

# Mixing Workflow from Mike Senior's Mixing Secrets for the Small Studio

Brad Lumley

Rev. 1.02  
October 19, 2020

# Table of Contents

[Author's Note](#)

[Workflow](#)

[PRE-WORK](#)

[7.1 Comp](#)

[7.2.1 Reduce clutter](#)

[7.2.2 Add detail](#)

[5.1 Start fresh](#)

[5.2 Enhance navigation](#)

[5.2.1 Organize tracks](#)

[5.2.2 Add colors and symbols](#)

[5.2.3 Divide the timeline](#)

[5.3 Project reconnaissance](#)

[5.3.1 Scan individual tracks for trouble and highlights](#)

[5.3.2 Multing](#)

[6.1 Tweak groove and timing](#)

[6.1.1 Identify timing peaks and valleys](#)

[6.1.2 Tighten the timing](#)

[6.2 Adjust timing](#)

[6.2.1 Camouflage edit points](#)

[6.2.2 Time stretch](#)

[6.2.3 Review the song](#)

[6.3 Adjust tuning](#)

[6.3.1 What to target](#)

[6.3.2 Choose the right tool](#)

[6.3.3 Automated and pre-scanned correction](#)

[BALANCE](#)

[8.1.1 Start with the most important section](#)

[8.1.2 Start with the most important instrument](#)

[8.1.3 Spend the most time on the aspects that sell the mix](#)

[8.2.1 High-pass filter](#)

[8.2.2 Pan mono recordings](#)

[8.2.3 Set levels](#)

[8.2.4 Listen to your faders](#)

[8.2.5 Stereo track processing](#)

[Group tracks](#)

[8.3.1 Work on multimiked instruments](#)

[8.3.2 Work on multimiked ensembles](#)

- [8.3.3 Build ensemble balance and tone](#)
- [9.1.1 / 9.1.2 Check for compressor needs](#)
- [9.1.3 COMPRESS!](#)
- [9.2.1 Adjust ratio](#)
- [9.2.2 Series compress](#)
- [9.2.3 Adjust attack and release](#)
- [9.3 Consider parallel compression](#)
- [Special notes on vocal compression](#)
- [10.1 Expand and/or gate!](#)
  - [10.1.2 Expanders work in parallel too](#)
    - [Special note on drums](#)
- [10.2 Transient enhancing](#)
- [11 Equalize!](#)
  - [11.1 Unmask and balance](#)
    - [11.2.2 Shelf filter](#)
    - [11.2.3 Peak filter](#)
    - [Special note on low end](#)
    - [11.2.5 Shift your listening perspective](#)
    - [Special note on ordering of dynamics and EQ](#)
  - [11.3.1 EQ multimiked instruments](#)
  - [11.3.2 EQ multimiked ensembles](#)
  - [11.4.2 Using automated and match EQ](#)
- [12.1 Distort!](#)
- [12.2 Enhance low end](#)
  - [12.2.1 Implement drum triggering](#)
  - [12.2.2 Incorporate a MIDI subsynth](#)
- [12.3 Incorporate synth pads](#)
- [13 Implement frequency-selective dynamics](#)
  - [13.1.1 Equalize parallel processors](#)
  - [13.1.2 Refine gating](#)
  - [13.1.3 Reduce sibilance](#)
  - [13.1.4 Manage pumping and breathing](#)
  - [13.2 Use multiband dynamics](#)
  - [13.3 Equalize dynamically](#)
  - [Special notes on specialized de-essers](#)
  - [13.4 Spectral dynamics processing](#)
- [14 Sidechaining for fun and profit](#)
  - [Special note on ducking](#)
  - [15.2 Rebalance pre-mixed audio \(sampling, etc.\)](#)
  - [15.1 Moving toward fluent balancing](#)

## SWEETEN

16.2 Set up reverb

16.3 Blend with reverb

16.3.1 Choose a preset

16.3.2 Adjust tone and spread

16.3.3 Balance blend reverb

16.4 Add size with reverb

16.4.1 Balance size reverb

16.5 Add tone with reverb

16.6 Add sustain with reverb

16.7 Add spread with reverb

16.8 Juggling reverb enhancements

17.1 Set up delay

17.2 Delay in stereo

18.1 Tweak arrangement for stereo

18.2 Adjust stereo spread

18.3.1 Widen with EQ

18.3.2 Widen with comb filtering

18.3.3 Widen with the haas effect

18.3.4 Widen with pitch shifting

18.4.1 Widen with auto-panning and Leslie

18.4.2 Widen with dynamic pitch and tone changes

19.1 Perfect the master buss

19.1.1 Compress the master buss

19.1.2 Equalize the master buss

19.1.3 Adjust stereo width on the master buss

19.1.4 Sauce on 'em

19.1.5 Finalize your master buss plugins

19.2 Reference!

19.2.1 Louder!

19.2.2 Strategize loudness processing

19.2.3 Other loudness processing concerns

19.3 Check referencing

19.4 Automate long-term mix dynamics

19.5 Implement detailed rides

19.5.1 Troubleshoot intelligently

19.5.2 Perfect the mix balance

19.5.3 Direct the listener's attention

19.5.4 Ride the vocals

19.6 Finalize!

[19.6.1 Snag](#)

[19.6.2 Incorporate revisions](#)

[19.7 Master!](#)

[19.7.1 Determine if mastering is needed](#)

[19.7.2 Choose a mastering service](#)

[19.7.3 Evaluate the master](#)

[Checklist](#)

[Bibliography](#)

# Author's Note

This notebook is adapted entirely from Mike Senior's Mixing Secrets for the Small Studio (Senior). I created this document for my personal use in the studio. I make it available to the public in the same spirit. I am not soliciting, nor will I accept any direct monetary compensation for this work. Instead, if you don't already own a copy of Mike's book, please [buy it here](#). I'll receive a small affiliate fee and Mike will sell a copy of his book. This document is somewhat detailed but it's certainly not exhaustive. You really need to read the book to get into the nuts and bolts of the processes and procedures. If I haven't already stressed it enough, BUY THE BOOK.

Please also visit Mike's website, [Cambridge Music Technology](#) and support him on [Patreon](#). There is a wealth of resources for mixers of all experience levels here: free online recording and mixing resources, free multitracks to practice with, and some great articles and videos. There are also a number of ways to get in touch with Mike and team for the myriad services they offer. Just as I did with the book, I'll belabor the point here: bookmark this page. You'll be spending a lot of time there.

As to the layout of this document, the heading numbers match the sections in the book for easy reference. When not outright plagiarizing, I have interpreted guidance from the book. I realize what makes sense to me may not make sense to you. Further, I encourage you to read the text for additional details on any and all material.

As a matter of personal preference, I've moved the Chapter 7 Comping and Arrangement material to the front. For me, getting the arrangement organized up-front simplifies mixing. As with everything else in the tune, if changes are needed later in the process, don't be afraid to make them. Just be sure they serve the song.

I've also re-ordered some of the material in section 15. Again, this was a matter of personal preference.

Finally, I've created a checklist at the end of the document that I print out and work through for my mixes. I find this practice encourages diligence in my work.

I encourage you to make a copy of this material and modify to suit your own workflow and development. Please do not hesitate to contact me with corrections and suggestions.

Good luck on your mixing journey.

Brad Lumley  
[bradlumley@gmail.com](mailto:bradlumley@gmail.com)

# Workflow

## PRE-WORK

### 7.1 Comp

- Working with at least 3 takes per section, create the strongest composite track.
- Prioritize the feel of the section/arrangement rather than perfect pitch. Pitch can be corrected later. Passion cannot.
- Use this opportunity to pull out clicks, pops, and mechanical noises.
- Crossfade as transparently as possible.

#### 7.2.1 Reduce clutter

- Less is more. Reduce sections to the tracks that serve the song.
- Remove clashing timbres. If two things don't sound good together before mixing, they won't sound great after mixing. If needed and possible, retrack important instrumentation in non-clashing registers.

#### 7.2.2 Add detail

- Avoid playing the same thing more than three times in a row.
- Use licks, fills, hooks, spot effects, and/or samples every four to eight bars.

### 5.1 Start fresh

- Print all tracks to audio.
- If mixing your own music, take a break before beginning mixing.

### 5.2 Enhance navigation

#### 5.2.1 Organize tracks

- Put the most important instruments where you can easily access them.
- Submix large groups to fewer channels.

#### 5.2.2 Add colors and symbols

- Use short but descriptive names.
- Color code tracks.
- Use symbols if your DAW offers them.

### 5.2.3 Divide the timeline

- Mark song sections on the timeline.
- Use colors if available.
- Synchronize audio with the grid (tempo sync). NOTE: This does not mean to snap every transient to the grid (see section [6.1.1](#)).

## 5.3 Project reconnaissance

### 5.3.1 Scan individual tracks for trouble and highlights

- Edit out silences, clicks, and pops. Tweak crossfades, etc.
- Highlight any “hidden gems” that might have been lost in the rough mix.

### 5.3.2 Multing

- Mult significantly different parts.
- Mult song sections that will receive different processing.

## 6.1 Tweak groove and timing

Identify the single instrument that embodies the groove.

### 6.1.1 Identify timing peaks and valleys

- There may be portions of the song where the timing is rushed and moments of adjustments. Resist the urge to snap everything to the grid.
- Work in sections.

