How To Judge Speaker Quality With Listening Tests

By Larry Klein

Many years ago, when I was young, innocent, and unmarried, I decided that any well-rounded bachelor should have at least a passing acquaintance with the fine art of gourmet cookery. A great believer in the printed word, I immediately betook myself to a local bookshop, where I learned that an important part of almost every serious cookbook is devoted to the purchase of meat. Invariably, after a short essay on what part of which animal produces what cuts, each cookbook made the point that a good beef steak—of prime interest to us all—is "well marbled" with fat. Knowing that no novice in the steak-purchasing art would have in his mind an accurate mental image of a well-marbled steak, the editors of the cookbooks were usually kind enough to provide a badly reproduced color photograph of an adequately fat-marbled cut of meat. That was many years ago, but to this day I have yet to see in any butcher's showcase a steak that resembles in whole or in part any of those illustrations.

What has all this to do with speaker shopping? The relationship is closer than you might think: how many times have you been advised in the pages of this and other audio publications to listen for a speaker that has a "non-peaky mid-range," a "non-boomy bass," a "good transient response," and so on? None of these terms, I'm afraid, adequately convey the particular subjective-objective phenomena that the author is seeking to describe. For unless the reader already has in his mind's ear the sound of a "smooth, uncolored" speaker, he is in no better position to select a pair off the showroom shelf than I am to select a well-marbled steak from a butcher's showcase. This has nothing to do with the much-abused subject of psychoacoustics, but simply relates to the very real question of how one can judge whether a speaker is doing a good job of reproduction when one does not have available for comparison the original sound the speaker is attempting to reproduce.

There is a popular (but fallacious) notion that it is enormously helpful, as a preliminary to speaker shopping, to attend a concert of live music. Then, with the live sound still reverberating within your cerebral cortex, a quick after-trip to a hi-fi showroom will permit you to make instant and accurate distinctions between "real" and "unreal" speakers. Unfortunately, the average mind's ear cannot be expected to isolate the distinguishing features of live sound under concert-hall conditions in the first place. And in the second place, the mind's ear is a notoriously leaky vessel and cannot retain the memory of what it has heard for more than a few seconds even under the best of circumstances.

Some experts maintain that A-B listening comparisons of equipment are of limited value: they are rather like attempting to evaluate the accuracy of two reproductions of a painting, each differing from the other in color values, without having the original painting at hand. This view has merit, I feel, only when you are dealing with very subtle differences among several very good loudspeakers or when you are attempting to educate an untrained ear. These exceptions aside, I have not found the task of speaker evaluation by listening

at all difficult with the usual run of speakers that find their way into my living room.

The average speaker buyer, of course, will seldom have the opportunity of hearing a large number of models in his own listening room. He almost certainly does not have an A-B-C-D switching setup built into his hi-fi system. Nor is he likely to have made up a test tape of program material chosen specifically for speaker evaluation. Nonetheless, it is possible to make a valid judgment of the sound quality of a speaker in a home or showroom once you become aware of what to listen for and how to listen for it.

Most speaker manufacturers seem to have pretty well licked the bass- and treble-reproduction problems: fewer systems are now being produced with woofers whose bass is lacking or overly boomy, and similarly, fewer systems have tweeters whose treble output is inadequate or screechy. Both bass and treble performance can be evaluated in the showroom with a few simple checks.

In my own listening tests I find it easier to make discriminations if I'm listening to one speaker rather than a stereo pair. However, one runs the slight risk, when auditioning a single speaker in a showroom, of having its location influence its frequency response. This can be easily checked by switching to the other member of the pair, which probably will not be installed in as advantageous (or disadvantageous) a location.

An important aspect of a speaker system's bass performance is its freedom from spurious resonances. This can be tested simply by tuning in several FM stations and listening carefully to the various announcers on the speaker(s) under consideration. One or two of the announcers may have naturally deep voices, but if every one of them sounds as if he were addressing you from the bottom of an oil drum, you can be sure that the loudspeaker under test (not the announcer) has a bass resonance peaked somewhere in the 100Hz region. This resonance provides for some pleasant overlay of bass on classical material and enhances the beat on pop stuff, but the price paid for this is loss of upper-bass clarity and (usually) absence of genuine low bass.

A speaker system that is inherently unable to reproduce low bass has a choice of how to react: when fed, say, 40Hz, it may either not make any sound at all (which is considered preferable), or produce sound that has within it a small amount of the original 40Hz signal, some 80Hz, and a lot of 120Hz noise. The spurious 80 and 120Hz harmonic signals are products of a phenomenon known as doubling or tripling that occurs when a speaker cone exceeds the linear limits of its suspension. With such a speaker, the sonic difference between a kettle drum and a trap drum, for example, is completely obscured.

