mic-Man Jr.	Solid state	2	No	No	No	No	1 Hz–300 kHz
Benchmark	MPS-400	Solid state	4	No	No	No	No	1 Hz–500 kHz
beyerdynamic	MV100	Solid state	2	HP filter	No	No	Clip LED	18 Hz–22 kHz
CLM	DB400S	Solid state	4	Low-cut filter	No	Yes	10-seg LED per ch	20 Hz–20 kHz
Curtis Technology	Opre2 2-Channel Microphone Preamplifier	Solid state	2	No	Yes	No	No	10 Hz–0 KHz
D.W. Fearn	VT-1/VT-2 Vacuum Tube Microphone Preamp/ifier	Tube	1/2	No	Yes	No	VU meter	5 Hz–28 KHz
DACS	DACS MicAmp	Discrete	2	Bass rolloff	No	No	No	20 Hz–55 kHz
dbx	386 Tube Mic Preamp	Dual tube mic preamp	2	No	Yes	Yes	No	10 Hz–75 kHz
Demeter	VTMP-2c Stereo Tube Microphone Preamp	Solid state	2	Low-cut filter	Yes	Yes	LED/meter	10 Hz–40 kHz
Demeter	VTBP-201 S Tube Bass Preamp	All tube	1	Treble; mid; bass (w/sel freq); presence	No	Yes	No	N/A
Demeter	VTMP-2cx Stereo Tube Microphone Preamp	Tube	2	Low-cut filter	Yes	Yes	LED/meter	10 Hz–40 kHz
Demeter	H MP-1 Stereo Tube Microphone Preamp	Tube	2	Low-cut filter	Yes	Yes	10-seg LED	10 Hz–80 kHz
Denecke	AD20	Solid state	2	No	Yes	Optional	No	10 Hz–20 kHz
Denecke	Zefiro In Box Preamp	Solid state	2	No	Yes	Optional	No	10 Hz–21 kHz
Earthworks	LAB102/LAB101	Solid state; stepped and variable gain	2/1	No	Yes	N/A	Clip LED	2 Hz–100 kHz, ±0.1 dB
Fishman	Acoustic Blender/Acoustic Bass Blender	Solid state	2	Active shelving style; bass; treble; low-cut filter	Yes	Yes	No	20 Hz–20 kHz
Fishman	Pocket Blender	Solid state	2	Active shelving style; bass; treble; high/low-cut filters	Yes	Yes	No	20 Hz–20 kHz
Fishman	Pro-EQ II	Solid state	1	4-band graphic	Yes	Yes	No	N/A
Fishman	G-II Acoustic Guitar/Instrument Preamp	Solid state	1	Treble; bass	Yes	Yes	No	N/A
Fishman	B II Acoustic Bass Preamp	Solid state	1	Treble; bass	Yes	Yes	No	N/A



## CREATING THE ULTIMATE MIX

From page 32—CREATING THE ULTIMATE MIX

do whatever you want to this guitar to make it sound as big as possible, as long as it doesn't conflict with the bass guitar. You can fatten up the low end with a boost of 3 dB around 160 Hz and another between 700 and 800 Hz. Depending on the sound of the amp, you may need to cut a few decibels around 3 kHz. The amount of high end you add depends on the sound you want: a boost of about 6 dB at 7 kHz will add crunch to the sound.

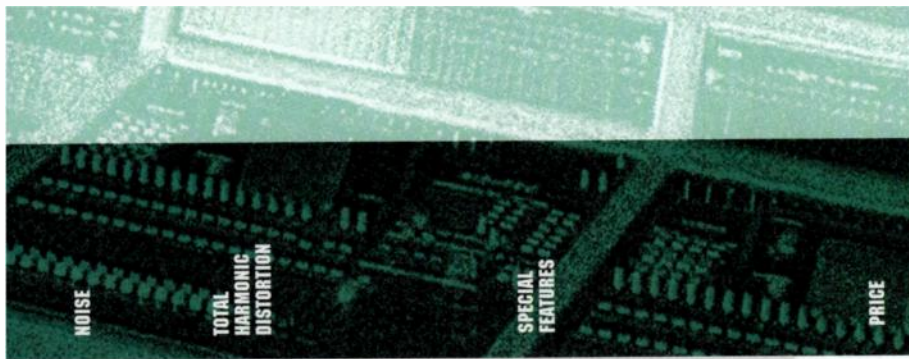
It's always good practice to roll off any frequencies above or below the ones you really need; but listen carefully before you cut, lest you accidentally eliminate desirable, but subtle, low-level subharmonics and high harmonics. At each step, check to make sure the guitar sits well in the mix with the bass.

**One of many.** For our second scenario, let's assume you have to fit this guitar into a mix with a full band, including two other electric guitars. In this case, you may want to focus on the midrange. Roll off everything less than 200 Hz and more than 9 kHz. Then do some sweeps in the middle to see what needs to go in and what ought to come out. You'll find that, often, a boost around 4 kHz and a cut around 6 kHz generally work, although sometimes the opposite is true. You have to listen to the track and decide according to the mix at hand. If you have more than one electric guitar, make sure that they sound a little different from each other. This could mean using different guitars, amps, mics, miking techniques, or processing. In addition, you can further differentiate the guitars by giving them their own space in the stereo field.

### GENTLE REMINDER

Now that we have examined a number of bass, drum, and guitar EQ settings, keep in mind that not one of them is worth a hill of beans if the resulting sounds don't complement the song and work to enhance the other elements of the mix.

Although it's certainly no sin to tweak a track in solo mode, EQ settings should only be finalized in the context of the complete mix. The purpose of equalizing a mix, after all, is to minimize frequency conflicts among the various instruments



-80dB	0.4%	Selectable inputs; passive/active inputs; tuner out; footswitch; balanced out; crossover	\$1,895
-100 dBu	<0.01%	Phantom; notch filters; Neve glow & sheen	\$2,269
-104 dBu S/N	<0.01%	Phantom; MS surround	\$1,710
-128 dBu EIN	0.2%	Remote mute; Tubessence; phantom; gain ctrl; pad	\$449
-135 dBu EIN	@+15 dBu 0.12% @+4 dBu 0.05%	Mic limiter; mic level limiter/24-bit 96kHz digital out	\$2,495
-129 dB	<0.05%	Re-issue 70's API mic pre; 7-seg input LED; phase; phant; 20 dB pad; 1/4"/XLR frnt pnl ins; fits 500 Series frms/consoles	\$825
N/A	N/A	ADAT; Toslink; S/PDIF out; phantom power; phase switch	\$699
N/A	N/A	V3 variable valve voicing; ADAT; phantom power; phase switch	\$319
N/A	N/A	V3 variable valve voicing; phantom power; 20 dB phase switch	\$219
-129 dBu EIN	<0.1%	Phase; phantom; +20 dB gain switch	\$349
-132 dBu EIN	<0.1%	Output-level VU meters; phase; phantom; 5-year warranty	\$649
-129 dBu EIN	<0.1%	Phase; phantom	\$139
-129 dBm EIN	0.006%	Vari-thrshld lmr on each input (8); phase; phant/grnd lift on ech ch; 8x2 mixer w/8 outs	\$1,899
-126 dB EIN	0.05%	Ext B2T power supply (100/240V); polarity; 20dB pad; DI in; opt B&K 130V phantom power	\$1,600
N/A	0.011%	12AX7 vacuum tube; phantom power; phase reverse	\$229
>108 dB S/N	N/A	Phantom power; line driver; phase reverse; balanced inputs/outputs	\$459
90 dB	0.1%	Transformer-balanced inputs; phase; pad	\$230
107 dB S/N	0.1%	Transformer-balanced inputs; phase; pad	\$500
107 dB S/N	0.1%	Analog VU meters; transformer-balanced inputs; phase; pad	\$600
1 dB noise figure	0.001%	Portable AC/DC operation; gain range: +26 to +76 dB	\$435
-130 dBu EIN	0.0009%	Active bal I/O; phantom; max output level: +27 dBu; gain range: -2 to +73 dB (w/pad)	\$1,125
-128 dB EIN	0.03%	Headphone monitoring	\$799
-128 dB	0.006%	Phantom; limiter; mid & side with stereo width mngmnt	\$1,300
-129 dB	0.03%	Lundahl input transformer	\$1,295
-124 dBu EIN	0.2%	Phantom; phase; 20dB pad; low imp in for transformerless mics	\$2,000/\$3,500
-133 dB	0.002%	Phantom	\$2,165
0.35% at +4 dBu out, 1kHz, 480 dB gain	0.35%	AES/EBU and S/PiF digital outputs	\$599
-124 dB EIN	0.016%	Jensen input transformers; phase; LC; pad; variable tube gain	\$2,299
N/A	N/A	Jensen DBE mic level output transformer; effects loop; balanced out	\$799
-124 EdB IN	0.016%	Phantom; Jensen in/out transformers; phase; iLC; pad; variable tube gain	\$2,549
-124 dB EIN	0.012%	Jensen input transformer; phase; LC; pad; variable tube gain	\$1,295
99 dB S/N (A/D) 125.4 dBm EIN	0.0016%	20-bit A/D; S/PDIF optical/coax out	\$325
99 dB S/N; -125.4 dB EIN	0.008%	20-bit A/D; S/PDIF optical/coax out	\$395
EIN: -125 dBv @ 20 dB of gain, -133 dBv @ 40 dB gain	0.02%	Multiple outs per channel; phase; phantom; standby	\$750-\$1,500
81 dB (A-weighted, ref to nom -20 dBV input)	0.2%	Separate mic/piezo transducer channels w/dedicated effects loops/phase reverse; phantom	\$500
87 dB (A-weighted, ref to nom -20 dBV input)	0.7%	Separate mic/piezo transducer channels w/dedicated effects loops/phase reverse; phantom	\$420
N/A	N/A	Sub bass trim control; input trim control; rugged injection molded case	\$160
N/A	N/A	Input trim control; rugged injection molded case; suitable as floor unit; belt/strap pack or with (sold separately) mic-stand adapter	\$110
N/A	N/A	Input trim control; rugged injection molded case; suitable as floor unit; belt/strap pack or with (sold separately) mic-stand adapter	\$110

# MICROPHONE & INSTRUMENT PREAMPS

MANUFACTURER	PRODUCT	TYPE	CHANNELS	EQ	OUTPUT LEVEL CONTROL	INSTRUMENT / LINE INPUT	OVERLOAD WARNING	FREQUENCY RESPONSE
Focusrite	Red 7 Mic Pre and Dynamics	Solid state		High-pass filter	Yes	Yes	VU meter	10 Hz–140 kHz
Focusrite	Red 8 Dual Mic Preamplifier	Solid state	2	No	No	No	VU meter	10 Hz–140 kHz
Focusrite	Red 1 Quad Mic Preamplifier	Solid state; transformer balanced	4	No	No	No	VU meter	10 Hz–140 kHz
Geoffrey Daking	52270 Mic-Pre & 4-Band Equalizer	Transformer-coupled discrete translator	1	4-band w/high- & low-pass filters	Yes	N/Y	No	10 Hz–56 kHz
George Massenburg Labs	8300	Solid state	2	No	No	No	Clip LED	1 Hz–20 kHz
George Massenburg Labs	8302	Solid state	2	No	No	No	Clip LED	1 Hz–200 kHz
George Massenburg Labs	8304	Solid state	4	No	No	No	Clip LED	1 Hz–200 kHz
Grace Design	Model 201	Solid state; fully balanced; transformerless	2	No	Yes	No	Yes	4.5 Hz–1.0 MHz, $\pm 3$ dB
Grace Design	Lunatec V2	Portable solid state, fully balanced	2	HP filter	Yes	No	Yes	6 Hz–250 kHz, $\pm 3$ dB
Grace Design	Model 801	Solid state; fully balanced; transformerless	8	No	Optional	No	Yes	4.5 Hz–1 MHz, $\pm 3$ dB
Grace Design	Model 801R	Solid state; fully balanced; transformerless	8 (up to 64 in a system)	No	No	No	Full digital metering/peak hold and reset	4.5 Hz–1 MHz, $\pm 3$ dB
Grace Design	Model 101	Solid state; fully balanced; transformerless	1	Low-cut filter @ 75 Hz	Yes	Yes	2/vol. full wave signal peak indicators	4.5 Hz–400 kHz, $\pm 3$ dB @ 40 dB gain
Great River Electronics	MP-2MH Microphone Preamplifier	Transformer coupled discrete; solid state	2	N/A	No	Yes	Overload LED	10 Hz–60 kHz, $\pm 0.5$ dB
Great River Electronics	MP-2NV Microphone Preamplifier	Transformer coupled discrete; solid state	2	N/A	Yes	Yes	2 LED meters per channel	10 Hz–30 kHz, $\pm 1$ dB @ 40 dB gain
HMB	Radius 10	Tube	4	HP filter; low-cut	Yes	No	Drive/peak LEDs	10 Hz–40 kHz
HMB	Radius 50	Tube	1	HP filter; low-cut	Yes	No	8-seg LEDs	10 Hz–40 kHz
HMB	Classic 80	Pentode tube	2	High-cut; low-cut	Yes	Yes	Drive/peak indicators	30 Hz–40 kHz
Langevin	Langevin Dual Mono Mic Pre	Solid state all-discrete	2	High and low shelving	No	Yes	No	10 Hz–20 kHz
Manley Labs	Dual Mono Mic Pre	Tube	2	No	No	Yes	No	10 Hz–60 kHz
Manley Labs	MIC/EQ 500	Tube	1	Stepped LF and HF; passive vintage EQ	Yes	Yes	VU meter	5 Hz–60 kHz
Manley Labs	Mono 40 dB Mic Pre	Tube	1	No	No	Yes	No	10 Hz–20 kHz
Martech	MSS-10 Microphone Preamplifier	Discrete; solid state	1	No	Yes	Yes	VU meter	10 Hz–20 kHz
Neotek	Martinsound MicMAX	Solid state	2	N/A	No	No	No	5 Hz–150 kHz $\pm 0/-3$ dB
Midiman	Audio Buddy	Solid state	2	No	No	Yes	Yes	5 Hz–50 kHz
Millennia Media	HV-3B	Solid state	2	No	Yes	No	Clip LED	1 Hz–300 kHz
Millennia Media	STT-1 Origin	Channel strip/preamp	1	4-band parametric	Yes	Yes	LED	5 Hz–300 kHz $\pm 0/-3$ dB
MindPrint	AN/DI Pro	Class A stereo	2	No	No	Yes	Yes	N/A
Nightpro	PreQ3	Solid state	2 or 4	1-band (sel freq); broad-band shelving; LF rolloff	No	Yes	Peak LED 3 db before clip	15 Hz–40 kHz
Oram Pro	Octasonic	Solid state	8	No	No	Yes	Preclip LED	20 Hz–40 kHz
Palmer Direct	Palmer PGA-01 Triline Buffered A/B Box	Buffered A/B box w/balanced output	2 in/3 out	None	Yes	Y/N	No	30 Hz–15 kHz
Palmer Direct	Palmer PGA-02 E-Frog Speaker Switcher	Speaker switcher for Triline	2 in/3 out	None	None	N/Y	No	Not Limited
Peavey	TMP-1	Mono class A tube mic preamp	1	N/A	Yes	Yes	No	20 Hz–20 kHz, $\pm 0/-3$ dB
Peavey	16 LM	16-ch line mixer	16	N/A	Yes (main and headphone)	N/Y	No	20 Hz–20 kHz, $\pm 0/-1$ dB
Pendulum	MDP-1	Tube; class A	2	10-psIn low-cut filter	Yes	Yes	VU meter	5 Hz–300 kHz
Phoenix Audio	GTQ2	Stereo mic pre with 3-band EQ and active DI	2	3u/sweep mids	Yes	Yes	No	20–20 kHz, $\pm 1$ dB
PreSonus	M80 and MP20	Class A; discrete	2 or 8	Low-cut filter	Yes	Yes	Clip LED	10 Hz–30 kHz



so that they're not fighting for the same sonic space. In other words, you're trying to create an aural "niche" for each instrument—and this can only be done while listening to all the parts together. Often, after you've equalized a track in the context of the entire mix, an individual track will sound absolutely horrible when soloed. Well, so be it. All that really matters is that the sound works when it is joined by all the other elements of a (hopefully) well-balanced mix.

Use these EQ recommendations only as starting points. Some of these suggestions will work for your track, and some



**FIG. 2: The BBE 462 Sonic Maximizer is a 2-channel spectral enhancer that uses phase manipulation and filters to give your mix (or tracks) extra sparkle.**

won't. But if nothing else, these "tonal templates" will help you get acquainted with the sonic capabilities of your console's EQ section. Then you can more readily find your own favorite EQ tweaks.

## POLISHING THE MIX

Regardless of whether you have the project professionally mastered or do it yourself, your best bet is to leave the overall EQ of your mix as flat as possible, meaning that you haven't unnecessarily boosted or cut any frequencies. The golden rule here is that you can always add, but you can't always subtract. You should be aware that the room you're working in can sometimes fool you, causing you to unnecessarily boost frequencies to compensate for the room's deficiencies.

However, you also want the mix to sound as good as it can when it leaves the studio. Don't assume that you can fix all of your mix's sonic problems during the mastering stage. If you hear something you don't like, fix it now.

A tool that comes in handy for mixing inside the personal studio is a spectral-enhancement processor, such as the BBE



NOISE	TOTAL HARMONIC DISTORTION	SPECIAL FEATURES	PRICE
-128 dB EIN	0.006%	Transformer balanced I/O mic-preamp with mono channel dynamics optimised for vocals	\$2,395
-128 dB EIN	0.003%	Phantom power; phase reverse on each channel; stepped gain controls	\$1,895
-128 dB EIN	0.003%	Phantom power; phase reverse on each channel; stepped gain controls	\$2,795
-96 dB with 26 dB of gain and EQ bypassed	<0.0033	Mute; phase change; 20 dB pad; phantom power	\$1,495
-127 dBu EIN	0.0008%	Phantom; 1 rackspace; can be upgraded to 4 channels for \$1,200	\$2,195
-127 dBu EIN	0.0008%	Phantom; all-discrete class-A design; +15-70 dB gain in 5 dB increments; can be upgraded to 4 channels; 1 rackspace	\$2,000
-127 dBu EIN	0.0008%	Phantom; all-discrete class-A design; +15-70 dB gain in 5 dB increments; 1 rackspace	\$2,800
<-130 dB @ 60 dB gain	0.0015%	24 position gold contact rotary gain controls	\$1,995
<-130 dB @ 60 dB gain	0.0011%	Studio quality in a battery operated package	\$1,495
<-130 dB @ 60 dB gain	0.001%	24 position gold contact rotary gain controls	\$4,795
<-130 dB @ 60 dB gain	0.001%	Fully remote control; up to 64 channels control from 1000' scene memory/recall; full MIDI control; desktop controller (\$995)	\$5,495
<-130 dB @ 60 dB gain	0.001%	Phantom power; XLR and 1/4" outputs	\$699
-129 dB EIN 150 source @ 40 dB gain	<0.007%	Phantom; polarity; pad switches; 2 dB stepped gain controls	\$2,299
-125 dB EIN 150 source @ 40 dB gain	<0.02%	Phantom; polarity; 1A port impedance; output loading; 5 dB stepped input gain	\$2,499
-127 dB EIN	N/A	Phantom; phase per channel	\$749
-127 dB EIN	N/A	Phantom power	\$469
-122 dB EIN	0.05%		\$1,850
80 dB S/N	0.05%	All discrete; two channels	\$1,475
80 dB S/N	0.05%	High headroom; big beefy sound	\$2,400
100 dB S/N	0.025%	Fully differential circuitry	\$2,900
80 dB S/N	0.05%	High headroom	\$1,600
-129.5 dBu typical	<0.0015%		\$1,995
N/A	<0.001%	Microphone impedance matching via switch selection	\$1,495
-122 dBu	0.1%		\$120
-129 dB EIN	0.001%	Fully balanced; B&K mic option	\$1,895
-128 dBu EIN	<0.002%	De-essers; compressors; EQs; preamps; metering	\$2,895
N/A	N/A	48 V phantom power with -20 dB pad	TBA
-126 dBu EIN	0.003%	Vari air air-band EQ	\$1,675-\$2,675
-127.5 dB EIN	0.005%	Phase; phantom per ch; alum knobs; 2 high-level inputs	\$1,795
<-80 dB	<0.1%	Play through two amps individually or together; balanced XLR jack to connect acoustic guitar directly to PA	\$290
N/A	N/A	Expands functions of the TRILINE; routes outputs of two amplifiers to one speaker cabinet; protected by internal load	\$105
106 dBv @ 150 $\Omega$ s	0.2%	+24 V phantom power; LED level meter; input volume pot; XLR and 1/4" in/out	\$290
92 dB (20 Hz-20 KHz)	<0.005%	Single rack space; 8 stereo inputs; 1/4" TRS balanced/unbalanced outputs	\$125
-125 dBu EIN	0.03%	All tube signal path; transformerless; fully regulated power supply w/soft-start warmup; phase; -20 dB pad	\$2,495
-45 dBu at 80 dB gain (22 Hz-22 KHz filter)	<0.075%	All discrete; all class A circuitry	\$1,995
<-127.5 dB	0.001%-0.5%	Class A transformer-coupled input; dual servo gain stage; mix bus assign for multiple mic/instr stereo imaging; IDSS control; headphone amp	\$2300/\$700

# MICROPHONE & INSTRUMENT PREAMPS

MANUFACTURER

PRODUCT

TYPE

CHANNELS

EQ

OUTPUT LEVEL  
CONTROLINSTRUMENT/  
LINE INPUTOVERLOAD  
WARNINGFREQUENCY  
RESPONSE

PreSonus	Digimax	Class A discrete w/digital outputs		On/off	Yes	Yes	Clip LED	20 Hz–40 kHz
PreSonus	Blue Tube	Tube/solid-state hybrid	2	No	Yes	Yes	Clip LED	20 Hz–40 kHz
Radio Design Labs	RU-MX5	Solid state	5	No	Yes	No	3-seg LED	70 Hz–30 kHz
Radio Design Labs	ST-MMX3	Solid state	3	No	Yes	No	No	10 Hz–18 kHz
Radio Design Labs	ST-VCA1	Solid state	1	No	Yes	Yes	No	20 Hz–22 kHz
Radio Design Labs	STM-1	Solid state	1	No	No	No	No	50 Hz–30 kHz
Radio Design Labs	STM-2	Solid state	1	No	Yes	No	No	50 Hz–25 kHz
Radio Design Labs	STM-2X	Solid state	1	No	Yes	No	No	50 Hz–25 kHz
Radio Design Labs	STM-3	Solid state	1	No	Yes	No	No	50 Hz–25 kHz
Rane	DMS22	Solid state	2	3-band w/sweepable parametric mid	Yes	No	Clip LED	20 Hz–200 kHz
Rane	MS1b	Solid state	1	No	Yes	No	Clip LED	20 Hz–20 kHz
Raven Labs	PMB-1 Master Blender	Electric/acoustic instrument preamp	2	Bass; mid; treble for each channel	Yes	Yes	N/A	30 Hz–30 kHz
Raven Labs	PHA-1 Preamp/Headphone amp	Bass preamp, practice amp; headphone mon	1	Bass, mid, treble	Yes	Y/N	N/A	30 Hz–30 kHz
Rolls	MP110 Direct Drive Tube Mic Preamp	Tube mic preamp	1	No	Yes	N/Y	Yes	20 Hz–40 kHz
Royer Labs	SX-M2	Solid state	2	Low-cut 18 dB/oct, -3 dB @ 70 H	No	Yes	Peak power	20 Hz–20 kHz, ±0.5 dB
Studio Technologies	Mic-PreEminence	Solid state	2	No	Yes	No	5-seg LED	20 Hz–60 kHz
Summit Audio	MPC-100A	Tube/solid-state hybrid	1 (stereo linkable with another MPC)	No	Yes	Yes	Clip LED; VU meter	5 Hz–65 kHz
Symetrix	302 Dual Microphone Preamplifier	Solid state	2	No	Yes	No	Clip LED	20 Hz–20 kHz
Symetrix	306 Preamp/Ducker	Preamplifier/ducker	2	N/A	Gain adjustable over ±20dB range	Yes	N/A	20 Hz–20 kHz
Sytek	EQ4B-1M	Solid state	1	4-band parametric	No	Yes	Peak LED	10 Hz–85 kHz
Sytek	MPT-1A	All tube	1	No	Yes	No	Peak LED	10 Hz–75 kHz
Sytek	MPX-4A II	Solid state	4	No	Yes	No	Peak LED	10 Hz–85 kHz
TC Electronic	1140 Parametric Equalizer Mic Preamp	Solid state	1	2-band parametric	Yes	Yes	Overload LED	N/A
Tech 21	SansAmp RBI	1 U rackmount	1	No	N/A	N/A	N/A	N/A
Tech 21	SansAmp Acoustic DI	Floor	1	Phantom; 9V battery; opt DC power supply	N/A	Yes	N/A	N/A
Tech 21	SansAmp Bass Driver DI	Floor	1	Phantom; 9V battery; opt DC power supply	N/A	Yes	N/A	N/A
TerraTec	Phono PreAmp	Instrument preamp	2	RIAA-equalization	0.3V/0.7V/1.2V (5mV/1kHz)	Yes	N/A	20 Hz–20 kHz, ±0.5 dB
The John Hardy Co.	Jensen Twin Servo 990 Mic Preamp	Transformer coupled; solid state (class A)	1–4 (expandable)	No	No	No	20-seg LED; clip LED	N/A
The John Hardy Co.	M-1 Mic Preamp	Transformer coupled; solid state (class A)	1–4 (expandable)	No	No	No	20-seg LED; clip LED	N/A
The John Hardy Co.	M-2 Mic Preamp	Transformer coupled; solid state (class A)	No	No	No	No	N/A	N/A
TL Audio	Ivory 5001	Tube	4	Low-cut filter	Yes	No	Drive; peak LEDs	20 Hz–40 kHz
TL Audio	Classic PA1 Pentode Preamp	Tube	2	Low- and high-cut filters	Yes	Yes	Drive; peak LEDs	30 Hz–40 kHz
True Systems	Precision 8	Solid state; transformerless	8	N/A	N/A	Yes	Y/OL light; peak meters	1.5 Hz–500 kHz
True Systems	P2 Digital	N/A	2	N/A	N/A	Yes	OL light; peak meters	1.5 Hz–500 kHz
Tube Tech	MP-1A	Tube mic preamp	2	No	Yes	Yes	No	15 Hz–60 kHz
Tube Tech	PE-1C	Solid state	1	N/A	N/A	N/A	N/A	N/A
Tube Tech	MP-1A	Solid state	N/A	+20 dB to +70 dB in 5 dB steps	No	Yes	No	N/A
Universal Audio	2-610 Dual Channel Tube Mic Pre	Tube	2	HF + LF shelf w/selectable corner frequency	Yes	Yes	N/A	20 Hz–20 kHz ±1 dB
Whirlwind	MD-1	Solid state	1	No	Yes	Yes	No	6 Hz–25 kHz
Yamaha	HA8	Solid state	8	No	No	Yes	Peak LED	20 Hz–40 kHz
Yamaha	MLA7	Solid state	8	No	No	Yes	Peak LED	20 Hz–20 kHz



462 Sonic Maximizer (see Fig. 2). These types of processors use phase and filter technology to add zest to the mixes. However, they should be used in moderation because they can put things out of phase and add high-frequency harshness if you are not careful.

Typically, engineers apply some pre-mastering compression to the stereo mix



**FIG. 3:** FMR Audio's Real Nice Compressor (RNC) is an inexpensive yet transparent compressor that works well across the mix bus.

(see Fig. 3). How you apply compression to the mix usually depends on the material. If you're working on a rock song that really needs to hit hard, try compressing the mix by 2 or 3 dB at a 2:1 ratio, with medium attack and release times. For fast, rhythmic music, such as dance or techno, you might shorten the attack time and lower the threshold. Generally, a little compression on the stereo mix is a good idea to smooth out the song. Just don't go crazy!

Most semipro analog stereo compressors add significant coloration to the signal chain. If you want the compression to be transparent, use a unit that doesn't color your mix. If your compressor has a hard-wired bypass, click it in and out to see how the circuitry affects a stereo mix before you use it on your mix. For units without a true bypass function, do trial mixes with and without the compressor in the chain and assess the differences.

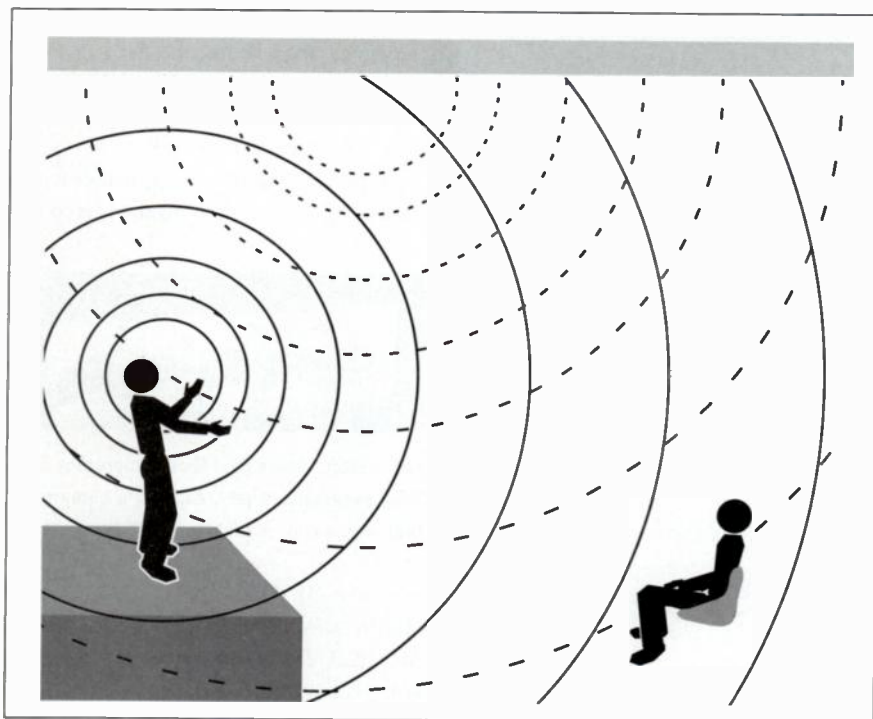
## FADE OUT

Expensive equipment is not always the key to great-sounding mixes. The tricks that professionals use day in and day out are not dependent on SSL consoles or Sony multitracks (although these high-ticket items do make things easier). With a little patience and some practice, anyone can learn to produce rich, full, in-your-face mixes. ■

This article was previously published in the ENR Book *Making the Ultimate Demo*, a product of artistpro.com, and is reprinted by permission of the publisher.



NOISE	TOTAL HARMONIC DISTORTION	SPECIAL FEATURES	PRICE
-94 dB	<0.009%	Dual domain limiters on every channel; analog & digital ADAT, AES/EBU, S/PDIF	\$1,700
-94 dB	<0.05%	Phase reverse; 1/4" & XLR I/O; 20dB pad	\$200
70 dB S/N	0.030%	5-channel active line mixer/mic pre w/phantom	\$255
70 dB S/N	0.2%	Small size (about 0.5"x1.5"x3"); indiv gain adj	\$130
80 dB S/N	0.05%	Small size (about 0.5"x1.5"x3"); cntrl via extnl potentiometer or 0-10 VDC	\$116
70 dB S/N	0.05%	Small size (about 0.5"x1.5"x3"); phantom, fixed gain of 50 dB	\$99
75 dB S/N	0.05%	Phantom; small size (about 0.5"x1.5"x3"); adjustable gain	\$136
75 dB S/N	0.05%	Gating preamp via external control; phantom; small size (about 0.5"x1.5"x3")	\$153
70 dB S/N	0.05%	Phantom; small size (about 0.5"x1.5"x3"); adjustable gain	\$156
97 dB S/N	0.009%	Stereo with pan; phantom	\$549
102 dB S/N	0.007%	Phantom	\$199
-85 dB, unweighted	0.005%	Record all electric/acoustic instruments direct to tape XLR out	\$399
-85 dB typical	0.008%-0.06%	Headphone mixed adjustable; click track monitor	\$299
-90 dB	0.1%		\$230
-129.2 dBu, 20 Hz-20 kHz	Battery or AC	Phantom recessed; optional AC supply \$150	\$1,250
69.5 dB S/N; -129.5 dB EIN	0.002%	Trnsfrmrlss; balanced in; phantom; bal/unbal outputs; phase; single rackspace	\$799
-84 dBu, 108 dB S/N	0.05%	"Clean" to "saturated" valve sounds; Jensen mic transformer; +4 dBu/-10 dBV outs; Hi-Z variable impedance	\$1,950
95 dB S/N; -128 dB EIN	0.007%	L/R mix output	\$299
N/A	<0.025	Mix control; phantom power	\$299
96 dB S/N; -129 dBu EIN	0.0015%	Class A hybrid	\$1,860
96 dB S/N; -110 dBu EIN	0.0115%	Internally balanced	\$2,450
96 dB S/N; -134 dBu EIN	0.0015%	Class A hybrid	\$1,680
N/A	N/A		\$760
N/A	N/A	Tube amp emu for bass; presence/drive/blend/XLR/level controls; act bass/mid/treble	\$395
N/A	N/A	Semi-parametric EQ; tube/mic emu; FX loop; level/blend/mid shift	\$225
N/A	N/A	Tube amp emu for bass; presence/drive/level/blend controls; active bass/treble	\$225
>86 dB	<0.002% (5mV)	Power comes from Gameport	\$79
N/A	N/A	(2) discrete op amps per ch (990C); Jensen in/out trnsfrmrs (JT-16-B/JT-11-BMQ); no caps in sgml path	\$1,550-\$4,250
N/A	N/A	990 discrete op amp; Jensen JT-16-B input transformer; no capacitors in signal path; optional Jensen JT-11-BMQ output trans	\$875-\$2,905
N/A	N/A	990 discrete op amp; Jensen JT-16-B input transformer; no capacitors in signal path; optional Jensen JT-11-BMQ output trans	\$920-\$3,085
-127 dBu EIN	0.05%	Phantom power; phase reverse	\$749
-122 dBu	0.05%	Phantom power; phase reverse; VU meters	\$1,850
-132 dB	0.0008%	MS decoder on ch. 1/2; 25-pin D connector outputs	\$2,695
-132 dB	0.0008%	MS decoder; 24/96 digital outputs; stereo correlation meter	\$1,995
-85 dB	0.2%		\$2,395
N/A	0-70 dB		\$1,850
N/A	N/A	Phantom; 1/4"; XLR mic inputs	\$2,395
>82 dB	0.03%	Mic/Hi-Z impedance selectable	\$2,295
-123 dB EIN 0	0.05%	Headphone amp w/vol cntrl/minimixer; batt oper w/belt clip; phantom	\$400
-128 dB EIN	0.05%	Phantom power; signal present LED; remote-control capable	\$1,779
-128 dB EIN	0.1%	Phantom	\$599



**Fig. 1.** Theoretically, sound waves emanate from a performer in a roughly spherical pattern toward the listeners, walls, and ceiling. They generally reach the listeners first, after which they reflect from the walls and ceiling. The reflections reach the listener a few milliseconds after the direct sound.

**A**t one time or another, you've probably walked down a large hallway with a polished marble floor and stone walls. Each step you take is followed by an echo that seems to hang in the air for awhile. The echo is not a clear repeat of each footfall, but a smear of sound that dies away slowly.

That lingering sound is called reverberation, or reverb, and it is a vital part of virtually every sound you hear. Your brain uses it to determine the size, shape, and other characteristics of the space in which the sound was produced. It occurs naturally almost everywhere, and it is artificially simulated in the recording studio. In fact, reverb is probably the most common signal-processing effect of them all.

## ACOUSTIC ORIGINS

Almost all enclosed and semi-enclosed spaces exhibit some reverberation. The process starts with a sound wave that emanates in a more or less spherical pattern from a sound source and expands

toward any listeners in the room, as well as nearby surfaces: walls, ceilings, windows, furniture, etc. (Speakers don't necessarily radiate sound in a spherical pattern; the radiation pattern depends on the design of the speaker.)

Once the sound wave reaches a surface, it is reflected back into the room (see Fig. 1), where it's reflected again and again by various surfaces. These multiple reflections also reach the listener. However, the initial sound waves almost always reach the listener first because the path between the source sound and the listener is shorter than the path taken by any of the sound's reflections.

Each reflection is generally lower in amplitude than the preceding one, because the sound wave

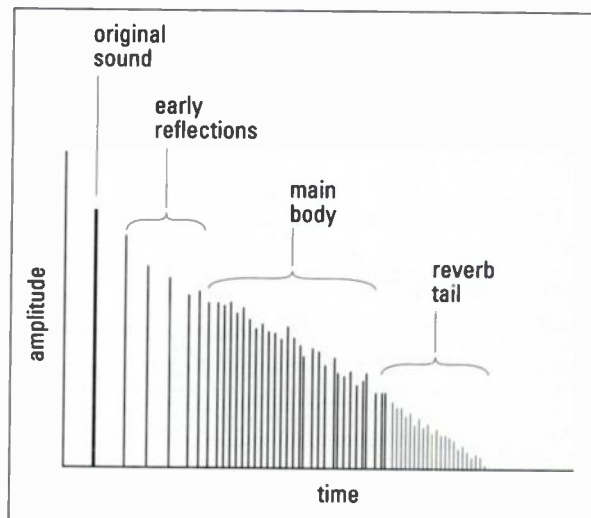
loses some energy each time it is reflected. Most materials absorb some of the sound wave's energy and reflect the rest. As a result, the reverberation dies away over time.

Normally, you can't hear these reflections individually because they happen in such quick succession. Most rooms are no more than a few dozen feet long in any direction, and sound travels at about 1,130 feet per second in air. Therefore, the sound waves are reflected many times per second in every direction (up/down, right/left, front/back). Our brain tends to smear all these rapid reflections into a continuous sound, which we call reverberation. This sound has a haunting, ringing quality that lingers for some period of time after the original sound stops.

Several factors contribute to the specific reverberation of a particular space. For example, the larger the space, the longer it takes sound waves to reach the walls and reflect back to your ears. Heavy drapes and thick-pile carpeting absorb much more sound than marble walls and hardwood floors. In addition, people tend to absorb a fair amount of sound energy (unless they're wearing suits of armor), so an empty room has different reverb characteristics than the same space when it's crowded with people.

The phenomenon of reverb can be

—continued on page 125



**Fig 2.** The original sound is immediately followed by a few early reflections, after which the main body of reverb decays to silence.





