

BEGINNER'S GUIDE TO HOME RECORDING ON A BUDGET

Part 10: Mixdown



After all the tracks are recorded, it's time to mix or combine them to 2-track stereo. You will use the software-mixer faders to control the relative volumes of the instruments, use panning to set their stereo position, use EQ to adjust their tone quality, and use plug-ins to control effects.

As you create a mix and save it, the project folder stores the fader settings, effects, panning, and plug-in settings. All those settings are recalled each time you open the project and play it back.

Set Up the Software Mixer

For starters, put the master faders at design center (about three-quarters of the way up, at the shaded portion of fader travel). This sets the mixer gain structure for the best compromise between noise and headroom.

You might color-code the DAW tracks to identify them easily: yellow for drum tracks, red for guitars, etc.

Clean Up Each Track with Editing

Mixing will be a lot easier if you first erase noises before and after each song, and within each track.

Play the multitrack recording and solo each track. Erase or delete unwanted sounds, silent (unplayed) sections, outtakes, and entire segments that don't add to the song. In a DAW you can do this visually by looking for parts of each track where there is no waveform. Zoom into a single track, highlight a silent portion, and select Edit > Cut (or a similar command). To avoid mistakes, it's best to do this while the musicians are around. If you aren't sure whether it's okay to delete part of a track, set that part's volume envelope to zero or mute the track during that part.

You can use editing to improve a song's arrangement. Typically, you'd put instrumental solos and fills only in the "holes" where the vocal is silent. Add instruments to the mix gradually so that it builds in excitement. You might add vocal harmonies only in the choruses. Reserve "all-out improvs" (where everybody plays) for the very end. Of course, work with the musicians or producer when making these decisions.

Fix timing errors by sliding notes in time. Add a 2-msec crossfade just before and after a time-slipped note to hide any glitches. Find the track that has the best groove, and adjust the timing of other tracks to match. Fix pitch errors with Auto-Tune or similar software.

Panning

You need to pan the tracks before doing the mix because the loudness of a track depends on where it's panned. Use the pan pots to place each track where desired between your stereo speakers. Typically the bass, snare, kick drum, and vocals go to center; guitars can be panned left or right, and stereo keyboards and drum overheads go partly left and right. Sometimes a mono drum mix can be punchier than a stereo one.

You can give an acoustic guitar a spacious effect by recording it twice. Pan the first take hard left and pan the second hard right. The second take could be capoed higher to add interest.

Pan tracks to many points between the monitors: left, half-left, center, half-right, right. Try to achieve a stereo stage that is well balanced either side of center. For clarity, pan to opposite sides any instruments that cover the same frequency range.

You may want some tracks to be unlocalized. Harmony singers and strings should be spread out rather than appearing as point sources. Stereo keyboard sounds can wander between speakers (although some engineers prefer to keep them mono). To fatten or "stereoize" a guitar track: clone the track, pan one track left, delay the other track (slide it to the right about 30 msec) and pan it right. Better yet, record a second take of the guitar part, and pan the two parts left and right. Pan doubled vocals left and right for a spacious effect.

If you want the stereo imaging to be realistic (say, for a jazz combo), then pan the instruments to simulate a band as viewed from the audience. If you're sitting in an audience listening to a jazz quartet, you might hear drums on the left, piano on the right, bass in the middle, and sax slightly right. The drums and piano are not point sources, but are somewhat spread out. If spatial realism is the goal, you should hear the same ensemble layout between your speakers.

Here's another way to pan a jazz quartet: pan the bass and lead instrument to center; pan stereo drums, stereo piano and stereo reverb to left and right.

Panned mono tracks often sound artificial; each instrument sounds isolated in its own little space. It helps to add some stereo reverb. It surrounds the instruments and "glues" them together.

When you monitor the mix in mono, you'll likely hear center channel buildup. Instruments in the center of the stereo stage will sound louder in mono than they did in stereo, so the mix balance will change in mono. To prevent this, note which tracks are panned hard left or right, and bring them a little toward the center: 9 and 3 o'clock (or 75%) on the pan controls.

Use a Highpass Filter on Each Track

To reduce muddy buildup, highpass all tracks by ear. Set up a highpass (low-cut) filter in each track with a Q of 1.7. Solo one track and play it. Adjust the filter frequency: start at a low frequency, then gradually raise it until the sound starts to thin out. Then back off a little (lower the filter frequency slightly). Repeat for all the tracks.

Set a Balance

Now comes the fun part. The mixdown is one of the most creative parts of recording. Here are some tips to help your mixes sound terrific.

