

## *Preface*

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Perhaps the title does not reflect the true content of this book, which comprehensively covers the major topics in what has become generally the subject of acoustics. The book contains chapters on the basic physics of vibration and sound and their effect upon man. There are 18 chapters, which are divided into three sections: fundamentals of noise and hearing, effects of noise on man, and sources of noise and its control.

Fifty years ago noise pollution did not exist as a subject to be studied and acoustics was basically a branch of physics with the embryonic topics of architectural acoustics and electroacoustics acknowledged by only a few cognoscenti. Concern for noise as a social problem was nominal except for a couple of pioneering programmes in San Francisco and New York in the late 1920s and early 1930s. During the decade before the Second World War there was a growing resentment to the noise caused by the expansion of road and air transportation systems. It was during this period that municipal airports were sited and their expansive development was begun. The British government study in 1938 concluded that the problem of aircraft noise nuisance was one which inhibited a major expansion of the industry.

The Second World War was not an opportune period to raise concern for noise pollution but as in many other fields, it did foster the development of much basic science, and technology was developed that served as a foundation for many of the post-war developments. Besides the increasing sophistication of electroacoustics, which provided the device for noise measurement and analysis, two other developments greatly aided the post-war work. The first was in the technique of psychophysics, which led relationships between physical stimuli and psychological response. Without these methods it would have been impossible to carry out the many laboratory and noise survey programmes. The second development was the collection of data on the propagation of noise from various sources and over a variety of terrains and ground covers. Some of these data are still of value but it gave an insight into the complexities of an analytical approach.

After the war it became apparent that the most spectacular new noise source was the jet-powered aircraft. Initially this noise problem was confined to air force bases, and the concern for the effects of this noise pollution on the

inhabitants produced a significant study by the US Air Force, and a result of this study was the community noise rating index. This most valuable programme only received public recognition by the US government many years after the work began. In the late 1950s civil air transportation had reached a level of activity which was giving cause for alarm in those communities close to major airports. Just prior to the introduction of jet aircraft the Port of New York Authority developed far-reaching criteria for aircraft take-off noise. This resulted in the setting-up of a specific noise level for jet aircraft and also the introduction of a new unit based upon the concept of noisiness, which have profoundly affected subsequent developments in civil aviation.

Contemporary with this initiative was the beginning of a comprehensive review of noise effects by the Wilson Committee in the UK, resulting in 1963 in their financial report on the problems of noise. This British study stimulated a variety of field surveys and laboratory tests into the effects of road traffic and aircraft noise. The most famous and significant was the first London Airport noise survey, conducted in 1961, which has served as a prototype of most noise surveys since that date. The next fifteen years witnessed an upsurge of interest in control of the environment and the problem of noise pollution became a universal problem. Once again the pattern of development was led by the noise problems created by aircraft. Aircraft noise did not occur on such a grand scale as traffic or industrial noise but it produced a series of disturbances for about 5 per cent of the population. Serious progress in solving the noise problem was possible because of the financial and technological support given to the air transportation industry. A combined legislative approach through noise certification of new aircraft and by environmental regulations is producing a sustained decrease in noise exposure. Since the introduction of noise certification similar processes have been developed for other forms of transportation. There are many national and international organizations currently involved in noise legislation over a wide range. It is difficult to remain aware of all of these activities although the contents of this monograph provides a comprehensive guide. Noise control has become complicated, particularly in some Western European countries who as part of the European Community are subject to local regulations, European Community criteria, and international standards.

During the active period of environmental concern the basic science and technology developed rapidly. Study of the work of some great nineteenth century scientists such as Helmholtz, Rayleigh and Lamb became fashionable and provided a basic insight into the physics of noise. Their work was extended and enhanced so that it could be applied in a contemporary context. James Lighthill perhaps provides the best example of someone whose research linked scientific work with modern technology requirements. The skills of the medical practitioner, social scientist and psychologist have been

directed at many facets of the noise pollution problem, and is well illustrated by the diversity of the authors. Perhaps it is necessary to offer a word of warning to the reader, who will learn of the effects of noise on people, of the available technology to make quieter road vehicles or aircraft, or of the noise regulations and criteria developed to effect control, but that the technology will only be effective if regulations are enforced. The cost of noise control can be enormous and more work is urgently required to identify the true cost. The need for noise control must be placed alongside other social and political priorities. Also the reader must carefully screen the many scientific facts and conclusions contained throughout this book, for the variability of the data particularly applied to conclusions affecting the general population is enormous. The work contained in this book clearly identifies that high levels of noise exposure can affect us in many different ways. Data are usually presented for a single source such as aircraft, road traffic or industrial machines, but we do not live in a single-source environment. Our noise exposure is varied, and research must be directed to examine the effect of complex noise environments experienced in everyday life. Although this is a difficult and detailed process, until we can produce such evidence our work can rightly be viewed as oversimplification of the problem and perhaps penalising one source of noise is inadequate in an environment composed of many sources. The book is a true reflection of our current knowledge and indicates how much intellectual effort is now at work to overcome the problems of noise pollution.