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# MICROPHONES

MANUFACTURER

PRODUCT

TYPE

POLAR PATTERNS

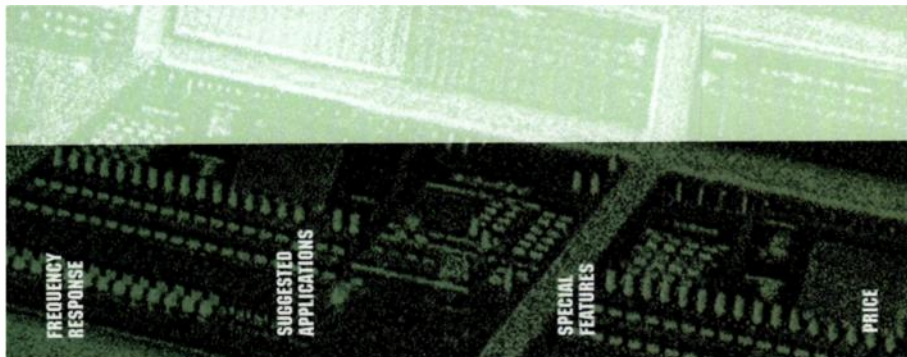
INTERNAL ROLL-OFF

INTERNAL PAD

MAX. SPL

ADK	A-51	Condenser	Cardioid	N/A	N/A	130 dB
ADK	A-51s	Condenser	Cardioid	N/A	N/A	140 dB
ADK	A-51TC	Condenser	Cardioid	N/A	N/A	125 dB
ADK	Area51	Condenser	9 (omni/cardioid/figure-8)	N/A	N/A	125 dB
AKG	C 1000S	Condenser	Cardioid	N/A	N/A	137 dB
AKG	C 2000B	Condenser	Cardioid	6dB/below 500 Hz	-10 dB	140-150 dB
AKG	C 3000B	Condenser	Cardioid	500 Hz	-10 dB, switchable	140 dB
AKG	C 4000BL	Condenser	Hypercardioid boundary layer	N/A	N/A	115 dB
AKG	C 4500B-BC	Condenser	Cardioid	6dB/120Hz	-20 dB	145/155 dB
AKG	C 411/C 411 B/C 411 L	Condenser	Figure 8 (vibration pickup)	N/A	N/A	100dB
AKG	C 414B/TLII	Condenser	Cardioid, hypercardioid, omni; figure-8	75 Hz/150 Hz	-10 dB/-20 dB, switchable	160 dB
AKG	C 414B/ULS	Condenser	Cardioid, hypercardioid, omni; figure-8	75 Hz/150 Hz	-10 dB/-20 dB, switchable	160 dB
AKG	C 416/C416 B	Condenser	Hypercardioid	N/A	N/A	130 dB
AKG	C 418/C 418 B	Condenser	Hypercardioid	N/A	N/A	131/140 dB
AKG	C 419/C 419 B/C 419 L	Condenser	Hypercardioid	N/A	N/A	126/130 dB
AKG	C 420/C 420 B/C 420 L	Condenser	Cardioid	N/A	N/A	126/130 dB
AKG	C 480B-CK 61	Condenser	Cardioid	70 Hz/150 Hz	-6 dB, -10 dB	144 dB
AKG	C 480B/CK 62ULS	Condenser	Omnidirectional	70 Hz/150 Hz	-10 dB, +6 dB	144 dB
AKG	C 480B/CK 63ULS	Condenser	Hypercardioid	70 Hz/150 Hz	-10 dB, +6 dB	144 dB
AKG	C 535EB	Condenser	Cardioid	72 Hz/100 Hz	-14 dB	130 dB
AKG	C 547BL	Condenser	Hypercardioid boundary layer	N/A	N/A	133 dB
AKG	C 562BL	Condenser	Hemispherical omnidirectional (semi-omnidirectional)	12dB/150Hz	N/A	130 dB
AKG	C 5960	Condenser	Hypercardioid	6dB/150Hz	N/A	140/149 dB
AKG	C 680BL	Condenser	Cardioid boundary layer	N/A	N/A	115 dB
AKG	C 747	Condenser	Hypercardioid	12dB/150 Hz	N/A	133 dB
AKG	CK 91 (w/SE 300B)	Condenser	Cardioid	75 Hz	-10 dB	132/142 dB
AKG	CK 92 (w/SE 300B)	Condenser	Omnidirectional	75 Hz	-10 dB	132/142 dB
AKG	CK 93 (w/SE 300B)	Condenser	Hypercardioid	75 Hz	-10 dB	132/142 dB
AKG	CK 94 (w/SE 300B)	Condenser	Figure-8	75 Hz	-10 dB	132/142 dB
AKG	CK77 WR	Condenser	Omnidirectional	N/A	N/A	133dB
AKG	D 112	Dynamic	Cardioid	N/A	N/A	N/A
AKG	D 230	Dynamic	Omnidirectional	N/A	N/A	N/A
AKG	D 440	Dynamic	Cardioid	N/A	N/A	147/156 dB
AKG	D 3700/D 3700S	Dynamic	Hypercardioid	N/A	N/A	156 dB
AKG	D 3800	Dynamic	Hypercardioid	N/A	N/A	156 dB
AKG	D 660S	Dynamic	Hypercardioid	N/A	N/A	150 dB
AKG	D 550	Dynamic	Cardioid	N/A	N/A	147/156 dB
AKG	D 770	Dynamic	Cardioid	N/A	N/A	147/156 dB
AKG	D 890/D 890S	Dynamic	Supercardioid	N/A	N/A	147/156 dB
AKG	Solid tube	Condenser	Cardioid	12dB/100Hz	-20dB	130/145 dB
AKG	WMS80	Wireless handheld	Omni-, Hyper-, Cardioid optional	N/A	N/A	Variable
AKG	WMS60	Wireless handheld	Omni-, Hyper-, Cardioid optional	N/A	N/A	Variable
AKG	WMS40	Wireless handheld	Super-, Cardioid	N/A	N/A	Variable
AKG	WMS61	Wireless handheld	Omni-, Hyper-, Cardioid optional	N/A	N/A	Variable
AKG	WMS81	Wireless handheld	Omni-, Hyper-, Cardioid optional	N/A	N/A	Variable
AKG	WMS300	Wireless handheld	Omni-, Hyper-, Cardioid optional	N/A	N/A	Variable
Alesis	AM11	Condenser	Cardioid	75 Hz switchable	-10 dB switchable	144 dB
Alesis	AM30	Condenser	Cardioid	75 Hz switchable	-15 dB switchable	144 dB
Alesis	AM40	Condenser	Cardioid	75 Hz switchable	-15 dB switchable	145 dB
Alesis	AM51	Condenser	Cardioid	75 Hz	-10 dB switchable	148 dB
Alesis	AM52	Condenser	Cardioid; figure-8; omni	75 Hz	-10 dB switchable	148 dB
Alesis	AM61	Condenser	Cardioid	75 Hz	-10 dB switchable	147 dB
Alesis	AM62	Condenser	Cardioid; figure-8; omni; supercardioid	75 Hz	-10 dB switchable	148 dB
Audio-Technica	AT4033a/SM	Condenser	Cardioid	80 Hz	-10 dB	145 dB
Audio-Technica	AT4041	Condenser	Cardioid	80 Hz	N/A	145 dB





20 Hz-20 kHz	Vocals; guitar; reed and woodwinds	Frequency curves derived from vintage tube mics	\$440-\$495
20 Hz-20 kHz	Vocals; electric/acoustic guitars; drums; bass	Proximity boost	\$550-\$595
20 Hz-20 kHz	Vocals; narration; acoustic instruments	Vintage sonic quality	\$995
20 Hz-20 kHz	Vocals; acoustic instruments	Remote polar pattern controller; vintage sonic quality	\$1,595
50 Hz-20 kHz	Personal studio; field recording; stage	Battery powered option	\$312
30 Hz-20 kHz	Personal studio		\$378
20 Hz-20 kHz	Studio; stage	Incl. H100 shock-mount	\$520
150 Hz-15 kHz	Table-top		\$133
30 Hz-20 kHz	Broadcast		\$665
10 Hz-18 kHz	Stringed instruments		\$248/\$182/\$152
20 Hz-20 kHz	Multipurpose, esp. vocals, strings	Incl. H100 shock-mount	\$1,225
20 Hz-20 kHz	Multipurpose studio	Incl. H100 shock-mount	\$1,100
20 Hz-20 kHz	Instrument; amplifier	Perm or temp mount	\$330-\$252
50 Hz-20 kHz	Percussion	Clip-on mount	\$330-\$252
20 Hz-20 kHz	Horn; brass	Clip-on mount	\$330/\$252/\$252
20 Hz-20 kHz	Vocals	Headset	\$358/\$316/\$316
20 Hz-20 kHz	Premium recording		\$987
20 Hz-20 kHz	Premium ambient/analysis		\$273
20 Hz-20 kHz	Premium ambient/analysis		\$273
20 Hz-20 kHz	Premium hand-held vocal		\$376
30 Hz-18 kHz	Edge-of-stage theatrical; conference	Shock-mount	\$723
20 Hz-20 kHz	Piano; conference		\$712
20 Hz-22 kHz	Handheld vocal		\$378
60 Hz-20 kHz	Conference table, lecterns	Shock-mount	\$238
30 Hz-18 kHz	Snare; acoustic guitar; lecterns		\$658
20 Hz-20 kHz	General purpose		\$462
20 Hz-20 kHz	General purpose		\$190
20 Hz-20 kHz	General purpose		\$190
20 Hz-20 kHz	Ambient; mid-side		\$190
20 Hz-20 kHz	Church; theater; broadcast	Water-resistant	\$300
20 Hz-17 kHz	Bass drums; bass instruments		\$338
40 Hz-20 kHz	Electronic news gathering		\$164
60 Hz-20 kHz	Instrument		\$198
Hz-18 kHz; 20 Hz-18 kHz	Vocal; instrument	On/off switch	\$191/\$206
Hz-18 kHz; 20 Hz-18 kHz	Vocal; instrument		\$275
70 Hz-20 kHz	Vocal	On/off switch	\$98
20 Hz-20 kHz	Bass instrument		\$238
Hz-18 kHz; 20 Hz-20 kHz	Vocal; instrument		\$129
Hz-18 kHz; 20 Hz-20 kHz	Vocal		\$142/\$155
20 Hz-20 kHz	Vocal; acoustic guitar		\$1,165
50 Hz-20 kHz	High quality UHF wireless	Frequency selectable; incl. rackmount	Variable
50 Hz-20 kHz	House of worship; theater; broadcast	Frequency selectable; incl. rackmount	Variable
40 Hz-20 kHz	House of worship; aerobics instructor	UHF at a low price	Variable
50 Hz-20 kHz	House of worship; theater; broadcast	Frequency selectable; incl. rackmount	Variable
50 Hz-20 kHz	House of worship; theater; broadcast	Frequency selectable; incl. rackmount	Variable
50 Hz-20 kHz	House of worship; theater; broadcast	Frequency selectable; incl. rackmount	Variable
20 Hz-18 kHz	Vocal; instruments	Hard-mount; case	\$499
20 Hz-18 kHz	Instrument; percussion; vocal	Interchangeable capsule design	\$599
20 Hz-20 kHz	Instrument; percussion; vocal	Hard-mount; power supply & case	\$999
20 Hz-18 kHz	Vocal; instrument	Hard-mount; shock-mount; case	\$649
20 Hz-18 kHz	Vocal; instrument	Hard-mount; shock-mount; case	\$799
20 Hz-20 kHz	Vocal; instrument	Power supply; 6-pin interconnect cable	\$1,199
20 Hz-20 kHz	Vocal; instrument	Power supply; 6-pin interconnect cable	\$1,499
30 Hz-20 kHz	Instruments; vocals; general purpose	AT8441 shock-mount	\$495
20 Hz-20 kHz	Instruments; acoustic guitar		\$395

## COMPRESSOR TIPS AND TRICKS

- Gain changes on the compressor caused by the drums can pull down the level of the vocals and bass and cause overall volume changes in the program.

- Slower Release settings will usually keep the gain changes more inaudible but will also lower the perceived volume.

- A slow Attack setting will tend to ignore drums and other fast signals but will still react to the vocals and bass.

- A slow Attack setting might also allow a transient to distort the next piece of equipment in the chain.

If the source is too percussive or has loud drums in the mix, try adjusting the Attack and Release controls.

- Sometimes fast Attack and medium Release helps tame drums.

- Fast Attack and Release settings tend to reduce transients.

- Usually only the fastest settings can make a unit pump.

- Slower Release settings tend to be the most inaudible.

- The more bouncy the meter seems, the more likely that the compression will be audible.

- Generally speaking, the trick with compression in mastering is to use a slow Release and less (usually way less) than 5 dB of compression.

- Quiet passages that are too loud and noisy are usually a giveaway that you are seriously overcompressing.

# MICROPHONES

MANUFACTURER	PRODUCT	TYPE	POLAR PATTERNS	INTERNAL ROLL-OFF	INTERNAL PAD	MAX. SPL
Audio-Technica	AT4047/SV	Condenser	Cardioid	80 Hz	-10 dB	149 dB
Audio-Technica	AT4050/CM5	Condenser	Cardioid; omni; figure-8	80 Hz	-10 dB	149 dB
Audio-Technica	AT4051a	Condenser	Cardioid	80 Hz	N/A	146 dB
Audio-Technica	AT4060	Tube Condenser	Cardioid	N/A	N/A	150 dB
Audio-Technica	AT822	Condenser	Cardioid stereo	150 Hz	N/A	125 dB
Audio-Technica	AT825	Condenser	Cardioid stereo	150 Hz	N/A	126 dB
Audio-Technica	ATM10a	Condenser	Omnidirectional	N/A	N/A	137 dB
Audio-Technica	ATM25	Dynamic	Hypercardioid	N/A	N/A	N/A
Audio-Technica	ATM31a	Condenser	Cardioid	N/A	N/A	137 dB
Audio-Technica	ATM33a	Condenser	Cardioid	N/A	N/A	137 dB
Audio-Technica	ATM35	Condenser	Cardioid	150 Hz	N/A	145 dB
Audio-Technica	ATM87R	Condenser	Cardioid	80 Hz	N/A	151 dB
Audio-Technica	MB4000C	Condenser	Cardioid	N/A	N/A	124 dB
Audio-Technica	PRO 37R	Condenser	Cardioid	N/A	N/A	141 dB
Audio-Technica	KP-STUDIO	Condenser	Cardioid	N/A	N/A	128 dB
Audio-Technica	AT3035	Condenser	Cardioid	80 Hz	-10 dB	148 dB
Audio-Technica	AT815ST	Condenser	Line-cardioid and figure-eight	80 Hz	N/A	127 dB
Audio-Technica	AT835ST	Condenser	Line-cardioid and figure-eight	80 Hz	N/A	127 dB
Audio-Technica	ATM23HE	Dynamic	Hypercardioid	N/A	N/A	N/A
Audix	ADX-20-i	Condenser	Cardioid	N/A	N/A	130dB
Audix	ADX-50	Condenser	Cardioid	N/A	N/A	132dB
Audix	ADX-90	Condenser	Cardioid	N/A	N/A	135dB
Audix	CX101	Condenser	Cardioid	N/A	N/A	135dB
Audix	CX111	Condenser	Cardioid	N/A	-10 dB	145dB
Audix	D1	Dynamic	Hypercardioid	N/A	N/A	144 dB
Audix	D2	Dynamic	Hypercardioid	N/A	N/A	144 dB
Audix	D3	Dynamic	Hypercardioid	N/A	N/A	144 dB
Audix	D4	Dynamic	Hypercardioid	N/A	N/A	144 dB
Audix	MD-10	Dynamic	Hypercardioid	N/A	N/A	144dB
Audix	OM3-xb	Dynamic	Hypercardioid	N/A	N/A	144 dB
Audix	OM5	Dynamic	Hypercardioid	N/A	N/A	144 dB
Audix	OM6	Dynamic	Hypercardioid	N/A	N/A	144 dB
Audix	OM7	Dynamic	Hypercardioid	N/A	N/A	144 dB
Audix	SCX-1	Condenser	Cardioid; hypercardioid; omni	N/A	N/A	128 dB
Audix	SCX-25	Condenser	Cardioid	N/A	N/A	135 dB
Baltic Latvian	Blueberry	Condenser	Cardioid	N/A	No	133 dB (0.5% THD)
Baltic Latvian	Dragonfly	Condenser	Cardioid	N/A	No	133dB (0.5% THD)
Baltic Latvian	Kiwi	Condenser	Multiple	N/A	N/A	135 dB (0.5% THD)
Baltic Latvian	Mouse	Condenser	Cardioid	N/A	No	135 dB (0.5% THD)
Behringer	ECM8000	N/A	Omnidirectional	N/A	N/A	N/A
Behringer	XM2000S	Dynamic	Supercardioid	N/A	N/A	N/A
Behringer	ULTRAVOICE XM8500	Dynamic	Cardioid	N/A	N/A	N/A
Benson Audio Labs	B2	Condenser PZM	Cardioid	N/A	N/A	141 dB
Benson Audio Labs	BA 30	Dynamic	Cardioid	N/A	N/A	145 dB
Benson Audio Labs	ND 90	Dynamic	Hypercardioid	N/A	N/A	145 dB
beyerdynamic	M-130	Dynamic ribbon	Figure-8	N/A	N/A	116 dB
beyerdynamic	M-160	Dynamic ribbon	Hypercardioid	N/A	N/A	116 dB
beyerdynamic	M-201TG	Dynamic	Hypercardioid	N/A	N/A	120 dB
beyerdynamic	M-88TG	Dynamic	Hypercardioid	N/A	N/A	120 dB
beyerdynamic	MC-740	Condenser	Wide cardioid; cardioid; hypercardioid; omni; figure-8	N/A	-10 dB	134/144 dB
beyerdynamic	MC-834	Condenser	Cardioid	80 Hz/160 Hz	-10 dB	130/140/150 dB
beyerdynamic	MCD 100	Digital condenser	Cardioid	Yes	Yes	150 dB



FREQUENCY  
RESPONSESUGGESTED  
APPLICATIONSSPECIAL  
FEATURES

PRICE

20 Hz-18 kHz	Vocals; instruments; general purpose	AT8449/SV shock-mount	\$695
20 Hz-20 kHz	Vocals; instruments; general purpose	AT8441 shock-mount	\$995
20 Hz-20 kHz	Instruments		\$700
20 Hz-20 kHz	Vocals; general purpose	AT8560 power supply; AT8447 shock-mount	\$1,695
30 Hz-20 kHz	Stereo recording		\$399
30 Hz-20 kHz	Stereo recording	Battery or phantom power	\$525
20 Hz-18 kHz	Group vocals; instruments	Battery or phantom power	\$210
30 Hz-15 kHz	Kick drum; toms		\$275
30 Hz-20 kHz	Vocals; general purpose	Battery or phantom power	\$250
30 Hz-20 kHz	Instruments; general purpose	Battery or phantom power	\$290
30 Hz-20 kHz	Horns; drums; instruments	Battery/phantom power, clip-on mount	\$350
30 Hz-20 kHz	Kick drum; piano		\$299
100 Hz-18 kHz	General purpose	Battery or phantom power	\$125
30 Hz-15 kHz	Instrument; general purpose		\$175
100 Hz-18 kHz	Strings; vocals; overheads	2 studio mics; ATH-M3X headphones & case	\$300
20 Hz-20 kHz	Vocals; instruments; general purpose		\$349
30 Hz-20 kHz	Studio audio acquisition	Carrying case	\$999
40 Hz-20 kHz	Studio audio acquisition	Carrying case	\$899
70 Hz-16 kHz	Snare; toms; instruments		\$235
40 Hz-20 kHz	Instrument	High-tension spring clamp; flexible gooseneck	\$199
40 Hz-18 kHz	Drum overheads; acoustic instr; hi-hat		\$289
50 Hz-18 kHz	Instrument	Flexible gooseneck	\$199
20 Hz-20 kHz	Vocals; drum overheads; acoustic instr; room	Shock-mount; flight case	\$499
20 Hz-20 kHz	Vocals; drum overheads; acoustic instr; room	Shock-mount; flight case	\$599
46 Hz-18 kHz	Snare; percussion		\$219
44 Hz-18 kHz	Toms; congas; percussion		\$219
50 Hz-19 kHz	Snare; timbale; trumpet; electric guitar		\$219
38 Hz-19 kHz	Kick drum; acoustic bass; piano; sax		\$329
70 Hz-15 kHz	Drum	Easy mounting system	\$259
50 Hz-18 kHz	General purpose		\$199
48 Hz-19 kHz	Vocals		\$299
40 Hz-19 kHz	Vocals		\$329
45 Hz-19 kHz	Vocals		\$359
20 Hz-20 kHz (omni) 40 Hz-20 kHz cardioid/hypercardioid)	Acoustic instruments	Interchangeable capsules	\$299-\$349
20 Hz-20 kHz	Vocals; instrument	Suspension mounting system	\$799
20 Hz-22 kHz	General studio		\$1,295
20 Hz-20 kHz	General studio	Shock-mount; rotating capsule grill	\$1,095
20 Hz-20 kHz	General studio	Shock-mount; cherry wood mic box	\$2,299
20 Hz-20 kHz	General studio	Rotating capsule grill; cherry wood mic box	\$1,699
15 Hz-20 kHz		+15V/+48V phantom power; clip/stand adapter	\$89
50 Hz-15 kHz	Vocals	On/off switch; 2 pop filter; hard case with clip/adaptor	\$29
5 Hz-200 kHz $\pm 3$ dB	General purpose	On/off switch; pop filter; hard case w/clip/adaptor	\$29
30 Hz-20 kHz	Piano; acoustic instruments; group vocals	Battery or phantom-power adapter	\$260
50 Hz-15 kHz	Drums; guitar amps; female vocals	Windscreen	\$170
50 Hz-18 kHz	Vocals		\$350
40 Hz-18 kHz	Digital recording; ambient; piano; strings		\$750
40 Hz-18 kHz	Stringed instruments; strings		\$750
40 Hz-18 kHz	Percussion; drums		\$300
30 Hz-20 kHz	General purpose		\$399
20 Hz-20 kHz	Vocals; piano; perc; overhead		\$1,899
20 Hz-20 kHz	Vocal; piano; strings; brass; perc; sampling; voice-overs		\$999
20 Hz-20 kHz	Studio recording	AES/EBU out (requires MPD 200 power supply)	\$2,500

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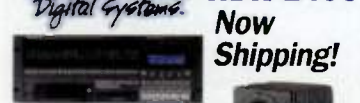
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# MICROPHONES

MANUFACTURER	PRODUCT	TYPE	POLAR PATTERNS	INTERNAL ROLL-OFF	INTERNAL PAD	MAX. SPL
beyerdynamic	MCE-82	Electret condenser	Dual cardioid	120 Hz	N/A	120 dB
beyerdynamic	MCE-83	Electret condenser	Cardioid	N/A	N/A	138 dB
beyerdynamic	MCE-90	Condenser	Cardioid	Switchable @ 100 Hz	Switchable to -15 dB	154 dB
BPM Studio Technik	CR-10	Condenser	Cardioid	N/A	N/A	136 dB
BPM Studio Technik	CR-4N	Condenser	Cardioid	N/A	N/A	126 dB
BPM Studio Technik	CR-73 II	Condenser	Cardioid; omni	80 Hz	-10 dB	124 dB
BPM Studio Technik	CR-95	Condenser	Cardioid; omni; figure-8	80 Hz	-10 dB	140 dB
BPM Studio Technik	TB-95	Tube	Cardioid; omni; figure-8	80 Hz	-10 dB	138 dB
Brauner	Valvet	Tube condenser	Omni; cardioid	N/A	None	142 dB
CAD	90/90Ni	Dynamic	Cardioid	N/A	N/A	N/A
CAD	95/95Ni	Condenser	Cardioid	N/A	N/A	130 dB
CAD	C-84	Condenser	Cardioid	N/A	N/A	132 dB
CAD	CM416	Electret condenser	Cardioid	N/A	N/A	130 dB
CAD	Equitek E100	Condenser	Supercardioid	80 Hz	-20 dB	148 dB
CAD	Equitek E200	Condenser	Cardioid; figure-8; omni	80 Hz	-20 dB	148 dB
CAD	Equitek E350	Condenser	Cardioid; figure-8; omni	80 Hz	-20 dB	148 dB
CAD	KBM412	Dynamic	Cardioid	N/A	N/A	N/A
CAD	M-177	Condenser	Cardioid	80 Hz	-20 dB	148 dB
CAD	M-277	Condenser	Cardioid; omni; figure-8	80 Hz	-20 dB	148 dB
CAD	TSM411	Dynamic	Cardioid	N/A	N/A	N/A
CAD	VSM1	Single-valve condenser	Cardioid	80 Hz	-8/-16 dB	149 dB
CAD	VX2	Dual-valve condenser	Cardioid; figure-8; omni	80 Hz	-8/-16 dB	145 dB
Carvin	CM30D	Dynamics x 3	Cardioid	75 Hz	N/A	140 dB
Carvin	CM50	Dynamic	Cardioid	N/A	N/A	N/A
Carvin	CM67	Dynamic	Cardioid	N/A	N/A	N/A
Carvin	CM68	Dynamic	Cardioid	N/A	N/A	N/A
Carvin	CM87S	Condenser	Cardioid	-6 dB @ 80 Hz; -72 dB below 40 Hz	-6dB/-10dB	145 dB
Carvin	CM90E	Condenser	Cardioid	N/A	N/A	132 dB
Carvin	CM98ST	Tube condenser	9 patterns	-6dB @ 120 Hz	10 dB pad	133 dB
Coles	4038	Ribbon	Figure-8	N/A	N/A	125 dB/150 dB
Coles	4104	Ribbon	Figure-8	50 Hz	N/A	120 dB
Countryman	Isomax Headset Microphone	Condenser	Hypercardioid; cardioid	N/A	N/A	150 dB
Countryman	Isomax II	Condenser	Hypercardioid; cardioid; omni; bidirectional	N/A	N/A	150 dB
Crown International	CM-150	Condenser	Omnidirectional	N/A	N/A	130 dB
Crown International	CM-311A	Condenser	Differoid	N/A	N/A	150 dB
Crown International	CM-700	Condenser	Cardioid	80 Hz/150 Hz	N/A	151 dB
Crown International	PZM 6D	PZM	Hemispherical	N/A	N/A	150 dB
Crown International	SASS-PMKII	Condenser	Stereo PZM	100 Hz	N/A	150 dB
DPA	DPA 4006	Pre-polarized condenser	Omni	N/A	N/A	143 dB
DPA	DPA 4007	Pre-polarized condenser	Omnidirectional	N/A	N/A	155 dB



From page 116—REVERB

distilled into several distinct parts. The most obvious component is the time it takes the reverberation to become inaudible. This decay time depends primarily on the reflective properties of the room—as determined by the texture of the walls, ceiling, floor, and furnishings—and the amplitude of the original sound. Also, high frequencies tend to fade away more quickly than low frequencies. In very large spaces, such as enclosed stadiums, there could be a perceptible delay between the original sound and the onset of reverberation.

## REVERB PARAMETERS

One problem with acoustic reverberation is that you can't easily control it. The physical size of the space limits what you can do, so studio recordings normally rely on artificial reverb. For maximum flexibility and creativity in signal processing, acoustic musicians are often recorded in a relatively "dead" (that is, nonreverberant) environment, and their signal is passed through a reverb unit that digitally simulates various acoustic environments. Electronic sound sources also benefit from passing through a reverb unit.

Many modern reverb units are actually multi-effects processors that perform reverb, modulation effects, and several other signal processing chores, which I'll discuss later in this part of the book. Many synthesizers also include onboard multi-effects processors that apply reverb in addition to other effects.

To program a reverb unit effectively, you need to know the basic parameters you will encounter. The most fundamental parameter is reverb type. Most units offer several types of reverb, generally based on different acoustic environments. As you might expect, a room reverb simulates a small to medium-size room, while a hall reverb simulates a large room or auditorium. Some units offer a stadium or cathedral reverb, as well. Select the reverb type that best suits the acoustic space you wish to simulate.

Many reverb units also include several digital simulations of early types of reverb processing. In the early days of recording, engineers sent a recorded



50 Hz–20 kHz	Drum overhead; piano; vocals		\$800
50 Hz–18 kHz	Brass; percussion		\$300
30 Hz–20 kHz	General purpose		\$700
20 Hz–20 kHz	Instrument; amplifier; vocal; drum; acoustic instruments suspension; cable; windscreen; pop filter	Includes shock mount; road case;	\$550
30 Hz–20 kHz	Strings; acoustic instruments; overheads; stereo	Mic clip; pop filter	\$470 (omni version) \$490
40 Hz–18 kHz	General purpose; vocals; amp close-miking	Case; shock mount; pop filter; cable	\$400
20 Hz–20 kHz	Vocals; overheads; amp; acoustic instr; drums	Transformerless; custom road case; shock mount; pop filter; XLR cable	\$700
20 Hz–20 kHz	Vocals; acoustic instruments; drums; strings	Power supply; road case; shock mount; pop filter; XLR cable	\$900
40 Hz–20 kHz	Reference recording	Lundahl transformer; power supply w/remote pattern switch; phase invert; shock mount	\$2,700
40 Hz–16 kHz	Vocals; instrument amps		\$199
40 Hz–20 kHz	Vocals; instruments; overhead		\$239
40 Hz–16 kHz	Overhead; hi-hat; acoustic guitar; stringed instruments; choir		\$199
40 Hz–20 kHz	Cymbals; overhead; percussion; string instruments	Shock mount clip	\$129
10 Hz–18 kHz	Vocals; acoustic instruments; amplifiers; overhead; drum kit	6 hours on 2 NiCad batteries	\$469
10 Hz–18 kHz	Vocals; orchestra; acoustic instrument; overhead; brass; room monitoring	6 hours on 2 NiCad batteries	\$749
10 Hz–20 kHz	Vocals; v/o; acoustic instruments; overhead and room monitoring	6 hours on 2 NiCad batteries	\$899
30 Hz–15 kHz	Bass drum; other low frequency sources		\$149
10 Hz–20 kHz	Vocals, acoustic and amplified instruments; overhead	High-speed; low noise; discrete power supply circuit	\$299
10 Hz–20 kHz	Vocals; instruments; overhead; room monitoring		\$449
50 Hz–15 kHz	Snare; toms; percussion instruments; amp miking		\$99
10 Hz–20 kHz	Vocals; strings; guitar	Suspension mount	\$1,299
10 Hz–20 kHz	All recording applications	Interchangeable capsule/head screen assembly	\$2,249
30 Hz–15 kHz	Drums	Set of 3 with case; adj. stand mount	\$140
50 Hz–14 kHz	Vocals	On/off switch	\$50
40 Hz–15 kHz	Vocals		\$90
45 Hz–15 kHz	Vocals		\$90
30 Hz–20 kHz	Instrument; amp; vocal	Adjustable shock mount	\$300
30 Hz–20 kHz	General purpose	Battery/phantom power	\$115
20 Hz–20 kHz	Instrument; amp; vocal	Suspension mount; flight case; power supply	\$600
30 Hz–15 kHz	Drum overheads; sax; string instruments; brass; voice; electric guitar; bass	Custom rigid mic mount	\$1,240
60 Hz–12 kHz	On-location; high noise environment	Lip bar for flat voice response	\$680
20 Hz–20 kHz	Vocals	Phantom vers. has pop-free switch	\$308
Isomax II H, C, B; Hz–20 kHz/Isomax II O: 20 Hz–20 kHz	General instrument/SR and exotic (acoustical measurements)	Miniature size; opt18V battery power module	\$279
20 Hz–20 kHz	General purpose; acoustical measurement applications		\$899
50 Hz–15 kHz	Vocals		\$329
30 Hz–20 kHz	Drums; brass; strings; guitar		\$299
20 Hz–20 kHz	Piano; overhead; conference table		\$349
20 Hz–20 kHz	Orchestra; church ensemble; marching band		\$995
20 Hz–20 kHz	Close-miking vocals; strings; woodwinds; digital recording		\$2,060
20 Hz–40 kHz	Close-miking drums; percussion; brass		\$2,060

# MICROPHONES

MANUFACTURER	PRODUCT	TYPE	POLAR PATTERNS	INTERNAL ROLL-OFF	INTERNAL PAD	MAX SPL
DPA	DPA 4011	Pre-polarized condenser	Cardioid	N/A	-20 dB	158 dB
DPA	DPA 4060	Pre-polarized condenser	Omnidirectional	N/A	N/A	134 dB
DPA	DPA 4065	Pre-polarized condenser	Omnidirectional	N/A	N/A	144 dB
Earthworks	QTC1	Condenser	Omnidirectional	No	No	142 dB
Earthworks	SR 71	Condenser	Cardioid	Flat at 6"	145 dB	50 Hz–20 kHz
Earthworks	SR 77	Condenser	Cardioid	Flat at 6"	No	145 dB
Earthworks	SR69	Condenser	Cardioid	N/A	N/A	145 dB
Earthworks	SR78	Condenser	Hypercardioid	N/A	N/A	145 dB
Earthworks	SRO	Condenser	Omni	N/A	N/A	150 dB
Earthworks	TC-30K	Condenser	Omni	No	No	150 dB
Earthworks	M30BX	Condenser	Omni	No	No	132 dB
Earthworks	SR68	Condenser	Hypercardioid	Flat at 6"	No	145 dB
Earthworks	Flex Series	Condenser	Cardioid	Flat at 6"	No	145 dB
Electro-Voice	N/D167	Dynamic	Cardioid	N/A	N/A	145 dB
Electro-Voice	N/D267a; N/D267as	Dynamic	Cardioid	N/A	N/A	154 dB
Electro-Voice	N/D468	Dynamic	Supercardioid	N/A	N/A	158 dB
Electro-Voice	N/D478	Dynamic	Cardioid	N/A	N/A	154 dB
Electro-Voice	N/D767a	Dynamic	Supercardioid	Yes	N/A	158 dB
Electro-Voice	N/D868	Dynamic	Cardioid	N/A	N/A	157 dB
Electro-Voice	RE1000	Condenser	Supercardioid	N/A	N/A	130 dB
Electro-Voice	RE20	Dynamic	Cardioid	80 Hz	N/A	148 dB
Electro-Voice	RE200	Condenser	Cardioid	N/A	N/A	130 dB
Fostex	321	Dynamic	Cardioid	N/A	N/A	N/A
Fostex	521	Dynamic	Cardioid	N/A	N/A	N/A
GT Electronics	AM11	Condenser	Cardioid	75 Hz switchable	-10 dB switchable	144 dB
GT Electronics	AM40	Condenser	Cardioid	75 Hz switchable	-15 dB switchable	145 dB
Independent Audio	Soundman OKM Rock	Binaural headset	Omnidirectional	20-300 Hz w/3A adapter	20 dB w/3A adapter	145 dB
Independent Audio	Soundman OKM Classic	Binaural headset	Omnidirectional	20-300 Hz w/3A adapter	20 dB w/3A adapter	125 dB
Langevin	CR-3A	FET condenser	Cardioid	100 Hz	-10 dB	132 dB
Lawson	L47MP	Tube condenser	Omni; cardioid; figure-8	N/A	-10 dB	128 dB
Lawson	L47SH	Condenser	Cardioid	100 Hz	-10 dB/-20 dB	145 dB
Marshall Electronics	MXL 2001-P	Condenser	Cardioid	N/A	N/A	130 dB
Marshall Electronics	MXL 2003	Condenser	Cardioid	150 Hz	-10 dB	140 dB
Marshall Electronics	MXL 690	Condenser	Cardioid	N/A	N/A	134 dB
Marshall Electronics	MXL V67 Gold	Condenser	Cardioid	N/A	N/A	130 dB
Marshall Electronics	MXL V77S Tube	Tube condenser	Cardioid	N/A	N/A	122 dB
MBHO - MTC	MBNM-622	Electret condenser	Omni	N/A	N/A	130 dB
MBHO - MTC	MBNM-410	Condenser	Omni	N/A	N/A	126 dB
MBHO - MTC	MBNM-440	Condenser	Cardioid	N/A	N/A	126 dB
MBHO - MTC	MBNM-540 EL	Measurement	Omni	N/A	N/A	128 dB
MBHO - MTC	MBNM-550 EL	Condenser	N/A	N/A	N/A	128 dB
MBHO - MTC	MBNM-608	Condenser	Omni; cardioid; figure-8	N/A	N/A	133 dB
MBHO - MTC	MBNM-630	Condenser PZM	Half cardioid/axial	N/A	N/A	130 dB
MicroTech	Gefell M300	Condenser	Cardioid	N/A	N/A	135 dB





40 Hz–20 kHz	Orchestra; perc; guitar; piano; sax; drums; brass; strings; voice	5.4 mm size	\$2,190
20 Hz–20 kHz	General purpose	5.4 mm size	\$430
20 Hz–20 kHz	Theater; stage; broadcast	5.4 mm size	\$599
4 Hz–40 kHz ±1dB	Classical location recording	Quiet, time-coherent sound	\$950; (matched pair ) \$2,000
General purpose	Uncolored sound on axis, excellent rejection off axis		\$450
30 Hz–30 kHz	Voice; guitar; drums; concert tapers	Uncolored sound on axis, excellent rejection off axis	\$650
50 Hz–20 kHz	Stage vocals	Red, black or silver finish	\$400
30 Hz–30 kHz	snare spot; location film; Foley	Excellent rejection	\$700
10 Hz–20 kHz	Sound reinforcement omni; guitar amp		\$350
9 Hz–30 kHz	Drums; guitar; bass; room; location recording of loud sources		\$500
9 Hz–25 kHz ±1dB	Field recording; sound effects; measurement	14dB of gain available; low handling noise	\$600
50 Hz–20 kHz ±2dB	General purpose	Red, black or silver finish	\$450
50 Hz–20 kHz ±2dB	General purpose	Flexible performance lengths - 360, 500, 720 mm	(all lengths) \$400
50 Hz–12 kHz	Vocals	Warm grip handle	\$110
45 Hz–15 kHz	Vocals	Stand clamp; gig bag; warm grip handle, vocal optimized bass response	\$150; (w/ switch) \$158
30 Hz–22 kHz	Instruments	Flex pivoting yoke; gig bag	\$278
45 Hz–15 kHz	Vocals; instruments	Warm grip handle; vocal optimized bass response	\$150
35 Hz–22 kHz	Lead vocals	Shock-mount; gig bag; vocal optimized bass response	\$210
20 Hz–10 kHz	Kick drum		\$310
70 Hz–18 kHz	General recording	Phantom power; 2-stage pop filter	\$598
45 Hz–18 kHz	Bass; drum; vocal; upright bass; toms; electric guitars	Variable-D design	\$748
50 Hz–18 kHz	Percussion; strings; brass; choir	Small; stand clamp; windscreen	\$298
90 Hz–16 kHz	Vocals		\$59
60 Hz–16 kHz	Vocals		\$79
20 Hz–18 kHz	Vocal; instruments	Hard-mount; case	\$499
20 Hz–20 kHz	Instrument; percussion; vocal	Hard-mount; power supply & case	\$999
20 Hz–50kHz	Live recording w/very high SPL	Discreet (looks like headphones)	\$395
20 Hz–50kHz	Live recording	Discreet (looks like headphones)	\$240
40 Hz–16 kHz	General purpose	Shock-mount; hard mount; wind screen; case	\$800
20 Hz–20 kHz	Vocals; acoustic guitar; strings; piano; choir; orchestra; sax	30' cable; case; 5-year warranty	\$1,995
20 Hz–20 kHz	High-intensity, esp. bass drum	Case; 5-year warranty	\$995
30 Hz–20 kHz	Vocal; overheads; drums; amplifier	Mic stand adapter	\$200
20 Hz–23 kHz	Vocals; piano; acoustic; high spl; strings	3-micron diaphragm; shock-mount	\$400
30 Hz–20 kHz	Instrument; acoustic; overhead; percussion	Mic stand adapter	\$270
30 Hz–20 kHz	Vocals; brass; overheads; percussion	Mic stand adapter	\$280
20 Hz–20 kHz	Vocals; strings; piano; orchestra; acoustic	3-micron diaphragm; shock-mount; wind screen	\$700
10 Hz–26 kHz	Stereo recordings; ambience; drums	Pressure zone; 2 high-grade condenser cartridges	\$545
15 Hz–20 kHz	Overhead; drums; choir; acoustic guitar; percussion	Short external routings with MBHO's SMD technology	\$341
40 Hz–20 kHz	Overhead; choir; acoustic guitar; percussion		\$341–\$409
20 Hz–20 kHz	Drum overhead; measurement; percussion; guitar	Clean impulse response; low handling noise	\$293
10 Hz–20 kHz	Measurements; percussion; overhead; acoustic guitar	Neutral frequency response	\$510
5 Hz–20 kHz	Voice recording; piano; acoustic bass; acoustic guitar	Vintage capsule design features a double diaphragm, gold sputtered capsule with brass back plate	\$1,299
20 Hz–20 kHz	Bass drum; as a directed pressure zone mic; broadcast	Nextel finish	\$755
40 Hz–18 kHz	Drums; guitar; chorus	Small capsule; excellent transient response	\$495

signal to a speaker in a small, tile-lined chamber. A microphone placed in the chamber picked up the sound from the speaker along with the subsequent reflections inside the chamber. Reverb chambers are prized for their lush, blossoming quality and were a major component of the classic Phil Spector sound in the early 1960s.

