

SEP 13 1961

SUPPLEMENTARY LIST OF PUBLICATIONS of the NATIONAL BUREAU OF STANDARDS

NBS
Publi-
cations



A11106 071376

REFERENCE

July 1, 1960 to June 30, 1961

Reference book not to be
taken from the library.

(To accompany NBS Circular 460, its Printed
Supplement 7-1-47 to 6-30-57, and Miscellaneous
Publication 240, 7-1-57 to 6-30-60)



U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS

QC
100
.U555
#460
1960/61
Suppl.

34.3

THE NATIONAL BUREAU OF STANDARDS

Functions and Activities

The functions of the National Bureau of Standards are set forth in the Act of Congress, March 3, 1901, as amended by Congress in Public Law 619, 1950. These include the development and maintenance of the national standards of measurement and the provision of means and methods for making measurements consistent with these standards; the determination of physical constants and properties of materials; the development of methods and instruments for testing materials, devices, and structures; advisory services to government agencies on scientific and technical problems; invention and development of devices to serve special needs of the Government; and the development of standard practices, codes, and specifications. The work includes basic and applied research, development, engineering, instrumentation, testing, evaluation, calibration services, and various consultation and information services. Research projects are also performed for other government agencies when the work relates to and supplements the basic program of the Bureau or when the Bureau's unique competence is required. The scope of activities is suggested by the listing of divisions and sections on the inside of the back cover.

Publications

The results of the Bureau's research are published either in the Bureau's own series of publications or in the journals of professional and scientific societies. The Bureau itself publishes three periodicals available from the Government Printing Office: The Journal of Research, published in four separate sections, presents complete scientific and technical papers; the Technical News Bulletin presents summary and preliminary reports on work in progress; and Basic Radio Propagation Predictions provides data for determining the best frequencies to use for radio communications throughout the world. There are also five series of non-periodical publications: Monographs, Applied Mathematics Series, Handbooks, Miscellaneous Publications, and Technical Notes.

A complete listing of the Bureau's publications can be found in National Bureau of Standards Circular 460, Publications of the National Bureau of Standards, 1901 to June 1947 (\$1.25), and the Supplement to National Bureau of Standards Circular 460, July 1947 to June 1957 (\$1.50), and Miscellaneous Publication 240, July 1957 to June 1960 (Includes Titles of Papers Published in Outside Journals 1950 to 1959) (\$2.25); available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Technical Notes

The Technical Note series is designed to supplement the Bureau's regular publications program. They provide a means for making available scientific data that are of transient or limited interest. Copies will only be available by purchase from the Department of Commerce, Office of Technical Services, Washington 25, D. C.

CONTENTS

| | Page |
|---|------|
| How to Purchase NBS Publications----- | IV |
| Periodicals of the National Bureau of Standards----- | V |
| Field Offices of the U. S. Department of Commerce----- | VII |
| Papers Published in the Journal of Research: | |
| Section A. Physics and Chemistry----- | 1 |
| Section B. Mathematics and Mathematical Physics----- | 2 |
| Section C. Engineering and Instrumentation----- | 3 |
| Section D. Radio Propagation----- | 4 |
| Circulars----- | 6 |
| Monographs----- | 6 |
| Miscellaneous Publications----- | 6 |
| Handbooks----- | 6 |
| Technical Notes----- | 7 |
| Technical News Bulletin----- | 9 |
| Basic Radio Propagation Predictions----- | 9 |
| Journal of Research----- | 9 |
| Price List of Available Publications 1901 to 6-31-61----- | 10 |
| Circulars----- | 10 |
| Monographs----- | 10 |
| Building Materials and Structures Reports----- | 12 |
| Applied Mathematics Series----- | 13 |
| Handbooks----- | 13 |
| Building and Housing Publications----- | 13 |
| Technical Notes----- | 14 |
| Depository Libraries in the United States----- | 15 |

HOW TO PURCHASE NBS PUBLICATIONS

Remittances for publications should be made to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., by coupon, postal money order, express order, or check. Publications cannot be mailed in advance of receipt of remittance. Currency may be sent at sender's risk. Foreign remittances should be made either by international money order or draft on an American bank.

Foreign money, defaced or smooth coins, will not be accepted. Do not send postage stamps.

For the convenience of the general public, coupons in the denomination of 5 cents that are good until used in exchange for Government publications sold by the Superintendent of Documents may be purchased from his office. Address order to Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Persons who make frequent purchases from the Superintendent of Documents may find a deposit account convenient. Deposits of \$10.00 or more are accepted against which orders may be placed without making individual remittances or first obtaining quotations. Order blanks are furnished for this purpose. After the handling of the order has been completed, it will be returned showing the publications supplied, explanations regarding those not sent, the amount of charge, and the balance on deposit.

No charge is made for postage on documents forwarded to points in the United States and possessions, or to Canada, Cuba, Mexico, Newfoundland (including Labrador), and certain Central and South American countries. To other countries the regular rate of postage is charged, and remittances must cover such postage. In computing foreign postage, add one-fourth of the price of the publication.

Beginning July 1959, the Journal of Research of the National Bureau of Standards will be issued as follows:

The Journal of Research

reports National Bureau of Standards research and development in physics, mathematics, chemistry, and engineering. Comprehensive scientific papers give complete details of the work, including laboratory data, experimental procedures, and theoretical and mathematical analyses. Illustrated with photographs, drawings, and charts.

After July 1959 the Journal will also present review articles by recognized authorities and compilations of information on subjects closely related to the Bureau's technical program.

All NBS nonperiodical publications and articles by the Bureau staff in professional journals will be abstracted in the appropriate section of the Journal. In addition, each section will carry a complete listing of all Bureau publications that are not abstracted in that section.

Four Sections

A. PHYSICS AND CHEMISTRY

Papers of interest primarily to scientists working in these fields. This section will cover a broad range of physical and chemical research, with major emphasis on standards of physical measurement, fundamental constants, and properties of matter. Issued six times a year. Annual subscription: Domestic, \$4.00; Foreign, \$4.75.

B. MATHEMATICS AND MATHEMATICAL PHYSICS

Studies and compilations designed mainly for the mathematician and theoretical physicist. Topics in mathematical statistics, theory of experiment design, numerical analysis, theoretical physics and chemistry, logical design and programming of computers and computer systems. Short numerical tables. Issued quarterly. Annual subscription: Domestic, \$2.25; Foreign, \$2.75.

C. ENGINEERING AND INSTRUMENTATION

Reporting results of interest chiefly to the engineer and the applied scientist. This section will include many of the new developments in instrumentation resulting from the Bureau's work in physical measurement, data processing, and development of test methods. It will also cover some of the work in acoustics, applied mechanics, building research, and cryogenic engineering. Issued quarterly. Annual subscription: Domestic, \$2.25; Foreign, \$2.75.

D. RADIO PROPAGATION

Reporting research in radio propagation, communications, and upper atmospheric physics. Topics to be covered include propagation in ionized media; scattering by turbulence, effect of irregular terrain on propagation, diffraction and scattering by solid obstacles, propagation through time varying media, surfaces, waves, and antennas. Issued six times a year. Annual subscription: Domestic, \$4.00; Foreign, \$4.75.

PERIODICALS OF THE NATIONAL BUREAU OF STANDARDS

The following two monthly periodicals are issued by the Bureau, and may be obtained on a 1-, 2-, or 3-year subscription basis (although no reduction in rates can be made) from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., as follows:

Technical News Bulletin

Summaries of current research at the National Bureau of Standards are published each month in the Technical News Bulletin. The articles are brief, with emphasis on the results of research, chosen on the basis of their scientific or technologic importance. Lists of all Bureau publications during the preceding month are given, including Research Papers, Handbooks, Applied Mathematics Series, Miscellaneous Publications, Monographs, and Technical Notes. Each issue contains 12 or more two-column pages; illustrated. Annual subscription: domestic, \$1.50; foreign, \$2.25.

Basic Radio Propagation Predictions

The Predictions provide the information necessary for calculating the best frequencies for communication between any two points in the world at any time during the given month. The data are important to all users of long-range radio communications and navigation, including broadcasting, airline, steamship, and wireless services, as well as to investigators of radio propagation and ionosphere. Each issue, covering a period of one month, is released three months in advance and contains 18 large pages, including pertinent charts, drawings, and tables. Annual subscription: domestic, \$1.00; foreign, \$1.50.

FIELD OFFICES OF THE U.S. DEPARTMENT OF COMMERCE

Department of Commerce Field Offices are maintained in the cities listed below. Their purpose is to provide ready access, at the local level, to the Department's reports, publications, statistical statements, surveys, as well as to the specialized and experienced staff in charge. Each Field Office serves as an official sales agent of the Superintendent of Documents, U. S. Government Printing Office, making available for purchase locally a wide range of Government publications. The reference library maintained by each Field Office contains many Government and private publications, periodicals, directories, reports, and other reference material.

| | | |
|--|--|---|
| ALBUQUERQUE, N. M. U. S. Courthouse | DETROIT 26, MICH. 438 Federal Building | PHILADELPHIA 7, PA. Jefferson Building 1015 Chestnut Street |
| ATLANTA 3, GA. 604 Volunteer Bldg. 66 Luckie St., N. W. | GREENSBORO, N. C. Room 407 U. S. Post Office Bldg. | PHOENIX, ARIZ. 419 Ellis Building 137 N. Second Avenue |
| BOSTON 10, MASS. Room 230 80 Federal Street | HOUSTON 2, TEXAS 610 Scanlan Bldg. 405 Main Street | PITTSBURGH 22, PA. 835 Fulton Bldg. 107 Sixth St. |
| BUFFALO 3, N. Y. 504 Federal Building 117 Ellicott Street | JACKSONVILLE 1, FLA. 425 Federal Building 311 West Monroe Street | PORTLAND 4, ORE. 217 Old U.S. Courthouse 520 S. W. Morrison Street |
| CHARLESTON 4, S. C. Area 2, Sergeant Jasper Bldg. West End Broad St. | KANSAS CITY 6, MO. Room 2011 911 Walnut Street | RENO, NEVADA 1479 Wells Avenue |
| CHEYENNE, WYO. 207 Majestic Bldg. 16th & Capitol Ave. | LOS ANGELES 15, CALIF. Room 450, Western Pacific Bldg. 1031 S. Broadway | RICHMOND 19, VA. Parcel Post Bldg. 11th and Main Sts. |
| CHICAGO 6, ILL. Room 1302 226 West Jackson Blvd. | MEMPHIS 3, TENN. 212 Falls Building 22 N. Front Street | ST. LOUIS 1, MO. 910 New Federal Building 1114 Market Street |
| CINCINNATI 2, OHIO 809 Fifth Third Bank Bldg. 36 E. Fourth Street | MIAMI 32, FLA. 408 Ainsley Bldg. 14 N. E. First Ave. | SALT LAKE CITY 1, UTAH 222 S. W. Temple St. |
| CLEVELAND 1, OHIO 4th Floor Federal Reserve Bank Bldg. E. 6th St. & Superior Ave. | MINNEAPOLIS 1, MINN. Room 304 Federal Bldg. 110 South Fourth Street | SAN FRANCISCO 11, CALIF. Room 419 Customhouse 555 Battery St. |
| DALLAS 1, TEXAS Rm. 3-104 Merchandise Mart 500 South Ervay Street | NEW ORLEANS 12, LA. 1508 Masonic Temple Bldg. 333 St. Charles Avenue | SAVANNAH, GA. 235 U. S. Courthouse and Post Office Building 125-29 Bull Street |
| DENVER 2, COLO. 142 New Custom House 19th & Stout Street | NEW YORK 1, N. Y. 61st Floor Empire State Building 350 Fifth Ave. | SEATTLE 4, WASH. 809 Federal Office Bldg. 909 First Avenue |

SUPPLEMENTARY LIST OF PUBLICATIONS
OF THE NATIONAL BUREAU OF STANDARDS
(TO ACCOMPANY NBS CIRCULAR 460, ITS
PRINTED SUPPLEMENT 7-1-47 to 6-30-57,
AND MISCELLANEOUS PUBLICATION 240,
July 1, 1957 to June 30, 1960)

A complete list of all National Bureau of Standards publications that are available by purchase from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., is given on page 10. See also page IV, "HOW TO PURCHASE NBS PUBLICATIONS."

