U. S. Government

RESEARCH REPORTS

April 13, 1956
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Reports on titanium, aluminum, steel, copper, chromium plating, ionizing radiation of foods, plastics, chemicals, electronics, a tracer technique, brazing alloys, heat-resistant paints, aviation, marine chronometers, construction of wooden pallets, and other subjects . . .

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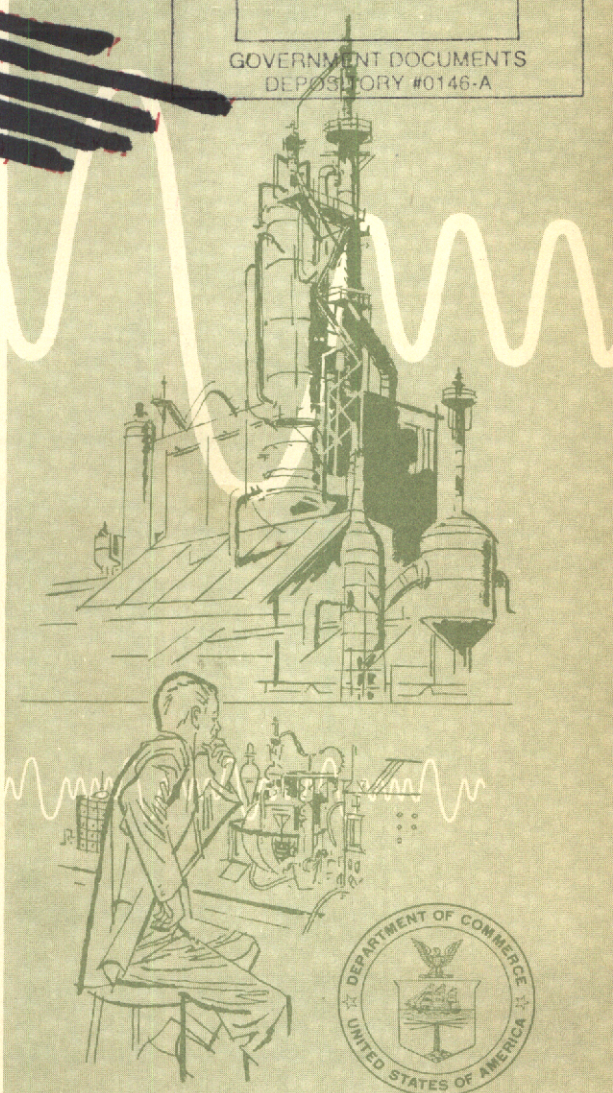

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OFFICE OF TECHNICAL SERVICES
John C. Green, *Director*

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U. S. DEPARTMENT OF COMMERCE

OFFICE OF TECHNICAL SERVICES

Vol. 25, No. 4 April 13, 1956

Contents

Printed Reports Available from OTS Announced in This Issue

APPAREL

Acoustic transmission properties of winter headgear, by Howard W. Hembree and Henry F. Gaydos. U. S. Army. Quartermaster Research and Development Command. Environmental Protection Division, Quartermaster Research and Development Center, Natick, Mass. Aug 1955. 22p diagr, graphs, table. Order from OTS. 75 cents.
PB 111832

Studies were conducted to determine the degree of acoustic transmission loss in various pile and cloth fabrics and in the Ensolite sound cell which has been tested in Korea. It was found that perforated Ensolite attenuates the higher sound frequencies to an undesirable extent and possesses certain structural and mechanical disadvantages which make it an impractical material for headgear. Certain types of pile fabrics have good acoustic transmission properties and are good thermal insulators. Project reference 7-95-20-003B. QMC EP TR 19.

Comparison of experimental pile clothing with the standard Army Arctic uniform of 1953, by Alan H. Woodcock, Richard L. Pratt, and George F. Fonseca. U. S. Army. Quartermaster Research

and Development Command. Environmental Research Branch, Quartermaster Research and Development Center, Natick, Mass. Aug 1955. 33p photos, graphs, tables. Order from LC. Mi $3.30, ph $6.30. PB 119547

Scientific information in terms of a new concept of heat transfer through "functional clothing" was applied to the design of two types of experimental pile clothing for dry-cold conditions. On the basis of this information, predictions were made of the performance characteristics of such clothing. Ensembles of pile clothing were then constructed and subjected to both laboratory and field studies. This report discusses the results of this study in terms of the predictions of the performance characteristics of the experimental loose and tight pile clothing. Project reference 7-64-06-001. QMC EP TR 13.

