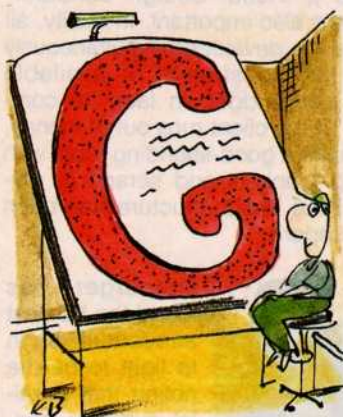


George L. Augspurger

Designs by Perception



George L. Augspurger has been involved in architectural acoustics for more than two decades, yet his small-room design work remains overshadowed by his many contributions to the evolution of loudspeaker design. He is perhaps best known as the author of the Patent Reviews published in the *Journal of the Acoustical Society of America (JASA)* and reprinted in the *Journal of the Audio*

Engineering Society (JAES). He maintains an active interest in scientific research and possesses a renowned penchant for tinkering.

After completing undergraduate studies at Arizona State University and earning a Master of Theater Arts at UCLA, Augspurger joined James B. Lansing Sound. In 1958, he served as JBL's technical service manager and later as manager of the newly formed Professional Products Division. As such, he was responsible for the liaison between the sales and engineering departments.

Back then, JBL was still a small company, and Augspurger was able to work directly with loudspeaker pioneers Bart Locanthi and Ed May. In the process of developing new professional loudspeaker systems, JBL had developed close relations with some of the major record labels—most notably, Capitol Records. He was named technical director of JBL in 1968. As the loudspeaker company grew strong in the professional sound market, Augspurger spent an increasing amount of time providing information and calculations to acoustical consulting firms. Also through JBL, he was given the chance to work directly with, and receive guidance from, Boner Associates of Texas—a famous old-line acoustical firm. When he left JBL in 1970, it seemed a natural move to form his own acoustical consulting firm.

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operated almost exclusively by Augspurger, Perception Inc. provides consultation for a wide spectrum of acoustical environments, ranging from the Hollywood Bowl to the screening room in TV producer Norman Lear's home. Among Augspurger's recent studio projects are the A & M mixdown room in Hollywood, the remodelling of Electric Lady's Studio A in New York, Take-One Studios in Tokyo, and Pegasus Studios in Tallahassee. Current projects include the remodelling of Studio A at Criteria Recording Studios in Miami, the remodelling of Studio 2 for Som Livre in Rio de Janeiro, a private practice room for Alex Van Halen, two new studios for Young and Rubicam Damaris in the Dominican Republic, a Hollywood Synclavier studio for New England Digital, and a surround sound R & D studio for Harman Electronics. Augspurger has also been the consultant for screening rooms at Geffen Records and MCEG Productions.



While attending the 1989 Audio Engineering Society Convention in New York, he was approached by a studio owner who wanted to know what his design philosophy was. "Well," replied Augspurger, "I think that a room should sound good when the designer is through with it." The man stood in thought for a moment and then said, "You know, that is a different approach." Augspurger readily admits his job is not entirely fair; many other acoustical designers also turn out rooms which sound good. As he is quick to point out, however, there are also many so-called experts in the field who believe either that if a room looks nice, then it is bound to sound nice or that if their favorite computer program tells them that a room should sound nice, then it sounds nice. To this he adds, "I can't imagine telling someone like [recording engineer/producer] Bruce Swedien that if he hears something he doesn't like, it means that he needs to get his ears recalibrated."

In Augspurger's opinion, good-sounding rooms are achieved only if the basic structure has been properly constructed. His environmental concerns are simple: Basic room geometry ("not a cube, not a half-cube, not a dome or a sphere"), basic construction techniques ("practical, functional considerations come first") and quiet mechanical system design ("noise isolation and the background levels come second"). Visual design considerations are also important. In reality, all of these are developed simultaneously within the constraints of available space and budget. In fact, he comments, "If the client runs out of money, I can make a good-sounding room with packing blankets and scraps of plywood if the basic structure has been done properly."



Augspurger has found the hardest acoustical myth to fight to be the notion that parallel surfaces generate standing waves. "Not so," says he. "The number of standing waves (or normal modes, or if you really want to sound stuffy, eigenmodes) is largely determined by the room volume. Making the room a pie wedge or an irregular polyhedron or any of the other shapes adopted by studio designers may shift the frequencies of resonance, but standing waves

are still there. Parallel reflective surfaces may produce flutter echo," he adds, "but that is easy to suppress with patches of surface treatment."

"Some of the best-sounding mixdown rooms and dubbing theaters share at least one acoustical feature in common with traditional concert halls: They are shaped like shoeboxes." Apart from movie theaters, Augspurger finds greater variations in consumer listening environments than among control rooms. "The only truly universal consumer audio environment, the Sony Walkman, is not a room at all."

