

The Mixing Engineer's Handbook

THIRD EDITION

Bobby Owsinski

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**The Mixing Engineer's Handbook,
Third Edition**
Bobby Owsinski

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About the Author

A longtime music-industry veteran, **Bobby Owsinski** started his career as a guitar and keyboard player, songwriter, and arranger, eventually becoming an in-demand producer/engineer working not only with a variety of recording artists, but also on commercials, television, and motion pictures. One of the first to delve into surround-sound music mixing, Bobby has worked on more than a hundred surround projects and DVD productions for a variety of superstar acts.

Combining his music and recording experience with an easy-to-understand writing style, Bobby has become one of the bestselling authors in the music-recording industry, with 19 books that are now staples in audio recording, music, and music-business programs in colleges around the world, including the bestselling *Mixing Engineer's Handbook*, *The Recording Engineer's Handbook*, *How to Make Your Band Sound Great*, and *Music 3.0: A Survival Guide for Making Music in the Internet Age*. Many of his books have also been turned into video courses that can be found online at lynda.com. Bobby continues to provide presentations, workshops, and master classes at conferences and universities worldwide.

Visit Bobby's production blog at bobbyowsinski.blogspot.com, his Music 3.0 blog at music3point0.blogspot.com, and his website at bobbyowsinski.com.

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Introduction

Welcome to the third edition of *The Mixing Engineer's Handbook*. In the six years since I wrote the second edition and the 13 years since I wrote the original book, the recording industry has truly undergone a huge paradigm shift. Recording budgets have decreased significantly, the number of major studio facilities has dropped to just a handful in each major media center, and the rise of the digital audio workstation has made it possible for just about anyone to make a record at home for a minimal investment.

All the more reason to update this book. Mixing techniques have evolved and adapted to the digital world, and with fewer studios, there are also fewer mentors to learn from. That said, the classic mixing techniques are more useful than ever, since the basics of balance, equalization, compression, and effects never go out of style.

My main goal has always been to preserve these techniques before they're lost to rumor or twisted into irrelevance. Where once these skills were handed down from engineer to assistant, that whole master-apprentice information exchange has almost faded into oblivion, which is all the more reason to have a single repository of techniques.

For the third edition, I've added a number of chapters and interviews, updated the interviews from the previous editions, and generally adapted the remaining material so that what's contained herein is much more relevant to today's DAW-based mixing. Since the majority of readers will be working at home in their personal studio, I've put a special emphasis on how the pros use their DAWs, as well as how they adapt their large-console techniques to the home studio.

Just so you know, the reason why I originally wrote the first edition of this book is probably the same reason why you're reading it: to get better at what I do. I noticed that my mixes were somewhat hit or miss. Sometimes they were great, sometimes just okay, and sometimes just plain off the mark. I also noticed that much of the time my mixes didn't have the big-time sound that I heard on the radio. I wanted this sound badly, and the only way I knew how to get it consistently was to ask questions of the engineers who already knew the secret.

While doing research for this book, I found that a common factor among most great mixers was that they usually all had at least one mentor as a result of coming up through the studio ranks. Most great mixers started as assistants, learned by watching and listening to the greats they helped, and had taken a little from all of them as a result.

I didn't do that, however. Being a musician first and foremost, I learned to engineer thanks to my early interests in electronics, which came from wanting to know how the electrons got from my guitar to the speakers of my amplifier. As I became familiar with the recording studio, I was lucky to be offered all sorts of varied session work, from recording jingles to big band to jazz to R&B to hard rock, but since I never wanted to give up being a musician (which I knew I'd have to do), I never took a proper studio job as an assistant to really learn the trade at the hands of the masters. As a result, my recording skills were always pretty good, but my mixing skills were lacking.