Before doing a mix, tune up your ears. Play over your monitors some CDs whose sound you admire. This helps you get used to a commercial balance of the highs, mids, and lows.

Choose a CD with a genre and tunes like those you're recording. Check out the production. How is the balance set? How about EQ, effects, and sonic surprises? Try to figure out what techniques were used to create those sounds, and duplicate them. Of course, you might prefer to break new ground.

Using the track faders, adjust the volume of each track for a pleasing balance among instruments and vocals. You should be able to hear each instrument clearly.

Here's one way to build the mix. Set all the faders to -12 dB. Then turn up the most important tracks and turn down background instruments. Or, bring up one track at a time and balance it with the other tracks. For example, first bring up the kick drum until the stereo mix-bus meters read about -10 dBFS. Then add bass and balance the two together. Next add drums and set a balance. Then add guitars, keyboards, and finally vocals.

In a ballad, the lead vocal is usually loudest. You might set the soloed lead-vocal level to peak at -6 dBFS in the stereo mix-bus meters. Bring up the monitor level so that the vocal is as loud as you like to hear it, then leave the monitor level alone. Bring in the other tracks one at a time and mix them relative to the vocal track.

When the mix is right, everything can be heard clearly, yet nothing sticks out too much. The most important instruments or voices are loudest; less important parts are in the background. In a typical rock mix, the snare is loudest, and the kick is nearly as loud. The lead vocal is next in level. Note that there's wide latitude for musical interpretation and personal taste in making a mix.

If you recorded some MIDI tracks, consider replacing a MIDI instrument with another one that sounds better. You might replace a grand piano with a honky-tonk piano, replace a fretted bass with a fretless bass, and so on. Swap out the snare sound with a new one during choruses.

If you hear a poorly played note or transition that you can't fix, you might cover it up with a cymbal roll or other sound.

Set EQ

Set EQ for the tonal balance you want on each track. If a track sounds too dull, turn up the highs or add an enhancer. If a track sounds too bassy, turn down the lows, and so on. Cymbals should sound crisp and distinct, but not sizzly or harsh; kick drum and bass should sound deep, but not overwhelming or muddy. Be sure the bass is recorded with enough edge or harmonics to be audible on small speakers.

For suggestions on EQ settings, see Part 6 of this series.

The EQ that sounds right on a soloed track seldom sounds right when all the tracks are mixed together. So make EQ decisions when you have the complete mix happening. Switch EQ in and out to make sure it is an improvement. You'll need to readjust the mix balances after adding EQ.

In pop-music recordings, the tone quality or timbre of instruments does not have to be natural. Still, many listeners want to hear a realistic timbre from acoustic instruments, such as the guitar, flute, sax, or piano.

The overall tonal balance of the mix shouldn't be bassy or trebly. That is, the perceived spectrum should not emphasize lows or highs. You should hear the low bass, mid-bass, midrange, upper midrange, and highs roughly in equal proportions. Frequency bands that are too loud can tire your ears.

When your mix is almost done, switch between your mix and a commercial CD of the same genre to see whether you're competitive. If the tonal balance and reverb of your mix matches a commercial CD, you know your mix will translate to the real world. This works regardless of what monitors you use. An effective tool for this purpose is Harmonic Balancer (www.harbal.com). It displays the spectrum (level vs. frequency) of a mix, and shows where certain frequencies may be too strong or too weak. You can adjust the frequency balance with a mouse to make the spectrum (and tone quality) more like that of a commercial reference mix. But be sure to use your ears too.

Add Effects

With the balances and EQ roughed in, it's time to add effects, dynamics processing and time-based processing by inserting plug-ins into each track that needs it. To review, dynamics processing is compression, limiting and expanding (gating). Time-based processing is echo, flanging, chorus, and reverb. Reverb was covered in Part 7 of this series; compression in Part 9.

Too much effects and reverb can muddy the mix. You might turn up the reverb only on a few instruments or vocals. Once you have the reverb set, try turning it down gradually and see how little you can get by with. Instead of using reverb, maybe try a quiet slap-echo to add some "air". Typically the bass gets no reverb so it retains its clarity.

Usually, short reverb decay times (under about 0.7 second) are best for up-tempo songs. Longer reverb times (1 to 1.5 seconds) are better for slow ballads.

You might use 25–120 msec of predelay on vocals or certain instruments to separate the dry sound from the reverb. This makes the voice sound up front even with reverb added.

Consider creating some front-to-back depth. Leave some instruments dry so they sound close; add reverb to others so they sound farther away.

