

Noise Reduction

What is noise?

- Anything in a sound that we don't want.
- Hiss from electronics.
- Hum from AC power. Buzz from an instrument amplifier.
- A fan in the background of a film dialog.
- A door slam in an interview.

Signal-to-Noise Ratio: The difference between the signal level and the noise floor, specified in dB. 70 dB is ok. 50 dB is poor. Listen to the Bartlett Demo.

Noise in mixed tracks adds up! Equal levels in a mix add 3 dB for each track.
Systems have additive noise. Individual hardware has it specified.

How can we avoid it in the first place?

How can we record for the best signal-to-noise?

- Don't set your recorder to record at a low level.
- It has internal noise that will become more noticeable.

If you are stuck with noise:

- Minimizing noise on a remote recording/film/video session
 - First of all notice them, and realize they will seem "louder" when recorded.
 - Get the mics away from the noise source.
 - Pad the noise sources.
 - Get a little bit of just the background noise ahead of time.
 - To use as a sample in noise reduction software.
 - Or often get a lot of it.
 - That way you can put it behind any ADR you do later.
 - Or get a mic with it's own track recording only the noise, and no dialog.
 - While the dialog is on another track.
 - Later, align and invert it, in the mix. Nice if you have a clapperboard.
- Note that a loose connection on any mic cable can turn it into a radio!

Unbalanced cables pick up noise easily. They use 2 internal connectors.

Balanced cables reject electromagnetic noise (Like AC) using 3 conductors.

- Two wires carry the same signal. However one copy is flipped out of phase.
 - Receiving hardware will flip that out-of-phase copy back and combine the two copies.
- Noise that overwhelms the cable shielding will get into both copies equally as much.
- The receiving hardware flips one copy phase 180 degrees so that the signals now add.
- But the noise, which was in phase, has one copy now flipped out of phase.
 - The noise cancels itself out.

Reducing Noise in a Track in Postproduction

Example of "unavoidable" noise: AC/buzz on a bass amp (BassBuzz.wav)

Remember: perception of noise is relative. People may not notice it if it is reduced a bit.
How loud does the noise have to be for us to notice it... compared to the desired sound?

Almost all noise reduction techniques require a compromise. Some bad goes with the good.

Masking is a very useful phenomenon. When two sounds are in the same frequency range, we tend to notice only the louder one.

So if a splice in one track will be audible,
we put that splice "behind" a snare hit in another track.

We don't bother with a little guitar amplifier buzz during the guitar notes.
In between the guitar notes is another story. We deal with that.

Look at a spectrum display of, say the BassBuzz, waitress.
(I need another example recording with a steady state noise)

Try filters? Too many harmonics in Buzz Bass
Best to use learned noise reduction. Just enough sample noise.

For pops There are dedicated tools – Audacity pop/click removal
Set the thresholds and listen

For occasional sound behind the desired sound, as a car honk
Audition/Soundboard have unique tools such as the Healing tool

For fans/hiss – steady state noises
Manually cut to silence or negatively amplify (Audacity tool to lower levels)
But this often leaves noticeable dropouts.
Ironically people might not notice the noise, but do notice the dropouts.

Use Gate – good for small problems,
See the bass guitar and snare tracks that are gated.
Also good for not getting the noise in the first place when recording live
Suppress the click on the Ricky bass clip (Studio One?)

Use EQ
Audacity > Spectrum will sometimes show the offending frequency.
Note that AC 60 hz harmonics are most often multiples, 60-120-240 Hz
Narrow filters are best, as they affect the wanted sound the least.

Use common noise-learning tools (Audacity noise reduction)
Soundboard and Audition

For sibilance Dynamic Filters (deesser)

Remember

Most noise reduction tools are not perfect. Many require learned skill.

Try to get things right when recording in the first place.

Noise is only a problem if you notice it. Don't work over every track.

Some noises require multiple passes of the same tool, taking a little each time.

Some noises, like guitar amp noise, require a combination of treatments.