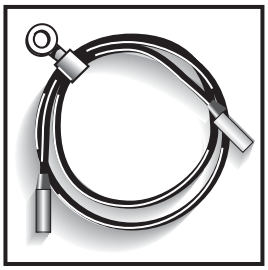
CHAPTER 3
Studio Setup



The best recordings come from properly designed spaces. Before anything is loaded into the room, before any equipment setup begins, you must determine the best ways to take advantage of the recording space. Some studios have dead areas and live areas, each with their individual functions. Some studios have adjustable wall panels that can liven or deaden areas of the room. You may decide to, for example, record horns in a live area of the room and record an intimate acoustic guitar in a less live area.

Again, understanding the physical limitations and characteristics of the room helps you decide where each setup will sound best.

Room Preparation

• **Clean the place.** A clean studio, as with a clean control room, keeps everyone from getting anxious. It makes you look like a professional,

Recording Tips for Engineers ISBN: 978-0-240-52176-3

not some hack that doesn't care enough to clean out the dirty food containers.

- **Use it or lose it.** Remove everything that isn't involved in your session, such as another client's equipment. Every item in the room rattles, so, if it isn't there, that's one less rattle to worry about. In addition, when the client books the studio, he wants the whole studio. It isn't fair to him when you store someone else's equipment in the corner of the room.

- **Go ahead and ask.** In an unfamiliar studio, ask a staff member about any standard instrument placements. Then use that information, along with your experience, when placing each instrument. Sketch the layout of the studio and use it to decide where each instrument will go.

- **Deal with noisy floors and chairs.** Oil squeaky chairs and throw down a carpet over squeaky floors. Everyday noises that are unconsciously blocked out by our ears are not blocked out by the microphones.

- **Diffuse the situation.** Use diffusion devices, such as sections of acoustic foam, stand-alone baffles, and perhaps sections of plywood placed on the floor to fit your specific session needs. Figure 3.1 shows how properly placed baffles will block and absorb most initial reflections. In this instance, reflections coming back off the wall are not an issue. Baffles might be used as absorption devices or reflective devices, depending on the situation. Note that absorption devices do not affect some frequencies, such as low lows.

- **Any size recording studio can make hit records.** Good equipment means nothing unless the players are up to the task. Thinking you will get a great recording because you use the best gear is like thinking you can do a great painting because you have the best paintbrushes. Even a broken pencil can draw a masterpiece.

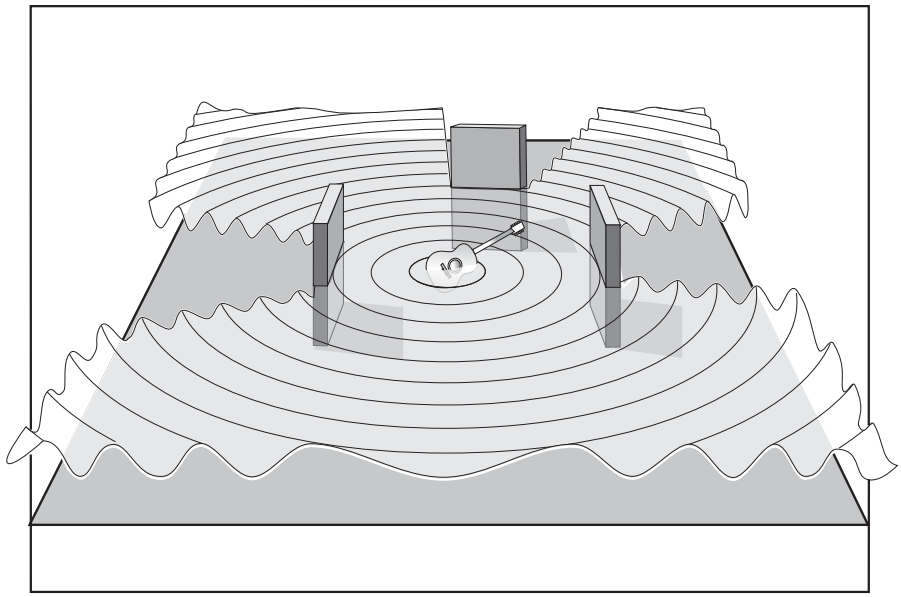


FIGURE 3.1
Baffles used for absorption

Placement

• **Draw a setup sheet with the layout of the room.** Before considering where the instruments and players are placed, draw an instrument setup sheet, along with an input list, to refer to. This is useful when other people are helping to set up the room.

