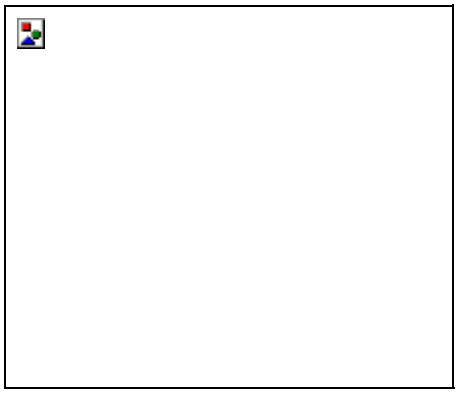
The Basics of

by David Gibson

> *This article is excerpted from David Gibson's* The Art of Mixing, *published by MixBooks. In the book, Gibson proposes a visually oriented approach to compiling a mix and offers a number of tips on creating solid mixes across various genres, with an emphasis on music and arrangements. For this month's audio education issue, we've chosen sections dealing with the basics of mixing.*

It is easy to learn the function of each piece of equipment in the studio. You can read user's manuals or the plethora of books available that explain the equipment. The difficulty lies in knowing how to use the equipment and in learning what combinations of equipment are used to create great-sounding mixes. Once you know what the knobs do, which way do you turn them? And what makes a great mix?



MIXER PHOTO: COURTESY EUPHONIX

Mixes can be made to fit the song so that the mix becomes transparent, or invisible. Or, the mix can be used to create musical dynamics of its own. It can be used as a tool to enhance and highlight, or it can be used to create tension or chaos. It could be said that a great engineer uses the mix to push the limits of what has already been done.

If the band is trying to create as full a mix as possible, you might make some suggestions to help. Adding more sounds or notes is the most obvious way to fill out a mix. Therefore, you might suggest double-tracking (recording the same part twice), or even triple-tracking. You could also recommend doubling a part with a different instrument. However, a more common problem is arrangements that are too full and need weeding out. There are some bands that would record 48 tracks if available--just because they are there, and just because they can! Then, even worse, they want all 48 tracks in the mix just because they have become attached to their parts.

Therefore, it often becomes the engineer's duty to try to weed out the arrangement--for clarity's sake. An engineer will often suggest turning off (muting) certain tracks in particular sections of the song. Dropping out parts like this can make certain sections of the song seem more personal and can contribute to the overall clarity of the song. On a more detailed level, the engineer might point out when too much is going on in a specific frequency range. You might suggest playing a part at a different octave, or in a different inversion.

But sometimes the intent is to be sparse, and other times the intent is to create the proverbial "wall of sound"--it all depends on the music. Still, you have to begin a mix somewhere, so let's look at the most common effects-based processes.

EQUALIZATION

When you go to mixdown a song, the first step is usually to EQ each of the sounds individually. The most common mistake made by an inexperienced engineer is to begin turning EQ knobs before listening. Don't touch the knobs until you know what you want to do. Listen to figure out if anything is wrong with the sound first. And if it ain't broke, don't break it.

Cut Muddiness (100 to 800 Hz): Listen to each instrument to check if it sounds muddy. Kick drums almost always need to have the muddiness cut (unless it is a rap or hip hop kick). Other potentially muddy instruments include toms, bass guitar, piano, acoustic guitar and harp. Muddiness normally occurs around 300 Hz (although, it varies between 100 and 800 Hz). Be judicious: If you cut the muddiness too much, the instrument will sound thin because this mud also contributes to the "body" of most sounds. When cutting muddy frequencies, always check to make sure that you haven't lost your bottom--the low lows. Sometimes you might compensate by boosting the lows around 40 to 60 Hz.

Cut Irritation (1,000 to 5,000 Hz): Cut any excessively irritating, or "honky," frequencies occurring in the midrange from 1,000 to 5,000 Hz. Vocals, electric guitars and cymbals (including hi-hat) often need frequencies cut in the midrange.

When getting rid of irritating frequencies, set the bandwidth as narrow as possible. If you were to use a wide bandwidth to take out an irritating edge on a vocal, guitar or cymbal, you would lose the entire body of the sound in the midrange--and the sound would appear dull and not present. By using a narrow bandwidth you preserve your body.