I soon realized that there were many others like me who were good but not great, not because they weren't capable, but because they didn't have the opportunity or access to the methods of the masters. After all, how often does a George Massenburg or Bruce Swedien record in Lincoln, Peoria, Santa Fe, or even smaller towns like Minersville, Millersburg, or Avondale? And unfortunately, because there are fewer real commercial studios left, there's even less of a chance of that happening today than ever before. Not only that, the vast majority of musicians (who inevitably end up as engineers in some capacity) operate in their personal studio anyway.

So the first edition of the book started out very selfishly, as it was meant specifically to meet my needs, but it ended up for you as well. I hope you will benefit from it as much as I have.

And yes, my mixes have gotten much, much better.

Meet the Mixers

When I wrote the first edition of *The Mixing Engineer's Handbook*, my intention was to interview as many great engineers as I could in order to accumulate their various methods and anecdotes simply as background material. The more I got into it, though, the more it became obvious that these interviews were living and breathing on their own and they really should be included in the text; otherwise, a lot of really useful information would be left out. In other words, let them tell you what they do in their own words. These interviews are contained in Part II of the book. Most of the mixers interviewed in the first and second editions have been re-interviewed, since their mixing methods have changed along with the industry changes.

Every one of the mixers I interviewed for this book was extremely forthcoming, answering just about any question and offering explicit information as to why and how he works. Professional jealousy just does not exist in this industry, at least in my experience, as the general attitude is, "I'll tell you anything you want to know, since no one can do it like me anyway."

As a matter of fact, here's a list of the engineers who contributed to this book, along with some of their credits. I've tried to include someone to represent every genre of modern music (punk to classic to alternative to jazz to classical to R&B to EDM to Latin to rap to orchestral to country), so there's something for everyone. I'll be quoting them from time to time, so I wanted to introduce them early on so you have some idea of their background when they pop up.

Just remember, whenever a "mixer" or "engineer" is referred to in this book, I don't mean your average, run-of-the-mill Joe Blow engineer (hardworking and well meaning as he is). I mean someone who's made the hits that you've listened to and loved. This book is about how these glorious few think, how they work, how they listen, and why they do the things they do. And even though we can't hear as they hear, perhaps we can hear through their words.

Bob Brockman: "Bassy" Bob has been a fixture on the New York studio scene with a wide range of awards and credits that include Mary J. Blige, Toni Braxton, Notorious B.I.G., Babyface, Aretha Franklin, Al Green, the O'Jays, Brian McKnight, Jodeci, Faith Hill, Korn, Laurie Anderson, Vanessa Williams, Christina Aguilera, P. Diddy, Herbie Hancock, the Fugees, Santana, and Sting.

Bob Bullock: Since he moved to Nashville in 1984, Bob has been one of the town's top engineers, trusted by the likes of Kenny Chesney, Shania Twain, George Strait, Reba McEntire, Hank Williams Jr., and Jimmy Buffett, among with many others. Prior to that he saw a different side of the music world while working in Los Angeles with acts such as the Tubes, Art Garfunkel, Seals and Crofts, Chick Corea, and REO Speedwagon.

Joe Chiccarelli: With credits such as the White Stripes, Alanis Morissette, the Strokes, Jason Mraz, Tori Amos, Etta James, Beck, U2, Elton John, Oingo Boingo, the Shins, Frank Zappa, the Killers, Brian Setzer, and many more, chances are you've heard Joe's work more times than you know.

Lee DeCarlo: From his days as chief engineer at New York's Record Plant in the heady 1970s, Lee has put his definitive stamp on hit records that include works by Aerosmith, John Lennon, Kenny Loggins, Black Sabbath, Rancid, and Zakk Wylde, among many others.

Introduction

Jimmy Douglass: One of the few engineers who can cross genres with both total ease and credibility, Jimmy has done records for artists as varied as Snoop Dogg, Jay-Z, the Roots, Ludacris, Justin Timberlake, Timbaland, Missy Elliott, Otis Redding, the Rolling Stones, Foreigner, Hall & Oates, Roxy Music, and Rob Thomas.

