

# Bad audio: so easy to get, and so annoying

PBS has convened the Quality Group to improve the quality of the public TV digital signals reaching viewers' homes. This article is part of the group's series on real-life issues in DTV production and broadcasting. The author is John Garrett, a well-known professional in location sound engineering.

The next inexpensive (\$50) regional workshop sponsored by the Quality Group will be held Nov. 3-4 in Boston. Details at the group's website: [tinyurl.com/pbs-QualityGroup](http://tinyurl.com/pbs-QualityGroup)

By G. John Garrett, CAS

**T**he first step in getting good sound is understanding how we hear the world around us. There is no place in your brain where you "think about sound." Instead the brain processes sound in the language centers and other specialized sites.

With music there's a pitch map in the brain. Rhythm is entrained by the cerebellum, chord progressions excite anticipatory structures, and chord resolution excites the nucleus accumbens, the brain's pleasure center.

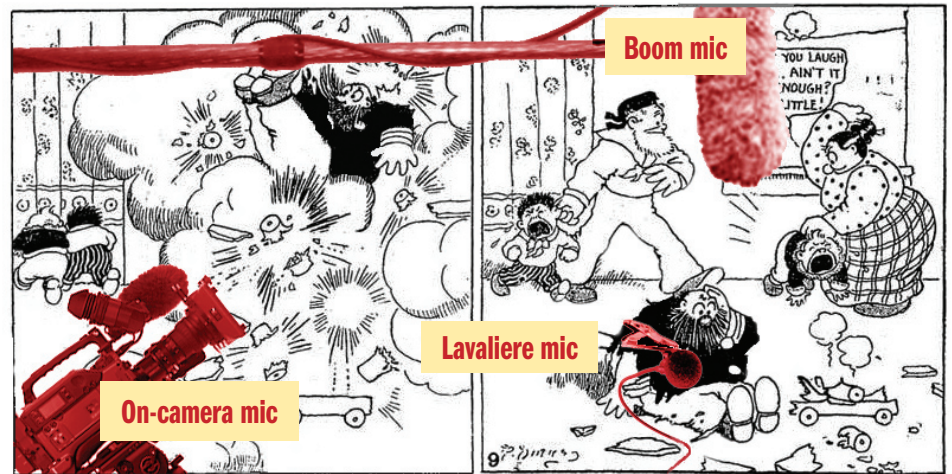
Sound has a significant input to the amygdala, the crucial gatekeeper of our emotional states. This part of the brain tells us when we're in danger, when we're safe, when to be excited, and maybe even when to change the channel. It regulates the "fight or flight" response. This is a major organ of our survival mechanism, and the sound department talks directly to it.

So the first lesson is this: We don't *think* about sound; we *feel* about it. So think about that for a while.

This is also why bad sound is more annoying than bad pictures. If the picture has a problem you immediately analyze it (there's that *thinking* again) and continue watching the film. With poor sound, your brain thinks there's something wrong with your threat-detection system, and it won't stop poking you. After all, there may be a tiger sneaking up behind you.

That's why a good soundtrack escapes notice. We're busy having this experience and good sound helps make it continuous and seamless. Sound *leads* the emotional arc of the film!

So how *do* you think about this stuff you never think about? Producers and directors may have an idea of how they want their final product to sound, but surprisingly few know



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much about what's involved in achieving that goal. Just like ordinary folks, many seem to assume that sound just *happens*. But, like pictures, the sound should have intention behind it.

The most reliable way to get good sound is to hire a good, experienced sound mixer and trust him or her. The knowledgeable mixer comes with the skills and expensive, high-quality gear to make the best master recording possible under the circumstances. As filmmakers, we have all seen these circumstances. In this commentary, I'm trying to give you some tools, offer some ideas, and share some know-how so you can collaborate better with your sound department or improve your own location sound.

This brings me to a piece of essential reading: "Designing a Movie For Sound" ([tinyurl.com/thomsound](http://tinyurl.com/thomsound)), by Randy Thom, who has been recording and mixing for a few decades and has two Oscars to show for it. This is the best thing I've read that shows directors (and the rest of us) how to think about that stuff that we never think about. Randy is a postproduction mixer at Skywalker Sound in California who won the Cinema Audio Society's highest honor, the CAS Career Achievement Award earlier this year. The IMDB lists 94 titles to his credit, and his first job in film was on *Apocalypse Now* as an FX recordist; Randy knows his profession.