Spring reverbs employ a physical spring with a microphone transducer attached to one end and a speaker transducer attached to the other end. The signal passes through the spring to create a reverb effect. Spring reverbs tend to produce a boingy, chattery timbre with accentuated high end. Plate reverbs use a metal plate instead of a spring, with pickups placed at various locations on the plate. Plate reverbs typically produce a sharp timbre that greatly enhances the punch of drum and percussion tracks.

Many units also offer several reverb types that have little to do with acoustic reverb. These types are generally known as nonlinear reverb. For example, a reverse reverb starts from silence and grows to maximum level, after which it cuts off abruptly, which is opposite from the way natural reverb works. A gated reverb starts normally but suddenly is cut off after a user-definable gate time. Gated reverb is often applied to the snare drum in pop and rock music.

Once you have selected the basic reverb type, there are several parameters you can play with. The first and most obvious parameter is reverb or decay time. This parameter determines how long the reverb effect remains audible, and it lets you control the apparent size and reflectivity of the simulated acoustic space. For example, a room reverb might have a decay time of one or two seconds, whereas a hall reverb might last three to five seconds. A cathedral reverb might last as long as eight to ten seconds. If the environment is highly reflective, the reverb time is longer.

Sometimes, you can actually discern the first few reflections separately before the reverberation starts to smear together, particularly in large acoustic spaces (see Fig. 2). These early reflections have a strong influence on how you perceive reverb in a large space. In a

# MICROPHONES

MICROPHONES

MANUFACTURER	PRODUCT	TYPE	POLAR PATTERNS	INTERNAL ROLL OFF	INTERNAL PAD	MAX. SPL
MicroTech	Gefell M930	Condenser	Cardioid	N/A	N/A	N/A
MicroTech	Gefell MT 711S	Condenser	Cardioid	90 Hz	-10 dB	144 dB
MicroTech	Gefell UMT 70S	Condenser	Cardioid, omni, figure-8	90 Hz	-10 dB	149 dB
Neumann	KM 120	Condenser	Figure-8	N/A	-10 dB	138 dB; (w/pad) 148 dB
Neumann	KM 130	Condenser	Omni	N/A	-10 dB	140 dB; (w/pad) 150 dB
Neumann	KM 140	Condenser	Cardioid	N/A	-10 dB	138 dB; (w/pad) 148 dB
Neumann	KM 183	Condenser	Omni	N/A	N/A	140 dB
Neumann	KM 184	Condenser	Cardioid	N/A	N/A	138 dB
Neumann	KM 185	Condenser	Hypercardioid	N/A	N/A	142 dB
Neumann	KMS 105	Condenser	Supercardioid	120 Hz	N/A	150 dB
Neumann	TLM 103	Condenser	Cardioid	N/A	N/A	138 dB
Neumann	TLM 193	Condenser	Cardioid	N/A	N/A	140 dB
Pearl Labs	CC22	Condenser	Cardioid	N/A	N/A	126 dB
Pearl Labs	MS8 Stereo	Condenser	Cardioid, figure-8	N/A	N/A	130 dB
Pearl Labs	TL66	Condenser	Cardioid; omni	N/A	No	132 dB
Pearl Labs	TLC 90	Condenser	Cardioid	N/A	N/A	144 dB
Peavey	PVM 22	Dynamic	Cardioid	None	None	140 dB
Peavey	PVM 46	Dynamic	Hypercardioid	None	None	140 dB
Posthorn Recordings	CCM 4	Condenser	Cardioid	N/A	N/A	132 dB
Posthorn Recordings	CMB1	Condenser	Cardioid, omni, figure-8	N/A	-15 dB	132 dB
Posthorn Recordings	CMC 641	Condenser	Supercardioid	N/A	N/A	132 dB
Røde Microphones	Broadcaster	Condenser	Cardioid	12 dB/octave; -3 dB @ 120 Hz	N/A	128 dB
Røde Microphones	Classic II	Condenser	Switchable in nine steps	Dual	-10 dB and -20 dB	131 dB
Røde Microphones	NT1	Condenser	Cardioid	N/A	N/A	128 dB
Røde Microphones	NT2	Condenser	Cardioid; omni	150 Hz	-10 dB	130 dB
Røde Microphones	NT3	Condenser	Hypercardioid	N/A	N/A	140 dB
Røde Microphones	NT1000	Valve Condenser	Cardioid	N/A	N/A	140 dB
Røde Microphones	NTK	Valve Condenser	Cardioid	N/A	N/A	158 dB
Roland	DR-10	Dynamic	Hypercardioid	N/A	N/A	130 dB
Roland	DR-20	Dynamic	Hypercardioid	N/A	N/A	130 dB
Royer Labs	R-121 Ribbon Microphone	Ribbon	Figure-8	N/A	N/A	>135 dB
Royer Labs	SF-12 Stereo Ribbon Microphone	Ribbon	Figure-8	N/A	N/A	130 dB
Royer Labs	SF-1 Ribbon Microphone	Ribbon	Figure-8	N/A	N/A	130 dB
Sabine	SWM-5000	Condenser	Hypercardioid	75 Hz selectable	Switchable	140 dB
Samson	Q Mic	Dynamic	Hypercardioid	N/A	N/A	137 dB
Samson	Q1	Condenser	Cardioid	N/A	N/A	134 dB
Samson	Q2	Dynamic	Cardioid	Switchable	Switchable	137 dB
Samson	Q3	Dynamic	Hypercardioid	Switchable	Switchable	137 dB
Samson	S11	Dynamic	Cardioid	N/A	N/A	130 dB
Samson	S12	Dynamic	Hypercardioid	N/A	N/A	130 dB
Sanken	CU-31	Condenser	Cardioid	N/A	N/A	148 dB
Sanken	CMS-10	Condenser	Mid-mic high directivity	N/A	N/A	120 dB
Sanken	CS-3	Condenser	Supercardioid	N/A	N/A	120 dB
Sennheiser	E 602	Dynamic	Cardioid	N/A	N/A	160 dB
Sennheiser	E 604	Dynamic	Cardioid	N/A	N/A	160 dB





FREQUENCY RESPONSE	SUGGESTED APPLICATIONS	SPECIAL FEATURES	PRICE
N/A	Vocal; drums; acoustic instruments		\$795
40 Hz–18 kHz	Vocals	Cable; windscreen; stand-mount	\$795
40 Hz–18 kHz	General purpose	Cable; windscreen; stand-mount	\$1,100
20 Hz–20 kHz	One of stereo pair for midside/Blumlein recording		\$1,275
20 Hz–20 kHz	Room; strings; piano; choir		\$1,060
20 Hz–20 kHz	Acoustic guitar; overheads; piano; hi-hat; percussion; orchestra		\$1,060
20 Hz–20 kHz	Room; piano; overheads; sampling; strings	16 dB (A) self noise	\$749
20 Hz–20 kHz	Acoustic guitar; overheads; hi-hat; strings; perc; piano	16 dB (A) self noise; avail. in stereo pairs	\$729
20 Hz–20 kHz	Hi-hat; acoustic guitar; drums; percussion	18 dB (A) self noise	\$749
20 Hz–20 kHz	Vocals; broadcast; home studio		\$595
20 Hz–20 kHz	Vocals; acoustic guitar; strings; Foley; acoustic bass; piano	7 dB (A) self noise; available in stereo pairs	\$995
20 Hz–20 kHz	Vocals; drum overheads; acoustic guitar; strings; sax; percussion; piano	Available in stereo pairs	\$1,195
20 Hz–25 kHz	Vocals; instruments	Dual membrane	\$1,145
29 Hz–25 kHz	TV; video; film		\$1,820
20 Hz–20 kHz	Percussion		\$510
20 Hz–20 kHz	Vocal		\$540
50 Hz–16 kHz	Vocal & instrument miking	Diamond-coated diaphragm	\$150
45 Hz–16 kHz	Vocal w/instrument miking	Diamond-coated diaphragm	\$200
18 Hz–22 kHz		15' cable	\$1,470
18 Hz–22 kHz	Portable recording	Internal battery; 15' cable	\$1,190
18 Hz–22 kHz	Film/video boom	Interchangeable capsules	\$1,455
20 Hz–20 kHz	Broadcasting	LED "on air" indicator	\$599
20 Hz–20 kHz	Vocals; instruments; general purpose	6072 twin triode; 1" dual edge-terminated gold sputtered diaphragm; custom Jensen transformer; birdcage shockmount; aluminum flight case	\$1,999
20 Hz–20 kHz	General purpose; vocals; guitar	Built-in pop filter; internally shockmounted	\$349
20 Hz–20 kHz	Vocals; acoustic guitar; woodwinds; piano; overheads	Dual pressure-gradient transducer	\$649
20 Hz–20 kHz	Instruments; drums; location	Internal capsule shockmounting; transformerless output; battery or phantom powered with battery status indicator; on/off switch	\$199
20 Hz–20 kHz	Vocal; instrumental	Ultra low noise transformerless circuitry	\$599
20 Hz–20 kHz	Vocal; instrumental	Hand selected and graded twin triode valve	\$999
60 Hz–15 kHz	General purpose	On/off switch; wind screen; case	\$95
60 Hz–15 kHz	General purpose	On/off switch; wind screen; case	\$150
30 Hz–15 kHz	General purpose	High SPL handling; lifetime warranty; natural tone & feel; low self noise	\$995
30 Hz–15 kHz	Single-point stereo recordings	X-Y and M-S recording; high SPL handling; lifetime warranty; low self noise	\$2,150
30 Hz–15 kHz	Strings; acoustic instruments; piano; woodwinds; flute; vocals	Lifetime warranty; extremely low self noise; high SPL handling	\$1,075
48 Hz–19 kHz	General; live	Wireless; compressor; de-esser; receiver	\$1,100
20 Hz–18.5 kHz	Vocals		\$200
50 Hz–20 kHz	Project studio vocals		\$400
50 Hz–15 kHz	Vocal; instruments	Gold-plated XLR; case; clip; Eurometric adapter	\$150
50 Hz–15 kHz	Drums; instruments	Gold-plated XLR; case; clip; Eurometric adapter	\$225
60 Hz–18 kHz	Vocals	Case; clip	\$100
60 Hz–18 kHz	Vocals	Case; clip	\$150
20 Hz–18 kHz	High-pressure sources; brass; drums	Right-angle version available	\$699
N/A	Mounting on the new generation of high definition camera		\$2,195
60 Hz–20 kHz	Location & studio recording		\$1,350
20 Hz–16 kHz	Bass drums; bass guitar cabs; tuba	Glass-composite housing	\$319
40 Hz–18 kHz	Drums (esp toms & snares)	Glass-composite housing	\$249

digital reverb unit, the time between the original sound and the very first reflection is controlled by the predelay parameter. As the predelay time gets longer, the apparent size of the space increases and your apparent location within the space gets closer to the "center" of the room. Predelay is generally no more than 500 milliseconds and typically in the 10 to 50 ms range.

Another parameter that relates to early reflections is called, reasonably enough, early reflections (in some units, it's called density). This parameter controls the time between the first few reflections, which is generally just a few milliseconds. This might seem insignificant, but it determines the "opacity," or density, of the reverb sound during the first few moments. Like reverb time, density helps simulate different room sizes; higher density values simulate larger spaces, because it takes longer for the early reflections to reach your ears in a large space.

The diffusion parameter controls the separation of the reflections within the main body of the reverb sound, which determines its "thickness." Reducing the diffusion value produces a thinner sound because the reflections are more widely spaced in time. This parameter lets you determine the complexity of the simulated acoustical space. Keep in mind that many reflective surfaces in a room result in a thicker, denser reverb.

One of the characteristics of acoustic reverberation is that high frequencies typically die away faster than low frequencies. As a result, many reverb units include a high-frequency damping parameter, which lets you control the decay rate of high frequencies separately from the main reverb decay. Some reverb units even include a low-frequency damping parameter. Both of these parameters provide additional control over the apparent size and reflective characteristics of the simulated acoustical space. For example, softer surfaces cause high frequencies to decay more rapidly, while smaller rooms cause low frequencies to decay more rapidly.

## APPLICATIONS

As mentioned earlier, one of the primary applications of artificial reverb is to

# MICROPHONES

MANUFACTURER

PRODUCT

TYPE

POLAR PATTERNS

INTERNAL ROLL-OFF

INTERNAL PAD

MAX. SPL

Sennheiser	E 609	Dynamic	Cardioid	N/A	N/A	150 dB
Sennheiser	MD 421 II	Dynamic	Cardioid	N/A	N/A	160 dB
Sennheiser	ME 64/K 6	Electret condenser	Cardioid	120 Hz	N/A	130 dB
Shure	Beta 52	Dynamic	Supercardioid	N/A	N/A	174 dB
Shure	Beta 87A	Condenser	Supercardioid	N/A	N/A	142 dB
Shure	Beta 87C	Condenser	Cardioid	N/A	N/A	142 dB
Shure	BG4.1	Condenser	Cardioid	N/A	N/A	131 dB
Shure	BG5.1	Condenser	Cardioid	N/A	N/A	132 dB
Shure	KSM32/SL	Condenser	Cardioid	Switchable	-15 dB	139 dB
Shure	KSM44	Condenser	Cardioid, omni-, bidirectional	6dB/octave at 115 Hz	15 dB switchable	156 dB
Shure	SM57	Dynamic	Cardioid	N/A	N/A	N/A
Shure	SM58	Dynamic	Cardioid	N/A	N/A	N/A
Shure	SM7A	Dynamic	Cardioid	N/A	N/A	N/A
Shure	SM81	Condenser	Cardioid	80 Hz/100 Hz	-10 dB	146/136 dB
Shure	SM94	Condenser	Cardioid	N/A	N/A	141 dB
Shure	SM98A	Condenser	Cardioid, supercardioid	80 Hz	-10 dB	144 dB
Shure	VP88	Stereo condenser	Mid: cardioid, side, bidirectional	80 Hz	N/A	129 dB
Sony	C48	Condenser	Uni-, omni-, bidirectional	Yes	-10 dB	128 dB
Sony	ECM-23F3PR	Electret condenser	Unidirectional	Yes	N/A	134 dB
Sony	ECM-77B	Electret condenser	Omni	N/A	N/A	N/A
Sony	ECM-MS5	Electret condenser	Variable (stereo)	Yes	N/A	130 dB
Sony	ECM-MS957	Stereo condenser	m-s, x-y	N/A	N/A	115 dB
Sony	F740/9X	Dynamic	Unidirectional	N/A	N/A	N/A
Sony	F780/9X	Dynamic	Unidirectional	N/A	N/A	N/A
Soundelux	U195	Condenser (FET)	Cardioid	80 Hz	10 dB	125 dB
Soundelux	U99	Tube, 1" KK67	Continuously variable	N/A	N/A	126 dB
Stedman	C15	Condenser	Cardioid	N/A	N/A	132 dB
Stedman	LD23	Dynamic	Supercardioid	N/A	N/A	157 dB
Stedman	LD50	Dynamic	Supercardioid	N/A	N/A	152 dB
Stedman	N90	Dynamic	Cardioid	N/A	N/A	155 dB
Stedman	Transonic-TR1	Dynamic	Cardioid	80 Hz	N/A	152 dB
Studiomaster	KM-81	Dynamic	Cardioid	N/A	N/A	119 dB
Studio Projects	C1	Condenser	Cardioid	N/A	N/A	131 dB
Studio Projects	C3	Multi-pattern condenser	Cardioid; omni; figure 8	150 Hz	-10 dB	142 dB
Studio Projects	T3	6072 dual triode	Cardioid; omni; figure 8	N/A	N/A	125 dB
Yorkville Sound	Apex 110	Electret Condenser	Hypercardioid	N/A	N/A	140 dB
Yorkville Sound	Apex 120	Dynamic	Hypercardioid	N/A	N/A	130 dB
Yorkville Sound	Apex 130	Electret condenser	Semi-cardioid	N/A	N/A	130 dB
Yorkville Sound	Apex 150	Electret condenser	Cardioid	N/A	N/A	130 dB
Yorkville Sound	Apex 165	Electret condenser	Cardioid	N/A	N/A	135 dB
Yorkville Sound	Apex 170	Electret condenser	Cardioid	N/A	N/A	115 dB
Yorkville Sound	Apex 190	Electret condenser	Cardioid	N/A	N/A	135 dB
Yorkville Sound	Apex 350	Dynamic	Cardioid	N/A	N/A	N/A
Yorkville Sound	Apex 380	Dynamic	Cardioid	N/A	N/A	N/A
Yorkville Sound	Apex 420	Condenser	Cardioid; omni	Yes	Yes	130 dB
Yorkville Sound	Apex 750	Dynamic	Cardioid	N/A	N/A	N/A
Yorkville Sound	Apex 770	Dynamic	Cardioid	N/A	N/A	N/A
Yorkville Sound	Apex 850	Dynamic	Cardioid	N/A	N/A	N/A
Yorkville Sound	Apex 880	Dynamic	Hypercardioid	N/A	N/A	130 dB
Yorkville Sound	Apex 950	Dynamic	Cardioid	N/A	N/A	N/A



simulate an acoustical space within which your recorded ensemble “performs.” To accomplish this, send the entire mix through the same reverb unit programmed to re-create the type of space you wish to simulate.

You can also apply different reverbs to individual instruments for special effects. In many pop drum mixes, for example, the snare is heavily processed (often with a gated and/or reverse reverb), while the kick drum is relatively dry. This approach lends an air of drama to the snare backbeat without washing the kick drum in confusing reflections that would diminish its cohesiveness with the bass. Many guitar players like to apply liberal amounts of reverb to enhance their solo sounds.

Another interesting application is playing in a highly reverberant environment à la Paul Horn’s *Inside the Taj Mahal*. Use a hall or cathedral reverb type with a long decay time and high aux-send and aux-return levels.

In many synthesizers with onboard multi-effects units, the effects are an integral part of each patch. Unfortunately, most of these kinds of synths can produce only one combination of effects at a time. If the synthesizer is multitimbral, all parts are passed through the same effects. If you’re not careful, this overall effect will be the one assigned to the last patch you called up, which might or might not serve the other parts well. Instead, you should set the synth’s effect mode to “master,” which lets you select the effects you want for all the parts from that synth. (Fortunately, some synths now include several separate effects processors; some effects are global and others are applied as “insert” effects to individual patches.)

Reverb is inescapable. You hear it everywhere, and rightly so. Almost all music sounds better with reverb, which is why church choirs generally sound better than one would expect from the singing skills of their members. Your music will sound better with reverb, too. All you need to do is experiment a bit with a digital reverb unit to discover just how much better. ■

This article was previously published in the EM Book *Anatomy of a Home Studio*, a product of [artistpro.com](http://artistpro.com), and is reprinted by permission of the publisher.



40 Hz–18 kHz	Guitar amp	Glass-composite housing	\$349
30 Hz–17 kHz	Drums; vocals; guitar; amps	5-position low-frequency rolloff switch	\$485
40 Hz–20 kHz	Acoustic guitar; drum overhead	Interchangeable capsules	\$515
20 Hz–10 kHz	Kick drum; bass amp; acoustic bass	Bass instruments	\$388
50 Hz–18 kHz	Vocals; live; studio	High gain before feedback	\$543
50 Hz–20 kHz	Live vocal		\$445
40 Hz–18 kHz	Guitar; cymbals; strings; vocals; piano	Battery or phantom power	\$275
70 Hz–16 kHz	Vocals	Battery or phantom power	\$275
20 Hz–20 kHz	Vocal; instrument	Shock-mount; case	\$1,029
20 Hz–20 kHz	Vocals	Shurelock swivel mount or elastic shock mount	\$1,304
40 Hz–15 kHz	Guitar amp; drums; guitar; vocals		\$146
50 Hz–15 kHz	General purpose		\$188
50 Hz–20 kHz	Vocals; bass amp		\$584
20 Hz–20 kHz	Guitar; cymbals; strings; vocals; piano		\$530
40 Hz–16 kHz	Guitar; cymbals; strings; vocals; piano	Battery or phantom power	\$280
40 Hz–20 kHz	Drums; brass; woodwinds	Mini condenser; mounting clamp	\$350
40 Hz–20 kHz	Single-point stereo	Internal matrix or MS out	\$1,194
30 Hz–16 kHz	Vocals; guitar	48V or 9V internal battery	\$1,550
20 Hz–20 kHz	Instrument; vocal	Music/vocal/off switch	\$295
40 Hz–20 kHz	On-air broadcast; interview; conference	Mini design; lavalier clip-mount; bat/phantom power	\$465
70 Hz–20 kHz	Stereo recording of live performances and ambient sounds	Phantom power	\$1,550
50 Hz–18 kHz	Stereo DAT; overhead piano; guitar; drum	1000-hour battery; rotating caps; x-y/m-s switch; stand; windscreen; cable; bag	\$299
50 Hz–15 kHz	Vocals; guitar		\$234
50 Hz–18 kHz	Vocals; guitar	Enhanced isolation and feedback rejection	\$375
20 Hz–20 kHz	Close mic situations	1" capsule; "fat" bass switch	\$1,250
20 Hz–20 kHz	Vocals; instruments; general studio	Case; donut-mount	\$2,500
25 Hz–19 kHz	Vocal; instrument	Super buffered output	\$599
38 Hz–18 kHz	Live vocals; instruments		\$139
37 Hz–19 kHz	Live instruments	Large diaphragm	\$139
35 Hz–19 kHz	General purpose	Large diaphragm	\$399
33 Hz–19 kHz	General purpose	Switchable stage/studio EQ settings	\$159
50 Hz–15 kHz	Personal studio; live performance	20-ft. cable; adapter; case	\$60
20 Hz–20 kHz	Vocals; overhead; broadcast; instruments; production	FET 1" 6 µm capsule	\$299
20 Hz–20 kHz	Vocals; overhead; broadcast; instruments	FET 1" 6 µm capsule	\$599
20 Hz–20 kHz	Vocals; overhead; broadcast; instruments	1" 6 µm capsule	\$1,099
70 Hz–18 kHz	Vocal		\$169
50 Hz–18 kHz	Instrument		\$109
50 Hz–18 kHz	Boundary		\$209
30 Hz–18 kHz	Vocals		\$179
30 Hz–18 kHz	Instruments		\$159
80 Hz–15 kHz	General recording		\$109
70 Hz–17 kHz	Vocals; instruments		\$119
50 Hz–15 kHz	Instruments; vocals		\$99
50 Hz–18 kHz	Vocals; instruments		\$119
20 Hz–20 kHz	Vocals; instruments		\$339
50 Hz–15 kHz	Vocals		\$65
50 Hz–15 kHz	Instruments		\$49
80 Hz–12 kHz	Vocals		\$39
80 Hz–12 kHz	Vocals		\$39
80 Hz–12 kHz	Vocals		\$26



# MIDI INTERFACES, PATCH BAYS & PROCESSORS

MANUFACTURER	PRODUCT	COMPUTER INTERFACE	# OF MIDI INS/OUTS	MERCING	FILTERING	RECHANNELIZING	CONTROLLER REMAPPING	KEYBOARD SPLIT/ZONES	# OF PATCHES	SYNCHRONIZATION TYPE	SPECIAL FEATURES	PRICE
Behringer	UltraPatch ProPX2000	N/A	N/A	N/A	None	N/A	N/A	N/A	24	N/A		\$69
DACS	DACS MIDI Patch Bay	N/A	10/10	No	No	No	No	N/A	40	N/A	Uses 1/4" patch cords	\$295
Digital Music	MX-28M MIDI Patch Bay	N/A	2/8	Yes	No	Yes	No	Yes	N/A	N/A	Mapping; transposition; LED data indctrs; panic btn	\$399
Digital Music	MX-28S MIDI Patch Bay	N/A	2/8	No	No	No	No	N/A	N/A	N/A	Output disable; LED data indctrs	\$89
Digital Music	MX-8 MIDI Patch Bay	N/A	6/8	Yes	Yes	Yes	No	Yes	50	N/A	Vel scaling/cmpndr; vel cross-switch/MIDI dlys; pitch chaining; alphanumeric dslpy	\$399
Digital Music	The Funnel	N/A	6/1	No	No	No	No	N/A	N/A	N/A	Auto MIDI input select for routing SysEx data	\$79
Doepler	Pocket Control	N/A	1/1	Yes	N/A	No	No	N/A	N/A	N/A	MIDI control box with 16 rotary controls	\$125
Edirol	ED UM-1	USB; Win; Mac	1/1	No	No	No	No	No	No	No		\$59
Edirol	ED UM-2 USB MIDI Interface	USB	2/2	No	No	No	No	N/A	N/A	MTC	Power supplied by USB bus	\$99
Edirol	ED UM-4 USB MIDI Interface	USB	4/4	No	No	No	No	N/A	N/A	N/A	Power supplied by USB bus; 4 units stackable	\$199
EGO-Systems	Mid/terminal 4140	Printer port	4/4	No	No	No	No	N/A	N/A	MTC; SMPTE (LTC)	SMPTE generator/reader; optional connection to Wave/terminal	\$150
EGO-Systems	Mid/terminal M4U	USB	4/4	No	No	No	No	N/A	N/A	MTC; SMPTE (LTC)	SMPTE generator/reader; 4 units stackable	\$170
Emagic	AMT 8	USB, Serial	8/8	Yes	Yes	No	No	N/A	32	N/A	Exp. to 192 MIDI w/o Mac/PC	\$499
Emagic	Unitor 8 MkII	USB, Serial	8/8	Yes	Yes	No	No	N/A	32	SMPTE; VTC	VTC bin-in; updtbl fmrwr; click in; OMS; Mac/PC	\$799
Emagic	Emagic's MT4	USB	2/4	Yes	Yes	No	No	N/A	32	N/A	Software included for patch bay programming; Mac/PC	\$199
Friend Chip	DMX12/8	PC/Mac	1/1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6 optical in/out; 6 coaxial in/out; S/PDIF and ADAT	\$500
Frontier Design	Sierra MIDI/SMPTE	PCI card	8/8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Dedicated SMPTE in/out jacks	\$299
Infusion Systems	I-CubeX	N/A	1/1	N/A	N/A	No	N/A	N/A	1	N/A	Use with our Sensors to create alternate MIDI controllers	\$615
JLCooper	MLA-1/MLA-10	N/A	4/4	No	No	No	No	N/A	N/A	N/A	Extends MIDI cable runs over 1,000'	\$370; \$500
Mark of the Unicorn	FastLane	Mac serial	1/3	No	No	No	No	N/A	N/A	N/A	Pwrs off cmpr; bypass allows use of MIDI cntrlr when cmpr is off	\$59
Mark of the Unicorn	Micro Express-USB	USB, Mac serial	4/6	Yes	Yes	Yes	No	N/A	16	SMPTE; MTC	Oprts w/o cmpr; supps MMC; freewheels ovr SMPTE drp-outs; cnvrts click to MIDI; 2 pdl ins	\$295
Mark of the Unicorn	MIDI Express XT-USB	USB, Mac serial	8/9	Yes	Yes	Yes	No	N/A	16	SMPTE; MTC	Oprts w/o cmpr; supps MMC; freewheels ovr SMPTE drp-outs; cnvrts click to MIDI; 2 pdl ins	\$395
Mark of the Unicorn	MIDI Timepiece AV-USB	USB, serial	8/8	Yes	Yes	Yes	No	N/A	128	SMPTE; MTC; video; word clock	Oprts w/o cmpr; MIDI time stamping many A/V sync features	\$595
Mark of the Unicorn	PC MIDI Flyer	PC parallel	2/2	No	No	No	No	N/A	N/A	N/A	Pwrs off cmpr; bypass allows use of MIDI cntrlr when cmpr is off	\$89
Mark of the Unicorn	Pocket Express	Mac serial; PC parallel	2/4	No	No	No	No	N/A	N/A	SMPTE; MTC	Bypass allows use of MIDI cntrlr when cmpr is off; SMPTE free-wheeling ovr drp-outs	\$165
Mark of the Unicorn	FastLane USB	USB	2/2	No	No	No	No	N/A	N/A	N/A	5 fruity colors + charcoal; thru button passes MIDI in to out w/computer off	\$69
MIDI Solutions	F8 Footswitch Controller	N/A	1/1	Yes	No	Yes	No	N/A	N/A	N/A	MIDI-pwrd	\$119; \$329
MIDI Solutions	Mapper	N/A	1/1	No	No	No	Yes	N/A	N/A	N/A	MIDI-pwrd; prog via SysEx	\$119
MIDI Solutions	Merger; Quadra Merge; M8	N/A	2/1; 4/1; 8/1	Yes	No	No	No	N/A	N/A	N/A	MIDI-pwrd	\$79-\$279
MIDI Solutions	Relay R8	N/A	1/1	No	No	No	No	N/A	128	N/A	MIDI-pwrd	\$119; \$429
MIDI Solutions	Rouler	N/A	1/2	No	Yes	Yes	No	Yes/10	N/A	N/A	MIDI-pwrd; prog via SysEx	\$119
MIDI Solutions	Thru; Quadra Thru; T8	N/A	1/2; 1/4; 1/8	No	No	No	No	N/A	N/A	N/A	All messages appearing at In sent to all outs; MIDI-pwrd	\$49; \$59; \$199
MIDI Solutions	Velocity Converter	N/A	1/1	No	No	No	No	N/A	40	N/A	Applies velocity curves to MIDI data; MIDI-pwrd; prog via SysEx	\$119
MIDI Solutions	Pedal Controller	N/A	1/1	Yes	No	No	No	N/A	N/A	N/A	MIDI-pwrd	\$119
MIDI Solutions	Breath Controller	N/A	1/1	Yes	No	No	No	N/A	N/A	N/A	Accepts Yamaha BC3; MIDI-pwrd	\$199
MIDIator	MS-124	Serial	1/4	No	No	No	No	No	N/A	N/A		\$100
MIDIator	MS-101	Serial	1/1	No	No	No	No	No	N/A	N/A		\$70
MIDIator	MP-120EP	Parallel	1/2	No	No	No	No	No	N/A	N/A		\$80
MIDIator	MP-128MP	Parallel	2/4	No	No	No	No	No	No	No		\$110
MIDIator	MP-126SP	Parallel	2/8	No	No	No	No	No	No	SMPTE	SMPTE in and out	\$180
MIDIator	UM1	N/A	1/1	No	No	N/A	N/A	N/A	N/A	N/A	Keyboard encoder/solenoid low side driver up to 128 lines	\$215-\$345
MIDIator	UM2	N/A	1/1	No	No	N/A	N/A	N/A	N/A	N/A	Solenoid driver up to 128 lines	\$195-\$330
Midiman	USB Midisport 8x8	USB	8/8	Yes	No	No	No	N/A	N/A	SMPTE; MTC	USB and serial cable included; Mac/PC	\$500
Midiman	Macman	Mac	1/3	No	No	No	No	N/A	N/A	N/A	Passive thru; serial thru (geo port); serial cbl inc	\$60
Midiman	Merge 2x2	N/A	2/2	Yes	No	No	No	N/A	N/A	N/A	N/A	\$100
Midiman	USB Midisport 1x1	USB	1/1	No	No	No	No	N/A	N/A	N/A	USB cable included; Mac/PC	\$70



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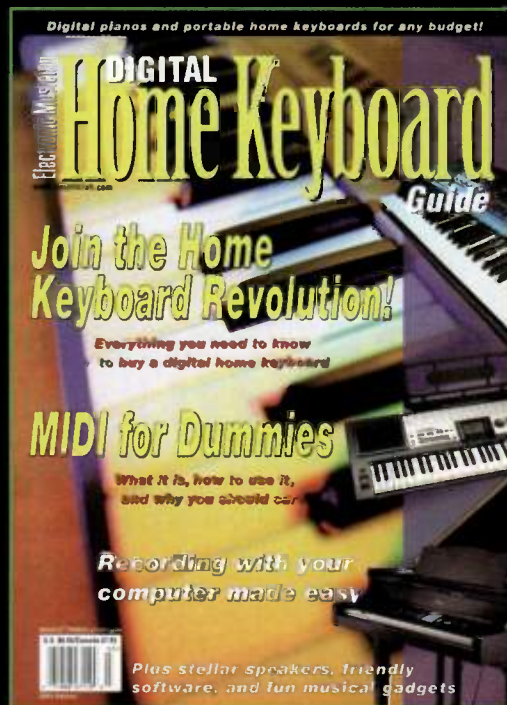
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MANUFACTURER	PRODUCT	COMPUTER INTERFACE	# OF MIDI INS/OUTS	MERCING	FILTERING	RECHANNELIZING	CONTROLLER REMAPPING	KEYBOARD SPLIT/ZONES	# OF PATCHES	SYNCHRONIZATION TYPE	SPECIAL FEATURES	PRICE
Midiman	USB MidiSport 4x4	USB	4/4	No	No	No	No	N/A	N/A	N/A	USB cable included; Mac/PC	\$200
Midiman	Midilink	PC; PCMCIA	1/1	No	No	No	No	N/A	N/A	N/A	Win 95/98/NT/2000 drivers	\$140
Midiman	Portman PC/P	PC	1/1	No	No	No	No	N/A	N/A	N/A	Includes cable (parallel)	\$80
Midiman	Portman PC/S	Serial	1/1	No	No	No	No	N/A	N/A	N/A	Includes PC serial cable	\$80
Midiman	Thru 1x4	N/A	1/4	No	No	No	No	N/A	N/A	N/A	N/A	\$60
Midiman	Winman 1x1	PC	1/1	No	No	No	No	N/A	N/A	N/A		\$70
Midiman	Winman 2x2	PC	2/2	No	No	No	No	N/A	N/A	N/A		\$90
Midiman	Winman 4x4/S	PC	4/4	Yes	No	No	No	N/A	N/A	N/A	64-chan; ISA; native Win 95 drivers; 4x4 patch bay	\$250
Midiman	Thru 3x8	N/A	3/8	No	No	No	No	N/A	N/A	N/A	N/A	\$100
Midiman	Bi Port 2x4	Mac; PC	32/64	No	No	No	No	N/A	N/A	SMPT-E; MTC	Serial port intric	\$180
Midiman	USB MidiSport 2x2	USB	2/2	No	No	No	No	N/A	N/A	N/A	USB cable included; Mac/PC	\$100
Native Instruments	4 Control	Win; Mac	1/1	Yes	No	No	Yes	No	No	No		\$199
Rolls	RFX MP1288 MIDI Wizard	N/A	1/1	Yes	No	No	Yes	N/A	128	N/A	MIDI song select & str/stop; up to 8 prgm chngs on 8 MIDI chans w/1 switch; 8 CCs	\$200
Seekers	Seekers UMC-1688	N/A	1/2	Yes	Yes	No	No	N/A	40	N/A	16 knobs; 8 buttons and 8 faders for real time control	\$369
Steinberg	Midex 8	Mac; PC	8/8	Yes	Yes	N/A	N/A	N/A	128	LTP	USB; cable checker; MIDI thru	\$499
Tech 21	MIDI Mouse	Floor	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	MIDI foot controller; 128 program locations; 16 MIDI channels	\$125
Yamaha	UX256	USB	6/6	Yes	No	N/A	N/A	N/A	N/A	N/A	Bundled patch bay software for Mac and PC; self powered	\$300

## From page 16—MAXIMIZING YOUR MIXER

mixers offer simple EQ, such as fixed 2-band shelving (treble and bass), fixed 3-band (treble, bass shelving, mid-range peaking), or 3-band with switchable (or sweepable) mid-range. If you are lucky—or if you paid more for your mixer—you may get switchable/sweepable high or low frequencies, or more bands.

As with gain structuring, you need to learn the characteristics of the EQ to optimize its use. Identify the center frequencies, check the amount of boost and cut available, and find the slope of the shelving and the bandwidth of the peaking filters. One often overlooked concern is that boosting the EQ increases the signal level, which can cause clipping. In most cases, cutting undesired frequencies is preferable to boosting desired ones. Having said that, it is important to note that the equalization of some mixers sounds thin or wimpy when set flat and sounds much better when some boost is applied.