• **How many players are recording basic tracks?** Most recordings are broken down into three sections: basics, also called bed tracks, then overdubs and mixing. In today's studio, these overlap considerably. Determine how many players will be in the studio during the basics to properly choose which, and how many, microphones to use on each setup. Different situations will require different approaches.

• **What is the style of music?** Determine player placement by considering the style of music, how prominent each instrument will be, and how many players there are. Is it:

- A jingle? Jingles are advertisements heard on radio and television – often 30 or 60 seconds long. Recording will often be completed in a single day so there will not be a lot of time for experimentation. The most important factor here is usually the time restraints. Because the musicians that play on jingles are professionals, they will most likely play the part properly every time. The emphasis here is not on setup or performance. It is assumed that the setup is good and that the performance will be fine. The important factors here are time and money. Set up and press the record button. Proper documentation is key for a smooth-running jingle session. Many different versions of a commercial, or 'spot,' are recorded, and each spot needs proper documentation during recording, editing, and mixing.

- A movie soundtrack? As movies get cheaper and more accessible, more engineers are getting into recording movie soundtracks. While most modern records are recorded to feature vocals or a certain instrument, movie soundtracks are less focused on the individual player and more on creating a feel that complements the movie. There is no strict standard, and you would record what each scene requires: a large group of players or an individual musician.

- A power rock band? They might sound better in a larger live space. Start the session by concentrating on bass and drums, but also record reference vocals and guitars.

- A jazz session? You may prefer a mellower, dryer feel from a less reverberant space. With jazz, often players will want to watch each other without headphones. Everything is recorded live with no

overdubs. Confirm that your session has enough hard drive space, because, left to their own devices, jazz players will never stop playing. Sleep? Food? Time itself? All secondary to the groove.

- A demo? Recording demos is not the time to spend four hours getting that perfect guitar sound. Take less time on setup and more time recording.
- A television show? Many televisions have smaller speakers that cannot recreate a wide range of frequencies. Therefore, a piano, for example, recorded for a television soundtrack might not have the same equalizer setting as a piano recorded for a rock record: on a television soundtrack, boosting low low frequencies might not have much of an effect. They will equalize and compress it at the TV station.
- A rap or hip-hop session? Commonly, electronic drum machines and modern keyboards combine with live vocalists. Vocals might be recorded after all the music is recorded. To play off of each other, sometimes two or more singers record into separate microphones at the same time.
- An independent punk band? They might sound best in a smaller, tighter 'garage' style room. Not a lot of setup time, and often raw sounds with live vocals.
- A solo acoustic player/singer? Setup may sound best in a smaller, more intimate space, and the voice and the musical instrument might have separate microphones. The microphones could be placed in a stereo array in front of the artist, as long as they are comfortable.

No matter what the situation, all aspects of the recording, production, and playing must be of the highest quality. The world (hopefully) is

going to hear the results, so take the time to set up properly and record everything correctly.

• **Places please.** Most musicians, if they have been playing together for a long time, get used to certain placement among the rest of the players. Maybe the rhythm guitar player prefers to stand on the left side, while the bassist may like the right. Ask the players if they are used to playing in specific locations in reference to each other, and set them up that way.

• **Don't isolate the players.** Just because an amplifier is isolated doesn't mean that the player must be isolated as well. Commonly, players being recorded together should be able to see each other, and at least one should be able to see the engineer. The person who can see the engineer normally gets a talkback microphone.

• **Carpets and chairs.** Before setting up the microphone stands and running the cables, lay out any carpets that will be needed. Tape them to the floor to keep them in place and so no one trips and falls. Once the carpets are down, place chairs for each player. They might not use them when they are actually playing, but they may want to sit down during playback or during a lull in the session.

• **Set up and sit down**. Bring in and set up the instruments as described in the next few chapters. With the instruments placed according to your setup sheet, begin placing the microphone stands and cables.