### 6.1.2 Tighten the timing

- Tighten up the most rhythmic tracks with the key instrument you worked on in 6.1.1.
- Once the groove is strengthened enough, the remaining tracks may not need to be tweaked much.
- Adjust layered tracks one at a time, then combine them all.
- Pay special attention to closely timing hard-panned parts.
- Tails may also need to be timed up.
- Use the waveform of your reference instrument to time “by eye.” But always check/confirm by ear.

## 6.2 Adjust timing

### 6.2.1 Camouflage edit points

- Use equal power crossfades except for matched-waveform edits where you should use equal gain crossfades.



- Look for small periods of silence to work in crossfades.
- Noisy sections are often the easiest places to hide edit points.
- During continuous audio, place crossfades immediately before percussive attack onsets.
- Hide edit points behind powerful transients or noise signals from another instrument.
- Matched-waveform edits may be an option for sustained notes.

### 6.2.2 Time stretch

Even the best time stretch algorithms can leave artifacts. Use only when necessary.

### 6.2.3 Review the song

- Double-check for artifacts.
- Listen holistically, returning your focus to the song rather than minute details.
- Listen for timing drifts.
- Adjust overall timing offsets using the track's time-offset parameter.

## 6.3 Adjust tuning

### 6.3.1 What to target

- Pitch correcting monophonic sources will almost always sound better. If polyphonic instruments are out of tune, it may be best to adjust tuning on several monophonic tracks than polyphonic (even with modern tools like Melodyne).
- Bypass pitch correction during atonal/non-tonal moments (fret-slides, breaths, esses).

### 6.3.2 Choose the right tool

- Avoid real-time/online pitch correctors unless you're targeting an unnatural-sounding result.
- Adjust formants when necessary.

### 6.3.3 Automated and pre-scanned correction

- Use MIDI when available to take the guesswork away from the plugin.
- Activate only when needed (turn on and off with automation).
- Keep correction as slow and gentle as possible.
- Trust your ears more than your eyes. How does the track sound in context with the rest of the arrangement?
- Take frequent breaks.

# BALANCE

## 8.1.1 Start with the most important section

- Find the section you want to sound the biggest (loudest, most instrumentation) and start there.
- Work down in intended impact.
- You will “unbuild” the rest of the sections.
- Focus on the emotional flow of the song.
- Don’t be afraid to mute parts and instrumentation.
- The intro must grab the listener’s attention and make them want to listen to the rest of the song.

## 8.1.2 Start with the most important instrument

- It’s not always the vocals!
- Which instrument(s) drive the song --the “sonic signature?”
- Make a list of tracks/instruments in descending order of importance.
- Build up in order of importance and it’ll become clear what’s *not* needed.

## 8.1.3 Spend the most time on the aspects that sell the mix

- Only a few aspects of production carry the commercial appeal.
- Be clear in your mind where the money is.
- Abandon finesse if it won’t be appreciated. Know the difference between what a mixing engineer hears and what the audience hears.

## 8.2.1 High-pass filter

- Use gentle slopes (6, 12, 18 dB) and no resonance. This is often a task better suited to a quality EQ plugin rather than a filter plugin.
- If you can’t hear it, you don’t need it: Start raising the frequency slowly until you can hear a change in the low end and then reduce the frequency by about 15 percent.
- If your low-end monitoring isn’t completely dependable, use a spectrum analyzer to verify that you aren’t losing important low-frequency information.

## 8.2.2 Pan mono recordings

- Put the most important musical elements in the center of the stereo image as they’ll survive best when heard in mono.
- Bass signals work best in the center to improve low-end frequency translation.
- Other panning decisions are up to the mixer and may have technical or entirely creative rationale.

- Be aware of your chosen pan law's effect on the mono downmix: center-panned signals are always going to become roughly 3dB louder when you sum to mono.
- Use opposition panning to place similar instruments on separate sides of the stereo signal. This can keep them from losing their individual character.
- Use call-and-response panning to balance instrumentation and parts that aren't synced.

### 8.2.3 Set levels

- Set a sensible level relative to your mixing system's headroom.
- In modern DAWs, you're not likely to clip the signal, so you may be OK leaving the fader at unity.
- You may choose to use gain plugins rather than the channel fader. This can offer enhanced control when the fader would otherwise be at an extreme.
- Bring tracks in with a focus on how present they should be in the mix.
- Remember that there's only so much room. This step is all about tradeoffs.
- Use the mute button judiciously to decide if a level is correct.
- Work iteratively. Turn one aspect up a small amount and if it sounds worse, turn it back down and try the next item. Examples: level up 1dB, level down 1dB, bass up 1dB, etc.
- Try starting the fader at -inf and bringing it up until the level is reasonable. Mark that position. Then turn the fader up way too loud and bring the fader down until the level is reasonable. Mark that position. Work within the window you've just marked.
- Vocals should feel too soft when you turn your monitors up loud, too loud when your monitors are very quiet.
- An alternative approach to vocals is to use them to draw the listener in. If the listener says "what did he say?" he's diving into the mix.
- Don't rush the initial fader settings but don't spend too much time there either. You want to get it as good as it can be without downline processing. But most mixes still need some of this.

### 8.2.4 Listen to your faders

- If you can't find one level where your faders feel correct, downline processing may be needed.
- Alternatively, if it sounds great right where the fader is, have the confidence to leave that track alone.
- If part of a track feels properly balanced but some elements don't, this can be a clue that multing would be useful.
- If continuous tracks have some notes that pop out and others that are buried, this can be an indication dynamics processing is necessary.

- If one frequency range of a track's timbre starts to overcome a more important part, it may help to put the offending range on another fader.
- The objective is to become sensitive to what the fader's instability is telling you. This will make it much easier to choose the right plugins later.

### 8.2.5 Stereo track processing

- On the off chance you're presented with a split stereo recording, interleave it into a stereo file or buss the left and right channels to a stereo group channel.
- Compare waveforms to check for phase cancellation, inverting phase where necessary. Fully out-of-phase stereo elements will disappear entirely when summed to mono.
- If you can't determine where a given instrument is in the stereo spectrum, swap the left and right channels to see if it moves.
- If you experience comb filtering, be sure tracks are appropriately time-aligned. This issue can transcend phase matching. Note that getting the items too synced may result in loss of the stereo image. So use this technique to solve problems, not as a must-do.
- As a last-ditch effort to remedy comb-filtering, try bringing the stereo signals closer together so the comb-filtering matches in mono and stereo. There may be tonalities to deal with later but at least the mono-summed mix will more closely match the stereo mix.

### Group tracks

Group any tracks you want to balance, process, or visually organize together.

### 8.3.1 Work on multimiked instruments

- Route individual channels to a single mixer channel for processing.
- Correct or leverage polarity and phase relationships between different signals. While most often correction may be used, exploiting a difference in phase and timing relationships may offer more tonal options.
- High-pass filter as instructed in [8.2.1](#).
- Place each microphone's signal in the stereo field. Moving each signal even slightly can increase the perceived "realness" of the instrument.
- Balance.

### 8.3.2 Work on multimiked ensembles

- Initial balance can make or break these recordings.
- Check stereo-arranged mics for phase issues in isolation.
- High-pass only to remove frequencies well below the range of the lowest instrument.

- Consider creating a stereo picture that mimics the physical layout of the recording session. However, keep in mind the panning considerations from [8.2.2](#).
- As a last-ditch, phase-manipulation plugins may save the day.

### 8.3.3 Build ensemble balance and tone

- Mute all ensemble channels.
- One at a time, reintroduce mono mics, stereo pairs, and multimic combinations.
- Adjust phase.
- Balance fader.
- Work in order of sonic importance.
- If any track represents a reasonable balance of the whole ensemble, set a level for that track first and use other tracks as spot mics for small refinements.
- Don't get too creative with phase. Stick to polarity adjustment.

### 9.1.1 / 9.1.2 Check for compressor needs

- Mute all channels. Do not change fader/gain levels.
- Reintroduce channels in order of importance.
- Concentrate on how compression might improve the balance.
- Do you find yourself wanting to grab a fader to make flying adjustments? These channels may benefit from compression.
- Don't assume it's needed on channels that sound well-balanced.

### 9.1.3 COMPRESS!

#### Throughout this process, ask yourself:

- **Is the compression helping the balance?**
- **Do I like the subjective quality of the compression sound?**
- Choose whichever compressor is at hand. Do not agonize but if available, choose one with some sort of gain reduction meter.
- If presets are available, choose one that looks like it might match the task at hand.
- Adjust the threshold control to get at least 6dB on peaks.
- Adjust the makeup gain to compensate for the level change. **AVOID AUTO GAIN COMPENSATION.** To our ears, louder tends to sound better but is not always better.
- Tweak the fader and determine if track now feels more stable in the mix.
- If the channel sounds better now, try turning the threshold back up a little to see if you can get away with less compression.
- If you still find yourself reaching for the fader, roll the threshold down further to see if it gets easier to find the right level. Max the threshold out if necessary, even if it sounds unnatural.

- If heavy compression is making the channel unmusical, now is the time to try a different preset or different compressor altogether.
- Multing the channel may be a necessary step if it just won't balance.

