

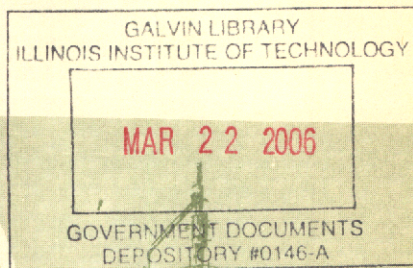
U. S. Government

RESEARCH REPORTS

March 16, 1956

Vol. 25, No. 3

. . . . A monthly listing of
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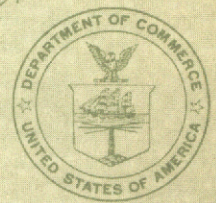
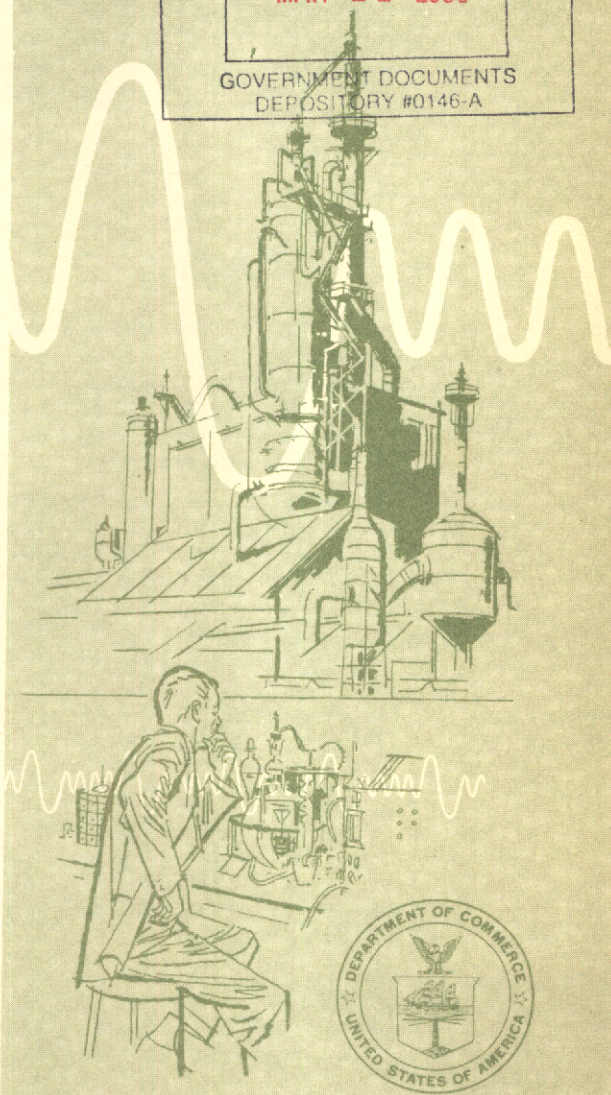
In this issue:

Available to the public for the first time . . . the Naval Research Laboratory's monthly Report of NRL Progress.

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January and February issues listed in this volume. Subsequent issues will be announced each month through USGRR.

Complete list of this month's printed reports on pages 95-96-97.



U. S. DEPARTMENT OF COMMERCE
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The printing of this publication has been approved by the Director of the Bureau of the Budget, August 22, 1955.



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APPAREL

Development of an air circulating unit for ventilation of impermeable suits, by S. D'Amico. U. S. Naval Supply Activities. Clothing Supply Office, Brooklyn, N. Y. Jul 1955. 17p photos, drawing, graph. Order from OTS. 50 cents. PB 111803

Discusses the problem of providing ventilation and other means of cooling the wearer of impermeable protective suits is reviewed, and the shortcomings of supplying air and relying on present evaporative cooling techniques. Use of a midget, battery powered, air circulating unit is proposed. Busanda reports control symbol 3950-2. Report no. 5.

CHEMICALS AND ALLIED PRODUCTS

Organic Chemicals

Acid-catalyzed hydrolysis of acetal and chloroacetal, by Maurice M. Kreevoy and Robert W. Taft, Jr. Pennsylvania State University. School of Chemistry and Physics, State College, Pa. Jan 1955. 10p graph, tables. Order from LC. Mi \$1.80, ph \$1.80. PB 119197

1. Ethane, 1,1-Diethoxy - Hydrolysis 2. Ethane, 2-Chloro-1, 1-diethoxy - Hydrolysis 3. Contract Nonr 656(05), Project NR 055-328.

Crystal structure of nickel salicylaldoxime, by Lynne L. Merritt, Jr. and Charles Guare. Indiana University. Dept. of Chemistry, Bloomington, Ind. n.d. 25p diags, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119172

Part of a study on chelating compounds. The structure of nickel salicylaldoxime was studied by X-ray single crystal methods. Date is 1952 or later. For final report on this contract see PB 119173. Contract Nonr-191(00), NR 052-243, Technical report no. 3.

Final report on Contract Nonr-191(00), NR 052-243, by Lynne L. Merritt, Jr. Indiana University. Dept. of Chemistry, Bloomington, Ind. n.d. 3p. Order from LC. Mi \$1.80, ph \$1.80. PB 119173

Summarizes work and publications on the crystal structure of cheiate compounds, performed under this contract. Date is 1953 or later. For Technical report no. 3 see PB 119172.

Saturated vapour pressure of ethylene at low temperatures and the magnitude of thermomolecular pressure differences in tubes of various diameters, by B.A.J. Lister and L. A. McDonald. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Feb 1953. 13p diagr, graphs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 41¢ plus mail handling. PB 119297

Unclassified 1955. S. O. code no. 91-3-1-96.
1. Ethylene - Vapor pressure - Gt. Brit. 2. Vapor pressure - Measuring equipment - Gt. Brit.
3. Atomic power - Research - Gt. Brit. 4. AERE C/R 1122.

Plastics and Plasticizers

Influence of temperature on creep stress-rupture, and static properties of melamine-resin and silicone-resin glass fabric laminates, by William N. Findley, Harlan W. Peithman, and Will J. Worley. U. S. National Advisory Committee for Aeronautics. Jan 1956. 71p photos, drawings, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 'H' St., N. W., Washington 25, D. C. PB 119376

Results are reported of static-tension, static-compression, tension-creep, and time-to-fracture tests of melamine-resin and silicone-resin glass-fabric laminates at temperatures up to 400° and 600° F, respectively. An equation which describes the effect of stress, time, and temperature and is based on the activation-energy theory and a power function of time represents an analysis of the creep data. NACA TN 3414.

Comparative fungicide attenuations in oil-modified coatings, by J. M. Leonard, S. B. Crecelius, H. L. McKeown, and D. E. Klemme. U. S. Naval Research Laboratory. Dec 1955. 10p graphs, tables. Order from OTS. 50 cents. PB 111868

Nine varnishes representing three chemical types - alkyd, ester gum, and phenolic - were prepared in the laboratory at each of three oil contents - 50%, 60%, and 70%. After the fungicides had been incorporated in the varnishes, dried films were prepared, given a mild aging (baked at 55° C), and then assayed for fungitoxicity. In a collateral experiment on the nine nontoxic vehicles the relationship of fungus susceptibility and moisture absorption was explored. NRL R 4674.

Resins for vinyl finishes. Part II: Atmospheric resistance, by S. B. Crecelius. U. S. Naval Research Laboratory. Dec 1955. 17p graph, tables. Order from OTS. 50 cents. PB 111824

A study was undertaken to establish the type of alkyd resin which would give the best performance when used in combination with vinyl resin (VAGH) as topside coatings for Navy ships. Several series of alkyd resins have been prepared containing varying percentages of phthalic anhydride, different fatty acids (soya bean, dehydrated castor, linseed, and mixtures of these), and polyhydric alcohols (glycerol, pentaerythritol, ethylene glycol, sorbitol, and mixtures of these). In addition, several resins other than alkyds (Epon esters and straight Epon) were included. Paints were prepared from these resins using the standard matrix of Mil-P-15936 as a base. Panels from these paints were exposed at the NRL Tropical Exposure Site at Coco Solo, Panama, in salt spray cabinets, on land racks at Kure Beach, N. C., in a weatherometer, and on the roof at NRL. The results of the long-term exposure test are discussed here and compared with results from the salt spray test. For Part I see NRL R 4257 (PB 111369). NRL R 4663.

Protective coatings for magnesium, by T. Kirk Hay, Gerald F. Bechtle, Garmond G. Schurr, Maurice Van Loo. Sherwin-Williams Co. Paint Research Dept., Cleveland, Ohio. Oct 1954. 216p photos, tables. Order from OTS. \$5.50. PB 111886

The purpose of this investigational work, which was to strive to develop improved coatings for the protection of magnesium, has been accomplished. The recommended finishing systems based on this work use a vinyl toluene-ether ester vehicle in both the primer and the topcoat. The primers are pigmented at 35% pigment volume concentration with zinc chromate and silicon dioxide. The solvent resistance of these systems has been variable. The two types used in the samples submitted for evaluation show bad softening but fair recovery upon solvent evaporation. Several items were investigated

briefly and showed enough promise to warrant further study. These include polysulfide resins, furan resins, a pigment prepared from calcium sulfide and ammonium vanadate, pigmentation changes in wash primers, and a method for determining the permeability of films to chloride ions. Covers work performed from 29 Mar 1952 to 1 Jun 1954. AF WADC TR 54-373. Contract AF-33(606)-35.

Inorganic Chemicals

Electromotive force of the cell, H₂, HCl(g), AgCl(s), Ag(s) at 25°, by J. G. Aston and Frank L. Gittler. Pennsylvania State University. School of Chemistry and Physics. Jan 1955. 10p tables. Order from LC. Mi \$1.80, ph \$1.80. PB 119234

The value of E_0^0 referred to the ideal gas state obtained from the aqueous cell is -0.1506. A method for measuring this value directly has been found leading to a value of -0.1509 abs. volts. Values are calculated from this result from 0° to 40°. Contract N6 onr-269, T. O. III.

Heat capacities from 10.9°K, heats of transition, fusion and vaporization, vapor pressures and entropy of pentafluorochloroethane. The barrier hindering internal rotation, by J. G. Aston, P. E. Wills, and T. P. Zolki. Pennsylvania State University. School of Chemistry and Physics. Dec 1954. 13p graph, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 119245

The heat capacities of pentafluorochloroethane from 10.9°K. to the normal boiling point are tabulated. Temperatures of a rotational transition and the triple point are tabulated as well as vapor pressures, heats of transition, fusion and vaporization. The calorimetric entropy of the vapor at the normal boiling point when compared with a value calculated from spectroscopic data yields a barrier of 5300 cal. mole⁻¹ hindering internal rotation. Technical report under Contract N6 onr-269, T. O. III.

Studies on nitramide, by Neil Terrence Flathers. Pennsylvania State University. School of Chemistry and Physics. Jan 1954. 81p graphs, tables. Order from LC. Mi \$4.80, ph \$13.80. PB 119215

The present work was undertaken to expand the known reactions of nitramide and to investigate possible new reactions. A possible new method for the synthesis of nitramide has also been studied. Technical report no. 5 under Contract N6 onr-26917, NR 052-235. Thesis - Pennsylvania State College.

Ordnance Chemicals

Simulated high altitude tests of illuminating compositions, by Stanley Resnick. U. S. Picatinny Arsenal. Samuel Feltman Ammunition Laboratories, Dover, N. J. Apr 1955. 11p photos, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 119366

Pyrotechnic items consisting of various illuminating compositions in paper cases were fired statically in a stratosphere chamber at Aberdeen Proving Ground. The tests were conducted at pressures corresponding to altitudes ranging from sea level to 40,000 feet. The temperature was varied from ambient to -65°F. Still photographs and data on illumination characteristics were obtained for each item fired. Dept. of the Army project 504-01-027. Ordnance project TA2-9201. PA TR 2166.

Analytical Chemistry

Control method of chemical analysis of barium titanate, by W. Zimmerman, III, S. Zerfoss, and P. H. Egli. U. S. Naval Research Laboratory. Aug 1955. 26p drawing, diags, graphs, tables. Order from OTS. 75 cents. PB 111780

As a part of the effort to improve the quality and reproducibility of BaTiO₃ ceramics, a procedure for the analysis of BaTiO₃ for both major and minor constituents is presented. The Brush Laboratories Co., the Titanium Alloy Manufacturing Division of the National Lead Co., and the Naval Research Laboratory have had experience in titanate analysis and have cooperated in this joint contribution. Gravimetric and volumetric analysis is used for the major constituents and the principal minor constituents. Flame photometry is used for minor constituents which are particularly difficult to analyze by more normal analytical procedures. Spectrography is used for the less common minor constituents and as a check that no major unsuspected impurity is present. NRL R 4591.

Determination of rubidium and caesium in sodium-potassium alloys and related materials by radio-activation, by M. J. Cabell and A. Thomas. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Sep 1955. 15p graphs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 45¢ plus mail handling. PB 119321

Unclassified 1955. S. O. code no. 91-3-2-21.
1. Rubidium - Determination - Gt. Brit. 2. Cesium - Determination - Gt. Brit. 3. Sodium-potassium alloys - Chemical analysis - Gt. Brit. 4. Potassium hydroxide - Chemical analysis - Gt. Brit. 5. Chromatographic analysis - Gt. Brit. 6. Atomic power - Research - Gt. Brit. 7. AERE C/R 1725.

Extraction of the uranyl ion by thiophenyl trifluoroacetone, by G. Byfleet, G. N. Walton, and F. Baker. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Aug 1951. 32p graphs, tables. Order from British Information Service, 30 Rockefeller Plaza, New York 20, N. Y. 81¢ plus mail handling. PB 119325

Unclassified 1955. S. O. code no. 91-3-2-11.
1. Atomic power - Research - Gt. Brit. 2. Uranyl ions - Extraction - Gt. Brit. 3. Thiophenyl trifluoroacetone 4. Uranium - Uranyl ion extraction 5. Complexing agents 6. AERE C/R 768.

ELECTRICAL MACHINERY

Communication Equipment

Progress report for period Oct thru Dec 1954 under Contract Nonr-248(42), by Frank R. Eldridge, Jr. Johns Hopkins University. Institute for Co-operative Research. Controls Research Laboratory, Baltimore, Md. Dec 1954. 16p photos, fold drawings, diags (1 fold), table. Order from LC. Mi \$2.40, ph \$3.30. PB 119176

The primary objective of the project is to develop a means of transforming a pulse code into voice signals for such purposes as: 1. Receiving information, warnings, commands and control orders on combat communications networks. 2. Receiving automatic weather broadcasts. 3. Monitoring digital computers and automatic communications networks, such as those used for guided missiles and autopilots. 4. Providing security and anti-jamming features for voice circuits.

Electronics

Analysis of a frequency modulated multi-signal, by William J. Jones. U. S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, Rome, N. Y. Nov 1955. 20p graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 119446

A mathematical analysis of a specific frequency modulated signal is made and is extended to cover general cases. The distribution of power components and the frequency bandwidth needed for 99 percent transmission of power is emphasized. The effect of varying parameters is considered along with an explanation of the methods used in a general analysis. AF RADC TN 55-304.

Behavior of piezoelectric transducer systems. Utah. Engineering Experiment Station, Salt Lake City, Utah. Contract N7onr-45104, T. O. IV,

Project no. 385-403. Order separate parts described below from LC, giving PB number of each part ordered.

Technical report IV: Cavitation in viscous liquids and calorimetric measurements of losses, by Howard T. Ozaki, J. Hugh Hamilton, and L. Dale Harris. Aug 1954. 139p photos, drawings, diags, tables. Mi \$6.90, ph \$21.30. PB 119210

1. Cavitation - Theory 2. Cavitation - Testing equipment 3. Transducers, Crystal - Tests 4. Liquids, Viscous - Cavitation 5. Crystals, Piezoelectric - Electrical properties.

Technical report V: Sonically induced cavitation, Frank Watson Neilson, J. Hugh Hamilton, and L. Dale Harris. Aug 1954. 161p photos, diags, graphs, tables. Mi \$7.80, ph \$25.80. PB 119209

The purpose of this investigation was: 1) To experimentally study the behavior and possible control of sonically induced cavitation occurring at an ADP-castor oil interface with particular emphasis placed upon the effects of dissolved and absorbed gas, the effects of the roughness of the crystal surface, the effects or cavitation upon the oil, and the effects of surface active reagents.

Circuit equations for rectifier and magnetic amplifier circuits, by D. H. Schaefer. U. S. Naval Research Laboratory. Nov 1955. 36p diags, graphs, tables. Order from OTS. \$1. PB 111770

A systematic method has been developed for analyzing circuits containing piecewise linear elements such as rectifiers and rectangular loop magnetic cores. The analysis utilizes a new method of formulating circuit equations and a new type symbolism and algebra, especially developed for the purpose, that allows operations on and simplifications of the resultant expressions. Examples of the use of the method in analyzing rectifier and magnetic amplifier circuits are presented. NRL R 4567.

Circuit minimization: Minimal and irredundant Boolean sums by alternative set method, by Edward W. Samson and Rolf Mueller. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Communications Laboratory, Cambridge, Mass. Jun 1955. 15p. Order from LC. Mi \$2.40, ph \$3.30. PB 119207

A rigorous algorithm is presented for finding all the irredundant and minimal sum or product expressions of a Boolean function. The procedure starts from the star or del expressions, and is simple and efficient. The background theory and a few additional theorems are given. The method for sums compares the star terms with the states, to find essential alternative sets of star terms, from

which it simply derives all irredundant sums, and thence the minimal sums. See also PB 111528. AF CRC TR 55-109.

Contribution to the question of the scattering of electromagnetic waves by uneven surfaces, by Yu. P. Lysanov. Translated by Morris D. Friedman. Jul 1952. 7p. Order from LC. Mi \$1.80, ph \$1.80. PB 119435

Translated from Doklady, A.N. USSR, vol. 87, no. 5, 1952, pp. 719-722.

1. Waves, Electromagnetic - Scattering - Theory - Russia 2. AF CRC TN 55-556 3. Contract AF 19-(604)-1476, Translation no. 3.

Contributions to the study of the polarization of vertical incidence radio echoes from the ionosphere, by William Snyder. Stanford University. Radio Propagation Laboratory, Stanford, Calif. May 1955. 213p photos, diags, graphs, tables. Order from LC. Mi \$9.60, ph \$33.30. PB 119189

The problem of the polarization of echoes reflected at vertical incidence from the ionosphere is studied. A general expression for the magneto-ionic characteristic polarizations of an homogeneous medium containing several types of charged particles is presented. General charts relating parameters of the ionization density and collision frequency to the characteristic polarizations are presented. A nomogram relating the normalized parameters of the charts to the charge density, magnetic dip angle and gyro frequency for the case in which the charged particles consist only of electrons is presented. Scientific report no. 2 for the period Jun 15, 1953 to May 1, 1955 under Contract AF 19(604)-795. AF CRC TN 55-199.

Description of circuitry for erasing video signals above a selected threshold level and a flap attenuator for automatically measuring its performance when connected to the output of an airborne radar. American Airlines System. Flight Engineering Operational Development Branch. May 1949. 25p photos, diags (1 fold), graphs (1 fold), tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119510

The video erasure circuitry and its companion flap attenuator measuring device are described. First simulated operational tests which produced satisfactory results are described in this report. Technical note no. 12. Contract NOd(s)-9006.

Diffraction by a perfectly conducting half-plane of electromagnetic waves emitted by an arbitrarily oriented electric and magnetic dipole, by Yu. V. Vandakurov. Translated by Morris D. Friedman. Jun 1953. 23p diags. Order from LC. Mi \$2.70, ph \$4.80. PB 119433

A rigorous solution is given of the diffraction of electromagnetic waves, emitted by an arbitrarily oriented electric or magnetic dipole, by a perfectly conducting half-plane. The result is given as a single integral, between finite limits, of tabulated functions. Translated from Zh. Eksp. Teor. Fiz., vol. 26, no. 1, 1954, pp. 3-18. AF CRC TN 55-554.

Diffraction of surface waves by a semi-infinite dielectric slab, by Carlos M. Angulo. Brown University. Division of Engineering, Providence, R. I. Aug 1955. 72p diags, graphs. Order from LC. Mi \$4.50, ph \$12.30. PB 119255

It is well known that surface waves can propagate along dielectric slabs. In this report we study the effect produced by the abrupt termination of the dielectric slab. The diffraction problem has been attacked by modal analysis, considering the dielectric slab as an open waveguide. Scientific report no. 1 under Contract no. AF 19(604)-1391. AF CRC TN 55-765.

Digest of literature on dielectrics, vol. 18, 1954, edited by H. M. Philofsky and R. W. Crowe. National Research Council. Jun 1955. 188p tables. Order from NAS-NRC Publications Office, 2101 Constitution Ave., Washington 25, D. C. \$3. PB 119254

Contents: I. Instrumentation and measurements, by Robert A. Soderman. - II. Tables of dipole moments, dielectric constants and dielectric relaxation values, by R. C. Miller and D. F. Williams. - III. Molecular and ionic interactions in dielectrics, by John Hart. - IV. Conduction phenomena in dielectrics, by S. Roberts. - V. Breakdown of dielectrics, by A. H. Sharbaugh and R. W. Crowe. - VI. Ferroelectric and piezoelectric materials, by William R. Cook, Jr. and Hans Jaffe. - VII. Ferromagnetic materials, by D. J. Epstein. - VIII. Rubber and plastic insulation, by L. I. Suber and Stephen Palinchak. - IX. Insulating films, by H. A. Birdsall. - X. Insulating liquids, by J. E. Gibbons. - XI. Ceramic insulation, by T. C. Browne and J. H. Strimple. NRC 383.

Electronic collision cross sections and oscillator strengths for oxygen in the Schumann-Runge region, by Edwin N. Lassetre, Sam Silverman, and Marvin E. Krasnow. Ohio State University Research Foundation, Columbus, Ohio. Dec 1954. 41p graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 119182

Scientific report 6. For reports 2-5 see PB 110870, 112121, 112255, 112474.
1. Electrons - Scattering 2. Oxygen - Cross sections 3. Oxygen - Nuclear reactions 4. Oxygen - Spectrographic analysis 5. OSURF Proj 464, Scientific report 6 6. AF CRC TN 55-662 7. Contract AF 19(122)-642.

Exact method for the study of the distribution of electrical relaxation times, applied to the system water, by Herman Schwan. 1954. 9p graphs. Order from LC. Mi \$1.80, ph \$1.80. PB 119155

A simple technique is explained which permits accurate statements with regard to the distribution of electrical relaxation times in frequency dependent dielectrics. It is based on the fact that dielectric losses, determined at considerably lower frequencies than the average characteristic frequency, are extremely sensitive to small changes in the distribution law. The method is demonstrated by evaluating the measurements obtained with distilled water. The evaluation of such measurements shows that within the obtainable high accuracy the dielectric behavior of water can be characterized by one single relaxation time. Translated from Zeitschrift für Naturforschung, vol. 9a, p. 35-37, 1954. Technical report no. 12 under Contract Nonr-551(05), NR 119-289.

Increasing the reliability of electronic equipment by the use of redundant circuits, by C. J. Creveling. U. S. Naval Research Laboratory. Dec 1955. 14p diagr, graphs, tables. Order from OTS. 50 cents. PB 111740

Equations relating reliability to the number of circuit elements in the redundant and non-redundant cases are derived and applied to examples which show the degree of improvement which can be achieved. It is shown that equipments having hundreds of tubes could be made sufficiently reliable to satisfy most requirements. NRL R 4631.