DO NOT SEND YOUR ORDER TO THE NATIONAL BUREAU
OF STANDARDS

PAPERS PUBLISHED IN THE FOUR SECTIONS OF THE
JOURNAL OF RESEARCH OF THE NATIONAL BUREAU OF STANDARDS

SECTION A. PHYSICS AND CHEMISTRY

Volume 64A, Number 4, July-August 1960

- Gamma irradiation of hexafluorobenzene, R. E. Florin, L. A. Wall, and D. W. Brown, paper 64A4-49, p. 269.
- Behavior of isolated disturbances superimposed on laminar flow in a rectangular pipe, G. C. Sherlin, paper 64A4-50, p. 281.
- Standard of spectral radiance for the region of 0.25 to 2.6 microns, R. Stair, R. G. Johnston, and E. W. Halbach, paper 64A4-51, p. 291.
- Photovoltaic effect produced in silicon solar cells by X- and gamma rays, K. Scharf, paper 64A4-52, p. 297.
- Phase equilibria in systems involving the rare-earth oxides. Part I. Polymorphism of the oxides of the trivalent rare-earth ions, R. S. Roth and S. J. Schneider, paper 64A4-53, p. 309.
- Phase equilibria in systems involving the rare-earth oxides. Part II. Solid state reactions in trivalent rare-earth oxide systems, S. J. Schneider and R. S. Roth, paper 64A4-54, p. 317.
- Some observations on the calcium aluminate carbonate hydrates, E. T. Carlson and H. A. Berman, paper 64A4-55, p. 333.
- Acid dissociation constant and related thermodynamic quantities for triethanolammonium ion in water from 0 to 50 °C, R. G. Bates and G. F. Allen, paper 64A4-56, p. 343.
- Ionization constants of four dinitrophenols in water at 25 °C, R. A. Robinson, M. M. Davis, M. Paabo, and V. E. Bower, paper 64A4-57, p. 347.
- Dissociation constant of anisic (p-methoxybenzoic) acid in the system ethanol-water at 25 °C, E. E. Sager and V. E. Bower, paper 64A4-58, p. 351.
- Preparation of sulfur of high purity, T. J. Murphy, W. S. Clabaugh, and R. Gilchrist, paper 64A4-59, p. 355.
- Tritium-labeled compounds IV. D-Glucose-6-t, D-xylose-5-t, and D-mannitol-1-t, H. S. Isbell, H. L. Frush, and J. D. Moyer, paper 64A4-60, p. 359.
- Tritium-labeled compounds V. Radioassay of both carbon-14 and tritium in films, with a proportional counter, H. S. Isbell, H. L. Frush, and N. B. Holt, paper 64A4-61, p. 363.

Volume 64A, Number 5, September-October 1960

- Infrared spectrum of hydrobromic acid, E. K. Plyler, paper 64A5-62, p. 377.
- Determination of the value of the faraday with a silver-perchloric acid coulometer, D. N. Craig, J. I. Hoffman, C. A. Law, and W. J. Hamer, paper 64A5-63, p. 381.
- Systems silver iodide-sodium iodide and silver iodide-potassium iodide, G. Burley and H. E. Kissinger, paper 64A5-64, p. 403.
- Conformations of the pyranoid sugars. III. Infrared absorption spectra of some acetylated aldopyranosides, R. S. Tipson and H. S. Isbell, paper 64A5-65, p. 405.
- Dissociation constant of 4-aminopyridinium ion in water from 0 to 50 °C and related thermodynamic quantities, R. G. Bates and H. B. Hetzer, paper 64A5-66, p. 427.

Tritium-labeled compounds VI. Alditols-1-t and alditols-2-t, H. L. Frush, H. S. Isbell, and A. J. Fatiadi, paper 64A5-67, p. 433.

Volume 64A, Number 6, November-December 1960

- The spectrum of singly ionized atomic iodine (I II), W. C. Martin and C. H. Corliss, paper 64A6-68, p. 443.
- The third spectrum of gold (Au III), L. Iglesias, paper 64A6-69, p. 481.
- Tolerances for layer thicknesses in dielectric multilayer coatings and interference filters, K. D. Mielenz, paper 64A6-70, p. 487.
- Note on particle velocity in collisions between liquid drops and solids, O. G. Engel, paper 64A6-71, p. 497.
- Resistance of white sapphire and hot-pressed alumina to collision with liquid drops, O. G. Engel, paper 64A6-72, p. 499.
- Note on the thermal degradation of polytetrafluoroethylene as a first-order reaction, S. L. Madorsky and S. Straus, paper 64A6-73, p. 513.
- Heat of formation of titanium trichloride, W. H. Johnson, A. A. Gilliland, and E. J. Prosen, paper 64A6-74, p. 515.
- Heat of formation of decaborane, W. H. Johnson, M. V. Kilday, and E. J. Prosen, paper 64A6-75, p. 521.
- Ultra low-conductivity water by electrophoretic ion exclusion, W. Haller and H. C. Duecker, paper 64A6-76, p. 527.
- Spectrophotometric determination of the ionization constant of dimethylpicric acid (2,4,6-trinitro-3,5-xyleneol) in water at 25 °C, M. M. Davis, M. Paabo, and R. A. Robinson, paper 64A6-77, p. 531.
- Spectrophotometric determination of the ionization constant of 2,4,6-trinitro-m-cresol in water at 25 °C, M. M. Davis and M. Paabo, paper 64A6-78, p. 533.
- Method for the separation of titanium, zirconium, iron, and aluminum from one another and for their subsequent determination, T. J. Murphy, W. S. Clabaugh, and R. Gilchrist, paper 64A6-79, p. 535.

Volume 65A, Number 1, January-February 1961

- Faint lines in the arc spectrum of iron (Fe I), C. C. Kiess, V. C. Rubin, and C. E. Moore, paper 65A1-80, p. 1.
- Infrared absorption of spectra of some 1-acetamido pyranoid derivatives and reducing, acetylated pyranoses, R. S. Tipson and H. S. Isbell, paper 65A1-81, p. 31.
- Monolayers of linear saturated succinate polyesters and air-liquid interfaces, W. M. Lee, J. L. Shereshefsky, and R. R. Stromberg, paper 65A1-82, p. 51.
- Heat of formation of beryllium chloride, W. H. Johnson and A. A. Gilliland, paper 65A1-83, p. 59.
- Heat of decomposition of potassium perchlorate, W. H. Johnson and A. A. Gilliland, paper 65A1-84, p. 63.

Section A. Physics and Chemistry - continued

- Heats of formation of lithium perchlorate, ammonium perchlorate, and sodium perchlorate, A. A. Gilliland and W. H. Johnson, 65A1-85, p. 66.
- Heat of formation of N-dimethylaminodiborane, W. H. Johnson, I. Jaffe, and E. J. Prosen, paper 65A1-86, p. 71.
- Separation of hafnium from zirconium by anion exchange, J. L. Hague and L. A. Machlan, paper 65A1-87, p. 75.
- Reaction of sulfur, hydrogen sulfide, and accelerators with propylene and butadiene, F. J. Linnig, E. J. Parks, and L. A. Wall, paper 65A1-88, p. 79.
- Volume 65A, Number 2, March-April 1961
- Mass spectra of some deuterioethanes, E. I. Quinn and F. L. Mohler, paper 65A2-89, p. 93.
- Heats of hydrolysis and formation of potassium borohydride, W. H. Johnson, R. H. Schumm, I. H. Wilson, and E. J. Prosen, paper 65A2-90, p. 97.
- Heat of combustion of borazine $B_3N_3H_6$, M. V. Kilday, W. H. Johnson, and E. J. Prosen, paper 65A2-91, p. 101.
- Thermodynamic properties of thorium dioxide from 298 to 1,200 °K, A. C. Victor and T. B. Douglas, paper 65A2-92, p. 105.
- Calculated energy dissipation distribution in air by fast electrons from a gun source, J. E. Crew, paper 65A2-93, p. 113.
- Vitrons as flow units in alkali silicate binary glasses, L. W. Tilton, paper 65A2-94, p. 117.
- Tetragermanates of strontium, lead, and barium of formula type AB_4O_9 , C. R. Robbins and E. M. Levin, paper 65A2-95, p. 127.
- Volume 65A, Number 3, May-June 1961
- International practical temperature scale of 1948. Text revision of 1960. H. F. Stimson, paper 65A3-96, p. 139.
- Evaluation of the NBS unit of resistance based on a computable capacitor, R. D. Cutkosky, paper 65A3-97, p. 147.
- Wavelengths and intensities in the first spectrum of bromine, 2000 to 13000 Å, J. L. Tech and C. H. Corliss, paper 65A3-98, p. 159.
- Torsional resonance vibrations of uniform bars of square cross section, W. E. Tefft and S. Spinner, paper 65A3-99, p. 167.
- Infrared studies of aragonite, calcite and vaterite type structures in the borates, carbonates, and nitrates, C. E. Weir and E. R. Lippincott, paper 65A3-100, p. 173.
- Dielectric properties of polyamides: polyhexamethylene adipamide and polyhexamethylene sebacamide, A. J. Curtis, 65A3-101, p. 185.
- Heat of formation of calcium aluminate monocarbonate at 25 °C, H. A. Berman and E. S. Newman, paper 65A3-102, p. 197.
- Thermodynamic constants for association of isomeric chlorobenzoic and toluic acids with 1,3-diphenylguanidine in benzene, M. M. Davis and H. B. Hetzer, paper 65A3-103, p. 209.
- Heats of combustion and formation of trimethylborane, triethylborane, and tri-n-butylborane, W. H. Johnson, M. V. Kilday, and E. J. Prosen, paper 65A3-104, p. 215.
- Pyrolysis of linear copolymers of ethylene and propylene, S. Straus and L. A. Wall, paper 65A3-105, p. 221.
- Pyrolysis of fluorocarbon polymers, L. A. Wall and S. Straus, paper 65A3-106, p. 227.
- Preparation of fluoro- and bromofluoroaryl compounds by copyrolysis of bromofluoroalkanes, L. A. Wall, J. E. Fearn, W. J. Pummer, and R. E. Lowry, paper 65A3-107, p. 239.
- Thermal stability of polydivinylbenzene and of copolymers of styrene with divinylbenzene and with tribinylbenzene, S. Straus and S. L. Madorsky, paper 65A3-108, p. 243.
- Conformations of the pyranoid sugars. IV. Infrared absorption spectra of some fully acetylated pyranoses, R. S. Tipson and H. S. Isbell, paper 65A3-109, p. 249.
- A standard^a for the measurement of the pH of blood and other physiological media, V. E. Bower, M. Paabo, and R. G. Bates, paper 65A3-110, p. 267.

SECTION B. MATHEMATICS AND MATHEMATICAL PHYSICS

- Volume 64B, Number 3, July-September 1960
- Electric polarizability of a short right circular conducting cylinder, T. T. Taylor, paper 64B3-30, p. 135.
- Distribution of quantiles in samples from a bivariate population, M. M. Siddique, paper 64B3-31, p. 145.
- Split Runge-Kutta method for simultaneous equations, J. R. Rice, paper 64B3-32, p. 151.
- A reduction formula for partitioned matrices, E. V. Haynsworth, paper 64B3-33, p. 171.
- Selected bibliography of statistical literature, 1930 to 1957: III. Limit theorems, L. S. Deming, paper 64B3-34, p. 175.
- Volume 64B, Number 4, October-December 1960
- Magnetic polarizability of a short right circular conducting cylinder, T. T. Taylor, paper 64B4-35, p. 199.
- Accuracy of Monte Carlo methods in computing finite Markov chains, N. W. Bazley and P. J. Davis, paper 64B4-36, p. 211.
- Error bounds in the Rayleigh-Ritz approximation of eigenvectors, H. F. Weinberger, paper 64B4-37, p. 217.
- Sequence transformations based on Tchebycheff approximations, J. R. Rice, paper 64B4-38, p. 227.
- Numerical solution of the frequency equations for the flexural vibration of cylindrical rods, W. E. Tefft, paper 64B4-39, p. 237.
- Volume 65B, Number 1, January-March 1961
- On transient solutions of the "baffled piston" problem, F. Oberhettinger, paper 65B1-40, p. 1.
- Special types of partitioned matrices, E. V. Haynsworth, paper 65B1-41, p. 7.
- Bound for the P-condition number of matrices with positive roots, P. J. Davis, E. V. Haynsworth, and M. Marcus, paper 65B1-42, p. 13.
- Some computational problems involving integral matrices, O. Taussky, paper 65B1-43, p. 15.
- Computational problems concerning the Hilbert matrix, J. Todd, paper 65B1-44, p. 19.

Section B. Mathematics and Mathematical Physics - continued

Index to the distributions of mathematical statistics, F. A. Haight, paper 65B1-45, p. 23.
Selected bibliography of statistical literature, 1930 to 1957: IV. Markov chains and stochastic processes, L. S. Deming and D. Gupta, paper 65B1-46, p. 61.

Volume 65B, Number 2, April-June 1961

Optimal approximation for functions prescribed at equally spaced points, H. F. Weinberger, paper 65B2-47, p. 99.

Truncations in the method of intermediate problems for lower bounds to eigenvalues, N. W. Bazley and D. W. Fox, paper 65B2-48, p. 105.

Comparison theorems for symmetric functions of characteristic roots, M. Marcus, paper 65B2-49, p. 113.