### 9.2.1 Adjust ratio

- If there are no presets available for what you're tracking, it may be time to adjust the ratio.
- Start off with the ratio fairly high and find a threshold setting that catches the peaks.
- If this doesn't solve the balance problem, increase the ratio.
- Once you've reached the correct level, back off the ratio a bit, ensuring the balance problems don't return.

### 9.2.2 Series compress

- Use two or more compressors in series a signal needs high-ratio peak reduction and overall low-ratio dynamic restraint.
- Try switching the order of the compressors to pick the best character.
- Slow compressors can add attack to a signal which can necessitate another compressor to soften the peaks.
- Use two or more compressors in series to avoid "overworking" any one compressor or to add desired color from multiple units.

### 9.2.3 Adjust attack and release

- Use fast attack times to catch and lower peaks.
- Use slow attack times to maintain and even enhance transients.
- Set the release times to control how quickly the compressor "returns to zero." Listen for chatter.
- Long release times can increase sustain.
- Long release times may allow the first transient in a passage through while softening/stomping out the rest.
- If you can't hear the effects of attack and release, temporarily increase the severity of the compression with the threshold and ratio settings.
- The gain reduction meter may also help in gauging how quickly the compressor is acting.

## 9.3 Consider parallel compression

- When fast attack and release times are needed for balance but you don't want to neuter a channel, parallel compression may help.
- Put aggressive compression on a return channel and blend to taste.
- Parallel compression is also useful when you want to add a taste of compressor color.
- Be aware of loudness bias. Blending in return signals increases the overall volume level of the track. This can be mitigated by grouping the compressed and

uncompressed signals into a single track and using that group channel to set the balance.

- Wet/Dry controls can be hit and miss and are not recommended.
- As with any plugin, be aware of phase and comb-filtering issues that may be introduced. Latency isn't always reported correctly to the DAW for auto-correction. Use your ears.

## Special notes on vocal compression

- Mult different sections of the vocal and use clip gain to even out obvious disparities.
- Often an initial soft-knee 2:1 / 3:1 compressor with moderate attack and release times can help even out overall levels without crushing the sound.
- If peaks still remain, follow with a faster, higher ratio compressor. Be aware of the attack and release settings on hard and soft consonants.
- Volume automation/vocal rides may still be necessary.

## 10.1 Expand and/or gate!

- Set the threshold to the lowest level of the material you want to expand.
- For expanders, set the ratio to appropriately reduce the gain of everything below the threshold. For gates, this will typically be inf:1.
- Has this solved the balance problem?
- Has the quality of the processed signal suffered?
- Check for chattering. Backing off ratio or attack/release times can solve this. If that's not an option for your material, a few milliseconds of hold time may help, if your expander offers it. A minimal amount of dBs of hysteresis is another option --again, if your expander offers it.

### 10.1.2 Expanders work in parallel too

- Sometimes bleed/spill sounds good but you still need an expanded/gated signal of the tracked instrument. Use a parallel expander to keep the favorable bleed and blend in the featured signal.
- Wet/Dry controls are often replaced by Range in expanders, allowing you to set the maximum allowable gain reduction.

#### Special note on drums

Gating drums can completely reshape their envelope.

Example: Use a high-ratio expander on a snare drum track and set the threshold as high as possible. Use the attack, hold, and release time to adjust the level envelope of each hit.

## 10.2 Transient enhancing

- Consider specialist transient-enhancer tools when expanders just won't do the job.
- Upward expanders, or decompressors, increase the dynamic range of signals above the threshold, rather than below it. This is helpful when you want to just boost signal peaks but if there are irregularities in those peaks, these expanders will only exacerbate that irregularity.
- Some transient boosters can also give a temporary gain boost to transients and also offer a useful sustain envelope.
- Modern transient enhancers can work without a threshold control, detecting transients in individual notes.
- Tempo-driven balancing can be achieved with many modern plugins by sending rhythmic MIDI notes to the plugin. This can be used quite creatively. Try to find a plugin that offers a phase control so you can move the rhythm off-grid to reduce the robotic impression.

## 11 Equalize!

- When fader positions work for one part of a channel's frequency range but not all of them, an equalizer can be a helpful tool.
- Where possible, always favor EQ cuts over EQ boosts.
- Linear phase EQ can be helpful when standard EQs cause phase issues. However, it's not a cure-all. Be aware of resonant filter ringing preceding audio events.

### 11.1 Unmask and balance

- Focus on unmasking the important frequencies of the featured channels in the context of the mix.
- Mute all channels and rebuild the balance in order of importance.
  - Does the new instrument leave the perceived frequency balance of the more important tracks essentially unscathed?
  - If so, don't touch the EQ. You may only need some high-pass --maybe not even that.

#### 11.2.2 Shelf filter

- Identify which half of the frequency spectrum is masking important channels.
- Adjust the filter gain to get a feel for which frequencies the filter is affecting in the context of the mix.
- Tweak the frequency knob to adjust the corner frequency to find the region that's offending while minimizing changes to the rest of the spectrum.
- Work in short time boxes, turning the filter on and off to reassess the scale of the problem.



- Lower the filter gain to pull the region down and turn the fader up. If the frequency pops out again, pull the region down more. Keep doing this until it's just right or some other balance problem appears.
- Turn the filter off again and try to imagine what the perfect balance would sound like.
- Reactivate the filter and check that you've made the right adjustments. Tweak until it's right, repeating the above procedures.
- If frequencies still sound masked, you must decide whether the shelving filter is actually helping at all. If it helps some, you may choose to leave it. But if it's not helping at all, don't hesitate to remove it altogether.
- Since shelving filters affect large swaths of frequencies, it's important to check for unacceptable loss of low-end heft and high-end detail.

### 11.2.3 Peak filter

- Use peak filtering to solve localized frequency domain problems.
- Follow the same procedure used with shelf filtering.
- Choose as wide a bandwidth as possible to minimize side effects.
- Hard notch may be applied to a limited few frequencies where certain offending frequencies just won't mix.
- Sometimes multiple harmonics may benefit from notching, for example, the noise from 60Hz mains.

### Special note on low end

- Low end can prove particularly challenging in a small studio.
- Not all adjustments need to be made on the low end. High end activity is often required to get bass instruments to cut through the mix.
- Make room for the most important low end instruments. A bass guitar and kick often can't occupy the same frequency ranges.

### 11.2.5 Shift your listening perspective

- As you develop your ear and skillset, work to listen to one track while EQing another.
- By the time every track is mixed, it can be nearly impossible to unearth masking effects. Thus, it's important to be disciplined about building up the mix.

### Special note on ordering of dynamics and EQ

- If you're happy with the way your dynamics processors are responding, EQ after them. If not, try EQing earlier in the chain to see if you can improve things.
- If you change the order, you should reevaluate settings on all processors.
- There is no rule against EQing in at multiple locations in the chain.

### 11.3.1 EQ multimiked instruments

- Where possible, balance and group/buss channels for each instrument. If it sounds balanced, leave it alone.
- EQ the group channel just as if it were a single recording. While this gives less scope to alter the instrument's balance or timbre, it may be enough.
- Tweak timing, phase, and polarity of individual mics to try to find a better frequency balance. If this works, there may be nothing more to do. However, you can tweak infinitely and never find the right balance. Know when to stop.
- Try EQing channels individually, perhaps favoring the best frequency ranges of each channel. Be aware of comb-filtering and phase issues. This method is hit-and-miss.
- A blend of the above three tactics may yield the best result. Experiment with the order and intensity of these steps.

### 11.3.2 EQ multimiked ensembles

- The strategies in [11.3.1](#) can work equally well for multimiked ensembles.
- Start adding in mics/DIs just as in the first balance but pay more attention to unwanted effects as you mute and unmute each channel/group.
- Applying EQ and compression to individual channels may sacrifice the cohesiveness of groups. Pay special attention.
- You may reassess high-pass filtering decisions to clear out additional unwanted built-up low end.

### 11.4.2 Using automated and match EQ

Many automated and EQ match tools are now available. These can be very useful in certain situations but never trust a plugin's analysis over your ears.

## 12.1 Distort!

- Distortion adds harmonics that fill out instrumentation.
- Choose a distortion plugin you like and adjust the drive to taste.
- Putting the distortion on a return allows more flexible blends.
- Don't hesitate to EQ distortion channels.
- Beware phase mismatches with the parallel method.
- Try the Aphex Aural Exciter technique for vocals: On a return, aggressively high-pass and compress the vocal, then distort. Blend to add detail and air. Switch the effect off periodically to check for objectivity as high-frequency enhancement can be very fatiguing on the ear.
- Adding distortion compresses sound. Be aware of the dynamic range reduction and how it factors into the mix.

## 12.2 Enhance low end

Many automated subsynths are available but depending on the signal they're fed, they may offer unpredictable results. It's often preferable to feed MIDI to a VST.

### 12.2.1 Implement drum triggering

- Trigger samples using a MIDI channel to layer existing drums.
- Check for timing and phase consistency.
- Consider using triggered tracks, where you have greater sonic control, to feed effects like reverb and delay.
- Try pitch-shifting samples to add density.

