

*Expanding the Frontiers
of Space Technology in*

SOLID STATE ELECTRONICS

■ At Lockheed Missiles and Space Division, solid state electronics encompasses a wide range of activities. Solid state physics concerns itself with theoretical and experimental work in the areas of thermoelectric and radiant energy conversion; paramagnetic resonance studies in solids, ferromagnetics and ferroelectrics; transport processes in solids; electroluminescent and other phosphors; radiation effects in semiconductors; and other related topics.

In solid state devices, the basic work applies to the evaluation of environmental effects, and the study of new components based on ferrites, ferroelectrics, thin films, semiconductors, intermetallic compounds, and other solid state materials.

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the treatment to those areas most thoroughly understood and by occasionally using phenomenological rather than mathematical arguments, the book gives a good introduction to the field of semiconductors. As pointed out in the first paragraph the reader should not expect to find, in a book as small as this one, a detailed treatise on quantum mechanics and statistical mechanics. The same limitation applies to some of the other subjects which range from general properties of solids to photoconductors and transistors. To top it all off, the reader is also given a taste of the techniques used in the preparation of semiconductor crystals, the fabrication of transistors, and the use of thermoelectric devices.

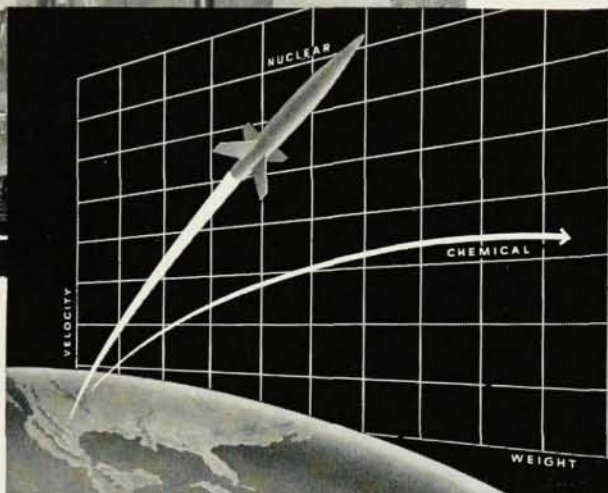
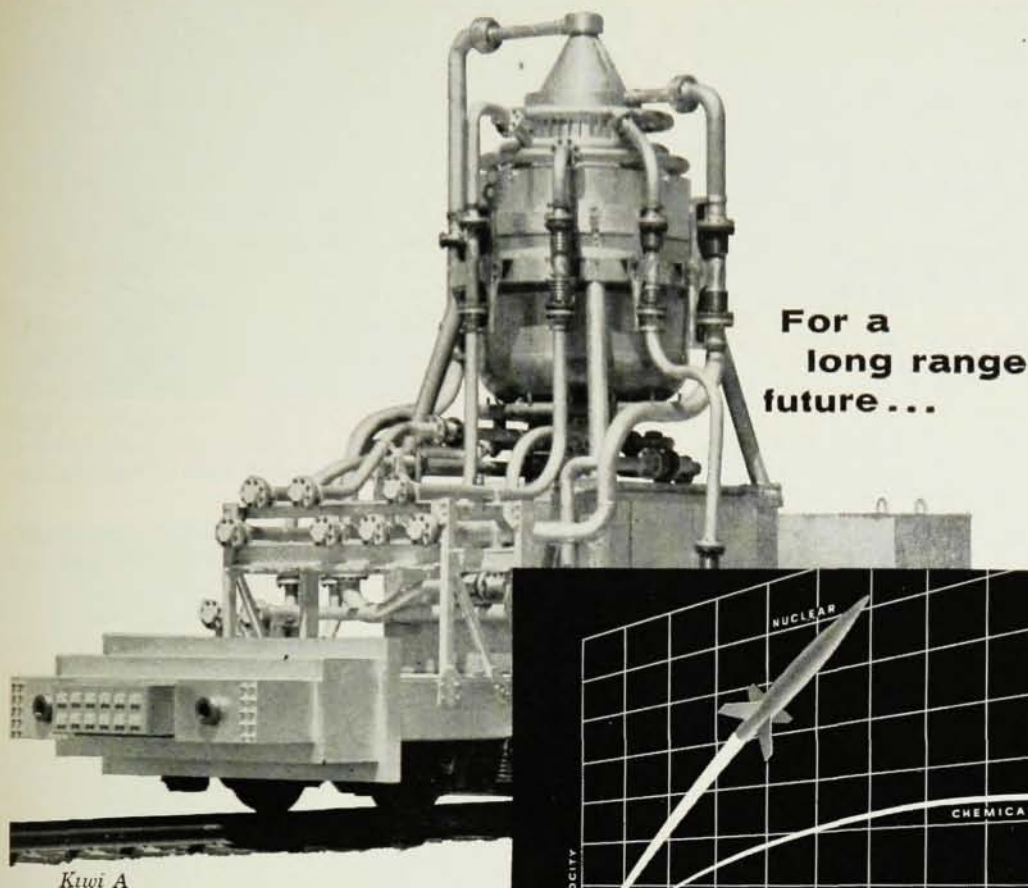
The value of an introductory text such as this one would be greatly enhanced by providing the reader with suitable references and bibliographies. Unfortunately, the authors refer to the works of various investigators by name without quoting a single reference. This reviewer considers the absence of reference material one of the major drawbacks of this brief but stimulating booklet.