Then boost the highs on instruments that sound dull--especially snare. The amount of boost is largely dependent on the style of music. R&B, dance and certain types of rock typically require more crispness than other styles. Country, middle-of-the-road and folk often do not need as much boost.

If ever in doubt as to how to set the bandwidth, start with the narrowest bandwidth possible. Then try widening it out bit by bit to see if it sounds better. By doing this, you end up with the center frequency where it should be.

Kick EQ: Engineers often seem to go for one of three general types of drum sounds: 1) The dead "thud" you get with one head on the drum, with some type of weight (sandbag, mic stand bottom or brick) on top of the pillows or padding in the drum. 2) The resonant "ring" you get with two heads on the drum, with a small hole in the front head of the drum. 3) The dull "boom" you get with both heads on the drum with no hole (commonly sought in rap, hip hop or techno).

The first and second types normally have a huge amount of the muddiness taken out in the EQ range around 300 Hz--as much as 10 dB. They also sometimes have a high-frequency boost of a few dB around 5,000 to 6,000 Hz.

The third type often has a bit of a boost in the muddy range around 300 Hz. Also, there is commonly a boost around 40 to 100 Hz for the low end. The high end, around 6,000 Hz, might actually be rolled off to get rid of the attack of the sound.

Snare EQ: The snare drum is often only boosted in the highs around 5,000 to 6000 Hz. Sometimes a little bit of low end is added around 60 to 100 Hz to make a thin drum sound fatter. And occasionally, it is necessary to take out some of the muddiness around 300 Hz. Snare drum sounds sometimes have a midrange "flap" or "edginess" around 800 to 1,000 Hz that needs to be taken out to smooth out the sound.

Hi-hat EQ: First, it is often necessary to take out just about all of the low end to get rid of the bleed from the kick drum. If you have a highpass filter, you can roll off the entire low end up to around 300 to 700 Hz. It is also quite common to roll off the muddiness in the bleed from the rest of the drum kit. Occasionally, it is nice to add a bit of super-high frequencies around 10,000 Hz for a nice bright "sizzle" up top. Also, every so often, it is necessary to take out irritating frequencies in the midrange between 1,000 to 4,000 Hz. However, if taken out too much, the hi-hat will sound too dull. (A narrow bandwidth is helpful in this situation.)

Bass EQ: On some bass guitars, it is necessary to take out some of the muddiness around 300 Hz. However, if too much is taken out, the bass will sound too thin and wimpy. It is also often necessary to boost the highs (much more than you would think when in solo) around 2,000 Hz. Occasionally, it is fun to boost the low end of the bass around 40 Hz to add a solid bottom.

Guitar EQ: Most commonly, guitars only need to be brightened up around 3,000 to 6,000 Hz. Sometimes it is necessary to take out some of the muddiness around 300 Hz.

Vocal EQ: Vocals vary tremendously. It is quite common to not EQ vocals while recording for the simple reason that it can be difficult to find the exact same EQ in future overdub sessions. This is fine because vocals are normally not EQ'd much anyway: Not only are we hypersensitive to midrange frequencies (where vocals hang out), we are also extra sensitive to the natural sound of vocals. We know what a voice should sound like better than any other sound in the world. Therefore, it is critical to be extremely sparing with any vocal EQ.

Vocals are often boosted just a couple of decibels around 5,000 to 6,000 Hz. Occasionally, it is necessary to take out a bit of muddiness around 300 Hz, and a bit of irritation around 3,000 or 4,000 Hz. The irritation sometimes comes from the harmonic structure inherent in the sound; but, it can also come from a cheap or bad microphone. It is also often helpful to use a highpass filter to roll off all low frequencies below 60 Hz in order to get rid of any rumbly-type noises or bleed from any bassy instruments.

DELAY

A simple way to set delay time is to put the delay on the snare drum--or some other instrument playing a continuous pattern--so that it's easy to hear when the delay is in time with the tempo of the song. Once you have found a delay time that works, any multiple or fraction of that time might also work.

A delay time of more than 100 milliseconds creates a dreamy effect and is most commonly placed in songs with slower tempos, where there is room for the effect. The delays take up so much space in a mix that they are often only turned up on the end of a line--where there is enough space to hear the echoes by themselves.