## AUDIO SUPPLEMENTS

Another way to get the most out of your mixer is by selectively supplementing it. Many inexpensive mixers sound pretty good except for their mic preamps, which usually are terrible. Purchasing an inexpensive outboard mic preamp allows for much better sounding vocal or acoustic instrument tracks for an investment of only a few hundred dollars. Similarly, buying one or two parametric EQs will let you treat critical signals more accurately than you can with the limited EQ of your mixer.

Not enough effects sends? Some multi-effects processors have stereo inputs that are summed to mono before processing. You can take advantage of this by routing direct outs from two separate mixer channels into a signal processor and letting the box do the mixing. This little trick also saves your effects sends for more critical applications.

If you plan to get into creative patching, you may find it useful (if somewhat

costly) to connect a patch bay to your mixer's ins and outs. Although it can be a pain to wire, a patch bay saves wear and tear on the mixer's connectors and eliminates the need to crawl around the back of the mixer. Be sure to construct a patch bay that services all your mixer's inputs and outputs, even if it ends up having a lot of jacks. Doing the job halfway may work fine, but you'll eventually want access to even the most obscure patch points.

## MASTER FADE

Many musicians and engineers recoil at the mere thought of digging into schematics, but all your efforts will be rewarded when you save a brutal mix with some inspired patching. The benefits of learning all these tricks go far beyond the tapes you make now, because the same approach and tricks are used by every engineer on every level of console. ■

*Larry the O is a producer/engineer, sound designer, musician, and consultant.*



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# MINIDISC AND CASSETTE MULTITRACKS

MANUFACTURER	PRODUCT	FORMAT	# OF TRACKS/ SIMULTANEOUSLY	MIXER CONFIGURATION	CHANNEL INPUTS	# OF MIC TRIMS	EQ (TYPE)	# OF AUX SENDS/ AUX RETURNS	# OF DIRECT OUTS/INSERTS
Fostex	X-12	Cassette	4/1	4x2	(2) 1/4"; built-in mic	1	No	No	No
Sony	MDM-X4 MKII	MiniDisc	4/4	10x4	(10) 1/4"; (2) XLR	4	3-band	2/2/stereo	4/0
Tascam	414 MKII	Cassette	4/4	8x2	(8) 1/4; (2) XLR; 1 guitar	4	High and low shelving		N/A
Tascam	414 MKII Portastudio	Cassette	4/4	8x2	(8) 1/4; (2) XLR; 1 guitar	4	High and low shelving	2/2	N/A
Tascam	424 MKII	Cassette	4/4	8x2	(6) 1/4"; (4) XLR	6	3-band w/mid-sweep	2/2	N/A
Tascam	564 Digital Portastudio	MiniDisc	4/4	12x2	(12) 1/4"; (4) XLR	4	3-band w/mid sweep	2/2	4/2
Tascam	Porta 02 MKII	Cassette	4/2	2x2; 4x2	(2) 1/4"; 1 guitar	2	N/A	N/A	N/A
Tascam	788 Digital Portastudio	IDE HD	8/6	8x2	(6) 1/4"; TRS	4	3-band parametric w/mid Q	2/2	N/A
Yamaha	MD4S	MiniDisc	4/4	8x4	(2) XLR; (2) 1/4"	4	3-band	2/2	4/2
Yamaha	MD8	MiniDisc	8	12x2	(2) XLR; (10) 1/4"	8	3 band w/mid sweep	2/2	8/2

# MODULAR DIGITAL MULTITRACKS

MANUFACTURER	MODEL	TAPE FORMAT	ADC	DAC	SAMPLING RATE	FREQUENCY RESPONSE	DYNAMIC RANGE	SIGNAL-TO- NOISE RATIO	CROSSFADE TIMES
Alesis	LX20 20-Bit Digital Audio Recorder	S-VHS	20-bit/64x	20-bit/64x	44.1, 48 kHz	20 Hz–20 kHz	97 dB	N/A	11, 21 32, 43 ms
Alesis	XT20 20-Bit Digital Audio Recorder	S-VHS	20-bit/128x	24-bit/128x	44.1, 48 kHz	20 Hz–20 kHz	102 dB	N/A	11, 2, 32, 43 ms
Alesis	M20 20-Bit Digital Audio Recorder	S-VHS	24-bit/64x	24-bit/128x	44.1, 48 kHz	20 Hz–20 kHz	D/A; A/D	N/A	5.4 ms–1.365 sec
Fostex	VF-08	E-IDE	16-bit	16-bit	44.1 kHz	20 Hz–20 kHz	N/A	N/A	N/A
Fostex	VF-16	E-IDE	16-bit	16-bit	44.1 kHz	20 Hz–20 kHz	N/A	N/A	N/A
HHB	Genex GX8500	Magneto optical disk; hard disk	24-bit	24-bit	32, 44.1, 48, 88.2, 96, 176.4, 192 kHz	1 Hz–20 kHz	N/A	N/A	N/A
Studer	Studer V-Eight	S-VHS; ADAT type II	24-bit	24-bit	44.1, 48 kHz	20 Hz–20 kHz	A/D; D/A	N/A	5.4 ms–1.4 sec
Tascam	DA-88	Hi-8	16-bit	16-bit	44.1, 48 kHz	20 Hz–20 kHz	>92 dB	>92 dB	10–90 ms
Tascam	DA-78HR	Hi-8	24-bit	24-bit	44.1, 48 kHz	20 Hz–20 kHz	>104 dB	>104 dB	10–200 ms
Tascam	DA-98	Hi-8	18-bit	20-bit	44.1, 48 kHz	20 Hz–20 kHz	>92 dB	>97 dB	10–90 ms
Tascam	DA-98HR	Hi-8	24-bit	24-bit	44.1, 48 kHz	20 Hz–20 kHz	>104 dB	>104 dB	10–200 ms



# OF LOCATE POINTS	TAPE SPEED (IPS)	PITCH CONTROL RANGE	NOISE REDUCTION (TYPE)	FREQUENCY RESPONSE	SIGNAL-TO-NOISE RATIO	TOTAL HARMONIC DISTORTION	PRICE
No	1.87 ips	No	No	20 Hz-20 kHz	N/A	N/A	\$199
11	N/A	±8%	No	5 Hz-20 kHz	>94 dB	N/A	\$895
1	3.75 ips	±12%	dbx Type II	40 Hz-16 kHz	>85 dB	<1% (@ 1 kHz)	\$375
1	3.75 ips	±12%	dbx Type II	40 Hz-16 kHz	85 dB	1% (@ 1 kHz)	\$190
2 plus RTZ	3.75, 1.875 ips	±12%	dbx Type II	40 Hz-16 kHz	>95 dB	<1% (@ 1 kHz)	\$499
20	N/A	±9.9%	None	20 Hz-20 kHz	>88 dB	<0.008%	\$1,499
N/A	1.875 ips	N/A	N/A	50 Hz-12.5 kHz	43 dB	<3.0%	\$190
3 plus RTZ	N/A	±6%	N/A	20 Hz-20 kHz	N/A	<0.01%	\$1,149
10	N/A	±6%	None	20 Hz-20 kHz	96 dB	0.02% (@ 1 kHz)	\$899
8	N/A	±12%	N/A	20 Hz-20 kHz	96 dB	0.02%	\$1,399

# OF LOCATE POINTS	TOTAL HARMONIC DISTORTION	CHANNEL CROSSTALK	ANALOG I/O	DIGITAL I/O	ONBOARD SYNC	JOG/SHUTTLE CONTROL	SPECIAL FEATURES	OPTIONS	PRICE
5	>0.009	<-90 dB	RCA	Alesis 8-ch optical digital interface	ADAT Sync	No	Auto-punch; auto-record; rehearse mode; loop	BRC mstr rem cntrl; ADAT/EDIT PCI Card	\$1,899
10	<0.005	<-90 dB	Elco; RCA	Alesis 8-ch optical digital interface	ADAT Sync	No	Auto-punch; auto-record; rehearse mode; loop; track copy	BRC master remote/synchronizer; ADAT/EDIT PCI Card	\$2,599
100	<0.002%	<90 dB	(6) 1/4"; Elco; XLR	Alesis 8-ch optical digital interface	ADAT; SMPTE/EBU; word clock; video in/thru; MTC out	Yes	Auto-punch; auto-record; rehearse mode; loop; track copy	Controller/autolocator; remote meter display	\$4,999
90	N/A	N/A	(2) 1/4" mic/line; monitor; hdph jack	S/PDIF; ADAT optical I/O	N/A	Yes	32-bit processing & mixing; MIDI contr; 99 scene memory; stereo FX; imp/exp WAV file	N/A	\$799
90	N/A	N/A	8.25" mic/line; 2.25" monitor; hdph jack	S/PDIF; ADAT optical I/O	N/A	Yes	32-bit processing & mixing; MIDI contr; 99 scene memory; stereo FX ext SCSI; imp/exp WAV file	N/A	\$1,499
100	N/A	N/A	I/O bal +4 on 25 pin D sub 8 per converter x 2	SDIF 2; AES DSD	LTC; Biphase; Video; word clock	Yes	Varispeed; Ethernet; Scg: 50 pin	N/A	\$5,580
100	N/A	<90 dB	XLR; ELCO	ADAT optical; AES/EBU	Word clock; video; digital in; SMPTE in; SMPTE reader/ generator; Sony 9-pin RS-422	Yes	Linear aux track; SMPTE track; monitor mixer	Cockpit remote control; remote meters	\$5,500
2	<0.007%	>90 dB	Balanced or unbal	TDIF	See options	Yes	108 min on std 120 tape	Digital interface; remotes; SMPTE; MIDI & Sony 9-pin sync cap	\$5,199
2	<0.004%	>90 dB	D-sub 25 pin bal or RCA unbal	T-DIF; S/PDIF	SMPTE in/out/thru; wordclock; MIDI	Yes	Int mixer, save-to-tape; backwards compatible w/existing 16-bit machines	Remote	\$3,399
2	>0.006%	>90 dB	D-sub 25 pin bal or RCA unbal	T-DIF	SMPTE; MIDI; 9-pin	Yes	Internal digital trk; internal digital patch bay; confidence monitoring	Digital interface; remotes	\$6,499
10	<0.004%	>90 dB	As option	T-DIF	SMPTE; video; MIDI	Yes	Confidence monitoring; electronic patchbay internal mixer; save to tape	High resolution interface; analog card remote	\$6,999

# MODULAR HARD-DISC RECORDERS

COMPANY	MODEL	# OF TRACKS	# OF VIRTUAL TRACKS	LEVELS OF UNDO	# OF LOCATE POINTS	ANALOG INPUTS	ANALOG OUTPUTS	DIGITAL I/O	BACKUP OPTIONS	JOG/SHUTTLE CONTROL
Akai	DPS12i Digital Personal Studio	12	250	N/A	112	6 1/4"	2 RCA; 2 1/4"	S/PDIF	N/A	N/A
Akai	DR16 Pro	16	5 takes—includes all tracks		108	8 1/4"	16 1/4"	AES/EBU; S/PDIF	SCSI; DVD-RAM	Yes
Akai	DPS16 Digital Personal Studio	16	250	N/A	116	2 XLR; 6 1/4"	4 RCA; 4 1/4"	RCA; S/PDIF I/O	N/A	N/A
Boss	VSR-880	8	128	999	1,032	8 + 2 balanced	8	stereo coax/opt. in/out	CD-RW software included	Yes
Boss	BR-8	8	64	1	999	2 line, 2 balanced	2 line/phones	S/PDIF out	Zip disk built in	Yes
Edirol	ED A-6 Digital Multi Audio Station	8	64	99	N/A	1/4" mic; 2 RCA	2 RCA	S/PDIF I/O	Zip	Yes
Fostex	D160V2	16	8	1	99	8 RCA	16 RCA	S/PDIF	ADAT; DAT; SCSI	Yes
Fostex	D-108	8	16	1	99	8 RCA	8 RCA	S/PDIF	ADAT; DAT; SCSI	Yes
Fostex	D824	8	16	Unlimited	99	Optional	Optional	S/PDIF; optical	SCSI; ADAT; DAT	Yes
Fostex	D1624	16	8	Unlimited	99	Optional	Optional	S/PDIF; optical	SCSI; ADAT; DAT	Yes
Fostex	VF-16	N/A	N/A	N/A	90	8 1/4"; 2 XLR	2 1/4"	S/PDIF and ADAT optical	SCSI	Yes
Fostex	VR-800	24	N/A	N/A	N/A	N/A	N/A	ADAT optical I/Os	N/A	Yes
iZ Technology	Radar 24	24	N/A	100	100	24	24	S/PDIF; TDIF; ADAT; optical; AES/EBU	Exabyte; DVD RAM; SCSI	Yes
Korg	D1600	16	112	18 or 99	4	4 XLR 1/4" inputs; 4 1/4" inputs	Stereo RCA; master out	S/PDIF optical I/O	External HD/CDR/RW; internal CDR/W	Yes
Korg	D12	12	116	1, 8 or 99	4	2 XLR 1/4" inputs; 2 1/4" inputs	Stereo RCA master out	S/PDIF optical I/O	External HD/CDR/RW; internal CDR/W	Yes
Roland	VS-840EX Digital Studio Workstation	8	64	999	1,008	4	4	S/PDIF coax/opt. outs	ext./removable SCSI	Yes
Roland	VS-880EX Digital Studio Workstation	8	128	999	1,032	6 TRS	4 RCA	S/PDIF I/O	CD-R; CD-RW; ext. SCSI; DAT	Yes
Roland	VS-1680EX Digital Studio Workstation	16	256	999	1,064	2 XLR; 6 1/4"	8	S/PDIF I/O	CD-R; CD-RW; ext. SCSI; DAT	Yes
Sonifex	Courier Location Recorder	2	0	1	99	2 XLR	2 XLR	AES out	PCMCIA; ext. drives	Yes
Tascam	MX-2424	24	999	100	100	24	24	TDIF; ADAT optical; AES/EBU	Travan tape drive; DVD-RAM; SCSI	Yes
Yamaha	AW4416	16	130	16	8 (per song)	2 XLR; 6 TRS 1/4" bal	4 1/4" omnibouts; 2 mon; 2 stereo	SPDIF (+options)	SCSI; CD ROM	Yes



CHANNEL EQ	SYNCHRONIZATION	TIME CODE RATES	# OF EXPANSION PORTS	ADC	DAC	SAMPLE RATES	SCSI	MAXIMUM ADDRESSABLE HARD DRIVE SIZE	OPTIONS	PRICE
N/A	MIDI clock w/SPP, MTC	N/A	N/A	18-bit/64x	20-bit/8x	32, 44.1, 48 kHz	Yes	10 GB	Internal stereo FX processor; CD-R/CD-RW support	\$1,649
3-band parametric or HS/LS w/parametric midband	MIDI clock w/SPP, MTC, SMPTE, RS422 serial TC	24, 25, 29.97, 29.97d, 30, 30d	6	24-bit/128x	20-bit/8x	32, 44.1, 48, 96 kHz	Yes	2 terabyte	SMPTE, MIDI, RS422 intrincs; ADAT, TDIF, AES/EBU 16 ch I/O; EQ brd	\$4,295
N/A	MIDI clock SPP, MTC, MMC	Yes	N/A	24-bit	24-bit	32, 44.1, 48, 96 kHz	N/A	N/A	6-inch diag. tilting display; Q-Link	\$2,695
3-band	MTC, MMC, SPP	No	1	24-bit	24-bit	32, 44.1, 48 kHz	Yes	6 GB	VS8F-2 card for 2 stereo FX w/COSM	\$1,795
3-band	MTC master, MMC, SPP	No	No	24-bit	20-bit	44.1 kHz	No	Built-in Zip	Includes digital mixer with 3 stereo FX	\$845
Yes	MIDI MTC/MMC (master, slave)	N/A	1	20-bit/64x	20-bit/128x	44.1 kHz	Yes	2.1 GB	OP-1 expansion board	\$1,695
N/A	MTC (SMPTE optional)	24, 25, 29, 29d, 30, 30d	2	18-bit/64x	20-bit/128x	44.1, 48 kHz	Yes	8 GB	Balanced I/O; time code; 2.5 GB hard drive	\$2,395
N/A	MTC (SMPTE optional)	24, 25, 29, 29d;	2	18-bit/64x	20-bit/128x	44.1, 48 kHz	Yes	8 GB	Balanced I/O; SMPTE interface 2.5 GB hard drive	\$1,495
No	Yes	24, 25, 30d, 30df, 29.97nd/df	N/A	16-, 24-bit	16-, 24-bit	44.1, 48, 96 kHz	Yes	N/A	RS-422 to support P2 protocol; 24-bit/96 kHz audio	\$1,895
No	Yes	24, 25, 30nd, 30df, 29.97nd/df	N/A	16-, 24-bit	16-, 24-bit	44.1, 48 and 96 kHz	Yes	N/A	RS-422 to support P2 protocol; 24-bit/96 kHz audio	\$2,795
N/A	N/A	N/A	N/A	16-bit	16-bit	44.1 kHz	Yes	N/A	32-bit processing and mixing; imports/exports; WAV file format	\$1,400
N/A	MTC, MMC, Fostex SysEx	N/A	N/A	20-bit/64x	20-bit/128x	44.1, 48 kHz	Yes	N/A	External Zip; internal hard drive; 3'/6' optical cables; footswitch	\$749 and up
N/A	SMPTE; MTC; TDIF; AES/EBU; video	All	N/A	16/24-bit	16/24-bit	32-95.904 kHz	Yes	32 terabytes	AES/EBU I/O; ADAT optical I/O; remote; 24/48 channel meter bridges	\$4,995
Hi/mid/lo per channel	Transmits MTC, MIDI; receives MTC, MMC	30	0	24-bit/64x	24-bit/128x	44.1 kHz	Yes	1 terabyte	CDRW-2 internal CDRW	\$2,000
Hi/mid/lo per channel	Transmits MTC, MIDI; receives MTC, MMC	30	1	24-bit/64x	24-bit/128x	44.1 kHz	Yes	1 terabyte	CDRW-1 internal CDRW	\$1,150
3-band	MMC, MTC (master)	30, 29d, 29, 25, 24	N/A	20-bit/64x	20-bit/128x	32, 44.1 kHz	Optional	250 MB	VS-840BG bag; VS4S-1 SCSI exp kit; DR-20 mic (for modeling)	\$1,395
3-band	MTC, MMC, MIDI clock	30, 29d, 29, 25, 24	1	20-bit/64x	20-bit/128x	32, 44.1, 48 kHz	Yes	32 GB	VS-CDR CD rec; VS-880TC case; SI-80S MTC cnvtr	\$2,195
3-band	MTC, MMC, MIDI clock	30, 29d, 29, 25, 24	2	20-bit/64x	20-bit/128x	32, 44.1, 48 kHz	Yes	128 GB	CD rec; VS8F-2 FX exp board; case; stand; video ownrs man.	\$3,195
No	No	No	No	16-bit	16-bit	8-48 kHz	No	520 MB	ISDN	\$2,675
No	SMPTE; wordclock; video sync; MIDI; TL-Bus	All	3	24-bit	24-bit	44.1, 48, 88.2, 96 kHz	Yes	36 GB	Audio I/O; back-up media; remote	\$3,999
4 band fully parametric	MTC	24, 30, 30d, variable	2 slots	24-bit	24-bit	44.1, 48 kHz	Yes	64 GB		\$3,799

# POWER AMPS

POWER AMPS

MANUFACTURER	MODEL	CONTINUOUS AVG. POWER INTO 8Ω (20 Hz-20 kHz ± 1 dB)	CONTINUOUS AVG. POWER INTO 4Ω (20 Hz-20 kHz ± 1 dB)	FREQUENCY RESPONSE	SIGNAL- TO-NOISE	TOTAL HARMONIC DISTORTION	DAMPING FACTOR	SLEW RATE
Alesis	RA-100	75W per channel	100W per channel	20 Hz-20 kHz	>100 dB	<0.05%	200 @ <1 kHz (ref. 8Ω)	20 V/μs
Ashly Audio	FTX-1501	200W per channel	300W per channel	20 Hz-100 kHz	>100 dB	0.007%	>250 @ <1 kHz (ref. 8Ω)	50 V/μs
Ashly Audio	FTX-2001	300W per channel	500W per channel	20 Hz-100 kHz	>105 dB	0.007%	>250 @ <1 kHz (ref. 8Ω)	50 V/μs
Ashly Audio	MFA-8000	750W per channel	1,200W per channel	8 Hz-100 kHz	>105 dB	0.025%	>200 @ <1 kHz (ref. 8Ω)	25 V/μs
Ashly Audio	SRA-120	45W per channel	60W per channel	20 Hz-20 kHz	100 dB	<0.01%	>200 @ <1 kHz (ref. 8Ω)	10 V/μs stereo/ 20 mono
Behringer	PowerPlay Pro HA4400	N/A	N/A	10 Hz-100 kHz	>99 dB	0.005%	N/A	N/A
BGW Systems	Millennium Series 1	110W per channel	165W per channel	8 Hz-150 kHz	>100 dB	<0.1%	>200 (ref. 8Ω)	>40 V/μs
BGW Systems	Millennium Series 2	220W per channel	330W per channel	8 Hz-150 kHz	>100 dB	<0.1%	>200 (ref. 8Ω)	>40 V/μs
BGW Systems	Millennium Series 3	330W per channel	500W per channel	8 Hz-150 kHz	>100 dB	<0.1%	>200 (ref. 8Ω)	>40 V/μs
BGW Systems	Performance Series 1	110W per channel	165W per channel	8 Hz-175 kHz	>100 dB	<0.1%	>200 (ref. 8Ω)	>40 V/μs
BGW Systems	Performance Series 2	220W per channel	330W per channel	8 Hz-175 kHz	>100 dB	<0.1%	>200 (ref. 8Ω)	>40 V/μs
BGW Systems	Performance Series 3	330W per channel	500W per channel	8 Hz-175 kHz	>100 dB	<0.1%	>200 (ref. 8Ω)	>40 V/μs
BGW Systems	Performance Series 4	440W per channel	660W per channel	8 Hz-175 kHz	>100 dB	<0.1%	>200 (ref. 8Ω)	>40 V/μs
Bryston	2-B-LP-PRO	70W per channel	120W per channel	0.5 Hz-100 kHz	>100 dB	<0.01%	>500 @ 20 Hz (ref. 8Ω)	>60 V/μs
Bryston	3B-ST Pro	150W per channel	250W per channel	<1 Hz-100 kHz	>106 dB	<0.007%	>500 @ 20 Hz (ref. 8Ω)	>60 V/μs
Bryston	4B-ST Pro	300W per channel	500W per channel	<1 Hz-100 kHz	>106 dB	<0.007%	>500 @ 20 Hz (ref. 8Ω)	>60 V/μs
Bryston	7B-ST Pro Mono Block	600W per channel	900W per channel	<1 Hz-100 kHz	>106 dB	<0.007%	>300 @ 20 Hz (ref. 8Ω)	>60 V/μs
Bryston	Power Pac 120	150W per channel	250W per channel	<1 Hz->1 kHz	>106 dB	<0.007%	>500 @ 20 Hz (ref. 8Ω)	>60 V/μs
Bryston	Power Pac 60	60W per channel	120W per channel	<1 Hz->1 kHz	>106 dB	<0.007%	>500 @ 20 Hz (ref. 8Ω)	>60 V/μs
Bryston	5B-ST Pro 3-channel	150W per channel	250W per channel	<1 Hz-1 kHz	>106 dB	<0.007%	>500 @ 20 Hz (ref. 8Ω)	>60 V/μs
Carver Professional	pm125	50W per channel	62W per channel	20 Hz-20 kHz	>100 dB	<0.1%	<400	10 V/μs
Carver Professional	pm420	135W per channel	210W per channel	20 Hz-20 kHz	>100 dB	<0.1%	<400	10 V/μs
Carver Professional	pm700	225W per channel	350W per channel	20 Hz-20 kHz	>100 dB	<0.1%	<400	40 V/μs
Carver Professional	pm950	325W per channel	475W per channel	20 Hz-20 kHz	>100 dB	<0.1%	<400	40 V/μs
Carver Professional	pm1400	475W per channel	700W per channel	20 Hz-20 kHz	>100 dB	<0.1%	<400	40 V/μs
Carver Professional	pt1860	600W per channel	900W per channel	20 Hz-20 kHz	>100 dB	<0.5%	<400 @ 1 kHz	25 V/μs
Carver Professional	pt2400	750W per channel	1,200W per channel	20 Hz-20 kHz	>100 dB	<0.5%	<400 @ 1 kHz	25 V/μs
Carver Professional	PX1450	375W per channel	725W per channel	20 Hz-20 kHz	>106 dB	<0.1%	<600 @ 10-400 Hz (ref. 8Ω)	70 V/μs
Carver Professional	PX850	260W per channel	425W per channel	20 Hz-20 kHz	>106 dB	<0.1%	>600 @ 10-400 Hz (ref. 8Ω)	70 V/μs
Carver Professional	PXm900	280W per channel	440W per channel	20 Hz-20 kHz	>113 dB	<0.1%	>200	29 V/μs
Carver Professional	PXm450	140W per channel	215W per channel	20 Hz-20 kHz	>108 dB	<0.1%	>200	29 V/μs
Carver Professional	PXm250	70W per channel	120W per channel	20 Hz-20 kHz	>104 dB	<0.1% @ 60W	>180	29 V/μs
Carvin	DCM 600	150W per channel	225W per channel	20 Hz-20 kHz	100 dB	0.03%	>350	>45 V/μs
Carvin	DCM1000	225W per channel	350W per channel	20 Hz-20 kHz	106 dB	0.03%	>400	>45 V/μs
Carvin	DCM1500	300W per channel	500W per channel	20 Hz-20 kHz	107 dB	0.03%	>450	>50 V/μs
Carvin	DCM2000	450W per channel	700W per channel	20 Hz-20 kHz	109 dB	0.03%	>500	>5 V/μs
Carvin	DCM4000	425Wx4; 1,400Wx2	700x4/2,000Wx2	20 Hz-20 kHz	>109dB	<0.05% @ 1 kHz	>500	>50 V/μs
Carvin	HT150	50W per channel	75W per channel	20 Hz-20 kHz	100 dB	0.1%	>300	>30 V/μs
Carvin	HT760M	175W per channel	250W per channel	20 Hz-20 kHz	103 dB	0.03%	>350	>45 V/μs



POWER CONSUMPTION	PROTECTION FEATURES	AC CIRCUIT BREAKER	GROUND LIFT	INDICATOR LIGHTS	DIMENSIONS (INCHES)	WEIGHT (LBS.)	PRICE
500W	Short circuit; thermal ovrid; DC offset; RF; open crct; sft clppng; on/off trnsnt	No	No	Clip	19x3.5x8	14.25	\$379
760W	Short circuit; thermal ovrid; DC offset; RF	Yes	Yes	11-seg LED mtrs; protect LEDs	19x3.5x16.5	41	\$859
1,350W	Short circuit; thermal ovrid; DC offset; RF	Yes	Yes	11-seg LED mtrs; protect LEDs	19x5.25x16.5	53	\$1,139
3,000W (max)	Short circuit; thermal ovrid; DC offset; RF limit/thermal/protect LEDs	Yes	Yes	11-seg LED mtrs;	19x5.25x16.5	61	\$2,139
350W	Short circuit; thermal ovrid; DC offset; RF	Yes	Yes	Sgnl prsnt/clip/protect LEDs	19x1.75x10	18	\$499
40W	100-120V AC (630mA); 200-240V AC (315mA)	No	N/A	In level: 4 LED display; out level: 4 LED display	19x1.75x8.5	5.9	\$149
350W	Short circuit; RF; spkr out rlys; trn on/off; thermal DC; inst shut-off	No	Yes	Clip; pwr; sgnl prsnt	19x5.25x12.8	28	\$786-\$943
480W	Short circuit; RF; spkr out rlys; trn on/off; thermal DC; inst shut-off	No	Yes	Clip; pwr; sgnl prsnt	19x5.25x12.8	34	\$899-\$1,057
675W	Short circuit; RF; spkr out rlys; trn on/off; thermal DC; spkr prct; inst shut-off	No	Yes	Clip; pwr; sgnl prsnt	19x5.25x15.4	40	\$1,259-\$1,417
350W	Short circuit; RF; spkr out rlys; trn on/off; thermal DC; spkr prct; inst shut-off	No	Yes	Clip; pwr; sgnl prsnt	19x3.5x12.6	26	\$849
480W	Short circuit; RF; spkr out rlys; trn on/off; thermal DC; spkr prct; inst shut-off	No	Yes	Clip; pwr; sgnl prsnt	19x3.5x12.6	32	\$999
675W	Short circuit; RF; spkr out rlys; trn on/off; thermal DC; spkr prct; inst shut-off	No	Yes	Clip; pwr; sgnl prsnt	19x3.5x13.6	37	\$1,399
1,100W	Short circuit; RF; spkr out rlys; trn on/off; thermal DC; spkr prct; inst shut-off	No	Yes	Clip; pwr; sgnl prsnt	19x3.5x17.1	54	\$1,999
15-250W	Short circuit; RF; thermal; DC offst	No	Yes	Tricolor LED	19x1.75x10	18	\$995
30-500W	Short circuit; RF; thermal; DC offst	No	Yes	Tricolor LED	19x5.25x9	22	\$1,650
50-1,000W	Short circuit; RF; thermal; DC offst	No	Yes	Tricolor LED	19x5.25x15.5	42	\$2,350
50-1,000W	Short circuit; RF; thermal; DC offst	No	Yes	Tricolor LED	19x5.25x15.5	42	\$2,500
15-250W	Short circuit; RF; thermal; DC offst	No	Yes	Tricolor LED	12x3.6x7.25	10	\$795
15-250W	Short circuit; RF; thermal; DC offst	No	Yes	Tricolor LED	12x2x5.5	6	\$450
15-250W	Short circuit; RF; thermal; DC offst	No	Yes	Tricolor LED	19x5.25x15.5	33	\$2,550
250W	DC offset; ovr temp; short circuit; clppng	Yes	No	Power ready; signal; clip; protect	19x1.75x13.25	13.8	\$619
1,000W	DC offset; ovr temp; short circuit; clppng; crct brkr	Yes	No	Power ready; signal; clip; protect	19x3.5x13.25	23.8	\$799
500W	DC offset; ovr temp; short circuit; clppng	Yes	No	Pwr cnctd/stndby; 7-LED dsply per chan	19x3.5x13.25	30	\$1,069
725W	DC offset; ovr temp; short circuit; clppng	Yes	No	Pwr cnctd/stndby; 7-LED dsply per chan	19x3.5x13.25	34	\$1,269
800W	DC offset; ovr temp; short circuit; clppng	Yes	No	Pwr cnctd/stndby; 7-LED dsply per chan	19x3.5x13.25	34.2	\$1,539
N/A	Shrt crct; exc high frqncy; thermal; clppng; DC; soft str/lnpt mute	Yes	Yes	Power ready; signal; clip; protect	19x5.25x12.75	46	\$2,379
N/A	Shrt crct; exc high frqncy; thermal; clppng; DC; soft str/lnpt mute	Yes	N/A	Power ready; signal; clip; protect	19x5.25x12.75	48	\$2,779
750W	Thermal; short circuit prct; thermal and stndby	Yes	No	Power ready; signal; clip; protect	19x5.75x15.38	58.2	\$1,245
840W	Thermal; short circuit	Yes	No	Power ready; signal; clip; protect; thermal and standby	19x5.75x15.38	46	\$895
1,135W	Thermal; short circuit; DC fault	N/A	N/A	Power ready; signal; clip; protect; thermal	19x5.25x15.38	28	\$795
640W	Thermal; short circuit	N/A	N/A	Power ready; signal; clip; protect; thermal	19x3.5x16.38	26.3	\$665
424W	Thermal; short circuit	N/A	N/A	Power ready; signal; clip; protect; thermal	19x3.5x15.38	24.4	\$535
750W (max)	Short circuit; RF; thermal; DC offset	Yes	Yes	Power; clip; signal protect	19x3.5x10	23	\$360
1,200W	Short circuit; RF; thermal; DC offset	Yes	Yes	Power; clip; signal protect	19x3.5x10	26	\$440
1,800W	Shrt crct; RF; thermal; DC offset	Yes	Yes	Power; signal; clip; protect	19x5.25x10	31	\$540
2,400W	Shrt crct; RF; thermal; DC offset	Yes	Yes	Power; signal; clip; protect	19x5.25x10	36	\$640
4,400W	Short circuit; RF; thermal; DC offset; no load; mute on/off	Yes	Yes	Signal protect; clip; power	19x5.25x16	70	\$1,100
180W	Short circuit; RF; thermal; DC offset	No	No	Power; clip; signal protect	19x1.75x10	11	\$230
900W (max)	Short circuit; RF; thermal; DC offset	Yes	Yes	Power; clip; signal protect	19x3.5x10	23	\$470

# POWER AMPS

MANUFACTURER	MODEL	CONTINUOUS AVG. POWER INTO 8Ω (20 Hz–20 kHz ±1 dB)	CONTINUOUS AVG. POWER INTO 4Ω (20 Hz–20 kHz ±1 dB)	FREQUENCY RESPONSE	SIGNAL- TO-NOISE	TOTAL HARMONIC DISTORTION	DAMPING FACTOR	SLEW RATE
Crate	SPA 200	70W per channel	100W per channel	20 Hz–20 kHz	N/A	N/A	N/A	10 V/μs
Crate	SPA400	125W per channel	200W per channel	20 Hz–20 kHz	100 dB	0.02% @ 1 kHz	250 (1 kHz/8 Ω)	30 V/μs
Crate	SPA1400	260W per channel	450W per channel	20 Hz–20 kHz	100 dB	0.02% @ 1 kHz	Typically 250 (1kHz, 8 Ω)	40 V/μs
Crate	SPA1400C	260W per channel	450W per channel	20 Hz–20 kHz	100 dB	0.02% @ 1 kHz	Typically 250 (1kHz, 8 Ω)	40 V/μs
Crate	SPA 1400C	260W per channel	450W per channel	20 Hz–20 kHz	100 dB	0.02%	N/A	40 V/μs
Crate	SPA 400	200W (stereo) per channel	125W (stereo); 400W (mono)	N/A	100 dB	0.02%	N/A	30 V/μs
Crate	SPA 200	100W per channel	70W (stereo); 200W (mono)	N/A	100 dB	0.02%	N/A	10 V/μs
Crown	CE 1000	275W per channel	450W per channel	20 Hz–20 kHz	>105 dB	<0.5%	>400	N/A
Crown	CE 2000	400W per channel	660W per channel	20 Hz–20 kHz	>105 dB	<0.5%	>400	N/A
Crown	CP 660	60W per channels	75W per channel	20 Hz–20 kHz	>100 dB	<0.3%	>250	N/A
Crown	K1	350W per channel	550W per channel	20 Hz–20 kHz	>100 dB	<0.1%	>3,000	N/A
Crown	K2	500W per channel	800W per channel	20 Hz–20 kHz	>100 dB	<0.1%	>3,000	N/A
Crown	MA-602	225W per channel	325W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	MA-1202	310W per channel	480W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	MA-2402	520W per channel	800W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	CT-210	110W per channel	150W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	CT-410	220W per channel	240W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	CT-810	305W per channel	490W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	CT-1610	540W per channel	870W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	D-45	25W per channel	35W per channel	20 Hz–20 kHz	>110 dB	<0.05%	>400	N/A
Crown	D-75A	40W per channel	55W per channel	20 Hz–20 kHz	>110 dB	<0.05%	>400	N/A
Crown	PT-1	220W per channel	305W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	PT-2	325W per channel	460W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	PT-3	540W per channel	760W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	MT-600	225W per channel	325W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	MT-1200	310W per channel	480W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	MT-2400	520W per channel	800W per channel	20 Hz–20 kHz	>105 dB	<0.05%	>1,000	N/A
Crown	CE-4000	600W per channel	1,200W per channel	20 Hz–20 kHz	>102 dB	0.5%	>700 from 10 Hz to 400 Hz	N/A
Demeter	VTHF-300m Tube Mono Block	300W mono	300W mono	N/A	<97 dB	0.06%	10:1	N/A
Demeter	VT275HF 150 Watt Stereo Power Amplifier	60W per channel	60W per channel	N/A	<90 dB	0.06% @ 1 kHz 1W	10:1	N/A
FBT	HP400	100W per channel	140W per channel	20 Hz–20 kHz	>100 dB	<0.02%	>150 @ 8Ω–1 kHz	>40 V/μs
FBT	HP600	150W per channel	200W per channel	20 Hz–20 kHz	>102 dB	<0.02%	>150 @ 8Ω–1 kHz	>40 V/μs
FBT	HP1000	260W per channel	420W per channel	20 Hz–20 kHz	>105 dB	<0.02%	>150 @ 8Ω–1 kHz	>40 V/μs
FBT	Symbol 9000	450W per channel	650W per channel	20 Hz–20 kHz	>110 dB	<0.02%	>250 @ 8Ω–1 kHz	>40 V/μs
FBT	Symbol 16000	600W per channel	950W per channel	20 Hz–20 kHz	>110 dB	<0.02%	>250 @ 8Ω–1 kHz	>40 V/μs
Furman	SP-20A Half Rack Stereo Power Amp	20W per channel	20W per channel	+0, -1 20 Hz–20 kHz	99 dB	0.05%	N/A	20 V/μs
Hafler	9505	250W per channel	375W per channel	0.15 Hz–300 kHz	100 dB	<0.07%	1,000 (to 1 kHz)	150 V/μs
Hafler	P1000	50W per channel	55W per channel	0.1 Hz–100 kHz	100 dB	<0.2%	900 (to 1 kHz)	20 V/μs
Hafler	P1500	75W per channel	85W per channel	0.15 Hz–300 kHz	100 dB	<0.1%	350 (to 1 kHz)	100 V/μs
Hafler	P3000	150W per channel	200W per channel	0.15 Hz–300 kHz	100 dB	<0.1%	400 (to 1 kHz)	100 V/μs



