servations are to be interpreted. He discusses the observed variations with barometer, with altitude and with latitude, the zenith angle effects, and the details of the meson and nucleon components of the showers. He also treats the time variations, the effects of galactic fields, and the interpretation in terms of the primary energy spectrum. In short, he gives a complete review and summary of both the theory and the experiments on extensive showers. Chapter II, by H. S. Bridge, similarly gives a good review of the Experiments on Charged K Mesons and Hyperons. He discusses tau mesons, S events and the various V particles, reviewing the evidence and discussing such experimental data as the nuclear absorption of these particles.

In Chapter III, R. W. Thompson writes about the Decay Processes of Heavy Unstable Neutral Particles. He discusses in detail the nature, identification, and experimental properties of the various neutral particles, and recapitulates the data on each. Finally he discusses the production in the laboratory of the various neutral hyperons. Chapter IV is written by G. Puppi, and treats the Energy Balance of the Cosmic Radiation. In this section he goes at some length into the problem of the three main components, the mesonic component, the electron-photon component, and the nucleonic component. He reviews the experiments and the interpretations thereof. He lists for the various components, at 50° latitude, approximately the following fractions: energy dissipated in charged pion production about 41%, in neutral pion production 26%, and the remainder dissipated by the nucleonic component. He finds the interesting result that about 24% of the incoming energy goes into neutrinos, and that roughly 4% reaches sea level.

The book is undoubtedly a useful one to students of the subject. Each chapter is authoritatively written by one of the people well known to be expert in the particular branch treated, and each chapter has an extensive bibliography for those desiring to pursue any point further. It is most useful to have such competent summaries available. The book makes excellent collateral reading for graduate students in courses on the subject. It is well written and authoritative, and should be in every cosmic-ray man's library.

Vacuum-Tube Circuits and Transistors. By Lawrence Baker Arguimbau. Contributions by Richard Brooks Adler. 646 pp. John Wiley & Sons, Inc., New York, 1956. $10.25. *Reviewed by J. G. Castle, Jr., Westinghouse Research Laboratories.*

Arguimbau and Adler have composed an interesting presentation of much of the long, factual subject of circuit engineering. The basic and some specialized parts of the subject are knit together around a central application by a thread of humor. The central application is that of radio transmission of information and the central problem is, of course, nonlinear circuit elements.

The approach in most parts involves brief, cogent discussions and probably too little mathematics. However, the attempt is to establish a basic understanding and the discussions appear to be well designed for this. The early audio sections are followed by considerable emphasis on oscillators, amplitude modulation, frequency modulation, and television. Rounding out the ever present applications aspect, the final pages touch on transit time of and noise generation by electron motion.

The transistor treatment is to be commended on at least two features—the clear discussion of conduction in semiconductors (as accurate as quantum concepts without mathematical support allow) and the arrangement of transistor and vacuum-tube sections together under the several circuit types.

The author may be correct in suggesting that this book will be looked back at "with amusement" in twenty years. However by then the book's explanations will have contributed well to that difficult task—the transmission of technical concepts and of some understanding of them.

Atoms and Energy. By H. S. W. Massey. 174 pp. Philosophical Library, Inc., New York, 1956. $4.75. *Reviewed by Norman H. Nachtrieb, Institute for the Study of Metals.*

Written in 1953, this little volume was not published until three years later. One is inclined to wonder at the delay, since the useful life of a "popular science" book is usually brief. This may be the fate of Professor Massey's *Atoms and Energy;* well written, it nevertheless has a topical flavor. The recent discoveries of the anti-proton and the neutrino have already dated it, thanks particularly to the considerable speculation it devotes to the existence of the latter.

It is addressed to the layman, for whom it attempts to develop the basic concepts of the equivalence of mass and energy, nuclear forces, and elementary particles without resort to mathematics. In this it is remarkably successful.

An ambitious effort, it ranges over a much wider subject than its title implies. From a very excellent description of fundamental nuclear particles and nuclear binding energies it proceeds in logical fashion to a discussion of the energy release accompanying nuclear fission and fusion. The principles underlying slow and fast neutron piles are well described.

The fifth of its six chapters departs from the otherwise fundamental character of the book; its miscellany of topics includes the industrial, therapeutic, and diagnostic uses of radioisotopes, the commercial power potentialities of nuclear energy, and efforts at international control of nuclear weapons. A tendency to border on the political and moral aspects of nuclear military weapons seems out of context, however understandable and urgent. The bewildering state of high-energy physics with its plethora of mesons is the substance of the last chapter.