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A FEW PET MYTHS

BY

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I have a few pet audio myths that continue to provoke and sometimes amuse me. I suppose that we all do. In the past 80 years, the audio business has evolved from one of science and engineering being applied to problem solving to one that now also includes market posturing. Some of this is perfectly natural, healthy and even funny. However, part of this evolution must also include those who are willing to discuss some of their pet issues, hopefully in a constructive way, and offer their opinions about some of the distortions or exaggerations that irk them the most. If I may indulge the readers of this column, here are a few of mine:

Myth number 1: Perfect sound.

Perfect sound does not exist. Natural sound is everywhere. We do not necessarily respond to everything we hear, indeed we completely ignore a great deal of the sound around us. But when we talk about sound in the sound business, we are not talking about the background din of noise in which we exist. We are talking about reproduced or amplified sound, typically speech, music or motion picture soundtracks. The high fidelity industry ostensibly grew out of the desire to recreate a concert experience. One should be able to sit down in their living room, turn on their stereo system, close their eyes and hear exactly what they would experience if they were in the hall where the music was originally performed and recorded.

This indeed remains the goal of many high fidelity enthusiasts. Unfortunately, we have to be honest and admit that such a goal is impossible to achieve. Paul Klipsch used to use the term "High Futility" to describe the industry that made him such an icon. Having said that, it is also quite obvious that reproduced sound can be very satisfying. It's just that there is often so much more unknown potential. Such satisfaction is relative to the quality of the sound system, not to mention the recording, and, frankly, many of those we encounter leave a lot to be desired.

People in and out of the audio business often say that sound quality is totally subjective. This myth says that the average person cannot tell the difference between one sound system or speaker system and another. Furthermore, they don't really care. This is not true. Indeed, I wonder how anyone could believe such things. Recall how quickly consumers adopted the vastly superior digital compact disk when it became available. They heard the difference. We all did. A trip to any Hi Fi store, now a home theatre store, proves that people continue to make such distinctions all the time. Whether or not their choices are truly informed, consumers select from a wide variety of loudspeakers every time they buy them. Clearly they are hearing differences and find such differences important in making their decisions.

While it is true that the listening skills of some are more discerning than others (those who have never been to a concert hall really won't know what one sounds like), it is equally true that a sound system's accuracy can be determined objectively. This can be done by talented listeners who compare the original sound to the reproduced sound. This, of course, must be done with music created with acoustic instruments. Beautiful as synthesized instruments can sound, they are by definition artificial creations as well as effects, that depend on good loudspeakers to be heard and enjoyed. So it only makes sense to judge speaker accuracy with live music and voice. This does not need to be as difficult as it may seem. As an example, we hear people speaking all the time. When we go to the movies and the theatre's sound system makes the actors all sound like they are speaking through a hose, we know that the sound is distorted or unnatural. The more real it sounds, the more accurate the loudspeaker.

It's worth noting that from airport public address systems to Broadway shows and even some (too many, I think) movie theatres, we all hear so much distorted sound emanating from speakers in our everyday lives that we have come to expect it. But our universal love of music shows how much every one of us is drawn to and appreciates something better.

Myth number 2: Speaker efficiency doesn't matter.

This one baffles me. I have heard people in the audio business -- people who should know better -- say that now that we have 1000, 2000 and 4000 watt amplifiers, the efficiency of the speaker systems we use no longer matters. There is a small grain of truth in this statement -- but!

Suppose that we have two loudspeakers, one small, one big. The small speaker has a one watt / one meter sensitivity of 89 dB. The bigger one has a sensitivity of 109 dB. This 20 dB difference is a factor of 100 in power. If all one cares about is achieving a specific sound pressure level at a given distance, then one simply needs to use 100 times the

amplifier power with the smaller less efficient speaker. But the physical size of the more efficient 109 dB speaker is also likely to be ten or twelve times larger than the smaller one. Those who say that this doesn't matter would have us believe the two speakers should sound exactly the same. Intuitively, however, we all know that a one cubic foot speaker system will not and cannot sound the same as another that is twelve times larger. We also know that we cannot fill a theatre with the sound from a three inch speaker no matter how large the cabinet or the amplifier. And yet the myth goes on.

Myth number 3: Speaker generated distortion doesn't matter.

One of the reasons that the larger and more efficient speaker can sound more accurate is that it moves more air. Another is that a larger speaker works less hard than a smaller one to move that air. In the example above, the larger loudspeaker works 100 times LESS hard to deliver a given sound level. Moving air requires the speaker's cone or diaphragm to move. It is, after all, essentially an air pump. The larger the piston area of the diaphragm, the less it will have to move to pump the same amount of air. This is obvious. But, when loudspeaker diaphragms move at all, they generate frequencies that are not present in the sound they are being asked to reproduce -- in other words, distortion. If the distortion frequencies are harmonically related to the program material, we call it harmonic distortion. If the frequencies are not harmonically related, we call it modulation distortion or intermodulation distortion. The names get used interchangeably.

Of these two types of distortion, harmonic distortion is less offensive because music is already so harmonically rich. However, this is not to say that harmonic distortion doesn't matter. Indeed, speaker and amplifier manufacturers have always touted their harmonic distortion figures. Rightly so. Everyone knows that the lower these numbers are, the better.

