

# Book Reviews

## An Engineering Profession in Retrospect

**Engineers and Electrons.** A Century of Electrical Progress. JOHN D. RYDER and DONALD G. FINK. IEEE Press (Institute of Electrical and Electronics Engineers), New York, 1984. xx, 251 pp., illus. \$29.95.

**The Making of a Profession.** A Century of Electrical Engineering in America. A. MICHAEL McMAHON. IEEE Press (Institute of Electrical and Electronics Engineers), New York, 1985. xvi, 304 pp., illus. \$39.95.

To commemorate its 100th anniversary in 1984, the Institute of Electrical and Electronics Engineers (IEEE) has given us a wonderful birthday present: a pair of good histories. *Engineers and Electrons*, an illustrated popular account, is designed to give electrical engineers an exciting introduction to the evolution of their profession. *The Making of a Profession* is a scholarly volume to satisfy the need for a careful, documented analysis of how the IEEE and its predecessors, the American Institute of Electrical Engineers (AIEE) and the Institute of Radio Engineers (IRE), fostered the development of electrical engineering in America. Commissioning two books was wise. Both objectives are important; neither book meets those of the other.

*Engineers and Electrons* should become a regular fixture in the anterooms of electrical engineering departments and corporate offices, as well as on the shelves of IEEE members. It was carefully crafted for productive browsing. Its dozen chapters develop a coherent story, but the wealth of photographs, drawings, diagrams, and short sections of narrative can be savored in bits without compromise. Even the casual reader will begin to sense the richness of the history of electrical engineering.

Technology is the hero of the book. The authors describe milestones from the experiments of Benjamin Franklin to television, transistors, and computers. In their discussions, however, they carefully include the historical context of the developments and the people who made them as well as their technical essence. To the core technical sections are added others on the formation of IEEE's prede-

cessors and their merger in 1963. Also mentioned are reforms in engineering education, work on technical standards, and the evolution of technical publications. Historians who like to denigrate popular treatments will find little ammunition here. Within their consciously set limits, the authors have written an outstanding illustrated history of their profession that is ideally suited to its busy audience.

What does the scholarly account add? Analytic depth. McMahon focuses on explaining the central aspects of electrical engineering: the character of professional careers, educational philosophy, professional values, and social awareness. "This book concentrates," he says, "on the object that has historically concerned the engineering societies themselves: the state of the profession" (p. xiii).

Part of this story is standard organizational history. Naturally we get the details of the formation of the AIEE in 1884 and the IRE in 1912 and their ultimate merger into the IEEE. McMahon also includes coverage of the periodic fights over membership structure and a com-

parison of the AIEE's ethical code of 1912 with the IEEE's written in 1973.

Yet McMahon rightly understood that the essence of his subject lay less in the history of the IEEE itself than in its effect on the careers of its members. How to analyze that part of the story? A collective biography of an organization whose membership already numbered 7000 in 1910 and is over a quarter of a million today was impossible. The base of McMahon's answer is similar to the story in *Engineers and Electrons*: a narrative of major developments. The focus now, however, is less on electrical technology than on the people who created it and the institutions they built. Interwoven in this general context is detailed analysis of the careers of a few pivotal figures whose activities markedly shaped the character of the profession: Franklin Pope, Charles Steinmetz, Samuel Insull, Dugald Jackson, David Sarnoff, and Frederick Terman. McMahon's approach, unusual in the sterile world of organizational history, works well. His characters come alive as he tracks central issues in the shaping of the profession.

Yet despite my admiration for this book, I must confess I was somewhat disappointed. An obvious question to raise, a classical historical dilemma, goes largely unexamined: How and how much does the history of the elite of the profession tell us about the value of the IEEE in the careers of the thousands of other members? Although this is impossible to answer objectively, McMahon should have at least given us his views to balance his concentration on the elite.



"An IRE banquet at Luchow's Restaurant in New York, 1915; a banquet during the early years gathered a significant portion of the few hundred members of the society." [From *The Making of a Profession*; IEEE Center for the History of Electrical Engineering]

Another serious omission is in the historical context. McMahon tells the story of the electrical engineers without reference to the professionalization of other branches of engineering. Yet what was happening elsewhere definitely affected his leading characters as they established institutions, values, and educational curricula. Third, McMahon says little about the role of the IEEE and its predecessors as arbiters of accepted knowledge in the profession. Yet fostering knowledge was their principal purpose. Surely understanding how they accomplished it is crucial to understanding the character of electrical engineering. Finally, I may be old-fashioned, but I still expect a few standard collections of information in a book like this: a short chronology, a chart of membership growth, publication statistics, a list of key officers, selected organizational diagrams, and the like. McMahon gives us only narrative.

Criticisms of what is missing are always weaker than criticisms of what is included. What is there is generally good. McMahon's book, which has no predecessor in this field, is a major contribution to the history of technology and will become a standard reference. And, together with *Engineers and Electrons*, it has its own place in the history of the IEEE. By commissioning these two excellent books, continuing sponsorship of the Center for the History of Electrical Engineering in New York, and fellowships for historical research, the IEEE

has passed another significant milestone in its maturity as a professional society: taking responsibility not only for the future of electrical engineering but also for its past.