Sometimes the lead vocal track might be too loud or too quiet relative to the instruments because vocals have a wider dynamic range than instruments. You can control this by inserting a compressor plug-in into the vocal track. It will keep the loudness of the vocal more constant, making it easier to hear throughout the mix. Set the desired amount of compression ratio, attack time, release time, and gain reduction. It's also common to compress the kick drum and bass.

Set Levels

As you're mixing, set the stereo mix-bus level. To maintain the correct gain staging, keep the master faders at design center. Then adjust all the track faders by the same amount so your stereo output level peaks around -3 dBFS maximum. You can touch up the master faders a few decibels if necessary. Don't exceed a 0 dBFS level in the stereo mix bus because that will create clipping distortion. It must be avoided.

You might prefer to start with the master faders at +5 dB. When the mix is nearly finished, bring the master faders down to 0 dB. Check that the stereo output level peaks around -3 dBFS maximum (in peak meter mode). That way, you may not need to bring down all the track faders by the same amount.

Suggestions On Using the Monitors While Mixing

It's a good idea to monitor around 85 dB SPL. If you monitor louder, the bass and treble will be weak when the mix is played softly. Use an SPL meter from Radio Shack or other source.

To test your mix, occasionally play the monitors very quietly and see if you can hear everything. Switch from large monitors to small, and make sure nothing is missing.

While mixing, monitor the program alternately in stereo and mono to make sure there are no out-of-phase signals that cancel certain frequencies in mono. It's a good idea to monitor a mix in mono first so that you'll make instruments distinct with EQ rather than panning. After the mix sounds good in mono, monitor in stereo to hear the panning.

Check the mix while listening from another room, where the lows and highs are weakened. Is the balance still good? Also check it on a boombox, car stereo and headphones.

Mixing Tips

If you have several drum tracks, you might want to set up a drum bus to make mixing easier. For example, insert a stereo bus, name it "drums", and set the outputs of all the drum tracks to the drum bus. That way, you can control the level of the entire drum kit with one bus fader. The output of that bus should be assigned to the two stereo output channels of the audio interface. The same principle applies to background vocals (BGV).

When you mix, your attention scans the inputs. Listen briefly to each instrument in turn and to the mix as a whole. If you hear something you don't like, fix it. Is the vocal too tubby? Roll off the bass on the vocal track. Is the kick drum too quiet? Turn it up. Is the lead-guitar solo too dead? Turn up its effects send.

The mix must be appropriate for the style of music. For example, a mix that's right for rock music usually won't work for folk music or acoustic jazz. Rock mixes typically have lots of production EQ, compression, and effects; and the drums are way up front. In contrast, folk, bluegrass, old-time or acoustic jazz is usually mixed with no effects other than slight reverb, and the instruments and vocals sound natural. A rock guitar typically sounds bright and distorted; a straight-ahead jazz guitar usually sounds mellow and clean.

Pop songs have several sections: intro, verses, choruses, solos, bridge, and outro. Set up loop points at the beginning and end of each section, and listen repeatedly to each section while perfecting the mix of that section. Create automation volume envelopes for each section. We discuss automation later in this article.

To make choruses stand out, increase their reverb level, volume, and stereo width slightly. You might add more instruments too.

When the mix is almost finished, close your eyes and listen. That will remove the visual distraction of the computer monitor screen, so you'll hear better.

When you're striving for a natural sound—as your ears hear an instrument live—compare the recorded instrument with your memory of the real thing. How does it sound different? Turn the appropriate control that reduces the difference. You're creating an illusion of accuracy. To make a recorded instrument sound real—as if it's really playing in front of you—often you need to add some processing.

Try to convey the musician's intentions through the recorded sound quality. If the musician has a loving, soft message, translate that into a warm, smooth tone quality. Add a little mid-bass or slightly reduce the highs. If the musical composition suggests grandeur or space, add reverberation with a long decay time. Ask the musicians what they are trying to express through the music, and try to express that through the sound production as well. Listen to the lyrics to see if the song is intimate (suggesting a warm, dry sound) or a proclamation (maybe with lots of reverb).

You might want some tracks to be lo-fi: distorted, noisy, muddy and distant, or tonally colored. Do that with distortion plug-ins, distant miking, extreme EQ, and funky old mics.

Achieving Clarity

Try to keep the mix clean and clear. A clean mix is uncluttered; not too many parts play at once. It helps to arrange the music so that similar parts don't overlap. Usually, the fewer the instruments, the clearer the sound. Mix selectively, so that not too many instruments are heard at the same time. Have guitar licks fill in the holes between vocal phrases, rather than playing on top of the vocals. Sustained parts (like synth pads) mask other tracks more than transients do, so keep pads low in level.

