

ignore the usual division of acoustics into sound and ultrasound, which is of no significance in this technology. The first three chapters of the book are concerned with establishing in some detail the fundamentals of vibration and sound, and of radiation. Here we find an introduction to such concepts as acoustic analogy, acoustic impedance, reflexion and transmission, energy density and intensity, radiation pressure, the decibel scale and diffraction. In Chapters 4 and 5 the principles and design of piezoelectric and magnetostrictive transducers are considered. Chapter 5 is particularly useful in that it summarizes in some detail much that has not been readily available.

The remainder of the book deals with the three facets of the technology—power or processing applications, testing and analysis of fluids and materials, and instrumentation and control. Information is given on the physical principles involved in processing and the practical design of transducers. This latter covers, as well as the transducers already considered, electrodynamic, fluid dynamic and siren sources. There is a useful section on cavitation. Under testing and analysis, the various methods at present available for determining the propagation velocity and attenuation are discussed, as is also the relation of these quantities to the physical properties of the medium. A mainly theoretical appendix effectively summarizes our knowledge of acoustic relaxation mechanisms in fluids.

It should be emphasized that the authors have attempted to discuss the general principles of the technology rather than to consider all known applications. This approach should be of greater value. In their presentation they have sought to steer a middle course between a script intelligible only to the advanced physicist and one dealing with technical details of specific designs. They have also assumed little knowledge of acoustics proper, but some understanding of electronics. Substantially, they have succeeded in their plan by using a relatively simple presentation and recourse to intuitive arguments, with the addition of footnotes and sections in small type to augment the discussion. The inclusion in the book of design tables, graphs and formulæ, together with practical instructions, considerably increases its usefulness. The M.K.S. system of units is used; but other units are also indicated on some graphs and tables. Tables for the conversion of units from one system to another are included. Many references to the literature are given, including those to extensive bibliographies. It has been a pleasure to read and review this book.

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## LAND AND PEOPLE: 1955-80

### World Population and Resources

A Report by PEP. Pp. xxxvii+339. (London: Political and Economic Planning, 1955.) 30s. Distributed by George Allen and Unwin.

THE Demographic Revolution has joined the Agrarian Revolution and the Industrial Revolution as a significant mechanism of change in the course of human history. Whether one regards it as an embarrassment in a specific historical situation is largely a matter of one's political or national affiliations, but it remains a fact to be faced. In this report Political and Economic Planning (PEP) discusses the wide range of problems attendant upon

the almost inevitable increase of 25 or 30 per cent in the world population (now estimated at 2,500 million) within the life-time of an already adult generation. Many have said that this generation is frightening itself with phantoms of Neo-Malthusianism which the next generation will exorcise using the formulæ of nuclear energy, algæ culture, watered deserts, and the rapid diffusion of 'Western' standards of 'social responsibility' through Africa and Asia. Political and Economic Planning, however, does not anticipate that any significant new technological contribution will alleviate a deteriorating situation during the twenty-five years ahead. It recognizes, of course, that fundamental discoveries are being made, but argues in terms of distribution and costs to the peasant whose income is only a fraction of our own.

The ecology of human societies embraces the mastery of techniques of production and distribution, and of social organization. In assessing the balance of populations against their respective resources, one can scarcely avoid finding that solutions to specific problems are not judged by scientific standards alone, but also in terms of politics and morals. It would be very convenient if the willing gift of mortality control to the under-developed lands were acknowledged by equally willing acceptance of fertility control, but there are ancient prejudices to be overcome. A highly urbanized society with a high standard of living moves spontaneously towards low fertility; the most immediate problem is the control of fertility in illiterate rural societies. Mortality control finds ready and public acceptance; but fertility control remains a sensitive and controversial issue for the individual. Here is the basic social problem.

Theories of control based on the 'rhythm' method can be viewed against the account given here of the difficulties of teaching it in an Indian village. Interested readers might refer to the Milbank Memorial Fund Report for 1954 for a considered statement and discussion of the Catholic attitude. Incidentally, the Marxist thesis that there is no population problem, only a social problem, and that every mouth brings with it a productive pair of hands, is considered and rejected. In brief, Political and Economic Planning is not optimistic about the prospects of the poor and densely populated countries combining a stable population with an increasing standard of living in any future we can usefully consider. It couples recognition of the values of family and social responsibility with an appeal to biologists to work energetically (and with increased support!) towards the new philosopher's stone, an oral contraceptive which is cheap, effective and acceptable to all creeds and cultures.

The report falls into three major sections: a general survey of population and resources, a series of comparative studies of countries at various stages of economic and demographic development, and thirdly, a study of "Nation and Family" in the context of attitudes towards fertility control. The whole provides an extremely valuable summary of the most useful facts (closely up to date), clearly arranged and leading to a carefully accurate review of the problems and issues at stake. Discussion throughout is brief, to the point and realistic, and based on authoritative sources and opinion. Its value as a text for students will be enriched if read along with Prof. W. A. Lewis's important chapter on "Population and Resources" in his recent "Theory of Economic Growth".

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