Modulation distortion is another matter altogether. Because these frequencies are not harmonically related to the sound, we can hear the effects of such distortion when present in remarkably small amounts. Some have called intermodulation distortion the mud factor as it obscures clarity. Amplifier manufacturers have been equally forthcoming about their intermodulation distortion levels. I have recently compared two amplifiers. One had six times less intermodulation distortion than the other. The difference in clarity when listening to the amplifier with lower distortion was stunning to all who participated in the comparison -- disposing of yet another audio myth that all power amplifiers sound the same.

Speaker systems can produce much higher modulation distortion levels. Figures of 10 percent or higher are common, perhaps 1200 times greater than the best amplifiers. This

is probably why speaker manufactures don't like to mention it in their specifications. Modulation distortion is directly linked to the velocity of the driver's diaphragm motion. In other words, the faster the driver has to move to get somewhere, the worse the distortion will be. More efficient speakers by definition need as much as 90 percent less driver motion to generate given sound levels. Hence, the greater a speaker's efficiency, the less its distortion will be and, all else being equal, the cleaner the sound.

Perhaps another way to look at it is to realize that by simply increasing a speaker's efficiency by 3 dB (or a factor of two), one reduces the distortion by half. Unfortunately, the reverse is also true and therein lies the myth.

Myth number 4: Loud trailers are good.

No one who has stepped into a movie theatre has escaped loud trailers. It became such a curse that the National Association of Theatre Owners designated a group called the Trailer Audio Standards Agreement to regulate and enforce standardized sound levels for trailers. There has been some genuine and welcome improvement, but trailers are still louder than features and continue to irritate, if not alienate, the most precious asset we have -- our customers.

The reason trailers as well as commercials are loud stems from the common myth among too many trailer producers and advertisers, that the louder their thing is the better it will sell. Yet everyone knows that we avoid loud commercials on television whenever possible. We either hit the mute button, change the channel or simply leave the room. Movie theatres have captive audiences. When subjected to loud trailers and advertisements, there is no escape. Unless the trailers are run at reduced fader settings, audiences will recoil at every commercial and trailer they are forced to sit through. Personally, I hate loud trailers, you hate them, everyone hates them. How do they help sell anything except the idea that we should have stayed home and watched a DVD? Indeed, I submit that the only thing that loud trailers ultimately sell are DVDs. The bottom line is that the best way to make pre-show commercials and movie trailers effective is to reduce their perceived sound levels to be equal to or even less than those of feature films. This will be far more likely to get and keep the attention of an audience.

Myth number 5: You can't have good sound coverage in theatres with stadium seating.

It has been noted by some that many theatres with stadium seating suffer from poor sound coverage. However, this has nothing to do with the fact that the floors have greater slope. Rather it is caused by certain design characteristics of the speaker systems used and their placement. To illustrate, suppose someone speaks from the front of two theatres of

identical length and width, but one has conventional seating and the other has stadium seating. If you have no trouble hearing the person when you are sitting anywhere in one house, you will find the same is true in the other.

Why then do some stadium theatres suffer from poor sound coverage? The answer is complex. It basically comes down to the industry's misplaced adoption of screen speakers with constant horizontal and vertical coverage angles at all of the middle and higher frequencies. To be fair, these systems do sound better than the older multi-cell high frequency horns they replaced. But these constant coverage horns were never designed for use behind movie screens. They were intended for use in large horn arrays used in sports arenas and other large venues. When properly used in such situations, these horns can perform brilliantly. However, when a loudspeaker is placed behind a movie screen its coverage pattern is changed by the screen. Even if one wanted the same coverage pattern for all frequencies, it could not achieved with constant coverage loudspeakers, due to the effects on coverage patterns caused by the screen.

When such horns appeared in theatres it became immediately apparent that, for best results, they would need to be placed high up behind the screen. This didn't raise any concerns as the high frequency horns had historically been installed on some tall woofer cabinets and were thus always pretty high above the floor. Even so, the people in the front rows tended to hear a treble balance that was too bright, while those in the rear either heard a fairly good balance or too little treble resulting in a dull sound. The truth is that the industry simply tolerated this and essentially forgot about the issue -- at least until stadium theatres came along.

Now that the floor's slope was so much greater and the back row was ten to fifteen feet higher than the front or more, the axis of the horn needed to be aimed higher -- more parallel to the ceiling. This pulled more middle frequencies away from the front areas and left people in those seats with a sound that was too bright, thin and irritating. Turning down the treble was the only immediate solution. But this really made the sound in the back too dull. The answer was to finally go after the coverage pattern distortion caused by the screen. While there have been several offerings by various manufacturers, the problem has not entirely gone away. From my experience, the coverage has been improved in the front areas, but not much, if any, in the rear. The problem can be dealt with if one considers all the factors. (See A MAJOR DEVELOPMENT IN MOTION PICTURE LOUDSPEAKERS: SOLVING THE "SCREEN PROBLEM" in the March, 1992 issue of BOXOFFICE. This article can also be downloaded at http://www.hps4000.com/pages/special/solving_the_screen_problem.pdf).

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