Some properties of the empirical distribution function of a random process, M. M. Siddiqui, paper 65B2-50, p. 117.
Another extension of Heinz's inequality, M. Marcus, paper 65B2-51, p. 129.
Mean motions in conditionally periodic separable systems, J. P. Vinti, paper 65B2-52, p. 131.
Some boundary value problems involving plasma media, J. R. Wait, paper 65B2-53, p. 137.
A new decomposition formula in the theory of elasticity, J. H. Bramble and L. E. Payne, paper 65B2-54, p. 151.
Pointwise bounds in the Cauchy problem of elastic plates, L. E. Payne, paper 65B2-55, p. 157.

SECTION C. ENGINEERING AND INSTRUMENTATION

Volume 64C, Number 3, July-September 1960

A new method of measuring gage blocks, J. B. Saunders, paper 64C3-37, p. 173.

Gage blocks of superior stability: initial developments in materials and measurement, M. R. Meyerson, T. R. Young, and W. R. Ney, paper 64C3-38, p. 175.

Variation of resolving power and type of test pattern, F. E. Washer and W. P. Tayman, paper 64C3-39, p. 209.

A multiple isolated-input network with common output, C. M. Allred and C. C. Cook, paper 64C3-40, p. 225.

Phase angle master standard for 400 cycles per second, J. H. Park and H. N. Cones, paper 64C3-41, p. 229.

Disturbances due to the motion of a cylinder in a two-layer liquid system, L. H. Carpenter and G. H. Keulegan, paper 64C3-42, p. 241.

Volume 64C, Number 4, October-December 1960

Error analysis of a standard microwave phase shifter, G. E. Schafer and R. W. Beatty, paper 64C4-43, p. 261.

A method of controlling the effect of resistance in the link circuit of the Thomson or Kelvin double bridge, D. Ramaley, paper 64C4-44, p. 267.

Automatic precise recording of temperature, G. S. Ross and H. D. Dixon, paper 64C4-45, p. 271.

Gimbal device to minimize the effects of off-center loading on balance pans, H. A. Bowman and L. B. Macurdy, paper 64C4-46, p. 277.

Response of microchemical balances to changes in relative humidity, H. E. Almer, paper 64C4-47, p. 281.

Chemical changes occurring during the weathering of two coating-grade asphalts, S. H. Greenfeld, paper 64C4-48, p. 287.

Characteristics of fifteen coating-grade asphalts, S. H. Greenfeld, paper 64C4-49, p. 299.

Volume 65C, Number 1, January-March 1961

Electronic scanning microscope for a spectrographic plate comparator, M. L. Kuder, paper 65C1-50, p. 1.

Viscoelastometer for measurement of flow and elastic recovery, R. J. Overberg and H. Leaderman, paper 65C1-51, p. 9.

An ultra low frequency bridge for dielectric measurements, D. J. Scheiber, paper 65C1-52, p. 23.

The Ephi system for VLF direction finding, G. Hefley, R. F. Linfield, and T. L. Davis, paper 65C1-53, p. 43.

Fast counting of alpha particles in air ionization chambers, Z. Bay, F. D. McLernon, and P. A. Newman, paper 65C1-54, p. 51.

X-ray diffraction measurement of intragranular misorientation in alpha brass subjected to reverse plastic strain, C. J. Newton and H. C. Vacher, paper 65C1-55, p. 57.

Enthalpy and specific heat of nine corrosion-resistant alloys at high temperatures, T. B. Douglas and A. C. Victor, paper 65C1-56, p. 65.

Determination of minor constituents in low-alloy steels by X-ray spectroscopy, R. E. Michaelis, R. Alvarez, and B. A. Kilday, paper 65C1-57, p. 71.

Volume 65C, Number 2, April-June 1961

An experimental study concerning the pressurization and stratification of liquid hydrogen, A. F. Schmidt, J. R. Purcell, W. A. Wilson, and R. V. Smith, paper 65C2-58, p. 81.

Temperature dependence of elastic constants of some cermet specimens, S. Spinner, paper 65C2-59, p. 89.
Analog simulation of zone melting, H. L. Mason, paper 65C2-60, p. 97.

Residual losses in a guard-ring micrometer-electrode holder for solid-disk dielectric specimens, A. H. Scott and W. P. Harris, paper 65C2-61, p. 101.

A bolometer mount efficiency measurement technique, G. F. Engen, paper 65C2-62, p. 113.

Telescope for measurement of optic angle of mica, S. Ruthberg, paper 65C2-63, p. 125.

An automatic fringe counting interferometer for use in the calibration of line scales, H. D. Cook and L. A. Marzetta, paper 65C2-64, p. 129.

SECTION D. RADIO PROPAGATION

Volume 64D, Number 4, July-August 1960

Relation of turbulence theory to ionospheric forward scatter propagation experiments, A. D. Wheelon, paper 64D4-62, p. 301.

Propagation at oblique incidence over cylindrical obstacles, M. P. Bachynski, paper 64D4-63, p. 311.

Diffraction by smooth conical obstacles, H. E. J. Neugebauer and M. P. Bachynski, paper 64D4-64, p. 317.

Characteristics of 488 megacycles per second radio signals reflected from the moon, B. C. Blevis and J. H. Chapman, paper 64D4-65, p. 331.

The use of polarization fading of satellite signals to study the electron content and irregularities in the ionosphere, C. G. Little and R. S. Lawrence, paper 64D4-66, p. 335.

Note on a test of the equivalence theorem for sporadic E propagation, J. W. Wright and T. N. Gautier, paper 64D4-67, p. 347.

Daytime attenuation rates in the very low frequency band using atmospheric, W. L. Taylor, paper 64D4-68, p. 349.

Measured electrical properties of snow and glacial ice, A. D. Watt and E. L. Maxwell, paper 64D4-69, p. 357.

Half-wave cylindrical antenna in a dissipative medium: current and impedance, R. King and C. W. Harrison, paper 64D4-70, p. 365.

Some ELF phenomena, E. T. Pierce, paper 64D4-71, p. 383.

Mode theory and the propagation of ELF radio waves, J. R. Wait, paper 64D4-72, p. 387.

Studies of natural electric and magnetic fields, G. D. Garland and T. F. Webster, paper 64D4-73, p. 405.

Natural electromagnetic energy below the ELF range, W. H. Campbell, paper 64D4-74, p. 409.

Possible application of the system loss concept at ELF, K. A. Norton, paper 64D4-75, p. 413.

Measurements of the spectrum of radio noise from 50 to 100 cycles per second, M. Balser and C. A. Wagner, paper 64D4-76, p. 415.

Volume 64D, Number 5, September-October 1960

ELF electric fields from thunderstorms, A. D. Watt, paper 64D5-77, p. 425.

Field strength measurements in fresh water, G. S. Saran and G. Held, paper 64D5-78, p. 435.

Electrical resistivity studies on the Athabasca Glacier, Alberta, Canada, G. V. Keller and F. C. Frischknecht, paper 64D5-79, p. 439.

Amplitude distribution for radio signals reflected by meteor trails, A. D. Wheelon, paper 64D5-80, p. 449.

Computation and measurement of the fading rate of moon-reflected UHF signals, S. J. Fricker, R. P. Ingalls, W. C. Mason, M. L. Stone, and D. W. Swift, paper 64D5-81, p. 445.

On the theory of wave propagation through a concentric stratified troposphere with a smooth profile, H. Bremmer, paper 64D5-82, p. 467.

Polarization and depression-angle dependence of radar terrain return, I. Katz and L. M. Spetner, paper 64D5-83, p. 483.

Methods of predicting the atmospheric bending of radio rays, B. R. Bean, G. D. Thayer, and B. A. Cahoon, paper 64D5-84, p. 487.

Loss in channel capacity resulting from starting delay in meteor-burst communication, G. R. Sugar, paper 64D5-85, p. 493.

Elementary considerations of the effects of multipath propagation in meteor-burst communication, G. R. Sugar, R. J. Carpenter, and G. R. Ochs, paper 64D5-86, p. 495.

Use of logarithmic frequency spacing in ionogram analysis, G. A. M. King, paper 65D5-87, p. 501.

Guiding of whistlers in a homogeneous medium, R. L. Smith, paper 64D5-88, p. 505.

Propagation of microwaves through a magnetoplasma, and a possible method for determining the electron velocity distributions, A. L. Cullen, paper 64D5-89, p. 509.

On electromagnetic radiation in magneto-ionic media, H. Kogelnik, paper 64D5-90, p. 515.

Radiation and admittance of an insulated slotted-sphere antenna surrounded by a strongly ionized plasma sheath, J. W. Marini, paper 64D5-91, p. 525.

A contribution to the theory of corrugated guides, G. Piefke, paper 64D5-92, p. 533.

High-gain, very low side-lobe antenna with capability for beam slewing, A. C. Wilson, paper 64D5-93, p. 557.

Shielding of transient electromagnetic signals by a thin conducting sheet, N. R. Zitron, paper 64D5-94, p. 563.

Cylindrical antenna theory, R. H. Duncan and F. A. Hinchey, paper 64D5-95, p. 569.

Volume 64D, Number 6, November-December 1960

URSI National Committee Report:

Commission 1. Radio measurement methods and standards, p. 591.

Commission 2. Tropospheric radio propagation, p. 607.

Commission 3. Ionospheric radio propagation, p. 629.

Commission 4. Radio noise of terrestrial origin, p. 637.

Commission 5. Radio astronomy, p. 655.

Commission 6. Radio waves and circuits, p. 671.

Commission 7. Radio electronics, p. 751, paper 64D6-96.

Volume 65D, Number 1, January-February 1961

Incoherent scattering by free electrons as a technique for studying the ionosphere and exosphere: some observations and theoretical considerations, K. L. Bowles, paper 65D1-97, p. 1.

Radio wave absorption of several gases in the 100 to 117 kMc/s frequency range, C. O. Britt, C. W. Tolbert, and A. W. Straiton, paper 65D1-98, p. 15.

On the theory of diffraction by a composite cylinder, R. D. Kodis, paper 65D1-99, p. 19.

An atlas of oblique-incidence ionograms (a digest), V. Agy, K. Davies, and R. Salaman, paper 65D1-100, p. 35.

A new approach to the mode theory of VLF propagation, J. R. Wait, paper 65D1-101, p. 37.

East-west effect on VLF mode transmission across the earth's magnetic field, D. Dobrott and A. Ishimaru, paper 65D1-102, p. 47.

Section D. Radio Propagation - continued

- Magneto-ionic propagation phenomena in low- and very-low-radiofrequency waves reflected by the ionosphere, J. R. Johler, paper 65D1-103, p. 53.
- Correlation of monthly median transmission loss and refractive index profile characteristics, B. R. Bean and B. A. Cahoon, paper 65D1-104, p. 67.
- Characteristics of waveguides for long-distance transmission, A. E. Karbowski and L. Solymar, paper 65D1-105, p. 75.
- Useful radiation from an underground antenna, H. A. Wheeler, paper 65D1-106, p. 89.
- Observation of F-layer and sporadic-E scatter at VHF in the Far East, K. Miya, T. Sasaki, and M. Ishikawa, paper 65D1-107, p. 93.
- A high-resolution rapid-scan antenna, H. V. Cottony, and A. C. Wilson, paper 65D1-108, p. 101.
- Volume 65, Number 2, March-April 1961
- Ionospheric motions observed with high-frequency back-scatter sounders, L. H. Tveten, paper 65D2-109, p. 115.
- Relationship between red auroral arcs and ionospheric recombination, G. A. M. King and F. E. Roach, paper 65D2-110, p. 129.
- Fresnel region fields of circular aperture antennas, M. K. Hu, paper 65D2-111, p. 137.
- Free-balloon borne meteorological refractometer, J. F. Theisen and E. E. Gossard, paper 65D2-112, p. 149.
- Weather reception level on a troposphere link--annual and short-term correlations, L. G. Abraham, Jr. and J. A. Bradshaw, paper 65D2-113, p. 155.
- Initial results of a new technique for investigating spheric activity, G. Hefley, R. H. Doherty, and R. F. Linfield, paper 65D2-114, p. 157.
- Effect of antenna radiation angles upon HF radio signals propagated over long distances, W. F. Utlaut, paper 65D2-115, p. 167.
- Graphical determination of radio ray bending in an exponential atmosphere, C. F. Pappas, L. E. Vogler and P. L. Rice, paper 65D2-116, p. 175.
- A formula for radio ray refraction in an exponential atmosphere, G. D. Thayer, paper 65D2-117, p. 181.
- The impedance of a monopole antenna with a circular conducting-disk ground system on the surface of a lossy half space, S. W. Maley and R. J. King, paper 65D2-118, p. 183.
- Radio-wave propagation in the earth's crust, H. L. Wheeler, paper 65D2-119, p. 189.
- Volume 65, Number 3, May-June 1961
- Propagation studies using direction-finding techniques, E. C. Hayden, paper 65D3-120, p. 197.
- Diversity effects in long distance high frequency radio pulse propagation, S. A. Bowhill, paper 65D3-121, p. 213.
- Influence of ionospheric conditions on the accuracy of high frequency direction finding, P. J. D. Gething, paper 65D3-122, p. 225.
- Phase difference observations at spaced aerials and their application to direction finding, W. C. Bain, paper 65D3-123, p. 229.
- Research at the National Bureau of Standards applicable to long-distance location and direction-finding problems, R. Silverstein, paper 65D3-124, p. 233.
- Design for spinning goniometer automatic direction finding, W. J. Lindsay and D. S. Heim, paper 65D3-125, p. 237.
- Resolution characteristics of correlation arrays, I. W. Linder, paper 65D3-126, p. 245.
- Instrumentation for propagation and direction-finding measurements, E. C. Hayden, paper 65D3-127, p. 253.
- Brooke variance classification system for DF bearings, E. M. L. Beale, paper 65D3-128, p. 255.
- Estimation of variances of position lines from fixes with unknown target positions, E. M. L. Beale, paper 65D3-129, p. 263.
- Statistics of a radio wave diffracted by a random ionosphere, S. A. Bowhill, paper 65D3-130, p. 275.
- Space analysis of radio signals, J. B. Smyth, paper 65D3-131, p. 293.
- Effective receiver bandwidth on the amplitude distribution of VLF atmospheric noise, F. F. Fulton, Jr., paper 65D3-132, p. 229.
- Excitation of VLF and ELF radio waves by a horizontal magnetic dipole, J. Galejs, paper 65D3-133, p. 305.