Investigation of atmospheric radio noise. Scientific report no. 8 for the period 1 Apr-30 Jun 1955, by A. W. Sullivan, S. P. Hersperger, R. F. Brown, and J. D. Wells. Florida. Engineering and Industrial Experiment Station. Dept. of Electrical Engineering, Gainesville, Fla. Jul 1955. 143p diags, graphs, tables. Order from LC. Mi \$7.20, ph \$22.80. PB 119364

Study of the probability distribution of atmospheric noise amplitudes has been extended to very low probability levels. Curves are presented which show the deviations from the logarithmic normal probability distribution. A complete report of the study of the effect of atmospheric noise on a frequency-shift radioteletype system is presented. An analysis was made of the enhancement of atmospheric noise levels during the occurrence of solar flares. For 1st-7th reports see PB 113559, 113764, 116122-116123, 116501, 116979, and 117733. Appendix A: System characteristics. - Appendix B: Circuit diagrams and band-pass characteristics of the FSK radioteletype system. AF CRC TN 55-397. Contract AF 19(604)-876, Report no. 8.

Leakage characteristics of the 1B63A TR tube under elevated ambient temperature conditions, by

Irving Reingold. U. S. Camp Evans Signal Laboratory, Belmar, N. J. Jul 1955. 17p photos, diags, graphs. Order from LC. Mi \$2.40, ph \$3.30. PB 119427

Dept. of the Army project nr. 3-19-03-032. Signal Corps project nr. 323B.

1. Tubes, TR
2. Tubes, Electron - Leakage
3. Tubes, Electron - Thermal properties
4. Tubes, Electron - Tests
5. SCEL TM 1681.

Leroy beam evaluation, by Robert Barlow. U. S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, Rome, N. Y. Oct 1955. 20p photos. Order from LC. Mi \$2.40, ph \$3.30. PB 119429

A description and limited evaluation is given of the prototype retractable LEROY masts, type Jucho I. The report presents the problems encountered in attempting to restore the two prototypes to an evaluative condition. The limited testing that was possible is described, and recommendations are made for a future evaluation. AF RADC TN 55-303.

New method of antenna array synthesis applied to generation of double-step patterns, by C. J. Sletten, P. Blacksmith, and G. R. Forbes. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Antenna Laboratory, Cambridge, Mass. Sep 1955. 35p photos, diags, graphs, table. Order from LC. Mi \$3, ph \$6.30. PB 119431

A method of synthesizing linear antenna arrays utilizes the natural phase distribution that exists on transmission lines. This theory is applied to an asymmetric pattern. The engineering techniques needed for the design of this pattern are described. Experimental results are in good agreement with the theory. AF CRC TR 55-108.

Perturbation of the electromagnetic field for small deformation of the metal surface, by V. Z. Katzenelenbaum. Translated by Morris D. Friedman. Dec 1953. 18p diagr. Order from LC. Mi \$2.40, ph \$3.30. PB 119434

A general expression is given for the field perturbation caused by deformation of a metal surface. If the deformed surface approximates a nondeformed one and makes a small angle with it everywhere, then this perturbation can be found in an elementary way - by quadratures. The method is applied to the problem of the diffraction of a plane wave by a step of small height compared to the wave length. In particular, the known Rayleigh formulas are obtained for the reflection from sloping low roughness. Translated from Zh. Tekh. Fiz., vol. 25, no. 3, 1955, pp. 546-557. AAF CRC TN 55-555.

Principles of the exact theory of the wave field of a transmission line, by G. A. Grinberg and B. E. Bonshtedt. Translated by Morris D. Friedman. Jun 1953. 41p tables. Order from LC. Mi \$3.30, ph \$7.80. PB 119437

Starting from a rigorous formulation, the problem is solved of electromagnetic wave propagation along a single conductor above a plane and homogeneous earth. Procedures are indicated for solving the analogous problem for multi-conductor lines taking into account the "proximity effect" of the conductors. Translated from Zh. Tekh. Fiz., vol. 24, no. 1, 1954, pp. 67-95. AF CRC TN 55-558.

Quarterly progress report no. 7, for the period Oct 1-Dec 31, 1954, by J. D. Axtell, Jr. California. University. Division of Electrical Engineering. Electronics Research Laboratory, Berkeley, Calif. Jan 1955. 46p diags, graph. Order from LC. Mi \$3.30, ph \$7.80. PB 119194

1. Waves, Electromagnetic - Scattering
2. Waves, Electromagnetic - Diffraction
3. Wave guides, Broadband - Propagation
4. Impedance matching
5. Data - Analysis
6. CU IER Series 60, Issue no. 7.

Radiating discontinuity on a corrugated surface transmission line, by Morris J. Ehrlich and Irving K. Williams. Microwave Radiation Co., Inc. 1955. 44p photos, drawing, diagr, graphs. Order from LC. Mi \$3.30, ph \$7.80. PB 119205

The study was formulated to obtain data essential in the use of surface wave excited discontinuities as antenna elements. Although much work had been done in the past by various workers, on surface wave transmission lines and antennas, no data were available regarding the radiation characteristics and equivalent network representation of the radiating discontinuity fed by a corrugated surface transmission line. Report no. 205. AF CRC TN 55-769. Contract AF 19(604)-1150.

Radio wave propagation in the Arctic. Interim scientific report no. 1 for the period Apr 15, 1954-Jul 15, 1955 under Contract no. AF 19(604)-1089, by C. G. Little. Alaska. University. Geophysical Institute. Aug 1955. 80p photos, drawings, diags, graphs, tables. Order from LC. Mi \$4.50, ph \$12.30. PB 119416

1. Radio waves - Propagation - Ionosphere
2. Radio waves - Propagation - Troposphere
3. AF CRC TN 55-579
4. Contract AF 19(604)-1089, Interim scientific report no. 1.

Scattering of radiowaves by local nonuniformities of the ionospheric plasma, by M. E. Gertzenstein. Translated by Morris D. Friedman. Apr 1952. 7p. Order from LC. Mi \$1.80, ph \$1.80. PB 119436

Translated from Zh, Eksp, Teor, Fiz., vol. 23, no. 1(7), 1952, pp. 678-681.

1. Waves, Electromagnetic - Scattering - Theory - Russia
2. Waves, Electromagnetic - Scattering - Ionosphere - Russia
3. AF CRC TN 55-557
4. Contract AF 19(604)-1476, Translation no. 4.

Study of certain problems in the field of absorption of microwave energy in the atmosphere. Quarterly progress report no. 9 for the period Jul 1-Sep 30, 1955 under Contract no. AF 19(604)-831, by Edwin K. Gora. Providence College, Providence, R. I. Oct 1955. 4p. Order from LC. Mi \$1.80, ph \$1.80. PB 119452

1. Microwave power
2. Absorption spectra
3. Contract AF 19(604)-831
4. AF CRC TN 55-956.

Study of the generation and detection of electromagnetic waves in the millimeter wave region. Report no. 4, Mar 1, 1955-May 31, 1955, under Contract AF 19(604)-1115, by J. H. Rohrbaugh. New York University. Washington Square College of Arts and Science. Physics Dept. Jun 1955. 41p fold drawing, diags. Order from LC. Mi \$3.30, ph \$7.80. PB 119237

This report contains: 1. Further details of design for the spectrometer reinstrumentation, and its present status. 2. The description and critical analysis of a new device for measuring the complex index of refraction of liquids in the millimeter wave region. 3. A statement regarding the status of the ultra-high-speed source experiment. 4. An analysis of the calculations previously presented with regard to the echelette grating, the analysis being an evaluation of the equations as they tend toward a plane mirror. For 1st-3d reports see PB 116645, 116990, 117767. AF CRC TN 55-563.

Study to guide ordnance designs to meet new horizons for electronic assembly. Stavid Engineering, Inc., Plainfield, N. J. Sep 1955. 54p diags, graphs, tables. Order from OTS. \$1.50. PB 111997

This report summarizes the developments, the advantages, and the application of: (1) mechanized manufacturing methods which provide the means of enormous production capacity at low cost and high reliability; (2) development of ultra-small electronic parts; (3) new form concepts for electronic products, which are starting to crystallize around these developments. NAVORD 5143. Contract NOrd 14843.

Techniques for application of electron tubes in military equipment, by Rex S. Whitlock. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Electronic Components Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Revised. Oct

1955. 295p drawings, graphs, tables. Order from OTS. \$5. PB 1116445

This technical report presents tube information primarily from the point of view of the electronic equipment designer as a guide in the application of electron tubes. In Part I tube properties are discussed. These are grouped according to ratings, characteristics essential in circuit operation, and properties detrimental to circuit operation. Part II discusses the tube properties in relation to circuit design. It includes a check list for use of the circuit designer to insure coverage of all important design factors. Part III contains numerical data and special design considerations for specific tube types. Part IV presents product distribution curves derived from Life Test records where available. The concepts of specification control, operation within ratings, and tolerance of characteristics are emphasized throughout. Supersedes PB 111644. AF WADC TR 55-1 Revised.

Thermal evaluation of air-cooled electronic equipment, by Walter Robinson and John R. Barton. Ohio State University Research Foundation, Columbus, Ohio. Aug 1953. 139p diags, graphs, tables. Order from LC. Mi \$6.90, ph \$21.30. PB 119267

Methods are presented for the calculation of forced-convective and radiant heat transfer of external and internal aircraft skin surfaces and of equipment case surfaces arranged in various configurations. These methods supplement the evaluation and correlation procedures given in AFTR 6579 for individual electronic equipment items and are used in conjunction with the procedures of AFTR 6579 for the prediction of equipment component temperatures in aircraft compartments. Evaluation procedures are presented for electronic systems installations operating under steady-state thermal conditions. Heat balance calculation methods are developed for various combinations of compartment and equipment cooling methods. Applications of the various calculation methods are illustrated in detail by several examples. Supplement to AF TR 6579 (PB 111106). AF TR 6579 Suppl. 1. Contract W-33-038-ac-14987.

Thermionic emission from semiconductors, by Evan O. Kane. Cornell University. Dept. of Physics, Ithaca, N.Y. Dec 1954. 108p graphs. Order from LC. Mi \$5.70, ph \$16.80. PB 119240

Chapter II contains a discussion of the basic emission equation. Chapter III discusses the screening of fields in semiconductors and the effects that fields may have on the thermionic emission. The influence of the fields of surface states is given particular attention. The Schottky effect in a semiconductor is also discussed. Chapter IV discusses the limitations of the equilibrium treatment. Chapter V discusses some of the ways in which current flow may alter the emission determined from equilibrium conditions. The effect of mobile donors is

particularly important. Chapter VI presents some recent experimental work by the author which is evidence of the importance of surface states. The relation of this work to that of Hannay, McNair, and White is also discussed. Technical report no. 3 under Contract no. Nonr-401(08).

Generators, Motors, Transmission

Research and development of new design method for power transformers. Final report under Contract no. DA 36-039-sc-5519, for the period Mar 15, 1951 to Feb 28, 1953, by Harold L. Garbarino. Armour Research Foundation, Chicago, Ill. Feb 1953. 344f drawings, diags, graphs (part fold), tables. Order from LC. Mi \$11.10, enl pr \$55.85. PB 119335

A new design method has been developed which is applicable for many different types of power transformers. Principles of an optimum design have been found which can aid a designer in minimizing cost, losses, weight, or volume. Methods are given for calculating important transformer characteristics, such as regulation, efficiency, leakage reactance, capacitances and temperature rise. Specific types of transformers have been studied, and research on other special types is being continued under Contract no. DA 36-039-sc-52656. When study of these special types is completed, the report to be issued will constitute a second part to the present report. Dept. of the Army project no. 3-26-00-600. Signal Corps project no. 32-2006-31. SIG Contract DA 36-039-sc-5519, Final report. ARF Proj E 017-0, Report no. 21.

Simplified design and construction of high temperature power transformers, by Irving Remis. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Aug 1955. 55p photo, drawings, graphs, tables. Order from LC. Mi \$3.60, ph \$9. PB 119283

The mechanism of an improved simplified design method is presented in a straight-forward manner as a progressive series of calculation steps with the curves, tables and nomograph included as appended reference material. The application of the design method to auto-transformers, filament transformers, transformers with rectified output and carrying no unbalanced direct current and transformers carrying ac loads and rectified loads with no unbalanced dc, are discussed in the light of modifications or variations in the design method for these specific applications. A method of predicting the temperature within any portion of the coil is presented. A review of recommended construction techniques is presented. A design of a typical miniature high temperature power transformer is quantitatively illustrated with brief appropriate comments relating thereto. Signal Corps project nr. 2006A. Dept. of the Army project nr. 3-26-00-600. SCEL ER 1156.

Chromatographic determination of gum in fuels, by H. S. Knight, T. Skei, A. C. Nixon, S. Groennings. Shell Development Co., Emeryville, Calif. Mar 1955. 20p diagr, graphs. Order from OTS. 50 cents. PB 111861

The gum content is related to the length of a brown zone observed when the fuel is displaced over silica gel in a small chromatographic column with α -methylnaphthalene as solvent and acetone as eluent. This method is superior to the conventional procedure involving evaporation at elevated temperatures in a jet of steam because it is much simpler and permits the use of very small samples which is advantageous in research work on fuel stability. The present, supplementary report deals with improvements of this "chromatogum" method. The purification of α -methylnaphthalene has been made more effective, the necessity of using a closely specified amount of sample has been eliminated, and a narrower column has been designed to improve the reliability even though smaller samples are employed. Also, the method appears to be applicable to insoluble gum from jet fuels and many gas oils. AF WADC TR 54-328, Part II. Contract AF 18-(600)-37.

Development of a test rig and 1000-hour test on blades of various alloys to determine the fouling and corrosive effects of the ash from the combustion of a western Canadian residual fuel, by R. J. T. Bruce and J. C. Vrana. National Research Council of Canada. Division of Mechanical Engineering. Sep 1955. 39p photos, diags, graphs, tables. Order from LC. Mi \$3, ph \$6.30. PB 119432

A test rig has been developed for studying the deposition on, and the corrosion of, gas turbine blade materials caused by the ash in the exhaust from a residual fuel-burning combustion chamber. A 1000-hour test has been carried out in which blades of Vitallium, Inconel X and Nimonic 80 were exposed to the combustion products of residual fuels from the Leduc Field in Alberta. NRCC MT 28.

Experimental and calculated temperature and mass histories of vaporizing fuel drops, by M. M. El Wakil, R. J. Priem, H. J. Brikowski, P. S. Myers, and O. A. Uyehara. U. S. National Advisory Committee for Aeronautics. Jan 1956. 82p photos, diags, graphs, table. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119391

It is confirmed that, under many conditions, the unsteady state or time required for the drop to reach the wet-bulb temperature is an appreciable portion of the total vaporization time. Work was done to

verify or disprove the assumptions used in the computations. Data are presented to show that the assumption of infinite thermal conductivity is valid primarily because of circulation inside the drop. Appendix A. Theoretical calculation for unsteady state with finite liquid thermal conductivity. - Appendix B. Theory of simultaneous mass transfer and heat transfer. - Appendix C. Calculation of lifetime of a vaporizing drop under different air velocities. NACA TN 3490.

Spontaneous ignition of liquid fuels, by B. P. Mullins. Gt. Brit. Ministry of Supply. National Gas Turbine Establishment. 1955. 128p diags, graphs. Order from the Interscience Publishers, Inc., 250 Fifth Avenue, N. Y. 1, N. Y. \$3. PB 119168

1. Fuels, Liquid - Flow characteristics - Gt. Brit.
2. Fuel additives - Explosive effects - Gt. Brit.
3. Ignition, Spontaneous - Tests - Gt. Brit.
4. Ignition, Spontaneous - Theory - Gt. Brit.

Spontaneous ignition studies relating to lubricants of reduced flammability, by Kenneth T. Mecklenberg. U. S. National Advisory Committee for Aeronautics. Jan 1956. 17p graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119390

The determination of spontaneous ignition temperatures has been extended to a number of representative organic phosphorous esters with predominantly aliphatic structures. Determination of the change in spontaneous ignition temperature with composition has been carried out with hydrogenated polyisobutylene in combination with a siloxane and with a phosphonate. The synthesis of polyisobutylene in the lubricant molecular weight range has been improved in yield. NACA TN 3560.

Squid conference on atomization, sprays, and droplets held at Northwestern Technological Institute, Sep 24-25, 1953. Princeton University. James Forrestal Research Center. Dec 1954. 33p. Order from LC. Mi \$3, ph \$6.30. PB 119023

This report is a summary of the proceedings of a Conference on Atomization, Sprays, and Droplets sponsored by SQUID at Northwestern Technological Institute in September 1953. Seventeen papers and discussions were presented. Abstracts or references to each are given. Titles of all sentences, papers, their authors and professional affiliation are given, so that presumably these authors may be contacted for spare copies of their papers if still available. Technical report NTI-1-C.

HIGHWAYS AND BRIDGES

Proceedings of the thirty-fourth annual meeting, Washington, D. C., Jan 11-14, 1955. Highway Re-

search Board. 1955. 655p photos, drawings, diags, graphs, tables. Order from Highway Research Board, 2101 Constitution Ave., Washington 25, D. C. \$8.50. PB 119165

1. Roads - Design
2. Roads - Construction
3. Roads - Surface treatment
4. Road materials
5. Pavements - Maintenance and repair
6. Traffic - Research
7. Soils - Trafficability
8. NRC 362.

INSTRUMENTS

Accuracies of radiosonde data. U. S. Air Force. Air Weather Service. Military Air Transport Service. Andrews Air Force Base, Washington, D. C. Sep 1955. 14p graph, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 119159

1. Radiosondes - Performance
2. AF AWS TR 105-133.

Application of Boolean algebra to a synchronous magnetic digital computer, by Allan Karson. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Aug 1955. 15p diags. Order from LC. Mi \$2.40, ph \$3.30. PB 119445

The scope of this paper is to present the schematic diagram of a synchronous digital magnetic computer, to introduce the reader to the problems involved in its design and analysis, and to see how Boolean algebra might be used as a tool which aids in understanding and analyzing this type of system. Dept. of Army project no. 5B0306002. Ordnance research and development project no. TB3-0007. APG BRL M 930.

Compressor, reciprocating, skid-mounted, GED, 100 CFM, E35, by George Norris, Frederic W. Alter, Larry J. Dalley, and Harold L. Gotoff. U. S. Chemical Corps. Chemical and Radiological Laboratories. Army Chemical Center, Md. Aug 1955. 75p photos, drawing, graphs, tables. Order from LC. Mi \$4.50, ph \$12.30. PB 119411

Covers details and results of final-development test of a 100 cfm compressor to be used for servicing of mechanized flame thrower tanks. The test program established the ability of the unit generally to satisfy the military characteristics and requirement for which it was designed. Project no. 4-09-02-019-02. CC CRL R 524.

Density and viscosity of molten materials. Part III: Summary of viscosity measurements Sep 1953 to Aug 1954, by Curtis C. Beusman. Cincinnati. University. May 1955. 21p diags, graph. Order from OTS. 75 cents. PB 111945

A viscometer was fabricated which uses a torsionally vibrating piezoelectric crystal attached to a metal sensing element. Electronic components for measuring the resonant frequency and the resonant resistance of the damped crystal did not yield adequate sensitivity or reproducibility with the instrument. A servomechanism designed to stabilize the instrument was not successful in remedying the difficulties encountered. AF WADC TR 53-308, Part III. Contract AF 33(616)-52-9.

Digital compensation of continuous-data feedback control systems, by Karuna K. Maitra and Philip E. Sarachik. Columbia University. Dept. of Electrical Engineering. Electronics Research Laboratories. Aug 1955. 44p diags, graphs. Order from LC. Mi \$3.30, ph \$7.80. PB 119451

In this paper two classes of systems are considered, namely, (1) Duplicators and (2) Regulators. It is understood that the performance requirements of the two systems are entirely different. In the duplicator problem, the system is required to follow the reference input with no steady state error, with the fastest possible rise time and minimum overshoot. On the other hand, in the regulator system the output to any suddenly applied disturbance should decay rapidly and if possible with no overshoot. The methods of digital compensation described here can be used to optimize the performance of continuous systems. CUN ERL TR T-9/B. OSR TN 55-377. Contract AF 18(600)-677.

Evaluation of a differential-expansion temperature-sensing device based on critical flow through a variable orifice, by Paul D. Freeze and Ernest F. Flock. U. S. National Bureau of Standards, Jun 1954. 22p photos, diagr, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119204

This report presents data on the performance of a temperature-sensing device based on critical flow of compressed air through an orifice whose area varies with free stream temperature. Changes in the area of the orifice result from the differential expansion of coaxial tubes immersed in the gas whose temperature is of interest. The unit described in this report was found to perform reproducibly, to be somewhat sensitive to the mass flow rate in the free stream, and to have a rate of response comparable with that of a bare No. 18 gage thermocouple. Project no. 3073. AF WADC TR 54-567. Contract AF 33(616)-53-1.

Fast carry logic for digital computers, by Bruce Gilchrist, J. H. Pomerene, and S. Y. Wong. Princeton University. Institute for Advanced Study. Jul 1955. 13p diags, graphs. Order from OTS. 50 cents. PB 111751

Existing large scale binary computers typically must allow for the maximum full length carry time in each addition. It has been shown that average carry sequences are significantly shorter than this

maximum, on the average only five stages for a 40 digit addition. A method is described to realize the implied 8 to 1 time saving by deriving an actual "carry completion" signal. Experimental results verify this saving. Project no. TB 3-0538. Technical report no. 55-01. Contract no. DA 36-034-ORD-1646.

High-speed wide-range fluorite spectrograph, by Chester J. Silvernail. California. University. Institute of Geophysics. Aug 1955. 14p diagr. Order from LC. Mi \$2.40, ph \$3.30. PB 119444

A plane-grating spectrograph using a movable calcium fluoride lens has been constructed. The camera focal ratio of $f/2$ gives the instrument a speed such that for relatively weak sources, the exposure times have been reduced from several weeks to a number of hours. Scientific report no. 4 under Contract AF 19(122)-453. AF CRC TN 55-855.

Instrumentation and apparatus for a high amplitude sound research program, by Robert W. Leonard and O. B. Wilson, Jr. Soundrive Engine Co., Los Angeles, Calif. Oct 1952. 18p photo, drawings, diags, graph, table. Order from LC. Mi \$2.40, ph \$3.30. PB 119066

A description of a low frequency (20 to 200 cps) siren installation which is capable of producing up to approximately 100 kilowatts of sound power is presented. The siren efficiency appears to be about 40 percent. Instrumentation for study of various aspects of the properties of the intense, non-linear sound waves confined in a long 10-inch diameter tube is described. Contractor's serial report no. 45. Technical report no. 2 on the High Amplitude Sound Abatement Research Program. For technical reports no. 1 and 3 see PB 119065 and 119067. Contract N8 onr-70502, Project NR 014-907, Technical report no. 2.

Instrumentation for measurement of free-space sound pressure in the immediate vicinity of a propeller in flight, by William D. Mace, Francis J. Haney, and Edmund A. Brummer. U. S. National Advisory Committee for Aeronautics. Jan 1956. 16p photo, drawings, diagr, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119389

Instrumentation suitable for the measuring, recording, and subsequent harmonic analysis of the free-space sound pressures in the immediate vicinity of an airplane propeller at flight Mach numbers up to 0.72 is described. NACA TN 3534.

Methods of measurement and computation to determine trajectory data from Askania cinetheodolite records, by John Tifus, Mary Driggers and

Laurence Minvielle. U. S. Naval Ordnance Test Station, Inyokern, Calif. Sep 1951. 58p photos, diags, graphs, tables. Order from LC. Mi \$3.60, ph \$9.30. PB 119268

The scope of this report is limited to the methods of measuring and calculating position data from Askania cinetheodolite film, and of computing the standard deviation of the position of the missile when the angular accuracy of the instrument is known. NAVORD 1907. NOTS 433.

Middle ultraviolet transmission filter, by L. Dunkelmann and D. E. Field. U. S. Naval Research Laboratory. Nov 1955. 8p graphs. Order from OTS. 50 cents. PB 111773

For an experiment to be performed in an Aerobee rocket on the detection of middle ultraviolet light of the night airglow, it was determined that an ideal middle ultraviolet photometer should consist of a chemical filter with a 1P28 multiplier phototube. Complete descriptions of materials and assembly are given for the chemical filter. Tests indicate that the filter is stable to a temperature variation of from -50° to $+150^{\circ}$ F, age, and shock. NRL R 4647.