### 12.2.2 Incorporate a MIDI subsynth

- Replicate, even exactly, the bass part of a tune.
- Try doubling the bass part an octave below with a sine wave.
- A simple triangle wave is also a good option.
- If the existing bass sound's fundamental frequency is low enough to interfere with the subsynth, consider moving up the high-pass on the existing bass sound.
- Meanwhile, it's often helpful to low-pass the subsynth to restrain too much upper harmonic contribution.
- Using a mono subsynth/sample can help avoid mono-compatibility problems.
- Tightly control the dynamic range so as not to eat up headroom.

## 12.3 Incorporate synth pads

- Chordal synth pads can be useful to add warmth and sustain.
- Keep it simple. Choose pads that don't have loads of effects.
- Turn the pad up a couple dB too loud at first then use EQ cuts to turn down the most offensive frequencies. Then, turn the pad down until it's almost imperceptible.
- If you can hear the pad, it's too loud.

## 13 Implement frequency-selective dynamics

Some balance problems cannot be overcome unless you process both the time and frequency domains at once. There are many options to solve these problems.

### 13.1.1 Equalize parallel processors

- If you set up a dynamics processor as a send effect, you can EQ its return channel to tailor the processed tone. This method can be used to add density in frequency ranges that are too light in the mix.

- Additional EQ may be needed to compensate for the overall level increase in the enhanced frequency region.
- Keep an ear out for phase shifts and comb-filtering. Using linear-phase EQs can head this problem off.
- Consider the order of dynamics and EQ just as in 12 above: if the gain changes seem musical, EQ after the dynamics. If not, use EQ earlier.

#### 13.1.2 Refine gating

- Use sidechain EQ to be more selective about the frequencies that trigger gates.
- This can be used to great effect when mic bleed causes unwanted triggering (or missed triggers).
- Be aware of transient frequency. If you filter out the transient frequency to select the fundamental, gates may open slightly late. Lookahead functionality can help.

#### 13.1.3 Reduce sibilance

- Determine which sidechain frequencies you need to boost by using EQ boost on the main signal with the aim of making “s” sounds as overblown as possible. Use that frequency range to trigger a compressor sidechain and boost until sibilants come down to an appropriate level in the context of the mix.
- Note that oversoftening can make vocalists sound like they have a lisp.

#### 13.1.4 Manage pumping and breathing

- Low frequency transients, often from a kick drum, can cause rhythmic triggering of compression that cuts the tails off high frequency material and then allows tails back through as the compressor releases. This is perceived as pumping or breathing.
- Use this to artistic effect where needed to increase “aggression” or add rhythmic feel to tracks.
- To avoid this, often a dose of low-end shelving in the sidechain is enough to reduce it.

### 13.2 Use multiband dynamics

- Splitting dynamics processing into different frequency bands can help manage problem dynamics without unnecessarily squashing the entire frequency range.
- Process what needs it and avoid working across multiple bands just because you can.
- Setting up and evaluating the impact of multiband processors is exactly the same as with a full-band processor --you’re just working in smaller chunks of the frequency band. Do not cut corners.

- Pay special attention to attack and release times for each band as signals in different frequency ranges move at very different speeds.
- Be wary of automatic gain compensation as some multiband plugins won't allow you to switch it off.
- Use only as many bands as you need. This keeps the side effects from crossover filters to a minimum.
- Adjustable slope crossovers can be very useful as sharper slopes are more helpful for targeting narrow problem ranges whereas softer slopes sound more natural for broadband enhancement.
- Parallel processing is also an option for multiband dynamics but as always, be aware of phase and comb-filtering.
- Keyed multiband dynamics are also a possibility though use cases for this are rare.

### 13.3 Equalize dynamically

- Use dynamic EQs to tame sporadic narrow-bandwidth frequency peaks. Common example: vocal resonances normally somewhere above 1kHz that only present when the singer is belting.
- In cases where several resonant peaks pop out, specialized tools such as Soothe or the Trackspacer de-harshing use case may help.

### Special notes on specialized de-essers

- There are many specialized de-essers available. Choose one that works on the vocal spectrum in a similar way as dynamic EQ. De-Essers that chop out sibilants one-by-one can be too fiddly unless needed for a special reason.
- Consider using two de-essers in series so one isn't working too hard and creating excessive side effects.
- You may also use one wide and one narrow de-esser in series.
- Place de-essers all the way at the end of the vocal chain. The one exception is when there's high-end enhancement such as Aphex Aural Exciter. De-essing should happen prior to this effect, which should always land at the end of the chain.
- Avoid de-essing vocal busses. As every track will have esses at a different place, you need to de-ess each track independently.
- De-essers can also be used to soften overprominent consonants and vowels.
- De-essers can also calm guitar fret noise or raucous cymbal frequencies.

### 13.4 Spectral dynamics processing

- Spectral dynamics processors operate on thousands of bands at once, so their use can be fiddly. However, there are practical uses at mixdown.
- Compress upper octaves to enhance brightness and detail while smoothing transients and resonant peaks.

- Gentle low-ratio compression across the entire spectrum can reduce the main pitched components to add character, grain, and breathiness.

## 14 Sidechaining for fun and profit

- Sidechains can be from tracks outside the track the processor is placed on.
- The classic use of a sidechain is using the vocal to feed a sidechain for a compressor on a spectrally-competing track, such as electric guitars or pianos. Even a couple of decibels can make a huge difference in “making room” for the vocal.
- Don’t apply so much compression that it becomes distracting.
- Use sidechains to contain spill.
- Use fundamental tracks to gate room mics and reverbs to enhance their space while not making a mess of the mix.
- Another classic use: sidechain the kick drum to a compressor on the bass track to keep the bass from competing with the kick drum transient and heft.
- Add rhythmic feel to pads by sidechaining the kick to the pads’ compressor.
- Create a constant low-frequency sine wave. Sidechain the kick to a gate on this track to add low-end heft. Start with a frequency of around 50Hz and then tune appropriately.
- Key compressors on reverb and delay outputs from the vocals to keep these effects from swamping the performance.

## Special note on ducking

- A ducker can be a better choice than a compressor sidechained to a vocal since often it’s the quietest vocals that need the most space but these would trigger a compressor the least.
- Duckers work inversely as a gate: they close when the signal crosses the threshold. They can be set to always introduce the same gain reduction regardless of the strength of the sidechain signal.
- Trackspacer is a good example of a ducker that cuts conflicting frequencies to make space.

## 15.2 Rebalance pre-mixed audio (sampling, etc.)

- Don’t hesitate to edit or totally recreate the audio, copying and pasting over elements.
- De-layer by finding isolated hits, copying, pasting, and inverting to pull that element out.
- Cut away inessential frequencies. High-pass filters, low-pass filters, and notch filters are all useful tools to cut out what’s not needed.
- Frequency-selective dynamics processing tends to work better on pre-mixed audio than full-band dynamics processing.
- Pay attention to which side elements of the track are on. Sometimes it may be helpful to only process one side of a stereo channel.

- If a note or two needs muting, multi-notch EQ may help.
- Note-muting with tools like Melodyne can also be useful.
- If a signal in the pre-mixed audio is too quiet and can't be raised without too many side effects, try doubling with a MIDI VST or audio overdub. The sonics often don't need to be an exact match to make this work. Timing and phase are critical, however.

## 15.1 Moving toward fluent balancing

- As you grow in mixing, the above steps needn't be so structured/ordered. You will eventually "let the faders set the agenda."
- Regardless of your place on the path to fluency, it's always a good idea to AB/X with a tool like [Lacinato ABX/Shootout-er](#) to maintain as much objectivity as possible.
- The more time you spend mixing, the more quickly you'll become fluent.
- Sometimes the best approach is to zero everything and start over, remembering what didn't work in the last iteration.

# SWEETEN

## 16.2 Set up reverb

- Reverb is almost always best applied on a send/return.
- Ensure that the reverb placed on the return is 100% wet.
- Ensure that sends are post-fader so the wet/dry balance will remain constant as the channel fader is adjusted.
- The most important control is decay time, sometimes also called length, reverb time, RT60, or tail. Other controls are often more of a distraction than a necessity. Pick a preset and adjust the decay and you'll probably be fine.

## 16.3 Blend with reverb

- Play back your balance and listen for parts/instruments that don't blend with the mix as a whole. Also listen for parts that seem too up-front.
- Select one of these tracks that has a full frequency range and hopefully some transients.
- Send a decent level from this track to the reverb and solo the reverb return to listen to only the reverb.
- Concentrate on the nature of the effect, listening for unacceptable sonic issues like flanging, phasing, and cancellation. If you experience any of these, you may need to consider a different plugin or at the least, a different preset.

### 16.3.1 Choose a preset

- Immediately reduce the decay of any preset to 500ms to home in on the blending characteristics. You're looking for a brief, well-defined burst of reflections rather than an echoey delay tail.
- Preset names may not mean much but "ambience," "early reflection," "short," or "dry" may be close to what you're looking for.
- Natural sounding presets are best for blending. This isn't the time for springs or plates.
- It may help to close your eyes and visualize the sort of space you'd like to work in.
- Don't worry too much about frequency balance if the overall acoustic signature feels right.
- Avoid metallic sounds and pitched resonances.
- Find patches that are balanced across the stereo field.
- Don't rush your preset choice.
- This is a task best suited to nearfield monitoring rather than headphones.
- Check the effect in mono to make sure it doesn't disappear or over-exaggerate.
- Once you have the best candidate, unsolo and mute the return channel as a reminder of how the production sounds without reverb.
- Unmute and fade the reverb up.
- Tweak the length so it's short enough to tuck behind the dry sound without any audible tail but still delivers blend.