CIRCULARS

C

- 510, Suppl. 2. Alphabetical index to tables of chemical kinetics. Homogeneous reactions. August 5, 1960.
- 539, Vol. 10. Standard x-ray diffraction powder patterns, H. E. Swanson, M. I. Cook, E. H. Evans, and J. H. deGroot. September 23, 1960.

MONOGRAPHS

MONO

18. Heat treatment and properties of iron and steel, T. G. Digges and S. J. Rosenberg. October 3, 1960. Supersedes C495.
19. Atomic energy levels in crystals, J. L. Prather. February 24, 1961.
20. Ideal gas thermodynamic functions and isotope exchange functions for the diatomic hydrides, deuterides, and tritides, L. Harr, A. S. Friedman, and C. W. Beckett. May 29, 1961.
21. Specific heats and enthalpies of technical solids at low temperatures. A compilation from the literature, R. J. Corruccini and J. J. Gniewek. October 3, 1960.
22. Climatic charts and data of the radio refractive index for the United States and the world, B. R. Bean, J. D. Horn, and A. M. Ozanich, Jr. November 25, 1960.
23. Amplitude-probability distributions for atmospheric radio noise, W. Q. Crichlow, Q. D. Spaulding, C. J. Roubique, and R. T. Disney. November 4, 1960.
24. A spectrophotometric atlas of the spectrum of CH from 3000 A to 5000 A, A. M. Bass and H. P. Broida. February 14, 1961.
25. Unassigned
26. Development of high-temperature strain gages, J. W. Pitts and D. G. Moore. March 17, 1961.
27. Bibliography of temperature measurement, January 1953 to June 1960, C. Halpern and R. J. Moffat. April 6, 1961.
28. Causes of variation in chemical analysis and physical tests of Portland cement, B. L. Bean and J. R. Dise. April 27, 1961.
29. Thermal expansion of technical solids at low temperatures. A compilation from the literature, R. J. Corruccini and J. J. Gniewek. May 19, 1961.
30. Corrected optical pyrometer readings, D. E. Poland, J. W. Green, and J. L. Margrave. April 21, 1961.

MISCELLANEOUS PUBLICATIONS

M

230. Standardization activities in the United States. A descriptive directory, S. F. Booth. August 1, 1960. Supersedes M169.
231. Hydraulic research in the United States, 1960, H. K. Middleton. August 5, 1960.
232. The metric system of measurement (1 chart). Rev. April 1, 1961. Supersedes MP3.
233. Units of weight and measure (United States customary and metric). Definitions and tables of equivalents, L. V. Judson. December 20, 1960. Supersedes M214.
234. Household weights and measures (card). October 1960. Supersedes M39.
235. Report of the 45th national conference on weights and measures, 1960.
236. Standard frequencies and time signals from NBS stations WWV and WWVH. December 1, 1960.
237. Research highlights of the National Bureau of Standards, Annual Report 1960.
240. Publications of the National Bureau of Standards, July 1, 1957, to June 30, 1960. (Includes titles of papers published in outside journals 1950 to 1959), B. L. Arnold. April 3, 1961. Accompanies C460 and Supplement.

HANDBOOKS

H

28. (1957)--Part III. Screw-thread standards for Federal Services, 1957. October 7, 1960.
72. Measurement of neutron flux and spectra for physical and biological applications. July 15, 1960.
73. Protection against radiations from sealed gamma sources, July 27, 1960. Supersedes H54.
74. Building code requirements for reinforced masonry. October 21, 1960.
75. Measurement of absorbed dose of neutrons, and of mixtures of neutrons and gamma rays, February 3, 1961.
76. Medical x-ray protection up to three million volts. February 9, 1961. Supersedes H60.
77. Precision measurement and calibration. Vol. I. Electricity and electronics; Vol. II. Heat and mechanics; and Vol. III. Optics, metrology, and radiation. February 1, 1961.
78. Report of the international commission on radiological units and measurements (ICRU) 1959. January 16, 1961. Supersedes H62.

NBS Technical Notes, initiated in 1959, are designed to supplement the Bureau's regular publications program. They provide a means for making available scientific data that are of transient or limited interest. They are for sale by the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. (Order by PB number only).

TN

- 2-2 (PB151361-2). Supplementary world maps of F2 critical frequencies and maximum usable frequency factors, D. H. Zacharisen. October 1960. \$3.50.
- 18-3 (PB151377-3). Quarterly radio noise data - June, July, August 1959, W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. September 9, 1960. \$1.00.
- 18-4 (PB151377-4). Quarterly radio noise data - September, October, November 1959, W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. September 28, 1960. \$1.50.
- 18-5 (PB151377-5). Quarterly radio noise data - December, January, February 1959-60, W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. October 10, 1960. \$1.75.
- 18-6 (PB151377-6). Quarterly radio noise data - March, April, May 1960, W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. October 19, 1960. \$1.75.
- 18-7 (PB151377-7). Quarterly radio noise data - June, July, August 1960, W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. November 4, 1960. \$1.75.
- 18-8 (PB151377-8). Quarterly radio noise data - September, October, November 1960, W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. January 31, 1961. \$1.75.
- 18-9 (PB151377-9). Quarterly radio noise data - December, January, February 1960-61, W. Q. Crichlow, R. T. Disney, and M. A. Jenkins. April 18, 1961. \$1.75.
- 40-3 (PB151399-3). Mean electron density variations of the quiet ionosphere, J. W. Wright, L. R. Wecostt and D. J. Brown. March 1960. \$1.50.
- 58 (PB161559). A survey and bibliography of recent research in the propagation of VLF radio waves, J. R. Wait. May 1960. 75 cents.
- 59 (PB161560). Measurements and standards in plasma-physics and astrophysics at the National Bureau of Standards. July 1960. \$1.00.
- 60 (PB161561). Amplitude and phase of the low- and very low-radiofrequency ground wave, J. R. Johler, L. C. Walters, and C. M. Lilley, June 1, 1960. 75 cents.
- 61 (PB161562). Proceedings of the 1960 conference on the propagation of ELF radio waves, J. R. Wait. June 1960. 75 cents.
- 62 (PB161563). Rapid determination of the order of chemical reactions from the time-ratio tables, J. H. Flynn. August 1960. \$3.00.
- 63 (PB161564). Single scattered neutrons from an isotropic point source, E. R. Mosburg, Jr., W. M. Murphey. July 1960. 50 cents.
- 64 (PB161565). Design and operation of the Ceilometer computer, P. Meissner. October 1960. \$2.00.
- 65 Unassigned.
- 66 (PB161567). Radio refractometry, J. W. Herbstreit. July 1960. 50 cents.
- 67 (PB161568). On the nature of the crystal field approximation, H. Goldberg and C. M. Herzfeld. October 1960. \$2.50.
- 68 (PB161569). Transistorized building blocks for data instrumentation, J. A. Cunningham and R. L. Hill. July 1960. \$2.00.
- 69 (PB161570). Low- and very low-radiofrequency model ionosphere reflection coefficients, J. R. Johler, L. C. Walters, and J. D. Harper, Jr. July 1, 1960. \$2.00.
- 70 (PB161571). Vapor pressures of organic compounds in the range below one millimeter of mercury, E. E. Hughes and S. G. Lias. October 1960. 75 cents.
- 71 (PB161572). Calibration of five gamma-emitting nuclides for emission rate, J. M. R. Hutchinson. July 1960. 75 cents.
- 72 (PB161573). Table of magnitude of reflection coefficient versus return loss $(L_R = 20 \log \frac{1}{|r|})$, R. W. Beatty and W. J. Anson. September 19, 1960. \$1.25.
- 73 (PB161574). Some experiments on the deposition of gases at 4.2° K, T. Braurer. October 1960. \$1.00.
- 74 (PB161575). Scattering of cobalt-60 gamma radiation in air ducts, C. Eisenhauer. October 1960. 75 cents.
- 75 (PB161576). Soviet research in field electron and ion emission, 1955-1959; an annotated bibliography, T. W. Marton and R. Klein. October 1960. \$1.25.
- 76 (PB161577). ISOPAR. A new improved symbolic optimizing assembly routine for the IBM 650, H. H. Howe. July 19, 1960. \$1.50.
- 77 (PB161578). VHF and UHF power generators for RF instrumentation, A. H. Morgan and P. A. Hudson. September 1960. 75 cents.
- 78 (PB161579). Oblique incidence receiving antenna array for a relative ionospheric opacity meter, A. C. Wilson. November 1960. 50 cents.
- 79 (PB161580). VHF radio propagation data for Cedar Rapids-Serling, Anchorage-Barrow, and Fargo-Churchill test paths, April 1951 through June 1958, G. R. Sugar and K. W. Sullivan. September 1, 1960. \$4.00.
- 80 (PB161581). Bibliography of tropospheric radio wave scattering, R. L. Abbott. November 1960. \$2.25.
- 81 (PB161582). An evaluation of Kacser's second order born approximation to the bremsstrahlung differential cross section, G. S. Ofelt. June 1961. 75 cents.
- 82 (PB161583). A survey of spread-F, F. N. Glover. November 1960. \$1.75.
- 83 (PB161584). On the scattering of γ rays by nuclei, U. Fano. November 1960. 75 cents.
- 84 (PB161585). Bibliography on ionospheric propagation of radio waves (1923-1960), W. Nupen. October 1960. \$7.00.

- 85 (PB161586). A survey of computer programs for chemical information searching, E. C. Marden and H. R. Koller. February 1961. \$2.25.
- 86 (PB161587). The NBS meteor-burst propagation project - a progress report, C. E. Hornback, L. D. Breyfogle, and G. R. Sugar, March 31, 1960. \$1.25.
- 87 (PB161588). A theoretical study of sporadic-E structure in the light of radio measurements, K. Tao. January 1961. \$1.25.
- 88 (PB161589). Prolonged space-wave fadeouts in tropospheric propagation, A. P. Barsis and M. E. Johnson. February 8, 1961. \$2.00.
- 89 (PB161590). Collisions of liquid drops with liquids, O. G. Engel. May 1961. \$2.00.
- 90 (PB161591). Flux switching mechanisms in ferrite cores and their dependence on core geometry, G. W. Reimherr. May 1961. \$1.25.
- 91 (PB161592). Determination of the K fluorescence yield of argon by proportional-counter spectrometry, C. Godeau. May 1961. 50 cents.
- 92 (PB161593). Research program of the Radiation Physics Division, National Bureau of Standards, W. R. Ney and L. S. Taylor. May 1961. \$1.50.
- 96 (PB161597). On the climatology of ground-based radio ducts and associated fading regions, E. J. Dutton. June 16, 1961. \$1.75.
- 107 (PB161608). A fixed frequency, 9.1 Gc, field intensity recording receiver with extremely narrow bandwidth, R. W. Hubbard and J. V. Cateora. June 1961. 75 cents.

PERIODICALS OF THE NATIONAL BUREAU OF STANDARDS

The following two monthly periodicals are issued by the Bureau, and may be obtained on a 1-, 2-, or 3-year subscription basis (although no reduction in rates can be made) from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., as follows:

Technical News Bulletin (12 monthly issues):

Annual subscription, domestic, \$1.50; foreign, \$2.25.

Basic Radio Propagation Predictions (12 monthly issues):

Annual subscription, domestic, \$1.50; foreign, \$2.00.