POWER CONSUMPTION	PROTECTION FEATURES	AC CIRCUIT BREAKER	GROUND LIFT	INDICATOR LIGHTS	DIMENSIONS (INCHES)	WEIGHT (LBS.)	PRICE
N/A	N/A	N/A	N/A	N/A	19x3.5x7	19	\$400
10 amps (120 VAC)	Short circuit; RF; spkr out rlys; trn on/off trnsnt; thermal	N/A	N/A	Signal; limit; fault	19x3.5x15	27	\$500
N/A	Short circuit; RF; spkr out rlys; trn on/off trnsnt; thermal	Yes	N/A	Signal; limit; protect	19x3.5x15	27	\$600
N/A	Short circuit; RF; spkr out rlys; trn on/off trnsnt; thermal	Yes	N/A	Signal; limit; protect	19x3.5x15	27	\$700
N/A	Short circuit; RF burnout; overtemp; speaker out relays; off/on transient; DC protection	N/A	N/A	N/A	19x3.5x16.7	36	\$699
N/A	Variable-speed fan; short circuit; RF burnout; overtemp; speaker out relays; on/off transient; DC protection	N/A	N/A	N/A	19x3.5x15	27	\$499
N/A	Variable-speed fan; short circuit; RF burnout; overtemp; speaker out relays; off/on Transient; DC protections	N/A	N/A	N/A	19x3.5x7	19	\$399
N/A	Short; DC; clip; other	Yes	No	Power; signal; fault; clip	19x5.25x13	32.4	\$731
N/A	Short; DC; clip; other	Yes	No	Power; signal; fault; clip	19x5.25x13	40.2	\$1,043
N/A	Short; DC; other	No	No	Power; signal; fault; clip	19x3.5x12.75	25	\$864
N/A	Short; DC; clip; other	No	Yes	Sgnl; TLC; IOC; clip; enable	19x3.5x16	32	\$1,559
N/A	Short; DC; clip; other	No	Yes	Sgnl; TLC; IOC; clip; enable	19x3.5x16	38	\$1,872
N/A	Short; DC; ODEP; other	No	Yes	IOC/SPI; ODEP; enable	19x3.5x16	39.6	\$1,559
N/A	Short; DC; ODEP; other	No	Yes	IOC/SPI; ODEP; enable	19x3.5x16	44.1	\$1,820
N/A	Short; DC; ODEP; other	Yes	Yes	IOC/SPI; ODEP; enable	19x3.5x16	51.75	\$2,339
N/A	Short; DC; ODEP; quad mute; other	Yes	No	IOC; SPI; ODEP; power	19x3.5x16	29.4	\$991
N/A	Short; DC; ODEP; quad mute; other	Yes	No	IOC; SPI; ODEP; power	19x3.5x16	31.9	\$1,230
N/A	Short; DC; ODEP; quad mute; other	Yes	No	IOC; SPI; ODEP; power	19x5.25x16	47.25	\$1,717
N/A	Short; DC; ODEP; quad mute; other	Yes	No	IOC; SPI; ODEP; power	19x7x16	57.9	\$2,268
N/A	Short; DC; other	No	No	IOC; signal; power	19x1.75x9	10	\$496
N/A	Short; DC; other	No	No	IOC; signal; power	19x1.75x9	10	\$652
N/A	Short; DC; ODEP; other	Yes	Yes	Enable; IOC/SPI	19x3.5x16	30	\$1,303
N/A	Short; DC; ODEP; other	Yes	Yes	Enable; IOC/SPI	19x5.25x16	33	\$1,538
N/A	Short; DC; ODEP; other	Yes	Yes	Enable; IOC/SPI	19x7x16	36.5	\$1,798
N/A	Short; DC; ODEP; other	No	Yes	Enable; ODEP	19x3.5x16	36.25	\$1,094
N/A	Short; DC; ODEP; other	No	Yes	Enable; ODEP	19x3.5x16	41	\$1,407
N/A	Short; DC; ODEP; other	Yes	Yes	Enable; ODEP	19x3.5x16	46.9	\$1,824
N/A	Short; DC; others	N/A	N/A	Power; signal; clip; fault	19x5.25x16.25	33.3	\$2,237
600W	N/A	Yes	No	LED	19x7x15	49	\$2,649
300W	N/A	Yes	No	LED	19x7x12	45	\$2,299
690W (max)	DC; thermal overload; SOA; soft start; open circuit	3 amp fuse	Yes	Signal active; limit/clip; protect	19x3.25x18	27	\$700
880W (max)	DC; thermal overload; SOA; soft start; open circuit	4 amp fuse	Yes	Signal active; limit/clip; protect	19x3.25x18	27	\$830
1,350W (max)	DC; thermal overload; SOA; soft start; open circuit	6.5 amp fuse	Yes	Signal active; limit/clip; protect	19x3.25x19	29	\$900
1,500W (max)	DC; thermal overload; SOA; soft start; open circuit	8 amp fuse	Yes	Signal active; limit/clip; protect	19x3.25x19	53	\$2,000
1,750W (max)	DC; thermal overload; SOA; soft start; open circuit	10 amp fuse	Yes	Signal active; limit/clip; protect	19x3.25x19	62	\$2,400
130W	Short circuit; thermal ovrid	Yes	Yes	Clip; sgnt prsnt	8.45x1.75x8.25	9	\$289
840	± Rail fuses	Yes	Yes	Power	19x5.25x12.5	50	\$2,200
260W	NOMAD	Yes	Yes	Pwr; sgnt; clip; therm	19x1.75x8.375	12	\$569
325W	Short circuit	Yes	Yes	Pwr; sgnt; clip; therm	19x3.5x8.5	22	\$599
600W	Short circuit	Yes	Yes	Pwr; sgnt; clip; therm	19x3.5x9.875	23	\$779

# POWER AMPS

MANUFACTURER	MODEL	CONTINUOUS AVG. POWER INTO 8 $\Omega$ (20 Hz–20 kHz $\pm 1$ dB)	CONTINUOUS AVG. POWER INTO 4 $\Omega$ (20 Hz–20 kHz $\pm 1$ dB)	FREQUENCY RESPONSE	SIGNAL- TO-NOISE	TOTAL HARMONIC DISTORTION (%)	DAMPING FACTOR	SLEW RATE
Haller	P4000	200W per channel	275W per channel	0.2 Hz–200 kHz	100 dB	<0.1%	500 (to 1 kHz)	100 V/ $\mu$ s
Haller	P7000	350W per channel	500W per channel	0.2 Hz–200 kHz	100 dB	<0.1%	600 (to 1 kHz)	100 V/ $\mu$ s
Hot House	Model Four Hundred	125W per channel	200W per channel	3 Hz–100 kHz	>100 dB	0.01%	>200	>60 V/ $\mu$ s
Hot House	Model Six Hundred	195W per channel	325W per channel	3 Hz–100 kHz	>100 dB	<0.05%	>200	>60 V/ $\mu$ s
Hot House	Model One Thousand	350W per channel	500W per channel	3 Hz–100 kHz	>100 dB	<0.05%	>200	>60 V/ $\mu$ s
Hot House	Model Two Thousand	450W per channel	700W per channel	3 Hz–100 kHz	>100 dB	<0.05%	>200	>60 V/ $\mu$ s
Hot House	Model M500 High Current Mono Block	150W mono	275W mono	5 Hz–100 kHz	>100 dB	0.01%	>200	>60 V/ $\mu$ s
Hot House	Model M500HV High Voltage Mono Block	375W mono	600W mono	5 Hz–100 kHz	>100 dB	0.01%	>200	>60 V/ $\mu$ s
Mackie Designs	M1400i	250W per channel	425W per channel	10 Hz–70 kHz	>107 dB	<0.025% @ 8 $\Omega$	>350 (0–400 Hz)	>50 V/ $\mu$ s mono/stereo
Mackie Designs	M800	150W per channel	225W per channel	10 Hz–70 kHz	>104 dB	<0.025% @ 8 $\Omega$	>250 (0–400 Hz)	>40 V/ $\mu$ s mono/stereo
Mackie Designs	M2600	425W per channel	700W per channel	10 Hz–70 kHz	>107dB	<0.025% @ 8 $\Omega$	350V (0–400 Hz)	>60V/ $\mu$ s mono/stereo
Manley Labs	Studio 240	240W per channel	240W per channel	10 Hz–30 kHz	N/A	N/A	N/A	N/A
Manley Labs	Studio 440	500W per channel	500W per channel	10 Hz–30 kHz	N/A	N/A	N/A	N/A
Miles Technology	MPR-450	60W per channel x 6	75W per channel	20 Hz–20 kHz	>100 dB	0.15%	>400	Not slew limited
Peavey	CS200X	85W per channel	85W per channel	10 Hz–40 kHz	100 dB	<0.1%–0.07%	>200 @ 4 $\Omega$	15 V/ $\mu$ s
Peavey	CS500A	130W per channel	200W per channel	5 Hz–50 kHz	100 dB	0.03%	>100 @ 4 $\Omega$	40 V/ $\mu$ s
Peavey	CS800S	240W per channel	400W per channel	3 Hz–60 kHz	100 dB	0.03%	>1,000 @ 8 $\Omega$	40 V/ $\mu$ s
Peavey	CS1000X	325W per channel	525W per channel	5 Hz–50 kHz	100 dB	<0.03%	>200 @ 4 $\Omega$	40 V/ $\mu$ s
Peavey	PV260	100W per channel	130W per channel	10 Hz–40 kHz	100 dB	<0.1%	>200 @ 8 $\Omega$	20 V/ $\mu$ s
Peavey	PV500	130W per channel	210W per channel	10 Hz–40 kHz	100 dB	<0.1%	>300 @ 8 $\Omega$	20 V/ $\mu$ s
Peavey	PV1200	270W per channel	425W per channel	10 Hz–40 kHz	100 dB	<0.1%	>300 @ 8 $\Omega$	20 V/ $\mu$ s
Peavey	PV2000	400W per channel	700W per channel	10 Hz–40 kHz	100 dB	<0.1%	>300 @ 8 $\Omega$	20 V/ $\mu$ s
QSC Audio	MX700	150W per channel	225W per channel	20 Hz–20 kHz	100 dB	0.1%	>200	N/A
QSC Audio	PLX 1202	200W per channel	325W per channel	8 Hz–50 kHz	106 dB	<0.05%	>500	N/A
QSC Audio	MX1500a	350W per channel	500W per channel	20 Hz–20 kHz	100 dB	0.05%	>200	N/A
QSC Audio	MX2000a	450W per channel	650W per channel	20 Hz–20 kHz	100 dB	0.05%	>200	N/A
QSC Audio	MX3000a	800W per channel	1,200W per channel	20 Hz–20 kHz	100 dB	0.1%	>200	N/A
QSC Audio	PowerLight 1.0	200W per channel	325W per channel	20 Hz–20 kHz	108 dB	0.1%	>350	N/A
QSC Audio	PowerLight 1.0HV	300W per channel	500W per channel	20 Hz–20 kHz	108 dB	0.1%	>350	N/A
QSC Audio	PowerLight 1.4	300W per channel	500W per channel	20 Hz–20 kHz	108 dB	0.1%	>350	N/A
QSC Audio	PowerLight 1.5X Bi-amp	200W ch. 1; 450W ch. 2	325W ch. 1; 700W ch. 2	20 Hz–20 kHz	108 dB	0.1%	>350	N/A
QSC Audio	PowerLight 1.6HVX Bi-amp	300W ch. 1; 700W ch. 2	500W ch. 1; 100W ch. 2	20 Hz–20 kHz	108 dB	0.1%	>350	N/A
QSC Audio	PowerLight 1.8	400W per channel	650W per channel	20 Hz–20 kHz	108 dB	0.1%	>350	N/A
QSC Audio	PowerLight 2.0HV	650W per channel	1,000W per channel	20 Hz–20 kHz	108 dB	0.1%	>350	N/A
QSC Audio	PowerLight 2.4MB Mono-block	1,000W mono	1,600W	20 Hz–20 kHz	108 dB	0.1%	>350	N/A
QSC Audio	PLX 1602	300W per channel	500W per channel	8 Hz–50 kHz	106 dB	<0.05%	>500	N/A
QSC Audio	PLX 2402	425W per channel	700W per channel	8 Hz–50 kHz	106 dB	<0.05%	>500	N/A
QSC Audio	PLX 3002	500W per channel	900W per channel	8 Hz–50 kHz	106 dB	<0.05%	>500	N/A
QSC Audio	PLX 3402	700W per channel	1,100W per channel	8 Hz–50 kHz	106 dB	<0.05%	>500	N/A
QSC Audio	RMX 850	200W per channel	300W per channel	5 Hz–50 kHz	100 dB	<0.03%	>300 @ 8 $\Omega$	N/A
QSC Audio	RMX 1450	280W per channel	450W per channel	5 Hz–50 kHz	100 dB	<0.03%	>300 @ 8 $\Omega$	N/A
QSC Audio	RMX 2450	500W per channel	750W per channel	5 Hz–50 kHz	100 dB	<0.03%	>300 @ 8 $\Omega$	N/A
Rane	MA6S	100W per channel	150W per channel	20 Hz–20 kHz	103 dB	0.07%	300 @ 1 kHz	N/A
Roland	SRA-200E	100W per channel	150W per channel	20 Hz–50 kHz	100 dB	0.05%	N/A	N/A
Samson	Servo 120	52W per channel	60W per channel	10 Hz–100 kHz	105 dB	<0.05%	>150	N/A
Samson	Servo 170	60W per channel	85W per channel	20 Hz–50 kHz	103 dB	<0.01%	N/A	N/A
Samson	Servo 260	90W per channel	130W per channel	20 Hz–50 kHz	103 dB	<0.03%	>100	N/A
Samson	Servo 550	220W per channel	275W per channel	20 Hz–50 kHz	103 dB	<0.03%	>100	N/A



POWER CONSUMPTION	PROTECTION FEATURES	AC CIRCUIT BREAKER	GROUND LIFT	INDICATOR LIGHTS	DIMENSIONS (INCHES)	WEIGHT (LBS.)	PRICE
720W	Short circuit	Yes	Yes	Pwr; sgnl; clip; therm	19x5.25x11	34	\$999
1,100W	Short circuit	Yes	Yes	Pwr; sgnl; clip; therm	19x3.5x12.875	40	\$1,399
600W	RC network for RF	Yes	N/A	N/A	19x3.5x10.5	28	\$1,699
1,000W	RC network for RF	Yes	N/A	N/A	19x5.25x10.5	32	\$2,499
1,500W	RC network for RF	Yes	N/A	N/A	19x5.25x10.5	38	\$2,999
1,500W	RC network for RF	Yes	Yes	True RMS clip/channel	19x8.75x17	95	\$4,999
600W	RC network for RF	Yes	N/A	N/A	19x3.5x10.5	32	\$2,099
800W	RC network for RF	Yes	N/A	N/A	19x3.5x10.5	34	\$2,499
65W	Short circuit; thermal	No	No	Power; cold & ho.; signal pres	19x3.5x16.25	36	\$699
55W	Short circuit; thermal	No	No	Power; normal & hot,	19x3.5x16.25	28	\$549
140W	Short circuit; thermal	No	No	Power; cold & hot; sig pres	19x5.2x16.65	55	\$1,199
1,400W	B+ fuse	Yes	No	Yes	19x8.75x11	75	\$7,000
1,400W	B+ fuse	Yes	No	Yes	19x8.75x11	75	\$9,500 (pair)
780W	Short circuit; hi temp; DC offset	No	No	Pwr on; high temp; all 6 chans: sgnl prsnt; clip	19x3.5x12.7	25	\$1,099
N/A	Short circuit; thermal ovrid; DC; RF	Yes	No	On; DDT	19x1.75x12.5	16.9	\$460
N/A	Short circuit; thermal ovrid; DC; RF	No	No	On; DDT 3.5	19x3.75x16.88	30.3	\$700
N/A	Short circuit; thermal ovrid; DC; RF	Yes	No	On; DDT	19x5.25x17	37	\$900
N/A	Short circuit; thermal ovrid; DC; RF	Yes	No	On; DDT	19x5.25x17	51	\$1,100
N/A	Short circuit; thermal ovrid; DC; RF	Yes	No	On; DDT	19x3.5x9.6	15.6	\$300
N/A	Short circuit; thermal ovrid; DC; RF	Yes	No	On; DDT	19x5.25x9	30	\$400
N/A	Short circuit; thermal ovrid; DC; RF	Yes	No	On; DDT	19x5.25x13	43.5	\$600
N/A	Short circuit; thermal ovrid; DC; RF	Yes	No	On; DDT	19x7x14	58.7	\$800
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; clip; protect; signal	19x12x3.5	25	\$775
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; sgnl lddr; clip; prtct; parallel/bridge mode	19x3.5x13.25	21	\$838
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; clip; protect; signal	17.9x3.5	42	\$1,425
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; clip; protect; signal	17.9x5.25	54	\$1,800
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; clip; protect; signal	17.9x5.25	69	\$2,600
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; sgnl lddr; clip; prtct; parallel/bridge mode	17.9x3.5	18	\$1,698
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; clip; signal; standby	17.9 x 3.5	18	\$1,748
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; clip; signal; standby; protect	17.9x3.5	18	\$1,778
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; clip; signal; standby	17.9 x 3.5	18	\$1,778
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; clip; signal; standby	17.9 x 3.5	18	\$1,948
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; clip; signal; standby; protect	17.9x3.5	18	\$2,028
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; clip; signal; standby; protect	17.9x3.5	18	\$2,198
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; clip; signal; standby	17.9 x 3.5	18	\$2,068
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; sgnl lddr; clip; prtct; parallel/bridge mode	19x3.5x13.25	21	\$978
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; sgnl lddr; clip; prtct; parallel/bridge mode	19x3.5x13.25	21	\$1,258
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; sgnl lddr; clip; prtct; parallel/bridge mode	19x3.5x13.25	21	\$1,398
N/A	Full short circuit; thermal mtng; ultrasonic/RF	No	No	On; sgnl lddr; clip; prtct; parallel/bridge mode	19x3.5x13.25	21	\$1,638
N/A	DC; thermal overload	Yes	No	Signal; clip LEDs	19x3.5x15.9	35	\$549
N/A	DC; thermal overload	Yes	No	Signal; clip LEDs	19x3.5x15.9	40	\$649
N/A	DC; thermal overload	Yes	No	Signal; clip LEDs	19x3.5x15.9	40	\$899
2,200W	Main fuse; chan fuses; forced cooling	No	No	Chan-rdy LED; clip limit LED; SOA limit LED	19x5.25x11	44	\$1,649
N/A	Yes	No	Yes	Yes	19x14.375x1.9375	11.1	\$795
240W	Short circuit; thermal; DC offset	No	No	Prot LED; 5-seg/3-color lvl mtrs; Pwr LED; spkr-dsbl LED (for headphone)	17.5 (19 w/rack ears incl) x 1.75x11.5	15.6	\$260
838W	Thermal; DC offset	Yes	No	Clip; idle; protect; pwr	19x5.2x9.2	13.7	\$300
420W	Short circuit; thermal ovrid; DC offset	No	No	Clip; peak; protect; power	19x1.72x10.4	14.3	\$380
430W; 480W	Thermal; DC offset	Yes	No	Clip; idle; protect; power	19x3.5x9.5	17.6	\$450

# POWER AMPS

MANUFACTURER	MODEL	CONTINUOUS AVG. POWER INTO 8 $\Omega$ (20 Hz–20 kHz $\pm 1$ dB)	CONTINUOUS AVG. POWER INTO 4 $\Omega$ (20 Hz–20 kHz $\pm 1$ dB)	FREQUENCY RESPONSE	SIGNAL- TO-NOISE	TOTAL HARMONIC DISTORTION	DAMPING FACTOR	SLEW RATE
Samson	Q5 Headphone Amp	500W per channel	N/A	20 Hz–20 kHz	N/A	<.003%	N/A	N/A
Sony	SRP-P50	50W per channel	75W per channel	20 Hz–20 kHz	N/A	<.05%	N/A	N/A
Soundtech	PL200	65W per channel	100W per channel	20 Hz–20 kHz	90 dB	<0.1%	>300:1	48 V/ $\mu$ s
Soundtech	PL600M	255W mono	395W mono	20 Hz–20 kHz	90 dB	<0.1%	>300:1	40 V/ $\mu$ s
Soundtech	PL602	200W per channel	300W per channel	20 Hz–20 kHz	120 dB	<0.1%	>300:1	40 V/ $\mu$ s
Soundtech	PL350M	150W mono	230W mono	20 Hz–20 kHz	90 dB	<0.1%	>300:1	40 V/ $\mu$ s
Soundtech	PL802	230W per channel	400W per channel	20 Hz–20 kHz	90 dB	<0.1%	300:1	40 V/ $\mu$ s
Soundtech	PL1204	190W per channel	280W per channel	20 Hz–20 kHz	100 dB	<0.05%	300:1	40 V/ $\mu$ s
Soundtech	PL1402	390W per channel	620W per channel	20 Hz–20 kHz	100 dB	<0.05%	300:1	40 V/ $\mu$ s
Soundtech	PS802	230W per channel	400W per channel	20 Hz–20 kHz	120 dB	<0.05%	200:1	42 V/ $\mu$ s
Soundtech	PS1602	525W per channel	620W per channel	20 Hz–20 kHz	100 dB	<0.05%	200:1	56 V/ $\mu$ s
Stewart Audio	PR-1000	200W per channel	350W per channel	15 Hz–20 kHz	>108 dB	<0.05%	>500	>35 V/ $\mu$ s
Stewart Audio	PR-500	110W per channel	190W per channel	15 Hz–20 kHz	>108 dB	<0.05%	>500	>35 V/ $\mu$ s
Stewart Audio	World 1.2	240W per channel	420W per channel	20 Hz–20 kHz	>100 dB	<0.1%	>500	>30 V/ $\mu$ s
Stewart Audio	World 1.6	390W per channel	650W per channel	20 Hz–20 kHz	>100 dB	<0.1%	>500	>30 V/ $\mu$ s
Stewart Audio	World 2.1	400W per channel	650W per channel	20 Hz–20 kHz	>100 dB	<0.1%	>500	>30 V/ $\mu$ s
Stewart Audio	World 250	70W per channel	120W per channel	20 Hz–20 kHz	>100 dB	0.05%	>500	>30 V/ $\mu$ s
Stewart Audio	World 600	110W per channel	190W per channel	20 Hz–20 kHz	>100 dB	<0.1%	>500	>30 V/ $\mu$ s
Stewart Audio	PA-50B	25W per channel	50W per channel	20 Hz–20 kHz	100 dB	<0.08%	>200 @ 8 $\Omega$	30 V/ $\mu$ s
Stewart Audio	PA-100B	50W per channel	90W per channel	20 Hz–20 kHz	98 dB	<0.08%	>200 @ 8 $\Omega$	30 V/ $\mu$ s
Stewart Audio	PA-200B	50W per channel	90W per channel	20 Hz–20 kHz	98 dB	<0.08%	>200 @ 8 $\Omega$	30 V/ $\mu$ s
Stewart Audio	CVA-7400	N/A	200W per channel	30 Hz–20 kHz	>100 dB	<1%	>500	30 V/ $\mu$ s
Stewart Audio	CVA-7800	N/A	400W per channel	30 Hz–20 kHz	>100 dB	<1%	>500	30 V/ $\mu$ s
Stewart Audio	CA-400	110W per channel	200W per channel	20 Hz–20 kHz	>100 dB	<0.1%	>500	30 V/ $\mu$ s
Stewart Audio	CA-800	200W per channel	400W per channel	20 Hz–20 kHz	>100 dB	1kHz 0.1%	>500	30 V/ $\mu$ s
Studiomaster	940 E	210W per channel	350W per channel	20 Hz–20 kHz	100 dB	0.008%	200	20 V/ $\mu$ s
Studiomaster	1500 E	375W per channel	600W per channel	20 Hz–20 kHz	100 dB	0.015%	200	20 V/ $\mu$ s
Studiomaster	2000 E	500W per channel	800W per channel	20 Hz–20 kHz	100 dB	0.015%	200	20 V/ $\mu$ s
Studiomaster	600E	140W per channel	210W per channel	20 Hz–20 kHz	100 dB	0.015	100	12 V/ $\mu$ s
Tascam	PA-20MKII	N/A	25W per channel	20 Hz–20 kHz	85 dB	0.05%	80 @ 8 $\Omega$	N/A
Tube Works	1160 MosValve	60W per channel	80W per channel	N/A	>95 dB	N/A	N/A	N/A
Tube Works	1500 MosValve	185W per channel	250W per channel	N/A	>97 dB	N/A	N/A	N/A
Whirlwind	P-12	11W per channel	14W per channel	20 Hz–20 kHz	>96 dB	0.2% @ 6 W	N/A	9.6 V/ $\mu$ s
Yamaha	A100A	50W per channel	N/A	20 Hz–20 kHz	107 dB	0.2%	>70	10 V/ $\mu$ s
Yamaha	CP2000	400W per channel	600W per channel	20 Hz–50 kHz	104 dB	0.1%	>200 (ref 8 $\Omega$ )	N/A
Yamaha	P1000	160W per channel	200W per channel	10 Hz–50 kHz	101 dB	0.05%	>200 (ref 8 $\Omega$ )	$\pm 30$ V/ $\mu$ s
Yamaha	P3200	340W per channel	440W per channel	10 Hz–50 kHz	104 dB	0.05%	$\geq 200$ (ref 8 $\Omega$ )	$\pm 30$ V/ $\mu$ s
Yamaha	P4500	460W per channel	620W per channel	10 Hz–50 kHz	105 dB	0.05%	200 (ref 8 $\Omega$ )	30 V/ $\mu$ s
Yorkville Sound	SR-300	110W per channel	150W per channel	20 Hz–20 kHz	95 dB	<0.015%	>400	20 V/ $\mu$ s



POWER CONSUMPTION	PROTECTION FEATURES	AC CIRCUIT BREAKER	GROUND LIFT	INDICATOR LIGHTS	DIMENSIONS (INCHES)	WEIGHT (LBS.)	PRICE
N/A	N/A	No	No	Power	8.9x1.7x6.9	2	\$180
160W	N/A	N/A	N/A	2-color input/peak/fault-front panel LEDs	19x1.75x13.75	17	\$545
310W; 335W	Thermal protection; DC offset	Yes	No	Clip; protect; power; mono bridge	19x1.72x10.4	14.3	\$380
N/A	Thermal; DC offset	Yes	No	Clip; protect; power	3.5x19x14	33.5	\$550
1,080W	Short circuit; thermal ovrid; DC offset; current limit; power-up/down	Yes	No	Clip; protect; power; mono bridge	19x3.47x14	34.1	\$550
N/A	Thermal; DC offset	Yes	No	Clip; protect; power	19x3.5x14	26.4	\$550
1,080W	Thermal overload; DC offset	Yes	No	Clip; protect; power; mono bridge	19x5.23x16	38	\$700
1,800W	Thermal overload; DC offset	Yes	No	Clip; protect; power; mono bridge	19x3.5x16	52	\$1,000
1,900W	Thermal overload; DC offset	Yes	No	Clip; protect; power; mono bridge	19x5.23x16	40	\$1,000
1,080W	Short circuit; thermal overload; DC offset; current limit	Yes	Yes	Clip; protect; power; mono bridge	19x1.72x14	15.8	\$600
1,900W	Thermal overload; DC offset	Yes	No	Clip; protect; power; mono bridge, temperature	19x3.5x14	21	\$1,100
5.25 amps	7-stg crct guard; short circuit; thermal ovrid; DC offset; RF	Yes	No	Clip; signal; power	19x1.72x15	11	\$1,099
3.5 amps	7-stg crct guard; short circuit; thermal ovrid; DC offset; RF	Yes	No	Clip; signal; power	19x1.72x15	10	\$799
6 amps	7-stg crct guard; short circuit; thermal ovrid; DC offset; RF	Yes	No	Clip; signal; power	19x1.72x15	11	\$999
5 amps	7-stg crct guard; short circuit; thermal ovrid; DC offset; RF	Yes	No	Clip; signal; power	19x1.72x15	16	\$1,199
5 amps	7-stg crct guard; short circuit; thermal ovrid; DC offset; RF	Yes	No	Clip; signal; power	19x1.72x15	17	\$1,399
5.25 amps	7-stg crct guard; short circuit; thermal ovrid; DC offset; RF	Yes	No	Clip; signal; power	19x1.72x5.5	5.5	\$469
5.8 amps	7-stg crct guard; short circuit; thermal ovrid; DC offset; RF	Yes	No	Clip; signal; power	19x1.72x15	10	\$699
100W	N/A	Yes	No	1/4" TRS input; barrier strip output	8.2x1.75x6.2	3.5	\$325
100W	N/A	Yes	No	1/4" TRS input; barrier strip output	8.2x1.75x6.2	5.5	\$425
200W	N/A	Yes	No	1/4" TRS input; 1/4" phone outputs	8.5x1.75x10.2	5.5	\$455
120 VAC	7-stage circuitguard protection/VIF limiting	Yes	No	3 pin XLR; barrier strip output	19x1.75x15.3	10	\$749
120 VAC	7-stage circuit protection/VIF limiting	Yes	No	3 pin XLR; barrier strip inputs	17.5x19x14.8	11	\$1,049
120 VAC	7-stage circuitguard protection/VIF limiting	Yes	No	3 pin XLR; barrier strip inputs	1.75x19x14.8	10	\$749
120 VAC	7-stage circuitguard/VIF limiting	Yes	No	3 pin XLR; barrier strip inputs	1.75x19x14.8	11	\$1,049
8.6 amps	Gated power stage; crow bar speaker protection	No	Yes	Peak; temp; fault; mono; bridge; power	17x16x3 9/16	38	\$690
15 amps	Gated power stage; crow bar speaker protection	No	Yes	Peak; temp; fault; mono; bridge; power	19x3.5x17.1	42	\$895
20 amps	Gated power stage; crow bar speaker protection	No	Yes	Peak; temp; fault; mono; bridge; power	19x3.5x17.1	45	\$1,195
6 amps	Gated power stage; crow bar speaker protection	No	Yes	Peak; temp; fault; power	19x3.5x17.1	30	\$500
90W	DC balance; overload	Yes	Yes	Clip; power; protect	19x1.72	9.9	\$250
400W	Short circuit; thermal	N/A	N/A	Power (1)	19x3.5x7	13	\$419
1,400W	Short circuit; thermal; time delay turn-on relay	N/A	N/A	Power (1); clip (2)	19x3.5x11.5	30	\$699
75W	SOAR	No	Yes	Clip	19x1.75	N/A	\$300
120W	Short circuit; thermal; DC detector	No	No	Meters; clip indic	19x3.5x11.5	10	\$329
400W	On mute; short circuit; thermal; DC detector	N/A	No	Signal; limit; protect; temp; power	19x3.5x16.5	30	\$799
600W	On mute; thermal; DC detector	N/A	No	Power; temp; protection; clip; signal	19x3.5x18	34	\$599
400W	On/off; mute; short circuit; thermal; DC detector	N/A	No	Signal; clip; power; protect; temp	19x3.5x18	32	\$849
500W	On/off; short circuit; thermal; DC detector	N/A	No	Signal; clip; power; protect; temp		34.5	\$999
500W	Current limit; thermal	Yes	No	Activity; clip; limit	19x15x3.5	22.5	\$499

# REFERENCE MONITORS

MANUFACTURER	PRODUCT	ENCLOSURE TYPE	POWERED / UNPOWERED	FREQUENCY RESPONSE	SENSITIVITY	CROSSOVER FREQUENCY	WOOFER SIZE AND TYPE
Alesis	Monitor One Mk2	Superported	Unpowered	45 Hz–18 kHz	88 dB	2.5 kHz	6.5" polypropylene cone
Alesis	M1 Active Mk2	Ported	Powered	45 Hz–22 kHz	N/A	2 kHz	6.5" non-woven carbon fiber
Alesis	ProLinear 820	Ported	Powered	40 Hz–20 kHz	90 dB	N/A	8" non-woven carbon fiber
Ambiance Acoustics	California Cube Loudspeaker System	Vented	Passive enclosure, outboard processor	38 Hz–16.5 kHz (-5 dB)	90 dB	N/A	N/A
Ambiance Acoustics	Super Cube Loudspeaker System	Vented	Passive enclosure, outboard processor	38 Hz–16.5 kHz (-5 dB)	91 dB	N/A	N/A
Ambiance Acoustics	Hyper Cube Loudspeaker System	Vented	Passive enclosure, outboard processor	38 Hz–16.5 kHz (-5 dB)	92 dB	N/A	N/A
ATC	SCM10 Pro	Sealed	Unpowered	65 Hz–20 kHz (-6 dB)	80 dB	2.8 kHz	5"
ATC	SCM100A Pro	Sealed	Powered	32 Hz–20 kHz (-6 dB)	-115 dB	380 Hz, 3.5 kHz	12" superlinear
ATC	SCM20 Pro	Sealed	Unpowered	60 Hz–20 kHz (-6 dB)	86 dB	2.8 kHz	6.5" superlinear
ATC	SCM50A Pro	Ported reflex	Powered	38 Hz–20 kHz (-6 dB)	N/A	380 Hz, 3.5 kHz	9" superlinear
ATC	SCM20A Pro	Sealed 20 liter cast aluminum	Powered	N/A	N/A	2.8 kHz	6.5" superlinear
Audix	N-5	Bass reflex	Unpowered	40 Hz–20 kHz	87 dB	2.2 kHz	7" Kevlar
Audix	N-10	Bass reflex	Unpowered	40 Hz–20 kHz	89 dB	2.2 kHz	2x7" Kevlar
Audix	Studio 1A	Bass reflex	Unpowered	55 Hz–18 kHz	87 dB	3 kHz	6.5" poly
Audix	PH150	Bass reflex	Powered	50 Hz–20 kHz	86 dB	2.5 kHz	5.25" poly
Audix	PH250	Wood composite	Powered	50 Hz–18 kHz	96 dB	2.5 kHz	5.25" poly
Bag End	D10E-I Subwoofer	Sealed	Unpowered	8–95 Hz (±3dB w/ELF processor)	92 dB	N/A	2x10" EL-10 woofers
Bag End	Infrasub-18 Subwoofer	Sealed	Powered	8–95 Hz (±3 dB)	N/A	N/A	18" EL-18P woofer
Bag End	MM-8 Nearfield Monitor	Ported	Unpowered	95 Hz–20 kHz (±3 dB)	93 dB	Time-Align EQ filter @ 2.9 kHz	8" LF
Bag End	MM-8H	Ported	Unpowered	95 Hz–20 kHz (±3 dB)	93 dB	Time-Align EQ filter @ 2.9 kHz	8" LF
Barbetta	D-10	Ported reflex	MOSFET powered biamp	39 Hz–22 kHz (±1 dB)	N/A	2,330 Hz	10" carbon fibre
Barbetta	DIVA D-9	Ported reflex	MOSFET powered	36 Hz–20 kHz (±1 dB)	N/A	2,345 Hz	8" polymer treated, rubber surround
Behringer	Truth B2031	2-way high-resolution active studio monitor	Manual, auto	50 Hz–20 kHz	116 dB	2 kHz	22 cm (8.75") polycarbonate diaphragm
Carvin	SRS 6.5	Ported reflex	Unpowered	50 Hz–20 kHz	92.5 dB	Switchable	6.5 Kevlar
Cerwin Vega	CM-80	8" 2-way	Unpowered	40 Hz–20 kHz	93 dB	2.5 kHz	8" woofer with diecast aluminum frame
Diamond Audio	S2 Pro-Media 1060 Powered Subwoofer	Dual-port	Powered	50–140 Hz	N/A	12 dB/octave continuously variable from 70 to 140 Hz	6.5" long-throw neodymium DVC subwoofer
Diamond Audio	S2 Pro-Media 1100 Powered Subwoofer	Dual-port vented	Powered	30–140 Hz	N/A	12 dB/octave continuously variable from 70 to 140 Hz	8" long-throw neodymium DVC subwoofer
Diamond Audio	S2 Pro-media 4100 System	Dual-port vented	Powered	50 Hz–20 kHz (±3 dB)	N/A	120 Hz: 12 dB/octave active (HP and LP); 3.5 kHz: 12/6 dB/octave passive (HP/LP)	8" long-throw neodymium DVC subwoofer
Dynaudio Acoustics	BM5	Composite	Unpowered	55 Hz–29 kHz	87 dB	2.5 kHz	7"
Dynaudio Acoustics	BM6A/ BM6	Composite	Powered	42 Hz–21 kHz	86 dB	2.2 kHz	7"
Dynaudio Acoustics	BM15A/ BM15P	Composite	Powered	40 Hz–21 kHz	88 dB	2.2 kHz	10"
Dynaudio Acoustics	M1	Composite	Unpowered	50 Hz–20 kHz	88 dB	2 kHz	2x6"
Dynaudio Acoustics	BX30	Subwoofer	Powered	22–120 Hz	115 dB	95 Hz	2x12"
Edirol	DM-5 Powered Speakers	Bass reflex	Powered	68 Hz–22 kHz	N/A	2.3 kHz	5" foam polypropylene
Edirol	ED MA-150U Speakers	Bass reflex	Powered	68 Hz–22 kHz	N/A	2.3 kHz	5" (foam polypropylene)
Edirol	ED MA-110 Powered Speakers	Bass reflex	Powered	75 Hz–18 kHz	87 dB	N/A	12 cm (magnetically shielded)
Electro-Voice	Sentry 100A	Vented	Unpowered	45 Hz–18 kHz	91 dB	2 kHz	8"



MIDRANGE SIZE  
AND TYPETWEETER SIZE  
AND TYPEMAGNETIC  
SHIELDINGCABINET  
DIMENSIONS  
(HxWxD)

WEIGHT (LBS.)