### 16.3.2 Adjust tone and spread

- Isolate the dry track and reverb return together.
- Adjust the effect signal using the techniques in 8.3 and 11.3: timing and phase shifts, polarity inversion, and EQ. Many reverb plugins have tools to manage these adjustments. However it's often just as easy to insert your preferred delay, phase-adjustment, or EQ plugins.
- Listen for undesirable tonal colorations and adjust with the above tools as necessary.
- Pre-delay can be an important part of this process. Using no pre-delay gives the effect of the treated instruments being stuck to the back wall of the modeled space. Adding 10-20ms of pre-delay brings the instrument forward in the mix.
- Pre-delay often allows you to use less reverb signal, helping clarify the mix.
- If you have a need to push specific instruments farther back in the mix, it may be necessary to create an additional send with less/no pre-delay
- Adjust stereo spread taste paying attention to instruments you've deliberately narrowed.



### 16.3.3 Balance blend reverb

- Unsolo all tracks.
- Fade down the single send you've added so far.
- Set the return channel's gain to unity.
- Re-identify the blend problem you're trying to solve.
- Slowly raise the send to blend and push the instrument back until the blend and position is right.
- Mute and unmute the return to identify any new blend issues the reverb has created.
- EQ away any problem frequency ranges from the return.
- Check to see that you don't need to fade up more to regain the blend you achieved prior to EQing.
- Pay particular attention below 300Hz to preserve headroom and clarity while avoiding muddying up the low-midrange.
- Excessive high frequencies can also sound unnatural as most musically useful natural acoustics rarely have lots of bright-sounding reflections. A low-pass filter or high shelf cut can help here. If high end is still troublesome, turn the reverb up a bit too loud and then carve away offending frequencies to get back to the right blend.
- You know you're heading in the right direction when you can't hear the reverb as an effect but the mix starts to fall apart or sound too thin when you mute it.
- If transients are causing distracting flams or ricochets, compression may be needed prior to the reverb to tone those down. If multiple tracks are feeding the reverb, threshold-based processors likely won't be effective. Frequency-selective dynamics processors may even be necessary.
- Vocal sibilance can send reverbs into a panic. However, threshold independent de-essers are uncommon. It may be necessary to first send vocals to an intermediate channel for extravagant de-essing then on to the reverb. Another option is to use a copy of the vocals with all the troublesome consonants edited out solely to feed the reverb.
- Confirm the balances on different monitoring systems at different volumes.
- Bypass the reverb return for 10 seconds, envision how you want the track to blend, then pop the reverb back in.
- Make EQ tweaks with this fresh perspective.
- Listen once or twice with the main tracks bypassed in various combinations so the foreground parts don't distract your concentration from background details.
- Adjust again.

### 16.4 Add size with reverb

- When scanning presets for size, the focus should be on the tail.

- Leave the reverb length unchanged.
- Turn down any setting for pre-delay.
- Listen for presets that start softly and slowly rather than having a clear attack.
- Beware of unnatural-sounding presets.
- Imagine the space implied by each preset and feel free to ignore preset names.
- Avoid metallic resonances but otherwise don't be overly concerned with tonal imbalances.
- Look for an evenly spread stereo picture and check mono compatibility.
- Check your choice on different monitoring systems.
- When you've identified a good candidate, mute the return, recalibrate your ears to the mix, then fade it back up to confirm.
- Now give the reverb a good dose of pre-delay from 50ms upward to reduce "mission creep" from your blending reverb. You might opt to use a tempo-related pre-delay time to hide the "bump" with a percussive hit.
- Aim to make the tone of the reverb fairly neutral as size reverb inevitably adds sustain.
- Solo a full-range instrument along with the reverb and fade the reverb up and down to highlight any tonal changes you want to address with simple EQ (the long pre-delay minimizes phase cancellation, so no concerns about linear-phase plugins).
- Stereo spread can normally be left as-is.

#### 16.4.1 Balance size reverb

- Since there is lots of room for artistic choice with size reverb, begin balancing with your intent for the space in mind.
- Decide whether every instrument will live in the same space or if different groups will have different spaces.
- Aim to match the environment/feel of the reverb to the material and instrumentation.
- With longer reverb, masking becomes more of a concern.
- Low end tails are rarely desirable, so high-pass the return and be conservative about the amount of reverb applied to bass instruments.
- Avoid adding lots of reverb to sustained stereo chordal parts like synth pads as the reverb doesn't add much and can make the parts seem out-of-time.
- If your purpose with size reverb is to enhance the apparent size of the virtual venue, keeping the reverb understated is the best approach. Use the same approach as blend reverb when applying EQ and dynamics.
- If instead, you want the effect of the size reverb to be heard, pay careful attention to masking consequences.
- Bypass the return for a few seconds, recreate in your mind the size illusion you're targeting, then turn the reverb back on to see if you're close.

- Try dropping out some of the more important instruments to refine the subtler reverb balances.
- Take time to determine whether you've chosen the best combination of reverb length and overall reverb level.
- If you find that you can't push the reverb level up enough to give the desired impression, it is probably too long. If, on the other hand, turning the reverb way up doesn't give the desired impression, it may be too short.

## 16.5 Add tone with reverb

- This function has more in common with EQ than it does with reverb. Thus, if you get this right, you will need to rebalance affected tracks.
- When browsing presets, keep the length under control and try to get an impression of each reverb's tonal qualities.
- The most usable presets will be the ones with an unnatural sound.
- You do not want this reverb to blend the track as a side effect.
- Springs are on the menu for this task.
- The sound of a preset echoes is only part of what you're looking for because a big portion of the final tonal change comes from comb filtering between the wet and dry sounds.
- Always mix the dry signal with the effect, paying attention to the relative levels' impacts on phase cancellation.
- Once you find the right preset, you may be able to refine it further by applying pre-delay (<10ms) and phase/polarity adjustment to the return channel.
- Equalization on the return channel can also help, focusing on the frequencies where the reverb matches the input signal.
- The goal is for this reverb not to be heard.
- As the level of the reverb increases, decrease the length.
- Be careful of the width and placement as you don't want the reverb to be wider than the signal you're enhancing.
- Checking mono compatibility is paramount here as cheap reverbs often work the best but have the worst mono compatibility.
- Since this sort of reverb increases the signal, judging its value requires a different approach. Find a reasonable fader level for the processed sound and mute both the dry and wet channels together for a few seconds. Think about what you want the composite to sound like and then reintroduce.
- Route both the wet and dry channels together for global control.
- There may be benefit to processing the individual channels but if you add it to more than one track, it may not suit others. However, you can create separate instances for each track and modify them accordingly.
- You may also be able to reduce audibility by replacing a stereo reverb patch with several mono instances panned to the location of the dry track that feeds them.

## 16.6 Add sustain with reverb

- Adding sustain with reverb follows mostly the same steps as adding tone with reverb.
- Use a higher dose of predelay (>25ms) to avoid phase cancellation.
- Avoid a clearly defined predelay onset with either a soft-attack preset or tempo-related predelay.

## 16.7 Add spread with reverb

- Use a short, fizzy reverb to add density and stereo width to the upper frequency range. Keep the tail short, the predelay long, and the high-pass quite high.
- Paint the edges of the stereo field with any effect with a reverb tail. Reduce early reflections and add substantial predelay to avoid adjustments to blend or tone. Choose a smooth, bland, unnatural preset. Balance process the return channel as needed.
- Short reverbs can also add spread. Choose characterless but synthetic-sounding presets and increase predelay. Be careful of flams if your predelay exceeds 20ms.

## 16.8 Juggling reverb enhancements

- If things just don't sound right, more often than not, it's your choice of plugin.
- Think in terms of what you need to do and try to use your reverb as efficiently as you can while still achieving your reverb goals.
- Don't worry about using multiple seemingly disparate reverb types in the mix. If people notice, they don't care. Just make sure it serves the song.
- Once you get comfortable enough, you'll begin to be able to construct single reverb patches that serve several functions.
- Don't use reverb pro forma. If your mix doesn't need all (or any) of the above enhancements, leave it out.

## 17.1 Set up delay

- Get comfortable with delay time and feedback and you'll often be able to use presets and ignore many of the other parameters.
- Set delays up in a send/return configuration.
- Delays can be used in all the same ways as reverbs: blend, size, tone, sustain, and spread. Added bonus: delay takes up less room in the mix than reverb.
- Simple, clean echoes are best for blend and size.
- More characterful algorithms give more varied tone and sustain changes.
- Creative delays are best introduced while balancing.
- Spend time balancing returns in level and equalization/dynamics.
- For blend, a single 50ms-100ms slap with little or no feedback is a good choice.
- For size, a longer delay with some feedback works well.