The following may be obtained at the prices indicated:

TECHNICAL NEWS BULLETIN

1960, Vol. 44, Numbers 2 to 12. 15 cents each
1961, Vol. 45, Numbers 1 to 6. 15 cents each

BASIC RADIO PROPAGATION PREDICTIONS

1960, Numbers 185 to 187, 189 to 196.
15 cents each.
1961, Numbers 197 to 202. 15 cents each.

Information concerning the subscriptions on the following sections of the Journal of Research are given on page V:

| Section A (Bimonthly) (70 cents each) | Section B (Quarterly) (75 cents each) | Section C (Quarterly) (75 cents each) | Section D (Bimonthly) (70 cents each) |
|--|--|--|--|
| 1959: 63A-1 to 63A-3 | 1959: 63B-1 & 63B-2 | 1959: 63C-1 & 63C-2 | 1959: 63D-1 to 63D-3 |
| 1960: 64A-1 to 64A-6 | 1960: 64B-1 to 64B-4 | 1960: 64C-1 to 64C-4 | 1960: 64D-1 to 64D-6 |
| 1961: 65A-1 to 65A-3 | 1961: 65B-1 & 65B-2 | 1961: 64C-1 & 64C-2 | 1961: 65D-1 to 65D-3 |

JOURNAL OF RESEARCH

Bound Volumes

| Vol. | Price |
|----------------------|--------|
| 63A (July-Dec. 1959) | \$3.50 |
| 64A (Jan.-Dec. 1960) | 5.50 |
| 63B (July-Dec. 1959) | 2.25 |
| 64B (Jan.-Dec. 1960) | 2.75 |
| 63C (July-Dec. 1959) | 2.25 |
| 64C (Jan.-Dec. 1960) | 3.50 |
| 63D (July-Dec. 1959) | 3.75 |
| 64D (Jan.-Dec. 1960) | 5.75 |

Journal of Research - Bound Volumes (Issued monthly prior to July 1959):

| Vol. | Price | Vol. | Price |
|---------------------|--------|---------------------|--------|
| 33 (July-Dec. 1944) | \$3.00 | 49 (July-Dec. 1952) | \$3.50 |
| 35 (July-Dec. 1945) | 3.00 | 50 (Jan.-June 1953) | 3.75 |
| 36 (Jan.-June 1946) | 3.00 | 51 (July-Dec. 1953) | 3.75 |
| 37 (July-Dec. 1946) | 3.00 | 52 (Jan.-June 1954) | 3.75 |
| 38 (Jan.-June 1947) | 4.00 | 53 (July-Dec. 1954) | 3.75 |
| 39 (July-Dec. 1947) | 3.50 | 54 (Jan.-June 1955) | 3.75 |
| 40 (Jan.-June 1948) | 3.25 | 55 (July-Dec. 1955) | 3.75 |
| 41 (July-Dec. 1948) | 3.75 | 56 (Jan.-June 1956) | 3.75 |
| 42 (Jan.-June 1949) | 3.75 | 57 (July-Dec. 1956) | 4.00 |
| 43 (July-Dec. 1949) | 4.00 | 58 (Jan.-June 1957) | 3.75 |
| 44 (Jan.-June 1950) | 4.25 | 59 (July-Dec. 1957) | 4.25 |
| 45 (July-Dec. 1950) | 3.75 | 60 (Jan.-June 1958) | 6.00 |
| 46 (Jan.-June 1951) | 3.75 | 61 (July-Dec. 1958) | 5.25 |
| 47 (July-Dec. 1951) | 3.75 | 62 (Jan.-June 1959) | 3.50 |
| 48 (Jan.-June 1952) | 3.50 | | |

LIBRARY OF CONGRESS PHOTODUPLICATION SERVICE

The Photoduplication Service, Library of Congress, Washington 25, D. C., makes photoduplicates of material in its collections for research use. National Bureau of Standards publications are on file at the Library, so that a copy of any Bureau document that is out of print can usually be obtained. Full information concerning this service may be secured by writing to the Library of Congress at the address noted above. In making such inquiry, it is important, of course, to give an accurate and complete identification (author, title, place of publication, name of the series and number, if known) of the document desired.

PRICE LIST OF AVAILABLE PUBLICATIONS

The following is a list of National Bureau of Standards publications issued from 1901 to date that may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at the prices given. See "HOW TO PURCHASE NBS PUBLICATIONS," page IV.

The tabulation brings up to date the information given in the basic Circular 460, its Supplement, and Miscellaneous Publication 240, and should be referred to instead of these publications to determine if a given publication is still available.

Individual papers from the Journal of Research are not available by purchase. However, reprints may often be obtained directly from the author. The bimonthly (Sections A and D) and quarterly (Sections B and C) issues of the four section Journal of Research are usually obtainable by purchase from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at the prices indicated on page 9.

RESEARCH PAPERS

| No. | Price | No. | Price |
|------------------------|-------|-----------|--------|
| 768 Superseded by C590 | | 2279----- | \$0.20 |

CIRCULARS

| No. | Price | No. | Price | No. | Price |
|------------------------|--------|-----------------------------------|--------|---------------------------|--------|
| 8 Superseded by C600 | | 455----- | \$0.15 | 500 Pt. I----- | \$2.50 |
| 31 (4th edition)----- | \$0.30 | 460----- | 1.25 | 500 Pt. II----- | 2.25 |
| 47 Superseded by M121 | | 460 Supplement ¹ ----- | 1.50 | 501----- | 6.50 |
| 74----- | 1.25 | 461----- | 3.75 | 503----- | .05 |
| 142----- | .40 | 462----- | 1.25 | 505----- | .15 |
| 328 Superseded by C572 | | 465----- | .30 | 506 Superseded by C576 | |
| 332 Superseded by C572 | | 466 Superseded by C559 | | 508 Superseded by C561 | |
| 376----- | .10 | 467 Volume I----- | 5.50 | 509----- | .25 |
| 383 Superseded by C424 | | 467 Volume II----- | 4.00 | 509 Supplement----- | .50 |
| 389----- | .15 | 467 Volume III----- | 2.50 | 510----- | 4.00 |
| 398 Superseded by C552 | | 468----- | .40 | 510 Supplement No. 1----- | 3.25 |
| 402----- | .05 | 469----- | .15 | 510 Supplement No. 2----- | .35 |
| 419----- | .10 | 470----- | .30 | 512----- | .20 |
| 422----- | .15 | 472----- | .10 | 514----- | .40 |
| 427----- | .10 | 474 Superseded by C506 | | 515----- | .15 |
| 428 Superseded by C533 | | 475----- | .30 | 516 Superseded by C534 | |
| 429----- | .20 | 476----- | .50 | 517----- | .10 |
| 433----- | 1.50 | 477 Superseded by C555 | | 518----- | .65 |
| 434 Superseded by C602 | | 478----- | .40 | 519----- | 2.00 |
| 435 Superseded by C466 | | 482 Superseded by C509 | | 521----- | 2.00 |
| 440----- | 4.25 | 484----- | .35 | 523----- | 1.50 |
| 440 Supplement----- | .05 | 485 Superseded by C592 | | 524----- | 2.00 |
| 441----- | .05 | 488 Section 1----- | .55 | 526----- | 2.25 |
| 442----- | .05 | 488 Section 2----- | .70 | 528----- | 1.50 |
| 443----- | .05 | 490----- | .25 | 531----- | .35 |
| 447----- | 3.50 | 492----- | .15 | 532----- | .15 |
| 449----- | .10 | 493----- | .10 | 533----- | 1.75 |
| 450 Superseded by C579 | | 495 Superseded by Mono. 18 | | 535----- | .35 |
| 453----- | .10 | 497----- | .15 | 536----- | .20 |
| 454----- | .15 | 498----- | .20 | 537----- | .20 |

¹Supplement for July 1, 1947 to June 30, 1957

CIRCULARS (Continued)

| No. | Price | No. | Price | No. | Price |
|-----------------------|--------|----------------------------|--------|--------------------|--------|
| 538----- | \$0.15 | 561----- | \$0.55 | 585----- | \$0.50 |
| 539 Volume IV----- | .45 | 562----- | .50 | 586----- | .20 |
| 539 Volume V----- | .45 | 562 Supplement No. 1----- | .25 | 587----- | .15 |
| 539 Volume 6----- | .40 | 563----- | .20 | 588----- | .10 |
| 539 Volume 7----- | .40 | 563 Supplement No. 1----- | .10 | 589----- | .50 |
| 539 Volume 8----- | .45 | 565----- | .30 | 590----- | .20 |
| 539 Volume 9----- | .40 | 566----- | 8.75 | 591 Section 1----- | .20 |
| 539 Volume 10----- | .40 | 567----- | 1.00 | 592----- | .60 |
| 540----- | 1.25 | 568----- | .20 | 593----- | .30 |
| 541----- | .20 | 569----- | .25 | 594----- | .35 |
| 542----- | .55 | 571----- | .50 | 595----- | .40 |
| 543----- | .15 | 572 Superseded by Mono. 15 | | 596----- | .30 |
| 545----- | .50 | 573----- | .35 | 597----- | .20 |
| 547 Section 1----- | .35 | 574----- | .20 | 598----- | .15 |
| 548----- | .40 | 575----- | .15 | 599----- | .25 |
| 550----- | .35 | 576----- | .15 | 600----- | .20 |
| 551----- | 2.00 | 577----- | .30 | 601----- | .30 |
| 552 (3d edition)----- | .35 | 577 Supplement----- | .30 | 602----- | .20 |
| 553----- | 2.00 | 578----- | .15 | 603----- | .65 |
| 554----- | .30 | 579----- | 3.00 | | |
| 555----- | .10 | 580----- | .15 | | |
| 556----- | .50 | 581----- | 1.50 | | |
| 557----- | .30 | 582----- | 3.25 | | |
| 559 Superseded by H71 | | 583 Supplement----- | .15 | | |
| 560----- | .15 | 584----- | .20 | | |

MONOGRAPHS

| No. | Price | No. | Price | No. | Price |
|------------------|--------|---------|--------|---------|--------|
| 1----- | \$0.45 | 10----- | \$0.20 | 20----- | \$2.75 |
| 2----- | .25 | 11----- | .20 | 21----- | .20 |
| 3 Volume I----- | 6.00 | 12----- | 1.50 | 22----- | 2.00 |
| 3 Volume II----- | 6.00 | 13----- | 1.50 | 23----- | .20 |
| 4----- | .45 | 14----- | .15 | 24----- | .20 |
| 5----- | .20 | 15----- | .15 | 26----- | .20 |
| 6----- | .20 | 16----- | .20 | 27----- | .15 |
| 7----- | .25 | 17----- | .65 | 28----- | .25 |
| 8----- | .40 | 18----- | .35 | 29----- | .30 |
| 9----- | .15 | 19----- | .60 | 30----- | .55 |

BUILDING MATERIALS AND STRUCTURES REPORTS

| No. | Price | No. | Price | No. | Price |
|---|--------|----------|--------|-----------------------|--------|
| 4----- | \$0.10 | 73----- | \$0.10 | 129----- | \$0.10 |
| 5----- | .25 | 74----- | .20 | 130----- | .15 |
| 8----- | .15 | 78----- | .35 | 131----- | .15 |
| 10----- | .10 | 79----- | .20 | 132----- | .25 |
| 11----- | .10 | 80----- | .25 | 133----- | .25 |
| 17 Superseded by BMS 144 | | 82----- | .25 | 135----- | .15 |
| 17 Supplement ¹ —Superseded by BMS144 | | 95----- | .30 | 136----- | .15 |
| 17 Supplement ² —Superseded by BMS144 | | 102----- | .15 | 137----- | .15 |
| | | 106----- | .15 | 139----- | .25 |
| | | 110----- | .20 | 140 (3d edition)----- | .30 |
| 19 Superseded by BMS116 | | 112----- | .15 | 141----- | .20 |
| 25----- | .25 | 114----- | .25 | 142----- | .25 |
| 39----- | .10 | 117----- | .25 | 143----- | .35 |
| 52----- | .15 | 118----- | .25 | 144----- | .40 |
| 56----- | .10 | 121----- | .35 | 144 Supplement----- | .05 |
| 58----- | .15 | 122----- | .20 | 144 Supplement 2----- | .10 |
| 64----- | .10 | 124----- | .15 | 145----- | .20 |
| 66----- | .40 | 125----- | .30 | 146----- | .15 |
| 67----- | .20 | 127----- | .15 | 147----- | .20 |
| 71----- | .30 | 128----- | .20 | 148----- | .15 |
| | | | | 149----- | .20 |
| | | | | 150----- | .15 |
| | | | | 151----- | .20 |
| | | | | 152----- | .15 |

¹Supplement No. 1, Dec. 20, 1940.
²Supplement No. 2, Sept. 15, 1947.