NOTES

PRICE  
(PER PAIR)

N/A

1" silk dome

Yes

5x8.5x10

15

5-way binding posts

\$299

N/A

1" silk dome

Yes

8.5x15x9.25

21

Bi-amplified; shielded; new HF/LF transducers

\$649

N/A

1" silk dome

Yes

15x16.5x10.5

39

Bi-amplified; shielded; 4-band fully parametric digital EQ module  
serial interface; software

\$1,500

(4) 4.5" full-range drivers

N/A

No

13.6x13.6x13.6

Enclosure: 27  
equalizer: 3

System includes two speakers and one processor

\$1,295

(9) 4.5" full range drivers

N/A

No

13.6x13.6x13.6

Enclosure: 32  
equalizer: 3

System includes two speakers and one processor

\$1,595

(16) 4.5" full range drivers

N/A

No

13.6x13.6x13.6

Enclosure: 40  
equalizer: 3

System includes two speakers and one processor

\$1,995

N/A

1" soft dome

Optional

15x7.1x10

22

\$1,900

3" soft dome

1" soft dome

Optional

32.8x15.7x22.29

143

\$12,999

N/A

1" soft dome

Optional

17.3x9.8x12.4

50.6

\$3,200

3" soft dome

1" soft dome

Optional

28.2x13.8x18.8

107.8

\$9,999

N/A

1" soft dome

Optional

17.6x10.6x12.2

66

\$5,400

N/A

1" cloth dome

No

15x9.5x11

24

\$1,495

N/A

1" cloth dome

No

22x10x13.5

45

\$1,995

N/A

1" cloth dome

Optional

13x9x10

18

\$599

N/A

1" dome

Yes

9x6x9

18

\$479

N/A

1" dome

Yes

12.5x10x8

36

\$649

N/A

N/A

No

13x22x13

44

Studio subwoofer for use w/ELF processor

\$760

N/A

N/A

No

23.5x21.25x18.25

88

Time-align subwoofer w/8 Hz response; 400W power amp

\$1,670

N/A

1.75" aluminum  
compression HF

No

16.5x12.5x8.5

28

For use w/ELF subwoofer; EQ; polarity switch

\$2,640

N/A

1.75" aluminum  
compression HF

No

16.5x12.5x8.5

29

Includes cloth grille (no switches)

\$2,440

N/A

1" silk dome

Optional

14.5x12x17

47

Bi-amplified; patented active control technology

\$2,699

N/A

1" silk dome

Optional

14.5x10.75x11

36

Bi-amplified; patented circuitry

\$1,799

N/A

25 mm  
ferrofluid-cooled dome

N/A

15.75x9.84x11.41

30.8

2-way active; well-balanced vertical and horizontal dispersion;  
2 amplifiers; XLR & phone

\$799

N/A

N/A

Yes

9.25x9x14.75

21

Contour switch

\$280

N/A

1" system-matched  
dome tweeter

No

10.88 x20x1.5

26

Rear-loaded bass reflex cabinet design

\$600

N/A

N/A

Yes

11.5x8.5x14.5

20

RCA (line lvl) or push-type spkr cnctrs  
(amplified lvls); bass output lvl cntr; polarity switch

\$289

N/A

N/A

Yes

16.5x8.5x17

30

RCA (line lvl) or push-type spkr cnctrs  
(amplified lvls); bass output lvl cntr; polarity switch

\$399

4.5" neodymium (midbass)

0.5" poly-aluminum  
composite dome tweeter

Yes

Sub: 16.5x8.5x17;  
satellite: 7.25x5x4.5

48

4-pc satellite/subwoofer system; S2 DS1 spkr stnds;  
mic input w/lvl cntr; S2 TP-1 for use w/existing preamps

\$649

N/A

1"

Yes

12x8x10

12.5

\$799

N/A

1"

N/A

15x9x12/  
13x8x10

26.4/15.2

\$2,599/\$1,169

N/A

1"

N/A

18x11x5/  
17x10x13

41.8/27.1

\$3,599/\$1,529

N/A

1"

N/A

8x18x12

31

\$3,199

N/A

N/A

N/A

16x24x21

69.3

\$2,200 ea

N/A

3/4" soft dome

Yes

7.75x10.5x12.25

17.6

Digital input; 24-bit; S/PDIF

\$595

N/A

3/3"  
soft dome type

Yes

7.75x10.5x12.25

17.6

Digital input 24-bit; S/PDIF

\$595 ea

3 cm cone tweeter  
magnetically shielded

Yes

9.65x5.75x7.75

11

\$185

N/A

Superdome (high-power)

No

7.25x12x11.13

28

\$1,164

# REFERENCE MONITORS

MANUFACTURER	PRODUCT	ENCLOSURE TYPE	POWERED/ UNPOWERED	FREQUENCY RESPONSE	SENSITIVITY	CROSSOVER FREQUENCY	WOOFER SIZE AND TYPE
Electro-Voice	Sentry 500	Vented	Unpowered	40 Hz–18 kHz ( $\pm 3$ dB)	96 dB	11.5 kHz	12" extended voice coil
Electro-Voice	S-40	Vented	Unpowered	85 Hz–20 kHz	85 dB	3.5 kHz	5.25"
Event Electronics	20/20 Direct Field Monitor	Ported	Unpowered	50 Hz–20 kHz, $\pm 2$ dB	88 dB	2.2 kHz, 2nd-order	8" mineral-filled polypropylene cone
Event Electronics	20/20bas Bi-amplified System	Ported	Powered	35 Hz–20 kHz, $\pm 3$ dB (-2 dB @ 38 Hz)	N/A	2.6 kHz, active fourth order	8" mineral-filled polypropylene cone
Event Electronics	Project Studio 5 Bi-amplified Direct Field Monitor	Ported	Powered	53 Hz–19 kHz ( $\pm 3$ dB)	N/A	2.6 kHz, active second order	5.25" mineral-filled polypropylene cone
Event Electronics	Project Studio 6 Bi-amplified Direct Field Monitor	Ported	Powered	45 Hz–20 kHz ( $\pm 3$ dB)	N/A	2.6 kHz, active fourth order	6.5" mineral-filled polypropylene cone
Event Electronics	Project Studio 8 Bi-amplified Direct Field Monitor	Ported	Powered	35 Hz–20 kHz ( $\pm 3$ dB)	N/A	2.6 kHz, active fourth order	8" mineral-filled polypropylene cone
Event Electronics	20/20/15 System Subwoofer	Ported	Powered	28–120 Hz (-3 dB)	N/A	LFE: 120 Hz, third order; monitor: variable, 30–80 Hz, third order	15" high temperature long throw coated cone
Event Electronics	20/20/12 System Subwoofer	Ported	Powered	28–120 Hz (-3 dB)	N/A	LFE: 120 Hz, third order; monitor: variable, 30–80 Hz, third order	12" high temperature long throw coated cone
FBT	MaxX 2	Ported	Unpowered	50 Hz–20 kHz	97 dB	1.8 kHz	10" paper cone; neodymium magnet
FBT	MaxX 2A	Ported	Powered	50 Hz–20 kHz	97 dB	1.8 kHz	10" paper cone; neodymium magnet
FBT	MaxX 4	Ported	Unpowered	50 Hz–20 kHz	98 dB	1.8 kHz	12" paper cone; neodymium magnet
FBT	MaxX 4A	Ported	Powered	50 Hz–20 kHz	98 dB	1.8 kHz	12" paper cone; neodymium magnet
FBT	MaxX 9S	Bass reflex	Unpowered	40–125 Hz	97 dB	N/A	15" dual coil; neodymium magnet
FBT	MaxX 9SA	Bass reflex	Powered	40–125 Hz	97 dB	N/A	15" dual coil; neodymium magnet
FBT	Jolly 3	Ported	Unpowered	80 Hz–20 kHz	93 dB	3.5 kHz	5" polypropylene-coated paper cone
FBT	Jolly 3A	Ported	Powered	80 Hz–20 kHz	93 dB	3.5 kHz	5" polypropylene-coated paper cone
FBT	Esprit 3.0	Ported	Unpowered	70 Hz–19 kHz	97.5 dB	3.5 kHz	10" polypropylene-coated paper cone
FBT	Esprit 3.0A	Ported	Powered	70 Hz–19 kHz	97.5 dB	3.5 kHz	10" polypropylene-coated paper cone
FBT	EN 5.0 Subwoofer	Bandpass	Unpowered	45–200 Hz	97.5 dB	200 Hz	12" dual coil (8 $\Omega$ & 8 $\Omega$ )
FBT	EN 5.0A Subwoofer	Bandpass	Powered	45–200 Hz	97.5 dB	200 kHz	12" dual coil (8 $\Omega$ & 8 $\Omega$ )
Fostex	6301BEA	Sealed	Powered	80 Hz–13 kHz	84 dB	N/A	N/A
Fostex	NF-1	Ported bass reflex featuring HP sound reflectors	Unpowered	50 Hz–40 kHz	89 dB	10 kHz	6.5" cone
Fostex	NF-1A	Ported bass reflex featuring HP sound reflectors	Powered	50 Hz–40 kHz	89 dB	10 kHz	6.5" cone
Fostex	PS-3.1	Sub: ported bass reflex; satellites: sealed full range	Powered	80 Hz–20 kHz	60 mV	N/A	5.25" cone in sub
Fostex	SPA-11	Sealed; dual cone	Powered	60 Hz–18 kHz	92 dB/1W	N/A	None
Galaxy	Hotspot Chameleon HF	Ported	Unpowered	50 Hz–29 kHz ( $\pm 6$ dB)	0.92 dB	N/A	5" poly paper woofer



MIDRANGE SIZE AND TYPE	TWEETER SIZE AND TYPE	MAGNETIC SHIELDING	CABINET DIMENSIONS (HxWxD)	WEIGHT (LBS.)	NOTES	PRICE (PER PAIR)
N/A	1" superdome coupled to dispersion control device	No	23.75x27x13	70	Step-down mode allows operation down to 25 Hz	\$1,960
N/A	1"	Yes	9.8x7.0x5	5.7		\$398
N/A	1" ferrofluid-cooled silk dome	Yes	14.75x10.25x11.75	22	Front-mounted lrg-diam port; 5-wy bndng psts	\$399
N/A	1" ferrofluid-cooled silk dome	Yes	14.75x10.25x11.75	30	200W per side; low/high freq & trim cntrls; sbstnc ltr; RF prot; gold 1/4"/XLR combo cntrls	\$999
N/A	1" ferrofluid cooled natural soft dome neodymium	Yes	10.5x7.5x9	16.5	100W per side; balanced gold XLR and 1/4" inputs; front-panel volume control; RF interference protection; power-on/clip LED indicator; subsonic filter	\$599
N/A	1" ferro-fluid cooled natural silk dome	Yes	12.5x8.25x10	23	100W per side; balanced gold XLR and 1/4" inputs; input level control; RF interference protection; power-on/clip LED indicator; subsonic filter	\$699
N/A	1" ferro-fluid cooled natural silk dome	Yes	14.75x10.25x11.75	26.5	100W per side; balanced gold XLR and 1/4" inputs; input level control; RF interference protection; power-on/clip LED indicator; subsonic filter	\$849
N/A	N/A	Yes	29x21.5x17.5	88	250W linear amplifier; 117dB max SPL; Full bass management system with continuously variable phase and monitor blend crossover tuning	\$1,199 ea
N/A	N/A	Yes	19.25x22.25x13.5	65	250W linear amplifier; 112dB max SPL; Full bass management system with continuously variable phase and monitor blend crossover tuning	\$899 ea
N/A	1" titanium w/aluminum flat wound voice coil	No	21.5x13.75x12	22	Speakon input jacks	\$800
N/A	1" titanium w/aluminum flat wound voice coil	No	21.5x13.75x12	28.5	3-band parametric EQ; gain; volume controls; ground lift; dual ADAP protection circuitry; clip indicator LEDs; 1/4" & XLR balanced inputs	\$1,400
N/A	1.4" titanium w/aluminum flat wound voice coil	No	25x16x13	28.5	Speakon input jacks	\$1,000
N/A	1.4" titanium w/aluminum flat wound voice coil	No	25x16x13	35	3-band parametric EQ; gain; volume controls; ground lift; dual ADAP protection circuitry; dual clip indicator LEDs; 1/4" & XLR balanced inputs	\$1,700
N/A	N/A	No	25.5x19.5x19	46	Subwoofer with built-in stereo crossover; 1/4" TRS balanced & XLR input/output jacks	\$1,550
N/A	N/A	No	25.5x19.5x19	55	Subwoofer with built-in PWM 900W RMS amplifier; built-in stereo crossover; 1/4" TRS balanced & XLR input/output jacks	\$2,500
N/A	.75" Mylar cone	Yes	10.1x6.4x6.2	7	Available in 4 or 16 $\Omega$ models; white or dark grey finish; wall-/mic stand-mountable w/opt mounts	\$400
N/A	.75" Mylar cone	Yes	10.1x6.4x6.2	9	Built power 60W power amp; 1/4" TRS bal input jack; aux out; gain/vol/tone control; white or dark grey; wall /mic stand mountable, w/optl mounts	\$680
N/A	1.25" Mylar cone w/aluminum flat wound voice coil	Yes	16.9x11.4x11.2	23	1/4" TRS balanced input jacks; white or dark grey	\$880
N/A	1.25" Mylar cone w/aluminum flat wound voice coil	Yes	16.9x11.4x11.2	33	1/4" TRS balanced input jacks; 1/4" aux out jack; gain/volume control; 2-band EQ; ground lift switch; white or dark grey	\$980
N/A	N/A	No	19.7x14.6x19.9	50	Built-in stereo crossover; Left & right channel 1/4" TRS balanced jacks	\$1,400
N/A	N/A	No	19.7x14.6x19.9	65	Built-in stereo crossover; volume control; left & right channel 1/4" TRS & XLR balanced input jacks; 1/4" TRS balanced filtered ouptut jacks	\$2,100
4" full range	N/A	Yes	6.5x4x5	7	Amplifier may be used independently	\$189 ea
N/A	1" soft dome	Yes	13.4 x10.8x10.8	20	'Hyperbolic parabolic' diaphragm for woofer; URD tangential diaphragm edge; push-pull damper; time-aligned encl	\$1,198
N/A	1" soft dome	Yes	13.4x.5x12.6	24	Biamped w/2 60W amps; adj. boost/cut @ 60 Hz & 10kHz; 3dB attenuator at 3kHz; tweeter level adj. $\pm$ 3dB	\$1,998
3" full-range cone in each satellite	N/A	Yes	10x11.25x 8.25 (subwoofer); 7.25x6-.56x4.69 (satellites)	14	Woofer contains 15W amp; x-over; 5W ampsx2 for satellites	\$349 (for entire system)
2x 4" full-range cones	None	No	7x12x7	16.75	100W internal amplifier; mic and line inputs; level control; daisy-chainable and stackable	\$499 ea
N/A	1" ferro fluid cooled soft cloth dome tweeter	N/A	6.75x10.94x6	6	High fidelity; permanent installation loudspeaker	\$338

# REFERENCE MONITORS

MANUFACTURER	PRODUCT	ENCLOSURE TYPE	POWERED/ UNPOWERED	FREQUENCY RESPONSE	SENSITIVITY	CROSSOVER FREQUENCY	WOOFER SIZE AND TYPE
Genelec	1029AP	Ported	Powered	68 Hz–18 kHz ( $\pm 2.5$ dB)	110 dB peak/pair	Electronic (3.3 kHz)	5" coated cone
Genelec	1030AP	Ported	Powered	52 Hz–18 kHz ( $\pm 2.5$ dB)	115 dB peak/pair	Electronic (3.5 kHz)	6.5" polymer composite
Genelec	1091A Active Subwoofer	Ported	Powered	38–85 Hz ( $\pm 2.5$ dB)	103 dB	Electronic (85 Hz)	8" cone
Genelec	1092A	Ported	Powered	33–85 Hz ( $\pm 2.5$ dB)	115 dB	Electronic (85 Hz)	Dual 8" cones
Genelec	2029A Digital Monitor System	Ported	Powered	68 Hz–18 kHz ( $\pm 2.5$ dB)	110 dB	Electronic (3.3 kHz)	5" coated cones
Genelec	2029B Digital Monitor System	Ported	Powered	66 Hz–20 kHz	110 dB peak/pair	3.3 kHz	5" coated paper
Haller	TRM8	Bass reflex	Powered	45 Hz–21 kHz $\pm 2$ dB	N/A	2.5 kHz	8" polypropylene cone
Haller	TRM6	Bass reflex	Powered	55 Hz–21 kHz $\pm 2$ dB	N/A	3.2 kHz	6" polypropylene cone
Haller	TRM10s	Bass reflex	Powered	30–110 Hz $\pm 2$ dB	N/A	Variable 40–110 Hz	Down firing 10" cellulose fiber cone
Haller	TRM12s	Bass reflex	Powered	25–110 Hz $\pm 2$ dB	N/A	Variable 40–110 Hz	Down firing 12" cellulose fiber cone
Haller	M5	MDF cabinet	Unpowered	N/A	N/A	3.2 kHz	5.25" polypropylene cone
HHB	HHB Circle 3	2 way non-ported	Active & passive	70 Hz–20 kHz	83 dB	3.5 kHz	4.5" NRSC cone
HHB	HHB Circle 5	Ported	Active & passive	48 Hz–20 kHz	87 dB	2.6 kHz	8" polymer cone
HHB	HHB Circle Powered Sub	Twin chamber reflex	Powered	33 Hz–120 kHz	1V	5 main ch use Sallen & Key filters @ 120 Hz	12" double magnet
Hot House	ASB 310 Active Sub-Bass System	7th-order twin passive radiator	Powered	20–80 Hz	N/A	80 Hz	10" ultra-high excursion w/2x10" passive radiators
Hot House	ARM 265 Active Reference Monitor	6th-order reflex, heavily braced, rear ported	Bi-amped	30 Hz–20 kHz ( $\pm 1.75$ dB)	Adjustable input gain +4 or -10 line level	1.5 kHz	2x6.5" long throw
Hot House	PRM 165 Passive Reference Monitor	Hybrid 6th-order reflex, heavily braced, rear ported	Passive	49 Hz–20 kHz ( $\pm 1.75$ dB)	91 dB	2.4 kHz	6.5" long throw
JBL	Control 1	Bass reflex	Unpowered	70 Hz–20 kHz (-10 dB)	87 dB	6 kHz	5.25"
JBL	4206	Bass reflex	Unpowered	65 Hz–20 kHz ( $\pm 2$ dB)	87 dB	2.8 kHz	6.5" woofer
JBL	4208	Bass reflex	Unpowered	60 Hz–20 kHz ( $\pm 2$ dB)	89 dB	2.8 kHz	8"
JBL	4408A	Bass reflex	Unpowered	50 Hz–20 kHz ( $\pm 2$ dB)	89 dB	2.5 kHz	8" cast frame
JBL	4410A	Bass reflex	Unpowered	45 Hz–20 kHz ( $\pm 2$ dB)	90 dB	900 Hz, 4 kHz	10" cast frame
JBL	4412A	Bass reflex	Unpowered	45 Hz–20 kHz ( $\pm 2$ dB)	89 dB	850 Hz, 4 kHz	12" cast frame
JBL	LSR28P	Bass reflex	Powered	50 Hz–20 kHz (+1, -1.5 dB)	89 dB	1.7 kHz	8" differential drive
JBL	LSR32	Bass reflex	Unpowered	60 Hz–20 kHz (+1, -1.5 dB)	90 dB	250 Hz, 2.2 kHz	12" neodymium differential drive
JBL	LSR12P	Subwoofer	Powered	28–80 Hz (-6 dB)	96 dB	85 Hz	12" neodymium differential drive
JBL	LSR25P	Die-cast aluminum	Powered	70 Hz–20 kHz (+1, -2dB)	96 dB @ +4 dBu-10dBv	2.3 kHz	5.25 SFG woofer
KRK	Exposé E8	Tuned port	Powered	100 Hz–4 kHz ( $\pm 1$ dB) 46 Hz–22 kHz ( $\pm 2.5$ dB)	+6 to -30 dB	1.7 kHz	8" Kevlar
KRK	K-Rok/S	Tuned port	Unpowered	57 Hz–19 kHz ( $\pm 3$ dB)	92 dB	2.5 kHz	7" latex-coated, long stroke
KRK	M6000/S	Tuned port	Unpowered	62 Hz–20 kHz	89 dB	2.4 kHz	6" polyglass
KRK	M7000B/BS	Tuned port	Unpowered	50 Hz–20 kHz	91 dB	3 kHz	7" Kevlar
KRK	Rokit Personal Shielded Monitor	Tuned port	Unpowered	69 Hz–24 kHz ( $\pm 2$ dB)	91 dB	1.5 kHz	6.5" long stroke polyvinyl
KRK	V8	Tuned port	Powered	47 Hz–23 kHz ( $\pm 2$ dB)	+6 to -30 dB	1.66 kHz	8" woven kevlar
KRK	V6	Tuned port	Powered	30 Hz–50 kHz; -130 Hz (vari) $\pm 2$ dB	+6 to -30 dB	80 Hz Fixed	10" woven kevlar



MIDRANGE SIZE AND TYPE	TWEETER SIZE AND TYPE	MAGNETIC SHIELDING	CABINET DIMENSIONS (HAWK)	WEIGHT (LBS.)	NOTES	PRICE (PER PAIR)
N/A	0.75" metal dome	Yes	10x6x7.25	12.5	XLR ins; pwr indctr; input-sens cntrls; amp/driver-prot; x-overs; EQ	\$1,080
N/A	0.75" metal dome	Yes	12.5x8x9.5	15	XLR ins; pwr indctr; input-sens cntrls; amp/driver-prot; x-overs; EQ	\$2,098
N/A	N/A	No	20x10x9	22.5	XLR ins; pwr indctr; input-sens cntrls; amp/driver-prot; x-overs; bass roll-off EQ; for use w/1029As	\$699
N/A	N/A	Optional	24.25x12.5x20	66	XLR ins; pwr indctr; input-sens cntrls; amp/driver-prot; x-overs; L-C-R in/out; LFE in	\$2,150 ea
N/A	0.75" metal dome	Yes	10x6x7.25	12.5	S/PDIF and XLR ins; all features of 1029A	\$1,325
N/A	0.75" metal dome	Yes	9.75x6x7.25	12.5	24-bit/96 kHz digital interface	\$1,375
N/A	1" soft dome	Yes	15.7/16x10.25x13	35	150W + 75W trans nova amps	\$1,650
N/A	1" soft dome	Yes	13.25x8.875x11.5	25	150W + 33W trans*ana amps	\$1,250
N/A	N/A	No	14.75x16x16	60	200W class G trans*ana ampl; XLR, RCA ins; 90/180/270 dgr phsng	\$745 ea
N/A	N/A	No	18x19.5x19.25	96	200W class G trans*ana ampl; XLR, RCA ins; 90/180/270 dgr phsng	\$845 ea
N/A	Proprietary 25mm silk dome	Yes	12.25x6.75x7	10	4th order Butterworth vented 2-way	\$249
N/A	1" softdome neodymium magnet	Yes	10.6x6.9x7.8	8.1 passive; 11 active	Active amp w/anti thump circ	\$795 active; \$395 passive
N/A	1" softdome with damping chamber	Yes	16.5x10x11.8	10 passive; 12.6 active	Active version: 2 ch amp Class AB	\$1,399 active; \$749 passive
N/A	N/A	No	18.3x16.3x16.3	47.3	Built in 5 ch active filtering	\$1,399
N/A	N/A	No	17x17x18	58	Stereo x-over w/ XLR & RCA I/O; HP outs; sens/lvl mtchng; pk SPL 118 dB	\$2,499
N/A	1" recessed soft dome	N/A	25x14x12	52	Vertically aligned; adj LF/HF; pk SPL per pair 126 dB; avail in black, red, golden oak	\$6,499
N/A	1" recessed soft dome	Yes	212.5x8.5x13	25	Req 100-300W of hi qlty amplification for ruler-flat mastering performance	\$1,299
N/A	0.75" polycarbonate	Yes	9.25x6.25x5.625	4	Multimedia brackets and adapters available	\$314
N/A	1" titanium	Yes	15.375x9x9.5	15	Multiradial baffle	\$396
N/A	1" titanium	Yes	17.75x11.25x9.5	20.5	Multiradial baffle	\$520
N/A	1" titanium dome	No	17.25x11.625x12	26	Mirror image pairs	\$724
5" cast frame	1" titanium dome	No	23.5x14.25x11.25	43	Mirror image pairs	\$1,000
5" cast frame	1" titanium dome	No	14.25x23.5x11.25	47	Mirror image pairs in horizontal configuration	\$1,500
N/A	1" titanium composite on waveguide	No	13x16x12.75	50	Carbon fiber composite baffle	\$2,242
5" neodymium w/2" voicecoil	1" titanium composite on waveguide	No	15.5x25x11.5	47	Carbon fiber composite baffle	\$2,242
N/A	N/A	No	15.5x25x11.5	50	Integrated bass management system	\$1,223
N/A	1" titanium composite with waveguide	Yes	10.6x 6.8x9.5	17		\$978
N/A	1" kevlar	Standard	17x15.25x14.5	61		\$4,799
N/A	1" silk dome	Optional	14x12x9.75	46 (pair)		\$599 (\$750 shielded)
N/A	1" kevlar	Optional	13x9x10	36		\$1,050 (\$1,200 shielded)
N/A	1" kevlar	Optional	14.25x11x11	50		\$1,500 (\$1,800 shielded)
N/A	1" silk dome	Yes	12.5x10.5x8	29 (pair)		\$450
N/A	1" silk dome	Standard	N/A	38 (pair)		\$1,800
N/A	N/A	No	13.017x18.75x17	53 (pair)		\$1,200

# REFERENCE MONITORS

MANUFACTURER	PRODUCT	ENCLOSURE TYPE	POWERED/ UNPOWERED	FREQUENCY RESPONSE	SENSITIVITY	CROSSOVER FREQUENCY	WOOFER SIZE AND TYPE
KRK	S10	Tuned port	Unpowered	30 Hz–50 kHz –130 kHz (variable)±2 dB	+6 to –30 dB	80 kHz fixed	10" woven kevlar
KRK	S12	Slotted port	Powered	31 Hz–50 kHz (variable)±2 dB	N/A	N/A	12" woven kevlar
KRK	V88	Tuned port	Powered	35 Hz–2 kHz (±2 dB)	+6 to –30 dB	1.83 kHz	8" woven kevlar
KRK	V4	Slotted port	Powered	N/A	N/A	N/A	4" coated
KRK	S8	Slotted port	Powered	N/A	N/A	N/A	8" coated paper
Mackie Designs	HR824	Sealed	Powered	39 Hz–20 kHz (±1.5 dB)	>120 dB 1W/1m	2 kHz	8.75" mineral-filled polypropylene cone
Meyer Sound	HM-1S	Tuned bass reflex	Powered	42 Hz–20 kHz	N/A	3 kHz	7" graphite cone driver
M&K Professional	MPS-2810 Subwoofer	Sealed cabinet	Powered	20–125 Hz	N/A	N/A	(2) 8"
M&K Professional	MPS-5320 Subwoofer	Sealed cabinet	Powered	20–125 Hz	N/A	N/A	(2) 12"
M&K Professional	MPS-5150 Subwoofer	Sealed cabinet	Powered	20–125 Hz	N/A	N/A	(2) 12"
M&K Professional	MPS-5410 x Subwoofer	Sealed cabinet	Powered	18–125 Hz	N/A	N/A	(2) 12"
M&K Professional	MPS-5310 Subwoofer	Sealed cabinet	Powered	20–125 Hz	N/A	N/A	(2) 12"
M&K Professional	MPS-5420 Subwoofer	Sealed cabinet	Powered	18–125 Hz	N/A	N/A	(2) 12"
M&K Professional	MPS-1525 Tripole Surround	Sealed cabinet	Unpowered	80 Hz–20 kHz	90 dB	1.8 kHz	(2) 5.25"
M&K Professional	MPS-1625 Tripole Surround	Sealed cabinet	Unpowered	80 Hz–20 kHz	90 dB	1.8 kHz	6.5"
M&K Professional	MPS-2525 Tripole Surround	Sealed cabinet	Unpowered	80 Hz–20 kHz	90 dB	1.8 kHz	(2) 5.25"
M&K Professional	MPS-1610	Sealed cabinet	Unpowered	80 Hz–20 kHz	90 dB	1.8 kHz	6.5"
M&K Professional	MPS-1510	Sealed cabinet	Unpowered	80 Hz–20 kHz	90 dB	1.8 kHz	5.25"
M&K Professional	MPS-1520 Center Channel	Sealed cabinet	Unpowered	80 Hz–20 kHz	90 dB	1.8 kHz	(2) 5.25"
M&K Professional	MPS-2575 Tripole Surround	Sealed cabinet	Unpowered	80 Hz–20 kHz	90 dB	1.8 kHz	(2) 6.5"
M&K Professional	MPS-2550	Sealed cabinet	Unpowered	77 Hz–20 kHz (±2 dB)	90 dB	200 Hz/1,500 Hz	(2) 6.5"
M&K Professional	MPS-2510 Powered	Sealed cabinet	Powered	77 Hz–20 kHz (±2 dB)	90 dB	1.5 kHz	(2) 5.25"
M&K Professional	MPS-2510	Sealed cabinet	Unpowered	77 Hz–20 kHz (±2 dB)	90 dB	1.5 kHz	(2) 5.25"
M&K Professional	MPS-2525P Tripole Surround Monitor	Sealed	Powered	77 Hz–20 kHz	90 dB	1.8 kHz	(2) 5.25"
M&K Professional	MPS-1625P Tripole Surround Monitor	Sealed	Powered	77 Hz–20 kHz	90 dB	1.8 kHz	6.5"
NHT Pro	M-00	2-way; sealed; cast aluminum	Powered	80 Hz–20 kHz	111 dB	N/A	4.5" paper cone
NHT Pro	A-10	2-way; sealed	Dedicated outboard amplifier	50 Hz–20 kHz	116 dB	2 kHz	6.5" paper cone
NHT Pro	A-20	2-way; sealed	Dedicated outboard amplifier	40 Hz–20 kHz	117 dB	2 kHz	6.5" paper cone
NHT Pro	S-00	Acoustic suspension subwoofer	Powered	39 Hz–90 Hz	N/A	Variable 50–90 Hz	8" long throw; treated paper
NHT Pro	C-20	Acoustic suspension	Modular; powered	48 Hz–20 kHz	N/A	N/A	6.5" treated paper; shielded
NHT Pro	B-20	(2) Air suspension subwoofers	Modular powered stereo subwoofer system	29–100 Hz	N/A	5 position variable 70, 85, 95, 105, bypass (230 Hz)	(2) 10" ultra long throw (1" linear peak-peak); treated paper
Paradigm Reference	Active/40	Bass reflex	Powered	32 Hz–22 kHz (±1 dB)	N/A	400 Hz/1.5 kHz	6.5" polypropylene cone



MIDRANGE SIZE AND TYPE	TWEETER SIZE AND TYPE	MAGNETIC SHIELDING	CABINET DIMENSIONS (HxWxD)	WEIGHT (LBS.)	NOTES	PRICE (PER PAIR)
N/A	N/A	No	13x18.75x17	53 (pair)		\$1,200
N/A	N/A	N/A	15x22x20	72		\$1,499
N/A	1.25" silk dome	Standard	N/A	50 (pair)		\$2,400
N/A	1" titanium dome	Standard	N/A	N/A		\$800
N/A	N/A	N/A	N/A	N/A		\$749
N/A	1" alumin-alloy; ferrofluid cooled coil	Yes	15.75x10x10.5	32	Rear mass-loaded passive radiator	\$1,498
N/A	1" soft-dome tweeter	Yes	11.5x8.9x9.7	11	PS-1 pwr supp (\$400); sub-woofer (\$650)	\$2,600
N/A	N/A	Yes	14.5x17.5x12.125	41	Dual driver push-pull; hdrm maximizer; backfire dsgn	\$1,499 ea
N/A	N/A	Yes	23.25x15.5x19.625	82	Dual driver push-pull design; hdrm maximizer; XLR in; THX PM3 appr; backfire dsgn	\$2,100
N/A	N/A	Yes	23.25x15.5x19.625	72	Dual driver push-pull; hdrm maximizer; XLR in; THX PM3 appr	\$1,499
N/A	N/A	Yes	23.25x15.5x26	115	Dual driver push-pull design; hdrm maximizer; XLR in; THX PM3 appr	\$2,999
N/A	N/A	Yes	23.25x15.5x19.625	82	Dual driver push-pull design; headroom maximizer; XLR in; THX PM3 appr	\$1,999
N/A	N/A	Yes	23.25x15.5x26	115	Dual driver push-pull design; headroom maximizer; XLR in; THX PM3 appr; backfire design	\$3,099
(2) 3.5"	1" soft dome	Yes	10.5x8.5x6	11	Switchable power response	\$1,250 ea
(4) 3.5"	1" soft dome	Yes	12.6x10.5x8	14	Switchable power response	\$1,550
(4) 3.5"	(3) 1" soft dome	Yes	12.5x10.5x12	26	Tripole surround monitor; switchable power response	\$1,199
N/A	1" soft dome	Yes	12.6x18.4x7.5	12		\$750 ea
N/A	1" soft dome	Yes	10.5x6.25x7.4	9		\$450 ea
N/A	1" soft dome	Yes	5.6x6.18x8.25	17	Horizontal center channel monitor	\$599 ea
(2) 5.25"; (2) 3.5"	(5) 1" soft dome	Yes	12.375x10.5x14	36	Tripole surround monitor; switchable power response	\$1,599 ea
(2) 5.25"	(3) 1"	Yes	12.5x10.5x14	32	User selectable vertical directivity	\$1,299 ea
N/A	(3) 1" soft dome	Yes	12.5x10.5x12	24	THX PM3 appr; user selectable wide/narrow vertical directivity	\$1,499 ea
N/A	(3) 1" soft dome	Yes	12.5x10.5x12	24	THX PM3 appr; user selectable wide/narrow vertical directivity	\$899 ea
(4) 3.5"	(3) 1"	Yes	12.5x10.5x14	26	Switchable power response	\$2,500
(4) 3.5"	1"	Yes	12.6x10x9	18	Switchable power response	\$2,000
N/A	1" ferrofluid cooled; soft dome	Full, including transformer	9x5.7x7.3	14	Inputs-XLR, TRS, RCA; controls-NF/MF, +4/-10 dBu, auto power	\$750
N/A	1" ferrofluid cooled; soft dome	Yes	12x7.5x10.75 Amp dimensions: 3.5x19x12.75 (2u)	14	XLR/TRS in; output (amp-monitors)-XLR cables; controls listening position-NF/MF, wall prox-0/1, input sensi—10/-3/+4,+11 dBu, mute	\$1,200
N/A	1" ferro fluid cooled; metal dome	Partial	3.5x19x12.75 (2u)	17	XLR/TRS in; output (amp-monitors)-XLR cables; controls listening position-NF/MF, wall prox-0/1, input sensi—10/-3/+4,+11 dBu, mute; LED readout-SPL; VAC; heat sink temp.	\$2,000
N/A	N/A	No	13.25x10.25x13	30	Optional footswitch bypass	\$750 ea
N/A	1" aluminum dome; ferrofluid cooled; shielded	Partial	14x8x9.375	19	Center channel complement for A-20 system	\$1,250
N/A	N/A	N/A	(2) 14x14x16 (inc. grill)	38	Includes 250W/ch control amplifier	\$2,000/system
6.5" mica-polymer cone	1" pure aluminum dome	Yes	21x8x11.5	110/pr	Biampified: 125W/woofer, 50W/tweeter Black ash laminate or light cherry, rosenut, black ash veneer	\$2,000 laminate; \$2,300 veneer

# REFERENCE MONITORS

MANUFACTURER	PRODUCT	ENCLOSURE TYPE	POWERED / UNPOWERED	FREQUENCY RESPONSE	SENSITIVITY	CROSSOVER FREQUENCY	WOOFER SIZE AND TYPE
Paradigm Reference	Active/20	Bass reflex	Powered	36 Hz–22 kHz ( $\pm 1$ dB)	/A	1.5 kHz	6.5" mica-polymer cone
Paradigm Reference	Mini Monitor	Bass reflex	Unpowered	43 Hz–20 kHz ( $\pm 2$ dB)	89 dB	2 kHz	6.5" injection molded copolymer polypropylene
Paradigm Reference	Monitor 3	Bass reflex	Unpowered	36 Hz–20 kHz ( $\pm 2$ dB)	90 dB	2 kHz	8" injection molded copolymer polypropylene
Paradigm Reference	Studio/20	Bass reflex	Unpowered	38 Hz–22 kHz ( $\pm 2$ dB)	89 dB	1.5 kHz	6.5" mica-polymer cone
PMC	IB-1	Transmission line	Unpowered	25 Hz–25 kHz	91 dB	380 Hz, 3.8 kHz	10" flat carbon fiber; Nomey piston driver
PMC	LB-2	Transmission line	Powered (unpowered avail.)	35 Hz–25 kHz	87 dB	2.5 kHz	5" 1 kW pulse; 3" voice coil
PMC	TB-1S	Transmission line	Option	40 Hz–25 kHz	90 dB	3 kHz	6.5" doped-cast magnesium
PMC	TB-2S	Transmission line	Powered (unpowered avail.)	35 Hz–25 kHz	90 dB	3 kHz	6.5" doped-cast magnesium
PMC	XB-1P Subwoofer	Transmission line	Powered (unpowered avail.)	25–200 Hz	90 dB	100 Hz	Die-cast 10" dual voice coil
PMC	PMC LB-1	Transmission line	Option	35 Hz–25 kHz	87 dB	2.5 kHz	4.5" 1 kW pulse with 4" voice coil
PMC	PMC IB-1S	Transmission line	Option	25 Hz–25 kHz	89 dB	380 Hz, 3.8 kHz	10" carbon fiber/Nomex
Precision Systems	T16 Active	Ported	Powered	80 Hz–20 kHz	83 dB	2.8 kHz	6" ATC proprietary
Quested	H108	Bass reflex	Passive	55 Hz–18 kHz	90.5 dB	N/A	8" custom bass driver
Quested	VH3208	Bass reflex	Passive	45 Hz–20 kHz ( $\pm 2$ dB)	92 dB	N/A	2x8" custom bass drivers
Quested	VS2108	Bass reflex	Powered	55 Hz–19 kHz ( $\pm 2$ dB)	N/A	N/A	8" custom bass woofer
Quested	VS2205	Bass reflex	Powered	75 Hz–19 kHz	N/A	N/A	2x5" custom bass cone
Quested	F 11	Bass reflex	Powered	65 Hz–20 kHz ( $\pm 2$ dB)	N/A	N/A	6.5" custom
Quested	F11p	Bass reflex	Passive	65 Hz–20 kHz	84.5 dB	N/A	6.5" custom
Roland	DS-90 24-bit Digital Reference Monitor	Bass reflex	Powered	Flat, w/user-adjustable settings	0 dBm (0.775 Vrms)	2.6 kHz active 4th order	6.5" polypropylene cone
Samson	DMS80 Desktop Monitoring System		Powered w/2x40 W amp included	40 Hz–18 kHz	N/A	N/A	5.25"
Samson	S40 Subwoofer		Powered	20 Hz–100 Hz	N/A	N/A	6.5" bass driver
Samson	Sub120 Subwoofer	Ported/tuned	Powered	18 Hz–800 Hz	N/A	Adjustable	10" large excursion
Soundtech	ST5T	Ported	Unpowered	80 Hz–20 kHz	93 dB	4.5 kHz	5" polypropylene
Soundtech	ST8T	Ported	Unpowered	55 Hz–20 kHz	95 dB	3 kHz	8" impregnated paper
Studer	Active A1 Closefield Monitor	Ported	Powered	58 Hz–22 kHz	0.775V for 100 dB SPL @1m	3.5 kHz	142 mm
Studer	A3 Active Nearfield Monitor	Ported	Powered	43 Hz–23 kHz	0.775V for 100 dB SPL @1m	2.2 kHz	215 mm
Sumiko	Sonus Faber Concertino	Bass reflex	Unpowered	55 Hz–20 kHz ( $\pm 3$ dB)	86 dB	N/A	5.5 PP-treated cone
Sumiko	Sonus Faber Concerto	Bass reflex	Unpowered	45 Hz–20 kHz ( $\pm 3$ dB)	87 dB	N/A	7" cellulose carbonium 7 cone
Sumiko	Sonus Faber Concerto Grand Piano	Sealed	Unpowered	40 Hz–20 kHz ( $\pm 3$ dB)	87 dB	N/A	7" copper ring sys, cell carbonium 7 cone; 7" acrilate carbonium 7 cone pssv rdt
Sumiko	Sonus Faber Solo	Sealed	Unpowered	45 Hz–20 kHz ( $\pm 3$ dB)	86 dB	N/A	2x7" cellulose carbonium 7 cone
Sumiko	Vienna Acoustics Bach	Bass reflex	Unpowered	38 Hz–20 kHz ( $\pm 3$ dB)	90 dB	N/A	7" paper cone