Evaluation of new universal military last and experimental navy oxford, by Milton Bailey. U. S. Naval Supply Activities. Clothing Supply Office, Brooklyn, N. Y. Aug 1955. 23p photos, tables. Order from LC. Mi $2.70, ph $4.80. PB 119732

The evaluation was divided into three parts: 1. A service evaluation which indicated the fit and comfort of the new last and shoes. 2. A comparative evaluation of counters and insoles used in the standard Navy shoe and in the test shoe. 3. A fitting evaluation which determined the effectiveness of a Brannock shoe fitting device adjusted to the sizing system of the new last. Project no. NT 001-018: Service footwear. BUSANDA reports control symbol 3950-2.

CHEMICALS AND ALLIED PRODUCTS

Drugs and Pharmaceuticals

Coliformin: Production and isolation, by Stig K. L. Freyschuss, Stig O. Pehrson, and Börje Steenberg. 1955. 6p tables. Order from LC. Mi $1.80, ph $1.80. PB 119565

This paper deals with further studies of a new fungicidal antibiotic, coliformin, produced by a specific Bacillus coli-type. This substance is highly active against a variety of fungi including human and plant pathogens. Continued work is going on at an industrial laboratory for the purpose of large scale production. Svenska Träforskningsinstitutet. Trākemi och Pappersteknik. Meddelande 183.

Organic Chemicals

Chlorine and fluorine containing organic compounds for non-flammable materials, by J. C. Mosteller. Purdue University. Purdue Research Foundation, Lafayette, Ind. Feb 1949. 56f tables. Order from LC. Mi $3.60, enl pr $10.80. PB 119722

The purpose of this work was to investigate the applicability of fluorine containing compounds as base stocks, viscosity index improvers, and "snuffer" additives. Materials representing the following classes of compounds were investigated: esters, ethers, halo(perfluoroalkyl)benzenes, triazines, and polyhalo-hydrocarbons. Methods for the determination of physical properties and the procedures for preparing the compounds under consideration are described. For supplement 1 see PB 111924. AF TR 5763. AF TSEAM M 5427.

Countercurrent fractionation of cellulose acetate by preferential diffusion into porous charcoal, by Harold A. Swenson. 1955. 12p photos, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 119568

A multi-stage countercurrent apparatus is described with which porous charcoal is used as the stationary phase. The apparatus is used to fractionate secondary cellulose acetates with weight average molecular weights of ca. 35,000 and 60,000. Preliminary intrinsic viscosity weight distribution diagrams are presented. A method for determining the intrinsic viscosity of cellulose in acetone by single measurements is given. Reprinted from Acta Chemica Scandinavica 9 (1955) 572-582. Svenska Träforskningsinstitutet. Trākemi och Pappersteknik. Meddelande 186.

Effect of the sulfonyl and related groups on the reactivity of other groups in organic molecules. Final report under Contract N7 onr-45007, Project NR 955-210, by F. G. Bordwell. Northwestern University, Evanston, Ill. Dec 1954. 6p. Order from LC. Mi $1.80, ph $1.80. PB 119154

Summarization of published material by this research group under contract plus a set of six conclusions covering the studies to date.

Evaluation of organic fluorine compounds for use in military aircraft, by Harold Rosenberg and J. C. Mosteller. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Apr 1955. 22p tables. Order from OTS. 75 cents. PB 111983

The desirable properties of fluorine-containing organic compounds include wide liquid range, unusual chemical stability, good electrical conduction, desirable heat transfer characteristics and decreased flammability. Fluorine compounds have, accordingly, been studied for use as fire-extinguishing agents, acid-resistant coatings and greases, non-flammable hydraulic fluids, elastomers, electronic equipment and fungicides. Project no. 7340. AF WADC TR 54-580.