Large, expensive home entertainment systems are generally placed in large, expensive rooms with adequate carpeting, furnishings, and draperies to be acoustically proper and aesthetically acceptable. The most common afflictions in home listening rooms are twofold—poor speaker placement and benign neglect.

It should be obvious that if you can't see a speaker, you aren't going to be able to hear it very well. The most singularly effective way to improve your home system is to experiment with speaker placement. Get those speakers off of the floor! Try them in different locations throughout the room—near the wall, away from the wall, near the corners, away from the corners, angled in, tilted, or even suspended! If it turns out there is no practical way the speakers can be located where they sound the best, at least you will have established some sense of what the trade-offs will be.

Also, if your system is over a year old, says Augspurger, you should unplug all connections. Clean and polish any connectors that are corroded or dirty; this goes for video as well as audio connectors and fuses. Then plug the system back together, and exercise all knobs and switches, including crossover controls, at least a dozen times. This should forestall any need for superfast, oxygen-free, atomically nonresonant speaker cable.

Augspurger likes to scatter reflective and absorptive treatment on all room boundaries. It is difficult enough to design a small room with neutral acoustics, but starting with a totally absorptive ceiling or rear wall just makes the job that much harder. "In this regard," he notes, "I am grateful for the efforts of live end/dead end (LEDE) designers like Chips Davis and Russ Berger in promoting the idea that the rear wall [of

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a studio control room] should be a scattering surface, not an acoustical black hole."



ugs purger has used diffusion modules from RPG Diffusor Systems in several studios but generally sticks to custom-fabricated modules based on a design

that combines high-frequency scattering and low-frequency absorption within the same structural unit. Both he and Tom Hidley were instrumental in starting the trend toward extensive "bass trapping"—actually, broadband absorption—in mixdown rooms. This was in contrast to the practices of earlier designers like Bill Putnam, who relied on a few diaphragm absorbers and lots of diffusion. "Our approach," comments Augspurger, "was questioned by Michael Rettinger, who pointed out that normal stud and drywall construction has a substantial amount of built-in low-frequency absorption. I don't think there is any absolute right or wrong to this debate, but my experience of the last five years or so points up two interesting observations. First, tight bass is not necessarily dry bass; some tight, punchy mixdown rooms have much longer decay times at low frequencies. Second, less absorption often works better than more." He has personally pulled yards and yards of fiberglass insulation out of some of his earlier rooms and found that the bass character grew progressively tighter and cleaner.



o studio construction techniques and acoustical treatments have any bearing on home and commercial design trends? The answer is an unequivocal yes.

First and foremost, it is necessary to separate the requirements of sound isolation from those of room acoustics. To isolate, or soundproof, a room means to employ materials and methods of construction in a way that no outside sounds enter the enclosed space (nor should any inside sounds

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travel to the outer environment). The perfect isolated room is airtight. To keep from suffocating, however, studio designers and an increasing number of private and commercial builders use long, rigid ventilation ducts lined with an acoustically absorptive material.

Sound can travel between two adjoining spaces by two methods—structureborne and airborne. The latter may seem obvious, since audible sound waves travel through air. The average room may be made fairly airtight by simply caulking any air gaps at the seams. But sound vibrations, especially lower frequency vibrations possessing longer wavelengths, are capable of travelling right through most solids. Logically, then, to contain low-frequency sounds, especially in wide-range music, the structural shell of the room must be massive.

Sound Transmission Class (STC) ratings are used by acoustical suppliers and designers in comparing the soundproofing characteristics of various materials. Standard office partitions, for example, weigh about 5 pounds per square foot. If they don't have any cracks or openings, they have an STC rating of approximately STC-45. If double 5/8-inch drywall, with a fiberglass insulating blanket in the cavity, is used, the weight increases to something close to 12 pounds per square foot. The rating will then be about STC-54.

In general, although sheer mass can in many instances provide decent soundproofing, there comes a point where the trade-offs no longer balance out. This is why many studio designers develop techniques such as that just

described, combining mass and bulk in a multi-layered fashion. For the soundproofing of existing rooms, one newly available product that looks quite promising is ProSPEC sheeting, available from the makers of Sonex acoustical foam (and sold by Illbruck).

Acoustical treatment has nothing to do with soundproofing a room. The purpose of interior treatments is to get well-balanced absorption and diffusion over the full range of audible frequencies. There are many commercially available products for a diverse range of acoustical applications. Some, such as Sonex, ASC's Tube Traps, and Room Tunes are designed as at least partially absorptive treatments, whereas the modules from RPG Diffusor Systems are designed to break up standing waves and promote a diffuse, non-directional, room sound. As stated, though, most home users should find standard room furnishings adequate for most acoustical purposes.