Oil-stream photomicrographic aeroscope for obtaining cloud liquid-water content and droplet size distributions in flight, by Paul T. Hacker. U. S. National Advisory Committee for Aeronautics. Jan 1956. 36p photos, drawings, diagr, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119393

An airborne cloud aeroscope by which droplet size, size distribution, and liquid-water content of icing and nonicing clouds can be determined has been developed and tested in flight and in wind tunnels with water sprays. The aeroscope is described in detail, and some droplet size distributions and liquid-water contents obtained during tests are presented. NACA TN 3592.

ORDVAC stored subroutines to replace IBM control panels, by Roger L. Boyell. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Jun 1955. 26p diagr, table. Order from LC. Mi \$2.70, ph \$4.80. PB 119278

Large electronic computers usually operate in the binary number system. In order to accept input from and record output into punched cards in the decimal number system, some means of translation must be built into or programmed for the computer. Described in this report is a series of subroutines that will enable the ORDVAC to conveniently work with decimally punched IBM cards, having the same degree of flexibility as wired control panels on conventional IBM equipment. Dept. of the Army project no. 5B0306002. Ordnance research and development project no. TB 3-0007. APG BRL M 897.

Positive displacement pump for accurate metering of liquids, by Laurence R. Crisp and Frank O. Anderson. U. S. National Institute of Health. Instrument Section. Nov 1955. 11p photos. Order from OTS. 50 cents. PB 111851

The applications to which this pump has been successfully applied are for constant flows, liquid levels, automatic proportioning, pilot studies of automatic water chemical treatment, continuous infusion of animals, and perfusion of animal organs.

Quarterly report on the computing machine components program, Jul-Sep 1954. U. S. Naval Ordnance Laboratory. Computer Components Division, Corona, Calif. Sep 1954. 54p photos, diags, graphs. Order from LC. Mi \$3.60, ph \$9.30. PB 119282

1. Computers, Digital - Components 2. Films, Magnetic - Research 3. Crystals, Barium titanate - Low temperature properties 4. Pulse circuits - Design 5. Lines, Delay - Performance 6. Resonance, Ferromagnetic - Measurement 7. Resonance, Ferromagnetic - Theory 8. NOL CR 268.

Some experiments with a high speed refrigerating cyclone, by C. H. Robinson and F. Sterry. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Jun 1954. 39p photos, drawings, diags, graphs. Order from British Information Services, 30 Rockefeller Plaza, N. Y. 20, N. Y. \$1.04 plus mail handling. PB 119313

Unclassified 1955, S. O. code no. 91-3-2-13.
1. Gases - Purification - Gt. Brit. 2. Gases - Purification equipment - Gt. Brit. 3. Compressors, Centrifugal - Design - Gt. Brit. 4. Nozzles - Design - Gt. Brit. 5. Atomic power - Research - Gt. Brit. 6. AERE ED/R 1392.

Survey of domestic electronic digital computing systems, by Martin H. Weik. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Dec 1955. 271p photos, tables. Order from OTS. \$4.75. PB 111996

The engineering characteristics, logical features, operating experiences, cost factors and personnel requirements of eighty-four different domestic digital electronic computing systems are described. An analysis of the computer field, a discussion of trends and a complete glossary of computer engineering and programming terminology are included. Dept. of the Army project no. 5B0306002. ORD project no. TB3-0007. APG BRL R 971.

Temperature control with variable pulse time delay thyatron circuit, by M. C. Andrews and E. K. Weise. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory,

Urbana, Ill. Aug 1955. 5p diagr. Order from
LC. Mi \$1.80, ph \$1.80. PB 119252

For the control of temperatures in furnaces a modified thyatron circuit is used. The amplified signal from an unbalanced Wheatstone bridge controls a variable pulse time delay circuit which influences the firing angle of a thyatron. Technical Note no. 2 under Contract no. AF 33-038-12644, OSR Project no. 52-670A-85. OSR TN 55-260.

Vacuum tube electrometer with high input impedance, by M. C. Andrews and E. K. Weise. Illinois Engineering Experiment Station, Electrical Engineering Research Laboratory, Urbana, Ill. Jul 1955. 14p diagrs, table. Order from LC. Mi \$2.40, ph \$3.30. PB 119253

For the measurement of small DC voltages across very high resistances a vacuum tube electrometer with the following features was built: feedback is used to make the input resistance match the resistors across which the voltage is to be measured and to increase the range, linearity and stability. The influence of variable cathode emission resulting in drift effects is reduced by a new type of circuit. Technical note no. 1 under Contract no. AF 33-308-12644, OSR Project no. 52-670A-85.

MACHINERY

Development and preliminary operation of the gas-combustion oil-shale pilot retort, by A. Matzick, J. R. Ruark, and M. W. Putman. U. S. Bureau of Mines. Nov 1955. 73p drawings, diagrs, graph, fold tables. Order from LC. Mi \$4.50, ph \$12.30. PB 119266

1. Retorts, Oil shale - Design 2. Retorts, Oil shale - Operation 3. Oils - Distillation 4. BM RI 5145.

Haupt-kataloges (Principal catalog). Badische Maschinenfabrik, Durlach, Germany. n.d. 140f photos, tables. Order from LC. Mi \$6.90, enl pr \$22.80. PB 118604

1. Machinery - Catalogs - Germany 2. Tanning machinery - Germany 3. Micro BIOS FD4230/47, Frames 1-140.

Investigation of the effects of corrosion on the service life of ball bearings, by James C. Hanson. U. S. Arsenal, Rock Island, Ill. Jun 1955. 44p photos, drawing, graphs, tables. Order from OTS. \$1.25. PB 111829

Based on the limited tests made in this investigation, indications are that light and medium stains and corrosion equivalent to that obtained by expo-

sure to 20% salt spray for 15 minutes or less, have negligible effects on the service life of single row ball bearings. Corrosion equivalent to exposure to salt spray for 30 minutes or more shortens their service life. Dept. of the Army project 591-07-001. Ordnance project TB 5-1101E, Report no. 2. RIAL R 55-2683.

Literature survey on aluminum oxide base cutting tools, by F. S. DeLacey. U. S. Arsenal, Watertown, Mass. Rodman Laboratory. Aug 1954. 20p. Order from OTS. 50 cents. PB 111759

The historical background, technological development, properties and application of cutting tools fabricated from aluminum oxide are presented. The source material on which the report is based is included in the bibliography. WAL RPL 3.

Maschinen und vollständige einrichtungen für gerbereien und lederfabriken (Machinery and complete equipment for tanning and leather manufacture). Krause, Johs., G.m.b.H., Altona-Öffensen, Germany. n.d. 152f photos, tables. Order from LC. Mi \$7.50, enl pr \$25.80. PB 118603

1. Machinery - Catalogs - Germany 2. Tanning machines - Germany 3. Leather - Manufacture - Machinery - Germany 4. Micro BIOS FD4234/47, Frames 1-152.

So urteilt der fachmann über Klöckner gerberemaschinen (Professional judgment on Klöckner tanning machinery). Klöckner-Werke A. G., Troisdorf-bei-Köln, Germany. n.d. 102f photos. Order from LC. Mi \$5.70, enl pr \$18.30. PB 118602

1. Machinery - Catalogs - Germany 2. Tanning machines - Germany 3. Micro BIOS FD4233/47, Frames 1-102.

Utilization of ceramics for metal cutting tools, by W. B. Kennedy. U. S. Arsenal, Watertown, Mass. Rodman Laboratory. Dec 1954. 31p photos, diagrs, tables. Order from OTS. \$1. PB 111758

Fourteen types of ceramics were utilized in conducting tests described herein. The initial studies reported herein were based on finishing and roughing bar stock operations. Workpiece materials used in the tests included FS-1020 and FS-4140 annealed steel, half-hard commercial brass, and low alloy cast iron. All results were based on linear travel passes utilizing a standard 18-inch engine lathe. For survey of pertinent technical literature on this subject see PB 111759. WAL RPL 6.

MEDICAL RESEARCH AND PRACTICE

Antigenic and cultural properties of Nocardia, by Morris Frank Shaffer and John Donald Schneidau, Jr. Tulane University. Dept. of Microbiology, New Orleans, La. n.d. 43p fold tables. Order from LC. Mi \$3.30, ph \$7.80. PB 119178

1. Antigens and antibodies 2. Nocardia - Bacteriology 3. Microbiology - Research 4. Contract Nonr-762(00), Project NR 131-151.

Aspects of pancreatic physiology, by Piero P. Foa, Angelo Fasoli and Giorgio Galansino. Final progress report for the period Nov 1, 1953 to Oct 31, 1954 under Contract ONR-25363, NR 115-262. Chicago. University. Medical School, Chicago, Ill. Dec 1954. 2p. Order from LC. Mi \$1.80, ph \$1.80. PB 119148

1. Pancreas - Physiology 2. Diabetes, Pancreatic - Research 3. Lipoproteins - Biochemistry 4. Medical research 5. Contract ONR-25363, NR 115-262, Final report.

Cooling gradient calorimetry. U. S. Army Medical Research Laboratory, Fort Knox, Ky. Project no. 6-64-12-028. Order separate parts described below from LC, giving PB number of each part ordered.

Part IV. Further studies on effect of position change and skin temperature relationship, by Paul B. Reaser, Peter D'Alena, and John N. Wettlaufer. Apr 1955. 25p diags, graphs. PB 119258

On the basis of heat loss studies of forty subjects with digits at various levels at above and below heart level, it is concluded that elevation of a hand results in decreased heat loss while dependency results in increased heat loss. The use of digital skin temperature as a measure of blood flow, if heat loss is indicative of blood flow, does not seem to be justified. AMRL R 181.

Part V. Relationship between calorimeter heat removal and the rate of heat loss by digits, by Paul B. Reaser, Lawrence McNamara and Jerry B. Scott. Apr 1955. 7p tables. Mi \$1.80, ph \$1.80. PB 119259

In terms of heat output from the distal 2 phalanges of the 2nd and 4th digits it can be demonstrated that an increased rate of cooling exerts a definite effect. The more rapidly heat is removed from the calorimeter the greater the increase in heat loss from the digits. AMRL R 186.

Experimental investigation of the toxic amblyopias with particular reference to methanol poisoning,

by Albert M. Potts. Western Reserve University, Cleveland, Ohio. May 1954. 6p. Order from LC. Mi \$1.80, ph \$1.80. PB 119153

Final report for the period Jul 1, 1953-Apr 30, 1954, under Contract Nonr-05000, T. O. 442, NR 120-017. Work from May 1, 1954 on will be continued under a grant from the U. S. Public Health Service.

1. Amblyopias, Toxic - Research 2. Methanol - Toxicity 3. Methanol - Optical effects 4. Animals - Effects of methanol poisoning 5. Monkeys - Effects of methanol poisoning.

Further studies in the relationship of bioelectric phenomena to intravascular thrombosis. Annual progress report for period Jul 1953-Nov 31, 1954 under Contract N(onr) 551(09), NR 112-330, by Philip N. Sawyer, Bernhard Deutch, and David Harshaw. Pennsylvania. University. Schools of Medicine. Harrison Department of Surgical Research, Philadelphia, Pa. Dec 1954. 31p diags, graphs, tables. Order from LC. Mi \$3, ph \$6.30. PB 119180

For previous report see PB 116235.

1. Thrombosis, Intravascular 2. Blood - Electric conductivity 3. Blood vessels - Walls - Electrical properties.

Glycerol pectate as a blood plasma extender. Annual progress report including technical report for January 1955 for the period Jan 31, 1954-Jan 31, 1955 under Contract no. Nonr-860(00), NR 102-008, by Urs F. Nager. Burke Research Company, Van Dyke, Mich. Jan 1955. 8p. Order from LC. Mi \$1.80, ph \$1.80. PB 119246

During the early part of this research work attempts were made to modify pectin in such manner as to eliminate any possibility of forming insoluble precipitates. Various derivatives of the free carboxyl groups of pectinic acid and also of pectic acid (polygalacturonic acid essentially free from methyl ester groups) were prepared, among which the propylene glycol and glycerol esters showed the most promising physical-chemical characteristics. Preliminary animal studies revealed that the glycerol ester of pectic acid was a promising new plasma extender well tolerated by animals whereas the propylene glycol ester, although also very effective oncologically, occasionally caused various toxic side reactions. Report no. 31. For 1952-54 report see PB 116484.

Influence of stimulus duration on the pure-tone threshold during recovery from auditory fatigue, by James F. Jerger. Northwestern University. Audiology Laboratory, Evanston, Ill. Jun 1955. 9p graphs, tables. Order from LC. Mi \$1.80, ph \$1.80. PB 119410

The primary purpose of the present investigation was to determine whether this disturbance of the

intensity-time relationship could be demonstrated in the normal ear during the course of recovery from auditory fatigue. A secondary purpose was to gather data on the relative consistency and reliability of the temporary threshold shift over a period of time following intense acoustic stimulation. Such data are necessary to the ultimate design of a noise susceptibility test based on the threshold shift. AF SAM R 55-19.

Partitioning and saturation of the perceptual field and efficiency of visual search, by Charles W. Eriksen. Johns Hopkins University, Baltimore, Md. Apr 1954. 15p graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 119256

The present report describes a series of experiments upon the effects of various conditions of display upon visual search. The results show that search time increases both when the number of irrelevant signals is increased and when the number of partitions is increased. An explanation was advanced for these effects in terms of the number of foveal fixations required for signal identification and the use that observers make of grid lines in their plan of search. AF WADC TR 54-161. Contract AF 33(038)-22642.

Physiological and pathological study of experimental immersion foot (prolonged exposure of limb to cold short of freezing), with particular reference to the part played by anoxia as measured polarographically, by Hugh Montgomery. Pennsylvania University, School of Medicine, Philadelphia, Pa. Jun 1955. 3p. Order from LC. Mi \$1.80, ph \$1.80. PB 119152

Summary report. Technical report no. 2 for the period 1 Jul 1952-30 Nov 1954 under ONR Contract, Project NR 551-03.

1. Physiopathology 2. Animals - Pathology
3. Rabbits - Cold - Exposure - Effect on leg muscles 4. Oxygen deficiency - Physiological effects 5. Oxygen deficiency - Research.

Sleep measurements: Psychological, physiological and medical, literature search, by Francis C. Horgan. U. S. Office of the Quartermaster General, Military Planning Division, Research and Development Laboratories, Technical Library. Nov 1953. 35p. Order from LC. Mi \$3, ph \$6.30. PB 119190

The scope of the present survey encompasses psychological, physiological and medical literature. Such related areas as problems of consciousness, hypnosis, narcosis (anaesthetic and drug), the hypnagogic state, and the narcomimetic conditions, such as catatonia and narcolepsy are considered in the present search. The present compilation gives a good cross section of the literature of the past 15 years. Bibliographic series no. 31. QM TL BS 31.

Studies in the formation and secretion of mucus. Final report for the period 15 Nov 1950-14 Nov 1954 under Contract no. Nonr-196(00), by R. R. Ronkin. Delaware University. Dept. of Biological Sciences, Newark, Del. Jan 1955. 15p. Order from LC. Mi \$2.40, ph \$3.30. PB 119196

1. Mucus - Chemical analysis 2. Mucus - Formation 3. Mucus - Secretion.

Study of interacting protein systems. Final report for period Oct 1, 1949 to Aug 31, 1954 under Contract no. N9 onr-96200, NR 124-734, by Robert C. Warner. New York University, Bellevue Medical Center. Dept. of Biochemistry. Aug 1954. 5p. Order from LC. Mi \$1.80, ph \$1.80. PB 119161

1. Proteins - Chemical properties 2. Conalbumin - Reactions with lysozyme 3. Lysozyme - Reactions with conalbumin.

Summary technical report no. 3 for period 1 Jan 1953 to 31 Dec 1954 under Contract no. Nonr-1092, NR 102-024, by Warren Andrew. Wake Forest College. Bowman Gray School of Medicine, Winston-Salem, N. C. Dec 1954. 5p. Order from LC. Mi \$1.80, ph \$1.80. PB 119162

1. Lymphocytes - Research 2. Skin, Animal
3. Mycosis, Cutaneous 4. Animals - Physiology.

METALS AND METAL PRODUCTS

Damping, elasticity, and fatigue properties of unnotched and notched N-155 at room and elevated temperatures, by L. J. Demer and B. J. Lazan. Minnesota University, Minneapolis, Minn. Feb 1953. 77p photos, diagrs, graphs, tables. Order from OTS. \$2. PB 111618

Data are presented on the damping, elasticity, and fatigue properties of N-155 under rotating bending stress. Unnotched and notched specimens at room temperature, 1350°, and 1500°F. are included in this study. Properties at the three temperatures are compared on two bases, equal stress and equal stress ratio. Equations are developed for interpreting rotating cantilever beam data so that the effective length of specimen fillets, specific damping energy, and dynamic modulus of elasticity may be calculated. Continues study reported in PB 116824. AF WADC TR 53-70. Contract AF 33(038)-18903.

I. Deformation studies of metals at elevated temperatures. II. The iron-chromium-nickel ternary system. III. Effect of structure and composition

on the strength properties of stainless steel. IV. Effect of cold work on the strength properties of stainless steels, by N. J. Grant, H. C. Chang, P. E. Price, F. C. Monkman, and F. B. Cuff. Massachusetts Institute of Technology. Dept. of Metallurgy. Jan 1955. 8p tables. Order from LC. Mi \$1.80, ph \$1.80. PB 119213

Periodic status report no. 10, Nov 1954-Jan 1955, under Office of Naval Research contract no. N5 ori-07881, NR 039-007. For reports no. 6 - 9 see PB 116312, 117129, 117907 and 118662.

1. Metals - Deformation 2. Metals - Heat treatment 3. Steel, Stainless - Strength 4. Steel, Stainless - Physical properties.

Determination of niobium in some African low grade minerals and mineral dressing products. Part II. Spectrographic, by R. P. Thorne and B. M. Childs. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Sep 1953. 9p graph, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 27¢ plus mail handling. PB 119327

Unclassified 1955. S. O. Code no. 91-3-1-95.

1. Atomic power - Research - Gt. Brit. 2. Niobium - Determination - Gt. Brit. 3. Ore - Spectrographic analysis - Gt. Brit. 4. AERE C/R 1232/2.

Effect of gases on the contact potentials of evaporated metal films, by N. Hackerman and Emerson H. Lee. Texas. University. Dept. of Chemistry, Austin, Texas. Jan 1955. 44p diags, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 119212

In this work evaporated films of aluminum, iron, chromium, nickel, and lead were studied by the vibrating condenser method, using aged platinum as the reference metal. The potential between the films and the reference were measured in a vacuum system at room temperature as a function of time after evaporation of the film. The potential changes were thus a measure of the change of work function of the evaporated film. The system was so designed that samples of oxygen, nitrogen, and water vapor could be admitted and pumped out at will. This made it possible to distinguish between reversible and irreversible processes of adsorption. Contract Nonr-375(02).

Effect of strain rate on the tensile properties of SAE 4340 steel, by Richard F. Klinger. U. S. Air Force. Air Research and Development Command. Wright Air Development Center Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1955. 31p photos, drawing, graphs, tables. Order from OTS. \$1. PB 111948

The effect of tensile loading rate was determined at room temperature on SAE 4340 steel ranging from the annealed condition to a nominal ultimate strength of 220,000 psi. Stress-strain curves were obtained

and the mechanical properties determined over a strain rate range of from 0.00002 in/in/sec to 20 in/in/sec. The results indicate that the strength properties at the higher strain rates are greater than at the low strain rates and that this strain rate effect is less as the strength level of the steel is increased. This trend continues to the 220,000 psi level which shows no change or a slight loss in strength at the higher strain rates. The elongation was not affected by the change in strain rate at any strength level tested. Project no. 7360. AF WADC TR 53-507.

Effects of carbon, oxygen, and nitrogen on the mechanical properties of titanium and titanium alloys, by H. R. Ogden and R. I. Jaffee. Battelle Memorial Institute. Titanium Metallurgical Laboratory, Columbus, Ohio. Oct 1955. 102p graphs, tables. Order from OTS. \$2.75. PB 111982

This report reviews the effects of the alpha solute interstitials C, O, and N on the mechanical properties of titanium alloys. These interstitial elements strengthen titanium, although this effect is lost at elevated temperatures. At room temperatures the interstitials have little effect on tensile ductility, but at subzero temperatures they promote embrittlement. They also have a deleterious effect on toughness, notch sensitivity, weld ductility, machinability, and bend ductility. The strengthening effect of either individual or combined interstitials can be grouped in terms of an oxygen equivalent. Appendix A: Listing of government research projects directly related to the effects of carbon, oxygen, and nitrogen on titanium alloys. - Appendix B: Selected bibliography. - Appendix C: References. BMI TML R 20.

Electrodeposition of titanium, by Albert W. Schlechten, Martin E. Straumanis, and C. Burroughs Gill. Missouri. University. School of Mines and Metallurgy, Rolla, Mo. Nov 1954. 59p photos, drawings, diags, graphs, tables. Order from OTS. \$1.50. PB 111798

A process has been developed for obtaining a diffusion coating of titanium on iron, mild steel, copper, and other metals. This coating is very high in titanium content and displays good corrosion resistance. Many of the variables in the process have been investigated and are reported. Data are also presented on the corrosion of titanium in fused salts, the resulting products, and the probable mechanism. For Part 1 see PB 111797. AF WADC TR 53-162, Part 2. Contract AF 33(606)-75.

Engineering properties of commercial titanium alloys, by M. W. Mote, Jr. and P. D. Frost. Battelle Memorial Institute. Titanium Metallurgical Laboratory, Columbus, Ohio. Sep 1955. 90p graphs, tables. Order from OTS. \$2.25. PB 111981

This report presents an initial statement on the status and properties, as of the summer of 1955, of

titanium alloys which have been made in commercial-size ingots. The producers have supplied data on alloys which are, or soon will be, commercially available. This report includes sections on (1) the general composition and designation of alloys which have been made in commercial ingot size, (2) the properties of these commercial alloys in the annealed condition, (3) the properties of these commercial alloys in the heat-treated conditions, (4) a review of data on the uniformity of alloys, and (5) discussion of the data. Appendices are producer's data on titanium alloys produced by various corporations, and aeronautical material specifications. BMI TML R 15.

Enthalpy and specific heat of potassium bromide, potassium iodide, and potassium chloride at high temperatures, by C. B. Cooper. Determination of the adiabatic elastic constants of potassium chloride from 25°C to the melting point, by F. D. Enck. Maryland. University. Physics Dept., College Park, Md. Jan 1955. 40p graphs, tables. Order from LC. Mi \$3, ph \$6.30. PB 119242

By use of an ice calorimeter precision measurements of the enthalpies of pure samples of KBr, KI, KCl between 300°C and their melting points were made. Values for the specific heats at constant pressure of these substances through the same temperature range were calculated and tabulated. Measurements of the adiabatic elastic constants of KCl have been made in the region 300°C to the melting point (1043°K) by a dynamical method developed by Balamuth. Technical report no. 11. Final report under Contract no. Nonr-60200, Project no. NR 017-206.

Fatigue properties of tungsten-arc butt-welded wrought aluminum alloys, by Ture T. Oberg and Edward J. Ward. U. S. Air Force. Air Research and Development Command, Wright Air Development Center. Materials Laboratory, Wright-Fatterson Air Force Base, Dayton, Ohio. Oct 1951. 27p photos, drawing, graphs, tables. Order from OTS. 75 cents. PB 111616

A study has been made of the fatigue characteristics in reversed bending of argon gas shielded tungsten arc butt welded joints in 14S-T and 75S-T sheet. The effects of post weld heat treating and filler material were investigated. It is therefore concluded that the argon gas shielded tungsten arc welding process does not produce joints in 75S-T or 14S-T alloys of satisfactory fatigue strength. AF TR 6513.