Fluorine-containing polyethers, by Ogden R. Pierce, Donald D. Smith, and Robert M. Murch. Dow Corning Corp., Midland, Mich. Jun 1955. 57p drawing, graphs, tables. Order from OTS. $1.50. PB 111986

The purpose of this research is to synthesize fluorine-containing polymers of the polyether type for evaluation as sealants, rubbers, coatings and adhesives. In particular, the desired properties are thermal stability (up to 500°F), fuel and oil resistance (up to 400°F), retention of properties at -65°F, and resistance to fuming nitric acid and ozone. Project no. 7340. Covers period of work from Apr 1954 to Apr 1955. AF WADC TR 55-193.

Surface activity at the organic-liquid/air interface, by A. H. Ellison and W. A. Zisman. U. S. Naval Research Laboratory. Feb 1956. 24p photo, drawing, graphs, tables. Order from OTS. 75 cents. PB 111902

Surface activity at the interface of organic liquids with air has been studied by direct observation of the force-area properties of insoluble surface films, and by spreading coefficient measurements on soluble surface-active materials. An all-Teflon film balance has been developed for this purpose. Liquid substrates studied include n-hexadecane, white mineral oil, diethyl diisopropyl benzene, and tricresyl phosphate. Force-area studies were done on insoluble films of a high molecular weight linear polymethylsiloxane, the protein zein, and three different polyfluoro quaternary ammonium halides. The methods used here are applicable to problems in biochemistry, oil additives, and other fields. NRL R 4684.

Technical report no. 2 under Contract no. N6 ori-211, T. O. III, NR-019-133. California. University. Dept. of Chemistry and Chemical Engineering, Berkeley, Calif. Mar 1955. 53p graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 119711

Contents: Single-triplet absorption bands in some halogen substituted aromatic compounds, by D. S. McClure, N. W. Blake, and P. Hanst. (Reprinted from Journal of Chemical Physics, vol. 22, no. 2, p. 255-258, Feb 1954.) Excited states of the naphthalene molecule. I. Symmetry properties of the first two excited singlet states, by D. S. McClure. (Reprinted from Journal of Chemical Physics, vol. 22, no. 10, p. 1668-1675, Oct 1954.) - Excited states of the naphthalene molecule. II. Further studies on the first singlet-singlet transition, by D. S. McClure.

Detergents

Evaluation of waterless handcleaner SBS-30 submitted by Sugar Beet Products Corporation, by Howard W. Gillen. U. S. Navy. Medical Research Laboratory, Naval Submarine Base, New London, Conn. May 1955. 10p. Order from LC. Mi $1.80, ph $1.80. PB 119603

An evaluation of the waterless handcleaner SBS-30 was undertaken aboard two submarines during protracted operations. A forty-day supply was furnished each boat, with an appropraite dispenser that was fixed to the bulkhead in the crew's washing facilities. The shipboard tests were conducted under the direct supervision of medical officers. It was found that all newly acquired dirt of any variety could easily be removed, but that old stains presented an insoluble problem. NAV MRL M 55-2. NMRI Proj NM 002 015.14.01.

Plastics and Plasticizers

High-strength epon laminates, by F. C. Hopper and D. W. Elam. Shell Development Co., Emeryville, Calif. Dec 1952. 29p tables. Order from LC. Mi $2.70, ph $4.80. PB 119613

Covers work done between 1 Jan and 30 Jul 1952. 1. Resins, Epoxy-epon 2. Glass, Laminated - Heat resistance 3. Glass, Laminated - Strength 4. Cyanamide - Use as curing agent 5. Contract AF 33(038)-19587 6. AF WADC TR 52-5, Suppl. 1.

Paints, Varnishes and Lacquers

Analysis and control of black chromium plating solutions, by Oren Littig. U. S. Arsenal, Rock Island, Ill. Jul 1955. 19p photos, graphs. Order from OTS. 50 cents. PB 111830

A combination of steam distillation and potentiometric titration procedures can be used for the analysis of a black chrome plating solution. In the operation of the plating solution, trivalent chromium in certain ranges gives better results. It builds up in the solution by itself and unless it becomes too concentrated, is not detrimental. The percentage ratio of trivalent chromium to total chromium of approximately 10% is advantageous. Acetic acid should be present in at least 50% of the original formula amount. Chromic acid should have 40% or more of the original amount. Dept. of the Army project no. 593-14-006. Ordnance project TB 4-302C, Report no. 4. RIAL R 55-2705.