APPLIED MATHEMATICS SERIES

| No. | Price | No. | Price | No. | Price |
|-----------------------|--------|---------|--------|---------|--------|
| 1 Superseded by AMS25 | | 29----- | \$3.50 | 50----- | \$3.25 |
| 2----- | \$0.15 | 30----- | .30 | 51----- | 4.50 |
| 5----- | .50 | 31----- | 4.75 | 52----- | .25 |
| 6----- | 3.25 | 32----- | 2.25 | 53----- | 4.00 |
| 8----- | .30 | 33----- | .40 | 54----- | .30 |
| 9----- | 1.75 | 34----- | 2.00 | 56----- | .30 |
| 11----- | 1.50 | 35----- | 2.00 | 57----- | .15 |
| 12----- | .35 | 36----- | 4.00 | | |
| 14----- | 5.50 | 37----- | 2.25 | | |
| 16----- | .15 | 38----- | .25 | | |
| 17----- | 2.00 | 40----- | .35 | | |
| 18----- | 2.25 | 41----- | 3.25 | | |
| 19----- | 3.75 | 42----- | .40 | | |
| 20----- | 1.75 | 43----- | 3.00 | | |
| 21----- | .15 | 44----- | .30 | | |
| 22----- | .25 | 45----- | .55 | | |
| 23----- | 3.25 | 46----- | .50 | | |
| 26----- | 2.00 | 47----- | .45 | | |
| 27----- | 3.50 | 48----- | .50 | | |
| 28----- | .45 | 49----- | .50 | | |

HANDBOOKS

| No. | Price | No. | Price | No. | Price |
|----------------------------|--------|----------------------|--------|------------------|--------|
| 20 Superseded by H41 | | 51----- | \$0.20 | 73----- | \$0.30 |
| 21 Superseded by H46 | | 52 Superseded by H69 | | 74----- | .15 |
| 22 Superseded by H44 | | 53----- | .15 | 75----- | .35 |
| 23 Superseded by H54 | | 54 Superseded by H73 | | 76----- | .25 |
| 25 Superseded by H28 | | 55----- | .25 | 77 Part I----- | 6.00 |
| 28 ¹ | | 56 Superseded by H65 | | 77 Part II----- | 6.75 |
| 28 Supplement ¹ | | 57----- | .15 | 77 Part III----- | 7.00 |
| 28 1957 (Part I)----- | \$1.25 | 58----- | .20 | 78----- | .65 |
| 28 1957 (Part II)----- | .75 | 59----- | .35 | | |
| 28 1957 (Part III)----- | .60 | 60 Superseded by H76 | | | |
| 30----- | 2.25 | 62 Superseded by H78 | | | |
| 32 Superseded by H43 | | 63----- | .40 | | |
| 40 Superseded by H46 | | 64----- | .20 | | |
| 41 Superseded by H60 | | 65----- | .15 | | |
| 42----- | .20 | 66----- | .20 | | |
| 44 (2d edition) looseleaf | 1.00 | 67----- | .35 | | |
| 47 Superseded by H62 | | 68----- | 1.00 | | |
| 48----- | .15 | 69----- | .35 | | |
| 49----- | .15 | 71----- | .25 | | |
| 50----- | .20 | 72----- | .35 | | |

¹H28 and its 1950 supplement are superseded by H28(1957), pts. I, II, and III.

MISCELLANEOUS PUBLICATIONS

| No. | Price | No. | Price | No. | Price |
|------------------------|--------|------------------------|--------|----------|--------|
| 3 Superseded by M232 | | 204----- | \$0.50 | 224----- | \$1.25 |
| 39 Superseded by M234 | | 205----- | 1.00 | 225----- | .65 |
| 121 Superseded by M214 | | 208----- | 1.25 | 226----- | .45 |
| 155 Superseded by M190 | | 209----- | .40 | 227----- | 1.25 |
| 169 Superseded by M230 | | 210----- | 1.25 | 228----- | .65 |
| 170----- | \$0.35 | 211----- | .20 | 230----- | 1.75 |
| 174 Superseded by M211 | | 212----- | .50 | 231----- | 1.00 |
| 189----- | .40 | 213----- | .60 | 232----- | .50 |
| 192----- | .45 | 214 Superseded by M233 | | 233----- | .40 |
| 193----- | .15 | 216----- | .70 | 234----- | .05 |
| 196----- | .25 | 217----- | .55 | 235----- | .75 |
| 197----- | .10 | 218----- | 1.50 | 236----- | .10 |
| 200----- | .50 | 219----- | .70 | 237----- | .65 |
| 201----- | 1.25 | 222----- | .55 | 240----- | 2.25 |
| 203----- | .20 | 223----- | .45 | | |

BUILDING AND HOUSING PUBLICATION

| No. | Price |
|---------|--------|
| 13----- | \$1.50 |

PURCHASE OF TECHNICAL NOTES

The following is a list of the National Bureau of Standards Technical Note Series. This series is available only by purchase from the U. S. Department of Commerce, Office of Technical Services, Washington 25, D. C., at the prices indicated. The "PB" number in parenthesis is to be used when ordering this series.

| No. | Price | No. | Price |
|--------------------------|--------|-----------------------|--------|
| TN1 (PB151360)----- | \$0.75 | TN43 (PB151402)----- | \$2.25 |
| TN2 (PB151361)----- | 3.50 | TN44 (PB151403)----- | .50 |
| TN2-2 (PB151361-2)----- | 3.50 | TN45 (PB151404)----- | .50 |
| TN3 (PB151362)----- | .50 | TN46 (PB151405)----- | 2.50 |
| TN4 (PB151363)----- | .75 | TN47 (PB151406)----- | .50 |
| TN5 (PB151364)----- | 1.25 | TN48 (PB151407)----- | 2.50 |
| TN6 (PB151365)----- | 2.25 | TN49 (PB151408)----- | 1.00 |
| TN7 (PB151366)----- | 2.25 | TN50 (PB151409)----- | 1.75 |
| TN8 (PB151367)----- | 1.25 | TN51 (PB161552)----- | .50 |
| TN9 (PB151368)----- | .75 | TN52 (PB161553)----- | .50 |
| TN10 (PB151369)----- | 1.00 | TN53 (PB161554)----- | 1.00 |
| TN11 (PB151370)----- | .50 | TN54 (PB161555)----- | .50 |
| TN12 (PB151371)----- | 3.00 | TN55 (PB161556)----- | 1.00 |
| TN13 (PB151372)----- | 2.50 | TN56 (PB161557)----- | 1.75 |
| TN14 (PB151373)----- | .50 | TN57 (PB161558)----- | .50 |
| TN15 (PB151374)----- | 1.50 | TN58 (PB161559)----- | .75 |
| TN16 (PB151375)----- | 2.75 | TN59 (PB161560)----- | 1.00 |
| TN18 (PB151377)----- | 2.50 | TN60 (PB161561)----- | .75 |
| TN18-2 (PB151377-2)----- | 4.00 | TN61 (PB161562)----- | .75 |
| TN18-3 (PB151377-3)----- | 1.00 | TN62 (PB161563)----- | 3.00 |
| TN18-4 (PB151377-4)----- | 1.50 | TN63 (PB161564)----- | .50 |
| TN18-5 (PB151377-5)----- | 1.75 | TN64 (PB161565)----- | 2.00 |
| TN18-6 (PB151377-6)----- | 1.75 | TN66 (PB161567)----- | .50 |
| TN18-7 (PB151377-7)----- | 1.75 | TN67 (PB161568)----- | 2.50 |
| TN18-8 (PB151377-8)----- | 1.75 | TN68 (PB161569)----- | 2.00 |
| TN18-9 (PB151377-9)----- | 1.75 | TN69 (PB161570)----- | 2.00 |
| TN19 (PB151378)----- | .50 | TN70 (PB161571)----- | .75 |
| TN20 (PB151379)----- | 1.00 | TN71 (PB161572)----- | .75 |
| TN21 (PB151380)----- | .75 | TN72 (PB161573)----- | 1.25 |
| TN22 (PB151381)----- | 1.50 | TN73 (PB161574)----- | 1.00 |
| TN23 (PB151382)----- | .50 | TN74 (PB161575)----- | .75 |
| TN24 (PB151383)----- | 1.00 | TN75 (PB161576)----- | 1.25 |
| TN25 (PB151384)----- | .50 | TN76 (PB161577)----- | 1.50 |
| TN26 (PB151385)----- | 1.00 | TN77 (PB161578)----- | .75 |
| TN27 (PB151386)----- | 1.50 | TN78 (PB161579)----- | .50 |
| TN28 (PB151387)----- | 2.00 | TN79 (PB161580)----- | 4.00 |
| TN29 (PB151388)----- | .50 | TN80 (PB161581)----- | 2.25 |
| TN30 (PB151389)----- | 1.25 | TN81 (PB161582)----- | .75 |
| TN31 (PB151390)----- | 2.25 | TN82 (PB161583)----- | 1.75 |
| TN33 (PB151392)----- | 2.50 | TN83 (PB161584)----- | .75 |
| TN34 (PB151393)----- | .50 | TN84 (PB161585)----- | 7.00 |
| TN35 (PB151394)----- | .75 | TN85 (PB161586)----- | 2.25 |
| TN36 (PB151395)----- | 4.00 | TN86 (PB161587)----- | 1.25 |
| TN37 (PB151396)----- | .50 | TN87 (PB161588)----- | 1.25 |
| TN38 (PB151397)----- | .75 | TN88 (PB161589)----- | 2.00 |
| TN39 (PB151398)----- | .50 | TN89 (PB161590)----- | 2.00 |
| TN40-1 (PB151399-1)----- | 1.25 | TN90 (PB161591)----- | 1.25 |
| TN40-2 (PB151399-2)----- | 1.25 | TN91 (PB161592)----- | .50 |
| TN40-3 (PB151399-3)----- | 1.50 | TN92 (PB161593)----- | 1.50 |
| TN41 (PB151400)----- | 2.25 | TN96 (PB161597)----- | 1.75 |
| TN42 (PB151401)----- | 1.25 | TN107 (PB161608)----- | .75 |

DEPOSITORY LIBRARIES IN THE UNITED STATES RECEIVING
NATIONAL BUREAU OF STANDARDS PUBLICATIONS

ALABAMA

Auburn: Alabama Polytechnic Institute Library.
Birmingham: Howard College Library.
M. Paul Philipps Library.
Public Library.
Florence: State Teachers College Library.
Jacksonville: State Teachers College Library.
Mobile (Spring Hill): Thomas Byrne Memorial
Library, Spring Hill
College.
Montgomery: Department of Archives and
History Library.
State and Supreme Court Library.
Tuskegee Institute: Hollis Burke Frissell
Library.
University: University of Alabama Library.

ALASKA

College: University of Alaska Library.
Juneau: Territorial Historical Library and
Museum.

ARIZONA

Flagstaff: Arizona State Teachers College
Library.
Phoenix: Department of Library and Archives.
Phoenix Public Library.
Tempe: Matthews Library.
Tucson: University of Arizona Library.

ARKANSAS

Clarksville: College of the Ozarks Library.
Conway: Hendrix College Library.
Fayetteville: University of Arkansas Library.
Little Rock: Little Rock Public Library.
Russellville: Arkansas Polytechnic College
Library.
State College: Arkansas State College Library.

CALIFORNIA

Bakersfield: Kern County Free Library.
Berkeley: University of California Library.
Claremont: Pomona College, Honnold Library.
Davis: University of California Library.
Eureka: Eureka Free Library.
Fresno: Fresno County Free Library.
Long Beach: Public Library.
Los Angeles: University of Southern California
Library.
Los Angeles Public Library.
Los Angeles State College of Ap-
plied Arts and Sciences Library.
Loyola University Library.
Occidental College Library.
University of California at
Los Angeles Library.
Northridge: San Fernando Valley State College
Library.
Oakland: Oakland Public Library
Pasadena: California Institute of Technology
Library.

CALIFORNIA (continued)

Redding: Shasta County Free Library.
Redlands: University of Redlands Library.
Richmond: Richmond Public Library.
Riverside: Riverside Public Library.
Sacramento: California State Library.
City Free Library.
San Diego: San Diego Public Library.
San Francisco: Mechanics Mercantile Library.
San Francisco Public Library.
San Francisco State College,
Social Science and Business
Library.
Santa Barbara: Santa Barbara Public Library.
Stanford Univ.: Stanford University Library.
Stockton: Stockton Free Public Library.

COLORADO

Boulder: University of Colorado Library.
Colorado Springs: Colorado College, Coburn
Library.
Denver: Colorado State Library.
Public Library.
Regis College Library.
U.S. Air Force Academy.
University of Denver, Mary Reed
Library.
Fort Collins: Colorado State College of Agri-
culture and Mechanic Arts
Library.
Golden: Colorado School of Mines Library.
Gunnison: Western State College Library.
Pueblo: McClelland Public Library.

