JOHN EARGLE

TURNING BACK THE PAGES

HARRY F. OLSON

When I was learning the professional recording business at RCA Records during the '60s, Harry F. Olson was still a commanding presence at the RCA Sarnoff Research Center in Princeton, N.J. Most of us referred to that organization simply as RCA Labs, but in a more familiar way we considered it first and foremost to be "Harry's lab."

Olson's career was unlike any other in audio. It was all spent with RCA, and much of his landmark work was done so many years ago that later references often overlook it. It is said that the original Acoustic Research patent on the acoustic suspension loudspeaker was invalidated by a reference from one of his books. I know firsthand of an Olson-devised playback-only noise-reduction system that is conceptually the father of some of today's digital techniques for cleaning up old recordings.

Most of the applied research work of Olson and his group was product-oriented and provided the basis for what the various manufacturing divisions of RCA produced. Other studies of his are in internal company reports, and these may never see the light of day. Fortunately for us, Olson the teacher and explicator maintained a busy writing schedule. He produced a number of books that are as sought after today as when they were first published.

His major work, *Acoustical Engineering*, was originally published in 1957 by the D. Van Nostrand Company. I am not sure when (or why) the book went out of print, but for the last couple of decades it has been virtually impossible to find. (I'm an avid collector of books on audio, but it has only been in the last two years that I received a copy of *Acoustical Engineering*, courtesy of two good friends in the industry.) Happily, the book is now available through Professional Audio Journals, Inc. (P.O. Box 31718, Philadelphia, Pa. 19147; $53.95 including shipping and handling) in a hardbound format with a rugged binding worthy of its 718 pages. Jesse Klapholz is the man responsible for this, and he deserves our compliments for a job well done.

Before I get into a description of *Acoustical Engineering*, I would like to explain why I think it may be important for many readers of *Audio* to have a copy. Principally, Olson covers his subject matter on several levels at the same time, emphasizing the underlying physics along with clear, functional diagrams that are models of their kind.

As an example, consider Olson's description of a capacitor microphone. First, there is a description of the device, complete with pertinent physical equations governing its performance. For many readers, this description can stand alone, conveying as it does the basic operation. The figures accompanying the description include a detailed sectional view of the microphone, an equivalent mechanical circuit keyed to the elements shown in the sectional view, the pertinent electrical circuit, and a graph of frequency response that shows the mike's typical behavior. Olson certainly knew the value of concise but detailed graphics.

Thus, in a single to-the-point exposition, Olson satisfies all readers. The engineer walks away with a view of how the microphone is designed (complete with differential equations), and the non-mathematical novice gains an intuitive view of how the microphone works. The same approach is used in Olson's description of complete systems, such as loudspeakers, recorders, reproducing systems, and measurement setups.

The book begins with a short mathematical discussion of how sound is propagated, which leads directly to a detailed discussion of basic radiating systems. Included are point sources, line and circular sources, acoustic lenses, tapered arrays, and the like. The fundamentals are thus set down for how loudspeakers and microphones should be "shaped" if they are to do their respective jobs well. If you have ever wondered how and why the B & W 801 loudspeaker took on its bevelled midrange enclosure shape, you'll find the answer in Olson (page 23). This particular geometry ensures very smooth on-axis frequency response. If you read this section, you will find out why certain other shapes are generally avoided. It is safe to say that most of today's loudspeaker baffle geometry is a direct outgrowth of Olson's pioneering work in this area.

Mechanical vibrating systems are then discussed in their role as foundations of all acoustical devices. Following this is an explanation of dynamic analogies. This is the discipline Olson uses to set up the equivalent acoustical and mechanical circuits which he uses throughout his writing. Next is a lengthy chapter devoted to acoustical elements—horns, various slits, tubes, and juxtaposed media—and how they influence sound travelling through them. By this point, Olson has provided the foundation for the understanding of practical real-world devices.