Augspurger's basic approach to installing monitor systems in studios is to include room space for the placement of speaker boxes in the basic design rather than building the boxes into the structure. When clients include subwoofers in their system, Augspurger often utilizes the lower studio window soffit, which, in his opinion, is perfect for this function. Even though the final installation is rigid and heavy, it is not a permanent part of the basic structure. If, as so often happens, the speakers need to be changed two or three years down the road, this may be accomplished with a minimum of fuss.



ome years ago, it was common practice for loud-speaker companies to package studio monitors in fancy boxes and sell them as top-of-the-line components on the

consumer market. This is, to some degree, still true of certain makers of large, direct-radiator systems and of at least one coaxial unit often used in monitoring and mixing down classical performances. There are, however, a wide range of esoteric speaker designs available to consumers that are rarely seen inside recording studios.

It has been more than 30 years since the first full-range electrostatic loud-

speaker was designed, yet it has remained a favorite with high-end audiophiles. Other bipolar radiators that have found widespread acceptance among high-end buyers include large ribbon loudspeakers, unbaffled arrays of conventional cone loudspeakers, and large planar diaphragms driven by zig-zag voice-coils. This last design seems to resurface in some new form every 10 years or so, but the original concept was developed in 1927.



Small home bookshelf speakers are quite similar, and often identical to, console-top near-field monitors. An offshoot is the miniature three-box ensemble that combines a single subwoofer module with a pair of tiny two-way speakers. "On two occasions," relates Augspurger, "I have seen such ensembles being auditioned in mixdown rooms, but none of them have been accepted as a reference standard."

Augspurger is a veteran designer who knows that styles can and do change. "Just 10 years ago," he says, "the goal of a good mixdown room was a sweet spot near the center of the console. Today the console is 15 feet wide, the producer is at the far left, the keyboard player is 10 feet behind the recording engineer, the synthesizer programmer is off in a corner somewhere, and they all expect to make judgements based on the sound they hear from the monitors. I think I have learned" he adds, "to rely more on flexibility and subtlety and less on brute-force acoustical approaches. Also, I have developed my own little bag of tricks and solutions to common problems." The previously mentioned custom diffusion modules he favors are but one of these many "tricks".

This designer's approach is determined by client need. He doesn't sell standard designs. His advice to home and commercial builders is to experiment and learn to adapt techniques used in studio design for private and commercial use. Augspurger has also done his share of garage studios. Although some have turned out very well, he feels that he is not really suited to help bargain-basement clients. Basically, he enjoys developing rooms for

professionals that make the most efficient use of the client's space, budget, and projected usage.

He rarely has to contend with strongly biased preconceptions. Once or twice clients have approached him with a design, asking about "what to put on the walls." Augspurger related one incident where he wound up politely telling the client that he didn't care what was put up on the walls, since the basic acoustical properties of the room had already been determined and it was too late for him to be of any real help.

He is not sure how far he is willing to compromise his own standards to keep a commission. "There have been," he relates, "perhaps a half-dozen opportunities—some with big names in the entertainment world—that I declined because I sensed that whatever I wanted to do would never get done." Fortunately, most of his clients are established artists, studio owners, or architects who are very practical, who can articulate what they want and don't want, and who are easy to work with.

Augspurger has a reputation for being fairly laid-back, but that is because he usually works with pros. Once or twice he has been involved in dire emergencies—at least they were emergencies in the producer's imagination. He even returned a client's check once ("a budget studio that was not my design"). "I told him," said Augspurger, "that since my services obviously did not fit his needs, he should, therefore, find someone else." Usually, the deadline arrives before his pa-

tience is exhausted rather than the other way around.

He is sometimes criticized for not being radical enough in his design work. Most of his techniques, however, make sense to other acoustical consultants because he does not try to rewrite the Laws of Physics. When Augspurger is responsible for developing a design, he tries to approach it the way an architect does, with lots of sketches and "what if" studies. "The biggest mistake made by clients," he cautions, "is to zero in on... a control room like A&M and Studio A here, and a big artists' lounge here... before they have even found a suitable space to build in."



Unlike architecturally trained studio designers, Augspurger likes to work with architects and interior designers. He has never come up with a room design so perfectly

conceptualized that it could not be improved on by suggestions from someone else. "Take-One Studios in Tokyo, for example," he comments, "were designed by architect Jack Edwards, who has established his own reputation in this area. I collaborated with Jack on the design and later, when it came time for checkout and acoustical tuning, with the Japanese acoustical consulting firm. This three-way international collaboration resulted in a highly functional studio complex suited to the specific needs of the owner."

Augspurger feels there is a great deal home listeners can do to improve their systems without reconstructing the room environment or resorting to expensive and sometimes ineffective commercial methods. Before buying, prospective homeowners and do-it-yourselfers should investigate all the options. There are also many ways in which private and commercial contractors can benefit from studio design techniques. Even college students, especially those forced to live in very noisy environments, can benefit from the adaptation of studio acoustics for non-studio use. Acoustics is by no means a voodoo science, inexplicable and unexplained. All it commonly takes, says Augspurger, is a little old-fashioned common sense. **A**

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