Development of gloss specification for camouflage finishes, by Harry Schecter. U. S. Army. Air Corps. Materiel Division, Dayton, Ohio. Apr 1942. 160p photos, diagr, tables. Order from LC. Mi $7.50, ph $24.30. PB 119497

This investigation was undertaken for the purpose of developing an objective specification requirement for the optical reflection characteristics of camouflage finishes. A survey of available methods and instruments for measuring gloss revealed

that none were available for use on the very low gloss, very dark finishes which are used for camouflage. This report describes the method adopted and the instrument developed for these low-gloss measurements. Includes Army Air Forces Bulletin no. 41: Color card for camouflage finishes. (Color will not reproduce). AF TR 4617 Suppl. AF TSEAM M 56-3752.

Development of heat-resistant paints, by Murray Kornbluth. U. S. Army. Corps of Engineers. Engineer Research and Development Laboratories, Ft. Belvoir, Va. Feb 1955. 153p photos, graph, tables (2 fold). Order from OTS. $4. PB 111957

This report covers: (a) the development of a lusterless, olive-drab, corrosion-resistant paint (for steel surfaces), capable of withstanding temperatures up to 1400 F without film deterioration or loss of protective properties, and (b) the preparation of a procurement specification for this type of paint. The paint is intended to reduce the accelerated oxidation and rapid destruction of steel components which, under normal conditions of use, are heated to high temperatures in oxidizing atmospheres. Project 8-93-14-002. ERDL R 1391.

Inorganic Chemicals

Localization of photoconductivity in PbS films, by David Dutton. Rochester. University. Institute of Optics, Rochester, N. Y. Aug 1955. 13p diagr, graphs. Order from LC. Mi $2.40, ph $3.30. PB 119540

A test for the degree of localization of photoconductivity in thin films, first used by Müser and consisting of the comparison of the photocurrents produced by two orientations of a long narrow beam, parallel to and perpendicular to the applied field, has been applied to samples of lead sulfide photoconducting layers currently being investigated by fine-spot scanning. Paper presented at American Physical Society, Baltimore, Mar 17-19, 1955. OSR TN 55-279. Contract AF 18(600)-193, Technical note no. 3.

Materials for handling fuming nitric acid and properties of fuming nitric acid with reference to its thermal stability, by Mars G. Fontana. Ohio State University Research Foundation, Columbus, Ohio. May 1955. 140p photos, diagrs, graphs, tables. Order from OTS. $3.50. PB 111950

Polarization studies were made to study the effect of temperature on galvanic couple systems. These results when used to determine the maximum limiting corrosion rates of the aluminum - stainless steel couple system show good correlation with observed values. Results of the "guinea pig" testing program, long time tests in closed containers, are summarized in this report. A series of measurements of the rate of decomposition and the equilibrium decomposition pressure of pure nitric acid were carried out in glass tubes. The relation between the ratio of vapor volume to the total volume of the sample, the temperature, and the decomposition pressure was established over the temperature range from 76° to 125°C and was extended by extrapolation to room temperature. The initial results of a similar study of the nitric acid - water system are reported. The apparatus and experimental techniques used are described in detail. Fourth annual report covering the period Apr 1953 to Mar 1954 under Contract AF 33(038)-10381. For parts 1-2, 5 see PB 109151, PB 110963, PB 111877, AF TR 6519, Part IV.

Photoconductivity in potassium iodide containing F centers, by N. Inchauspe and R. J. Maurer. Illinois. University. Dept. of Physics, Urbana, Ill. Sep 1955. 41p diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 119538

Photocurrents have been observed when KI crystals containing F centers are irradiated with quanta of energy between 2.0 and 5.6 ev. Under these conditions, photocurrents are not observed in crystals which do not contain F centers. The photocurrents are attributed to the interaction of excitons and F centers. The lifetime of the excitons is estimated as of the order of 5×10^{-9} seconds. OSRD TN 55-281. Contract AF 18(600)-662-1.