MIDRANGE SIZE AND TYPE	TWEETER SIZE AND TYPE	MAGNETIC SHIELDING	CABINET DIMENSIONS (HxWxD)	WEIGHT (LBS.)	NOTES	PRICE (PER PAIR)
N/A	1" pure aluminum dome	No	14.5x8.25x12.625	80/pr	Bi-amplified: 110W/woofer, 50W/tweeter Black ash laminate or light cherry, rosenut, black ash veneer	\$1,650 laminate; \$1,900 veneer
N/A	1" pure titanium dome	Optional	13.25x8x11.25	31/pr	Black ash, light cherry and dark cherry laminates	\$349
N/A	1" pure titanium dome	Optional	20x9.1915x11.375	48/pr	Black ash, light cherry and dark cherry laminates	\$399
N/A	1" pure aluminum dome	Optional	14.5x8.25x11.375	56/pr	Black ash, light cherry and rosenut laminate and wood veneer	\$650 laminate; \$900 veneer
3" fabric dome	Silk soft dome with double chamber	Optional	30x13x21	65	Available in several finishes	\$4,500
N/A	Silk soft dome with double chamber	Optional	21x7x10.5	Powered: 27; unpowered: 17	Available in several finishes	\$3,660 (\$2,160 unpowered)
N/A	Aluminum alloy phase shield ferrofluid	Yes	16x12x8	18	Optional Briston power modules	\$900
N/A	Aluminum alloy phase shield ferrofluid	Optional	15.75x7.5x11.75	Powered: 30; unpowered: 20	Available in several finishes	\$2,530 (\$1,025 unpowered)
N/A	N/A	No	31x17x10.5	Powered: 71; unpowered: 60	Available in several finishes	\$2,000 (\$1,250 unpowered)
N/A	Silk soft dome w/double chamber	Yes	21x10x7	21	Optional Briston power modules	\$2,160
5.5" doped fabric	3.5" silk dome w/double chamber	Optional	29x18x13	76	Optional Briston power modules	\$4,500
N/A	1"	Optional		40		\$3,800
N/A	1.125" high frequency soft dome	Optional	15x9x9	26	Highly accurate nearfield monitor	\$1,780
3" custom midrange soft dome	1.125" high frequency soft dome	Optional	24x19x16.5	84	Highly accurate midfield	\$4,730
N/A	1.125" high frequency soft dome	Optional	16x13x13	48		\$4,680
N/A	1.125" high frequency soft dome	Yes	10x13x11	29		\$3,490
N/A	28 mm soft dome	Yes	12.5x8.5x11.25	24.5	Bass/treble bsl/cut; lvl cntrl; intgrd mntng points	\$1,960
N/A	28mm	Yes	12.5x9x11.5	26	Integral mounting points	\$1,190
N/A	1" soft dome	Yes	19.6x9x12.7	24	24-bit dgll ins (S/PDIF) on each spkr	\$1,190
N/A	1"	Yes	N/A	N/A		\$300
N/A	N/A	N/A	19x8.7x11	23		\$170 per unit
N/A	N/A	No	N/A	N/A		\$280
N/A	1" polycarbonate	No	9.25x6.25x5.5	5.25	Avail in white (ST5TWH); mounting brackets avail	\$200
N/A	1" linen	No	15.625x10x15.8	13.2	Avail in white (ST8TWH); mounting brackets avail	\$400
N/A	70 mm	Yes	9x6x7	11	Negative impedance and group delay compensation	\$1,590 (\$795 ea)
N/A	100 mm	Yes	16x10x12	28	Negative impedance and group delay compensation	\$3,790 (\$1,895 ea)
N/A	0.75" silk dome; ferrofluid	No	12.5x8.5x11.5	16.5	Walnut finish; piano black lacquer avail (\$1,200)	\$995
N/A	0.75" silk dome; ferrofluid	Yes	13.5x8.75x14.25	24.25	Walnut finish; piano black lacquer avail (\$2,100)	\$1,850
N/A	0.75" silk dome; ferrofluid	Yes	11.5x9.5x39.5	59.5	Piano black lacquer finish	\$3,500
N/A	0.75" silk dome; ferrofluid	Yes	9.25x21.75x8.75	11	Center channel speaker	\$995
N/A	1" silk dome; ferrofluid	Yes	33.7x7.5x9.8	34		\$1,500

# REFERENCE MONITORS

MANUFACTURER	PRODUCT	ENCLOSURE TYPE	POWERED / UNPOWERED	FREQUENCY RESPONSE	SENSITIVITY	CROSSOVER FREQUENCY	WOOFER SIZE AND TYPE
Sumiko	Vienna Acoustics Centerspeaker	Bass reflex	Unpowered	42 Hz–20 kHz (±3 dB)	89 dB	N/A	5.5" XPP cone
Sumiko	Vienna Acoustics Haydn	Bass reflex	Unpowered	42 Hz–20 kHz (±3 dB)	89 dB	N/A	5.5" XPP cone
Sumiko	Vienna Acoustics Mozart	Bass reflex	Unpowered	35 Hz–22 kHz (±3 dB)	90 dB	N/A	2x5.5" XPP cone
Sundholm Acoustics	Sundholm SL 6.5	Ported reflex-front panel	Unpowered	45 Hz–20 kHz (±2 dB)	88 dB	2.5 kHz	6.5" polycarbonate
Sundholm Acoustics	Sundholm SL 5.0	Ported reflex-front panel with wave guide	Unpowered	56 Hz–20 kHz (±3 dB); 150 Hz–20 kHz (±1 dB); 24–28 Hz–20 kHz (±1 dB)	87dB	3.2 kHz	5.25" coated paper cone fully shielded
Sundholm Acoustics	Sundholm SL 8.0	Ported reflex-front panel	Unpowered	40 Hz–20 kHz (±3 dB)	88 dB	2.2 kHz	8" polycarbonate
Sundholm Acoustics	Sundholm PS/10T Powered Sub	Ported reflex-front panel	Powered	34 Hz–100 kHz (±3 dB)	N/A	50–100 Hz variable	10" polycarbonate
Sundholm Acoustics	Sundholm PS/8 Powered Sub	Ported reflex-front panel	Powered	24–100 Hz (±3 dB); 28–100 Hz (±1 dB)	N/A	50–100 Hz variable	8" treated paper cone
Tannoy	System 600	Front ported	Unpowered	52–20 kHz (±3 dB)	90 dB	1.8 kHz	Dual concentric
Tannoy	System 800	Front ported	Unpowered	47 Hz–20 kHz (±3 dB)	92 dB	1.8 kHz	N/A
Tannoy	System 890A	Front ported	Powered	44 Hz–20 kHz	N/A	1.6 kHz	8" Tannoy dual concentric
Tannoy	Reveal Active	Rear ported	Powered	62 Hz–20 kHz	N/A	3 kHz	6.5" bi-laminate shielded bass driver
Tannoy	System 600A	Front ported	Powered	44 Hz–20 kHz (±3 dB)	N/A	1.6 kHz	6.5" Tannoy dual concentric
Tannoy	PS110-B	Vented	Powered	31 Hz–150 kHz	N/A	Variable 40–150 Hz	10" direct radiating
Tannoy	Reveal	Rear Ported	Unpowered	60 Hz–20 kHz	90 dB	3 kHz	6.5" bi-laminate shielded bass driver
Tannoy	Prolo -J		Unpowered	60 Hz–20 kHz ±3 dB	90 dB	3 kHz	6.5" bass driver
Westlake Audio	Lc6.75	Bass reflex	Unpowered	60 Hz–18 kHz	87.5 dB	4 kHz	6.5" polypropylene
Westlake Audio	Lc8.1	Bass reflex	Unpowered	55 Hz–18 kHz	90.5 dB	3.6 kHz	8" polypropylene
Westlake Audio	Lc3w10	Bass reflex	Unpowered	42 Hz–20 kHz	88 dB	160 Hz, 4.5 kHz	10" polypropylene
Westlake Audio	Lc3w12	Bass reflex	Unpowered	40 Hz–18 kHz	91 dB	160 Hz, 4.5 kHz	12" polypropylene
Westlake Audio	Lc265.1	Bass reflex	Unpowered	48 Hz–18 kHz	91 dB	180 H, 4 kHz	6.5" polypropylene
Westlake Audio	BBSM-4	Bass reflex	Unpowered	65 Hz–20 kHz	89 dB	1.5 kHz	4" polypropylene
Westlake Audio	BBSM-5	Bass reflex	Unpowered	55 Hz–20 kHz ±3 dB	90 dB	1.2 kHz	5" polyglass
Westlake Audio	Lc5.75	Bass reflex	Unpowered	60 Hz–18 kHz	86 dB	4.5 kHz	5"
Yamaha	MS20S	Ported reflex	Powered	70 Hz–15 kHz	88 dB	3 kHz	5" paper
Yamaha	MS60S	Bass reflex	Powered	20 Hz–20 kHz	91 dB	2.8 kHz	8" treated paper
Yamaha	MSP5	Bass reflex	Powered	50 Hz–40 kHz	101 dB	2.5 kHz	5" paper cone w/rubber surround
Yamaha	MSP10/10M	2 way, bass reflex	Bi-amplified	40 Hz–40 kHz (-10dB)	-6 dB to +4 (variable)	2 kHz	8" poly w/rubber surround
Yorkville Sound	YSM-1	Bass reflex	Unpowered	40 Hz–20 kHz	90 dB	2.5 kHz	6.5" stamped, proprietary, foam surround



MIDRANGE SIZE AND TYPE	TWEETER SIZE AND TYPE	MAGNETIC SHIELDING	CABINET DIMENSIONS (HxWxD)	WEIGHT (LBS.)	NOTES	PRICE (PER PAIR)
N/A	1" silk dome; ferrofluid	Yes	13.6x6.7x10.2	19	Center channel speaker	\$500
N/A	1" silk dome; ferrofluid	No	13.6x6.7x10.2	19		\$895
N/A	1" silk dome; ferrofluid	No	37x6.7x11.6	44		\$2,500
N/A	1" silk dome tweeter	No	15.5x10.6x11.6	25	Bi-wire connector; time offset correction plate; assym technology	\$795
N/A	1" aluminum dome tweeter; fully shielded	Yes	15x7.75x8	2 each	5.1 mixing system with PS/8 powered sub	\$795
N/A	1" aluminum dome	No	15.5x12x14.25	35	Bi-wire connector; time offset correction plate; Assym technology	\$995
N/A	N/A	No	29x12x15.25	55	Pair serve as speaker stand for full-range monitors	\$899 ea
N/A	N/A	No	15.25x15.25x15.25	50	Phase reversal switch; stacking outputs ; level control	\$820 ea
N/A	N/A	Optional	8.6x14.1x10.5	16.5		\$695
8" dual concentric	N/A	Optional	10.8x17.7x10.5	23		\$995
N/A	N/A	Included	10.875x17.75x11.375	28.5		\$1,995
N/A	1" silk soft dome	Included	13.375x8.25x10.125	18.5		\$899
N/A	N/A	Included	8.62x14.125x11.375	21		\$1,595
N/A	N/A	Optional	17.5x11.83x16.5	33		\$499 ea
N/A	1" silk soft dome	Yes	13.4x8.25x10.25	15.5		\$399
N/A	0.75" soft dome	N/A	13.4x8.25x10.25	24		\$279
N/A	0.75" soft dome	Optional	16x8x10.37	21.5	Electro/mech/acoustical dampening; align signal path	\$1,299
N/A	1" dome	Optional	18x10x11.625	31	Electro/mech/acoustical dampening; align signal path	\$1,649
5"	0.75" soft dome	N/A	12.25x21.5x13.375	69	Electro/mech/acoustical dampening; integrated passive cross-over for single/bi-amp operation	\$2,999
6"	1" dome	N/A	15x25x15.5	107	Electro/mech/acoustical dampening; integrated passive cross-over for single/bi-amp operation	\$3,699
5"	1" dome	N/A	8.5x22x11	42	Electro/mech/acoustical dampening; integrated passive cross-over for single/bi-amp operation	\$1,479
N/A	0.75" dome	N/A	8x15x10	31	Electro/mech/acoustical dampening; integrated passive cross-over for single/bi-amp operation	\$2,449
N/A	1" soft dome	N/A	10x18x11.75	42	Electro/mech/acoustical dampening; integrated passive cross-over for single/bi-amp operation	\$2,699
N/A	0.75"	Optional	14x6.5x9	18		\$1,099
N/A	0.75" dome mylar	Yes	11.38x5.5x7.75	8.8	Mic & line inputs	\$518
N/A	0.75" horn loaded dome	Yes	17.5x10.5x9.5	22	3-input mixer intergrated	\$1,258
N/A	1" titanium dome	Yes	11x6.625x8.75	16.5		\$598
N/A	1" titanium dome with waveguide	Yes	16.5625x10.4375x12.3125	44	MSP10; black finish/ MSP10M; high gloss maple finish	\$1,498/\$1,598
N/A	1" soft dome	Optional	16x9.5x9	18	2" forward-firing port; binding posts; available in black or white	\$290

# SEQUENCERS (MIDI AND DIGITAL AUDIO)

MANUFACTURER	PROGRAM	PLATFORM	SIMULTANEOUS MIDI TRACKS	MAXIMUM CLOCK RESOLUTION (PPM)	QUANTIZATION TYPES	SEQUENCING METHOD	EDITING VIEWS	GRAPHIC FADERS	SYSEX EDITING	LOOPING	# OF AUDIO TRACKS
Akai Musical	MPC2000XL	Standalone	64	99	Swing; shift timing	Linear; pattern	Event list	64	No	Region; sequence	None
Cakewalk	Pro Audio	Win 95/98/NT	256	480	Swing; percentage; groove	Linear	Track; console; audio; multitrack piano roll; staff; temp	Yes	Yes	Yes	256
Cakewalk	Guitar Studio	Win 95/95/NT	256	480	Swing; percentage; groove	Linear	Track; console; audio; piano roll; staff; temp; studio ware	Yes	Yes	Yes	16
Cakewalk	Home Studio	Win 95/98/NT	256	480	Swing (real-time, offline, input); percentage	Linear	Track; console; audio; piano roll; cntrlr; staff; studio ware; SysEx	Yes	No	Yes	8
Cakewalk	Metro	Mac	99	960	Swing; percentage; groove	Pattern based on linear	Track view; graphic editor; integrated audio/MIDI/velocity/cntrlr/pitch	Yes	Yes	Yes	64
Cakewalk	Guitar Tracks	Win 95/98	No	N/A	N/A	Linear	Audio	Yes	No	Yes	8
Emagic	Logic Audio Silver 4.7	Mac; Win 98	Unlimited	960	Input; output; swing; groove	Linear; pattern	Piano roll; event list; notation; stereo sample editing	Yes	No	Yes	4-24
Emagic	Logic Audio Gold 4.7	Mac; Win 98/ME	Unlimited	960	Groove; swing; percentage; range; length; flam; velocity	Linear; pattern; folder	List; score; matrix (piano roll); hyper edit; environment; more	Yes	Yes	Yes	Up to 64
Emagic	Logic Audio Platinum 4.7	Mac; Win 98/ME	Unlimited	960	Groove; swing; percentage; range; length; flam; velocity	Linear; pattern; folder	List; score; matrix (piano roll); hyper edit; stereo sample editor; environment editor	Yes	Yes	Yes	Up to 128
Emagic	MicroLogic AV 4.7	Mac; Win 98/ME	Unlimited	960	Normal; swing	Linear	List; score; matrix	Yes	No	Yes	16
FASoft	n-Track Studio	Win 95/98/NT	Unlimited	480	N/A	N/A	Timeline; piano roll	Yes	No	Yes	Unlimited
Mark of the Unicorn	Digital Performer 2.7	Mac	Unlimited	Unlimited	Input; output; swing; groove; humanize	Linear; pattern	Track overview; graphic; drum editor; event list; notation	Yes	Yes	Yes	Unlimited
Mark of the Unicorn	FreeStyle 2.3 (Mac/PC)	Mac; Win	Trackless	960	Straight; offset	Linear; loop	Piano roll; notation; event list	No	Yes	Yes	0
Mark of the Unicorn	Performer 6	Mac	Unlimited	480	Input; output; swing; groove; humanize; GrooveEditor	Linear; pattern; chunk	Graphic; event list; notation	Yes	Yes	Yes	Up to 8
Midisoft	Studio Recording Session 1.0	Win 95	Unlimited	1000	Percentage	Linear	Notation; MIDI list	Yes	Yes	No	8
Musicator	Musicator Win 3.0	Win 3.1/95	255	480	Swing; percentage	Linear	Track; passage; bar; roll view; notation; audio; effects	Yes	Yes	Yes	32
Personal Composer	Personal Composer	PC	8, 16, 44	1024	Note-on; note-off	Linear	Page; scroll; split-screen	Yes	No	No	NA
PG Music	Band-In-A-Box	Win 3.1/95/98/NT; Mac	12	120	Swing; percentage; randomize	Chord prog; style sel	Chord; staff/staff roll; notation; style edit; Style Maker; MIDI chans	No	Yes	Yes	0
PG Music	PowerTracks Pro	Win 3.1/95/NT	48	960	Swing; percentage; randomize	Linear; step	Tracks; audio; mixer; events; bars; roll notation; SysEx editor	Yes	Yes	Yes	Up to 48
Roland	MC-50mkII	Roland S-MRC	8 (32 chan)	96	Grid	Linear; step	Track; event	No	Yes	Yes	0
Roland	MC-80	Roland MRC-Pro	16 (32 chan)	480	Grid; groove; shuffle	Step/real; pattern/linear	Track; event	No	Yes	Yes	0
Steinberg	Cubase VST/32 5.0	Win 95/98, ME 2000	Unlimited	1,920	Over; note on; interactive; analytic; freeze editable; groove	Linear	Key; list; score; drum; logical; controller	Yes	Yes	Yes	Up to 128
Steinberg	Cubase VST/24 4.1/VST 4.1	Mac	Unlimited	1,920	Over; note on; interactive; analytic; freeze editable; groove	Linear	Key; list; score; drum; logical; controller	Yes	Yes	Yes	96/64
Steinberg	Cubasis VST 2.0	Win 95/98, ME	64	384	Over quantize	Linear	Key; list; score	Yes	Yes	Yes	48
Steinberg	Cubase VST 5.0	Mac	Unlimited	1,920	Over; note on; interactive; analytic; freeze editable; groove	Linear	Key; list; score; drum; logical; controller	Yes	Yes	Yes	72
Steinberg	Nuendo	Win 98/NT/2000; Mac	Unlimited	N/A	6	Linear	Key; EDL; pool; sample editor; surround	Yes	Yes	Yes	128
Technosaurus	CYCLODON	Hardware 16 Step Sequencer	N/A	N/A	N/A	16 step	N/A	N/A	N/A	Yes	N/A
Voyetra	Digital Orchestrator Pro	Win 3.1/95/NT 4.0	Unlimited	1,920	Intensity; sensitivity; offset; inside/outside range	Linear	Graphic cntrlr editor; MIDI mxr; multitrack; notation; conductor	Yes	Yes	Yes	Unlimited (h/w-dep)
WinJammer	WinJammer Professional Version 5.0	Win 3.1/95/NT	256	960	Swing; groove; input; variable strength	Linear	Piano roll; event list; score; drum view	Yes	Yes	Yes	None
Yamaha	RM1x	Hardware sequencer	16	480	Grid; percentage; groove templates	Step; real; pattern; linear	Event; track; pattern chain	Yes	Yes	Yes	None
Yamaha	XGworks 3.0	PC	100	480	Strength; sensitivity; swing; gate; velocity	Step; real; pattern; linear	Track view; piano roll; staff; drum; event list	Yes	Yes	Yes	6 stereo



INTEGRATED MIDI/AUDIO EDIT SCREEN	AUDIO EFFECTS	DYNAMICS PROCESSING	TIME COMPRESSION AND EXPANSION	PITCH-SHIFT TYPE	SAMPLE-RATE CONVERSION	DSP PLUG-IN FORMATS	AUDIO-TO-MIDI CONVERSION	EXTRACT TUNING FROM AUDIO	SPECIAL FEATURES	PRICE
No	Autopan; delay; reverb; distortion ring-mod; 4-band filter; freq mod; phase; chorus; flange; rotary; pitch shift	No	Yes	Traditional	No	No	No	No	Sampling; sample & program editing; real-time track muting	\$1,649
Yes	32-bit; real-time stereo FX	No	Yes	Formant	Yes	DirectX	Yes	Yes	Supports 24-bit/96 kHz; AVI, MPEG, QuickTime, RealMedia; encode to MP3; Audio X support	\$429-\$529
Yes	32-bit; real-time stereo FX	No	Yes	Yes	No	DirectX	No	No	Supports tab, virtual fribdr, MIDI gltr glitch fltr; MIDI FX; Roland GR-30 cntrl pnl; StudioWare; SMPTE/MTC	\$249
Yes	32-bit; real-time stereo rrvb; chrs	No	Yes	Basic	No	DirectX	No	No	Supports AVI, MPEG, QuickTime, RealMedia; vector autmln; MIDI FX; StudioWare	\$129
Yes	Real-time; stereo (para EQ, chrs, flngr, dly, rrvb, trml)	No	No	N/A	Yes	VST; Premiere	No	No	Rhythm Explorer; Note Spray; sprts: QuickTime, OMS, SMPTE/MTC, ASIO, import MP3's	\$249
N/A	Delay; EQ; chorus	No	Yes	N/A	No	N/A	No	No	Drag and drop drummer; Slowblast; tuner	\$69
Yes	21 native effects	Yes	Yes	Traditional	Yes	VST; DirectX; Emagic	No	No	Load Logic/Logic Audio files; import Environ templates; virtual studio; screen sets, supports E-magic, ESX24, ESI, EVP88	\$299
Yes	34 native plug-ins	Yes	Yes	Formant; trad	Yes	VST; DirectX; Premiere; ASuite	Yes	Yes	Supports ASIO, Audiowerk8/2, VS880/880EX/1680, more; real-time MIDI editing; Emagic plug-ins; supports E-magic, ESX24, ESI8, EVP88	\$499
Yes	40 native plug-ins	Yes	Yes	Formant; trad	Yes	TDM; VST; DirectX; Premiere; ASuite; Emagic	Yes	Yes	Supports TDM/DAE, ASIO, Stud I/O, Roland VS, 1212, CBX, AV, Akai DR8/16, 24-bit/96k; xlaides; 90 scrn-sets; 500 key/MIDI cmds; supports E-magic, ESX24, ESI, EVP88	\$799
Yes	9 native plug-ins	Yes	No	N/A	Yes	N/A	No	No	ASIO 2.0; Audiowerk8/2; Direct I/O; MME/Mac AV, real-time seq edit; supports E-magic, ESX24, ESI, EVP88	\$99
Yes	Reverb; echo; pitch shift; chorus	Yes	N/A	N/A	Yes	DirectX	No	No	Supports Win 2000	\$35-\$55
Yes	e-Verb, preamp-1, lim/comp; Sonic Modulator; autopan	Yes	Yes	Formant	Yes	TDM, MAS; Premiere	No	No	MIDI time stamping; MAS plug-in automation; 24-bit waveform editor; sports QuickTime	\$795
No	N/A	No	No	None	No	N/A	No	No	Sense tempo; note-spelling algorithms; step sequencing	\$195
Yes	EQ; dyn; chorus; flanger; delay; phase shifter; autopan; echo; trml	Yes	No	None	No	MAS	No	No	QuickTime support; Unisyn; csfm consoles for Roland VS-880; window sets; WYSIWYG notation editing	\$495
No	Delay; echo; chorus; flanger; EQ	Yes	No	Traditional	Yes	N/A	No	No	Multisequence playback; articulation mrks; more	\$150
Yes	N/A	No	No	N/A	Yes	N/A	No	No	Notation; frnt-pnl cntrls for GS, XG, SC-88 PRO FX; lng file nms w/Win 95	\$299
No	NA	No	No	RTC	No	NA	No	No	Transpose, copy to WP and DTP apps	\$69-\$199
No	N/A	No	No	N/A	No	N/A	No	No	Automatic soloing & songwriting; international language	\$88-\$249
Yes	Comp; gate; dist; reverb; echo; chorus; flanger; ring mod; trem	Yes	No	No	Yes	Proprietary	No	No	Supports .MID, .KAR, .WAV, .MP3, any Win comp format; international lang; guitar tuner	\$29-\$49
No	N/A	No	No	N/A	No	N/A	No	No	2 MIDI outs; 14 MB floppy drive, read/write, mid	\$795
No	N/A	No	No	N/A	No	N/A	No	No	Dir frm disk plybck; exp arpegg; RPS; music-1; 2 footswitches	\$1,295
Yes	Reverse; pitch shift; EQ; varispd; chorus; delay; reverb; pan; fuzz; comp; gate; limiter; TruTape; UV22 Dithering	Yes	Yes	Formant	Yes	VST; DirectX	No	Yes	Up to 32/96k audio; pro scoring; VST instruments; import REX and Mixman files; studio module; cue trax; MP3 encoding; ReWire; InWire	\$799
Yes	4-band EQ; reverb; chorus; delay; pan; fuzz; spatial; more	Yes	Yes	Formant	Yes	VST	No	Yes	Up to 24-bit/96K; VST instruments; import REX files; score VST w/pro scoring features	\$549-\$799
Yes	2 FX sends per channel; 2 band EQ per channel	No	Yes	None	No	VST; DirectX	No	N/A	VST instruments included; Master Unit; CD burning; MP3 export; REX import; Mixman trk import; InWire; MP3 encoding	\$99
Yes	4-band EQ; reverb; chorus; delay; pan; fuzz; spatial; overdrive; flange	Yes	Yes	Formant	Yes	VST	No	Yes	VST instruments; import REX files; Studio Module; arpeg; Style Trax; MP3 encoding; ReWire; up to 24-bit/48k; InWire; pro scoring; QuickTime	\$549
Yes	Chorus; delay; reverb; panning; fuzz; spatial	Yes	Yes	Formant	Yes	VST; DirectX	No	Yes	Surround sound built in; EDL; unlimited undo with history; VST Instruments; import OMF files; import REX files; Import Cubase Songs; Open TL	\$1,295
N/A	N/A	N/A	N/A	Knobs	N/A	N/A	N/A	N/A	Analog 16 step sequencer	\$329
Yes	EQ; dly	Yes	Yes	Traditional	Yes	N/A	No	No	Mixdown; export to ACM-compat; export to any avail codes	\$199
No	N/A	No	No	No	No	N/A	No	No		\$200
No	(11) reverb; (11) chorus; (43) variation	Yes	Yes	Normal	N/A	N/A	N/A	N/A	654 normal voices; 46 drum kits; 3.5 FDD; SMF compatible; 8 realtime control knobs w/16 parameters	\$900
Yes	Hardware dependent	Yes	Yes	Normal	Via software (TWE)	Proprietary (hardware)	Yes	Programmable	Guitar arranger; auto arranger; XG editor; Voice to score; multiple notation formats	\$100

# SONIC TREATMENT

MANUFACTURER

MODEL

TYPE

FIRE RATING

DIMENSIONS

SPECIAL FEATURES

PRICE

ASC	Mix Station	Room acoustic control package	N/A	5'x5' arrays; 6"x60" panels	Low-frequency control and reflection	\$1,500
ASC	Quick Sound Field System	Sub-space	N/A		Increase/decrease ambience 8 studio traps via placement, adjustable for bright or dead recording	\$2,520 and up
ASC	Studio Trap	Adjustable/tunable floor standing acoustic control device	N/A	9" diameter x 4' tall	Diffusive side & absorptive side, adjustable	\$315
ASC	Tuon Trap	Bass trap	N/A	9, 11, 13, 16, 20" diameters; 4' tall	Bass absorption down to 30 Hz with built-in diffusion above 400 Hz	\$248-\$678
ASC	Monitor Stand Acoustic Control Product	Reference monitor	N/A	11, 13, 16, 20" diameters; height varies	Low-frequency control; reduces vertical mode problems	\$374-\$678
ASC	Sound Panel	Acoustic wall panel	Meets code	2"x8"x48"	Controls flutter echo, excess reverb & brightness while maintaining ambience & presence	\$398 (set of 8)
ASC	Planar Trap	General purpose acoustic control device	N/A	15"x8"x60"	Free-standing gobo device for reflection & ambient control	\$596 (set of 4)
ASC	Sub-Stand Cube	Bass trap/resonant control	N/A	Standard 17"x17"x9"; 24"x24"x9"; custom sizes available	Decouples sub, controls vertical resonant mode, improves bass articulation	\$329-\$399
ASC	WallDamp IsoWall System	Soundproof wall & ceiling construction kit	Meets fire codes	N/A	Room soundproofing/isolation construction kit for new construction or remodeling	\$2-\$3 sq/ft.
Acoustical Solutions	AAP Alpha Pyramid	Sound-absorbing foam	Class 2	2'x2' sheets; 2, 3, 4" thick	Matching pattern; variety of colors; NRC 0.70-1.05	\$180-\$215/box
Acoustical Solutions	AB10-NR Audio-Seal Sound Barrier	Sound-transmission blocker; high temperature-fused vinyl	N/A	54"x60"x0.125" roll	Stops noise from transmitting through walls, floors and ceilings	\$1.75-\$2.25 sq ft
Acoustical Solutions	AS1, AS2 AlphaSorb Panels	Fabric wrapped wall panels and hanging baffles	Class 1	Any size up to 4'x10'; 1" or 2" thick	NRC 0.80-1.05; 48 colors; custom shapes and cut-outs	\$39-\$280
Acoustical Solutions	Soundtex, Linear II	Fabric wall covering	Class 1	Bolt: 54"x24 yards; linear yard: 54"x36"	35 colors; NRC 0.25; easy to install	\$432 bolt; \$24 yard
Acoustical Solutions	Sonex Acoustical Foam UNX	Polyurethane	Class 2	2'x4' or 4'x4'; 2, 3, or 4"	Charcoal, beige & brown	\$167 (3"); \$169 (2")
Acoustical Solutions	Sonex Acoustical Foam SOC-2	Melamine	Class 1/Class A	2'x4'x2"	White or colortec charcoal	\$213-\$299
Acoustical Solutions	Sonex Contour Ceiling Tiles	Drop in T-grid or surface mount	Class 1/Class A	2'x2'	White, gray, almond or black hypalon finish	\$374
Acoustics First	Art Diffusor Model C-ADCS	Styrene	N/A	24"x24"x4-1/2"	Custom colors	\$100
Acoustics First	Art Diffusor Model C-ADCT	Thermoplastic	Yes	24"x24"x4-1/2"	Custom colors	\$166
Acoustics First	Art Diffusor Model E	EPS plastic	N/A	15"x15"x9"	Custom colors	\$88
Acoustics First	Art Diffusor Model F-ADFS	Styrene	N/A	24"x24"x2"	Custom colors	\$100
Acoustics First	Art Diffusor Model F-ADFT	Thermoplastic	Yes	24"x24"x2"	Custom colors	\$166
Acoustics First	Art Diffusor Model W	Wood	N/A	15"x15"x9-1/2"	7 finish choices	\$170-\$260
Acoustics First	Double Duty Diffuser	Polycylindrical diffuser/bass trap	Class A	2'x2'-4'x8'	Uniform high-frequency dispersion; increases the acoustic size of a mixing room	\$200
Acoustics First	Bermuda Broadband Triangle Trap	Corner absorber	Class 1/3	1'x1'x4'	Also avail as bermuda shorts (24") and stand-alone sound cylinder	\$42
Acoustics First	Geometrix	Broadband	Class A	8" diam; up to 10' high	Formed fiberglass covered w/1.00 above Guilford FR701 fabrics; 84 absorption at 125 Hz	\$157
Auralex Acoustics	LENRD (Low End Noise Reduction Device)	Bass trap	Class B	12"x12"x17" triangular; 24" long	12 diff colors, 8 pcs per box; triangular to fit corners, overall NRC 1.35	\$259/box
Auralex Acoustics	SheetBlok	Sound barrier	Class B	1/8" thick; 4'x10' and 4'x30' rolls	Approx. 6 dB more effective than solid lead at stopping the transmission of sound	\$360/roll
Auralex Acoustics	Studiofoam	Absorptive foam	Class B	2'x4' panels; 1, 2, 3, 4" thick	12 colors; wedgecut, 6-20 pcs per box; overall NRC 0.50 to 1.10	\$209-\$239/box
Auralex Acoustics	T'Fusor	Diffusor	N/A	23.75" x23.75" square; 5.5" thick	Wall mountable; fits drop ceilings; easily painted, 4 pieces/box	\$280/box
Auralex Acoustics	Platfoam	Isolation device	Class B	2'x4"x48"	Improves transmission loss, 24 pieces/box charcoal gray only	\$180/box
Auralex Acoustics	Studiofoam Pyramids	Absorptive foam	Class B	2'x4' panels; 2, 4" thick	12 colors; pyramid cut; seamless installations; 6-12 pcs per box; overall NRC 0.70 to 0.95	\$279/box



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# SONIC TREATMENT

MANUFACTURER	MODEL	TYPE	FIRE RATING	DIMENSIONS	SPECIAL FEATURES	PRICE
Auralex Acoustics	Studiofoam Metro	Absorptive foam	Class B	2'x4' panels; 2" thick	12 colors; unique "city-scape" profile; seamless installations; 12 pieces/box	\$229/box
Auralex Acoustics	MAX-Wall 420	Absorptive foam	Class B	20"x48" panels; 4.375" thick	Portable, expandable, adaptable; interlocking panels; avail. in 3 colors; includes 4 panels 2 MAX stands & clamps	\$349/kit
Auralex Acoustics	MAX-Wall 521	Absorptive foam	Class B	20"x48" panels; 4.375" thick	Portable, expandable, adaptable; interlocking panels; avail. in 3 colors; incl. 5 panels, 2 MAX stands, 1 MAX-Wall Window kit & clamps	\$499/kit
Auralex Acoustics	MAX-Wall 633	Absorptive foam	Class B	20"x48" panels; 4.375" thick	Portable, expandable, adaptable; interlocking panels; avail. in 3 colors; incl. 6 panels, 3 MAX stands, 3 MAX-Wall Window kits & clamps	\$649/kit
Auralex Acoustics	MAX-Wall 831	Absorptive foam	Class B	20"x48" panels; 4.375" thick	Portable, expandable, adaptable; interlocking panels; avail. in 3 colors; incl. 8 panels, 3 MAX stands, 1 MAX-Wall Window kit & clamps	\$749/kit
Auralex Acoustics	MAX-Wall 1141VB	Absorptive foam	Class B	20"x48" panels; 4.375" thick	Portable, expandable, adaptable; interlocking panels; avail. in 3 colors; incl. 11 panels, 4 MAX stands, 1 MAX-Wall Window kit & clamps	\$999/kit
Auralex Acoustics	MAX-Wall Window Kit	Absorptive foam, plexiglas	Class B	20"x48" panel; 4.375" thick; window 8"x49"x25"	Portable, expandable, adaptable; interlocking panels; MAX-Wall panel w/plexiglas window; 3 colors	\$99/kit
Auralex Acoustics	Stand-Mounted LENRD Bass Traps	Bass traps	Class B	12"x12"x17" triangular; 48" long	12 colors; 4 pieces/box; 4 tripod-style mic stands included; overall NRC 1.35	\$319/box
Auralex Acoustics	ATOM-12 Corner Treatment Kit	Bass traps	Class B	12"x12"x17" LENRDs; 12"x12"x12" cubes	Kit contains 12 LENRD bass traps & 4 corner fill cubes; 12 colors	\$399/kit
Auralex Acoustics	Roominators Alpha 1 Kit	Absorptive foam	Class B	Wedge panels: 1'x1'x2"; LENRD: 12"x12"x17" triang; 24" long	64 Studiofoam wedge panels; 4 LENRD bass traps & 1 can Foamtak spray adhesive; charcoal gray only	\$319/kit
Auralex Acoustics	Roominators Project 2 Kit	Absorptive foam	Class B	Wedge panels: 1'x1'x2"; LENRD: 12"x12"x17" triang; 24" long	24 Studiofoam wedge panels; 8 LENRD bass traps & 5 tubes of Tubatak Pro liquid adhesive; charcoal gray only	\$429/kit
Auralex Acoustics	Roominators Deluxe Plus Kit	Absorptive foam	Class B	Wedge panels: 2'x2'x2"; LENRD: 12"x12"x17" triang; T-Fusors: 23.75"x23.75"x5.5"	24 Studiofoam wedge panels; 8 LENRD bass traps & 6 T-Fusor 3D sound diffusers; 2 cans Foamtak spray adhesive; charcoal gray only	\$699/kit
Auralex Acoustics	Roominators Pro Plus Kit	Absorptive foam	Class B	Wedge panels: 2'x2'x2"; LENRD: 12"x12"x17" triang; T-Fusors: 24"x24"x5.5"	36 Studiofoam wedge panels; 12 LENRD bass traps & 8 T-Fusor 3D sound diffusers; 3 cans Foamtak spray adhesive; charcoal gray only	\$999/kit
Auralex Acoustics	GRAMMA (Gig & Recording Amplifier & Monitor)	Isolation device	N/A	Decking: 15"x23"x0.5"; Platform: 4"x23"x2"	Tightens & increases sonic detail; more clarity & consistency of low freqs & bc lightweight & portable; 1 standard size fits most	\$60
Custom Acoustic	Sound Isolation Booths	Sound isolation booths	N/A	4'x4', 6'x6', 8'x8' and up; custom	Magnetic door closer system	\$2,000
Custom Acoustic	Acoustic Foam	Acoustic foam	Class 1	2'x54"x72"; 2'x54"x82"	Custom convolutions; sheet sizes; specifications available	\$69-\$75
Custom Acoustic	Anti-Fatigue and Acoustic Floor Mat	Anti-fatigue and acoustic floor mat	Class 1	0.75" x42"x70 mat sizes; custom sizes available	Lightweight and portable; black or gray	\$99 and up
Folded Space	Micro Room	Silent speaker cabinet	N/A	N/A	Silent recording of amp/speaker/mic	\$395
Folded Space	Acoustic Space	Diffusor; absorptive foam; panels; gobos	Class B foam and wood	2'x4' panels	128 sq ft of surf area (64 reflective/64 absorbent); 8 acoustic panels; 4 sets stills and linking hardware	\$549
Folded Space	Big Travel Kit	Diffusor; absorptive foam; acoustic panels; gobos	Class B foam and wood	2'x4' panels	64 sq ft of surf area (32 reflective/32 absorbent); 4 acstc panels; sticking & linking hardware	\$279
Folded Space	Folded Wall	Bass trap; diffusor; absorptive foam; panels; gobos	Class B foam and wood	2'x4' panels	Over 128 sq ft of surf area; 8 acstc panels; 4 sets linking hardware; 2 stacking bits	\$549
Folded Space	Medium Room Kit	Diffusor; absorptive foam; acoustic panels; gobos	Class B foam and wood	2'x4' panels	Over 128 sq ft of surf area; 8 acoustic panels; 2 swivel stands; 6 standoffs; linking	\$649
Folded Space	Small Room Kit	Diffusor; absorptive foam; acoustic panels; gobos	Class B foam and wood	2'x4' panels	64 sq ft surf area (32 reflective/32 absorbent); 4 acoustic panels; 2 extra 2'x4' of 2" Studiofoam	\$329