Dictionary of Physics. Compiled and edited by H. J. Gray. 544 pp. Longmans, Green & Co., Inc., New York, 1958. \$16.50. Reviewed by Sanborn C. Brown, Massachusetts Institute of Technology.

WITHIN the last two years two dictionaries of physics have appeared, and it is difficult to review one without comparing it to the other. The earlier of the two, the *International Dictionary of Physics and Electronics* edited by Walter C. Michels, was published by Van Nostrand in 1956. These two dictionaries are somewhat different in emphasis and function, and as one considers the purchase of dictionaries, one should weigh the strengths and weaknesses of both.

If you need a dictionary which specializes in the modern emphasis on physics and defines terms of current importance, the Gray dictionary is not the one to buy. Gray specializes in more classical physics and definitions of terms and concepts which are of less interest to the modern physicist. By the same token, these terms may not be familiar to the scientist of today, and therefore may be more important to him for reference use. Typical of the approaches of these two dictionaries is the largest illustration to be found in each. In Gray's *Dictionary of Physics* the largest illustration is that of a Dolezalek quadrant electrometer, whereas in Michels' dictionary the largest illustration shows a block diagram of a television system. For modern definitions of current terms, one would need Michels, since in Gray striations are patterns in a Kundt's tube, magnetrons are of the Hull type with no mention of multicavity magnetrons, fusion is a thermal effect with no mention of nuclear fusion, and Čerenkov radiation is not mentioned at all.

A really useful feature of Gray's dictionary, however, lies in the inclusion of bibliographies so that the brief descriptions of phenomena can be followed up.



NUCLEAR ROCKET PROPULSION

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He also includes careful biographical sketches of famous physicists.

In addition to the usual definitional paragraphs, Gray has interspersed fairly lengthy articles on particular subjects. Their primary emphasis is acoustical in nature and of a very classical subject matter. They cover subjects such as electrophonic instruments, Helmholtz resonators, Kundt's tubes, and manometric flames, as well as other classical physical problems such as relative humidity and photometry. Fairly typical of the emphasis is the fact that the article on the cyclotron is one-third as long as the article on the mercurial barometer, and although the Geiger point counter is described no mention is made of the Geiger-Müller counter. The primary reference under conduction in gases is to J. J. and G. P. Thomson's *Conduction of Electricity Through Gases* rather than to anything written in the past twenty-five years.

If you need a dictionary which deals in the modern idiom, Michels' dictionary is the one to add to your library. On the other hand, if you are familiar with the modern idiom and need rather a semi-historical reference for physical terms in particular vogue from 1900 to 1935, Gray's dictionary will serve a very useful function not only in giving definitions but in supplying references to original sources which will allow you to expand on the brief descriptions in the dictionary itself.

Dynamics of Flight: Stability and Control. By Bernard Etkin. 519 pp. John Wiley & Sons, Inc., New York, 1959. \$15.00. Reviewed by T. Teichmann, Lockheed Missiles and Space Division.

THE problems of modern high-speed flight have proved by far to transcend the classical disciplines of aerodynamics, structures, and propulsion. The comparatively simple considerations involving stability derivatives, which of course still play a crucial role, have not in themselves been enough to enable modern high-speed aircraft to be effectively maneuvered and navigated. The high speed at which maneuvers must be executed has necessitated the introduction of tight or at least highly coordinated control systems and the presence of these has in turn strongly emphasized the role played by control system engineers (mainly electrical) with their historic familiarity with frequency transform methods of control systems analysis and synthesis. There has indeed sometimes been an unfortunate tendency for such control system formalists to take over the design of the entire flying system. Despite its important role, the control of flight is not the only factor in the design of a flying vehicle and over-emphasis on the highly formal methods of control theory has often tended to ignore the underlying physical phenomena which are after all the basis for the entire operation—in other words, the system is more than simply a transfer function.

The present work essays a comprehensive approach to the problems of flight control including the aero-