Benny Faccone: Benny is unique in that he's a Canadian from Montreal, but 99 percent of the things he works on are Spanish. From Luis Miguel to Ricky Martin to the Latin rock supergroup Mana, to Spanish remixes for Boys II Men, Tony Braxton, and Sting, Benny's 14-time Grammy-winning work is heard far and wide around the Latin world.

Jerry Finn: With credits from Green Day to Rancid to the Goo Goo Dolls to Beck, Jerry represented one of the new generation of mixers who knows all the rules but are perfectly willing to break them. Unfortunately, Jerry passed away in 2008, but his techniques and wisdom live on.

Jon Gass: Jon has long been the go-to mixer for a who's who of music superstars, including Madonna, Whitney Houston, Janet Jackson, Celine Dion, Mariah Carey, Mary J. Blige, Usher, Babyface, Earth, Wind & Fire, Lionel Richie, John Mellencamp, and many more.

Don Hahn: When it comes to recording and mixing a 45- to 100-piece orchestra, there's no one better than Don, with an unbelievable list of credits that range from major television series to such legends as Count Basie, Barbra Streisand, Chet Atkins, Frank Sinatra, Herb Alpert, Woody Herman, Dionne Warwick, and a host of others (actually, 10 pages more).

Andy Johns: Andy Johns needs no introduction because we've been listening to the music that he's been involved with for most of our lives. With credits such as Led Zeppelin, Free, Traffic, Blind Faith, the Rolling Stones, and Van Halen (to name just a few), Andy has set a standard that most mixers are still trying to live up to.

Bernie Kirsh: From virtually all of Chick Corea's recordings to Quincy Jones, Stanley Clarke, Joe DeFrancesco, and Al Di Meola, Bernie has certainly made his mark as one of the top engineers in the world of jazz.

Nathaniel Kunkel: One of the most in-demand mixers in the business, with credits that range from James Taylor, Lionel Richie, and Sting to Good Charlotte, Fuel, and Insane Clown Posse, Nathaniel represents the best of the next generation of mixers.

George Massenburg: From designing the industry's most heralded audio tools to engineering classics by Little Feat, Earth, Wind & Fire, Dixie Chicks, James Taylor, Billy Joel, Lyle Lovett, and Linda Ronstadt (to name only a few), George needs no introduction to anyone even remotely connected to the music or audio business.

Greg Penny: Born into a music-business family to bandleader/producer Hank Penny and hit recording artist Sue Thompson, Surround Music Award winner Greg Penny seemed destined for a life in the studio. Indeed Greg's production aspirations resulted in hits with k.d. lang, Cher, and Paul Young among others, but a meeting with Elton John while in his teens turned into an award-winning mixing journey with the legend many years down the road.

David Pensado: Over the last two decades, Dave has taken mixing to a new level in artistry, having mixed megahits for superstars such as Christina Aguilera, Justin Timberlake, Kelly Clarkson, Pink, Black Eyed Peas, Beyonce, Shakira, and Michael Jackson, among many others. Well known in the business way before his popular Pensado's Place web video series, Dave not only is on the cutting edge of technology, but has thought long and hard about the more cerebral aspects of mixing as well.

Elliot Scheiner: With a shelf full of industry awards (seven Grammys, an Emmy, four Surround Music Awards, the Surround Pioneer and Tech Awards Hall of Fame, and too many total award nominations to count) from his work

with the Eagles, Steely Dan, Fleetwood Mac, Sting, John Fogerty, Van Morrison, Toto, Queen, Faith Hill, Lenny Kravitz, Natalie Cole, the Doobie Brothers, Aerosmith, Phil Collins, Aretha Franklin, Barbra Streisand, and many, many others, Elliot has long been widely recognized for his artful and pristine mixes.