- A distorted slapback can give vocals an aggressive, distorted character without sacrificing lyric intelligibility.
- Tonal delays produce the most dramatic effect when delay time is well within the comb filtering zone of under 20ms. Add a little feedback if you want to emphasize the ringing. Finesse the delay time to match pitch.
- Delays for sustain purposes should use substantial feedback and longer delay times.
- Processing blend and size returns focuses mostly on balance issues. It's also an option to send delay returns to a reverb to push them further back in the mix. Ducking lead vocals and instruments can also help with balance.
- Tone and sustain returns should be processed severely with EQ or other Chapter 12 tonal effects.
- Size and sustain delays are often tempo-synced because of their length. Since this makes them less audible, they can usually be faded up much more before they become obvious.
- It's not wrong or unusual to have several tempo-synced delays.
- With continuous vocal phrases, delays should be shorter to avoid washiness and overfilling. Try setting the delays right on the beat or just a tad slow for a laid-back feel.
- Non-synced delays can add creativity to a mix. However, their faders should be kept rather low. If you use non-synced delays too much, they can begin to undermine the groove of the track. Polyrhythmic delay times are a good compromise. Three-eighth and three-sixteenth delays are common.
- Tempo-synced delays can also add rhythmic energy. Try adding a very subtle eighth-note delay to drum tracks to increase energy and give the impression of ghost notes.

## 17.2 Delay in stereo

- Blend and size delays work best when you use a true stereo setup where the spread matches the dry signals.
- Mono-input, stereo-output delays add a sense of stereo width but may confuse the imaging of stereo tracks.
- Mono-in, mono-out delays don't work as well as global sends because the mono return narrows the mix, cluttering the stereo image.
- Mono delays are best used with tonal and sustain processing of individual instruments where the delay is panned to match the dry signal being treated.
- Panning short delays can disguise comb-filtering effects when listening in stereo. Confirm mono compatibility carefully.
- Panning individual echoes may skew the overall stereo image of the delay effect to one side. Ping pong delay can help combat this. Another tactic is to use a single echo panned to the opposite side of the panorama than the dry signal.
- Make sure the stereo character of your delays is not distracting too much attention from more important elements of the production as a whole. Pay special attention to lead instruments in the center of the stereo panorama.

## 18.1 Tweak arrangement for stereo

- Generate fake double tracks that can be opposition-panned. Duplicate the track in question and shuffle repeated sounds around if multiple takes aren't available to you.
- In the absence of repeated material, it may be necessary to use pitch and time shifting or steal single chords from different places.
- Consider adding stereo background textures if arrangements are just too sparse. Examples include synth pads, tape hiss, vinyl noise, and room sound. With these sounds, you don't have to worry quite as much about mono compatibility as most mono environments are so lo-fi, minute details tend to disappear anyway.
- Avoid using a delayed exact copy of the original channel as serious phase-cancellation problems may happen. Instead, try applying different real-time pitch-correction settings to the double-track.

## 18.2 Adjust stereo spread

- Use M/S widening to clear space in the center of the panorama.
- If unacceptable comb filtering, phasing, or chorusing occurs with any of these methods, use an M/S plugin to reduce or even mute the mid channel.
- Using stereo reverb with a reduced middle component can avoid too much reverb buildup in the center of the stereo picture.
- Use an M/S encoder so as not to have to fiddle with mix tricks. These tools can significantly increase your flexibility when dealing with pre-mixed audio as you're able to deal with the center and sides of the signal separately.
- Any frequency you boost in the sides will be widened while any frequency you cut will be narrowed.
- Split the audible spectrum into bands and apply M/S processing to each. This can solve phase alignment/mono compatibility mix problems, for example.
- Stereo vectorscopes can help you confirm appropriate stereo width. However, they will not highlight per-track mono incompatibility issues within a full mix. They also don't show frequency-selective information. However, they do show the left and right channel curves simultaneously, helping identify any seriously off-center frequency regions. Also, if you precede the analyzer with an M/S encoder, the display's two curves will show the middle and sides spectra, highlighting frequency regions where the sides signal dominates and mono-compatibility may be a concern.
- Spectral panning and correlation displays may prove easier for some to read.

### 18.3.1 Widen with EQ

- Duplicate your mono track.
- Pan the original and duplicate tracks to opposite sides of the stereo image.

- Insert an equalizer into the original channel and make any selection of boosts and cuts.
- Copy that equalizer setting to the duplicate channel and invert the boosts and cuts. Plugins like Pro-Q3 make this easy.
- Small peaks and troughs create a more even feeling of frequency spread than a few broad-band EQ changes.
- This method can destabilize the phantom image and make instruments sound less solid in the mix. Thus, it's better to save it for incidental and background parts.

### 18.3.2 Widen with comb filtering

- You can use comb filtering to generate many more frequencies and troughs than basic EQ widening.
- Create a stereo delay send effect with around 20ms delay time and no feedback.
- Invert the polarity of the return signal's left channel only.
- When you send to this delay, you'll cause the sound to be comb filtered but since one side is comb filtered, you'll get a frequency peak in the left channel when there's a trough in the right channel and vice versa.
- The more level you send, the deeper the comb filtering will be and the stronger the widening effect.
- Beware that comb filtering can cause a sense of metallic pitched resonance. Tweak exact delay time to find the least noticeable pitch.
- Shorter delay times reduce the number of peaks and troughs which can cause lower frequencies to veer undesirably to one side or another. Try a longer delay time if you can still maintain comb filtering. Otherwise, high-pass the return.

### 18.3.3 Widen with the haas effect

- Follow the dry signal with single delay within about 30ms.
- Pan the wet and dry sounds to opposite stereo sides.
- Try a gentle expansion. Otherwise, the affected sounds may be too homogenized and bland.
- Transient material may flum well below 30ms.
- Audition in mono frequently to avoid phase cancellation.
- This effect almost always feels lopsided subjectively. There's not much you can do: even pushing the delayed signal louder will yield the same result. Just be aware and plan the effect in your mix accordingly.
- For a send effect, set up a single-tap stereo echo using a delay time somewhere below 30ms then polarity invert just one side of the delay. Then, swap the return's left and right channels.
- Beware loudness bias, loss of detail, and flammng of transients.
- Removing the inversion from the above send effect offers an interesting variation on the blend delay treatment discussed in 17.

#### 18.3.4 Widen with pitch shifting

- Use the same method as EQ-widening from [18.3.1](#) but instead of inserting EQ to differentiate the channels, use small pitch shifts of around +/- 5 cents in the hard-panned channels.
- Since good pitch shifters are often CPU-hungry, this effect is often best-used on a send/return.
- If you experience comb-filtering, a short predelay of around 10ms before the pitch shifter can help.
- For a classic pitch-shifted delay effect:
  - Use slightly different delay values for each side of the stereo output.
  - Try a few ms longer delay time on the channel that is shifted upwards to counteract the Precedence Effect.
  - This effect is often used on delays.
  - If you experience unacceptable phase-cancellation, try increasing the predelay another 20ms or so.
  - Be aware that this will allow you to use much less of the effect before it becomes obvious.
  - You can also try subtly finessing delay times by 1-2ms in either direction.
  - High-passing the return can not only reduce phase-cancellation in the midrange but also add some high-frequency enhancement.
  - Always check mono compatibility, massaging pitch shift or delay amounts.

#### 18.4.1 Widen with auto-panning and Leslie

- Auto-panning plugins can be far too heavy handed for subtle stereo enhancement.
- Keep the modulation depth low so the panning isn't too wide.
- Use a smooth modulation waveform such as a sine or triangle.
- Push the modulation speed into the 5KHz-10KHz range.
- Use multiband auto-panners or Leslie emulators to pan different frequency regions in different ways.
- Use as a send effect to make results subtle.

#### 18.4.2 Widen with dynamic pitch and tone changes

- Chorus, flanging, and phasing are all valid stereo widening tools when used as send effects.
- Keep feedback and depth controls low.
- The send level from the dry track will determine the strength of the widening.



- Vibrato plugins that treat the stereo channels independently can also yield widening effects --if you can find one. Keep the depth low and use some predelay to reduce unwanted tonal coloration.
- Check in mono.

## 19.1 Perfect the master buss

Any buss processing will usually incur some undesirable artifacts and require some finicky parameter tweaks on both the master buss itself and individual channels in the mix. This isn't to say you shouldn't use it. But you must be aware of the implications.

### 19.1.1 Compress the master buss

- Use if the mix needs "gluing together."
  - Use 2db to 3db gain reduction at most.
  - Slow attack time
  - Automatic release time
  - Keep ratios under 2:1, all the way down to 1:1.
  -
- Use creatively to add pumping for a sense of loudness and aggression.
  - Use up to 8dB of gain reduction on peaks.
  - Use faster attack times.
  - Faster release times
  - Higher ratios
  - Play with attack release times until the limiter pumps with the music.
- Increase emotional engagement by increasing lower-level signals.
- Characterful compressors can enhance certain aspects of the mix.
- It may reduce negative effects of down-the-line mastering or transmission compression.
- Use to even out the dynamics of the entire mix signal, increasing loudness. This isn't a great reason to compress as this activity is usually reserved for mastering.
- Adjust makeup gain to eliminate loudness bias.
- Work to rein in unwanted side effects as far as possible and maximize the desirable aspects of the sound. Review 9 and 10 for suggestions.
- If you can't get the glue you're looking for without side effects, adjust the mix to compensate.
- If necessary, use multiple busses to sidestep side effects.
- Multiband master buss compression is best left to mastering engineers.