Microphone Stands

• **Don't use a large boomstand.** Sometimes a smaller boomstand will be less obtrusive. Microphone stands can range from a small stand to hold a tiny microphone, all the way up to a large boom with a big microphone hanging off the end of it. Match the stand size with the situation.

Microphone stands touch nothing but the floor. A microphone stand won't tip over unless it was teetering in the first place.

• **Use a large boomstand.** Larger boomstands tend to be more stable, with less resonances and rattles, and they help eliminate rumble from the floor.

• **Stand still, laddie.** Today's microphone stands tend to be flimsy, so don't force any of the clasps. Take the time to unscrew the fastener, and set the stand and the arm to the proper placement. Then tighten the clasp. Not Superman tight, but tight enough that the microphone stays at the right spot until the end of the session.

• **Duct tape rules.** Leave a couple of rolls of duct tape around, but only use it to stop resonance and rattles, not to hold a microphone stand. Duct tape won't hold a microphone stand in place for long, and it looks unprofessional. But sometimes there is no choice. If you must use duct tape to hold anything, don't wrap a whole roll around the microphone stand. A few times around will do.

• **Stand up.** Place all stands and run all cables before attaching the microphone to the stand. Wheeling a large boomstand around a cluttered room with a microphone connected to it is just asking for damage. Make a habit of setting up microphones last and breaking them down first.

• **Secure the boomstand.** If you must use a smaller tripod boomstand, place the stand so one leg is directly under the boom, then sandbag the other two legs to keep them secure. Place a sandbag on the base of the stand to ensure stability. If someone bumps into it and it topples over, it's your fault.

• **Pair of matching shocks.** When setting up to record something in stereo, use matching shockmounts, stands, and microphones. This not

only looks professional but also makes both microphones sound alike. If one microphone has a shockmount and the other doesn't, a slight rumble may creep into the one without the shockmount. Then you might need to add a low-end roll-off to one side, thus changing the intended matched sound.

• **Weight for the boom.** Set the counterweight of larger boomstands high enough so no one hits their head. If someone gets smacked in the nose, it gives the studio a black eye.

Cables

• **What are balanced cables?** A standard recording studio XLR balanced cable uses three wires – two to carry the signal and one for the shield. The three wires are termed hot, cold, and common. Both XLR and ¼″ stereo cables are balanced. On a balanced ¼″ cable, the three wires connected are tip, ring, and sleeve (TRS), with the sleeve being the shield terminal.

Figure 3.2 shows the two ends that carry the signal, and one has the polarity (phase) switched. Why? Any interference will affect both wires equally. At the balanced input connector, these equal and opposite interference signals will cancel out. This process is called balancing or common mode rejection. This eliminates interference so you can use longer cables with minimal hum pickup.

• **What are unbalanced cables?** A standard guitar cord is an example of an unbalanced cable. It contains two wires – one wire is the hot and the other is the shield. The shield is wrapped around the hot wire and used for the return signal. Unbalanced cables are normally used for getting mono signal from the instrument to the amplifier or direct box. Most outboard equipment uses ¼″ inputs and all consoles have the option of balanced and unbalanced ¼″ (line level) inputs.