As far as the high-frequency performance of the speaker system is concerned, a good test is to listen to recordings of music that include cymbals or triangles and try to isolate the ringing or shimmering sound that is typical of those instruments. You will probably have to listen carefully for this quality in several speakers before you can easily distinguish between those that have it and those that don't. Note also, while listening for shimmer, the amount of FM or tape hiss present. You'll find that some speakers will have the shimmer plus a liberal helping of hiss, and that some will have the shimmer without the noise. Emphasized hiss is usually the result of an irregularity in the speaker's high-frequency response, which may or may not audibly affect other aspects of its performance.

Another quality essential to good tweeter performance is wide dispersion—its ability to spread the high frequencies in a broad arc across your listening room. Without it, the sound will be closed in or boxy; with it, there is a sense of openness and airiness.

You can check for adequate high-frequency dispersion by using the interstation noise on an FM tuner. Switch off the interstation muting if present, and find a weak station or an unoccupied section of the band. Listen for the interstation noise (it has a rushing, hissy quality), while standing directly in front of the speaker. Then, concentrating on the hissy quality in the sound, walk off to one side of the speaker system; at some point you will find that the hissy quality disappears. You will find the same effect on the other side of the speaker—and probably, depending on where the speaker is installed, the hiss will also diminish if you duck your head toward the floor.

The wider the area covered by the very high-frequency hiss, the better the high-frequency dispersion of your speaker system, and the more open and natural-sounding will be the music reproduced by it. In addition, the problem of speaker placement, speaker separation, and listener position will be far less critical than with a narrow-dispersion system. This test should only be made, however, after you have already established that the speaker's on-axis high-frequency response is everything it should be—if it is already short on highs, you may not notice any falling off at the dispersion limits.

There is one area in which many speaker manufacturers still run into bad trouble—the mid-range. Good reproduction of the middle frequencies does not necessarily require a separate mid-range speaker.

In the past, a number of manufacturers (thankfully there are fewer each year) deliberately set out to design speaker systems with a 5 to 15dB boost in the upper middle frequencies. These manufacturers were—and are—appealing to the audio equivalent of the thirteen-year-old mentality oft cited as the target of most TV fare. On certain types of material the mid-range boost imparts a sense of projection, a front-row-center quality, to everything played. This is the so-called "presence" phenomenon, and it is a hindrance, not an aid, to accurate reproduction.

The overly bright and projected quality that comes from a boosted mid-range may be impressive on first listening, but it is accompanied by unfortunate side effects. Minor side effects are harshness (depending upon the range of the frequencies boosted) and emphasis of high-frequency noise

and distortion in the program material. A major side effect (for me, it can make a speaker unlistenable) is a kind of nasality or honkiness that accompanies and discolors everything the speaker is reproducing. Not to be accused of slipping back into well-marbled meaninglessness with the terms "nasality" and "honkiness," I have worked out a "live vs. reproduced" technique that makes it possible for anyone to imitate—and to detect—this type of objectionable coloration.

First, set up an FM tuner as you did for the high-frequency dispersion test. Then cup your hands over your mouth (as though you were trying to warm them with your breath) and make a "shhh" sound. Now remove your hands and make the same sound. Repeat several times until you hear the difference. The hollow, rather nasal quality heard with your hands in front of your mouth is a good approximation of the nasal or honky quality associated with mid-range difficulties in a speaker.

If you are in a hi-fi showroom, have the salesman switch among a number of speakers while you are listening to interstation noise. You will soon be able to pick out the speakers with the nasal quality rather quickly. And with practice you should be able to detect this same quality on music and voice if the speaker has a particularly bad case of the honks.

It is well to remember that if a speaker is suffering either from bass boom or a honky mid-range, the effects will pervade *everything* coming through the speaker. For this reason, it is relatively easy to determine whether the fault lies with the speaker or with the program material.

There are numerous other aspects of speaker performance and misperformance that an experienced ear can evaluate, but their subtlety precludes accurate verbal description. For example, I have heard speakers that I can only describe as having a "gritty" quality, a kind of harshness in the treble range—but the word "gritty" does not quite describe it. The only way I can pinpoint this quality for another pair of ears is to put on a recording that I know will demonstrate it and say, "There, listen to what is happening in the upper register of the piano."

The crux of the difficulty in evaluating speakers is *knowing what to listen for*. I have had this fact demonstrated to me a number of times during meetings of the New York Audio Society. I once, for example, switched from one to another of four under-$100 speaker systems under test while playing a Frank Sinatra recording. I asked for a vote as to preference, and the opinion of the 15 people present was about equally divided among the four systems.

I played the record again and asked the listeners to note that three of the systems, to a greater or lesser degree, made Sinatra sound as though he were singing through his nose, while one of them did not. Immediately, everyone was able to hear the superiority of one of the speakers (the non-nasal one) over the other three. (One can safely assume that the voice of Frank Sinatra does *not* suffer from nasality.)

Power of suggestion? No. And it wasn't a matter of the audience's being unable to hear the difference; they simply did not know what to listen *for*. And that, in a nutshell, is the problem I hope this article has helped to solve. ***aX***

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Speakers

• Larry Klein's "How to Listen to Speakers" in the August issue is a gem. I think it will be most helpful to a great many of your readers. At the same time, it can do nothing but help manufacturers of good speakers.

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