We then move on to a favorite subject, the direct radiator (cone) loudspeaker. Here we immediately get into discussions of particular designs in which we can see the effects of changes in parameters on output, dis-

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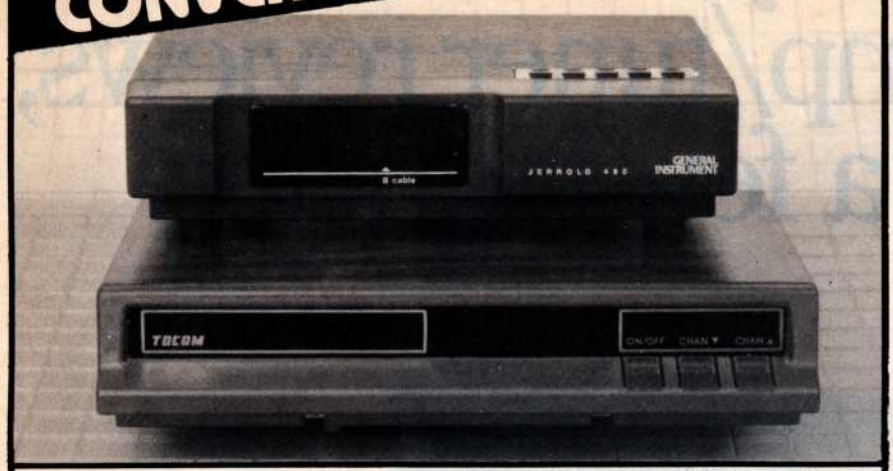

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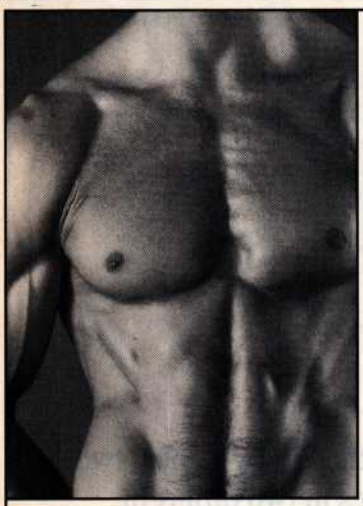

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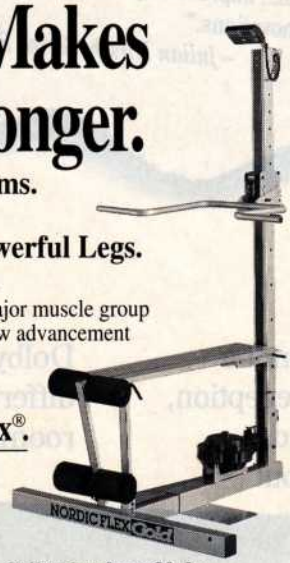

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tortion, and directivity. Even the most casual *Audio* reader will find items of interest here.

The next major section is devoted to horn loudspeakers, which are given the same depth and detail as cone devices. Though only a few of you may have horn loudspeakers in your homes, they are a mainstay in movie theaters and in speech and music reinforcement.

Perhaps Olson's crowning achievement in acoustical engineering was his work in microphones. Although not commonly encountered today, his basic ribbon microphone provided the broadcast and recording industries with their fundamental tool during the 1930s and 1940s. The subsequent popularity of capacitor and low-cost dynamic microphones put the ribbon designs in the background, but this in no way diminishes Olson's overall contribution. His work in higher order directional microphones is fundamental. The chapter on microphones covers all designs, including a few exotic items such as the electronic and "hot wire" mikes.

A chapter discussing various other transducers, including phonograph cutter heads and pickups, telephones, magnetic recorders, and basic noise-cancelling systems is next. Following chapters deal with such diverse subjects as measurements, architectural acoustics, psychoacoustics, and complete sound reproducing systems. Of special importance here is Olson's fundamental work in relating psychoacoustics to the parameters of playback systems. The author's listening tests regarding noise, distortion, and bandwidth in home music systems were probably the first of their kind and established consumer expectations in his day.

Acoustical Engineering's final chapters cover general information systems, underwater sound, and ultrasonics; as such, they may be of relatively little interest to the typical *Audio* reader. For engineers and physicists, I must state that the book expresses units basically in the cgs (centimeter-gram-second) system and not in the SI, or metric, system we use today. Conversions are simple enough to make, so this should not be a problem. Happy reading!

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