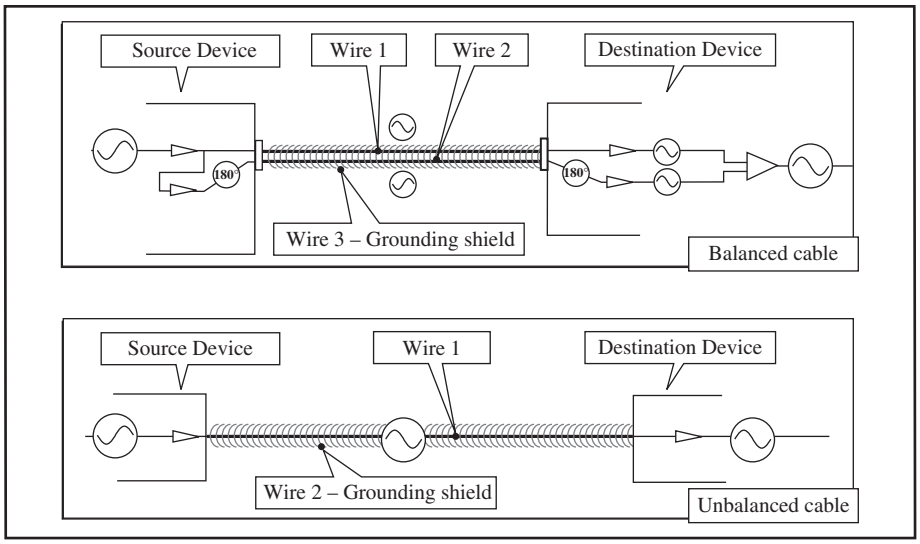


FIGURE 3.2
Balanced and unbalanced

Another unbalanced line is a ¼″ non-shielded speaker cable, which is two heavy-gauge parallel wires. Cables from amplifier to speaker must be heavy gauge for as little power loss as possible. Don't use speaker cable in place of shielded cable.

Running cables

• **Got cables?** Confirm that there are enough cables, including ¼″, XLR, power cables, and AC (alternating current) power boxes. Bring them into the room and set them in their appropriate places.

• **Use the proper cable and connectors.** Adapters will always degrade the signal so use them as a last resort. For the best results, use the proper cables so no adapters are necessary. Using one long cable is better than joining two short ones together.

• **Respect the studio cables.** Wrap and unwrap studio cables correctly and don't throw them around. Avoid any sort of sticky tape to hold cables

together. Use a specific plastic clip, a Velcro strip, or even a piece of rope with a loop on the end.

• **Label the cable.** Label both ends of XLR cables for easier tracing. For example, if cable 28 is connected to a microphone that is not working, rather than having to trace it through the labyrinth of all the other cables, simply read the number on the cable then check where the corresponding number is plugged in at the input panel.

• **Keep it short.** Use the shortest possible unbalanced, high-impedance cables. Longer cables can pick up hum and, as length increases, can diminish high frequencies.

• **Keep it long.** Allow enough length so cables are never taut. Don't wrap them up in a coil; just leave the excess cable on the floor by the base of the microphone stand.

• **Leave a channel or two open when plugging in the drums.** You want all the drum microphones to enter the console in the same area. Later in the session, if you need to add another drum microphone for any reason, you won't need to return it somewhere else on the console.

• **Use the best cable.** Don't use a suspect cable on a microphone. If you're short on cables, use it on headphones. If the cable fails during the session, the recording will not be compromised. No one wants to find out half the piano sound is gone when it comes time to mix. Remove faulty cables from the room so no one mistakes them for usable cables.

• **For best results.** Use the shortest, thickest, highest quality cables on the vocal microphone.

• **Check your shorts.** Keep an ohm meter close by to determine where a problem lies. Is the microphone not working? Is there a short in the

cable? Maybe it can be as simple as a wrong button pressed at the console. A meter tells you instantly if signal is correctly flowing through a piece of gear.

• **Three-cord rock and roll.** Place extra everything close by. The session should never stop due to a lack of workable cables.

• **Power arrangers.** Don't run (high-level) AC power cables parallel with (low-level) audio signal cables. Cross power cables at right angles from signal cables to minimize AC buzz leaking into the microphone cables.

• **The wall of sound.** To avoid interference, run cables a few inches away from the studio wall. Right behind this wall lies a plethora of power cables and other audio lines.

• **Don't plug everything into one AC outlet.** You will have a hot, smoking studio with scorching leads and blazing tracks that smolder! Get it?

• **Wrap the cable around the stand.** If you are sure the microphone stand is properly placed and the signal flow is correct, maybe wrap the cable around the stand to keep it out of the way.

• **Don't wrap the cable around the stand.** Unwrapping and removing a cable because the placement is wrong is a waste of valuable setup time. Sometimes, just leave it to hang.

Microphones

• **What is a microphone?** A microphone is a transducer that changes acoustic energy to electrical energy. Sound causes the diaphragm within the microphone to vibrate, creating a small voltage. Louder signals cause the microphone's diaphragm to vibrate more, creating more voltage.

The diaphragm is the internal membrane (or the ribbon – depending on the microphone) within the capsule that vibrates. Different microphones will display different frequency response charts. There is more on this later in this chapter.

A small diaphragm microphone will commonly, but not always, accentuate mid to high frequencies. Due to the smaller mass of the smaller diaphragm, the low frequencies may not be as accurate as in a large diaphragm microphone.

