

Architectural Acoustics Illustrated

Michael Ermann

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The purpose of this book is to translate the concepts of architectural acoustics into the graphic language of architecture. Not only should architects and architecture students be served by the information in this book, but also engineers, physicists, musicians, builders, planners, real estate professionals and laypeople interested in acoustics and architecture.

The author conveys the importance of room shaping over motorized components, material selection over sound system design, noise-space-planning over engineered partitions, site selection over outdoor noise barriers — without omitting or diminishing the important content of motorized components, sound system design, engineered walls and outdoor noise barriers. The intent is to allow users to design rooms and spaces with sound in mind from the earliest stages of design, when decisions have the greatest impact on the quality of the acoustics. The book also points out where acoustic opportunities and pitfalls lie, addresses routine matters in architectural acoustics and helps the reader judge when outside professional consultation is required.

Chapter 1, “Basic Theory”, provides a detailed discussion of sound level, sound propagation and sound frequency. Sound level discussion includes source path receiver, measuring sound level, multiple sound sources and decibel addition. Sound propagation includes brief descriptions of sound propagation and directivity and provides excellent graphical examples of each. Sound frequency discussion includes frequency, octave bands, sound level perception and frequency, A-weighted decibels, and the special case of low-frequency sound. There is no chapter summary but a short reference section is included relating to the chapter topics.

Chapter 2, “Sound Absorption”, includes discussion, illustrations and practical tables for the topics of principles of absorptive and reflective surfaces, absorption coefficient, types of sound absorbers, room constant absorption, room average absorption, noise reduction coefficient and sound absorption data. This chapter does not include a summary, but includes a reference section to specific topics cited in the text. This chapter also includes a comprehensive set of illustrations and images detailing each area of discussion within the chapter.

Chapter 3, “Room Acoustics”, provides a detailed look at the complexities of room geometry and its relationship to sound design and engineering. Topics include room acoustic qualities, theater planning, acoustic defects, performance venues, design checklists and sound system design. Room acoustic qualities discussion includes impulse

response, reverberance, optimal reverberation time, clarity, variable acoustics, reverberation time calculation checklist, room shaping for speech and music, loudness, balconies, sightlines, warmth, concert hall types, spatial impression, intimacy and diffusion. Theater planning includes stage acoustics, orchestra pits, and what makes a good room for music and performance venue seats. Acoustic defects illustrate the effects of and potential solutions for echo, flutter echo, sound focusing, acoustical creep, excessive loudness and resonance. Performance venues discussion focuses on room acoustics history and provides suggestions for performance venues to visit. Design checklists are provided for rooms for un-amplified music performance, opera houses, multipurpose spaces, lecture halls, classrooms, worship spaces and conference rooms. Finally, sound system design is a short section that focuses on electronic sound reinforcement and provides a few examples on shapes and features that improve or reduce performance. This chapter concludes with a comprehensive list of references.

Chapter 4, “Noise Control”, includes comprehensive discussion and illustrations on the topics of sound isolation principles, measures of airborne sound isolation, background noise, door and window sound isolation, impact noise, community noise and mechanical system noise. Sound isolation principles focus on flanking and provide an apartment layout graphic quiz and a flanking graphic checklist and flanking noise checklist. Measures of sound isolation include transmission loss, sound transmission class (STC), techniques to measure STC, target STC ratings, noise reduction and ways to achieve higher acoustical privacy. Background noise includes noise criteria, speech intelligibility and noise, open-plan office acoustics, sound transmission loss data, noise reduction example problem, and air-structure-air flanking and provides an acoustic privacy checklist and an apartment layout quiz. Door and window sound isolation discusses door type and placement, and noise isolation and window characteristics. Impact noise discusses and illustrates impact noise isolation and how to measure the impact isolation class of material, provides an impact noise checklist, includes recommended floor-ceiling assemblies, and discusses resiliently mounted room surfaces. Community noise includes principles of community noise, building-in-building design, noise sources, community noise research, community noise example problems, outdoor barriers, wind turbine noise, an outdoor barrier checklist and a community noise checklist. Finally, mechanical system noise discusses the principles of mechanical system noise, ducted fan noise, ducted air turbulence noise, vibration isolation, plumbing noise and isolating pipes from structure. It also includes checklists for mechanical rooms, mechanical noise and plumbing noise. Again, the chapter concludes without a summary but provides a detailed reference section.

Architectural Acoustics Illustrated is a comprehensive book recommended for those new or relatively new to acoustics, but those in practice as architectural acousticians will also find it valuable as a reference for its considerable library of data, its review of recent research and its design checklists. The book provides an excellent source of very detailed graphical depictions, illustrations, tables, checklists and examples for each topic area and includes a corresponding straightforward and detailed explanation for each.

At various points throughout the book there is an AV Content Online icon that invites the reader to explore further details on the subject matter by directing them to the Architectural Acoustics Illustrated Companion Site Content at www.wiley.com/go/architecturalacoustics. This site

contains 19 separate videos corresponding to specific sections within the text and provides an excellent visual and auditory dissection and enhancement of those sections. While the illustrations, graphics and tables in the book are in and of themselves very capable of supporting the relevant concepts outlined in the text, the videos add an extra touch of clarity in a way that only sound and motion can provide.

Chuck H. Perala
Scientific and Technical Advisor
Aviation and Aerospace Industry
Washington, D.C.
cperala@yahoo.com