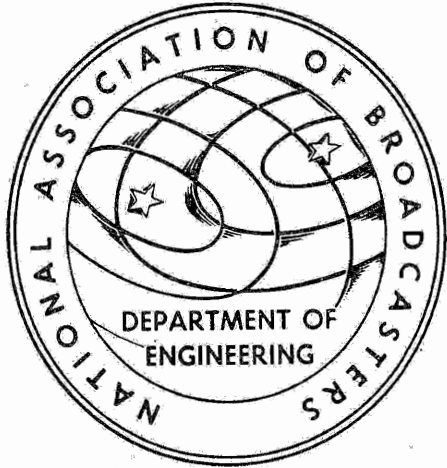




ENGINEERING HANDBOOK

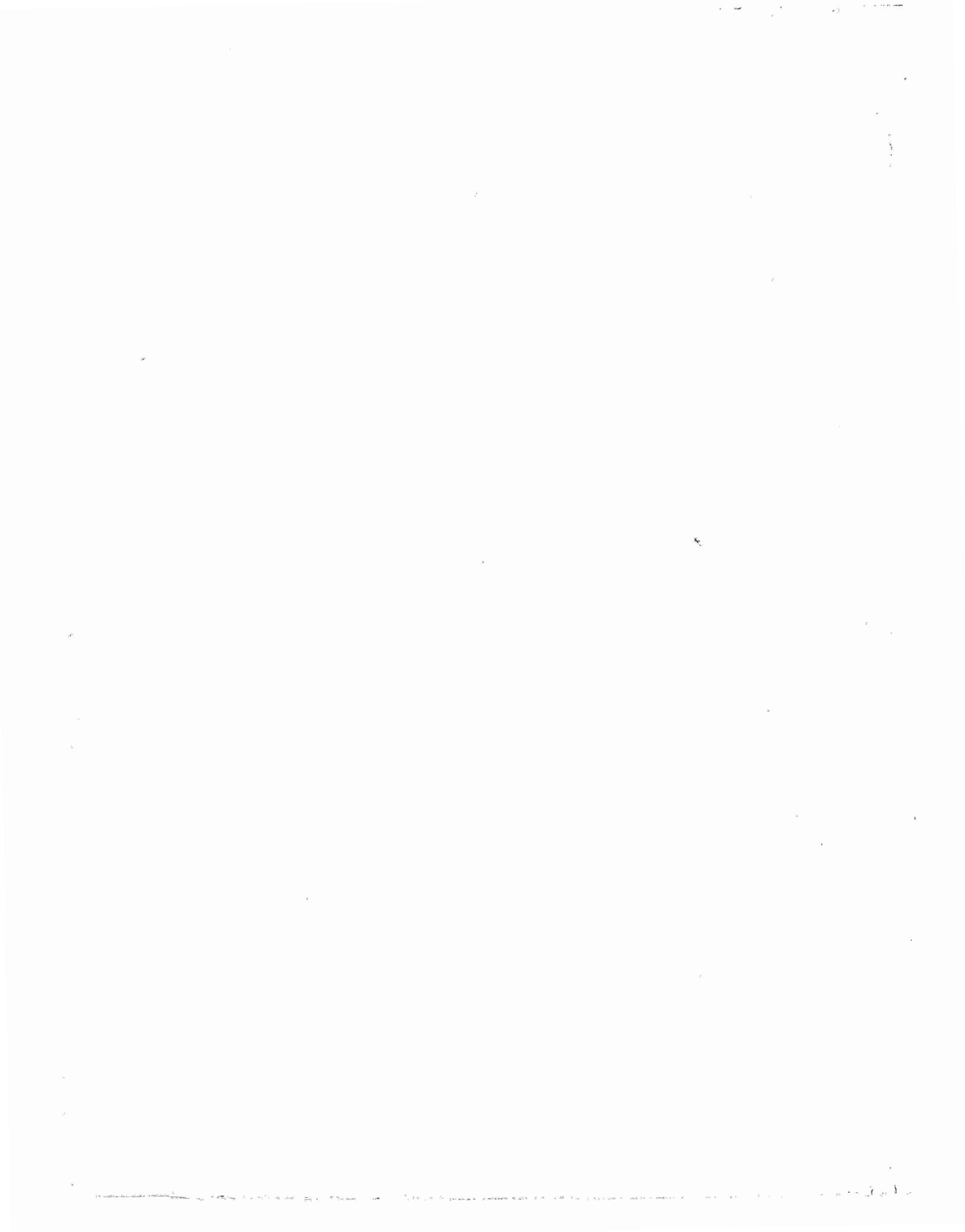
NATL. ASSN. OF RADIO & TELEVISION BROADCASTERS



ENGINEERING HANDBOOK

NATIONAL ASSOCIATION OF BROADCASTERS

FOURTH EDITION • 1949



NATIONAL ASSOCIATION OF BROADCASTERS

1771 N STREET, NORTHWEST

WASHINGTON 6, D. C.