Good sound begins in pre-production or "pre-pro." What are the locations like? What are the scheduling challenges? What deliverables does postproduction expect — sound-on-tape/disk/file? A mixed track and several ISO tracks, timecode? If you make sure to hold a 15-minute conversation among your

director, sound mixer and editor, that will prevent many headaches later. An e-mail exchange can work as well, with everything written down. Sometimes the post department has not yet been hired at the beginning of filming (a mistake in my opinion), and then the mixer must ask a lot of questions and get a few answers before starting work. Unfortunately, this often locks post into whatever regime the production mixer has chosen.

Pre-pro is also the stage when sound professionals can learn whether the costumes are sound-friendly, when the producers can address issues around generator and lighting noise, and whether anyone has considered the FX department's impact on the film's sound. I worked on a major PBS series not long ago set in the 17th century. I did not know until principal photography commenced that the historical period had been riddled with hissing smoke machines.

It's also useful to know whether sound is *not* important in some scenes; you can save the effort and expense of recording sound for scenes that will air under narration or music, for instance. Or you can be satisfied that the sound being recorded is only for guide track and not expected to appear in pristine glory on opening night.

Scouting the location in advance can play a crucial, often-overlooked role in pre-pro. If you can afford to, send your sound mixer along; he or she will be able to steer you clear of problem locations and identify potentially interfering noises so together you can plan how to mitigate them. Sometimes you'll only need to be ready with the right acoustical treatments for the location. Other situations

require a tough reality check. I have saved producers many thousands of dollars by saying “No!” to nice-looking but completely unusable sound locations.

On to production: The aim of location sound is to record intelligible dialog and usable ambient sound that supports the picture. This comes from controlling the environment, choosing and placing the microphones, and printing correct levels to the chosen recording medium. That also assumes you use good gear, pay attention and maintain continuity of sound.

On fiction films I always have a spare set of headphones and I invite visitors who come to my cart to look at the *picture* monitor to listen in. No matter whether they’re first-timers or old-timers, the thing they usually say after putting on the headphones goes something like this: “*Oh my God! You can hear EVERYTHING!*” It’s a great way to demonstrate that good sound doesn’t just happen, and what is meant when the assistant director says, “*Quiet on the set!*”

Since the microphone really does hear everything, it’s important to try to control the environment as much as possible. By shutting off humming appliances, improving the location acoustics with rugs, furniture pads on the walls or floor and sometimes under the camera, we get to transform a space from distracting or awful to usable or even wonderful. I have stashed my car keys in many a disabled refrigerator to remind myself to turn it back on before leaving. Since we want everything in the film to be intentional, it’s important to control as many extraneous noise sources as possible, including the fans in the kitchen, the landscapers and even traffic, depending on your budget! And shut off those cell phones! Now one can see why scouting is so important.

Once the location has been tamed, it’s time to listen to any wardrobe issues that haven’t been addressed. Clothing noise can be a big problem when using lavalier mics or “lavs.” Hard shoes on hard floors are trouble when you use overhead mics. You can tame shoe noise with foot foam, carpet runners or stocking feet. Try to stay away from hard, squeaky or scratchy fabrics. Nylon and polyester are not a great combination — the static discharge will not be welcome. Unstarched cotton is usually pretty quiet.

Sometimes you can squelch noisy clothing with double-sided tape, and tape some foam or other soft material around the mic to minimize noise. Location isn’t the only

element that needs to be scouted during pre-production.

We’ve minimized the noise. Now let’s maximize the signal. Two basic types of microphones are used to record dialog in production — directional mics on boom poles or on the camera, and omnidirectional mics mounted on the performers.

**Directional mics:** For natural, clean dialog, nothing beats a good directional mic overhead — a hypercardioid or short shotgun mic. You need to keep the mic out of the shot, but right above the top of the frame. This gives correct perspective to the performers in relation to the environment and the shot. It sounds right! It makes wide shots sound a little wide, close-ups sound close. But watch and listen for what’s beyond the performer in the mic’s path. Long shotguns especially act like the aural equivalent of a telephoto lens, bringing distant sounds closer.

**Lavalier mics:** The wholesale use of lavs ruins the sensation of authentic sound in a physical place. Along with clothing noise and wireless problems, that’s one reason to make lavs the second choice. Other times they work just fine. And for other shots — when you’re just following the action, or can’t go where the performers are going — lavalieres are the only choice. They can make the difference between having sound or not. Even though you lose the texture of perspective in the sound, you can hear what’s going on.

Learning how to hide a mic on talent and operate wireless equipment is beyond the scope of this essay, but if you’re going to be doing this, it doesn’t hurt to get some help ahead of time. To hide mics, bring different kinds of padded tape and make sure the cable is not pulled tight. You may have to experiment to get it in the right place, but a good starting point is somewhere along the talent’s sternum. The wardrobe department can be a great help in mounting wireless lavs, even to the extent of sewing them into costumes for you.

