Book Reviews

Electroacoustics. The analysis of transduction, and its historical background, Frederick V. Hunt. Wiley, New York; Chapman & Hall, London, 1954. viii + 260 pp. Illus. $6.

This fifth number of the Harvard Monographs in Applied Science combines an interesting, well-documented history of the evolution of electroacoustics with the theory of electroacoustic transduction as extended by the author and his coworkers at the Harvard Underwater Sound Laboratory from 1941 to 1946. Special attention is given to the author's recently modified formulation of the electromagnetic relationships, which permits a unified analytic and equivalent circuit presentation of all transducer types. The power and utility of this new approach are illustrated by applying it to the analysis of several transducer types.

The 91-page introductory chapter covers electroacoustic transduction and its relation to the electric communication art very thoroughly but in a lively narrative style. An interesting account of the beginnings of sonar is included. The author draws heavily on and makes a strong case for the use of patent literature as source material. He points out that many discoveries, inventions, and developments were first reported and others exclusively reported in patents. Although patents are primarily concerned with technologic improvements, the earlier patents in any art not infrequently contain disclosures of importance to science. Of interest to applied physicists is the case of the application of negative feedback by Maxfield and Harrison around the electromechanical transduction link as a method of increasing electrically the damping in a mechanical system. This was published in a 1925 patent—long before the broader principles of negative feedback were enunciated by others.

Some general aspects of electromechanical coupling are treated in a short chapter with that title. The third chapter is largely devoted to the antireciprocal aspects of the coupling coefficient in electromechanical transducers and an introduction to the author's space operator which allows all transducer types to be represented by the same form of equivalent circuit. The utility of this approach is illustrated in a chapter on "Electric-impedance analysis of transducer performance."

The last three chapters are devoted to the application of the new approach to the analysis of moving conductor, electrostatic, and moving-armature transducers. The treatment of electrostatic transducers is highlighted by the author's reported discovery that the force-displacement relationship in a push-pull unit approaches a linear one as the resistance of the bias supply circuit approaches infinity. The chapter on "Moving armature (magnetic) transducer systems" gives special attention to the fact that the coupling coefficient must be treated as a complex quantity. In most instances the usual approximation involving the assumption that the coefficient is a positive real is very unsatisfactory.

The author has gone to unusual lengths to ferret out and verify original sources. This is a conspicuous and laudable exception to the recent trend toward publishing books and papers of a survey nature with inaccurate and inadequate bibliographies which lead the reader to impute the historical material to the author or to an incorrect source. The detailed history, new historical material and mathematical treatment should interest many workers in the communication, audio, acoustic, and transducer fields.

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A Million Random Digits with 100,000 Normal Deviates. The Rand Corporation. Free Press, Glencoe, Ill., 1955. xxv + 200 pp. $10.

The publication of these tables should meet at least two requirements that one frequently encounters in the scientific field: the need for an extensive set of random numbers, and the need for some assurance that the numbers used are random. Up to this time, a person has felt that he could at best satisfy only one of these requirements from existing tables.

The publication is in itself a very fine technical job. The size of the type used and the arrangement of the columns and digits should facilitate their use. The addition of 100,000 random normal deviates should prove particularly useful to individuals working in the field of statistics and needing random samples from a normal population to study empirically the distribution of some statistic.

The introduction not only provides interesting information on the method used to generate the random numbers but also describes the numerous tests made of the final results in testing for randomness. For those who are unfamiliar with the problem, I should mention that, although it sounds easy, one of the hardest tasks in this world is to evolve a random process. The satisfactory manner in which the Rand tables meet the numerous tests that they applied to the tables speaks well regarding their scientific worth. Some attention is given in the introduction to the problem of how to use the tables, especially those of the normal deviates. Users of the tables should note these sections carefully, since care is necessary in how one actually uses tables of this type.

As a final comment, one cannot help but be amused by the problem of proofreading the final tables to see whether the printing and reproduction mechanism has introduced "random" errors.

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Endothelium. Its development, morphology, function and pathology. Rudolf Altschul. Macmillan, New York, 1954. xi + 157 pp. Illus. $3.50.

This monograph developed as an outgrowth of the author's interest in arteriosclerosis, and it brings together much of the widely scattered literature on endothelium. This important tissue is discussed under the following chapter headings: "Historical notes and nomenclature," "Morphology," "Development," "Tissue culture," "Metaplasia," "Function," "Pathology," "Summary and conclusions." The chapter on the pathology of endothelium includes a discussion of tumors, inflammation, shock, hypertension, renal diseases, radiation effects, blood clotting, changes or abolition of circulation and arteriosclerosis. The book is well documented, although occasional references were advisedly omitted in order to keep the bibliography within 400 titles.

In my opinion, additional experimental data should have been presented in support of some of the statements quoted or conclusions drawn. Although these data would have lengthened the monograph, they would have made the text more valuable. For example, without additional supporting data, I would be unwilling to agree with the conclusions