PREFACE

This the fourth edition of the NAB Engineering Handbook has been prepared by the Department of Engineering as a Member Service. Of the more than 650 pages included at time of release, 600 pages contain new or revised material. Those few sections reprinted from the third edition have been carefully revised or enlarged, where appropriate.

All information presented herein has been selected and prepared with two objectives in mind:

- 1) to present articles and data of a practical working nature; and
- 2) to present material which, if studied and applied, will permit the economical and more efficient installation, operation and maintenance of broadcast stations.

Lengthy and highly scientific material of an academic nature has not been included, since such data is readily available elsewhere and does not, in general, provide information lending itself to practical application.

The Department of Engineering acknowledges the valuable assistance provided so freely in the preparation of this Handbook by engineers associated with individual stations, government agencies, networks, manufacturers, radio consulting firms, trade journals, other trade associations and professional societies.

The post-type binder provided will permit the future addition of supplements, which may consist either of new or revised material. Supplements will be supplied to NAB Members as a Member Service. Non NAB Members may obtain supplements at a cost of \$1.00 each.

The Department of Engineering will welcome constructive criticism or comments on the format and contents of the Handbook and will welcome, in particular, the submission of new and original material for consideration as supplements.

Additional copies of the NAB Engineering Handbook, complete with post-type binder, may be obtained from NAB Headquarters at \$17.50 each, postpaid within the Continental limits of the United States.

August 15, 1949

Neal McNaughten, Director
Department of Engineering

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Furnishes the student with a sound mathematical foundation and shows how to apply this knowledge to practical problems.

MATHEMATICS FOR ENGINEERS by Raymond W. Dull. New York City, McGraw-Hill, Second Edition 1941, 780 pages, 5-1/2 x 8, 686 illustrations, \$5.50.

A quick, convenient and reliable reference and text book for engineers who wish to review or extend their information on those phases of mathematics especially important in engineering work.

MEASUREMENTS IN RADIO ENGINEERING by Frederick E. Terman. New York City, McGraw-Hill, 1935, 400 pages, 6 x 9, 208 illustrations, \$4.50.

A comprehensive discussion of measurements problems encountered in engineering practice, with emphasis on basic principles.

PRINCIPLES OF ELECTRON TUBES by Herbert J. Reich. New York City, McGraw-Hill, 1941, 398 pages, 6 x 9, Illustrated, \$4.00.

The theory, characteristics and applications of electron tubes and their circuits.

PRINCIPLES OF TELEVISION ENGINEERING by Donald G. Fink. New York City, McGraw-Hill, 1940, 541 pages, 6 x 9, 313 illustrations, \$5.50. Revised printing to conform to 525-line standard issued July 1947.

Covers the television system from the camera to the viewing screen in the receiver, with descriptions of modern equipment.

RADIO AMATEUR'S HANDBOOK. West Hartford, Conn., American Radio Relay League, 1949, 118 pages, U. S. \$2.00, Foreign \$2.50.

This Handbook is recommended since it contains many parts which will be found to be useful by engineering personnel of broadcast stations.

RADIO ENGINEERING by Frederick E. Terman. New York City, McGraw-Hill, Third Edition 1947, 951 pages, 6 x 9, 672 illustrations, \$7.00.

A comprehensive treatment covering all phases of radio communication, written from the viewpoint of the engineer who is interested not only in qualitative descriptions of radio phenomena, but also in making quantitative analyses for facilitating design and research.

RADIO ENGINEERS' HANDBOOK by Frederick E. Terman. New York City, McGraw-Hill, 1943, 1019 pages, 6 x 9, 869 illustrations, \$7.00.

An exceptionally thorough and comprehensive reference book presenting a wealth of sound,

technical information especially selected and organized to meet the needs of the engineer dealing with practical radio and electronic problems.

THE RADIO MANUAL by George E. Sterling. New York City, D. Van Nostrand, (to be published 1949), cost approximately \$10. (Third Edition consisted of 1120 pages, \$6.00).

A practical handbook, especially valuable to the commercial and broadcast operator, covering structure, installation, upkeep, operation and control of all forms of radio apparatus and equipment. The new edition will contain large areas of new material and illustrations.

REFERENCE DATA FOR RADIO ENGINEERS. New York City, Federal Telephone and Radio Corporation, Second Edition 1946, 336 pages, 5-1/2 x 8-1/2, 400 charts, \$2.00.

A new and greatly revised edition is expected to be available the latter part of 1949. The second edition of this widely accepted, pocket-size handbook included important radio technical data developed during the War.

TELEVISION STANDARDS AND PRACTICE edited by Donald G. Fink with the cooperation of the National Television System Committee Editorial Advisory Board. New York City, McGraw-Hill, 1943, 405 pages, 6 x 9, 115 illustrations, \$5.50.

An authoritative compilation of material on television consisting of abstracts from the Proceedings of the National Television System Committee.