In a clear-sounding recording, instruments do not “crowd” or mask each other's sound. They are separate and distinct. Clarity arises when instruments occupy different areas of the frequency spectrum. For example, the bass provides lows; keyboards might emphasize mid-bass; lead guitar may provide upper mids, and cymbals fill in the highs.

Often the rhythm guitar occupies the same frequency range as the piano, so they tend to mask each other's sound. You can aid clarity by equalizing them differently. Boost the guitar at, say, 3 kHz, and boost the piano around 10 kHz. Or pan them to opposite sides. Distorted electric guitars can mask the vocal, so try cutting the guitars' EQ at 1 kHz, or try a lowpass filter at 4 kHz. You might compress the guitars with the vocal fed to the compressor's sidechain. That way the guitars will duck down during the vocals.

Masking can happen when two instruments play in the same register. Consider re-recording one of the parts up or down an octave. If you have two similar guitar parts, you might capo each part differently.

Automation

It's rare to do a mix in which you set the faders and leave them there. Often you need to change fader levels, EQ, or effects-send levels as the song progresses. In your recording software, you can specify fader changes at various points in the song – a process called volume automation (volume envelopes). The project file on your hard drive stores your mix moves, and later recalls and resets them accordingly each time you play back the mix. In many DAWs, effects changes and panning changes can be automated as well.

Automated mixing has many advantages. With it you can:

- Perform complicated mixes without errors
- Fine-tune the mix moves
- Recall mixes weeks or months after storing them, without having to reset the mixer manually each time
- Listen to the mix without the distraction of having to adjust faders

Automation is easy in DAWs that let you insert a volume envelope on a track. This envelope is a graph of a track's fader setting versus time. You might prefer to automate the mix by tweaking a track's volume envelope on-screen instead of moving the fader. As the song plays, the fader for that track will move up and down, following the envelope. .

Use volume automation on lyrics so that you can understand every word (if that is desired). Also use it to bring out short instrumental riffs or fills that might otherwise be hidden. That helps to maintain the listener's interest throughout the song. You can raise the piano's volume during a solo, then drop it back down; or turn down a track to reduce noise during pauses in the performance.

What if a track needs a major change in EQ or reverb at a certain point? Find the section in the track that needs different EQ or reverb, create a clip of that section, and move it to another track with those plug-in settings. Or simply insert a new plug-in into the clip (if your DAW has that feature).

As we said earlier, a MIDI/audio recording program includes both digital audio tracks and sequencer tracks. You automate the audio track levels by adjusting their fader levels or volume envelopes. You automate the MIDI tracks by adjusting their MIDI volume or key-velocity scaling. Individual MIDI notes can be tweaked, too. In some DAWs, the MIDI tracks' volumes can be automated with fader volume envelopes.

To fade out the end of a song, select all the tracks and insert a fadeout at the end of all the tracks. Use a fade-out that starts quickly and ends slowly. Try to have the music faded out by the end of a musical phrase. The slower the song, the slower the fade should be. The musical meaning of a fade is something like, "This song is continuing to groove, but the band is leaving on a slow train." You could postpone fades until mastering.

The mixdown is complete. You might record several different mixes of one song, then choose the best mix. It's common to record a mix with the lead vocal up 1 dB, and another with the lead vocal down 1 dB.

Export the Mix

When you're happy with the mix and the stereo mix-bus levels, it's time to export or render the mix – save it as a stereo WAV file. If you plan to master the mix later, export the mix as a 24-bit WAV file with dither turned off. If you plan to burn a CD track of the mix, or convert it to an MP3 file, export the mix as a 16-bit WAV file with dither turned on.

Some mastering engineers prefer that you send them stems (submixes). For example, you could solo just the drum tracks and export a stereo drum-kit stem. Solo the background vocals and export a stereo BGV stem, and so on.

Listen Again

Repeat these mixdown procedures for the rest of the good takes. Give your ears a rest every few hours! Otherwise, your hearing loses highs and you can't make correct judgments.

Be sure to compare your mix to a few good-sounding commercial CDs of the same genre, at equal levels. Listen for the bass-midrange-treble balance, mix balances, each instrument's tone, amount of reverb and echo, and stereo width.

After a few days, listen to the mix on a variety of systems—car speakers, a boom box, headphones, a home system. The time lapse between mixdown and listening will allow you to hear with fresh ears. Do you want to change anything? If so, make it right. You'll end up with a mix to be proud of.

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