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# SONIC TREATMENT

MANUFACTURER

MODEL

TYPE

FIRE RATING

DIMENSIONS

SPECIAL FEATURES

PRICE

Folded Space	Small Travel Kit	Diffusor; absorptive foam; acoustic panels; gobos	Class B foam and wood	2'x4' panels	2 acoustic panels (32 sq ft of surf area); 1 set stilts and linking hrdwr, makes a bilfold on stilts or 2 freestanding floor panels; light	\$144
Folded Space	Space Doc	Diffusor; absorptive foam; acoustic panels; gobos	Class B foam and wood	2'x4' panels	96 sq ft of surf area (48 reflective/48 absorbent); 6 acoustic panels, 2 swivel stands	\$439
Folded Space	Space Doc Plus	Bass trap; diffusor; absorptive foam; acoustic panels; gobos	Class B foam and wood	2'x4' panels	164 sq ft of surf area; 6 cloaking device acoustic panels plus LENRD bass traps	\$599
Folded Space	Vox Box	Diffusor; absorptive foam; acoustic panels; gobos	Class B foam and wood	2'x4' panels	128 sq ft of surf area (64 reflective/64 absorbent); designed for vocals	\$699
Folded Space	Bass Micro Room	Silent speaker cabinet, compact	N/A	N/A	Silent recording through real amp/speaker/mic	\$425
Folded Space	Stereo Micro Room	Silent speaker cabinet/ stereo generator	N/A	N/A	Silent recording of amp/speaker/mic	\$525
Illbruck	Sonex	Acoustical and sound absorptive foam	Class A/B	2'x4'x2" and up	Many colors and patterns available	\$2.50-\$6 sq. ft.
Netwell Noise Control	Pyramids	Acoustic foam	Class 1/2	2'x2'x3"	Absorbs 90% of reflected sound	\$2-\$4 sq. ft.
Noren	AcoustiLock	Noise reduction cabinet	N/A	14, 20, 24 space racks	Silent coding	N/A
RPG Diffusor	Corner Bass Trap	Pressure zone membrane absorber	Class A	24"x24"x12.25"	Corner wall mounting or freestanding, high bass absorption efficiency; stackable, lightweight	\$564/box (2 per box)
RPG Diffusor	ProFoam	Absorbing foam panel	Class A Melaflex or Class B/C Polyflex	1'x1'x2"; 2'x2'x2"; 4'x2'x"	Nestable to any depth required, variable depth air cavity technology	Up to \$500
RPG Diffusor	Abflector	Absorbing/diffusion panel	Class A	48"x19"x6"	Simultaneously offers diffusion and moderate mid band absorption; internal hinge	\$569/box
RPG Diffusor	Skyline	2 dimensional diffusor	Class A	24"x24"x47"	Patented optimized primitive root reflection phase grating, omnidirectional; ideal for small rooms	\$284/box (2 per box)
RPG Diffusor	ProCorner	Corner mount foam bass trap	Class A/B/C	48"x1.625"x6.375"	Optimized corner profile, seamless integration with Profoam, NRC 1.0	\$247 (2 per box)
RPG Diffusor	Flatfusor	Flat sound diffuser	Class A	2'x2' nominal x1"	Omnidirectional diffusion from a thin, flat binary amplitude grating	\$126/box
RPG Diffuser	Room Optimizer Software	Software	N/A	N/A	Optimizes up to 20 loudspeakers	\$100
Silent Source	SoundSucker	Corner bass traps	Class A/CC	12"x24"; 12"x48"	Available in charcoal, beige, brown, blue, hunter green, burgundy; 8 & 4 units/box	\$200
Silent Source	Whisper Wedge	Absorptive foam	Class A/C	24"x48"x2, 3, 4, 6" thick	Many colors to choose from, 2-12 sheets/box (16-96 sq ft); class 1 available	\$160-\$250/box
Systems Development Group	Cutting Wedge Classic	Absorptive foam	Fire/smoke analysis available	Various	Sawtooth pattern for greatest absorption per sq ft; tear resistant w/shape memory	\$3 sq. ft. and up
Systems Development Group	Model C	Diffusor	Full Class A	24"x24"x4.5"	Install on wall or drop into 24"x24" opening of a T-Bar grid; available with center cutout	\$130
Systems Development Group	Model E	Diffusor	Available	15"x15"x9"	Small footprint, tight weight, simple install	\$88
Systems Development Group	Sonora Panels	Absorptive fiberglass panel	Class A	Up to 48"x120"x2"	Molded fiberglass board non-resin chemically hardened edges, wrapped in Guilford fabrics	\$8-\$10 sq. ft.
Systems Development Group	Model F	Acoustic diffusor	Full Class A	2"x24"x1.75"	Specialized high-frequency diffusion on wall or ceiling	\$100
Systems Development Group	Model F-Styrene	Acoustic diffusor	None	24"x24"x1.75"	Specialized high-frequency diffusion on wall or ceiling	\$100
Systems Development Group	Cutting Wedge 2000	Absorptive foam	Available upon request	Various	Sawtooth pattern across face and back for easy slacking	\$3 sq. ft. and up
Systems Development Group	Model C-Styrene	Acoustic diffusor	None	24"x24"x4.5"	Easy install on wall or drop into 24"x24" opening of a T-Bar grid; avail w/center cutout	\$100
Systems Development Group	Bass Eraser	Broadband bass trap	Class A	24"x48"x10"	Mounts horizontally or vertically	\$360-\$450
Systems Development Group	Reflektors	Absorptive face/reflective panel	None	24"x48"x8"	Creates reflection-free listening space	\$125



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# SONIC TREATMENT

MANUFACTURER

MODEL

TYPE

FIRE RATING

DIMENSIONS

SPECIAL FEATURES

PRICE

Taytrix	Absorptive Panels	Absorptive panels	Class 1	2'x2', 2'x4', 2'x6'	Fiberglass absorption panels trimmed with decorator fabrics	\$129 and up
Taytrix	Stack It Gobo System	Gobo	Class 1	15"x8"x48"; 30"x8x48	Stackable, lightweight, modular, interlocking acoustical control panels	\$300-\$445
Wenger	Ceiling Diffusor	Acoustical panels	Class A	2'x2'; 4'x4'; 4'x2'	Convex shape; impact-resistant PVC/acrylic plastic	\$90-\$135
Wenger	Pyramidal Diffusor	Acoustical panels	Class A	2'x2'; 4'x4'	Offset pyramid shape; impact-resistant PVC/acrylic plastic	\$57-\$156
Wenger	Quadratic Diffusor	Acoustical panels	Class A	4'x4'	Based on quadratic theory; effective over freq range of 750 Hz to 3.3 kHz	\$452
Wenger	Trapezoidal Diffusor	Acoustical panels	Class A	2'x2'; 4'x4'	Offset trapezoid shape; fiberglass resin with white gel-coat finish	\$101; \$153
Wenger	V-Room Sound-Isolating Room	Modular studio with active LARES-based acoustics	N/A	From 5'8"x5'8"; 10'8"x13'2"	Provide acoustical simulations of 10 different environments	\$13,946 and up
Wenger	Wall Diffusor	Acoustical panels	Class A	4'x4'; 4'x8"; other sizes available	Convex shape, PVC/acrylic plastic with reinforced corners & fabric covering	\$276; \$550
Wenger	Sound-Isolating Rooms	Sound-isolating, modular, pre-engineered rooms	N/A	4' 5'x5' 8"; 14' 5'x25' 8"	Optional horz. and vert. windows, 4-foot door, double door.	\$8,507 and up
Whisper Room	SE Series	Sound-isolation enclosures	N/A	Various sizes available	Portable; modular; easy assem; cable passage; ventilation sys; door window	\$1,995 and up

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- Talkback system allows each HRM-16 user to communicate with other users and the main mixing location
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HDS-16

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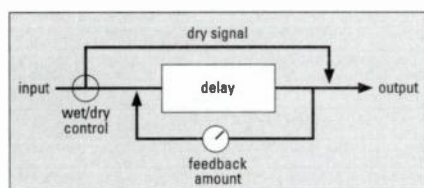
If you ever travel through the Swiss Alps, you might hear the haunting call of an alphorn. You might also hear an echo that exactly duplicates the initial phrase a few seconds later. This echo occurs because the sound from the 12-foot-long, bugle-like instrument is reflected from nearby mountains. Of course, the nearest mountain is typically thousands of feet away, so it takes several seconds for the sound to get from the alphorn to the mountain and back to the alphorn player.

This classic "Alps echo" is probably the best acoustical example of delay. Like reverb, delay is produced by reflected sound waves. Unlike reverb, however, these reflections are separate and distinct.

In both cases, it's nearly impossible to control the acoustical phenomenon with any precision, so the effect is simulated digitally to process recordings and live performances. As we'll see, digital delay has many interesting applications.

## SINGLE DELAY

The simplest type of delay is called a single delay (see Fig. 1). As in a digital reverb unit, an audio signal is sent into a digital delay unit, which splits the signal into two copies. One copy is sent directly to the output with no modification; this is the dry signal. The other copy, the wet signal, is digitized in much the same way as a sampler captures audio data.



**FIG. 1:** In a simple, single delay, the input signal is split into two copies; one proceeds directly to the output, and the other is delayed by a certain amount of time before it is mixed with the original signal. The delayed signal can also be split into two copies, one of which is fed back into the delay's input to be delayed again.

The delay unit then stores the sample in RAM for a user-specified period of time (called delay time, explained shortly), after which the signal is converted back into analog, mixed with the undelayed dry signal, and sent to the unit's output.

(Early delay units used analog circuitry to delay the signal, which is still used in some current models.) In more expensive units, the dry signal is also digitized and mixed with the wet signal in the digital domain before being converted back into analog. The user can set the percentage of the wet/dry mix to produce effects that are subtle (the delayed signal is barely audible behind the original dry signal) or aggressive (the delayed signal appears at the same or greater volume than the dry signal), and everything in between.

The fundamental parameter in any delay is the delay time, which determines how long the delayed signal is held in memory before it is sent to the output. Depending on how much memory a unit has, the delay time can range from one millisecond to several seconds. The amount of available memory determines the maximum delay time, but most delay units can delay up to at least one second.

Another primary characteristic of most delays is called regeneration or feedback. In this process, the wet signal is split into two copies: one copy is sent to the output, and the other copy is sent back to the delay's input, where it is delayed again (along with any new signal that enters the delay). This causes the signal to repeat over and over at intervals determined by the delay-time settings.

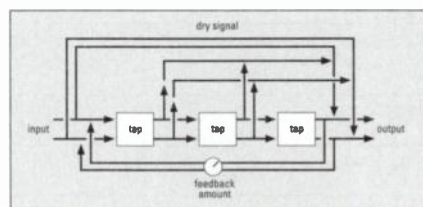
The amount of feedback—how many times the original signal repeats before fading away—is controlled by a feedback parameter. Inexpensive delay units, such as guitar-oriented stomp boxes, usually have a solitary feedback knob. The more you turn the knob, the more repeats you get. (If you leave the knob in the "off" position, you only get one repeat.)

## MULTITAP DELAY

Most modern delay units offer the ability to apply several different delays to the input signal. In early analog units, the delayed signal was accessed, or tapped, producing multiple echoes. Digital delays work in much the same way. For example, if the delay time is one second and you tap the signal at the

midpoint and at the end, you hear the signal delayed by a half-second and by one second.

Such a device is called a multitap delay (see Fig. 2), and you can specify where to place the taps with respect to the overall delay time. For example, let's say that in a 4-tap delay, you specify delay times of 250 ms, 500 ms, 750 ms, and 1 second. This would send the signal out four times after the original, once every quarter-second.



**FIG. 2:** In a multitap delay, the delayed signal is accessed, or tapped, two or more times. In this example, the signal has been tapped in three places, so you hear at least three distinct echoes. This delay also has a regeneration feature, which causes the signal to repeat over and over at intervals determined by the delay-time settings.

Most multitap delays include a stereo output. In addition to individual delay-time and output-level controls, each tap has a pan control that determines where the delayed signal is placed in the stereo field. This stereo facility lets you produce effects such as ping-pong delay, in which the repeating signal bounces back and forth between the right and left channels. A simple ping-pong delay requires two taps. A more complex ping-pong delay bounces between right, left, and center; this type requires at least three taps.

Some delay units have a stereo input as well as a stereo output. In many cases, each input can be delayed independently with its own multitap delay, which lets you produce some extremely complex effects.

## APPLICATIONS

There are many potential applications of delay. For example, you can "fake" a stereo signal by sending a mono signal

—continued on page 182

## STUDIO FURNITURE

MANUFACTURER	PRODUCT	TYPE	DIMENSIONS (INCHES)	SPECIAL FEATURES	PRICE
Anthro	Console	Workstation for non-linear video editing, mixing, & post prod	72x23.5x37	Holds (3) 21" monitors; keyboard area adj for sitting/standing; shelves adj in 1" incr; lifetime warranty	\$899
Anthro	RackCarts	Rack cart	13, 17, 21, 29	Rack mounting on tapped mounting rails front/back; rack accessories avail	\$719-\$929
Anthro	SlantRacks	Rack cart for mounting 19" rack equip	9, 13, 21	Rack mounting on tapped mounting rails front/back; tilted for easier vision of rack equipment	\$319-\$429
Anthro	AnthroBench	Studio furniture	48, 60, 72	Modular, open design; lifetime warranty; holds 600 lbs	\$999 and up
Argosy Console	90 Series Console Housing	Workstation for mixers	89.5-178x45x39	Expandable/modular enclosure w/full padded armrest; for Macki 8-bus, Digi ProControl and others	\$1,529 and up
Argosy Console	Dual 15	Workstation for digital-based rec/mix/post computer systems	90x50x43	Holds two 21" computer monitors plus 38 rack spaces; space for controllers and computer keyboard; full length padded armrest	\$1,200
Argosy Console	Dual 15K	Workstation for keyboard-based systems	94x50x43	Holds two 21" computer monitors plus 38 rack spaces; up to a 57" full size keyboard	\$2,000 and up
Argosy Console	Dual 15M-3	Workstation for mastering facilities	94x50x29.25	Full length padded armrest; 24 rack spaces; customizable	\$1,400
Argosy Console	Nevis 70 Series Console Housing	Workstation	68x45x30	Full padded armrest; multi-access bridge lids; optional oak end panels; casters available	\$700 and up
Argosy Console	Nevis 70V Series	Enclosure for video editing systems	68.2x42.7x33.75	Full padded armrest; mix & match rack units & monitor inserts to suit	\$690 and up
Argosy Console	Spire Rack Enclosures	Single, double, triple and quad rack bays; 14 or 28 spaces high	22-82x33x24	Optional finishes; producers desk attachments; removable access doors; optional shelves; casters available	\$300 and up
Argosy Console	Spire Speaker Stands	42" speaker stand	Base: 16x16; top: 12x12	Optional finishes	\$55-\$140
Argosy Console	Spire V Series Rack Enclosures	Rack bays	22.6-82.25x41.5-86.5x30	Optional finishes; removable access doors; optional front doors available	\$890 and up
Argosy Console	90V Series	Enclosure for video editing systems	89.5-179x42.7x33.75	Expandable full padded armrest; mix & match rack units & monitor inserts to suit	\$1,100 and up
Boutique Audio		Racks for vintage modules	5.25x19x14	Steel enclosure; internal shielded power supplies; 1/4" instrument input on front panel; XLRs on rear panel	\$995
Bryco Products	CD60, CDB60	Solid oak CD racks	21.63x11.25x4.88	Table or wall mount; holds 60 CDs	\$60
Bryco Products	DR-60 DATRAX, DRB-60 DATRAX	DAT tape holder—solid oak (natural & black)	21.25x9.5x2	Wall or table mount; holds 60 DATs	\$60
Bryco Products	DRP-40	DAT-tape holder	17.38x7.38x2	Wall or table mount; holds 40 DATs	\$22
Bryco Products	DSD-320	DAT tape storage cabinet	19.5x21.75x15.5	Stores 320 DATs	\$349
Bryco Products	V8-36 & V8-36 Pro	8mm tape storage racks	Reg: 17.5x10.25x2.38 Pro: 18.25x9.63x2.19	Wall or table mount; holds 36 tapes	\$22
Bryco Products	CP-48	Cassette tape storage racks	18.5x11.5x2	Wall or table mount; holds 48 cassettes	\$22
Bryco Products	CDP-63	Thick plastic CD-rack	15.75x13.88x4.25	Wall or table mount; holds 63 CDs	\$22
Bryco Products	MD-80 same as DRP-40	Minidisc holder	17.38x7.38x2	Wall or table mount; holds 80 Minidiscs	\$22
Bryco Products	MDV-24			Wall or table mount; holds 24 mini DV Tapes	\$20
HSA	Oak Rolltop Desks and Racks	Oak rolltop desks and racks	Variable	Locking tambour doors; cover racks; and worksurface	\$1,995 and up
Littlite	Task Lamp	Task lamp	6, 12, or 18 goosenecks	Flexible task lamp avail in 5W or 2.5W	\$25-\$160
Miles Technology	ACT-1 Audio/Cable Tester	Handheld portable tester	2.7x5.1x1.5	Checks XLR, 1/4", RCA cables; reads out exact wiring incl. XLR shells; 500Hz mic/line test tone	\$129
Omnirax	C2	Keyboard composing/audio-video workstation	45.75x43.4x107.25	Holds keyboard, two comp monitors, near-field monitors, comp keyboard, 58 rack spaces	\$1,921
Omnirax	CHKSC24	Optional solid mahogany cheeks for the S6C24	16.5x42.7x1.1	Enhances the look and feel of the Synergy console	\$400
Omnirax	CHKSRI100	Optional solid mahogany cheeks for the 88R100	159x41.6x1.1	Enhances the look and feel of the Synergy console	\$400
Omnirax	Coda	Digital editing/mixing workstation	38.75x38.5x67.9	For computer and peripherals; fits Mackie HUI and other compact mixers/controllers	\$900
Omnirax	Commander	Keyboard, composing, mixing workstation	48x44.5x88	Holds up to 88-note keyboards w/room for computer and near-field monitors; 60 rack spaces	\$1,560
Omnirax	CW-22	22 rack space rolling console	50.25x24 x20.6	22 rack spaces: 8 vertical below, 14 slanted above	\$330
Omnirax	CW-30	30 rack space rolling console	36.5x36.5x20.6	14 rack spaces on sloping top, 10 rack spaces below, 6 lower rear	\$360
Omnirax	E-146	Slanted rolling rack	30.63x26x20.6	Slanted rolling rack; 14 spaces front, 6 spaces lower rear	\$210
Omnirax	M8	Compact mixing workstation	45.5x36x40.5	Fits Mackie 24.8 mixer and others; 8 total rack spaces	\$540



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## STUDIO FURNITURE

MANUFACTURER	PRODUCT	TYPE	DIMENSIONS (INCHES)	SPECIAL FEATURES	PRICE
Omnirax	Hush Box	13 space quiet cabinet w/exhaust fan	28.4x26.7x25.5	Sleek cabinet w/curved glass door front, lined w/acoustical foam; rear door; integrated fan & temperature	\$1,500
Omnirax	KMSOM	Computer keyboard & mouse shelf; access for OmniDesk	.75x9.2x28.5	Fully articulating keyboard & mouse shelf; mounts to underside of the OmniDesk	\$75-\$90
Omnirax	MiniStation	Compact keyboard/computer workstation	39.75x30x48	Holds keyboards up to 46.5" wide; space for computer; keyboard/writing shelf; 6 rack spaces	\$800
Omnirax	MixStation MAK24	Console workstation for Mackie 24/8 bus mixer	43x37.9x81.6	Multilevel working environment for Mackie 24.8 mixer, computer, and peripherals; 42 rack spaces	\$1,440
Omnirax	MixStation MAK32	Console workstation for Mackie 32/8 bus mixer	43x37.9x90.5	Multilevel working environment for Mackie 32.8 mixer, computer, and peripherals; 42 rack spaces	\$1,500
Omnirax	MixStation O2R	Console workstation for Yamaha O2R	43.4x39x70.75	Multilevel working environment for Yamaha O2R mixer, computer, and peripherals; 42 rack spaces	\$1,440
Omnirax	Mobi	Mobile computer workstation	55.1x28.75x20.6	Room for 14" monitor, CPU, and computer keyboard; 10 rack spaces	\$480
Omnirax	OM13	13 space cabinet to accompany the OmniDesk	29.4x24x3x1.6	Companion to OmniDesk available in right- or lefthanded version; 13 rack spaces	\$300-\$340
Omnirax	OM13D	13 space cabinet w/CPU cubby to accompany the OmniDesk	29.4x24x42.3	Companion to OmniDesk available in right- or lefthand version solid door to muffle CPU; 10" cubby for CPU; 13 spaces	\$500-\$570
Omnirax	OmniDesk	Audio/Video workstation desk	35.5x34.6x77.6	Curved work surface & monitor bridge; 29 rack spaces	\$1,050-\$1,300
Omnirax	Pro-20	Rolling studio rack	44.5x18x20.6	Versatile slant front; 20-space rolling rack	\$240
Omnirax	Pro-316	3-bay producer's studio rack	34.56x27.6x62	Rolling rack; 48 rack spaces in 3 slanted bays of 16 spaces; large top surf area	\$720
Omnirax	Producer's Corner	5-piece audio/video suite	36.1x31x20.6	Workstation suite for audio/video editing; enclosed CPU space holds multiple video monitors & near fields; 28 rack spaces	\$1,530
Omnirax	ProStation	Digital audio workstation	44x36x72.25	For computer and near-field monitors; 30 rack spaces	\$1,080
Omnirax	ProStation Jr	Digital audio workstation	42.5x29.5x60.4	For computer and near-field monitors; 14 rack spaces	\$840
Omnirax	ProStation Junior M/C	Keyboard, composing workstation	43x29.5x60.4	Compact workstation for keyboard composing; holds computer and close-field monitors; 12 rack spaces	\$790
Omnirax	ProStation M/C	Keyboard composing/mixing workstation	45.5x36x72.25	For mixing boards or keyboard composing; holds computer and close-field monitors; 26 rack spaces	\$1,020
Omnirax	S6C24	Console workstation for the Digidesign Control 24	40x42.7x87.5	Dedicated Synergy console for Digidesign's Procontrol 24; 24 rack spaces	\$1,350
Omnirax	Sidewick	Rolling workstation	44.37x24.9x20.6	13 rack spaces and space for controllers and peripherals	\$390
Omnirax	Synthrax 88	Multiple keyboard housing and 30 rack spaces	48.9x24x60.4	Holds three 88-note synths on sliding, locking shelves; 30 rack spaces	\$990
Omnirax	Tyro	Ultra-compact keyboard/computer workstation	34x23.75x45.25	For keyboards up to 43" wide; piano shelf slides out/locks in place; computer keyboard slides out/locks in place; 12 rack spaces	\$750
Omnirax	Coda D8	Mixing workstation Digital 8-bus mixer and peripherals	38.5x36.6x71.38	Workstation for Mackie designs	\$960
Omnirax	Coda EX	Mixing workstation	38.14x40.38x71.38	For digital mix/edit environments; 18 rack spaces	\$1,020
Omnirax	Fusion	Keyboard composing workstation; riser bridge positions near-field monitors to sweet spot	38.6x53.9x93.8	Holds 88-note keyboard w/3 rack bays	\$1,550
Omnirax	Coda 328	Mixing workstation for Spirit 328	38.75x46.25x42.25	Compact ergonomic environment for Spirit 328 plus computer and associated peripherals	\$900
Omnirax	S8R100	Console workstation for Sony DMX R100	38.2x41.6x91.1	Dedicated Synergy console for the Sony DMX R100; padded wrist w/lift out section for access to drive; 20 spaces	\$1,900
Omnirax	Sidexars D8/EX	Sidexar	38.5x39.38x36	Sidexars attach directly to the Coda D8 or EX; avail left or right-handed; 17 rack spaces each	\$480
Omnirax	Synergy Jr	Console workstation for the Sony DMX R-100	39.5x39.6x70.8	Flexible, adaptable console; housing for smaller format mixers; w/padded wrist rest; mixer specific kits available; 18 spaces	\$1,350
Omnirax	Synergy 600	Mixing console housing	41.1x41.7x83.5	Flexible, adaptable console housing for most mixers; has padded wrist rest; 12 space rack bay standard	\$1,080 and up
Omnirax	Synergy 800	Mixing console housing	41.37x41.7x101.1	Flexible, adaptable console housing for most mixers; has padded wrist rest; 12 space rack bay standard	\$1,560 and up
Omnirax	Synergy 1000	Mixing console housing	41.37x41.7x121.5	Flexible, adaptable console housing for most mixers; has padded wrist rest; 12 space rack bay standard; many mixer specific kits available	\$1,920 and up



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## STUDIO FURNITURE

MANUFACTURER	PRODUCT	TYPE	DIMENSIONS (INCHES)	SPECIAL FEATURES	PRICE
Omnirax	Synergy 600 D8	Console housing for Mackie d8b	41.1x41.7x83.5	Fits Mackie d8b; contoured padded wrist-rest; two 12 space rack bays	\$1,350
Omnirax	Synergy 800 D8	Console housing for Mackie d8b	41.37x41.7x101.1	Fits Mackie d8b; contoured padded wrist-rest; two 12 space rack bays	\$1,900
Omnirax	Synergy 1000 D8	Console housing for Mackie d8b	41.37x41.7x121.5	Fits Mackie d8b; contoured padded wrist-rest; two 12 space rack bays	\$2,300
Omnirax	Synergy 800 2D8	Console housing for 2 Mackie d8b	41.37x41.7x101.1	Fits 2 Mackie d8b; contoured padded wrist-rest; one 12 space rack bay	\$2,100
Omnirax	S1000 2 D8	Console housing for 2 Mackie d8b	41.37x41.7x121.5	Fits Mackie 2 d8b; contoured padded wrist-rest; two 12 space rack bays	\$2,200
Omnirax	Cheeks-Synergy	Solid mahogany	17.9x41.7x1.25		\$300
Omnirax	Cheeks-Sidecar	Solid mahogany	16x37.2x1.25	Sold as left or right	\$150 ea
Omnirax	Coda 2328	Mixing workstation for 2 Spirit 328	38.75 46.25x70.4	Ergonomic multi-level 42 total rack spaces	\$1,080
Omnirax	MixStation DA7	Mixing workstation for Panasonic DA7	43.4x39x71.87	Ergonomic multi-level for Panasonic DA7; 42 total rack spaces	\$1,440
Omnirax	MixStation 202R	Mixing workstation for 2 Yamaha 02R	43.4x39x97.25	Ergonomic multi-level for 2 Yamaha 02R; 42 total rack spaces	\$1,560
Omnirax	MixStation D8	Mixing workstation for Mackie d8b	43.4x39x83.25	Ergonomic multi-level for Mackie d8b; 42 total rack spaces	\$1,440
Omnirax	KMSF	Computer keyboard/mouse shelf	0.75x8x28.5	Fully articulating mechanism fits Fusion	\$150
Omnirax	KMSD8	Computer Kkeyboard/mouse shelf	0.75x10.25x38.5	Fully articulating mechanism fits MixStation D8	\$150
Omnirax	KSHLF	Computer keyboard shelf	7.75x8x19	Stand positions computer keyboard	\$75
Omnirax	FUSTB	Hardwood tambour back for fusion	36x1x58.8	Covers all cable runs	\$400
Omnirax	Fido	CPU Cart	14.5x16x10	Rolling cart for any CPU up to 10" wide	\$120
Omnirax	Force 12	Multi purpose mixing/composing/ audio video workstation	36x52.9x86	12 rack spaces above desk; expansive video/near field monitor bridge	\$1,450
Omnirax	Force 12 MF Mahogany Finish	Multi-purpose mixing/composing/ audio video workstation	36x52.9x86	12 rack spaces above spacious desk; expansive video/near field monitor bridge	\$1,700
Omnirax	Force 24	Multi-purpose mixing/composing/ audio video workstation	39.7x39x94	24 rack spaces below spacious desk; expansive video/near field monitor bridge	\$1,450
Omnirax	Force 24 MF Mahogany Finish	Multi-purpose mixing/composing/ audio video workstation	39.7x39x94	24 rack spaces below spacious desk; expansive video/near field monitor bridge	\$1,700
Omnirax	Synergy Kits	Add-on kits for Synergy series console housings	Varies according to mixer	Additional rack bays, writing surfaces and filler panels for 600, 800, 1,000	\$100-\$300
Omnirax	Synthrax 76	Three tier synthesizer station	48.9x24x54.75	3 sliding, locking shelves for 76 note and smaller keyboards; 20 rack spaces below	\$900
Omnirax	ProLite Series	Economical racks	8.56-44.94x15.69x20.4	5/8" thick 4 to 20 space versions incl. 12/8 rolling rack	\$100-\$200
Omnirax	E-Series	Studio racks	8.75-19.25x12x20.6	4, 6, 10 space racks 12" overall depth	\$100-\$120
Per Madsen Design	RACKIT System 19 Component Rack Rails	Equipment rack with shelves	5,7.5,10,15x20.75x16	Modular, stackable oak equip racks	\$90/\$95/\$105/\$110
Per Madsen Design	RACKIT System 19 Component Rack Rails	Equipment racks with mounting rails	10,15,30x20.75x16 EIA standard 5, 8, and 16 unit sizes	Modular, stackable oak equip racks	\$110/\$125/\$185
Per Madsen Design	RACKIT System 19 CD/Minidisc 19 unit	Media storage drawers	15x20.75x16	Modular, stackable oak drawer units hold CD, Minidisc, and zip VHS	\$245-\$265
Per Madsen Design	RACKIT System 19 DVD/VHS 19 unit	Media storage drawers	15x20.75x16	Modular, stackable oak drawer units hold DVD, and zip VHS	\$245-\$265
Per Madsen Design	RACKIT System 19 Cassette 19	Media storage drawers (3 drawers)	15x20.75x16	Modular, stackable oak drawer units hold audio, DAT, 8mm cassettes, minidisks, floppy discs	\$275-\$295
Per Madsen Design	RACKIT System 19 Dolly 19	Dolly for all RACKIT System 19 units	4x20.75x16	4 twin-wheel casters; 300 lbs. rolling load	\$55
Per Madsen Design	RACKIT System 19 Dolly 19 PC Tower	Dolly for RACKIT System 19 units	4x30x16	Holds RACKIT 19 units and PC tower	\$110
Per Madsen Design	RACKIT System 19 File 19-25	Storage drawers for hanging files (2 drawers)	25x20.75x16	Stores letter or legal hanging file folders	\$330-\$365
Per Madsen Design	RACKIT System 19 File 19-25	Storage drawers for hanging files (3 drawers)	25x20.75x16	Stores letter or legal hanging folders, cassettes, DATs & CDs	\$360-\$395
Per Madsen Design	RACKIT System 19 Disc Cabinet 19	Media storage cabinet open front	15x20.75x16	Stores LPs, laser discs, books	\$135
Per Madsen Design	RACKIT System 19 Disc Cabinet 19	Media storage cabinet glass door	15x20.75x16	Stores LPs, laser discs, books	\$185





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## STUDIO FURNITURE

MANUFACTURER	PRODUCT	TYPE	DIMENSIONS (INCHES)	SPECIAL FEATURES	PRICE
Quik-Lok	Z-250	Triple shelf computer workstation	33.6x29.8x22.3	Main shelf with pull-out & peripheral shelves; holds computer equip./access	\$320
Quik-Lok	Z-544	Z-500 Series expandable music project station; 44"w	64.6x40.1x27.5	Expandable; holds computer peripherals, spkrs, rack equip, keyboards, mixers; shelves & crossbars height adjustable	\$280
Quik-Lok	Z-555	Z-500 Series expandable music project station; 55"w	55-75.6x28.75x35.4	Expandable; shelves and crossbars are height adjustable; computer-welded steel frame	\$300
Quik-Lok	BS-336	36" fixed height near-field studio monitor stand	Shelf: 11 square; height 36; base 17.7	All-steel, arc-welded construction; cable management; triangle base w/adj leveling floor spikes	\$150/pair
Quik-Lok	BS-342	42" fixed height near-field studio monitor stand	Shelf: 11 square; height 42; base 17.7	All-steel, arc-welded construction; cable management; triangle base w/adj leveling floor spikes	\$160
Quik-Lok	Z-750L	Computer workstation	52.8x28.9x22.3	Large left-angled main shelf with pull-out & peripheral shelves; scratch-resistant 3/4" laminate shelves	\$350
Quik-Lok	A-50	Tripod studio boom stand	Height: 53.5-91.5; Boom: 46.5-87	Tripod leg design w/solid steel legs; holds mics; locking casters; 7' boom; mic cable clips	\$180
Quik-Lok	Z-750R	Computer workstation	28.9x52.8x22.2	Main shelf w/pull-out & peripheral shelves; scratch-resistant	\$350
Quik-Lok	BS-300	Height adjustable near-field	Shelf: 9 square; height: 31.5-48; base 17.7 each side	All-steel, arc-welded construction; cable management; triangle base w/adj leveling floor spikes	\$180/pair
Rackcraft	Desktop Studio Rack	Black laminated melamine board/T-mold edging	25.5x2x48.16	Desktop; 20 rack spaces; ideal for Mackie ADAT studio w/FX and monitors	\$299
SoundAnchors	Digital Audio Workstation	Workstation for digital based recording, mixing, post-production	Custom	Adjustable platform heights; built-in cable management; can be configured for multiple monitors	\$450 and up
SoundAnchors	Mixer Table	Custom mixing table	Custom	Adjustable platform heights; can be configured for multiple monitors	\$550 and up
SoundAnchors	STUDADJ	Adjustable studio monitor stand	Custom	Adjustable platform heights; prefilled and damped; variable speaker tilt	\$325
SoundAnchors	STUDADJR	Adjustable studio monitor stand	Custom	Adjustable platform heights; prefilled and damped; variable speaker tilt; heavy duty platforms	\$355
SoundAnchors	ADMID	Adjustable studio monitor stand	Custom	Adjustable platform heights; variable speaker tilt	\$425
SoundAnchors	PROJ	Studio monitor stand	Custom	Spikes at floor sorbothane pads	\$225
SoundAnchors	PROVID	Adjustable studio video monitor stand	Custom	Adjustable platform heights; spikes at floor; variable tilt platform	\$275
Standtastic	122KS Double Tier Keyboard Stand Frame	For live or studio performance	48 tall; variable width; folds to 6x48		\$199
Standtastic	100KS Single Tier Keyboard Stand Frame	For live or studio performance	48 tall; variable width; folds to 6x48	Infinite adjustment	\$149
Standtastic	102KS 2 Tier Keyboard Stand 60" Frame	Studio or live	60 tall, adjustable width; holds 2 keyboards	Fully adjustable; folds to compact size	\$209
Standtastic	103KS 3 Tier Keyboard Stand 60" Frame	Live or studio 3 tier keyboard stand	60 tall frame; adjustable width	Fully adjustable	\$259
Standtastic	VF-1 Vertical Frames	Wall mount kit accessory	36 tall	Attaches to wall so 100TKs can be attached for wall mounting keyboards	\$53/pair
Standtastic	100TK Tier kits	Accessory for stands and wall mount kits	12-24 depth; 3 angle adjustments	Fully adjustable	\$68/pair
Standtastic	UB-1 U Bolts	Wall mount kit accessory	N/A	Adjusts 100TK's to 90° when used with VF-1s on the wall	\$10
Standtastic	P3 Wood Adjustable Stand	Home or studio	36-54 width adjustment	Adjustable width	\$200
Taytrix	Rack Units	12, 14 and 16 rackspace units	29.5-32x16.5-23	Available in square or unique front-angle design; maple or cherry furniture-grade plywood	\$117-\$300
Taytrix	Counter tops	Counter tops	Varies	Straight; angle wing; corner units	\$35/sq. ft. and up
Taytrix	Oval Workstation	Workstation	6.5' and 5' mini ovals	Adj meter bridge shelf; 180° swivel speaker wings; rack packages available	\$2,875 and up
Ultimate Support	HS268P	Studio-organizer stand	Height adjustable from 27.5-32 surface: 16x35.5	Large work surface; center tier and side arms support gear; many accessories available	\$250
Ultimate Support	MS36	Studio-monitor stand	Height: 36, top plate 9x9; triangle base diameter: 14	Cable management; triangle cast zinc base; available in black and pewter	\$210/pair
Ultimate Support	MS45	Studio-monitor stand	Height: 45, top plate 9x9; triangle base diameter: 14	Cable management; triangle cast zinc base; available in black and pewter	\$230/pair
Wenger	Workstation	Computer/synthesizer workstation	48x37x32	Cockpit-like design; steel & wood frame; cord-management system	\$1,143