Large diaphragm microphones might offer the widest range of frequency response to capture warmth, as for low strings or vocals. These microphones tend to naturally recreate better low frequencies simply due to the mass of the diaphragm. The larger the mass, the less accurate the transient response.

• **Do a listening test.** When you understand the characteristics of each microphone, you are better equipped to choose the best microphone for each situation. A listening test will help train your ears to determine which microphone does what. Once trained, you use your ears and your experience to choose the best microphone.

Set up the best few microphones available, perhaps four or five at a time, with the individual capsules adjacent to one another. Use no pads or roll-offs, and match the polar patterns. Set the faders so all the microphones have the same perceived volume. Have someone stand at an equal distance from all microphones and speak or sing. Switch one microphone on at a time and listen to which ones:

- Produce a nice, crisp high end.
- Produce a warmer midrange.

- Retain warmth and smoothness no matter what frequencies are altered. Lower-quality microphones may start to sound brittle as you boost the higher frequencies.
- Have a thick bottom.
- Produce hums or buzzes. Microphones with inherent lower levels may be noisier simply because the level must be raised to match the rest of the microphones being tested. Older tube microphones can have this problem, but their great sound makes up for it.
- Change level uniformly as the person moves about the microphone. Some cardioid microphones are more omnidirectional than others, and some may not be omnidirectional at all frequencies.

• **What is the proximity effect?** The proximity effect is the increase in a microphone's low-frequency response when it is placed very close to a sound source. Microphones with omnidirectional patterns are not affected by the proximity effect.

• **What is phantom power?** Condenser microphone capsules are very high impedance, so they need an impedance converter circuit that requires power to operate. The power is called phantom power and it comes from each mixer microphone input. Dynamic microphones have no active electronics, so phantom power is not needed.

• **What is a pre-amplifier?** Whether inside or outside the console, the microphone pre-amp raises the microphone signal level to a usable 'line level.'

• **What does frequency response mean?** A device's frequency response is its output level versus frequency. Different microphones will display different frequency response charts. All new microphones come with

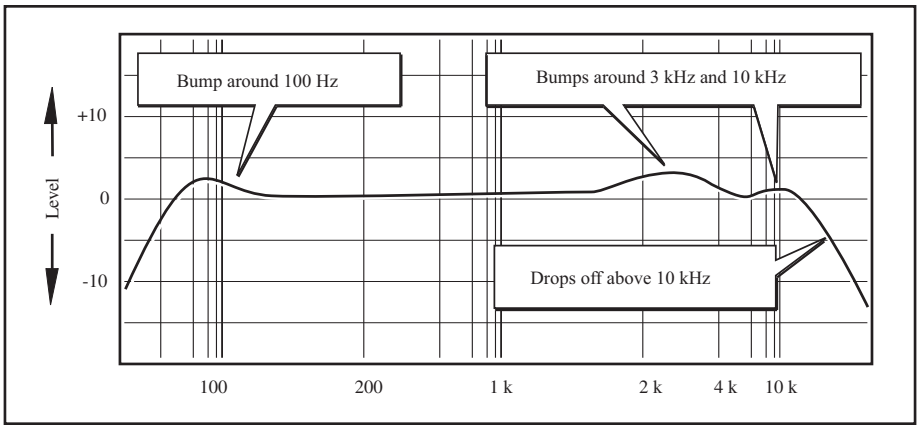


FIGURE 3.3
Microphone frequency response charts

a response chart. Figure 3.3 gives a readout page that shows that some microphones will have a smooth high end while others may have an upper midrange bump. While these charts may not be readily available for you to refer to, simply listening to different microphones on a similar sound source will result in a general idea of how a microphone's chart would look.

• **What does transient response mean?** Transients are the initial sudden peaks of a sound, and are very short in duration. Transient response is the measurement of how quickly a device responds to these transients. A percussion instrument contains very high transients, as can vocal sibilance.

• **Which microphone is best?** The best microphone is the one that sounds best in a particular situation. Unless you are totally familiar with all the microphones at your disposal, the only way to tell is to set up all the available microphones and listen. With experience, you will learn the characteristics of each microphone, and choosing which ones are best for different situations will come naturally. Microphones are the tools of your trade – learn them.