Hydrogen effusion method for the determination of corrosion rates in aqueous systems at elevated temperature and pressure, by M. C. Bloom and M. Krulfeld. U. S. Naval Research Laboratory. Nov 1955. 18p photos, diagr, graphs, tables. Order from OTS. 50 cents. PB 111772

This report contains an analysis of the limitations of prior techniques of corrosion rate measurement

under these conditions and a description of a new technique based on the fact that, in a closed system at elevated temperature, the hydrogen which results from the corrosion reaction will diffuse through the walls of the metal at a comparatively rapid rate. This hydrogen is collected and measured in a vacuum system of known volume which surrounds the system under test, and the rate of hydrogen evolution thus measured gives a direct measure of the rate of corrosion of metal. Results obtained with the technique show good reproducibility and compare well with results obtained by an independent method. NRL R 4644.

Improved procedure for semi-plant scale manufacture of nickel powder by the nickel amalgam process, by David J. Zauder, L. Keith Hudson and Dewey J. Munson. U. S. Picatinny Arsenal. Samuel Feltman Ammunition Laboratories, Dover, N. J. Apr 1955. 28p graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119281

The improved operating procedure developed for the distillation of nickel amalgam gives a greater rate of production with the equipment available than does the Catalyst Research Corporation procedure. Further improvements in the process could be made by redesigning the distillation still. Ordnance project WD OAC 47001420-19-99105 item D9-E3. PA TR 2148.

Industrial application of chromium plating, a review of the literature, by M. Kolodny. National Research Council. War Metallurgy Committee. Nov 1942. 81f tables. Order from LC. Mi \$4.80, enl pr \$15.30. PB 119511

A summary of published and unpublished material dealing with the industrial uses (i.e., non-decorative uses) of chromium plating. Many successful applications of chromium plating are described for parts subject to severe wear, for example, gauges, tools, dies and the like. Reference is made briefly to its use for the reduction of erosion in guns and for decreasing the wear of aircraft engines and propellers. OSRD 1074. NDRC Div. 18, M-26.

Investigation of the compressive strength and creep lifetime of 2024-T3 aluminum-alloy plates at elevated temperatures, by Eldon E. Mathauser and William D. Develkis. U. S. National Advisory Committee for Aeronautics. Jan 1956. 40p photos, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119388

The strength-test results indicate that a relation previously developed for predicting plate compressive strength at room temperature is satisfactory for determining elevated-temperature strength. Creep-lifetime results are presented for the plates in the form of master creep-lifetime curves

by using a time-temperature parameter that is convenient for summarizing tensile creep-rupture data. NACA TN 3552.

Literature survey on bainitic hardening of high-speed tool steels, by A. Ayzavian. U. S. Arsenal, Watertown, Mass. Rodman Laboratory. Nov 1954. 37p photos, diags, graphs, tables. Order from OTS. \$1. PB 111760

The pertinent technical literature concerning the attainment of a bainitic structure in high-speed tool steels has been reviewed. This survey has included a historical review of the subject and the influence of compositions, prior metallurgical condition and various treatments on the attainment of primary and secondary bainitic structures in these high-speed steels. The literature describing an evaluation of the cutting tool performance of bainitically treated high-speed steel tools is also described, together with the conclusions of these investigations. Production engineering measures. Program directive no. C-512-53. WAL RPL 5.

Mechanical properties of a new high-strength high-toughness general-purpose alloy steel, by William E. Dirkes, Robert E. Bowman, and Edward L. Horne. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Aug 1952. 28p diags, graphs, tables. Order from OTS. 75 cents. PB 111617

Mechanical properties of a chrome-nickel-molybdenum-vanadium general purpose medium carbon alloy steel (modified SAE 4330 plus vanadium) to evaluate the suitability of the steel for aircraft applications where the combination of high strength and toughness are required. The properties of this steel were compared with the properties of an alloy steel, designated as "Hy-Tuf". AF WADC TR 52-73.

Microstructure vs properties in Ti-V-Fe alloys and an investigation of some factors affecting rates of decomposition of beta titanium, by Harold Margolin, Paul Farrar, and William Kirk. New York University. College of Engineering. Research Division. May 1955. 92p photos, drawing, diags, graphs, tables. Order from LC. Mi \$5.40, ph \$15.30. PB 119528

The mechanical properties of a series of Ti-V-Fe alloys containing up to 42.5% V and 20% Fe were determined in three heat-treated states. The effect of rapid-quenching on the transformation of selected Ti-Fe, Ti-Mn and Ti-Cr alloys was studied and the partial phase diagrams determined by this method are presented. Contract Noas 54-665-c.

On the permeability of porous materials, by E. Carson Yates, Jr. U. S. National Advisory Committee for Aeronautics. Jan 1956. 31p diags,

graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119380

Samples of 30- by 250-mesh rolled Monel metal cloth and 1/16-inch-thick sintered bronze were calibrated with constant upstream pressures of 1 atmosphere and 2-1/3 atmospheres (varying downstream pressure) and with constant downstream pressure of 1 atmosphere (varying upstream pressure). Simple calculation and correlation procedures were developed for determining permeability with reasonable accuracy when experimental data are limited. NACA TN 3596.

Phase report on brazing tungsten to molybdenum, by J. T. Niemann and R. P. Sopher. Battelle Memorial Institute, Columbus, Ohio. Nov 1955. 33p photos, drawings, tables. Order from LC. Mi \$3, ph \$6.30. PB 119440

This report presents part of an investigation on brazing tungsten to molybdenum. Two curved simulated nozzle blocks were brazed and pressure tested to evaluate the strength of joints between tungsten and molybdenum. Both copper and 72 percent silver-28 percent copper alloys were used as filler metals. Summarizes work done from Sep 1953 through Apr 1955. AF AEDC TN 55-41.

Properties and microstructure of uranium dioxide; their dependence upon the mode of preparation, by J. S. Anderson, E. A. Harper, S. Moorbath, and L. E. J. Roberts. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Aug 1952. 42p diags, graphs, tables. Order from British Information Services, New York 20, N. Y. \$1.04 plus mail handling. PB 119331

Declassified 17 Nov 1955. S. O. code no. 91-3-2-29.
1. Uranium dioxide - Preparation - Gt. Brit.
2. Uranium dioxide - Microstructure - Gt. Brit.
3. Uranium dioxide - Properties - Gt. Brit.
4. Atomic power - Research - Gt. Brit. 5. AERE C/R 886.

Recommended methods of the Panel on Methods of Analysis. U. S. Ordnance Dept. Metallurgical Advisory Committee on Titanium. May 1955. 73p diagr, tables. Order from OTS. \$2. PB 111730

Information bulletin T8, Part I.

1. Aluminum - Determination 2. Chromium - Determination 3. Iron - Determination 4. Manganese - Determination 5. Molybdenum - Determination 6. Nitrogen - Determination 7. Tin - Determination 8. Vanadium - Determination 9. Titanium - Spectrochemical analysis 10. Titanium alloys - Spectrochemical analysis.

Selection of materials for high-temperature applications in airframes, by S. A. Gordon. Battelle Memorial Institute. Titanium Metallurgical Lab-

oratory, Columbus, Ohio. Aug 1955. 38p graphs.
Order from OTS. \$1. PB 111980

The Titanium Metallurgical Laboratory has conducted a survey of the airframe industry to determine as accurately as possible the factors that are considered in the selection of materials for high-temperature application in airframe design. To fulfill this task, all aircraft companies interested in the problem were contacted by personal visits, and the results are reported herein. Titanium-sheet alloys at the present guaranteed yield strength of 110 ksi are not competitive materials for sandwich (honeycomb) construction. A similar study of the applications of titanium alloys in aircraft engines has been started. Color in graphs will not reproduce. Appendix A: Suggested standardized procedure for testing titanium sheet alloys. - Appendix B: References (with abstracts of reports of special interest). BMI TML R 13.

Spot and seam welding of titanium and titanium alloys. Final report under Contract NCas 51-146-f, by D. E. Dawson. North American Aviation, Inc. Engineering Dept., Los Angeles, Calif. Apr 1954. 189p photos, drawings, diags, graphs, tables. Order from CTS. \$4.75. PB 111707

The spot welding and seam welding processes may be readily applied to production grades of commercially pure titanium sheet, the oxygen-nitrogen titanium-base alloy Ti-100A and the 8% manganese titanium-base alloy. Simple welding equipment of the alternating current type is most suitable, and a wide range of settings may be used. Surface preparation treatments are necessary only on heavily oxidized material or where surface conditions vary. Spot and seam welds in commercially pure titanium and the oxygen-nitrogen alloy have consistent, determinable, usable, static and dynamic engineering properties at room and elevated temperatures. Report no. NA-54-238. Contract NCas 51-146-f.

Study of electron effects in solid solution alloys of titanium, by Joseph M. Denney. California Institute of Technology, Pasadena, Calif. Jan 1955. 162p photos, drawings, diags, graphs, tables. Order from LC. Mi \$7.80, ph \$25.80. PB 119217

Anomalous behavior of the lattice parameters of solid solution alloys of aluminum and gallium in titanium were observed at approximately 3 atomic per cent solute. Alloys of silver in titanium did not exhibit similar anomalies. Anomalies also were observed in the resistivity and in the coefficient of magneto-resistance for solutes of Al and Ga. No significant evidence of anomalous behavior of the Hall coefficient or the magnetic susceptibility with solute concentration was found. Sixth technical report under Contract N6onr-24430, NR 031-355.

Temperature dependence of infrared quenching of cadmium sulphide, by S. H. Liebson. U. S. Naval Research Laboratory. Sep 1955. 5p graphs. Order from LC. Mi \$1.80, ph \$1.80. PB 119367

The proportional quenching of photoconductivity of CdS crystals due to a fixed amount of infrared illumination has been measured as a function of temperature. Based on the Taft and Hebb hypothesis for infrared quenching of CdS, a competing mechanism is indicated. The mechanism does not appear to be correlated with the primary process responsible for the decrease of photoconductivity with increasing temperatures. NRL R 4617.

Titanium and titanium alloys programs. U. S. Air Materiel Command. Directorate of Procurement and Production. Industrial Resources Division. Order separate parts described below from LC, giving PB number of each part ordered.

Book 1: Projects sponsored by Air Materiel Command. Mar 1955. 43p. Mi \$3.30, ph \$7.80. PB 119261

Book 2: Projects sponsored by Air Research and Development Command (Wright Air Development Center). Mar 1955. 98p. Mi \$5.40, ph \$15.30. PB 119262

Book 3: Projects sponsored by the Dept. of the Navy. Mar 1955. 81p. Mi \$4.80, ph \$13.80. PB 119264

Book 4: Projects sponsored by Dept. of the Army. Mar 1955. 130p. Mi \$6.30, ph \$19.80. PB 119265

Book 5: Projects sponsored by private industry, U. S. Bureau of Mines, National Advisory Committee for Aeronautics, National Bureau of Standards. Mar 1955. 77p. Mi \$4.50, ph \$12.30. PB 119263

Transformation studies of substitute special treatment steels. Part I: Comparison of transformation diagrams, by Lester F. Spencer and Richard H. Raring. U. S. Naval Research Laboratory. Nov 1955. 17p photos, graphs, tables. Order from CTS. 50 cents. PB 111783

Two steels, enriched modifications of AISI 8727 and 87B27, which are being considered as substitutes for Ni-Cr STS, were compared on the basis of transformation characteristics and end-quench hardenability with a production sample of Ni-Cr STS. Isothermal transformation diagrams determined metallographically and continuous-cooling transformation diagrams determined dilatometrically indicate points of similarity and dissimilarity between the substitute steels and the standard Ni-Cr STS armor. NRL R 4650.

X-ray diffraction studies of the bainite transformation in four alloy steels, by L. S. Birks and R. T. Seal. U. S. Naval Research Laboratory. Oct 1955. 13p diag, graphs, table. Order from OTS. 50 cents. PB 111771

High-temperature x-ray diffraction techniques were used to study and compare the isothermal and continuous-cooling bainite transformations in four alloy steels. For predicting continuous-cooling transformation from isothermal diagrams, a rapid, graphical solution of the Scheil approximation is described in which the isothermal diagram itself is used as one scale of a slide rule. Predicted and observed continuous-cooling transformations were compared for two of the steels and found to be in good agreement. NRL R 4623.

Constantine G. Makrides. Corvey Engineering Co., Washington, D. C. May 1954. 163p tables. Order from LC. Mi \$7.80, ph \$25.80.

PB 119369

METEOROLOGY AND CLIMATOLOGY

Aspects of travel and deposition of aerosol and vapour clouds, by A. C. Chamberlain. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Sep 1953. 41p graphs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 99¢ plus mail handling. PB 119310

Unclassified 1955. S. O. code no. 91-3-2-20.
1. Aerosols - Diffusion - Gt. Brit. 2. Clouds - Distribution - Gt. Brit. 3. Atomic power - Research - Gt. Brit. 4. AERE HP/R 1261.

Bibliography on snow, ice and permafrost. Cumulative index, vols. I-VIII. U. S. Army. Corps of Engineers. Snow, Ice and Permafrost Research Establishment, Wilmette, Ind. Sep 1955. 57p. Order from LC. Mi \$3.60, ph \$9.30. PB 119137

For vols. 1-8 (indexed herein) see PB 113539-113540, 112250, 112252, 114461, 115969, 117329, and 119002.
1. Snow - Bibliography 2. Ice - Bibliography 3. Permafrost - Bibliography 4. SIPRE 12, Index.

Comparison of cyclone frequencies in the North Atlantic and Mediterranean regions, by Thomas A. Gleeson. Florida. University. Dept. of Meteorology. May 1955. 13p table. Order from LC. Mi \$2.40, ph \$3.30. PB 119272

Scientific report no. 8 under Contract no AF 19(122)-466.
1. Cyclones - Development 2. AF CRC TN 55-475
3. Contract AF 19(122)-466.

Crushing strength of lake ice, by T. R. Butkovich. U. S. Army. Corps of Engineers. Snow, Ice and Permafrost Research Establishment, Wilmette, Ind. Aug 1955. 6p diags, graphs, table. Order from LC. Mi \$1.80, ph \$1.80. PB 119138

1. Ice - Strength 2. SIPRE RP 15.

Effect of climate and environment on ground support equipment, by Wallace S. Newton and

The need for operability of ground support equipment anywhere in the world, at any time, has added climatic and environmental criteria to the evaluation of performance efficiency. The combination of moisture and high ambient temperatures lead all the others in destructive effect. In a secondary role is the effect of low ambient temperature in rendering materials more sensitive to rapidly applied loads. All of the destructive phenomena are understood and can be guarded against by some combination of design, materials, protective finish and packaging. Analyses of many categories of equipment have been recorded in the tables. The data upon which the tables were compiled resulted from an extensive literature survey and personal interviews. Indicated solutions are recorded and the need for future development work has been indicated. AAF WADC TR 54-132. Contract AF 33-(616)-2278.

Examples of the field of motion and weather in the Western Central Pacific, by W. D. Ohmstede and G. A. Dean. California. University. Institute of Geophysics. Oahu Research Center, Oahu, Hawaiian Islands. Scientific report no. 13 under Contract no. AF 19(604)-546. Order separate parts described below from LC, giving PB number of each part ordered.

Vol. I. Oct 1955. 101p tables. Mi \$5.70, ph \$16.80. PB 119417

A synoptic meteorology of the tropics which consists of a daily kinematic analyses of the entire troposphere over the Marshall Islands from the period October 10 to 31 October 1952 together with a daily weather distribution showing the correlated weather over the islands. The maps, diagrams and data are of value to research workers working on the origin of the typhoons. Wind tabulation sheets, showing cardinal isogons in the vertical at each station.

Vol. II. Oct 1955. 85p fold diags. Mi \$4.80, ph \$13.80. PB 119418

Kinematic analyses at 1,500 feet.

Vol. III. Oct 1955. 65p fold diags. Mi \$3.90, ph \$10.80. PB 119419

Kinematic analyses at 10,000 feet.

Vol. IV. Oct 1955. 65p fold diags. Mi \$3.90, ph \$10.80. PB 119420

Kinematic analyses at 20,000 feet.

Vol. V. Oct 1955. 90p diags. Mi \$4.80, ph \$13.80. PB 119421
Kinematic analyses at 30,000 feet, 40,000 feet, 50,000 feet, and 60,000 feet.

Final report under Contract no. AF 19(604)-449, by William C. Morton, III, Morton C. Rubin, Irving I. Schell, and Hurd C. Willett. Weather Services, Inc., Boston, Mass. Mar 1955. 233p maps, diags, graphs, tables (part fold). Order from LC. Mi \$10.20, ph \$36.30. PB 119269

The investigations which constitute the work of this project may be classified in five categories, namely:

1. Work in the nature of statistical assistance to other forecast research at the Geophysical Research Directorate, for which computational or statistical results were turned over to others for evaluation, application and final reporting.
2. The development of purely statistical forecasting techniques which were applied, evaluated, and reported by this project.
3. The investigation of synoptic forecasting techniques based on the computational study of synoptic mean charts, particularly in relation to possible physical control factors. (analog, solar analog, southern oscillation and polar ice approaches).
4. Attempts to obtain by statistical analysis or index parameters, a better physical understanding of the mechanics of operation of the general circulation.
5. Preparation of operational long range forecasts. AF CRC TR 55-281. Contract AF 19(604)-449, Final report.

Mean monthly winds and temperatures over the Marshall Islands in the spring of 1954, by Julius Korshover. California. University. Institute of Geophysics. Oahu Research Center, Oahu, Hawaiian Islands. Oct 1955. 186p diags, graphs, tables. Order from LC. Mi \$8.40, ph \$28.80. PB 119422

This report summarizes, chiefly in diagrammatic form, the mean monthly atmospheric motion over the Marshall Islands during the months of February, March, April, and May, 1954, and the mean atmospheric motion for the Spring season of 1954. Scientific report no. 14, vol. I-II, under Contract no. AF 19(604)-546.

On the behaviour patterns of cyclones and anti-cyclones as related to zonal index, by Dorothy L. Bradbury. Chicago. University. Dept. of Meteorology. Feb 1955. 12p maps. Order from LC. Mi \$2.40, ph \$3.30. PB 119439

A statistical study of the variations in the frequency patterns of cyclone and anticyclone centers with respect to the zonal index is described. The results indicate significant variations, especially over the oceans, in the ratio of the frequency of cyclone and anticyclone centers during high-index months to the frequency during low-index months. AF CRC TN 55-296. Contract AF 19(604)-1293, Technical report no. 1.

Prediction model for cyclone development integrated by Fjortoft's method, by M. A. Estoque. Chicago. University. Dept. of Meteorology. Aug 1955. 20p diagr, maps, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 119270

A set of prediction equations based on a $2\frac{1}{2}$ dimensional model is derived. These equations are integrated graphically for ten cases of sea level cyclogenesis. The resulting forecasts for the 1000 mb surface indicate accuracies comparable to those of numerical forecasts using the three-level model. AF CRC TN 55-693. Contract AF 19(604)-1293, Technical report no. 6.

Rainfall intensities for local drainage design in Arctic and subarctic regions of Alaska, Canada, Greenland, and Iceland for durations of 5 to 240 minutes and 2-, 5-, 10-, 20-, and 50-year return periods. U. S. Weather Bureau. Sep 1955. 24p maps, graphs, tables. Order from LC. Mi \$2.70, ph \$4. PB 119275

Because there are relatively few arctic and subarctic rainfall observations available for less than a 24-hour duration, this study, like the North Africa report, required the use of methods derived essentially from studies of United States data. An objective method was developed for estimating short-duration rainfall intensities from usually available climatic data.

Stratosphere balloon techniques for exposing living specimens to primary cosmic ray particles, by David G. Simons. U. S. Air Force. Air Research and Development Command. Holloman Air Development Center. Holloman Air Force Base, New Mexico. Nov 1954. 70p photos, maps, graphs, tabs. Order from LC. Mi \$3.90, ph \$10.80. PB 119257

The results of the balloon flights conducted by the Aero Medical Field Laboratory between August 1951 and December 1952 are presented. Techniques are described which permit mice and hamsters to be flown at 80,000 feet for serial 30-hour flights. The development of balloon instrumentation and recovery techniques which permitted recovery of serial balloon flights are elucidated. AF HADC TR 54-16.

Weather radar research. Massachusetts Institute of Technology. Dept. of Meteorology. Contract W36-039-sc-32038. Dept. of the Army project: 3-99-05-022. Signal Corps project: 122 B-C. Order separate parts described below from LC, giving FB number of each part ordered.

First technical report, by Alan C. Bemis. Dec 1946. 132f photos, drawings (1 fold), diags (1 fold), fold map, graphs, tables. Mi \$6.90, ph \$22.80. PB 119506

This report covers: (1) A review of weather radar researches already completed or in process by other groups. (2) A review of those parts of weather radar theory most applicable to this program. (3) A discussion of the objectives of this program both immediate and long range.

Technical report no. 2: On the probability of detecting bases and tops of clouds by radar at K-band or at shorter wave lengths, by Pauline M. Austin. Oct 1947. 21p graphs, tables. Mi \$2.70, ph \$4.80. PB 119514

1. Radar - Bands K 2. Radar - Meteorological uses 3. Clouds - Radar detection 4. Clouds - Reflecting properties.

Technical report no. 3: Standard operational procedures, by Edwin L. Williams, Jr. and George A. Wilson. Oct 1947. 82f photos, drawings, diags. Mi \$4.80, enl pr \$15.30. PB 119507

The primary purpose of this report is to furnish an instruction manual for personnel involved in the accomplishment of coordinated air-ground weather radar flight missions. Included in this manual is a list of equipment used, the duties of personnel and an appendix which contains various check lists, data sheets, equipment instruction sheets and specific standard operating procedures.

Technical report no. 13: Disdrometer, an instrument for measuring the distribution of raindrop sizes encountered in flight, by A. C. Bemis. Jun 1951. 144f photos, drawings, diags, graphs, tables. Mi \$7.20, enl pr \$24.30. PB 119508

The disdrometer (Distribution of Drops Meter) is an attempt to measure the drop size distribution within a rain storm. Its measurements have suffered from a consistent error which leads to much higher total liquid water contents than are indicated by other, more dependable, measurements. The instrument is still under study, and this is an interim report on the work. It covers the history of the development to date and describes the device completely in its present form. Appendix: Analysis calibration, and evaluation of the "Disdrometer," by Lawrence Francois Vassamillet.

Technical report no. 14: Comparison of radar signal intensity with precipitation rate, by Pauline M. Austin and Edwin L. Williams, Jr. Jun 1951. 49f photo, graphs, tables. Mi \$3.30, enl pr \$9.30. PB 119509

An attempt is made to establish an average relationship between radar signal intensity and rain rate, and to compare this with the relationships obtained in previous studies. Some discussion is also included concerning the differences between various types of storms and the deviations of individual observations from the average. Experimental studies of the radar scattering cross section of a single drop of water show good agreement with theory.

For Technical reports no. 4-8, 9A-9B, 10-12 see PB 104277-104281, 104720, 104282-104285.

Wind variability as a function of time, by Bernard M. Singer. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate. Atmospheric Analysis Laboratory, Cambridge, Mass. Sep 1955. 33p maps, diags, graphs, tables. Order from LC. Mi \$3, ph \$6.30. PB 119442

Records of 226 sets of triple theodolite balloon observations taken at Muroc, California to heights of 38,000 feet, have been analyzed to determine magnitudes of horizontal vector wind changes over time intervals from thirty minutes to five hours. The medians of magnitudes of velocity change vary from 2.0 mph over a time interval of 30 minutes, to 6.4 mph over an interval of five hours. AF CRC TN 55-221. AF GRD SG 72.

MINERALS AND MINERAL PRODUCTS

Electrical admittance of a circular ferroelectric disc, by Hans G. Baerwald. Brush Laboratories Co., Cleveland, Ohio. Jan 1955. 44p graphs (part fold). Order from LC. Mi \$3.30, ph \$7.80. PB 119233

Formulas and graphs are presented which permit quick and accurate evaluation of the planar piezoelectric coupling factor and of an associated elastic modulus of polarized ferroelectric ceramics on the basis of the measurement of the fundamental resonance and antiresonance frequency of circular discs of small ratio of thickness to diameter. These include Rayleigh correction for finite thickness and data on its range of validity. Technical report no. 3 under Contract no. Nonr-1055(00).

