TEN ACOUSTIC FIXES FOR YOUR HOME STUDIO
by Bruce Bartlett copyright 2014

If your recordings sound like they were made in a house rather than in a studio, these tips are for you.

Do your recordings sound mushy or distant, even without any effects added? Do you hear sounds coming from outside the studio? The cause might be bad room acoustics. I'll suggest some low-cost ways to control acoustic problems.

First, how do you know if the acoustics need to be improved?

- You clap your hands next to a wall and you hear flutter echoes (a fluttering sound). These are caused by sounds bouncing back and forth between hard parallel walls.
- Your studio is a very live environment, such as a garage or concrete-block basement. You hear too much room reverberation.
- Your studio is very small.
- You hear outside noises in your recordings.
- Bass-guitar amps and monitor speakers sound boomy.
- You want the freedom to mike several feet away without picking up noise or excess room reverb.
- You hear a lot of leakage in the mic signals. Leakage (bleed or spill) happens when an instrument's sound gets into another instrument's mic. Sound from an instrument travels to the nearest microphone, and also "leaks" into the mics set up for other instruments.

HOW TO TAME ECHOES, REVERB AND LEAKAGE
There are two ways to reduce acoustic problems: with recording techniques, and with acoustic treatment. Let's start with the first method. Sometimes you can make clean recordings in an ordinary untreated room -- such as a living room, basement or club -- if you follow these suggestions:

1. Mike close. Place each mic 1 to 6 inches from each instrument or voice. Then the mics will hear more of the instruments and less of the room. You might want to use mini mics, which attach directly to instruments.

2. Use directional mics -- cardioid, supercardioid, or hypercardioid -- which reject room acoustics.

3. Record bass guitar and synth direct with a guitar cord or a direct box. Since you omit the microphone, you pick up no room acoustics. To get a good sound when recording electric guitar direct, record off the effects boxes, use a Line 6 Pod, or use a guitar amp plug-in.

4. Overdub instruments one at a time rather than recording them all at once. You'll pick up a much cleaner sound. However, this loses the emotional interaction that occurs when all the musicians play together. You might record all the loud instruments at once: drums, bass, and electric guitar. Then overdub the quiet instruments: acoustic guitars, sax, piano, vocals.

5. Record in a large room. This lets you spread the musicians farther apart, and weakens the sound reflections from the walls into the mics.

Now let's consider acoustic treatments. Reverb and echoes are caused by sound reflections off room surfaces. So any surface that is highly sound-absorbent helps to reduce those problems.

6. To absorb high frequencies, use porous materials such as convoluted (bumpy) foam mattresses. Nail or glue them to the walls, or mount them on frames. Thick foam works better

than thin. Four-inch foam on the wall absorbs frequencies from the mid-bass up. Leave some space between the foam panels; this helps to diffuse or spread out the sound in the room (Figure 1). Be sure that the foam is flame-retardant.

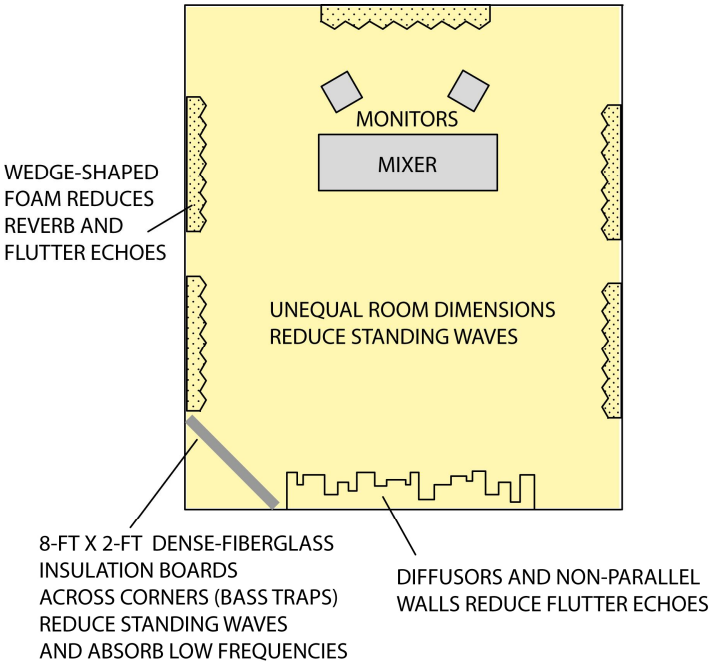

Figure 1. Some acoustic treatments.