CONNECTICUT

Bridgeport: Bridgeport Public Library.
Hartford: Connecticut State Library.
Hartford Public Library.
Trinity College Library.
Middletown: Wesleyan University, Olin Library.
New Haven: Yale University Library.
New London: Connecticut College, Palmer
Library.
U. S. Coast Guard Academy
Library.
Storrs: University of Connecticut Library.
Waterbury: Silas Bronson Library.

DELAWARE

Dover: Delaware State Library.
Newark: University of Delaware Library.
Wilmington: Wilmington Institute Free Library.

DISTRICT OF COLUMBIA

Washington: Department of Agriculture Library.
Department of Commerce Library.
Department of Health, Education,
and Welfare Library.
Department of Interior Central
Library.
Department of Justice Main
Library.

Washington: Department of State Library.
National War College Library.
Naval Records and Library, Navy
Department.
Post Office Department
Library.
Public Library.
Treasury Department Library.

FLORIDA

Coral Gables: University of Miami Library.
De Land: Sampson Library of John B. Stetson
University.
Gainesville: University of Florida Library.
Jacksonville: Jacksonville Public Library.
Lakeland: Lakeland Public Library.
Miami: Miami Public Library.
Tallahassee: Florida Agricultural and Mechanical
College Library.
Florida State Library.
Florida State University Library.
Tampa: University of Tampa Library.
Winter Park: Rollins College, Mills Memorial
Library.

GEORGIA

Athens: University of Georgia General Library.
Atlanta: Atlanta Public Library.
Georgia State Library.
Collegeboro: Georgia Teachers College Library.
Dahlonega: North Georgia College Library.
Emory University: Asa Griggs Candler Library.
Milledgeville: Georgia State College for Women
Library.
Savannah: Savannah Public Library.
Valdosta: Valdosta State College Library.

HAWAII

Honolulu: Library of Hawaii.
University of Hawaii Library.

IDAHO

Boise: Boise Public Library.
Idaho State Law Library.
Caldwell: Strahorn Memorial Library.
Moscow: University of Idaho Library.
Pocatello: Idaho State College Library.
Rexberg: Ricks College Library.

ILLINOIS

Carbondale: Southern Illinois University Library.
Carlinville: Blackburn College Library.
Chicago: Amundsen Junior College Library.
Chicago Public Library.
Chicago Teachers College Library.
John Crerar Library.
Museum of Science and Industry
Library.
Newberry Library.
University of Chicago Libraries.
University of Illinois Library.
Decatur: Decatur Public Library.

Elsah: The Marshall Brooks Library.
Evanston: Northwestern University Library.
Freeport: Freeport Public Library.
Galesburg: Galesburg Public Library.
Jacksonville: MacMurray College Library.
Joliet: Public Library.
Kankakee: Olivet Nazarene College Library.
Lisle: St. Procopius College Library.
Lockport: Lewis College of Science and Tech-
nology Library.
Monmouth: Monmouth College Library.
Normal: Illinois State Normal University
Library.
Peoria: Peoria Public Library.
Rock Island: Rock Island Public Library.
Rockford: Public Library.
Springfield: Illinois State Library.
Urbana: University of Illinois Library.

INDIANA

Bloomington: Indiana University Library.
Crawfordsville: Wabash College Library.
Evansville: Evansville Public Library.
Fort Wayne: Public Library.
Gary: Gary Public Library.
Greencastle: De Pauw University Library.
Hanover: Hanover College Library.
Indianapolis: Indiana State Library.
Indianapolis Public Library.
Lafayette: Purdue University Library.
Muncie: Public Library.
Notre Dame: University of Notre Dame Library.
Richmond: Morrison-Reeves Library.
Terre Haute: Indiana State Teachers College
Library.
Valparaiso: Valparaiso University Library.

IOWA

Ames: Iowa State College Library.
Cedar Falls: Iowa State Teachers College
Library.
Council Bluffs: Free Public Library.
Des Moines: Iowa State Traveling Library.
Public Library.
Dubuque: Carnegie Stout Free Public Library.
Fairfield: Fairfield Free Public Library.
Grinnell: Grinnell College Library.
Iowa City: State University of Iowa Library.
Lamoni: Graceland College Library.
Mount Pleasant: Iowa Wesleyan College Library.
Mount Vernon: Cornell College Library.
Sioux City: Public Library.

KANSAS

Baldwin City: Baker University Library.
Emporia: William Allen White Library, Kansas
State Teachers College.
Hays: Forsyth Library of Fort Hays Kansas
State College.
Lawrence: University of Kansas Library.
Manhattan: Kansas State College Library.
Pittsburg: Porter Library, Kansas State Teach-
ers College.
Salina: Kansas Wesleyan University Library.

KANSAS (continued)

Topeka: Kansas State Historical Society Library.
 Kansas State Library.
 Wichita: University of Wichita Library.

KENTUCKY

Ashland: Ashland Public Library.
 Barbourville: Abigail E. Weeks Memorial
 Library, Union College.
 Bowling Green: Western Kentucky State Teachers
 College Library.
 Danville: Centre College Library.
 Frankfort: State Law Library.
 Kentucky State College Library.
 Lexington: University of Kentucky Library.
 Louisville: Louisville Free Public Library.
 University of Louisville Library.
 Murray: Murray State Teachers College Library.
 Pikeville: Pikeville College Library.

LOUISIANA

Baton Rouge: Louisiana State University Law
 Library.
 Louisiana State University Library.
 Southern University Library.
 Lafayette: Southwestern Louisiana Institute
 Library.
 Lake Charles: McNeese State College Library.
 Natchitoches: Northwestern State College of
 Louisiana.
 New Orleans: Law Library of Louisiana.
 Loyola University Library.
 New Orleans Public Library.
 Tulane University, Howard-Tilton
 Memorial Library.
 Ruston: Louisiana Polytechnic Institute Library.
 Shreveport: Shreve Memorial Library.

MAINE

Augusta: Maine State Library.
 Bangor: Bangor Public Library.
 Brunswick: Bowdoin College Library.
 Lewiston: Bates College Library.
 Orono: University of Maine Library.
 Portland: Portland Public Library.
 Waterville: Colby College Library.

MARYLAND

Annapolis: Maryland State Library.
 U. S. Naval Academy Library.
 Baltimore: Enoch Pratt Free Library.
 Johns Hopkins University Library.
 Morgan State College Library.
 Peabody Institute Library.
 Chestertown: Washington College, George Avery
 Bunting Library.
 College Park: University of Maryland Library.
 Gaithersburg: Montgomery County Department
 of Public Libraries.
 Westminster: Western Maryland College Library.

MASSACHUSETTS

Amherst: Amherst College Library.
 University of Massachusetts,
 Goodell Library.
 Boston: Boston Athenaeum Library.
 Boston Public Library.
 State Library of Massachusetts.
 Brookline: Public Library.
 Cambridge: Harvard College Library, Serials
 Division.
 Massachusetts Institute of Tech-
 nology Library.
 Lowell: Lowell Textile Institute Library.
 Lynn: Lynn Public Library.
 New Bedford: Public Library.
 Tufts College: Tufts College Library.
 Wellesley; Wellesley College Library.
 Williamstown: Williams College Library.
 Worcester: American Antiquarian Society
 Library.
 Free Public Library.

MICHIGAN

Ann Arbor: General Library of University of
 Michigan.
 Battle Creek: Willard Library.
 Benton Harbor: Benton Harbor Public Library.
 Bloomfield Hills: Cranbrook Institute of Science
 Library.
 Dearborn: Henry Ford Community College
 Library.
 Detroit: Detroit Public Library.
 University of Detroit Library.
 Wayne University, General Library.
 East Lansing: Michigan State College of Agri-
 culture and Applied Science
 Library.
 Flint: Robert N. Mandeville High School Library.
 Grand Rapids: Grand Rapids Public Library.
 Houghton: Michigan College of Mining and
 Technology Library.
 Kalamazoo: Public Library.
 Lansing: Michigan State Library.
 Mt. Pleasant: Central Michigan College Library.
 Muskegon: Hackley Public Library.
 Port Huron: Port Huron Public Library.
 Saginaw: Hoyt Public Library.

MINNESOTA

Collegeville: St. Johns University Library.
 Duluth: Duluth Public Library.
 Minneapolis: Public Library.
 University of Minnesota Library.
 Moorhead: State Teachers College Library.
 Northfield: Carleton College Library.
 St. Olaf College Library.
 St. Paul: Minnesota Historical Society Library.
 Minnesota State Law Library
 St. Paul Public Library
 Stillwater: Stillwater Public Library.

MISSISSIPPI

Columbus: J. C. Fant Memorial Library of Mississippi State College for Women.
 Hattiesburg: Mississippi Southern College Library.
 Jackson: Mississippi Library Commission. Mississippi State Library.
 State College: Mississippi State College, Mitchell Memorial Library.
 University: University of Mississippi Library.

MISSOURI

Cape Girardeau: Kent Library Southeast Missouri State College.
 Columbia: University of Missouri Library.
 Fulton: Westminster College Library.
 Jefferson City: Lincoln University Library, Missouri Supreme Court Library.
 Kansas City: Kansas City Public Library, Rockhurst College Library, University of Kansas City Library
 Liberty: William Jewell College Library.
 Rolla: School of Mines & Metallurgy Library.
 St. Joseph: St. Joseph Public Library.
 St. Louis: St. Louis Public Library, St. Louis University Library, Washington University Library.
 Springfield: Drury College Library.
 Warrensburg: Central Missouri State College Library.

MONTANA

Billings: Eastern Montana College Library.
 Bozeman: Montana State College Library.
 Butte: Montana School of Mines Library.
 Helena: Helena Public Library, Historical Society of Montana Library.
 Missoula: State University of Montana Library.

NEBRASKA

Blair: Dana College Library.
 Crete: Whitin Library of Doane College.
 Fremont: Midland College Library.
 Lincoln: Nebraska State Library, University of Nebraska Library.
 Omaha: Municipal University of Omaha Library, Omaha Public Library

NEVADA

Carson City: Nevada State Library.
 Hawthorne: Mineral County Public Library.
 Reno: University of Nevada Library, Washoe County Library.

NEW HAMPSHIRE

Concord: New Hampshire State Library.
 Dover: Dover Public Library.
 Durham: University of New Hampshire Library.
 Hanover, Dartmouth College Library.
 Laconia: Laconia Public Library.
 Manchester: City Library.

NEW JERSEY

Atlantic City: Free Public Library.
 Bayonne: Free Public Library.
 Camden: Camden Free Public Library.
 Convent Station: Santa Maria Library of College of St. Elizabeth.
 Elizabeth: Public Library.
 Jersey City: Free Public Library.
 Madison: Rose Memorial Library.
 New Brunswick: Free Public Library, Rutgers University Library.
 Newark: Public Library.
 Princeton: Princeton University Library.
 Rutherford: Fairleigh Dickinson College Library.
 South Orange: Seton Hall University Library.
 Trenton: Division of State Library, Archives and History--Department of Education, Free Public Library.

NEW MEXICO

Albuquerque: University of New Mexico.
 Las Vegas: New Mexico Highlands University, Rodgers Library.
 Santa Fe: New Mexico State Law Library.
 Silver City: New Mexico State Teachers College Library.
 State College: New Mexico College of Agriculture and Mechanic Arts Library.

NEW YORK

Albany: New York State Library.
 Brooklyn: Brooklyn College Library, Brooklyn Public Library, Pratt Institute Library.
 Buffalo: Buffalo and Erie County Public Library, Grosvenor Library.
 Canton: St. Lawrence University Library.
 Elmira: Elmira College Library.
 Farmingdale: Long Island Agricultural and Technical Institute Library.
 Flushing: Queens College Library.
 Glens Falls: Crandall Library.
 Hamilton: Colgate University Library.
 Ithaca: Albert R. Mann Library, New York State Colleges of Agriculture and Home Economics, Cornell University Library.
 Jamaica: Queens Borough Public Library, St. Johns University Library.
 New York City: College of the City of New York Library, Columbia University Library, Cooper Union Library, Fordham University Library, New York Law Institute Library, New York Public Library (Astor Branch), New York Public Library (Lenox Branch), New York State Maritime College Library, New York University General Library.
 Newburgh: Newburgh Free Library.
 Potsdam: Clarkson College of Technology Library.

NEW YORK (continued)

Poughkeepsie: Vassar College Library.
 Rochester: Rochester Public Library, Edger-
 ton Branch.
 University of Rochester Library.
 St. Bonaventure: St. Bonaventure College
 Library.
 Schenectady: Union College Library.
 Staten Island: Wagner College Library, Grymes
 Hill.
 Syracuse: Syracuse University Library.
 Troy: Troy Public Library.
 Utica: Utica Public Library.
 West Point: U. S. Military Academy.
 Yonkers: Yonkers Public Library.