You can often hear a delay time of 60 to 100 ms, commonly referred to as "slap," on the vocals of many artists, including Elvis Presley. This effect can be quite helpful in making a thin sound (especially a voice) appear fuller. It can also help to obscure bad singing technique or pitch problems. In fact, a slap can be used to bury bad intonation of almost every instrument. On the other hand, a slap can also make a vocal seem less personal. If you have an incredible singer, you might forego using any delays. Just put it out there with a little reverb and let it shine.

Delay in the 30- to 60ms range is commonly referred to as "doubling" because it makes a sound seem like it was played twice, or double-tracked. The Beatles used this effect extensively to simulate more vocals and instruments.

A 1- to 30ms delay is commonly used for "fattening." At a delay time less than 30 milliseconds, the brain and ear are not quick enough to hear two sounds. We only hear one "fatter" sound.

Besides reverb, fattening is the most-used effect in the studio, perhaps because it doesn't sound much like an effect. When you put the original "dry" instrument sound in one speaker and put a delay less than 30 milliseconds in the other speaker, it "stretches" the sound in stereo between the speakers.

REVERB

Reverb is essentially multiple delays. When a sound first occurs, it travels throughout the room at the snail's pace of around 770 miles per hour. It bounces off the walls, ceiling and floor and comes back to us as hundreds of different delay times. All of these delay times wash together to make the sound we know as reverb.

One common rule in dealing with reverb, for example, would be to set the reverb time on a snare drum so that it ends before the next kick attack. This is so that the snare reverb does not obscure the attack of the next kick note--keeping the kick drum sounding clean, punchy and tight. This means the faster the tempo of a piece, the shorter the reverb time. Again, though, rules can be broken.

COMPRESSOR/LIMITERS

Sounds are often compressed more or less based on the dynamic range of the sound itself. For example, most acoustic instrument sounds are commonly compressed; vocals and bass guitar are almost always compressed. Many engineers will commonly compress the kick drum, but if the drummer is really good and has fine control of the volume of each kick hit, then compression may not be necessary.

Many instruments are only compressed when they are placed in a mix (as opposed to be being solo). For example, it is rare for anyone to compress a solo piano. However, pianos are commonly compressed when placed in a mix (especially a busy mix). This is also the case with an acoustic guitar. In fact, as mentioned before, the "busier" the mix--that is, the more sounds and the more notes--the more the individual sounds are compressed.

The overall amount of compression on a mix is obviously more noticeable than any individual setting. But, regardless of the way that overall compression is applied (or calculated), certain styles of music have developed quite strong traditions as to how much they are compressed. For example, a lot of pop music has much more overall compression than most country or punk. This can be heard as a sort of "polish" (which some people complain of as part of being over-produced). You can sometimes "see" the amount of overall compression on VU meters of a cassette deck. The meters barely move on highly compressed material.

The trick is to pay attention to the overall amount of compression that seems to be going on in each song you hear, and develop your own values for how much compression you like.

LEVELS

When bands complain that the mix doesn't sound right (but they don't know why), often it is as simple as an instrument being placed at the wrong volume. It seems that most engineers will start changing EQ and effects to try pleasing the band. It might actually be that the rhythm guitar is too loud compared to the vocals, or the kick drum is at the wrong volume compared to the bass guitar.

Sometimes, of course, the volume of the entire mix can be raised or lowered. The master stereo fader volumes are not commonly changed except at the beginning or end of the song. Fading in the entire mix at the beginning of a song creates a very nice and smooth dynamic--The Beatles used this on "Eight Days a Week." I've also heard songs where the entire mix is faded out, then faded back in, faded out again, and faded in one more time. Meanwhile, a very cool effect is to cut or boost the overall volume in the middle of a song. Such dynamics can be quite effective.

You also can create much more subtle (and often more effective) dynamics by making minor volume changes in various sections of a song. For example, you might boost the volume of the guitars (ever so slightly) in the chorus and raise the snare and snare reverb ever so slightly in the lead break. Then, in the vamp at the end of the song, bring up the

bass guitar and kick drum (again, just a touch). These subtle volume changes can add serious magic to your mix.