Quenching of photoconductivity in cadmium sulfide, by Simpei Tutihasi. Rochester. University, Rochester, N. Y. Sep 1955. 25p graphs. Order from LC. Mi $2.70, ph $4.80. PB 119541

The spectral distribution and the temperature dependence of quenching of the photoconductivity in cadmium sulfide crystals have been investigated. Of the two quenching bands which are resolved at room temperature in "pure" crystals, one, the 1.4 micron band, is no longer resolved at -75°C and lower, although some quenching is still observed in this wavelength region at -185°C. In copper-doped crystals, on the other hand, only one quenching band has been observed at 1.4 microns, which completely disappears at temperature below -80°C. Contract AF 18(600)-688, Technical note no. 10. Contract AF 18(600)-193, Technical note no. 4. OSR TN 55-239.

Thermal and related physical properties of molten materials. Part 1. Thermal conductivity and heat capacity of molybdenum disilicide, by C. T. Ewing and B. E. Walker. U. S. Naval Research Laboratory. Jul 1954. 33p drawings, graphs, tables. Order from LC. Mi $3, ph $6.30. PB 119498

Thermal conductivity and heat capacity figures for hot-pressed molybdenum disilicide are reported to 840°C. The apparatus and method employed for each property study are described in detail. The conductivity coefficients were measured in a longitudinal type system with guard-ring compensation;

the heat capacity results were derived from enthalpy measurements made by a drop-method with a copper block calorimeter. A detailed analytical description for each molybdenum disilicide test sample is included, and the change in property value from ideal due to the impurity content or physical form of the test sample is predicted, where possible. For Part II see PB 111883. AF WADC TR 54-185.

Thermodynamic properties of titanium chlorides, by David Altman, Alfred J. Darnell, Milton Farber, Walter F. Krieve, David M. Mason and Stephen P. Vango. California Institute of Technology. Jet Propulsion Laboratory, Pasadena, Calif. Dec 1954. 59p photos, diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 119530

Calorimetric determinations of the heats of chlorination of $TiCl_2(s)$, and $TiCl_3(s)$ to yield $TiCl_4$ were made at 25°C. Studies on the disproportionation and vapor pressures of $TiCl_3(s)$ and $TiCl_2(s)$ were carried out by the effusion method in a molybdenum cell in a vacuum system. It was found that hydrogen may be used to reduce $TiCl_4(g)$ to $TiCl_3(s)$ at low temperatures. The solid phases $TiCl_3$ and Ti cannot coexist at equilibrium with $TiCl_2$. Oxychlorides of titanium, which have been observed at low temperatures, are unstable with respect to TiO_2 and $TiCl_4$ at temperatures above 800°K. There is no appreciable solid solution between the phases $TiCl_2$ and $TiCl_3$ in the range of 5 to 50 per cent completion of the $TiCl_3$ disproportionation reaction. This fact was determined from X-ray analysis of the residue and from the fact that the disproportionation pressures were constant in this region. Metallic titanium may be formed completely from the disproportionation reactions at temperatures as low as 600°C. This fact may be of practical significance in metallurgy. CIT JPL R 20-88.

Analytical Chemistry

Analytical method for dicyclohexylamine, by R. L. LeMar. U. S. Arsenal, Rock Island, Ill. Oct 1955. 19p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 119471

A rapid turbidimetric method for the quantitative determination of dicyclohexylamine has been developed. Various aspects of the method, i.e., reaction time, suspension stability and interference of nitrite ion, casein and diisopropylamine were investigated. Dept. of the Army project no. 591-07-001. Ordnance project no. TB 5-11010, report no. 9. RIAL R 55-3906.

Determination of arsenic in steel by X-ray fluorescence, by M. B. Cavanagh. U. S. Naval Research Laboratory. Dec 1955. 7p photos, drawings, diagrs, graphs, tables. Order from OTS. 50 cents. PB 111870

The inherent difficulties of both chemical and spectrochemical approaches are avoided by the use of x-ray analysis techniques. Germanium is added to a sulfuric acid solution of the steel sample to serve as a collector for the arsenic and also as an internal standard. The solution is saturated with hydrogen sulfide; the resultant precipitate is collected and examined on a commercially available flat-crystal x-ray spectrometer. This method gives results which are accurate and reproducible; the presence of other elements in the sulfide precipitate does not affect the analysis. Arsenic concentrations of between 0.1 and 1.0 milligram can be handled most satisfactorily, but the method is also applicable to the parts-per-million range if a moderately large sample is used. NRL R 4679.