ORDNANCE AND ACCESSORIES

Brief history of tapered bore guns, by John S. Burlew. U. S. National Defense Research Committee. Apr 1942. 31p table. Order from LC. Mi \$3, ph \$6.30. PB 119068

Declassified Dec 17, 1954.

1. Guns, Tapered bore 2. NDRC A-43 3. OSRD 515.

Proceedings of the first ordnance conference on operations research held at Frankford Arsenal on May 14, 1954. U. S. Ordnance Corps. Office of Ordnance Research, Durham, North Carolina. Jan 1955. 96p diags. Order from LC. Mi \$5.40, ph \$15.30. PB 119273

OORR 55-1. Contents: Operations research and logistics, by Merrill M. Flood. - Some simple war

games, by Robert M. Thrall. - Industrial applications of operations research, by P. M. Morse. - Army operations research, by George Shortley. - An air war game, by Robert M. Thrall.

PACKING AND PACKAGING

Cube efficiencies of nested and non-nested cylindrical containers. Interim report no. 1, by J. P. Akrep and S. Stambler. U. S. Naval Supply Research and Development Facility, Bayonne, N. J. Feb 1955. 41p diags, graphs (part fold), tables. Order from OTS. \$1.25. PB 111754

The nested and non-nested cube efficiencies of various sizes and patterns of cylindrical containers were investigated to obtain selection criteria for maximum cube utilization in storage and shipment, for both the general case of cylindrical containers in a rectangular area and the special case of unit loads on the Navy general purpose 40" x 48" pallet. Project NT 003-016(r), sub-project SE 54-97. (Standardization of container sizes). Engineering report no. 2.5001 (Report no. 1).

Evaluation and development of closures for five gallon containers (types V and VI MIL C-124B), by S. Gaines and S. Stambler. U. S. Naval Supply Research and Development Facility, Bayonne, N. J. Mar 1955. 102p photos, diags, tables. Order from OTS. \$2.75. PB 111804

This report presents results of a study to determine the relative merits of the screw-type, snap-on, flexible spout, and flange and plug closures for use on types V and VI five gallon pails, as specified in MIL-C-124B. Recommendations for modification of this specification are included in order to increase the effectiveness of the screw type and snap-on closures. Project NT 003-016(g) Sub-project SE 53-75, Engineering report no. 2.0551 (Report no. 1)

Investigation and development of materials, equipment, and techniques for the bonding of palletized unit loads using adhesives, by G. F. Stahl and W. W. Sederlund. National Starch Products, Inc. National Adhesives Division, New York, N. Y. Jun 1954. 98p photos, diags, tables. Order from LC. Mi \$5.40, ph \$15.30. PB 119260

The objective of this contract is to obtain an improved adhesive, application equipment and working instructions for the bonding of palletized unit loads using adhesives. Previous experiences in the field had indicated difficulties with present adhesives and equipment due to tearing of cartons and defacing of advertising matter upon disassembly of glued loads. It is desired to eliminate these difficulties by the development of suitable glues, equipment and methods so that loads of varying types of containers

may be bonded to a pallet and to themselves in such a manner as to assure secure bonding during repeat handling and trans-shipment and yet permit satisfactory ease of separation at point of final issue without damage to containers. Engineering report no. 2.203070 (Report no. 1). Final report under Contract no. N140s-41632B.

Package safety test for volatile corrosion inhibitors, by R. K. Johnston, J. G. Schafer, L. C. McBeth. Nox-Rust Chemical Corp., Chicago, Ill. Jun 1955. 63p photos, diags, tables. Order from OTS. \$1.75. PB 111848

The major objective of this contract was to develop package safety tests which can be applied without opening and repackaging of materials assembled, using volatile corrosion inhibitors to protect ferrous metal components. Two methods were developed, both based on a rust-inhibition test of the package atmosphere, and laboratory tests have determined various limits of applicability. Project no. 7312. Covers work conducted from June 1953 to Dec 1954. AF WADC TR 55-84. Contract AF 33(616)-2119.

PHYSICS

General

Electrical cleanup of gases. Quarterly report for the period Jul 1955-Sep 1955 under Contract no. AF 18(600)-1049, by L. J. Varnerin, Jr. and J. H. Carmichael. Westinghouse Electric Corporation. Westinghouse Research Laboratories, East Pittsburgh, Pa. Oct 1955. 12p diagr, graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 119370

The mechanism by which the Bayard-Alpert ionization gauge pumps helium has been the subject of recent studies. It has been shown that the gas is trapped in the thin film of sputtered metal which is deposited on the glass walls of the tube. In this report, a phenomenological theory of pumping will be presented. The theory will be compared with experiment. Research report 71F191-R6. For other reports on this contract see PB 116569-116571, PB 117718.

Laminar separation over a transpiration-cooled surface in compressible flow, by Morris Morduchow. Polytechnic Institute of Brooklyn. Dec 1955. 32p graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119398

A theoretical analysis of laminar separation in compressible flow over a transpiration-cooled surface maintained at a uniform wall temperature is

made. A simple method of calculating the separation point over such a surface for a given adverse pressure gradient, Mach number, wall temperature, and uniform coolant temperature is developed. A numerical example shows the effects of these parameters on the separation point. NACA TN 3559.

Measurements of the attenuation of a repeated shock wave, by I. Rudnick. Soundrive Engine Co., Los Angeles, Calif. Feb 1953. 19p photos, diagr, graphs. Order from LC. Mi \$2.40, ph \$3.30.
PB 119067

In Technical Report No. 45 (PB 119066), a siren and microphone system capable of respectively producing and measuring sound waves of large amplitude is described. This report covers measurements, using this equipment, of the rate of attenuation of such large amplitude waves in the frequency range 30-200 c.p.s. and discusses the results in terms of known theories of attenuation. Contractor's serial report no. 48. Technical report no. 3 on the High Amplitude Sound Abatement Research Program. For technical reports no. 1-2 see PB 119065-119066. Contract N8 onr-70502, Project NR 014-907.

Method of extrapolating equation of state data to higher temperatures, by Roger A. Strehlow. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Jul 1955. 14p graphs, table. Order from LC. Mi \$2.40, ph \$3.30.
PB 119423

An extrapolation technique for obtaining high temperature equation of state data from low temperature experimental data is presented. The method is based on the assumption that at any constant high pressure the Lennard Jones 6-12 potential gives the correct virial equation as the temperature approaches infinity. The procedure works well for argon and nitrogen but a large discrepancy was found between the experimental data and the theory for carbon dioxide. Dept. of the Army project no. 5B0302001. Ordnance research and development project no. TB3-0110. APG BRL M 908.

Mixing of an axially symmetric compressible jet with quiescent air, by Walter R. Warren, Jr. Princeton University. Aeronautical Engineering Laboratory, Princeton, N. J. Sep 1953. 47p diagrs, graphs. Order from LC. Mi \$3.30, ph \$7.80.
PB 119073

A semi-empirical theory is presented for predicting the boundaries, velocity decay on the axis, and the velocity at any point in an air jet of variable density exhausting into air at rest. The integrated axial momentum equation is employed as the basic equation in the analysis and an approximate expression for density variation is presented and analyzed. Calculations are made for range of density ratios and an analysis of the results is attempted. A comparison with experiment is made indicating that the

mixing parameter $\frac{k}{u_1}$ is dependent upon the density

ratio. A method for solution of the mixing problem using a more exact density variation is indicated in Appendix I. Thesis - Princeton University. Project Squid. PU AEL R 252. Contract N6 ori-105, T. O. III.

Notes on diffraction by a circular disk, by Alfred Leitner. New York University. Washington Square College of Arts and Sciences. Mathematics Research Group. Apr 1949. 38p diagr, graphs. Order from LC. Mi \$3, ph \$6.30. PB 119280

The diffraction of a plane sound wave from a rigid circular disk of zero thickness was investigated. An exact theory is extended to compute values for the diffracted field both at the disk and at large distances from it. The solution obtained is compared with the Kirchhoff solution, an approximation designed for the case of very short wavelength, and found to be more efficacious than might heretofore have been considered. NYU RR EM-12. Contract AF 19(122)-42.

On the statistics of switch closing time, by George H. Weiss. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Jul 1955. 15p graph. Order from LC. Mi \$2.40, ph \$3.30.
PB 119276

This paper derives formal relations for the probability distribution between activation and closure of a switching network, in terms of the probability distributions for the constituent switches. A particular application is made to a network with a Gaussian time lag. Dept. of the Army project no. 5B0306002. Ordnance research and development project no. TB 3-0007. APG BRL R 942.

On the theory of thin elastic shells, by P. M. Naghdi. Michigan University. Engineering Research Institute, Ann Arbor, Mich. Jan 1955. 19p. Order from LC. Mi \$2.40, ph \$3.30. PB 119231

Suitable stress strain relations and appropriate boundary conditions are derived for thin elastic isotropic shells where the effects of both transverse shear deformation and normal stress are included; this is carried out by application of a recent variational theorem due to E. Reissner. Both the stress strain relations and boundary conditions are somewhat simplified as compared to those given previously. Using the results obtained, a theory for shallow spherical shells and an approximate theory for cylindrical shells are formulated, where in both cases only the effect of transverse shear deformation is retained. 2150-1-T. Contract Nonr-1224(01), Technical report no. 1.

Quarterly progress report no. 8 under Contract no. AF 18(600)-997. Boston. University. Dept. of

Physics. Sep 1955. 3p. Order from LC. Mi \$1.80, ph \$1.80. PB 119177

graphs, tables. Order from LC. Mi \$3.90, ph \$10.80. PB 119447

1. Physics - Research 2. Contract AF 18(600)-997, Report no. 8.

Quarterly progress report, Oct-Dec 1954, by R. H. Bolt and R. D. Fay. Massachusetts Institute of Technology. Acoustics Laboratory. 1954. 33p photo, diags, graphs. Order from LC. Mi \$3, ph \$6.30. PB 119025

1. Acoustic research.

Random normal deviates, by Herbert A. Meyer, Ernest J. Lytle, Jr. and Landis S. Gephart. Florida. University. Statistical Laboratory, Gainesville, Fla. Mar 1955. 122p tables. Order from OTS. \$3.25. PB 111875

Tables of a random arrangement of 25,000 six-place normal deviates, mean zero, variance one, are included with a description of the method used in their generation and with results of tests of normality and of randomness. Project no. 7060. AF WADC TR 55-125. Contract AF 33(616)-285.

Some practical aspects of the lot plot sampling acceptance plan, by W. Grant Ireson. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Oct 1954. 39p graphs, tables. Order from OTS. \$1. PB 111750

The purpose of this report is to examine critically the lot plot plan and to attempt to evaluate the practical aspects of it. This report describes some of the current uses and modifications, presents both favorable and unfavorable aspects, (as discovered by industrial users) and draws some conclusions regarding the possible future uses. SU AMSL TR 19. Contract N6onr-2512 (NR 042-002).

Spreading characteristics of choked jets exhausting into a supersonic stream, by Robert E. Tatro. U. S. Air Force. Air Research and Development Center, Tullahoma, Tenn. Oct 1955. 74p photos, drawings, diags, graphs, tables. Order from LC. Mi \$4.50, ph \$12.30. PB 119441

An investigation to determine the detailed effects of certain parameters on the spreading characteristics of jets discharging from choked convergent and convergent-divergent nozzles was conducted for the Arnold Engineering Development Center (AEDC) in the 12-inch wind tunnel of the Jet Propulsion Laboratory (JPL), California Institute of Technology. AF AEDC TR 55-2. Contract AF 40(600)-620.

Synthesis and critical study of sampled-data control systems, by E. I. Jury. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Aug 1955. 68p

The modified z-transform method has been applied to the synthesis and critical study of sampled-data control systems. It is shown that this method of analysis will remove all of the restrictions formerly imposed on the z-transform. Tables and examples are derived to demonstrate the application of this modified z-transform method. UC IER Series 60, Issue no. 136.

Theory of the attenuation of very high amplitude sound waves, by I. Rudnick. Soundrive Engine Co., Los Angeles, Calif. Jul 1952. 22p diags. Order from LC. Mi \$2.70, ph \$4.80. PB 119065

The propagation of continuous plane progressive sound waves whose pressure variation is of the order of one tenth of the average pressure is discussed, compared with previously published studies of the attenuation of single N waves, and found to be compatible. Also it is shown that Fay's solution of the hydrodynamic equations including the effects of viscosity, which shows the stable wave form to be a saw-tooth, may be extended to yield the attenuation rate derived here. Contractor's serial report no. 42. Technical report no. 1 on the High Amplitude Sound Abatement Research Program. For technical reports no. 2-3 see PB 119066-119067. Contract N8 onr-70502, Project NR 014-907, Technical report no. 1.

Wave propagation in solids. California. University. Dept. of Mathematics, Berkeley, Calif. Jan 1955. 132p graphs. Order from LC. Mi \$6.90, ph \$21.30. PB 119200

Technical report no. 4 under Contract no. Nonr-222(04), NR 340-040. Contents: Wave propagation in a plastic medium, by P. L. Chambre. - On the relation between a static and a dynamic elastic problem, by Ralph Lakness. - Spherically symmetric explosions in an elastic-plastic medium, by Charles B. Morrey, Jr. - Impulsive love waves in a heterogeneous medium, by Edmund Finney. - On establishing a soil mechanics theory, by Edmund Finney. - Singular cauchy problem for semi-linear hyperbolic systems, by M. H. Protter.

Nuclear

Fission product formation in a homogeneous power reactor, by C.J.L. Lock. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment, Jun 1955. 57p diagr, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. \$2.70 plus mail handling. FB 119319

Unclassified 1955. S. O. code no. 91-3-2-17.
1. Atomic power - Research - Gt. Brit. 2. Fission

products - Absorption - Gt. Brit. 3. Reactors, Power - Fission products - Gt. Brit. 4. AERE C/R 1715.

1. Gamma rays - Angular distribution 2. Coulomb friction 3. Atomic power - Research 4. OSR TN 55-447 5. Contract AF 18(600)-771.

Investigation of nuclear-energy levels. Progress report to January 1, 1955 under Contract no. N5-ori-116, Project Order III, ONR Project NR 024-01. Michigan University. Engineering Research Institute, Ann Arbor, Mich. Jan 1955. 29p graphs, tables. Order from LC. Mi \$2.70, ph \$4.80.
PB 119232

On the estimation of the energy of photon induced showers, by Paul Albert Bender. Washington University. Dept. of Physics, St. Louis, Mo. Jan 1955. 48p diagr, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80.
PB 119221

Contents: Decay of $^{66}\text{Dy}^{165\text{m}}$ (1.2 min) and $^{66}\text{Dy}^{165}$ (2.3 hr), by W. C. Jordan, M. M. Cork, and S. B. Burson. (Reprinted from The Physical Review, vol. 92, no. 5, 1218-1221, Dec 1953.) - Gamma spectra of Cd^{117} and In^{117} , by J. M. LeBlanc, J. M. Cork, and S. B. Burson. (Reprinted from The Physical Review, vol. 93, no. 4, 916, Feb 15, 1954.) - Radiation from antimony 122, by J. M. Cork, M. K. Brice, G. D. Hickman, and L. C. Schmid. (Reprinted from The Physical Review, vol. 93, no. 5, 1059-1061, Mar 1, 1954.) - Decay of V^{52} , by J. M. LeBlanc, J. M. Cork, S. B. Burson, and W. C. Jordan. (Reprinted from The Physical Review, vol. 93, no. 5, 1124-1125, Mar 1, 1954.) - Neutron capture in the separated isotopes of platinum, by J. M. Cork, M. K. Brice, L. C. Schmid, G. D. Hickman, and H. Nine. (Reprinted from The Physical Review, vol. 94, no. 5, 1218-1221, Jun 1, 1954.) - The activities of Zn^{71} , by J. M. LeBlanc, M. M. Cork, and S. B. Burson. (Reprinted from The Physical Review, vol. 94, no. 5, 1436, Jun 1, 1954.) - The decay of Pt^{199} , by J. M. LeBlanc, J. M. Cork, and S. B. Burson. (Reprinted from The Physical Review, vol. 95, no. 2, 627, Jul 15, 1954.) - Energies of the radiations from Ce^{144} and Pr^{144} , by J. M. Cork, M. K. Brice, and L. C. Schmid. (Reprinted from The Physical Review, vol. 96, no. 5, 1295-1297, Dec 1, 1954.)

A high energy photon or electron will produce a cascade of electrons and photons by means of pair production and radiation. This cascade is known as a shower. Examples are often seen in multiplate cloud chambers. The problem of this paper is to establish a procedure whereby one can estimate the energy, E_0 , of a shower when seen in a multiplate cloud chamber. Thesis - Washington University, St. Louis, Mo. Technical report no. 19. Contract N6 onr-202, T. O. III.

Perturbation calculation of the inelastic scattering of electrons by hydrogen atoms, by S. Borowitz and M. M. Klein. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research. Nov 1955. 61p table. Order from LC. Mi \$3.90, ph \$10.80.
PB 119438

A perturbation calculation has been made of the inelastic scattering of fast electrons by hydrogen atoms for the 2S and 2P cases, using for the perturbation only the interaction between the incident electron and the bound electron. The results are then compared to leading order terms in the energy, with calculations by the more customary perturbation scheme. AF CRC TN 55-878. NYU RR CX-22. Contract AF 19(122)-463.

Measurement of the elastic and inelastic scattering of H^- ions in hydrogen, by E. E. Muschlitz, Jr., T. L. Bailey, and J. H. Simons. Florida. Engineering and Industrial Experiment Station, Gainesville, Fla. Dec 1954. 48p photos, drawings, diagrs, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80.
PB 119216

Phenomenological theory of the constricted gas discharge at moderate currents, by W. B. Thompson. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. May 1952. 21p graphs. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 54¢ plus mail handling.
PB 119296

The measurements reported here of the elastic scattering of 4 - 400 e.v. H^- ions in hydrogen are the first such measurements with negative ions. The precision of the results obtained is about the same as that of the earlier measurements of positive ion scattering by Simons and co-workers. This has been accomplished, despite the much lower negative ion currents, by improvements in the apparatus and technique. Contract Nonr 580(01).

Unclassified 1955. S. O. code no. 91-3-2-12.
1. Gases, Ionized - Electron density - Theory - Gt. Brit. 2. Atomic power - Research - Gt. Brit. 3. AERE T/R 997.

Note on gamma angular distribution in Coulomb excitation, by G. Breit, M. E. Ebel, and J. E. Russell. Yale University. Sloane Physics Laboratory. Oct 1955. 13p. Order from LC. Mi \$2.40, ph \$3.30.
PB 119450

Quarterly progress report under Contract AF 33-(038)-20681, task no. 37506. Texas. University, Austin, Texas. Order separate parts described below from LC, giving PB number of each part ordered.

No. 17, for the period Apr 1-Jun 30, 1955. Jun 1955. 45p graphs, tables. Mi \$3.30, ph \$7.80.
PB 119249

Contents: Cockcroft-Walton apparatus (Summary), by E. W. Bennett. - Angular distribution

of reaction products, by J. C. Grosskreutz. - Gamma rays from the proton bombardment of separated copper isotopes (Summary), by J. C. Grosskreutz and C. E. Weller. - Coulomb excitation of heavy nuclei (Summary), by J. C. Grosskreutz. - Positron annihilation studies (Summary), by W. E. Millett. - Numerical variational method using quadratic interpolation, by W. W. Clendenin.

No. 18, for the period Jul 1-Sep 30, 1955. Sep 1955. 75p diags, graphs, tables. Mi \$4.50, ph \$12.30. PB 119250

Contents: Cockcroft-Walton apparatus (Summary), by E. W. Bennett. - Coulomb excitation of heavy nuclei (Summary), by J. C. Grosskreutz and A. A. O'Dell. - Gamma rays from the proton bombardment of separated copper isotopes - final report, by C. E. Weller and J. C. Grosskreutz. - Excitation curves for $C^{14}(p,r)$ and $O^{18}(p,r)$ (Summary), by E. L. Hudspeth. - Positron annihilation studies (Summary), by W. E. Millett. - Low temperature studies (Summary), by W. E. Millett. - Use of the numerical variational method with singular potentials, by W. W. Clendenin.

Quarterly progress report no. 9 under Contract AF 33(038)-27353. U. S. Air Force. Radiation Laboratory, University of Chicago, Chicago, Ill. Oct 1953. 134p graphs, tables. Order from LC. Mi \$6.90, ph \$22.80. PB 119512

Contents: Studies on the applicability of adenosine triphosphatase assays for screening chemical agents for prophylactic or therapeutic value against radiation injury. II: Influence of cysteine on the adenosine triphosphatase activity of hematopoietic tissues of irradiated rats, by Kenneth P. DuBois, Donald F. Petersen, and Oda K. Cummings. - Application of 5-nucleotidase measurements on hematopoietic tissues for evaluating the protective efficacy of chemical agents against radiation injury. II: The effects of cysteine on the 5-nucleotidase activity of spleen and thymus glands of irradiated rats, by Donald F. Petersen and Kenneth P. DuBois. - Effect of high doses of X-ray on the phosphatases of mouse tissues. I: Influence of high doses of X-ray on the 5-nucleotidase activity of mouse tissues, by Donald F. Petersen, Gladys Cotter, and Kenneth P. DuBois. - Effect of central nervous system stimulants on X-ray lethality in rats, by John Doull and Douane W. Hallesey. - Effect of high level X-irradiation on enzymatic reactions. I: Influence of high level X-irradiation on the respiration of tissue slices, by John C. Ballin and John Doull. - Studies on the effects of X-irradiation on the neurohumoral mechanisms of the gastro-intestinal tract, hematopoietic tissues and other tissues of mice, by John Doull and Oda K. Cummings. - Further studies on the effect of anesthetic agents on the mortality of X-irradiated rats, by James E. Wilson. - Studies on the protective action of p-aminopropiophenone against ionizing radiation, by Bernard Korol. - Hydrogen peroxide as possible intermediate causa-

tive agent in radiation damage. XVIII: Catalase in tissues of hibernating and non-hibernating gophers, by Robert N. Feinstein. - Failure of injected catalase to protect the giant amoeba from X-rays, by Edward W. Daniels and Robert M. Feinstein. - Effect of sulfur mustard, a nitrogen mustard, and X-radiation upon sodium alginate solutions, by Robert N. Feinstein and Leo L. Nejelski, Jr. - Effect of inhaled gas mixtures on the survival time of X-irradiated mice, by A. Hasegawa and H. D. Landahl. - Effect of X-irradiation on the amounts of acetone, ammonia, and carbon dioxide in the expired air of rabbits, by Joan Taubman, A. Hasegawa, and H. D. Landahl. - Studies on the adenosine nucleotide levels of hematopoietic tissues of irradiated animals. I: Development and application of ion exchange methods for nucleotide measurements in spleen, Edwin M. Uyeki. - Tests of various chemical agents against X-irradiation in mice, by Edwin M. Uyeki.

Recovery of tritium used in ion accelerators, by D. L. Allan, J. Carey, J. F. McCahon, and M. J. Poole. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Mar 1950. 8p diagr. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 24¢ plus mail handling. PB 119291

Unclassified 1955. S. C. code no. 91-3-2-9. 1. Tritium - Recovery - Gt. Brit. 2. Atomic power - Research - Gt. Brit. 3. AERE N/R 494.

Total cross sections for 14-mev neutrons: Comparison of measured values with values calculated from the complex square-well model, by W. I. McGarry, J. O. Elliot, and W. R. Faust. U. S. Naval Research Laboratory. Dec 1955. 5p diagr, table. Order from OTS. 50 cents. PB 111853

A comparison has been made between measured 14-Mev neutron total cross sections and theoretical values calculated from the complex square-well model of the nuclear interaction. The comparison shows that the calculated cross sections are low, indicating either that a greater nuclear radius parameter is required (in contradiction with the differential elastic scattering data) or that the theoretical model utilizing a square well is an oversimplification. NRL R 4666.