**Camera-mounted mics:** Using a mic on a camera is, for me, is the absolute last resort — for several reasons. First, it’s never close enough to isolate the actor. You hear the room, and intelligibility is low or zero. Second, you hear noises made by the camera and its operator. Third, you can never follow head turns. If the camera pans away, you’ve lost the sound, too. Lastly, the perspective is all wrong. If you have one actor on a radio on Channel 1 and put the camera mic on Channel 2, you can use the camera mic to add some air to the soundtrack when you get

to the mix stage. But that never sounds great, and it’s much more work than pointing a good overhead boom mic at subjects who speak.

You can keep the camera mic as a guide track, of course — just be consistent. Don’t pop outside for an establishing shot, turn on the camera mic and then shut it off when you come back inside. You may forget and not switch back to your primary audio source for the interview.

Connecting your boom and radio mics to a good mixer will improve the sound you capture. You may ask “Why? The camera takes a mic input.” The difference is that good mixers have good mic preamps that sometimes cost \$1,000 per channel or more. With that comes clean, rich sound, some wind/rumble filtering options, metering, channel assignments and, of course, more inputs than the camera has. In filmmaking you get what you pay for. How much do you suppose Sony spent on the mic preamps in your \$3,000 camcorder?

Sometimes you need more flexibility in post, there’s no rehearsing, or you’re shooting on a medium that has poor or no sound, like a DSLR with video capability, a RED Digital Cinema camera, or a 16mm film camera. Then it’s time to do double-system sound, using a separate recorder. The good news is: All digital recorders play back at the same speed they recorded, so maintaining sync is not a big issue. Using a clap slate will keep you out of trouble, and software tools such as Plural-Eyes™ can make synchronizing the sound in post easier. The number of individual tracks you can record in the field is limited only by how much recording horsepower you bring and the amount of time and money you have for sound editorial. “Reality” show producers, for example, record many ISO tracks (where each microphone gets recorded on its own track) and then mix them later, sending a scratch mix to cameras via wireless. I prefer and recommend a direct connection to the primary recorder.

When there are plenty of other options, there is no reason to trust your master recording to a limited and perhaps unscrutinized wireless link in the recording chain! When there’s a reason to not be cabled to a video camera, there’s a reason to treat the shoot like film, and record double-system.

Starting in March 2011, PBS will require all programs to be delivered in 5.1 surround sound. Now is the time to learn as much as you can about capturing sound for surround. You don’t necessarily need to record

it differently, because in most cases the tracks are assembled in the mix-room, However, there are ways to record stunningly accurate surround images in the field. For instance, you can use a mic like the Holophone H2 7.1 (pictured), which captures 7.1 audio channels. If you can't afford a mic like that you can still record at least some ambience tracks and unique sound effects — in stereo, if possible — as well as plenty of room tone to give the editors and mixers a good start at filling the soundscape during post.

Lastly, you need to be organized so postproduction can work efficiently and smoothly with the raw material. This means keeping good sound reports, labeling every bit of recording media, keeping each actor on the same track, maintaining consistent levels and recording room tone at each location. This gives the editors a chance to find and use all the good sound you've sent them.

Obviously, there's a lot more to making great-sounding master recordings than this article can even mention. Every situation offers its own challenges and learning experience. But if you think about sound, use the best professionals and equipment to record and mix it, and follow the best practices you can afford, you'll come away with at least usable sound that nobody will think about. They'll *feel* it. ■



**Holophone  
H2 7.1  
surround mic**

*The author of this article, John Garrett, started mixing live music in 1969, designing and building sound reinforcement systems and recording studios along the way. He has worked on documentaries, feature films, WGBH's Postcards from Buster, and other sonic events.*

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*About the Quality Group: The Quality Group is funded by CPB through PBS's year-long Technical Quality Improvement Program. Quality Group members include: Wendy Allen, PBS; David Felland, WMVS-WMVT, Milwaukee; Gerry Field, American Public Television; Chris Fournelle, WGBH/Frontline; Frank Graybill, WNET, New York; Terry Harvey, WSIU, Carbondale, Ill.; Bruce Jacobs, Twin Cities Public Television; Chris Lane, WETA, Washington; Dave MacCarn, WGBH, Boston; Tim Mangini, WGBH/Frontline; Ernie Neumann, Northern California Public Broadcasting; Mark Schubert, Metropolitan Opera (and other clients); Steve Scheel, PBS; Greg Tillou, National Educational Telecommunications Association (NETA); Steve Welch, NCPB; Eric Wolf, PBS; Ann Tucker (project manager), PBS; and Jim Kutzner (group manager) PBS.*

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