Development of a tracer technique. Final report under Contract no. AF 19(604)-1045, by E. Shapiro, J. Gibbs, E. Field, and T. Dillon. Tracerlab, Inc., Boston, Mass. Aug 1955. 86p photos, drawings, diagrs, graphs, tables. Order from OTS. $2.25. PB 111952

The development of an air tracer technique was studied in four phases: (1) selection and preparation of a tracer gas, (2) development of a gas dispenser, (3) development of an air sampler and (4) development of an analytical method. AF CRC TR 55-290.

Infrared spectrophotometric method for the determination of ortho, meta, and para nitrotoluene, 2,4- and 2,6-dinitrotoluene in admixtures, by Michael Halik and Frank Pristera. U. S. Picatinny Arsenal. Samuel Feltman Ammunition Laboratories, Dover, N. J. Aug 1955. 18p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 119531

An infrared spectrophotometric method of analysis has been developed for determining the amounts of ortho (o-MNT), meta (m-MNT), para (p-MNT) nitrotoluene, 2,4- and 2,6-dinitrotoluene (DNT). The method developed was applied to three synthetic samples containing various amounts of the ingredients. Dept. of the Army project 504-01-011. Ordnance project TA3-5002, item C. PA TR 2221.

Chemical Engineering and Equipment

Micro-mixer-settler for laboratory continuous counter-current solvent extraction, by G. P. Wall. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Jul 1955. 20p photos, drawing, diagr, graphs. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 72¢ plus mail handling. PB 119316

Unclassified 1955. S. O. code no. 91-3-2-18.
1. Atomic power - Research - Gt. Brit. 2. Solvent extraction processes - Equipment - Gt. Brit. 3. Laboratory equipment - Design - Gt. Brit. 4. AERE CE/R 1730.

Miscellaneous Chemicals

Hydrogen line red shift of radio source Cygnus A, by A. E. Lilley and E. F. McClain. U. S. Naval Research Laboratory. Dec 1955. 7p graph, table. Order from OTS. 50 cents. PB 111905

A measure of the red shift has been obtained on radio source Cygnus A by means of the hydrogen line absorption effect in the continuous microwave spectrum of the source. The measured microwave red shift agrees in magnitude with the optical red shift. NRL R 4689.

Spin wave analysis of the magnetite structure, by J. S. Kouvel. Harvard University. Cruft Laboratory. Feb 1955. 31p diagrs, tables. Order from LC. Mi $3, ph $6.30. PB 119465

It is the purpose of this report to include the effects of the spin superstructure in a semi-classical spin wave analysis of the magnetite structure at very low temperatures. This report is also concerned with the magnetic contribution to the specific heat. Finally, there will be a discussion of the antiferromagnetic inverse spinel having no net magnetic moment, again with particular reference to the effects of spin ordering (in the B sites) on the spin wave properties. Appendix: The antiferromagnetic inverse spinel. HU CL TR 210. Contract N5-ori-76, T. O. 1, NR-372-012.

Study on surface chemical reactions, by S. Bentur. Pennsylvania State University. College of Mineral Industries, University Park, Pa. Mar 1955. 40p graphs, tables. Order from LC. Mi $3, ph $6.30. PB 119737

This study is based on the atomistic approach and on the theory of screening of W. A. Weyl. It is the object of this report to describe different experimental methods which were used to study some of these phenomena. It has been found that this concept and these methods could be applied for studying the surface chemical reactions of carbon and carbohydrates. A comparative colorimetric method was applied for quantitative measurements of the oxidation capacity of surfaces and nascent surfaces. ONR TR 62.