Andrew Scheps: Andrew Scheps has brought a perfect combination of old- and new-school skills to his work with a who's who of superstar artists, including Red Hot Chili Peppers, Metallica, U2, Justin Timberlake, Jay-Z, the Rolling Stones, Linkin Park, Jewel, Neil Diamond, and Adele.

Ken Scott: Legendary producer/engineer Ken Scott began his career working with the Beatles on *The White Album* and *Magical Mystery Tour*; on six David Bowie records, including the seminal *Ziggy Stardust* album; and with Pink Floyd, Elton John, Duran Duran, Jeff Beck, Supertramp, Procol Harum, Devo, Kansas, Mahavishnu Orchestra, and many more. To put it mildly, he's an absolute icon in the recording industry, having been a part of records that have conservatively sold more than 200 million units.

Ed Seay: Ed has become one of the most respected engineers in Nashville since moving there in 1984, helping to mold hits for major hit-makers such as Blake Shelton, Lee Brice, Martina McBride, Ricky Skaggs, Dolly Parton, Pam Tillis, Highway 101, Collin Raye, and a host of others.

Allen Sides: Although well known as the owner of the premier Ocean Way Studio complex in Los Angeles, Allen is one of the most respected engineers in the business, with credits that include Josh Groban, Michael Jackson, Chris Botti, Barry Manilow, Neil Diamond, Mary J. Blige, and Faith Hill, as well as many major film scores.

Don Smith: With credits that read like a who's who of rock and roll, Don has lent his unique expertise to projects by the Rolling Stones, Tom Petty, U2, Stevie Nicks, Bob Dylan, Talking Heads, the Eurythmics, the Traveling Wilburys, Roy Orbison, and Iggy Pop, among many more. Don is another who unfortunately passed away way too soon, but hopefully this book will keep his unique techniques alive.

Ed Stasium: Ed has made some great guitar albums like ones by the Ramones, the Smithereens, and Living Color, but he has also worked with the likes of Mick Jagger, Talking Heads, Soul Asylum, Motorhead, and even Gladys Knight and the Pips and Ben Vereen.

Bruce Swedien: Maybe the most revered of all engineers, Bruce has a credit list that could take up a chapter of this book alone. Although the biggest Michael Jackson albums (*Off the Wall*, *Thriller*, *Bad*, *Dangerous*) would be enough for most mixer's resumes, Bruce can also include such legends as Count Basie, Tommy Dorsey, Duke Ellington, Woody Herman, Oscar Peterson, Nat "King" Cole, George Benson, Mick Jagger, Paul McCartney, Patti Austin, Edgar Winter, and Jackie Wilson, among many, many others.

For those of you who don't have the time or desire to read each interview, I've summarized many of their working methods in Part I of the book.

Please note: Just because you read this book doesn't automatically guarantee that you'll become a platinum-selling mixer who makes lots of money and works with big-name recording artists. You'll get many tips, techniques, and tricks from the book, but you still need ears and experience, which only you can provide. All this book can do is point you in the right direction and help a little on the way!

Also keep in mind that just because one best-selling mixer might do things a certain way, that doesn't mean that's the only way to do it. In fact, you'll notice that what works for one may be completely opposite of what works for another, yet they both produce great mixes. You should always feel free to experiment, because, after all, whatever works for you is in fact the right way.

PART I

Mixing Techniques

Some Background

BEFORE WE GET into the actual mechanics of mixing, it's important to have some perspective on how this engineering skill has developed over the years.

The Evolution of Mixing

It's obvious to just about everyone who's been around long enough that mixing has changed over the decades, but the why's and how's aren't quite so obvious. In the early days of recording in the '50s, mixing was minimal at best because the recording made with a single-track mono tape machine and a big recording date meant that all four of the studio's microphones were used. Of course, over the years recording evolved from capturing an unaltered musical event to one that was artificially created through overdubs, thanks to the innovation of Sel-Sync (the ability to play back from the tape machine's record head so everything stayed in sync), introduced in 1955. The availability of more and more tracks from a tape machine begot larger and larger consoles, which begot computer automation and parameter recall that became a required feature just to manage the complexity of these far larger sessions. With all that came not only an inevitable change in the philosophy of mixing, but even a change in the way that a mixer listened or thought as well.