Don't overdo the foam padding. A stuffed, dead room is uncomfortable to play in. Keep some reflections because they add "air" and liveliness to the sound.

Other high-frequency absorbers are sleeping bags, carpeting, curtains, and fiberglass insulation covered with muslin or burlap. If possible, space these materials several inches from the wall. The spacing helps them absorb mid-bass frequencies.

Start with just a little absorption behind or above the musician you're recording. Add more absorbers, a few at a time, until your recordings sound as "dead" as you wish.

7. To absorb low frequencies, you can buy bass traps. Get some 2-ft x 4-ft panels of dense fiberglass insulation (say, from ats.acoustics.com). Stack two of them vertically across each room corner.You may not need any bass traps if you don't put any bass into the room. For example, don't turn up the bass guitar amp -- just record the bass direct and have the musicians wear headphones to hear the bass.

CONTROLLING STANDING WAVES
Let's look at another acoustic problem: standing waves. If you play an amplified bass guitar through a speaker in a room, and play scales on the bass, you may hear some notes that boom out in the room. The room is resonating at those frequencies. These resonance frequencies, which are strongest below 300 Hz, occur in patterns called "standing waves". They can give a tubby or boomy coloration to musical instruments and monitor speakers.

8. Room resonances are worst in a cubical room. They are less of a problem if the room's length, width and height are different.Try to record in a large room because the room resonance frequencies are likely to be below the musical range. Use bass traps to absorb room resonances. Contrary to popular opinion, non-parallel walls don't prevent standing waves.

MAKING A QUIETER STUDIO

9. The following tips will keep noises out of your recordings:

- Turn off air conditioning, appliances and telephones while recording.
- Pause for ambulances and airplanes to pass.
- Close windows. Consider covering them with thick plywood.
- Close doors and seal with towels.
- Remove small objects that can rattle or buzz.
- Weather-strip doors all around, including underneath. (Leave the doors open for ventilation when not recording).
- Replace hollow doors with solid doors.
- Block openings in the room with thick plywood and caulking.
- Put several layers of plywood and carpet on the floor above the studio, and put insulation in the air space between the studio ceiling and the floor above.
- Place microphones close to instruments and use directional microphones. This won't reduce noise in the studio, but it will reduce noise picked up by the microphones.
- When building a new studio, you might want to make the walls of plastered concrete block because massive walls reduce sound transmission. Or make the walls of gypsum board and staggered studs. Nail gypsum board to 2x4 staggered studs on 2x6 footers as shown in Figure 2. Staggering the studs prevents sound transmission through the studs. Fill the airspace between walls with insulation.

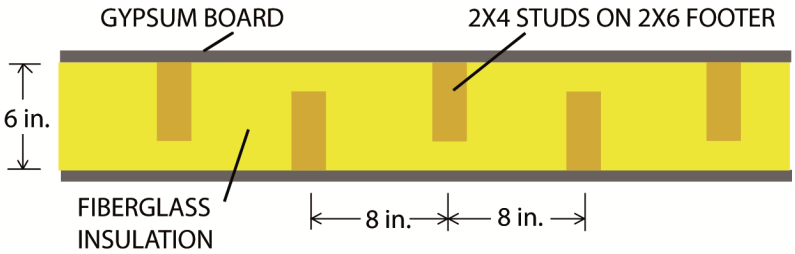

Figure 2. Staggered-stud wall construction keeps out noises.

The ideal home-recording room for pop music is a large, well-sealed room with optimum dimensions. This room is in a quiet neighborhood. It should have some soft surfaces (acoustic foam, carpet, acoustic-tile ceiling, drapes, couches), and some hard vibrating surfaces (wood paneling or gypsum-board walls on studs).

Your home studio may not need acoustic treatment. Do some trial recordings to find out. But if your room could stand some improvement, the suggestions here should point you in the right direction.

10. For better results and a more professional appearance, consider buying some acoustic treatments from these companies. Their websites are atsacoustics.com, tubetrap.com, realtraps.com, acousticalsolutions.com, primacoustic.com, auralex.com, acousticsfirst.com, wallmate.net, illbruck-sonex.com, and rpginc.com. Flame retardant treatment for blankets and curtains is at www.rosebrand.com/category16/flame-retardant.aspx.

I recommend this excellent source of information on room acoustic treatments: www.ethanwiner.com/acoustics.html.

Bruce Bartlett runs a commercial recording studio and uses the same acoustic treatments described here. He's the author of "Practical Recording Techniques 6th Edition" and "Recording Music On Location 2nd Edition."