### 19.1.2 Equalize the master buss

- Restrict master buss EQ to broad strokes to leave internal mix-balance relationships intact.

- If you find yourself wanting to boost or cut narrow frequency regions on your master buss, then it usually indicates you're better off going back to your individual channel EQ settings instead.

### 19.1.3 Adjust stereo width on the master buss

- Consider multiband mid-side processing or equalize the sides component of the stereo signal so that you can adjust different frequency ranges independently.
- Though any of the methods from 18 could be used, there is a greater likelihood of unwanted side effects when processing the entire mix.
- Listen to the mix both in stereo and mono to check your changes.
- Recheck the balance of the stereo mix.
- Confirm centrally-panned instruments haven't been knocked out of their desired positions.

### 19.1.4 Sauce on 'em

- OK, add your special sauce plugin(s) now but be aware of what they're doing to the mix.
- Check with headphones, not just nearfields.
- Be aware of loudness bias.

### 19.1.5 Finalize your master buss plugins

- Don't try to completely finalize your mix settings before you've gotten your master buss processing involved. You will always need to adjust.
- Readjust as the mix continues to develop until you reach the level of best interaction.
- You can decide to mix bottoms-up or top-down but ultimately, you're best served to establish your own workflow that balances benefits from both approaches.

## 19.2 Reference!

- Export the section of the production you've mixed so far as a stereo audio file and import it into a fresh DAW section along with appropriate reference material such as:
  - Specific target productions suggested by the client
  - Tracks selected from your personal reference library
- If you immediately discover that overall tonality or width is significantly off-target, try to correct those issues immediately with equalization or M/S processing. It can be difficult to evaluate more subtle attributes before this is squared.
- Be aware of loudness maximization in reference material and how its side effects impact the mix.

### 19.2.1 Louder!

- Concentrate on the side effects, not the loudness hike.
- Don't compare a loudness-processed mix with a subjectively quieter unprocessed signal. The louder one will win every time.
- Match the subjective loudness of the processed and unprocessed sounds for comparison.
- Duplicate the mix to two separate stereo channels but process only one of them for loudness purposes.
- Switch between the two channels and use the faders to match them on subjective loudness. A loudness metering plugin can really help here.
- Judge side effects with all your different monitoring options at many different volume levels. Not every side effect will be revealed by one monitoring system at one level.

### 19.2.2 Strategize loudness processing

- Top down
  - Use very low-ratio compression and a gentle threshold such that subtle compression is happening all the time.
  - Keep it within 3dB or so.
  - Adjust attack and release times by ear.
  - Listen for side effects such as undue emphasis of low-level details.
- Bottoms up
  - Use upward compressors/de-expanders or subtle full band parallel compression to target the dynamic range below the threshold.
  - Transient definition will suffer less but you lose peak control.
  - Sparser arrangement sections may have more unwanted overall level increases.
- Full-band limiting
  - Use fast-acting limiting to chop peaks and leave the remainder of the dynamic range unscathed.
  - Potential side effects include pumping, bass distortion, transient softening, and apparent drum level reduction.
- Multiband compression/limiting
  - Using multiband for any of the above strategies can reduce pumping.
  - Increasing gain reduction can, however, cause even greater side effects.
  - Changes in the spectral content of the track can cause much frustration.
  - Sometimes multiband compression gives the impression of draining the life out of a production by ironing out tonal contrasts.

- Subtle distortion
  - Adding harmonics to a signal can increase perceived loudness with very little increase in peak levels.
  - Choose subtle valve, tape, and transformer distortions.
  - Parallel and frequency-selective distortions can offer greater control than full-band options.
  - Beware of tonal harshness, emphasized vocal sibilance, increase in treble in percussion instruments, veiling of midrange details, and unwanted overall mix tonality changes.
- Clipping
  - Straight digital flat-topping and modeled analog clipping are on the menu for loudness enhancement.
  - Clipping doesn't seem to affect the subjective attack or balance of prominent drum parts as much as peak limiting.
  - Clipping is often more appropriate for styles with hard-hitting rhythm parts.
  - Side effects include tonal change of clipped peaks and unwanted distortion of steady signals.

If you are unable to push your mix to the target loudness without heinous side effects, it may be an indication that some aspect of the mix needs to be tweaked.

### 19.2.3 Other loudness processing concerns

- If your clients don't think your mixes sound loud enough to compete, you may not get the job or album cut. Thus, it's always advisable to send a loudness-enhanced mix.
- However, when you send to your mastering engineer, send them a mix with all loudness processing turned off.

## 19.3 Check referencing

The goal here is to give every single listening system you have a solid workout. This is the high point of the production. Solid reference material is crucial.

- How does overall mix tonality compare?
  - Try inserting an EQ over the mix to correct the frequency imbalance by ear.
  - Try EQ match if necessary. Don't aim to exactly replicate the EQ curve but be aware of major differences.
  - Compare the balance
    - At minimum, check kick, snare, bass, and lead vocals.
    - The more parts you pay attention to, the closer your own balance will be.
    - Listen to overall levels but also listen to the dynamic range of each instrument.
  - Compare tonality

- How does the tonality of the most important instruments compare?
  - If any instruments are less appealing, can you do anything about that without upsetting the balance?
- Compare reverb and delay effects
  - How well do the different instruments blend with each other?
  - How close/distant are the instruments in relation to each other?
  - How are different size reverbs used?
  - How do overall lengths and levels compare?
- Compare the stereo image
  - How wide are instruments?
  - Where are the instruments placed?
  - How wide is the stereo image overall?
  - Where do different regions of the frequency spectrum exist in the stereo image?

Collect a “to do” list from the above items. Again, this is the make-or-break point for your mix. Learn from your mistakes and keep working at it.

Once you’ve worked through your to-do list, bounce the new mixdown and do it all over again. Keep repeating the process as long as you can stand it.

## 19.4 Automate long-term mix dynamics

- Save a new version of your mix project.
- Mute all currently active tracks.
- Loop a new musical section.
- Reintroduce tracks in the appropriate rank order.
- If a track needs adjustment to fit its new context, either mult that section to a different track or engage automation. Mults are best when sections need to drastically change as it’s easier to have a separate track than manage several lanes of automation.
- The goal is to get each section sounding right until you have a complete pass that is a pretty good basic mix.
- Try contrasting the levels of reverb/delay between verses and choruses.  
Example: verses drier and closer, choruses bigger and more live sounding.  
Also try abruptly cutting reverb/delay at the end of chorus 1/beginning of verse 2.  
In some tunes, the exact opposite may work best. Try everything.
- Widening choruses is a time-honored tradition.
- Opening up the spectrum for important sections can also drive interest.  
High-pass and low-pass instruments for softer parts and open them up in the big sections.
- It’s also an option to ride the level of the entire mix. Just be mindful of down-the-line mastering processing and any sonic consequences.
- Reassess high-pass filtering and EQ in the context of the section. Don’t be afraid to make changes when an instrument needs to occupy more space. This can apply to dynamics as well.
- Enhancing pads are likely to need automation to remain hidden.

- Be thoughtful about build-ups in the context of the dynamic range of the whole arrangement. You'll often need to drop excitement level as far as possible in anticipation of a crescendo.
- Don't just use level increases to implement a buildup. Instead, think about arrangement complexity, instrument timbre, effects levels, and stereo width.

## 19.5 Implement detailed rides

- Detailed automation rides are unmatched in “humanizing” and “professionalizing” a mix. However, they are quite labor-intensive.
- The closer you can get to a great mix without detailed rides, the less time you'll need to spend.

### 19.5.1 Troubleshoot intelligently

- Dip vocal breath noises.
- Add attack to soft guitar notes by fading up an initial transient.
- Rebalance individual bass notes
- Ride down momentary feedback howlarounds.
- Catch sibilants that made it past the de-esser.
- Cut low-frequency thumps from stomps/bumps, etc.
- Automate gating thresholds to kill bleed.
- Compensate for changes to recording settings.

### 19.5.2 Perfect the mix balance

- Do these really critical moves at a low monitoring level.
- Use Auratones for this if you have them.
- Choose an important instrument and listen for the duration of the mix.
  - If it ducks, edge it up.
  - If it draws too much attention, edge it down.
  - Even a quarter of a decibel can make a difference here but momentary rides of 6dB or more are not unusual.
- Keep monitoring at the same level for these sessions.
- Think in terms of distance rather than level. If instruments take a step away, this might be an indication rides are needed.

### 19.5.3 Direct the listener's attention

- Use volume automation to emphasize or de-emphasize instrumentation in sections.
- Make the listener refocus during interludes.
- No DSP can do this for you. Make human decisions to draw attention.
- Consider riding up reverb or delay tails where nothing else is happening.
- You can get away with surprisingly skewed balance if it's only momentary, so be bold.

- Push up the first few syllables of a lead vocal to draw attention then quickly bring it down to a more reasonable level.
- Pull back background parts even while pushing focal parts up. If the rest of the mix (ex. Vocals, drums, and bass) remain the same volume, the listeners won't even be conscious of what you've done.