VACUUM TUBES by Karl R. Spangenberg. New York City, McGraw-Hill, 1948, 600 pages, 6 x 9, Illustrated, \$7.50.

An exceptionally comprehensive survey of all the physical laws which contribute to the understanding of vacuum tube behavior.

Publishers' Addresses:

American Radio Relay League
38 La Salle Road
West Hartford, Connecticut

Cleveland Institute of Radio Electronics
4900 Euclid Avenue
Cleveland 3, Ohio

Electronics Research Publishing Company
161 West 18th Street
New York, 11, New York

Federal Telephone & Radio Corp.
67 Broad Street
New York 4, New York

Illuminating Engineering Society
51 Madison Avenue
New York 10, New York

McGraw-Hill Book Co., Inc.
330 West 42nd Street
New York 18, New York

Murray Hill Books, Inc.
232 Madison Avenue
New York 16, New York

D. Van Nostrand Co., Inc.
250 Fourth Avenue
New York 3, New York

John Wiley & Sons, Inc.
440 Fourth Avenue
New York 16, New York

II. Periodicals (*listing yearly subscription rates*)

AUDIO ENGINEERING published monthly by Radio Magazines, Inc., 342 Madison Ave., New York City 17. \$3.00 U. S.; \$4.00 Foreign.

THE BELL SYSTEM TECHNICAL JOURNAL published quarterly by American Telephone & Telegraph Co., 195 Broadway, New York City. \$1.50 U. S.; \$1.85 Foreign.

THE B. B. C. QUARTERLY published quarterly by British Broadcasting Corporation. Can be purchased from B. B. C., 630 Fifth Ave., New York City 20. \$4.00 U. S.

BROADCAST NEWS published bi-monthly by the Radio Corporation of America, Engineering Products Department, Camden, N. J., \$2.00 U. S.

COMMUNICATIONS published monthly by Bryan Davis Publishing Co., Inc., 52 Vanderbilt Avenue, New York City 17. \$2.00 U. S. and Canada; \$3.00 Foreign.

ELECTRICAL COMMUNICATION published quarterly by International Telephone and Telegraph, 67 Broad Street, New York City 4. \$2.00 U. S.

ELECTRICAL ENGINEERING published monthly by the American Institute of Electrical Engineers, 33 West 39th Street, New York City 18. *Available to AIEE Members only.*

ELECTRONICS published monthly by McGraw-Hill Publishing Co., Inc., 330 West 42nd St., New York City 18. \$6.00 U. S.; \$7.00 Canada; \$15.00 Latin America; Other \$20.00.

FM-TV published monthly by FM Company, 246 Main Street, Great Barrington, Mass. \$3.00 U. S.; \$4.00 Foreign.

PROCEEDINGS OF THE IRE published monthly by the Institute of Radio Engineers, Inc., 1 East 79th St., New York City 21. *Available to IRE Members only.*

QST published monthly by American Radio Relay League, Inc., 38 LaSalle Road, West Hartford, Conn., \$4.00 U. S.

RCA REVIEW published quarterly by Radio Corporation of America, RCA Labs. Division, Princeton, N. J. \$2.00 U. S., Canada and Postal Union; \$2.40 Other.

TELE-TECH published monthly by Caldwell Clements, Inc., 480 Lexington Ave., New York City 17. \$5.00 U. S. and Possessions; \$6.00 Canada; \$7.00 Pan America; \$9.00 Other.

WESTINGHOUSE ENGINEER published bi-monthly by Westinghouse Electric Corp., 306 Fourth Ave., Pittsburgh 30, Pa. \$2.00 U. S. and Possessions; \$2.50 Canada; \$2.25 Other.

III. Government Information Sources

FEDERAL REGISTER published daily (except Sundays, Mondays and days following official Federal Holidays). The Register, which is obtainable from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., \$1.50 monthly or \$15.00 yearly, publishes official actions with respect to Rules and Standards of the Federal Communications Commission.

RADIO PROPAGATION LABORATORY, National Bureau of Standards, Washington 25, D. C., will furnish on request a list of its reports.

SUPERINTENDENT OF DOCUMENTS, Government Printing Office, Washington 25, D. C., will furnish on request a list of publications of the FCC and other Government Agencies or Departments. Copies of wanted data may then be ordered from GPO.

IV. Institutes and Societies

Note:

Any inquiries regarding membership in or publications of the following organizations should be addressed direct to the organization.

Acoustical Society of America
120 S. LaSalle Street
Chicago 3, Illinois

American Institute of Electrical Engineers
33 West 79th Street
New York 21, New York (see ELECTRICAL ENGINEERING under Periodicals above)

American Radio Relay League, Inc.
38 LaSalle Road
West Hartford, Connecticut

Society of Motion Picture Engineers
342 Madison Avenue
New York 17, New York

Institute of Radio Engineers
One East 79th Street
New York 21, New York (see PROCEEDINGS OF THE IRE
under Periodicals above)