According to the revered engineer/producer Eddie Kramer (engineer for Jimi Hendrix, Led Zeppelin, KISS, and many more), "Everything was 4-track [when I started recording], so we approached recording from a much different perspective than people do nowadays. My training in England was fortunately with some of the greatest engineers of the day who were basically classically trained in the sense that they could go out and record a symphony orchestra and then come back to the studio and do a jazz or pop session, which is exactly what we used to do. When I was training under Bob Auger, who was the senior engineer at Pye Studios, he and I used to go out and do classical albums with a 3-track Ampex machine and three Neumann U47s and a single three-channel mixer. With that sort of training and technique under my belt, approaching a rock-n-roll session was approaching it from a classical engineering standpoint by making the sound of a rock band bigger and better than it was. But the fact of the matter was that we had very few tools at our disposal except EQ, compression, and tape delay. That was it."

English mixer Andy Johns, who apprenticed under Kramer and eventually went on to equally impressive credits with the Rolling Stones, Led Zeppelin, Traffic, Van Halen, and others, goes a step further. "You know why *Sgt. Pepper* sounds so good? You know why *Are You Experienced* sounds so good, almost better than what we can do now? Because when you were doing the 4 to 4 [mixing down from one four-track machine to another to open up additional tracks for recording], you mixed as you went along. There was a mix on two tracks of the second 4-track machine, and you filled up the open tracks and did the same thing again. Listen to 'We Love You' by The Stones. Listen to 'Hole in My Shoe' by Traffic. You mixed as you went along; therefore, after you got the sounds that would fit with each other, all you had to do was adjust the melodies. Nowadays, because you have this luxury of the computer and virtually as many tracks as you want, you don't think that way anymore."

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And indeed, once more tracks were available and things began to be recorded in stereo (and now 5.1 and beyond), the emphasis has turned from the bass anchoring the record to the big beat of the drums as the main focal point. This is partially because typical drum miking went from just overhead and kick-drum mics to the now-common occurrence of a mic on every drum, since the consoles were capable of accommodating more microphone inputs and there were now plenty of tracks to record on. Now that the drums could be spread out over 6 or 8 or even 20 tracks, they could now be concentrated on more carefully during the mix, since they didn't have to be premixed along with the bass onto only one or two tracks. Instead of the drums being thought of as just another instrument equal to the bass, now they demanded more attention because more tracks were used.

At that point (approximately 1975), thanks to the widespread use of the then-standard 24-track tape machine, mixing changed forever, and, for better or for worse, mixing began to change into what it is today.

With more tracks came more mix complexity. Mixing suddenly became a multi-man operation, with four or five sets of hands on different console parameters, every one being given a job to execute during the mix. Mixing became a communal performance by the engineer, producer, assistant, and band members. Of course, it was impossible to execute the mix perfectly all the way through with that much human interaction, so mixes became a collection of sections edited together, but they were holistic and organic and part of the charm of the late '60s- and '70s-era mixing.

The demand for more mixing precision brought about console automation, first affecting only the console faders and mutes. Now it was possible to reduce the number of humans involved with a mix, since only the console parameters such as EQ and effects sends required manual dexterity. Soon the demands for remixes from record-label executives required that the massive gear setups had to be rebuilt in order to update mixes. The performance had to be re-created even though all that was required was maybe only the vocal level be raised by a dB. This brought about the need for "Total Recall," the feature that made SSL consoles a must-have for every major studio. While it was now possible to manually recall every position of every parameter on a console, assistants still had to fill in elaborate sheets to manually recall every piece of outboard gear as well. A typical recall setup could take three or four hours alone before the first notes of the song even came out of the speakers.