DAVID K. ALLISON

*David Taylor Naval Ship R&D Center,  
Bethesda, Maryland 20084*

## Science Surveyed

**Science and Scientific Researchers in Modern Society.** JOHN P. DICKINSON. Unesco, Paris, 1984. 254 pp. Paper, 90 F.

**An Introduction to Science Studies.** The Philosophical and Social Aspects of Science and Technology. JOHN ZIMAN. Cambridge University Press, New York, 1985. xii, 203 pp., illus. \$22.95.

The British expression "science studies" has not become popular in the United States to characterize academic programs or a field of study. Here, we cover much the same ground that phrase encompasses in programs devoted to "science, technology, and society" or in programs and conferences that look broadly at the history, philosophy, and sociology of science and technology. In addition to such academic enterprises, it is possible for an individual—often a scientist—to approach the subject through a reflective personal survey.

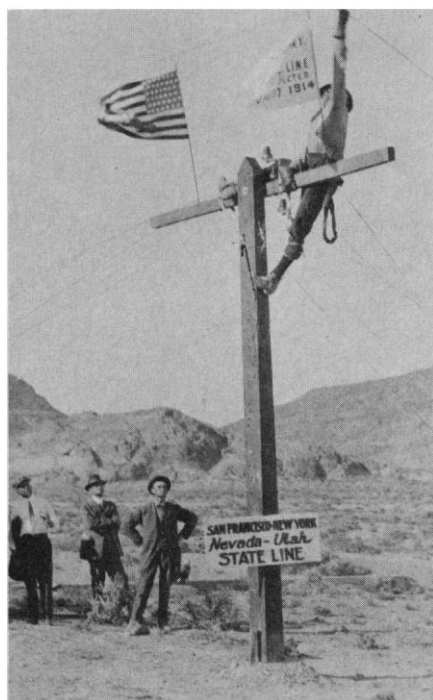
Dickinson's *Science and Scientific Researchers in Modern Society*, commissioned by Unesco, takes that approach. The book makes modest claims for itself. "For a writer to set out to cover, on his own and in a single volume, the whole range of facts and misconceptions, adventures and difficulties to be encountered in the world of scientific research, as well as its network of relations with other intellectual and political activities in modern society, would be foolhardy and presumptuous indeed," Dickinson writes in his foreword. What Dickinson says he is going to do instead is "to offer to the general reader, and more particularly to the young person who may be on the brink of a career in scientific research, a picture of the wider aims of that research, of the scientific researcher's life, and of his interaction with society." Dickinson presents his account under six headings, beginning with "Scientific research in contemporary perspective." The other areas dealt with are distinguishing features of scientific research, scientific careers, professionalism, the scientist as citizen, and the future. The author discusses such issues as repeatability and generalization,

quantification and standardization, continuity and anti-authoritarianism, norms and responsibilities, and academic freedom. The chapter on careers is somewhat pessimistic. There is an interesting discussion of codes of ethics, and two appendixes include examples of such codes and lists of organizations and conferences concerned with responsibilities of the scientific profession. An annotated bibliographical index and a fairly extensive list of suggested readings round out this useful but restrained volume.

In *Introduction to Science Studies* Ziman undertakes the task eschewed by Dickinson. His success in carrying out the endeavor is at least in part attributable to the fact that he really does not attempt it alone; his is a masterly summary of the whole range of the science studies literature, from philosophy of science to sociology of science to science and technology policy studies. At the same time, it is a personal summary, depending explicitly on Ziman's earlier formulations, especially in *Public Knowledge* (1967) and *Reliable Knowledge* (1979). Ziman is also strongly influenced by Jerome Ravetz's *Scientific Knowledge and Its Social Problems* (1971).

Ziman makes a deliberate choice, at the outset, to begin his survey with the more traditional views of philosophers and internalist historians and sociologists of science concerning issues of epistemology, communication, recognition, and the like. That is, he defers his discussion of the technopolitical dimension of "collectivized science." Nevertheless, he does organize his summaries of other people's views around his own collective-science-oriented model of "public knowledge." In making this choice, he admits that it might be more realistic to work from the outside in, so to speak. However, he recognizes that many scientists and engineers still cling to the old model of "reliable knowledge" as the ideal of "academic science."

Ziman warms to his task about two-thirds of the way through the volume, in a chapter headed "Collectivized science." There he has this to say: "The conventional description of the scientific community as a republic or oligarchy of autonomous scientists, exchanging communications for personal recognition, is not yet out of date, but it must be radically modified to take full account of the structures that have grown up to coordinate and *manage* scientific work." The modifications, he says, affect not only the internal but also the external sociology of science. "Science," he writes,



"The completion of the transcontinental telephone line in 1914." [From *Electrons and Engineers*; AT&T]