#### 19.5.4 Ride the vocals

- Don't ever be afraid of putting the vocal too high in the mix.
- Ask someone not involved in the production if they can hear every word.
- Carefully balance the level of each word, note, consonant, vowel. You should be spending real time here.
- Dull consonants may come across unclearly. Ride them up.
- Fast diphthong transitions can also benefit from a push.
- Vocal rides can even seem to improve the performance if executed correctly. Rhythmic vocals often benefit.
- Ride vocal EQs and effects as well when needed.

### 19.6 Finalize!

- Reference the mix. Yes, again.
- Then reference it again on every monitoring option you have and make a "snag list" of final nips and tucks.

#### 19.6.1 Snag

- Listen to the mix from beginning to end paying attention to long-term mix dynamics.
- Train yourself to listen to the whole song and not just individual instruments.
- Sometimes it's best to leave it overnight and listen again in the morning with fresh ears.
- This late in the game, it's better to listen to the song the way you normally listen to music as a consumer. Don't do your final checks in the DAW. Export the music.
- A couple of playbacks on your favorite day-to-day domestic systems can help here.
- Your snag list should include items that are truly justifiable across all of your monitoring systems.

#### 19.6.2 Incorporate revisions

- The client decides what's finished and what isn't.
- Save every mix. You never know when you're going to want to go back to a prior mix.
- Listen to and consider notes from stakeholders. Even if the critique makes no sense, there's something to learn about the perspective.

- Whatever you find yourselves disagreeing on, the artist wins. But don't ever be afraid to tell the artist what you think.
- Ask the artist for representative examples from their collection of what they want specific critiqued aspects to sound like. Interpretation of sounds may differ but an audio example doesn't.
- If you're working for a band, try to nominate a single person as a revision spokesperson. Otherwise, the mix feedback is likely to take you in many different directions.
- Copy all revision requests to all stakeholders so everyone knows what's being worked on.

## 19.7 Master!

### 19.7.1 Determine if mastering is needed

- If the mix just doesn't feel finished, fix the mix. It's not ready for mastering anyway.
- A mastering engineer provides an additional set of experienced ears to cross-reference your opinions about the balance, tonality, and dynamic range of the mix.
- A good mastering engineer will alert you to aspects of the sound you could address by revisiting your mixdown.
- Mastering engineers should also be expert at processing several different mixes so they sound like they belong side-by-side on the same album.
- Mastering engineers should also have an intimate understanding of how to make the final version sound best on every different format the artist intends to release on.

### 19.7.2 Choose a mastering service

- Look for a mastering engineer at least as good as you at bringing the mastered loudness to an appropriate level while minimizing negative sonic side effects.
- Be sure the engineer will respect your mixing intentions with any further processing they apply.
- Many mastering houses will test-master a single track to help determine the above.
- Line up the test master against your unmastered mix in a new DAW.
- Process your unmastered mix to match the subjective loudness of the test master using the best methods you have available.
- Ask yourself if the test master sounds worse.
- Eliminate any mastering engineer who radically changes any aspect of your mix during test-mastering without first contacting you to discuss it.
- Above all, find a mastering engineer with whom you can work with freely and easily. You need to be able to work as a team.



### 19.7.3 Evaluate the master

- Compare the master to your best-effort loudness-enhanced work.
- For EPs and albums, it's best to disconnect from the position of a mix engineer and try to listen as a music consumer.
- Think about how the target audience consumes music day-to-day and try to mimic that behavior to judge the entirety of the album.
- Try not to skip around so you allow yourself to engage with the music on an emotional level as the artist and/or producer intended.
- Listening top-to-tail also allows you to pay attention to between-song transitions.
- Try actively concentrating on the lyrics to break out of the engineer's mindset.

# Checklist

Title \_\_\_\_\_  
Date \_\_\_\_\_  
Version \_\_\_\_\_

## PRE-WORK

- 7.1 Comp
  - 7.2.1 Reduce clutter
  - 7.2.2 Add detail
- 5.1 Start fresh
- 5.2 Enhance navigation
  - 5.2.1 Organize tracks
  - 5.2.2 Add colors and symbols
  - 5.2.3 Divide the timeline
- 5.3 Project reconnaissance
  - 5.3.1 Scan individual tracks for trouble and highlights
  - 5.3.2 Multing
- 6.1 Tweak groove and timing
  - 6.1.1 Identify timing peaks and valleys
  - 6.1.2 Tighten the timing
- 6.2 Adjust timing
  - 6.2.1 Camouflage edit points
  - 6.2.2 Time stretch
  - 6.2.3 Review the song
- 6.3 Adjust tuning
  - 6.3.1 What to target
  - 6.3.2 Choose the right tool
  - 6.3.3 Automated and pre-scanned correction

## BALANCE

- 8.1.1 Start with the most important section
- 8.1.2 Start with the most important instrument
- 8.1.3 Spend the most time on the aspects that sell the mix
- 8.2.1 High-pass filter
- 8.2.2 Pan mono recordings
- 8.2.3 Set levels
- 8.2.4 Listen to your faders
- 8.2.5 Stereo track processing
- Group tracks
- 8.3.1 Work on multimed instruments
- 8.3.2 Work on multimed ensembles
- 8.3.3 Build ensemble balance and tone
- 9.1.1 / 9.1.2 Check for compressor needs
- 9.1.3 COMPRESS!
- 9.2.1 Adjust ratio
- 9.2.2 Series compress
- 9.2.3 Adjust attack and release
- 9.3 Consider parallel compression
- Special notes on vocal compression

- ❑ 10.1 Expand and/or gate!
      - ❑ 10.1.2 Expanders work in parallel too
        - ❑ Special note on drums
    - ❑ 10.2 Transient enhancing
  - ❑ 11 Equalize!
    - ❑ 11.1 Unmask and balance
      - ❑ 11.2.2 Shelf filter
      - ❑ 11.2.3 Peak filter
      - ❑ Special note on low end
      - ❑ 11.2.5 Shift your listening perspective
      - ❑ Special note on ordering of dynamics and EQ
      - ❑ 11.3.1 EQ multimiked instruments
      - ❑ 11.3.2 EQ multimiked ensembles
      - ❑ 11.4.2 Using automated and match EQ
    - ❑ 12.1 Distort!
    - ❑ 12.2 Enhance low end
      - ❑ 12.2.1 Implement drum triggering
      - ❑ 12.2.2 Incorporate a MIDI subsynth
    - ❑ 12.3 Incorporate synth pads
  - ❑ 13 Implement frequency-selective dynamics
    - ❑ 13.1.1 Equalize parallel processors
    - ❑ 13.1.2 Refine gating
    - ❑ 13.1.3 Reduce sibilance
    - ❑ 13.1.4 Manage pumping and breathing
    - ❑ 13.2 Use multiband dynamics
    - ❑ 13.3 Equalize dynamically
    - ❑ Special notes on specialized de-essers
    - ❑ 13.4 Spectral dynamics processing
  - ❑ 14 Sidechaining for fun and profit
  - ❑ Special note on ducking
    - ❑ 15.2 Rebalance pre-mixed audio (sampling, etc.)
    - ❑ 15.1 Moving toward fluent balancing
- ❑ **SWEETEN**
  - ❑ 16.2 Set up reverb
  - ❑ 16.3 Blend with reverb
    - ❑ 16.3.1 Choose a preset
    - ❑ 16.3.2 Adjust tone and spread
    - ❑ 16.3.3 Balance blend reverb
  - ❑ 16.4 Add size with reverb
    - ❑ 16.4.1 Balance size reverb
  - ❑ 16.5 Add tone with reverb
  - ❑ 16.6 Add sustain with reverb
  - ❑ 16.7 Add spread with reverb
  - ❑ 16.8 Juggling reverb enhancements
  - ❑ 17.1 Set up delay
  - ❑ 17.2 Delay in stereo
  - ❑ 18.1 Tweak arrangement for stereo
  - ❑ 18.2 Adjust stereo spread
    - ❑ 18.3.1 Widen with EQ

- 18.3.2 Widen with comb filtering
- 18.3.3 Widen with the haas effect
- 18.3.4 Widen with pitch shifting
- 18.4.1 Widen with auto-panning and Leslie
- 18.4.2 Widen with dynamic pitch and tone changes
  
- 19.1 Perfect the master buss
  - 19.1.1 Compress the master buss
  - 19.1.2 Equalize the master buss
  - 19.1.3 Adjust stereo width on the master buss
  - 19.1.4 Sauce on 'em
  - 19.1.5 Finalize your master buss plugins
- 19.2 Reference!
  - 19.2.1 Louder!
  - 19.2.2 Strategize loudness processing
  - 19.2.3 Other loudness processing concerns
- 19.3 Check referencing
- 19.4 Automate long-term mix dynamics
- 19.5 Implement detailed rides
  - 19.5.1 Troubleshoot intelligently
  - 19.5.2 Perfect the mix balance
  - 19.5.3 Direct the listener's attention
  - 19.5.4 Ride the vocals
- 19.6 Finalize!
  - 19.6.1 Snag
  - 19.6.2 Incorporate revisions
- 19.7 Master!
  - 19.7.1 Determine if mastering is needed
  - 19.7.2 Choose a mastering service
  - 19.7.3 Evaluate the master

# Bibliography

Senior, Mike. *Mixing Secrets for the Small Studio*. Second ed., New York, Routledge, 2019.