Treatment of isotopic exchange reactions having complex mechanisms, by R. A. Marcus. Polytechnic Institute of Brooklyn. Dept. of Chemistry, Brooklyn, N. Y. Dec 1954. 20p graph. Order from LC. Mi \$2.40, ph \$3.30. PB 119179

1. Atomic power - Research 2. Isotopes - Exchange reactions 3. Chemistry, Physical - Isotope chemistry 4. Chemical compounds, Organic - Exchange reactions 5. Borohydrides - Reactions with deuterium 6. Contract Nonr 839(09), Project NR 051-339, Technical report no. 1.

Ultraviolet absorption of atomic nitrogen in the region of its ionization continuum, by A. W. Ehler and G. L. Weissler. University of Southern California. Dept. of Physics, Los Angeles, Calif. Jun 1955. 38p diags. Order from LC. Mi \$3, ph \$6.30. PB 119107

Part A compares the absorption of a column of nitrogen with the absorption of this same column excited by an electrical discharge. The Phillips Ionization Gauge type discharge was chosen as the absorbing medium for this investigation. It was hoped to obtain information on the absorption cross section for the composite discharge plasma and to correlate this absorption with the various plasma components. Part B describes procedures and results obtained when radiation from the light source was passed through the plasma region after the P.I.G. discharge had been extinguished. AF CRC TN 55-694. Contract AF 19(604)-151, Technical report no. 5.

PSYCHOLOGY

Alternative classroom standards concerning management of hostility and effects on student learning, by Morton Goldman, Murray Horwitz, and Francis J. Lee. Illinois. University. College of Education. Mar 1955. 23p tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119365

To be presented in abbreviated form at the March 1955 meeting of the American Educational Research Association.

1. Psychology, Applied 2. Group behavior 3. Education - Methods 4. Contract N6 ori-07144.

Effectiveness of television instruction in training naval air reservists, by Robert T. Rock, Jr., James S. Duva, and John E. Murray. Fordham University. Dept. of Psychology, New York, N. Y. Apr 1951. 68p diags, tables. Order from LC. Mi \$3.90, ph \$10.80. PB 119191

This technical supplement to NAVEXOS 850-2 (PB 104414) presents in more detail the findings summarized in that report. It represents one phase of a pioneering study of training by television conducted over the period Oct 1948-Feb 1951. Human engineering project 20-E-5a, final report. SDC TR 476-02-S2. Contract N7 onr-47602, NR 781-007.

Guide for the design and evaluation of the instructor's station in training equipment, by Alan D. Swain. American Institute for Research, Pittsburgh, Pa. Dec 1954. 207p. Order from OTS. \$5.50. PB 111879

The purpose of this "Instructor's Station Guide" is twofold: (1) to provide procedures for the collection

of data on the design of the instructor's station, and (2) to provide a method to aid in the evaluation and design of existing or proposed instructor's stations. The contents of this report represent a human engineering and systems analysis approach in answering the following questions: (1) What facilities and equipment are needed at the instructor's station for him to accomplish his mission? (2) How should these various components be designed for most efficient use? (3) How should the whole instructor's station be laid out to allow maximum instructor effectiveness? Project no. 7197. AF WADC TR 54-564. Contract AF 33(616)-2080.

Legibility of type as determined by the combined effect of typographical variables and reflectance of background, by Mason N. Crook, John A. Hanson and Alexander Weisz. Tufts College. Institute for Applied Experimental Psychology, Medford, Mass. Mar 1954. 29p graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119251

The legibility of capital letters as a function of size, stroke width, spacing, and reflectance of background was measured under 0.082 foot-candles of red illumination, using specially designed experimental type. Scores were in terms of speed and accuracy on an oral reading task. Third report on this research. For 1st report see PB 107505. AF WADC TR 53-441. Contract W33-038-ac-14559. Contract AF 33(616)-2018.

Problems in staff relations: Experience survey, by Morton Deutsch and Harold Gerard. U. S. Air Force. Air Research and Development Command. Human Resources Research Institute, Maxwell Air Force Base, Ala. Aug 1953. 19p. Order from LC. Mi \$2.40, ph \$3.30. PB 119195

1. Group behavior 2. Psychology, Applied 3. AF HRRI RM 23.

Research in cohesive and disruptive tendencies in coalition-type groups, by Ben Willerman. Minnesota. University. n.d. 6p table. Order from LC. Mi \$1.80, ph \$1.80. PB 119158

1. Group behavior 2. Psychology, Applied 3. Contract N8 onr-66216, Technical report no. 4.

Standardized test evaluation of two methods of teaching human relations, by Francis J. Di Vesta. U. S. Air Force. Air Research and Development Command. Human Resources Research Institute. Maxwell Air Force Base, Ala. Jan 1954. 27p. tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119409

This report outlines a proposed research project to determine the relative effectiveness of different methods of teaching leadership. The major hypothesis is that certain selected techniques or

methods of instruction are more effective than others for promoting student learning and improvement in leadership skills. AF HRR1 RM 28.

Statistical model for relational analysis, by R. Duncan Luce, Josiah Macy, Jr. and Renato Tagiuri. Harvard University. Laboratory of Social Relations. 1953. 18p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 119069

1. Statistical analysis
2. Psychology, Social
3. Contract N5 ori-07646.

Study of learning and retention from television instruction transmitted to Army field forces reservists, by Robert T. Rock, Jr., James S. Duva, and John E. Murray. Fordham University. Dept. of Psychology, New York, N. Y. May 1951. 54p map, graphs, tables. Order from LC. Mi \$3.60, ph \$9.30. PB 119192

The results indicate that television instruction is an effective means of training large numbers of people dispersed in widely separated groups. All grades of personnel made statistically significant gains on test scores and retained what was learned. Human engineering project 20-E-5a, final report. Technical supplement to PB 105493. SDC TR 476-02-S3. Contract N7 onr-47602, NR 781-007.

Study of normative and informational social influences upon individual judgment, by Morton Deutsch and Harold B. Gerard. New York University. Research Center for Human Relations. n.d. 27p tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119157

The purpose of this paper is to consider two types of social influences, "normative" and "informational", and to report the results of an experiment bearing upon hypotheses that are particularly relevant to the former influence. Date is 1952 or later. Contract Nonr-285(10).

STRUCTURAL ENGINEERING

Compressive crippling of structural sections, by Melvin S. Anderson. U. S. National Advisory Committee for Aeronautics. Jan 1956. 31p diagrs, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119387

A method is presented for calculating crippling stresses of structural sections as a function of material properties and the proportions of the section. The presence of formed or anisotropic material is accounted for by the use of an effective stress-strain curve. The method of analysis applies to

many sections for which a procedure for calculating crippling was not previously available. NACA TN 3553.

Correlation of crippling strength of plate structures with material properties, by Roger A. Anderson and Melvin S. Anderson. U. S. National Advisory Committee for Aeronautics. Jan 1956. 50p drawing, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119373

A correlation approach to the crippling-strength analysis of multiplate-element structures in new materials and at elevated temperatures is presented. Appropriately defined crippling-strength moduli and correlation procedures are given for predicting the effect of a change in material properties on the strength of a structure. The accuracy of the approach is illustrated with available experimental data obtained in various materials and under different temperature conditions. NACA TN 3600.

Study of slab-on-ground construction for residences. Building Research Advisory Board. Jun 1955. 53p drawings, table. Order from NAS-NRC Publications Office, 2101 Constitution Ave., N. W., Washington 25, D. C. \$2. PB 119193

Slab-on-ground construction has three major design elements: structural soundness, moisture control, and thermal insulation. This report contains detailed recommendations for each of these elements. In addition, the report gives tentative answers arrived at by the Committee, and related items of useful information. NRC 385.

TEXTILES AND TEXTILE PRODUCTS

Cutaneous toxicity evaluation of fabrics impregnated with anti-mildew agents, by Morris V. Shelanski and Charles Josephs. Industrial Toxicology Laboratory, Inc., Philadelphia, Pa. Mar 1955. 22p tables. Order from OTS. 75 cents. PB 111800

Fabrics impregnated with certain anti-mildew agents were studied via the prophetic patch test method on laboratory animals and volunteer human subjects to determine the primary irritant effect and the sensitization index of the impregnated cloth. Other fabrics were studied which had been altered by the acetylation process or by the cyanoethylation process. The patch test studies with laboratory animals indicated that all materials were non-irritating. On the human subjects this was not the case. Those fabrics which were impregnated with halogen substituted dinitrobenzenes elicited many strong reactions as evidence of primary irritation. They were not recommended for use on any

material which would contact the human skin.
Project no. 7159. AF WADC TR 55-198. Contract
AF 33(616)-2432.

Effect of storage on shoe threads, by Edwards B. Frederick and Walter Zagieboylo. U. S. Office of the Quartermaster General. Research and Development Command, Textiles, Clothing and Footwear Division, Quartermaster Research and Development Center, Natick, Mass. Jul 1955. 31p photos, graphs, tables. Order from OTS. \$1. PB 111976

The effect of storage on the stress-strain properties of stitching thread for military footwear held under controlled storage conditions was evaluated at six-month intervals over a period of two years. Upper stitching threads and bottoming cords of cotton, linen, nylon and polyester fibers were exposed to moist tropical and temperate summer conditions where the temperature and humidity were controlled and cycled over a twenty-four hour period. Threads were stored in skein form wrapped around sole leather swatches and in seams. On an overall basis, the synthetic threads were found to have lost less strength than the natural fiber threads. The results of these laboratory tests are being checked in actual wear of shoes made from these threads. Project reference: 7-92-06-005. QMC LSR 10.

TRANSPORTATION EQUIPMENT

Aeronautics

Instruments

Design criteria for axisymmetric and two-dimensional supersonic inlets and exits, by James F. Connors and Rudolph C. Meyer. U. S. National Advisory Committee for Aeronautics. Jan 1956. 42p diags, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119375

1. Ducts, Air - Supersonic - Design 2. Mach number - Effect 3. Flow, Supersonic - Theory 4. NACA TN 3589.

Evaluation of exhaust-gas thermocouples and harness from a Mig-15 airplane, by Ernest F. Flock and Paul D. Freeze. U. S. National Bureau of Standards. Jul 1954. 26p photos, drawing, diags, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119203

The thermoelectric behavior of the gas-temperature measuring system of a Russian MiG-15 airplane has been determined in considerable detail, and the

compositions of various key parts have been determined. While the thermocouples themselves were found to require no cold-junction correction or compensation, their thermal emf is only a fraction as great as Chromel-Alumel in the temperature range encountered in turbojet exhaust gas. No characteristic of the Russian system is deemed worthy of integration into our own system for turbojet engines. AF WADC TR 54-552. Contract AF 33(616)-53-1.

Investigation of the effect of short fixed diffusers on starting blowdown jets in the Mach number range from 2.7 to 4.5, by John A. Moore. U. S. National Advisory Committee for Aeronautics. Jan 1956. 32p photos, diags, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119384

1. Diffusers, Supersonic - Design 2. Flow, Supersonic - Diffusion 3. Flow, Supersonic - Theory 4. Flow, Supersonic - Wind tunnel tests 5. Mach number - Effect 6. NACA TN 3545.

Study of an anticipator type control for an airframe, by Morimi Iwama. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Sep 1955. 75p photos, diags, graphs. Order from LC. Mi \$4.50, ph \$12.30. PB 119428

An investigation was made of the optimization of an underdamped non-linear third-order system by means of an anticipatory relay servo-mechanism. The results of the study were successfully applied to the pitch acceleration control mechanism of an airplane as simulated by an analog computer. Data and information necessary for the analysis and synthesis of the problem were furnished by the Physical Research Unit of the Boeing Aircraft Co. and are presented in Appendix 1-2. UC IER Series 60, Issue no. 145.

Suggestions concerning desirable display characteristics for aircraft instruments, by A. C. Williams. Illinois. University. Dept. of Psychology. Jul 1949. 18p diags. Order from LC. Mi \$2.40, ph \$3.30. PB 119222

Human engineering project 20-L-1.
1. Instruments, Aeronautical - Effect of location on instrument panel 2. Instruments, Aeronautical - Installation 3. SDC TR 71-16-4 4. Contract N6 ori-71, T. O. 16, NR 784-003.

Engines and Propellers

Cloud-droplet ingestion in engine inlets with inlet velocity ratios of 1.0 and 0.7, by Rinaldo J. Brun. U. S. National Advisory Committee for Aeronautics. Jan 1956. 52p diags, graphs, tables.

Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119383

1. Trajectories, Water droplet - Calculation
2. Bodies of revolution - Droplet impingement
3. Bodies of revolution - Velocity - Calculations
4. NACA TN 3593.

Experimental investigation of air-flow uniformity and pressure level on wire cloth for transpiration-cooling applications, by Patrick L. Donoughe and Roy A. McKinnon. U. S. National Advisory Committee for Aeronautics. Jan 1956. 28p photos, diagr, graphs, table. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119382

1. Wire cloth - Permeability
2. Wire cloth - Tensile tests
3. Heat - Transference - Aerodynamics
4. Air flow - Measurements
5. NACA TN 3652.

Simplified differential methods of performance reduction for subsonic turbo propeller aircraft, by Robert L. O'Neal. U. S. Air Force. Air Research and Development Command. Air Force Flight Test Center, Edwards Air Force Base, Calif. Dec 1955. 14p graph. Order from LC. Mi \$2.40, ph \$3.30. PB 119449

1. Propellers - Performance - Measurement - Standardization
2. Propellers - Thrust - Measurements
3. AF FTC TN 55-30.

Theoretical study of the effect of forward speed on the free-space soundpressure field around propellers, by I. E. Garrick and Charles E. Watkins. U. S. National Advisory Committee for Aeronautics. 1954. 18p diagrs, graphs. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 20 cents. PB 119248

Supersedes NACA TN 3018 (PB 112193).

1. Propellers - Thrust
2. Propeller theory
3. Noise, Propeller - Airplanes
4. Torque, Propeller - Measurements
5. Mach number - Effect
6. NACA 1198
7. NACA TN 3018 Revised.

Aerodynamics

Aerodynamic properties of a simple non rolling finned cone-cylinder configuration between Mach numbers 1.0 and 2.5, by L. C. MacAllister. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. May 1955. 43p photos, graphs. Order from LC. Mi \$3.30, ph \$7.80. PB 119277

The aerodynamic properties of a finned model are given for a Mach number range from 1 to 2.5. The test vehicle is a ten-caliber long cone-cylinder

body with four rectangular fins, of 8% thick wedge sections, set in a cruciform configuration. The data were determined by firings in a spark photography range. Dept. of the Army project no. 5B03-03-001. Ordnance research and development project no. TB 3-0108. APG BRL R 934.

Seitenstabilität eines geschleppten flugzeuges (Directional stability of towed airplanes), by W. Söhne. Translated by Mary L. Mahler. Jan 1956. 53p diagrs, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119401

Translated from Deutsches Ingenieur-Archiv, vol. 21, no. 4, p. 245-265, 1953.

1. Gliders - Towing - Germany
2. Airplanes - Towing - Germany
3. NACA TM 1401.

Sulla teoria delle superfici portanti (Remarks on the theory of lifting surfaces), by Aldo Muggia. Translated by R. H. Cramer, Cornell Aeronautical Laboratory, Inc. Jan 1956. 11p diagrs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119400

First, the Weissinger method, as it applies to a rectangular wing, is discussed. By building on this framework it is shown how to treat the lift problem for any thin wing of arbitrary plan form. Translated from Atti della Accademia delle Scienze di Torino, vol. 87, 1952-53.

Transonic characteristics of 36 symmetrical wings of varying taper, aspect ratio, and thickness as determined by the transonic-bump technique, by Warren H. Nelson, Edwin C. Allen, and Walter J. Krumm. U. S. National Advisory Committee for Aeronautics. Dec 1955. 131p photo, diagrs, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119394

See also PB 117645 and 117698.

1. Wings - Aerodynamics - Effect of taper
2. Wings - Wind tunnel tests
3. Mach number - Effect
4. Reynolds number - Effect
5. Flow, Supersonic - Wind tunnel tests
6. NACA TN 3529.

Rockets and Jet Propulsion

Effect of climb technique on jet-transport noise, by Warren J. North. U. S. National Advisory Committee for Aeronautics. Jan 1956. 19p graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119392

1. Jet engines, Turbo-jet - Noise - Measurement
2. Jet engines, Turbo-jet - Noise - Reduction

3. Jet engines, Turbo-jet - Operation 4. Jet engines, Turbo-jet - Thrust 5. Jet propulsion - Research 6. NACA TN 3582.

Heat transfer from combustion gases to wall as basis for the construction of uncooled rocket motors, by Klaus Scheufelen, with an appendix: Mathematical analysis of the temperature rise in uncooled walls of rocket motors, by Carl Wagner. Bendix Aviation Corporation, Eclipse-Pioneer Div., Teterboro, N. J. Mar 1948. 37p graphs, table. Order from LC. Mi \$3, ph \$6.30. PB 119371

This report gives an approximate method for the determination of the coefficients of heat transfer from the combustion gases to the wall of an uncooled rocket combustion chamber. Furthermore, a method is developed by means of which the wall thickness of the combustion chamber of the "Taifun" has been calculated and test results from the Peenemuende (1944) "Wasserfall" and "Taifun" projects are presented. In the Appendix a mathematical discussion of the temperature rises in an uncooled wall is given and its applicability is examined from the technical point of view. This report is presented as a basis for the development and construction of rocket combustion chambers for project "Loki". Project Loki, Interim report. Report no. 25-774. Contract W 30-069-ORD-4450.

Investigation of far noise field of jets, by Edmund E. Callaghan and Willard D. Coles. U. S. National Advisory Committee for Aeronautics. Order parts described below from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C.

Part I: Effect of nozzle shape. Jan 1956. 44p photos, diags, graphs. PB 119385

The noise generation of jets discharging from convergent (circular, square, rectangular, and elliptical), plug, and convergent-divergent nozzles was investigated. Only the convergent-divergent nozzle showed a reduction in both amplitude of the discrete-frequency noise and in total sound power radiated as compared with ordinary convergent nozzles. NACA TN 3590.

Part II: Comparison of air jets and jet engines. Jan 1956. 19p photos, diags, graphs. PB 119386

At jet pressure ratios below or only slightly above that for choked flow, the overall sound power was well represented by the Lighthill parameter, but the sound-power results obtained during afterburner operation were somewhat low. Directional patterns for overall sound pressures were similar for the engines and air jets. Air-jet and engine spectral data were dissimilar because of a dip in the engine-noise spectrum. NACA TN 3591.

Investigation of the propulsive characteristics of a helicopter-type pulse-jet engine over a range of Mach numbers and angle of yaw, by Paul J. Carpenter, James P. Shivers, and Edwin E. Lee, Jr. U. S. National Advisory Committee for Aeronautics. Jan 1956. 24p photos, drawings, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119379

1. Jet engines, Pulse-jets - Wind tunnel tests
2. Jet engines, Pulse-jets - Aerothermodynamics
3. Jet engines, Pulse-jets - Thrust - Measurement
4. NACA TN 3625.

Marine Transportation

Benthonic productivity project. Annual progress report for 1 Jan-31 Dec 1954 under Contract no. Nonr-396(03), (NR 163-100), by David M. Pratt. Rhode Island University, Narragansett Marine Laboratory, Kingston, R. I. Jan 1955. 7p table. Order from LC. Mi \$1.80, ph \$1.80. PB 119184

The objectives of the investigation are to identify and measure the more important environmental factors which determine the growth rate of the quahog, Venus mercenaria. Reference no. 55-1.

Influence of propeller clearance and rudder upon the propulsive characteristics, edited by H. Lindgren. Sweden, Statens Skeppsprovingsanstalt, Göteborg, Sweden. 1955. 27p diags, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 119071

Part I deals with experiments which were carried out for the purpose of investigating the effects of propeller position and clearance (or the shape of the aperture) on the propulsive characteristics. Vibration and other practical considerations have not been taken into account in this connection. Part II is concerned with the effects of the presence of the rudder and its thickness on the propulsive characteristics. A brief summary of the most important results from both series of tests is given. Meddelanden no. 33.

Laboratory and field tests of sounding leads, by George M. Watts. U. S. Beach Erosion Board. Nov 1954. 51p photos, drawings, graphs, tables. Order from LC. Mi \$3.60, ph \$9.30. PB 119413

The possibility of affecting a significant improvement in sounding methods utilized in connection with the maintenance of navigation channels underlain by silt bottom materials led the Office, Chief of Engineers to initiate a study of the behavior of various leadlines and the relationship between leadline and echo soundings in soft materials of varying consistency. The entire scope of the problem under consideration also includes the effect of materials

of varying viscosity on vessel movements with a view towards possibly determining the limiting characteristics of soft bottom materials detrimental to navigation. However, it was deemed necessary for the present to limit the scope of this investigation to that phase of the overall problem related to the behavior of sounding leads. ENG BEB TM 54.

Laboratory data on wave run-up and overtopping on shore structures, by Thorndike Saville, Jr. U. S. Beach Erosion Board. Oct 1955. 34p photos, diags, graphs, tables. Order from LC. Mi \$3, ph \$6.30. PB 119414

A need for more adequate design data on wave run-up and overtopping of shore structures has long been evident, most such structures being designed to meet run-up and overtopping requirements by rule of thumb rather than on a sound, factual basis. Since 1952, a considerable number of tests have been run, and this report presents tabulated data obtained over the course of the experiments. ENG BEB TM 64.

Laboratory study of wind tides in shallow water, by O. Sibul. U. S. Beach Erosion Board. Aug 1955. 53p photos, drawing, diags, graphs, table. Order from LC. Mi \$3.60, ph \$9.30. PB 119412

Wind tides and wave conditions in shallow water were studied in a laboratory channel. The experiments were conducted with smooth and rough bottom conditions, and with strips of cheese cloth in the channel to simulate the roughness effects of vegetation in nature. The results indicate a rapidly increasing set-up when the still-water depth decreases below a certain limit. ENG BEB TM 61.

Marine borer control. Part IV: Evaluation of creosote fractions, by T. R. Sweeney, T. R. Price and A. L. Alexander. U. S. Naval Research Laboratory. Dec 1955. 16p graphs, tables. Order from OTS. 50 cents. PB 111866

Wooden panels impregnated with various concentrations of fractions of coal tar creosote, both with and without prior accelerated leaching, were exposed to marine borer attack. A linear relationship of the extent of attack as a function of the concentration of preservative in the panel was derived for each fraction using the least squares method. As a result of the experience with the impregnation of panels, the procedures for impregnations and exposures have been modified. For parts 1-3 see PB 106763, 115476, 115477. NRL R 4672.

Marine microbiology. Semi-annual progress report no. 8 for the period 1 Jul-31 Dec 1954 under Contract no. N6 onr-275(18), Project NR 135-020, by Claude E. Zo Bell and Richard Y. Morita. California. University. Scripps Institution of Oceanography. Dec 1954. 16p graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 119247

Apparatus and procedures have been developed which make it possible to study the viability, reproduction, and biochemical activities of bacteria at pressures up to 2000 atm. Barophilic bacterial cultures have been maintained at pressures approximately isobaric and isothermic to their original environment for about three years. For 6th-7th reports see PB 115850, 117850.

Some results of the oceanographic studies in the straits of Florida and adjacent waters, 15 May-15 Nov 1954, by Ilmo Hela, Frank Chew, and Lansing P. Wagner. Miami. University. Marine Laboratory, Coral Gables, Fla. Jan 1955. 105p maps (1 fold), diags, graphs, tables. Order from LC. Mi \$5.70, ph \$16.80. PB 119211

Four papers are included; one relating to the velocity structure and transport of the Florida Current, and the second on the correction of GEK observations of the Florida Current off Miami for tidal currents, the third illustrating the tidal fluctuation of salinity at an estuary mouth; and a fourth describes conductivity-temperature-depth recorder. Contract Nonr-840(01).

