

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
RADIATION LABORATORY SERIES

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RADAR BEACONS

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RADAR BEACONS

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Foreword

THE tremendous research and development effort that went into the development of radar and related techniques during World War II resulted not only in hundreds of radar sets for military (and some for possible peacetime) use but also in a great body of information and new techniques in the electronics and high-frequency fields. Because this basic material may be of great value to science and engineering, it seemed most important to publish it as soon as security permitted.

The Radiation Laboratory of MIT, which operated under the supervision of the National Defense Research Committee, undertook the great task of preparing these volumes. The work described herein, however, is the collective result of work done at many laboratories, Army, Navy, university, and industrial, both in this country and in England, Canada, and other Dominions.

The Radiation Laboratory, once its proposals were approved and finances provided by the Office of Scientific Research and Development, chose Louis N. Ridenour as Editor-in-Chief to lead and direct the entire project. An editorial staff was then selected of those best qualified for this type of task. Finally the authors for the various volumes or chapters or sections were chosen from among those experts who were intimately familiar with the various fields, and who were able and willing to write the summaries of them. This entire staff agreed to remain at work at MIT for six months or more after the work of the Radiation Laboratory was complete. These volumes stand as a monument to this group.

These volumes serve as a memorial to the unnamed hundreds and thousands of other scientists, engineers, and others who actually carried on the research, development, and engineering work the results of which are herein described. There were so many involved in this work and they worked so closely together even though often in widely separated laboratories that it is impossible to name or even to know those who contributed to a particular idea or development. Only certain ones who wrote reports or articles have even been mentioned. But to all those who contributed in any way to this great cooperative development enterprise, both in this country and in England, these volumes are dedicated.

L. A. DuBRIDGE.



Preface

THIS book is about radar beacons. As far as the authors are aware, no other books on radar beacons have yet appeared. Because beacons constitute an important aspect of radar, an attempt will be made in this book to give a comprehensive survey of the present state of the beacon art.

Beacons were, at first, a minor and neglected aspect of the radar art. Their usefulness was recognized in nearly all laboratories working on radar, but only after the design of the radar was well advanced. Organized work on beacons at the Radiation Laboratory started only when the laboratory was in its second year; a separate beacon division was not organized until the summer of 1943. The influence of beacons was slow in making itself felt; nevertheless, by the end of the war, it had established itself firmly in the thinking of the designers of airborne and ground radar equipment and was beginning to be accepted for ship radar.

This survey is divided into four parts. Part I, Chaps. 1 to 6, discusses the nature of beacons and the principles according to which systems using beacons are designed. Part II, which includes Chaps. 7 to 16, is concerned with the design of beacons. Part III, Chaps. 17 to 19, takes up the design of beacon interrogators and gives examples of complete systems using beacons. Part IV, Chap. 20, covers the operation of beacon systems in the field.

This volume represents a summary of the efforts of Division 7 of the Radiation Laboratory, which was charged with work on radar beacons. In an attempt to give a complete picture of the beacon art, however, the authors have included much that did not originate at the Radiation Laboratory.

The plan of the book was drawn up by an editorial board before the personnel of the division was dispersed. Many members of the division were thus able to contribute to the book; and it could certainly never have been written without the contributions of so large and representative a group of the members of the division. Any omissions are due either to inadvertence or to residual military security.

Full acknowledgment to everyone who contributed to this book is impossible; apology must be made in advance for any omissions. First acknowledgment must go to L. A. Turner, who, as technical editor, guided the manuscript from the beginning. A special debt of gratitude is due to B. V. Bowden of the British Air Commission, whose thorough

acquaintance with the subject and friendly interest in the manuscript were of inestimable value. The authors wish to express their appreciation to J. R. Feldmeier, S. A. Goudsmit, D. E. Kerr, and F. F. Rieke for their constructive comments and contributions to the manuscript, to the RCA-Victor Company for permission to describe Shoran, and to Stuart W. Seeley of that company for comments on its treatment.

Thanks are due to Constance R. Henderson, who, as production assistant, shepherded the manuscript and figures through the mazes of production; and to Nina M. Kropoff and Margaret Jordan for their secretarial assistance. Especial thanks are owed to Beka Doherty, to whose editorial efforts is due what degree of literacy the book may possess, and who aided immeasurably in its final organization and intelligibility.

ARTHUR ROBERTS.

CAMBRIDGE, MASS.,
May, 1946.

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