The next innovation was "resettable" consoles that not only would remember all of your parameter settings, but would automatically reset them so the assistant didn't have to manually do it. As consoles became larger and larger to the point where 56 inputs was soon considered small, this was almost a necessity. Of course, the outboard gear still had to be reconnected and reset by hand, and with some mixers using 20, 30, or even more pieces during a large mix, life in the studio became more and more complex.

But an interesting turning point occurred around 2001. With the computer-based digital audio workstation now becoming more and more the centerpiece of the studio, much of the automation and effects began to take place inside the DAW ("inside the box" became the commonly used phrase), eliminating the need for much of the outboard gear used on every mix. Soon mixers became more comfortable with the sound of mixing completely inside the DAW, and thanks to digital controllers such as the Avid Icon that supplied faders and knobs, they had the same tactile experience as in the analog world of consoles.

Mixing in the box had another big effect on the music business, though. With album-project budgets dropping to the point where they almost matched the price of buying a full DAW setup, many mixers were suddenly faced with the scenario of "We can either pay for you or for the studio, but not both." This forced many top mixers to move their base of operations from a commercial studio into a studio inside their homes.

Today even the power of free or low-cost DAW applications goes far beyond what major acts were used to using from the '50s through the '80s. It's an amazing time to be an engineer, if you have a handle on what the tools at your disposal are able to accomplish.

Different Mixing Styles

Once upon a time, engineers worked for one particular studio, and one of the reasons a client would book time there was to get the services of that particular engineer. Because the engineer was tied to a specific region of the world, a unique mixing style for the area developed (much like what happened with the music), thanks to engineers and clients exchanging tips and tricks with one another. As a result, up until the late '80s or so, it was easy to tell where a record was made just by the sound of the mix.

Today there's less of a distinction than there used to be between the mixing styles of different areas. There's been a homogenization of styles in recent years mostly because engineers now mix in a variety of locations around the world, and many have relocated to new areas, transplanting their mixing styles along the way.

That said, you can trace the mixing styles of today to four major styles from the past, where most mixes fell into one of them: New York, Los Angeles, London, and Nashville. If you listen to records from the '80s and '90s, you can distinctly hear these styles.

The New York Style

The New York style used to be perhaps the easiest to identify because it featured a lot of compression, which makes the mix very punchy and aggressive (just like New Yorkers). In many cases, the compressed instruments (mostly the rhythm section) are even recompressed several times along the way. It seems that every New York engineer that I've ever talked to (even the transplanted ones) used the same trick, which is to send the drums (sometimes with the bass) into a couple of busses, send that through some compressors, squeeze to taste, then add back a judicious amount of this compressed rhythm section to the mix through a couple of channels. This effect can be enhanced even further by boosting the high and low frequencies (lots of boost in many cases) to the compressed signal as well. (More on this "New York Compression Trick" later in the book in Chapter 9, "The Dynamics Element: Compression, Limiting, Gating, and De-Essing.")

The LA Style

The LA style exhibited a somewhat more natural sound, which, although compressed, is done to a less obvious degree than the New York style. There's also less effects layering than the London style, but there'd be a good bit of delayed reverb added. The LA style has always tried to capture a musical event and then sonically augment it, rather than recreate it. Some good examples would be any of the Doobie Brothers or Van Halen hits of the '70s and '80s.

The London Style

The London sound was a highly layered musical event that borrowed from the New York style in that it would be pretty compressed but had multiple effects layers that put each instrument into its own distinct sonic environment. Although musical arrangement is important to any good mix, it's even more so a distinctive characteristic of a London mix. What this means is that many mix elements appear at different times during a mix, some for effect and some to change the dynamics of the song. Each new element would be in its own environment and, as a result, would have a different ambient perspective. A perfect example of this would be Hugh Padgham's work with the Police, or just about anything produced by Trevor Horn, such as Seal or Grace Jones or Yes's "Owner of a Lonely Heart."