Study of sediment sorting by waves shoaling on a plane beach, by Arthur T. Ippen and Peter S. Eagleson. Massachusetts Institute of Technology. Hydrodynamics Laboratory. Sep 1955. 92p photos, drawings, diags, graphs, tables. Order from LC. Mi \$5.40, ph \$15.30. PB 119415

Celerity and profile characteristics of the transforming waves are compared with the theory of Stokes extrapolated to the case of nonuniform depth. Net sediment motion is found to be due essentially to inequality of hydrodynamic drag and particle weight with a position of equality separating zones of net onshore and net offshore motion. A theoretical analysis is presented which yields a general functional equation for net particle velocities. ENG BEB TM 63.

Traffic flow on American inland waterways, by Donald J. Patton. Washington, University, Seattle, Wash. Dec 1954. 11p map. Order from LC. Mi \$2.40, ph \$3.30. PB 119081

A map of barge and raft traffic on the rivers and canals of the United States has been compiled for the year 1949, showing total traffic flow in tons in each direction along all waterways with a yearly traffic volume of at least 10,000 tons in either direction. (The map is included with this report). Report no. 11 under Contract Nonr-477(03).

MISCELLANEOUS

Non-visual orientation of fish. Progress report for the period Jan 1, 1954-Dec 31, 1954 under Con-

tract no. Nonr-233(15), NR 165-196, by Theodore J. Walker. California. University. Scripps Institution of Oceanography. Jan 1955. 11p diagr. Order from LC. Mi \$2.40, ph \$3.30. PB 119199

Single-fiber recordings of the lateral line system have been obtained, principally from the Shiner Sea Perch. The lateral line can be stimulated by a variety of pressure waves from a 0.5 to 225 cps. Anatomical studies reveal three types of sensing structures, all supplied by the lateral line nerve, which carried at least four kinds of fibers. Each kind of fiber relays different kinds of sensory information. For report for Mar-Dec 1953 see PB 116485. UC SIO Ref 55-11.

Report of NRL progress. U. S. Naval Research Laboratory. Order separate parts described below from OTS, giving FB number of each part ordered.

Jan 1956. 68p photos, diagr, graphs, tables.
\$1.25. PB 111995

Contents: New technique holds promise for measuring high-altitude winds, by A. D. Anderson and W. E. Hoehne. - Tropical performance of ammeters--a statistical study, by J. M. Leonard. - "Chopper" for 8.7-millimeter wavelength, by A. I. Reynard. - Measurement of short-term dust fall in atmospheric pollution studies, by I. H. Blifford, Jr. and L. B. Lockhart, Jr. - Scientific program: Problems accepted. - Problem notes: Astronomy and astrophysics: Solar X-ray spectroscopy; radio astronomy; meteorological instruments. - Chemistry: Friction and wear phenomena; adsorption-desorption equilibria; electrochemical recorder paper; investigation of the characteristics of alkaline secondary batteries. - Electricity: Magnetic amplifiers; analog computers; glazing materials for aircraft. - Mechanics: Studies of shock propagation, vibration and their instrumentation; pulse-jet studies. - Metallurgy and ceramics: Titanium base alloys; gases in steel; basic studies of the metallic state; principles of casting metals; metallurgical studies of cast metals. - Nuclear and atomic physics: Research reactor electronics; reactor heat transfer studies; radiation effects. - Optics: Ultraviolet spectroradiometry. - Radio: Very long range search radar; integrated jamming system; radar detection in sea clutter; microwave tube research; antenna applied research. - Solid-state physics: Semiconductors; dielectrics; growth and structure of solids. - Papers by NRL staff members. - Patents. - Index of unclassified reports published in 1955.

Feb 1956. 66p. \$1.25. PB 111994

Contents: Articles: The anatomy of flames, by K. G. Williams, H. W. Carhart, and J. E. Johnson. - Hot cracking of stainless steel weldments, by P. P. Puzak. - Rubber compatible and ice-resistant lubricant for aircraft ordnance, by

H. R. Baker, V. G. FitzSimmons, G. R. Single-terry, F. F. Sullivan, and T. M. Thomas. - Scientific program: Problems accepted. - Problem notes: Applications research: Psychological research in target tracking; training and performance evaluated for operators switching from conventional to "quicken" displays and vice versa. - Astronomy and astrophysics: High-altitude wind velocities measured with radar-tracked strips of metal foil dispersed by balloon and aircraft. - Electricity: Pulsed-light reader (in roentgens) for DT-60 glass dosimeter; lightweight, compact reader uses five Type-D flashlight batteries as power supply. - Mathematics: Effects of cracks on stress and strain in rectangular sheets of finite dimensions. - Mechanics: "Memory" effect in certain low-carbon steels illustrated; specimen can recover from effects of an elastic shock....Mild steels show unexpectedly high yield strength for load durations less than 100 microseconds....Parameters affecting penetration rate of shipboard deicer; rate as high as 8.3 in min achieved. - Metallurgy and ceramics: relieving embrittlement in electroplated high-strength steel....Brillouin zone studies: Hall coefficient of magnesium alloys.... Notch ductility of malleable iron....The determination of small amounts of iron in solution. - Nuclear and atomic physics: Monte-Carlo methods applied to nuclear-reactor shielding problems. - Radio: Receiver antenna filters.... Microwave tube research....Millimeter-wave components and systems....New reflector (an elliptical torus) can produce better characteristics with 50 percent fewer phase errors than the parabolic torus....Relatively simple dc voltage regulator for klystron power supplies.... Scanning antenna research. - Solid-state physics: Radiophotoluminescence response of lithium benzoates....Specific heat of magnesium and its relation to transport properties....Common feature of Debye, Weiss, and Van de Waal models found and applied to problem of electron-lattice vibration interactions in seven specific metals. - Sound: Instrumentation for ultrasonic absorption measurements. - Published reports. - Papers by NRL staff members. - Patents.

Study of persistent daily, tidal and lunar rhythmicity in animal organisms. Annual progress report for period Dec 1, 1953-Dec 31, 1954 under Contract no. Nonr-122803 and Nonr-09703, NR 163-254, by F. A. Brown, Jr. Northwestern University, Evanston, Ill., and Woods Hole Oceanographic Institution. Marine Biological Laboratory, Woods Hole, Mass. Jan 1955. 9p. Order from LC. Mi \$1.80, ph \$1.80. PB 119151

1. Rhythm, Tidal - Biological effects 2. Rhythm, Lunar - Biological effects 3. Crustacea - Rhythm - Research 4. Contract Nonr-122803, NR 163-245 5. Contract Nonr-09703, NR 163-245.

ATOMIC ENERGY REPORTS OF INTEREST TO INDUSTRY

The following Atomic Energy reports are listed here because of their interest and usefulness to general industry.

Reports may be purchased in accordance with instructions on the inside front cover of the U. S. GOVERNMENT RESEARCH REPORTS. As PB numbers are not indicated, order by series and number. These reports may also be consulted at any AEC Depository Library. A list of these libraries may be obtained from the U. S. Department of Commerce, Office of Technical Services, Washington 25, D. C.

Reproduction in whole or part of any report listed herein is encouraged by the U. S. Atomic Energy Commission, subject to the approval of authors or originating sites. General inquiries from the industrial press about AEC-developed information should be directed to the Industrial Information Branch, Atomic Energy Commission, Washington 25, D. C.

Biology and Medicine

Semiannual report to the Atomic Energy Commission, by Leon O. Jacobson, ed. Argonne Cancer Research Hospital, Chicago. Mar 1955. Contract AT(11-1)-69. 89p. Order from LC. Mi \$4.80, ph \$13.80. ACRH-3

Spot diameter method of quantitative autoradiography of Ru¹⁰⁶ particles in lung tissue, by N. L. Dockum and J. W. Healy. Hanford Atomic Products Operation, Richland, Wash. Mar 1955. Contract W-31-109-Eng-52. 8p. Order from LC. Mi \$1.80, ph \$1.80. HW-36760

Histopathology of sheep thyroid in chronic administration of I¹³¹, by S. Marks, N. L. Dockum, and L. K. Bustad. Hanford Atomic Products Operation, Richland, Wash. Aug 1955. Contract W-31-109-Eng-52. 43p. Order from LC. Mi \$3.30, ph \$7.80. HW-38758

Analytical procedures of the industrial hygiene group, by E. E. Campbell, B. C. Eutsler, Billye Head, Victoria E. Johnson, M. F. Milligan, W. D. Moss, M. C. Robbins, and C. P. Skillern -- Jean McClelland, comp. Los Alamos Scientific Lab., N. Mex. Dec 1954. Contract W-7405-eng-36. 173p. Order from LC. Mi \$8.10, ph \$27.30. LA-1858

An extraction method for the determination of uranium alpha activity in urine, by Evan E. Campbell, Billye Marie Head, and Morris F. Milligan. Los Alamos Scientific Lab., N. Mex. Jun 1955. Contract W-7405-eng-36. 24p. Order from LC. Mi \$2.70, ph \$4.80. LA-1920

Histopathological study of Sprague-Dawley rats injected intravenously with varying amounts of polonium, by R. N. Cowden and Robert E. Zipf. Mound Laboratory, Miamisburg, Ohio. Apr 1952. Contract No. AT-33-1-Gen-53. 62p. Order from OTS. 40 cents. Decl. Oct 1955. MLM-761

The effects of injected actinium equilibrium mixture on rats and mice, by W. P. Jolley, D. Roesch, R. Horne, and D. S. Anthony. Mound Laboratory, Monsanto Chemical Co. Jun 1954. Contract No. AT-33-1-Gen-53. 8p. Order from OTS. 10 cents. MLM-1057

Further studies on the relationship between oxygen tension and the protective actions of cysteine, mercaptoethylamine and para aminopropionone, by Paul R. Salerno, Edwin Uyeki, and Hymer L. Friedell. Western Reserve Univ., Cleveland. School of Medicine. Dec 1955. Contract W31-109-eng-78. 27p. Order from LC. Mi \$2.70, ph \$4.80. NYO-4924

Health Physics Division semiannual progress report for period ending July 31, 1955. Oak Ridge National Lab., Tenn. Oct 1955. Contract W-7405-eng-26. 37p. Order from LC. Mi \$3, ph \$6.30. ORNL-1942

Biology Division semiannual progress report for period ending August 15, 1955, by E. J. Slaughter, ed. Oak Ridge National Lab., Tenn. Dec 1955. Contract W-7405-eng-26. 141p. Order from LC. Mi \$7.20, ph \$22.80. ORNL-1953

The influence of soil organic matter on the uptake of Sr⁹⁰ by barley and tomato plants, by Hideo Nishita, Bruce W. Kowalewsky, Kermit H. Larson. California. Univ., Los Angeles. Atomic Energy Project. Oct 1955. Contract AT-04-1-GEN-12. 39p. Order from LC. Mi \$3, ph \$6.30. UC LA-349

Plant uptake of Fe⁵⁹-tagged iron from a slowly soluble source, by W. A. Rhoads, E. M. Romney and A. Wallace. California. Univ., Los Angeles. Atomic Energy Project. Oct 1955. Contract AT-04-1-GEN-12. 16p. Order from LC. Mi \$2.40, ph \$3.30. UC LA-350

Studies of the New Hampshire chicken embryo. VI. Nitrogen and lipide components of chylomicrons, total beta lipoproteins, beta₁ and beta₂ lipoproteins, by Ole Arne Schjeide and Nancy Ragan. California. Univ., Los Angeles. Atomic Energy Project. Nov 1955. Contract AT-04-1-GEN-12. 18p. Order from LC. Mi \$2.40, ph \$3.30. UC LA-355

Confirmation of radioactivity in thyroids of various animals. Report for the period July 15 to September 10, 1954, by Ralph L. Gunther and Hardin B. Jones. California. Univ., Berkeley. Radiation Lab.; and California. Univ., Berkeley. Donner Lab. Sep 1954. Decl. May 1955. Contract W-7405-eng-48. 12p. Order from LC. Mi \$2.40, ph \$3.30. UC LA-2689

Confirmation of radioactivity in thyroids of various animals. Report for the period July 15, to August 9, 1954. Addendum, by Hardin B. Jones. California. Univ., Berkeley. Radiation Lab.; and California. Univ., Berkeley. Donner Lab. Sep 1954. Decl. May 1955. Contract W-7405-eng-48. 5p. Order from LC. Mi \$1.80, ph \$1.80. UCRL-2689(Add.)

The effect of physiological and morphological changes on the radiation sensitivity of escherichia coli, by Arnold Stanley Brownell. California. Univ., Berkeley. Radiation Lab. Jul 1955. Contract W-7405-eng-48. 104p. Order from LC. Mi \$5.70, ph \$16.80. UCRL-3055

Medical and Health Physics quarterly report for April, May, June 1955. California. Univ., Berkeley. Radiation Lab. Jul 1955. Contract W-7405-eng-48. 37p. Order from LC. Mi \$3, ph \$6.30. UCRL-3096

Extra embryonic vascular deterioration in the irradiated chick embryo, by M. Goldman, S. R. Glasser, and L. W. Tuttle. Rochester, N. Y. Univ. Atomic Energy Project. Aug 1955. Contract W-7405-eng-49. 11p. Order from LC. Mi \$2.40, ph \$3.30. UR-296

Comparative in vivo and in vitro tissue fixation studies of I¹³¹ labeled anti-bodies prepared in rabbits against rat kidney, lymph node, and tumor tissue, by William F. Bale, Irving L. Spar, Ruth L. Goodland, and Dolores E. Wolfe. Rochester, N. Y. Univ. Atomic Energy Project. Jul 1955. Contract W-7405-eng-49. 118p. Order from LC. Mi \$6, ph \$18.30. UR-397

The lethal effect of acute x-irradiation on rats as a function of age, by J. B. Hursh and G. Casarett. Rochester, N. Y. Univ. Atomic Energy Project.

Mar 1955. Contract W-7401-eng-49. 12p. Order from LC. Mi \$2.40, ph \$3.30. UR-403

Ion exchange properties of cells and tissues, by Aser Rothstein. Rochester, N. Y. Univ. Atomic Energy Project. Jun 1955. Contract W-7401-eng-49. 41p. Order from LC. Mi \$3.30, ph \$7.80. UR-404

The histopathology of mice exposed to radon, by James K. Scott. Rochester, N. Y. Univ. Atomic Energy Project. Jul 1955. Contract W-7401-eng-49. 13p. Order from LC. Mi \$2.40, ph \$3.30. UR-411

The binding of polonium by red cells and plasma proteins, by Robert G. Thomas and J. N. Stannard. Rochester, N. Y. Univ. Atomic Energy Project. Oct 1955. Contract W-7401-eng-49. 18p. Order from LC. Mi \$2.40, ph \$3.30. UR-414

Chemistry and Chemical Engineering

Ion-exchange studies on carbonate leach liquors from Grants, N. M. ores, by Charles S. Abrams. Atomic Energy Division. American Cyanamid Co., Watertown, Mass. Oct 1951. Contract AT-(49-1)-533. 20p. Order from OTS. 20 cents. Decl. Sep 1955. ACCO-8

Uranium recovery from a Temple Mountain District ore sample, by F. W. Bloecher, Jr. Atomic Energy Division. American Cyanamid Co., Watertown, Mass. Oct 1952. Contract AT(49-1)-533. 27p. Order from OTS. 25 cents. Decl. Sep 1955. ACCO-27

Two stage leaching tests on Utex ore. Topical report, by Alan Stanley, Robert Eisenhauer, and Stanley Richardson. Atomic Energy Division. Raw Materials Development Lab. American Cyanamid Co., Winchester, Mass. Jul 1954. Contract AT(49-1)-533. 14p. Order from OTS. 20 cents. Decl. Sep 1955. ACCO-52

The recovery of vanadium by ion exchange, by C. S. Abrams and T. F. Izzo. Raw Materials Development Lab. Atomic Energy Division. American Cyanamid Co., Winchester, Mass. Jul 1954. Contract AT(49-1)-533. 29p. Order from OTS. 25 cents. Decl. Sep 1955. ACCO-53

The dissolution of zirconium and corrosion of stainless steel in sulfuric acid and nitric-hydrofluoric acid mixtures, by R. H. J. Gercke and D. Lewis. Livermore Research Lab. California Research and Development Co., Livermore, Calif.

- Jan 1954. Contract No. AT(11-1)-74. 11p. Order from OTS. 15 cents. AECD-3702
Decl. Nov 1955.
- The use of bromine trifluoride in the recovery of uranium from mixtures of UO_2 and MgO , by F. D. Rosen. North American Aviation, Inc., Downey, Calif. Jun 1953. Contract AT 11-1-GEN-8. 18p. Order from OTS. 20 cents. AECD-3797
Decl. Dec 1955.
- Use of radioactive indicators in the study of the mode of action of fungicides. Final report, by H. T. Kemp, R. W. Greenlee, M. M. Baldwin, R. S. Davidson, and W. C. Ellis, Jr. Battelle Memorial Inst., Columbus, Ohio. 1955? Contract AT(11-1)-74. 47p. Order from LC. MI \$3.30, ph \$7.80. AECU-3117
- The composition of plutonium, americium, and curium resulting from irradiation of Am^{241} in a high neutron flux, by Paul Fields and Molly Ann Weiss. Argonne National Lab., Lemont, Ill. Feb 1953. Contract No. W-31-109-Eng-38. 7p. Order from OTS. 15 cents. ANL-WMM-1140
Decl. Nov 1955.
- The solubility of hydrogen in uranyl sulphate solutions at elevated temperatures, by H. A. Pray and E. F. Stephan. Battelle Memorial Institute, Columbus, Ohio. Sep 1953. Contract No. W-7405-eng-92. 18p. Order from OTS. 15 cents. BMI-870
Decl. Sep 1955.
- The solubility of oxygen and hydrogen in uranyl fluoride solutions at elevated temperatures, by H. A. Pray and E. F. Stephan. Battelle Memorial Institute, Columbus, Ohio. Jan 1954. Contract No. W-7405-Eng-92. 22p. Order from OTS. 20 cents. BMI-897
Decl. Sep 1955.
- Composition of vapors from boiling nitric acid solutions, by R. C. Crooks, R. Q. Wilson, A. E. Bearse, and R. B. Filbert, Jr. Battelle Memorial Inst., Columbus, Ohio. Feb 1955. Contract W-7405-eng-92. 39p. Order from LC. MI \$3, ph \$6.30. BMI-978
- Corrosion of selected materials in pentalene 290 and a mixture of Dowtherm A and alkylbenzene, by Walter K. Boyd and Robert S. Peoples. Battelle Memorial Inst., Columbus, Ohio. Oct 1955. Contract No. W-7405-eng-92. 9p. Order from OTS. 15 cents. BMI-1046
- Corrosion in borated and deionized water at temperatures up to 500 F, by Walter K. Boyd and Robert S. Peoples. Battelle Memorial Inst, Columbus, Ohio. Oct 1955. Contract No. W-7405-eng-92. 19p. Order from OTS. 25 cents. BMI-1047
- Cost of cooling phosphoric acid in a 174 GPM solvent-extraction plant, by J. F. Valle-Riestra. Western Division. Dow Chemical Co., Pittsburg, Calif. Jul 1952. Contract No. AT-30-1-GEN-236. 14p. Order from OTS. 15 cents. DOW-82
Decl. Sep 1955.
- Proposed HCl recovery system, Salt Lake City Pilot Plant, by J. F. Valle-Riestra. Western Division. Dow Chemical Co., Pittsburg, Calif. Aug 1954. Contract No. AT-30-1-GEN-236. 17p. Order from OTS. 20 cents. DOW-119
- Soluble neutron absorbers for emergency reactor shutdown, by W. T. Withers. E. I. du Pont de Nemours & Co. Sep 1955. Contract AT(07-2)-1. 10p. Order from OTS. 15 cents. DP-132
- The preparation of primary standard U_3O_8 , by R. J. Brouns and W. W. Mills. Hanford Atomic Products Operation, Richland, Wash. Nov 1955. Contract #W-31-109-Eng-52. 13p. Order from OTS. 15 cents. HW-39767
- High precision micro spectrophotometric analysis with application to vanadium-aluminum alloys, by Max Q. Freeland and James S. Fritz. Ames Lab., Ames, Iowa. Nov 1954. Contract W-7405-eng-82. 20p. Order from LC. MI \$2.40, ph \$3.30. ISC-539
- Rapid microtitration of sulfate, by James S. Fritz and Stanley S. Yamamura. Ames Lab., Ames, Iowa. Nov 1954. Contract W-7405-eng-82. 15p. Order from LC. MI \$2.40, ph \$3.30. ISC-540
- Basic principles involved in the macro-separation of adjacent rare earths from each other by means of ion exchange, by J. E. Powell and F. H. Spedding. Ames Lab., Ames, Iowa. Oct 1955. Contract W-7405-eng-82. 28p. Order from LC. MI \$2.70, ph \$4.80. ISC-617
- Analysis of hydrogen-deuterium mixtures by the thermal conductivity method, by F. K. Heumann. Knolls Atomic Power Lab., Schenectady, N. Y. Jun 1952. Contract No. W-31-109-Eng-52. 21p. Order from OTS. 20 cents. KAPL-755
Decl. Sep 1955.
- Determination of the specific heats of some purex solvents and diluents, by Arthur Dreeben. Knolls Atomic Power Lab., Schenectady, N. Y. Oct 1952. Contract No. W-31-109-Eng-52. 12p. Order from OTS. 15 cents. KAPL-834
Decl. Dec 1955.
- Electrorefining of uranium—a new approach, by L. W. Niedrach and A. C. Glamm. Knolls Atomic

Power Lab., Schenectady, N. Y Aug 1954. Contract No. W-31-109-Eng-52. 29p. Order from OTS. 25 cents. Decl. Oct 1955. KAPL-1154

hydrides, Part II. Progress report, by George G. Libowitz, Edward J. Goon, and M. John Rice, Jr. Mar 1955. Contract AT(30-1)-1355. 30p. Order from OTS. 35 cents. NYO-3919

Separation of D₂O/H₂O by high temperature distillation, by G. F. Mills. K-25 Plant, Carbide and Carbon Chemicals Co., Oak Ridge, Tenn. Sep 1951. Contract No. W-7405-Eng-26. 8p. Order from OTS. 15 cents. Decl. Oct 1955. KLI-1098

Consideration of the nature, formation and density of hydrides: Part I. A naive approach to the calculation of density of crystalline solids, particularly hydrides, by Thomas R. P. Gibb, Jr. Nov. 17, 1954; Part II. Further consideration of the nature, formation and density of metallic hydrides, by Thomas R. P. Gibb, Jr. Mar. 17, 1955; Part III. Metallic hydrides and the hydride anion theory, by Thomas R. P. Gibb, Jr., and George G. Libowitz. Progress report. Tufts University, Medford, Mass. May 1955. Contract AT(30-1)-1350. 55p. Order from LC. Mi \$3.60, ph \$9.30. NYO-3920

Preparation of anhydrous plutonium trichloride, by E. L. Christensen and L. J. Mullins. Los Alamos Scientific Lab., Los Alamos, N. Mex. Oct 1952. Contract No. W-7405-Eng-36. 8p. Order from OTS. 15 cents. LA-1431

The pH measurement of uranyl sulfate solutions from 25° to 60°C, by Edward Orban. Mound Lab., Miamisburg, Ohio. Aug 1952. Contract No. AT-33-1-Gen-53. 12p. Order from OTS. 15 cents. Decl. Sep 1955. MLM-729

The evaluation of some related heterocyclic compounds as analytical reagents for metals (thesis), by Joseph Lawrence Walter. Univ. of Pittsburgh, Pittsburgh, Pa. Sep 1955. Contract No. AT(30-1)-860. 142p. Order from OTS. 70 cents. NYO-6506

Precision determination of deuterium in H₂O-D₂O mixtures by a pycnometer method, by L. Silverman and W. Gossen. North American Aviation, Inc., Downey, Calif. Jun 1953. Contract AT-11-1-GEN-8. 21p. Order from OTS. 20 cents. Decl. Oct. 1955. NAA-SR-236

The compleximetric titration of zirconium based on the use of ferric iron as the titrant and disodium-1,2-dihydroxybenzene-3,5-disulfonate as the indicator, by D. L. Manning, A. S. Meyer, Jr., and J. C. White. Oak Ridge National Lab., Tenn. Aug 1955. Contract W-7405-eng-26. 18p. Order from LC. Mi \$2.40, ph \$3.30. ORNL-1950

Equilibrium properties of isotope exchange reactions of water and hydrogen, by Joe C. Bradley. National Bureau of Standards, Washington, D. C. Oct 1955. 12p. Order from LC. Mi \$2.40, ph \$3.30. NBS-3329

Uranium production--process designs for leached zone plants. Volume X. Ammonium bisulfate digestion of leached zone, by D. F. Clements and R. F. McCullough. International Minerals and Chemical Corp. Jul 1953. Decl. Apr 1955. Contract AT(49-1)-545. 57p. Order from LC. Mi \$3.60, ph \$9.30. RMO-2021

Ideal gas thermodynamic functions of the isotopic hydrogen cyanides, by Joe C. Bradley, Lester Haar, and Abraham S. Friedman. National Bureau of Standards, Washington, D. C. Dec 1955. 14p. Order from LC. Mi \$2.40, ph \$3.30. NBS-4161

Electrolytic precipitation of uranium from carbonate leach liquors, by Paul F. Kirk. Research Laboratories. Rohm and Haas Co., Philadelphia, Pa. Aug 1952. Contract No. AT(49-1)-535. 12p. Order from OTS. 15 cents. Decl. Sep 1955. RMO-2507

Physical chemical properties of the systems NaCl-ZrCl₄, KCl-ZrCl₄ and NaCl-KCl-ZrCl₄. Summary report, by H. H. Kellogg, L. J. Howell, and R. C. Sommer. Columbia Univ., New York. School of Mines. Apr 1955. Contract AT(30-1)-1135. 64p. Order from LC. Mi \$3.90, ph \$10.80. NYO-3108

Electrolytic reduction of commercial phosphoric acids, by C. T. Dickert and P. F. Kirk. Research Laboratories. Rohm and Haas Co., Philadelphia, Pa. Aug 1952. Contract No. AT(49-1)-535. 16p. Order from OTS. 20 cents. Decl. Sep 1955. RMO-2509

The mechanisms of some radiation induced gas reactions and the chemical reactions of electrons. Annual report for period March 1, 1954 to January 1, 1955, by Benjamin P. Burt. Syracuse Univ., N. Y. Inst. of Industrial Research. Dept. of Chemistry. Jan 1955. Contract AT(30-1)-1131. 62p. Order from LC. Mi \$3.90, ph \$10.80. Decl. Dec 1955.