NORTH CAROLINA

Chapel Hill: University of North Carolina
 Library.
 Charlotte: Queens College Library.
 Cullowhee: Western Carolina College Library.
 Davidson: Library of Davidson College.
 Durham: Duke University Library.
 Greensboro: Agricultural and Technical College
 Library.
 Greenville: East Carolina College Library.
 Raleigh: D. H. Hill Library of North Carolina
 State College.
 North Carolina State Library.
 Salisbury: Catawba College Library.
 Wilson: Atlantic Christian College, Clarence L.
 Hardy Library.
 Winston-Salem: Public Library of Winston-
 Salem and Forsyth County.
 Wake Forest College Library.

NORTH DAKOTA

Bismarck: State Historical Library.
 State Law Library.
 Fargo: North Dakota Agricultural College and
 Experiment Station Library.
 Grand Forks: University of North Dakota
 Library.
 Minot: State Teachers College Library.
 Valley City: State Teachers College Library.

OHIO

Akron: Akron Public Library.
 Alliance: Mt. Union College Library.
 Ashland: Ashland College Library.
 Athens: Ohio University Library.
 Bluffton: Musselman Library of Bluffton
 College.
 Bowling Green: Bowling Green State University
 Library.
 Bucyrus: Bucyrus Public Library.
 Cincinnati: Public Library.
 University of Cincinnati Library.
 Cleveland: Adelbert College Library of
 Western Reserve University.
 Cleveland Public Library.
 Columbus: Columbus Public Library.
 Ohio State Library.
 Ohio State University Library.
 Dayton: Dayton Public Library.

OHIO (continued)

Delaware: Charles Slocum Library of Ohio
 Wesleyan University.
 Gambier: Kenyon College Library.
 Granville: Denison University Library.
 Hiram: Hiram College Library.
 Marietta: Marietta College Library.
 Oberlin: Oberlin College Library.
 Oxford: Miami University Library.
 Portsmouth: Free Public Library.
 Springfield: Warder Public Library.
 Toledo: Toledo Public Library.
 Van Wert: Brumbach Library of Van Wert
 County.
 Youngstown: Youngstown Public Library.

OKLAHOMA

Ada: East Central State Teachers College
 Library.
 Alva: Northwestern State Teachers College
 Library.
 Durant: Southeastern Teachers College Library.
 Edmond: Central State College Library.
 Enid: Carnegie Public Library.
 Langston: Langston University Library.
 Norman: University of Oklahoma Library.
 Oklahoma City: Oklahoma State Library.
 Shawnee: Oklahoma Baptist University Library.
 Stillwater: Agricultural and Mechanical College
 Library.
 Tahlequah: Northeastern State Teachers Col-
 lege Library.
 Tulsa: University of Tulsa Library.

OREGON

Ashland: Southern Oregon College of Education
 Library.
 Corvallis: Oregon State College Library.
 Eugene: University of Oregon Library.
 Forest Grove: Pacific University Library.
 La Grande: Eastern Oregon College of Education
 Library.
 Portland: Library Association of Portland.
 Reed College Library.
 Salem: Oregon State Library.

PENNSYLVANIA

Allentown: Muhlenberg College Library.
 Bethlehem: Lehigh University Library.
 Bradford: Carnegie Public Library.
 Carlisle: Dickinson College Library.
 Erie: Erie Public Library.
 Harrisburg: Pennsylvania State Library.
 Haverford: Haverford College Library.
 Huntingdon: Juniata College Library.
 Lancaster: Franklin and Marshall College.
 Fackenthal Library.
 Meadville: Allegheny College Library.
 Philadelphia: Free Library of Philadelphia.
 Philadelphia Commercial Museum
 Library.
 Temple University, Sullivan
 Memorial Library.
 University of Pennsylvania Library.

PENNSYLVANIA (continued)

Pittsburgh: Carnegie Free Library of Allegheny.
Carnegie Library of Pittsburgh.
University of Pittsburgh Library.
Reading: Reading Public Library.
Scranton: Scranton Public Library.
State College: Pennsylvania State University
Library.
Swarthmore: Swarthmore College Library.
Warren: Warren Library Association.
Washington: Memorial Library of Washington
and Jefferson College.
Wilkes-Barre: Kings College Library.
Williamsport: James V. Brown Library.

PUERTO RICO

Mayaguez: University of Puerto Rico, College
of Agriculture and Mechanical
Arts Library.
Rio Piedras: University of Puerto Rico General
Library.

RHODE ISLAND

Kingston: University of Rhode Island Library.
Providence: Brown University Library.
Providence Public Library.
Rhode Island State Library.
Westerly: Westerly Public Library.

SOUTH CAROLINA

Charleston: Charleston College Library.
Clemson: Clemson College Library.
Columbia: South Carolina State Library.
University of South Carolina Library.
Orangeburg: State Agricultural and Mechanical
College.
Rockhill: Carnegie Library of Winthrop College.

SOUTH DAKOTA

Brookings: Lincoln Memorial Library of South
Dakota State College.
Mitchell: Dakota Wesleyan University Library.
Pierre: South Dakota Free Library Commission.
Sioux Falls: Carnegie Free Public Library.
Spearfish: Black Hills Teachers College Library.
Vermillion: University of South Dakota Library.
Yankton: Yankton College Library.

TENNESSEE

Chattanooga: Chattanooga Public Library.
Clarksville: Austin Peay State College Library.
Johnson City: East Tennessee State College
Library.
Knoxville: University of Tennessee Library.
Memphis: Cossitt Library.
Murfreesboro: Middle Tennessee State College
Library.
Nashville: Joint University Libraries.
Nashville Public Library.
State Library Division, Tennessee
State Library and Archives.
Sewanee: University of the South Library.

TEXAS

Abilene: Hardin Simmons University Library.
Austin: Texas State Library.
University of Texas Library.
Beaumont: Lamar State College of Technology
Library.
Canyon: West Texas State Teachers College
Library.
College Station: Agriculture and Mechanical
College of Texas Library.
Commerce: East Texas State Teachers College
Library.
Dallas: Dallas Public Library.
Southern Methodist University Library.
Denton: North Texas State Teachers Library.
El Paso: El Paso Public Library.
Fort Worth: Fort Worth Public Library.
Texas Christian University Library.
Galveston: Rosenberg Library.
Houston: Houston Public Library.
University of Houston.
Huntsville: Sam Houston State Teachers Col-
lege, Estill Library.
Kingsville: Texas College of Arts and Indus-
tries Library.
Lubbock: Texas Technological College Library.
Marshall: Bishop College Library.
San Antonio: Public Library (La Villita Annex).
San Marcos: Southwest Texas State Teachers
College Library.
Waco: Baylor University Library.

UTAH

Ephraim: Snow College Library.
Logan: Utah State Agricultural College Library.
Ogden: Carnegie Free Library.
Provo: Brigham Young University Library.
Salt Lake City: University of Utah Library.
Utah State Library.

VERMONT

Burlington: University of Vermont Library.
Middlebury: Middlebury College, Egbert Starr
Library.
Montpelier: Vermont State Library.
Northfield: Norwich University Library.

VIRGINIA

Blacksburg: Virginia Polytechnic Institute
Library.
Bridgewater: Bridgewater College Library.
Emory: Emory and Henry College Library.
Fredericksburg: Mary Washington College
Library.
Hampden Sydney: Hampden Sydney College
Library.
Lexington: Virginia Military Institute Library.
Washington and Lee University
Library.
Norfolk: Norfolk Public Library.
Petersburg: Virginia State College Library.
Richmond: Virginia State Library.
Salem: Bittle Memorial Library of Roanoke
College.
University: University of Virginia Library.

VIRGINIA (continued)

Univ. of Richmond, P. O. : University of Richmond Library.
Williamsburg: William and Mary College Library.

WASHINGTON

Everett: Everett Public Library.
Olympia: Washington State Library.
Pullman: State College of Washington Library.
Seattle: Seattle Public Library.
University of Washington Library.
Spokane: Spokane Public Library.
Tacoma: College of Puget Sound Library.
Tacoma Public Library.
Walla Walla: Whitman College Library.

WEST VIRGINIA

Athens: Concord College Library.
Charleston: Department of Archives and History, State Library.
Kanawha County Public Library.
Elkins: Davis and Elkins College Library.
Fairmont: Fairmont State College Library.
Huntington: Marshall College Library.
Institute: West Virginia State College Library.
Morgantown: West Virginia University Library.
Salem: Salem College Library.

WISCONSIN

Appleton: Lawrence College Library.
Beloit: Beloit College Library.
Eau Claire: Wisconsin State College Library.
Fond du Lac: Fond du Lac Public Library.
La Crosse: Public Library.
Madison: State Historical Society Library.
University of Wisconsin Library.
Wisconsin State Library.
Milwaukee: Law Library of Milwaukee County.
Milwaukee Public Library.
Oshkosh: Oshkosh State College Library.
Racine: Racine Public Library.
Stevens Point: Wisconsin State College Library.
Superior: Superior Public Library.
Curran Library, Wisconsin State College.

WYOMING

Casper: Natrona County Public Library.
Cheyenne: Wyoming State Library.
Laramie: University of Wyoming Library.

U. S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

NATIONAL BUREAU OF STANDARDS
A. V. Astin, *Director*



THE NATIONAL BUREAU OF STANDARDS

The scope of activities of the National Bureau of Standards at its major laboratories in Washington, D.C., and Boulder, Colorado, is suggested in the following listing of the divisions and sections engaged in technical work. In general, each section carries out specialized research, development, and engineering in the field indicated by its title. A brief description of the activities, and of the resultant publications, appears on the inside of the front cover.

WASHINGTON, D.C.

Electricity. Resistance and Reactance. Electrochemistry. Electrical Instruments. Magnetic Measurements. Dielectrics.

Metrology. Photometry and Colorimetry. Refractometry. Photographic Research. Length. Engineering Metrology. Mass and Scale. Volumetry and Densimetry.

Heat. Temperature Physics. Heat Measurements. Cryogenic Physics. Equation of State. Statistical Physics.

Radiation Physics. X-ray. Radioactivity. Radiation Theory. High Energy Radiation. Radiological Equipment. Nucleonic Instrumentation. Neutron Physics.

Analytical and Inorganic Chemistry. Pure Substances. Spectrochemistry. Solution Chemistry. Standard Reference Materials. Applied Analytical Research.

Mechanics. Sound. Pressure and Vacuum. Fluid Mechanics. Engineering Mechanics. Rheology. Combustion Controls.

Organic and Fibrous Materials. Rubber. Textiles. Paper. Leather. Testing and Specifications. Polymer Structure. Plastics. Dental Research.

Metallurgy. Thermal Metallurgy. Chemical Metallurgy. Mechanical Metallurgy. Corrosion. Metal Physics. Electrolysis and Metal Deposition.

Mineral Products. Engineering Ceramics. Glass. Refractories. Enameled Metals. Crystal Growth. Physical Properties. Constitution and Microstructure.

Building Research. Structural Engineering. Fire Research. Mechanical Systems. Organic Building Materials. Codes and Safety Standards. Heat Transfer. Inorganic Building Materials.

Applied Mathematics. Numerical Analysis. Computation. Statistical Engineering. Mathematical Physics. Operations Research.

Data Processing Systems. Components and Techniques. Digital Circuitry. Digital Systems. Analog Systems. Applications Engineering.

Atomic Physics. Spectroscopy. Infrared Spectroscopy. Solid State Physics. Electron Physics. Atomic Physics.

Instrumentation. Engineering Electronics. Electron Devices. Electronic Instrumentation. Mechanical Instruments. Basic Instrumentation.

Physical Chemistry. Thermochemistry. Surface Chemistry. Organic Chemistry. Molecular Spectroscopy. Molecular Kinetics. Mass Spectrometry.

Office of Weights and Measures.

BOULDER, COLO.

Cryogenic Engineering. Cryogenic Equipment. Cryogenic Processes. Properties of Materials. Cryogenic Technical Services.

Ionosphere Research and Propagation. Low Frequency and Very Low Frequency Research. Ionosphere Research. Prediction Services. Sun-Earth Relationships. Field Engineering. Radio Warning Services.

Radio Propagation Engineering. Data Reduction Instrumentation. Radio Noise. Tropospheric Measurements. Tropospheric Analysis. Propagation-Terrain Effects. Radio-Meteorology. Lower Atmosphere Physics.

Radio Standards. High Frequency Electrical Standards. Radio Broadcast Service. Radio and Microwave Materials. Atomic Frequency and Time Interval Standards. Electronic Calibration Center. Millimeter-Wave Research. Microwave Circuit Standards.

Radio Systems. High Frequency and Very High Frequency Research. Modulation Research. Antenna Research. Navigation Systems.

Upper Atmosphere and Space Physics. Upper Atmosphere and Plasma Physics. Ionosphere and Exosphere Scatter. Airglow and Aurora. Ionospheric Radio Astronomy.