PANNING

If you follow panning traditions, you can create a dynamic that is transparent and lets the music punch through. But if you don't follow tradition, you might then be considered "creative." Unusual panning can actually create tension in a mix--when used appropriately.

Let's look at typical panning placement for some common instruments and sounds. But remember, let the music dictate the panning!

It is rare that the kick drum is ever placed anywhere except in the middle, exactly between the speakers. When a sound is in the middle, you have two speakers carrying the sound instead of one, so they don't have to work as hard (especially with big sounds like kick drums and bass guitars). Also, it makes sense to be in the center simply because the kick drum is normally in the center of most kits.

Two kick drums, or a double kick, present an interesting dilemma when it comes to panning. Depending on how often the second kick drum is played, some will pan them slightly left and right. However, some engineers will place the main kick in the center and only pan the second kick slightly. To pan the two kick drums completely left and right is unusual (or creative) but has been done.

The snare drum is also most commonly placed in the middle, although some engineers do place it a bit off to the side (especially in jazz). It seems to be the case that if the snare drum sound is huge (bigger sound and/or more reverb), it is more commonly placed in the center.

The hi-hat is often placed about halfway between one side and the middle, its natural placement in the kit. However, when the mix is busier, or when a "spatial" effect is desired, the hi-hat is often panned all the way to one side. In house music and hip hop, not only is the hi-hat often panned anywhere, it is commonly moved during the mix, and is sometimes panned far left with a delay panned to the far right. In order to provide maximum fun, tom toms are commonly spread completely left to right (or right to left). However, for natural panning, the toms are sometimes placed between the speakers exactly as they are on the actual drum set.

A floor tom is normally placed on the far side. However, occasionally the floor tom will get placed in the center, for the same reason we normally put a kick drum and a bass guitar in the middle--because it is so powerful and commands so much attention.

Bass guitar is most commonly placed in the middle because it is so large and commands so much attention, like the kick drum. In jazz and other types of music, the bass is often placed to one side.

It is almost against the law to place a lead vocal anywhere except smack dab in the middle. Pan a lead vocal to one side, go to jail.

If a vocal is recorded in stereo with two mics, double-tracked (sung twice, or made into stereo with a time-based effect), the two sounds are normally spread evenly left to right. Sometimes they are placed at 11:00 and 1:00. The panning of background vocals often depends on the vocal arrangement. When there is only one background vocal, it can't be panned in the center because it gets in the way of the lead vocal. You could put it off to one side or the other, but this makes the mix unbalanced.

A solo piano is almost always panned completely left and right in stereo. The bass strings are panned to the left and the high strings are panned to the right, because this is the way a keyboard is laid out. This is probably the strictest rule of all when it comes to panning. You'd better shoot the piano player before you pan the high end to the left. Even in a live show with a stereo P.A., the piano is panned with the lows on the left.

Panning of guitars is based on concerns similar to those for piano and keyboards. Often, the guitar is panned based on the placement of everything else--"crowd control." If you want the guitar to be more interesting-sounding or present, you might try fattening to spread it in stereo.

Horns and strings are almost always spread in stereo completely left and right. This stereo effect can be created in a few ways. The horns or strings can be recorded with more than one mic. The horns or string part can be played twice. Or, a time-based effect can be used to make the instrument be stereo. The horns or strings might not be spread completely in stereo (partial stereo or mono), if there isn't enough room in the mix. Effects like delay, flanging, chorusing, phasing, harmonizers and reverb can be panned separately from the instrument sound they came from.

PUTTING IT ALL IN PERSPECTIVE

All the mixes in the world are created with just these four tools: volume, EQ, panning and effects. It's what you do with them that counts.

The trick is to use the dynamics created by the equipment to enhance, accentuate, highlight, support, create tension or just let the music itself simply shine through (whichever is appropriate for the song and style of music). The way in which these dynamics interface with the music is the art of mixing.

Just as a musician learns techniques to make magical or great music, so must the recording engineer learn the technical equipment in order to create magical or artistic recordings. Different people have different ideas as to what art is. However, the point is that you develop your own values as to what you think is great art.

Then, make it!