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The electrolytic recovery of uranium and vanadium from carbon leach liquors by means of ion exchange membranes, by Jean Saunders. Research Laboratories. Rohm and Haas Co., Philadelphia, Pa. Apr 1953. Contract AT-(49-1)-535. 11p. Order from OTS. 20 cents. RMO-2519
Decl. Sep 1955.

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Decl. Sep 1955.

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Decl. Sep 1955.

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Decl. Sep 1955.

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Thorium. A bibliography of published literature, compiled by W. D. Prater, E. F. Joy, and E. G. Esterbrook. Edited by Robert E. Allen. Mound Laboratory and Technical Information Service. Jun 1955. 296p. Order from OTS. \$1.50. TID-3044(Suppl. 1)

Isolation and characterization of sodium hyaluronate from human umbilical cords, by Norman S. Simmons. Atomic Energy Project. Univ. of Calif., West Los Angeles, Calif. Nov 1955. Contract AT-04-1-GEN-12. 19p. Order from OTS. 20 cents. UCLA-353

Chemistry Division quarterly report for March, April, May 1955. California. Univ., Berkeley. Radiation Lab. Jul 1955. Contract W-7405-eng-

48. 57p. Order from LC. Mi \$3.60, ph \$9.30
UCRL-3068

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The crystal structure of gold (III) chloride, by Edward S. Clark. California. Univ., Berkeley. Radiation Lab. Nov 1955. Contract W-7405-eng-48. 48p. Order from OTS. 30 cents. UCRL-3190

Behavior: Imbalance in a network of chemical transformations, by Dan F. Bradley and M. Calvin. California. Univ., Berkeley. Radiation Lab. Oct 1955. Contract W-7405-eng-48. 29p. Order from OTS. 25 cents. UCRL-3203

Analytical and autoradiographic methods for polonium²¹⁰, by Frank A. Smith, Rocco J. Della Rosa, and Louis J. Casarett. Rochester, N. Y. Univ. Atomic Energy Project. Aug 1955. Contract W-7401-eng-49. 77p. Order from LC. Mi \$4.50, ph \$12.30. UR-305

Preferential extraction of zirconium and hafnium thiocyanates. Preparation of pure hafnium, by C. J. Barton, Sr., L. G. Overholser, and W. R. Grimes. Y-12 Plant. Carbide and Carbon Chemicals Co., Oak Ridge, Tenn. Jun 1950. Contract W-7405-eng-26. 21p. Order from OTS. 20 cents. Decl. Nov 1955. Y-611

Supplementary information on production of ZR at Y-12, by J. W. Ramsey and W. K. Whitson, Jr. Y-12 Plant. Carbide and Carbon Chemicals Co., Oak Ridge, Tenn. Nov 1951. Contract W-7405-eng-26. 31p. Order from OTS. 25 cents. Y-824
Decl. Nov 1955.

Investigations of analyses of zirconium hydride and zirconium oxide for boron, by H. G. King and C. B. Burnette. Y-12 Plant. Carbide and Carbon Chemicals Co., Oak Ridge, Tenn. Sep 1952. Contract W-7405-eng-26. 17p. Order from OTS. 20 cents. Decl. Oct 1955. Y-1052

Engineering

Heat transfer from parallel rods in axial flow, by David A. Dingee, Wayne B. Bell, Joel W. Chastain, and Sherwood L. Fawcett. Battelle Memorial Inst., Columbus, Ohio. Aug 1955. Contract No. W-7405-eng-92. 49p. Order from OTS. 35 cents. BMI-1026

Mixer-settler development. Use of a shrouded paddle, by W. J. Mottel, E. I. du Pont de Nemours & Co. Aug 1955. Contract AT(07-2)-1. 19p. Order from OTS. 20 cents. DP-130

Reclamation of defective Hoke diaphragm type packless valves, by N. H. Pease. K-25 Plant. Carbide and Carbon Chemicals Corp., Oak Ridge, Tenn. Mar 1949. 6p. Order from OTS. 15 cents. Decl. Dec 1955. K-362

Free convection theory and experiment in fluids having a volume heat source, by D. C. Hamilton and F. E. Lynch. Oak Ridge National Lab., Tenn. Aug 1955. Contract W-7405-eng-26. 70p. Order from LC. Mi \$3.90, ph \$10.80. ORNL-1888

Application of temperature solutions for forced convection systems with volume heat sources to general convection problems, by H. F. Poppendiek and L. D. Palmer. Oak Ridge National Lab., Tenn. Oct 1955. Contract W-7405-eng-26. 36p. Order from LC. Mi \$3, ph \$6.30. ORNL-1933

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Geology and Mineralogy

Annual report for June 30, 1954 to April 1, 1955. Part I. The chemical environment of pitchblende, by Leo J. Miller. Columbia Univ., New York, N. Y. May 1955. Contract No. AT(30-1)-702. 50p. Order from LC. Mi \$3.30, ph \$7.80. RME-3110(Pt. 1)

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1955. Contract No. AT(30-1)-610. 19p. Order from OTS. 20 cents. RME-3125

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Health and Safety

Monthly report of laboratory activities, by H. D. LeVine, J. H. Harley, and H. Blatz. Nov 1950. 15p. Order from LC. Mi \$2.40, ph \$3.30. NYO-1549

Instrumentation

Development of Dumont photomultiplier tubes. Report no. 18 covering period June 1, 1955 to August 31, 1955, by Bernard R. Linden, Philip A. Snell, and Robert E. Rutherford. Tube Research Laboratories, Allen B. DuMont Laboratories, Inc., Passaic, N. J. Dec 1955. Contract No. AT(30-1)-1336. 10p. Order from OTS. 15 cents. AECU-3112

A survey meter with an extended probe, by C. E. Flanagan, Jr. and R. T. Nowak. E. I. du Pont de Nemours & Co. Dec 1955. Contract AT(07-2)-1. 8p. Order from OTS. 10 cents. DP-142

Theory of nonlinear feedback systems having a multiple number of first-order operating points and its application to millimicrosecond counting techniques (thesis). Technical report on linear electron accelerator project, by Jan A. Narud. Stanford Univ., Stanford, Calif. Feb 1955. Contract N6onr-25116. 194p. Order from OTS. \$1. HEPL-34

A non-destructive method for the determination of uranium metal slugs, by D. G. Miller. Hanford Atomic Products Operation, Richland, Wash. Oct 1955. Contract #W-31-109-Eng-52. 26p. Order from OTS. 25 cents. HW-39969

Evaluation tests of quartz-fiber dosimeters manufactured by Bendix Aviation Corporation, by Frank H. Day. National Bureau of Standards, Washington, D. C. Oct 1955. 28p. Order from LC. Mi \$2.70, ph \$4.80. NBS-4342

Fourth annual symposium on hot laboratories and equipment, held in Washington, D. C., September 29 and 30, 1955. Supplement I. Technical Infor-

mation Service, Oak Ridge, Tenn. Jan 1956. 123p.
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A coaxial mercury relay for fast pulse generation,
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Radiation Lab, Jul 1955. Contract W-7405-eng-
48. 10p. Order from LC. Mi \$1.80, ph \$1.80.
UCRL-3062

Epoxy resin casting of dry-type high-voltage trans-
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Park. California, Univ., Berkeley. Radiation
Lab. Jan 1955. Contract W-7405-eng-48. 15p.
Order from LC. Mi \$2.40, ph \$3.30. UCRL-3135

A scintillation counter for paper chromatograms,
by K. Steenberg and Andrew A. Benson. Califor-
nia, Univ., Berkeley. Radiation Lab. Dec 1955.
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Electron multiplier fabrication, by Frederick L.
Reynolds. California, Univ., Berkeley. Radia-
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Thin plastic scintillators, by Chris Lagiss. Calif-
ornia, Univ., Livermore. Radiation Lab. Jun
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A pneumatically operated vacuum lock for mass
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Corey, III. Y-12 Plant. Union Carbide Nuclear
Co., Oak Ridge, Tenn. Oct 1955. Contract W-
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Y-1114

Metallurgy and Ceramics

Developments in the casting department of the metal
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port on the casting of uranium at Iowa State College,
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for Atomic Research. Aug 1945. Decl. Jul 1955.
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Leaching and precipitation tests on Grants ores, by
Charles S. Abrams and D'Arcy R. George.
American Cyanamid Co. Atomic Energy Div.,
Watertown, Mass. Sep 1951. Changed from
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22p. Order from LC. Mi \$2.70, ph \$4.80.
ACCO-5

The consolidation of zirconium at sub-fusion tem-
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Power Division. Westinghouse Electric Corp-
oration, Pittsburgh, Pa. Apr 1950. Contract
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The tensile strength of brazed stainless steel
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Klebanow. Battelle Memorial Inst., Columbus,
Ohio. Jul 1953. Contract W-7405-eng-92. 15p.
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Uranium-zirconium diffusion studies, by D. R.
Mash and B. F. Disselhorst. Livermore Re-
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Decl. Nov 1955. AECD-3701

Continued studies of corrosion by fused caustic,
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Columbus, Ohio. Dec 1952. Contract W-7405-
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Decl. Oct 1955. AECD-3704

Comparative behavior of a 1.8 atom % chromium-
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Lab., Schenectady, N. Y. Jul 1950. Contract
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20 cents. Decl. Dec 1955. AECD-3794

The possibility of "freezing-in" radiation damage
effects in simple metals, by E. F. Cooper and
M. M. Mills. North American Aviation, Inc.,
Downey, Calif. Jun 1950. Contract AT-11-1-
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Decl. Dec 1955. AECD-3796

Metallographic preparation of thorium, by J. E.
Baumrucker. Argonne National Lab., Lemont,
Ill. Mar 1952. Decl. Nov 1953. Contract W-
31-109-eng-38. 19p. Order from LC. Mi \$2.40,
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The process equipment and protective enclosures
designed for the fuel fabrication facility.
Facility #350, by A. B. Shuck and R. M. Mayfield.
Argonne National Lab., Lemont, Ill. Jan 1956.
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OTS. 75 cents. ANL-5499

Neutron diffraction studies of hafnium-hydrogen
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LeRoy Heaton, and D. D. Zaubers. Argonne
National Lab., Lemont, Ill. Jan 1956. Contract
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The transfer of impurities in zirconium prepared by the De Boer process, by H. H. Bulkowski, L. C. Beale, J. J. Sebenick, I. E. Campbell, and B. W. Gosner. Battelle Memorial Inst., Columbus, Ohio. Mar 1951. Contract No. AT(30-1)-771. 18p. Order from OTS. 20 cents. Decl. Nov 1955. BMI-522

A study of the strengthening of thorium by alloying, cold work, and aging, by R. M. Goldhoff, H. R. Ogden, and R. I. Jaffee. Battelle Memorial Inst., Columbus, Ohio. Nov 1952. Contract W-7405-eng-92. 44p. Order from OTS. 30 cents. Decl. Sep 1955. BMI-776

Identification and growth of oxide films on zirconium in high-temperature water, by C. M. Schwartz, D. A. Vaughan, and G. G. Cocks. Battelle Memorial Inst., Columbus, Ohio. Dec 1952. Contract W-7405-eng-92. 25p. Order from OTS. 25 cents. Decl. Oct 1955. BMI-793

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Fabrication and welding of arc-cast molybdenum, by Norman E. Weare, Robert E. Monroe, and George W. Rengstorff. Battelle Memorial Inst., Columbus, Ohio. Sep 1955. Contract W-7405-eng-92. 48p. Order from LC. Mi \$3.30, ph \$7.80. BMI-1037

A study of the mechanisms of heat treatment of zirconium-base alloys. Summary report no. 2 for July 1, 1954-June 30, 1955, by R. F. Domagala and D. J. McPherson. Illinois Inst. of Tech., Chicago. Armour Research Foundation. Aug 1955. Contract AT(11-1)-315. 93p. Order from LC. Mi \$5.40, ph \$15.30. COO-207

September-October progress report, by R. H. Bailes. The Dow Chemical Co. Research Dept., Pittsburg, Calif. Nov 1955. Contract No. AT-30-1-GEN-236. 38p. Order from LC. Mi \$3, ph \$6.30. DOW-136

Joint design for joining tubes to tube sheets for corrosive radioactive chemical service, by W. R. Smith. Hanford Atomic Products Operation, Richland, Wash. Aug 1955. Contract W-31-109-eng-52. 16p. Order from LC. Mi \$2.40, ph \$3.30. HW-37983

The effect of irradiation on the mechanical properties of arc melted Bureau of Mines zirconium with various degrees of cold work, by R. S. Kemper, Jr., and W. S. Kelly. Hanford Atomic Products Operation, Richland, Wash. Jul 1955. Contract W-31-109-eng-52. 30p. Order from LC. Mi \$2.70, ph \$4.80. HW-38079

An apparatus for obtaining the tensile properties of irradiated materials at elevated temperatures, by R. E. Hueschen and D. C. Kaulitz. Hanford Atomic Products Operation, Richland, Wash. Sep 1955. Contract W-31-109-eng-52. 22p. Order from LC. Mi \$2.70, ph \$4.80. HW-38991

Macroetching of irradiated uranium, by G. R. Mallett. Hanford Atomic Products Operation, Richland, Wash. Oct 1955. Contract W-31-109-eng-52. 6p. Order from OTS. 10 cents. HW-39539

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On the dimensional instability of uranium and of clad plates subjected to thermal cycling, by M. Bettman, G. W. Brown, and J. P. Frankel. Livermore Research Lab. Calif. Research and Development Co., Livermore, Calif. Dec 1953. Contract AT(11-1)-74. 21p. Order from OTS. 20 cents. Decl. Sep 1955. MTA-36

Effect of heat treatment on the corrosion behavior of zirconium binary alloys of nickel and iron, by D. S. Kneppel. Nuclear Metals, Inc., Cambridge, Mass. Jun 1955. Contract AT(30-1)-1565. 46p. Order from LC. Mi \$3.30, ph \$7.80. NMI-1137

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The welding of type 347 steels. The results of nitric acid and copper sulfate-sulfuric acid tests on modified type 347 weld deposits, by Lorin K. Poole. Arcos Corp., Philadelphia, Pa. Jul 1955. Contract AT(30-1)-1233. 25p. Order from LC. Mi \$2.70, ph \$4.80. NYO-3499

Application of chemical thermodynamics to the study of alloy formation. Progress report for April 1, 1955 to July 1, 1955, by W. E. Wallace, R. S. Craig, W. V. Johnston, G. S. Kamath, K. F. Sterrett, T. R. Waite, and M. G. Zabetakis. Pittsburgh. Univ. Jul 1955. Contract AT(30-1)-647. 5p. Order from LC. Mi \$1.80, ph \$1.80. NYO-6327

The measurement of thermal conductivity of refractory materials. Quarterly progress report for the period ending July 1, 1955, by W. D. Kingery and F. H. Norton. Massachusetts Inst. of Tech., Cambridge. Jul 1955. Contract AT(30-1)-960. 18p. Order from LC. Mi \$2.40, ph \$3.30. NYO-6450

X-ray study of radiation damage covering period January 1, 1955--June 30, 1955, by B. E. Warren. Massachusetts Inst. of Tech., Cambridge. Jul 1955. Contract AT(30-1)-858. 6p. Order from LC. Mi \$1.80, ph \$1.80. NYO-6513

Electrochemical studies of non-aqueous melts. Quarterly progress report for period ending June 1, 1955, by R. F. Mehl and G. Derge. Carnegie Inst. of Tech., Pittsburgh. Metals Research Lab. Aug 1955. Contract AT(30-1)-1024. 29p. Order from LC. Mi \$2.70, ph \$4.80. NYO-6620

Solid solutions and grain boundaries. Progress report no. 26, by B. L. Averbach, M. Cohen, F. Herbstein, J. Hilliard, and R. Kaplow. Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy. Jun 1955. Contract AT(30-1)-1002. 7p. Order from LC. Mi \$1.80, ph \$1.80. NYO-7048

Fundamentals of cold working and recrystallization. Progress report no. 19, by B. L. Averbach, M. Cohen, S. Allen, M. F. Comerford, and C. Houska. Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy. Jun 1955. Contract AT(30-1)-1002. 6p. Order from LC. Mi \$1.80, ph \$1.80. NYO-7075

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The adaptation of new research techniques to mineral engineering problems. Progress report. Massachusetts Inst. of Tech., Cambridge. Dept. of Metallurgy. Oct 1955. Contract AT(30-1)-956. 68p. Order from LC. Mi \$3.90, ph \$10.80. NYO-7173

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The process of pulse sintering, by Bernard Kopelman. Sylvania Electric Products Inc., Bayside, N. Y. Dec 1949. Contract AT-30-1-Gen-366. 10p. Order from CTS. 15 cents. SEP-33 Decl. Dec 1955.

Fundamental research in physical metallurgy. Twenty-sixth quarterly report. (Progress report no. 43), by J. H. Hollomon and D. Turnbull. General Electric Co. Research Lab., Schenectady, N. Y. Jul 1955. Contract W-31-109-eng-52. 9p. Order from LC. Mi \$1.80, ph \$1.80. SO-2041

Fundamental research in physical metallurgy. Twenty-seventh quarterly report. (Progress report no. 44), by W. DeSorbo, R. E. Hoffman, and D. Turnbull. General Electric Co. Research Lab., Schenectady, N. Y. Oct 1955. Contract W-31-109-eng-52. 6p. Order from LC. Mi \$1.80, ph \$1.80. SO-2043

The tensile characteristics of particle-strengthened alloys of zirconium with iron, by J. H. Keeler. General Electric Co. Research Lab., Schenectady, N. Y. Aug 1955. Contract W-31-109-eng-52. 31p. Order from LC. Mi \$3, ph \$6.30. SO-2521

Development of zirconium-base alloys. Twenty-third quarterly report. (Progress report no. 24), by J. H. Keeler. General Electric Co. Research Lab., Schenectady, N. Y. Jul 1955. Contract W-31-109-eng-52. 27p. Order from LC. Mi \$2.70, ph \$4.80. SO-2523

Zirconium. A bibliography of unclassified report literature, compiled by Hugh E. Voress and Thomas W. Scott. Technical Information Service, Oak Ridge, Tenn. Sep 1955. 40p. Order from OTS. 30 cents. TID-3010(Suppl. 2)

Investigation of the soundness of wrought zirconium. Final report for January 5, 1953--August 28, 1953, by Verne Pulsifer. Armour Research Foundation. Illinois Inst. of Tech., Chicago, Ill. Oct 1953. Contract AT(11-1)-Gen-14. 111p. Order from OTS. 60 cents. Decl. Oct 1955. TID-5184

Distribution of impurity elements in Bureau of Mines zirconium sponge. Report no. 4 covering period November 10, 1953 to June 30, 1954, by D. D. Harper. Northwest Electrodevelopment Lab., Albany, Ore. Nov 1954. Contract AT(11-1)-140. 40p. Order from LC. Mi \$3, ph \$6.30. USBM-U-3

Zirconium progress report for the period March 15--June 15, 1955. Bureau of Mines. Northwest Electrodevelopment Experiment Station, Albany, Oreg. Jul 1955. Changed from official use only Oct 1955. Contract AT(11-1)-140. 42p. Order from LC. Mi \$3.30, ph \$7.80. USBM-U-42

The development and production of heavy-walled back-extruded zircaloy-2 cups, by J. G. Goodwin and R. W. Tombaugh. Westinghouse Electric Corp. Atomic Power Div., Pittsburgh. Oct 1955. Contract AT-11-1-GEN-14. 42p. Order from LC. Mi \$3.30, ph \$7.80. WAPD-131

Carbonate leaching, acid leaching, settling, and ion exchange testing of Cal-uranium ore, by D. R. George, J. B. Larson, E. S. Porter, and H. I. Viklund. National Lead Co., Inc. Raw Materials Development Lab., Winchester, Mass. Oct 1955. Contract AT(49-6)-924. 38p. Order from LC. Mi \$3, ph \$6.30. WIN-6

Preliminary pilot plant testing of resin-in-pulp ion exchange of alkaline leach pulps, by C. K. McArthur, T. F. Izzo, R. G. Beverly, A. W. Griffith, and R. L. Shimmin. National Lead Co., Inc. Raw Materials Development Lab., Winchester, Mass. Apr 1955. Contract AT(49-6)-924. 23p. Order from LC. Mi \$2.70, ph \$4.80. WIN-11

Uranium recovery by hydrogen reduction of carbonate leach liquors, by Harry Papazian. National Lead Co., Inc. Raw Materials Development Lab., Winchester, Mass. Nov 1955. Contract AT(49-6)-924. 25p. Order from LC. Mi \$2.70, ph \$4.80. WIN-13

Initial operation of new acid leach resin-in-pulp pilot plant, by C. K. McArthur, T. F. Izzo, and R. L. Shimmin. National Lead Co., Inc. Raw Materials Development Lab., Winchester, Mass. Jul 1955. Contract AT(49-6)-924. 27p. Order from LC. Mi \$2.70, ph \$4.80. WIN-17

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The recovery of uranium from sulfate leach liquors by the TBP-thiocyanate process, by Henry G. Petrow and Harold N. Marenburg. National Lead Co., Inc. Raw Materials Development Lab., Winchester, Mass. Nov 1955. Contract AT(49-6)-924. 17p. Order from LC. Mi \$2.40, ph \$3.30. WIN-24

Laboratory investigation of Thornburg Los Ochos ore, by E. S. Porter, P. N. Thomas, H. I. Viklund, and G. Trueman. National Lead Co., Inc. Raw Materials Development Lab., Winchester, Mass. Oct 1955. Contract AT(49-6)-924. 31p. Order from LC. Mi \$3, ph \$6.30. WIN-25
Decl. Aug 1953.

Physics

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