ELECTRICAL MACHINERY

Electronics

Ausgewaehlte fragen ueber theorie und technik von antennen (Problems in theory and technique of antennas) part I. Germany. Zentrale für Wissenschaftliches Berichtswesen der Luftfahrtforschung. Mar 1943. 598p photos, drawings, diagrs, graphs, tables (Text in English and German). Order from LC. Mi $11.10, ph $90.65. PB 119640

Collection of 19 reports prepared by the Generalbevollmächtigten für Technische Nachrichtenmittel for presentation at the Vierjahresplan Institut für Schwingungsforschung, Mar 24-26, 1943. For Part II see PB 89013. Contents: I: General requirements on the qualities and dimensions of movable and fixed antennas, by R. Appel. - II. Ship transmission antenna installations with nongrounded antenna part and requirements of the navy as to shipboard antenna installations, by H. Schlicke. - III. Directional antenna systems with antenna amplifiers, by H. Rindfleisch. - IV. Requirements of the airforce of dm. antennas for directional connections, by H. Dahlmann. - V. Aircraft antennas, by H. Netherler. - VI. Surface excitation, by S. Zisler. - VII. Ultra short wave aircraft antennas, by W. Kloepfer. - VIII. Long wire antennas on airplane wings, by G. Goubau. - IX. Antenna and range, by K. Franes. - X. Principles of directional antennas, by W. Moser. - XI. New ultra short wave directional antenna with purely vertical polarization, by R. M. Wundt. - XII. Directional antenna system for dm- and cm-waves without energy cable to the instrument, by K. Laemmchen. - XIII. Ground direction-finding antenna systems, by W. Hasselbeck. - XIV. Direction finding loop with iron core, by A. Weis. - XV. On multiple utilization of transmitter antennas, by H. Brueckmann. - XVI. On anti-fading antennas, by H. Brueckmann. - XVII. Antennas on railroad cars, by A. Kraus. - XVIII. Raw material problems with antennas from the point of view of radio engineering, by W. Hahn. - XIX. Directions for the uniform designation of antenna magnitudes in lectures and reports. AF T-2 T/2222. ZWB FB 339/44.

Circularly polarized slot radiators, by Alan J. Simmons. U. S. Naval Research Laboratory. Jan 1956. 17p photos, diagrs, graphs. Order from OTS. 50 cents. PB 111904

A pair of narrow slots crossed at right angles and located at the proper point in the broad wall of a rectangular waveguide will radiate a circularly polarized wave. Some of the results of a study of the properties of such slots is presented. The study was undertaken with the aim of obtaining information useful in design of a circularly polarized linear array. NRL R 4687.

Continuous monitor of radar performance, by T. P. Dlugolecki. U. S. Air Force. Air Research and Development Command. Rome Air Development Center. Griffiss Air Force Base, Rome, N. Y. Sep 1955. 26p photos, diagr. Order from OTS. 75 cents. PB 111956

An experimental model of a continuous monitor of radar performance is described. This monitor affords the operator or maintenance personnel a continuous check on the performance of the equipment

without the necessity of taking the equipment out of operation. Transmitter power putput, receiver noise figure, and relative tuning of the local oscillator are each continually displayed on separate meters. AF RADC TR 55-46.

Density modulation of an electron stream from a field emitter cathode, by D. H. Goodman. California. University. Division of Electrical Engineering. Electronics Research Laboratory, Berkeley, Calif. Aug 1955. 86p diagrs, graphs. Order from LC. Mi $4.80, ph $13.80. PB 119593

This investigation deals principally with the proposal that a density modulated electron stream may be achieved by the control of the number of electrons leaving the metallic cathode as field emitted electrons rather than by the formation of electron bunches from a thermionic cathode by the resultant action of a force field upon the electrons. UC IER Ser. 60, Issue 142. Contract no. W 33-038-ac-16649.

Determination of the scattering potential from the spectral measure function. Part III: Calculation of the scattering potential from the scattering operator for the one-dimensional Schrödinger equation, by Irvin Kay and Harry E. Moses. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research. Sep 1955. 40p. Order from LC. Mi $3, ph $6.30. PB 119545

A procedure discussed in previous papers for the calculation of the scattering potentials from the spectral measure functions associated with certain eigenfunctions of the continuous spectrum of the perturbed Hamiltonian, has been adapted to the problem of obtaining the scattering potential from the scattering operator for the one-dimensional Schrödinger equation ($-\infty < x < \infty$). Examples are given to show how the procedure may be used. For Part II see PB 118162. NYU RR CX-20. AF CRC TN 55-699. Contract AF 19(122)-463.

Flip-flop circuit based on frequency memory, by Hon C. Lee. Stanford University. Electronics Research Laboratory, Stanford, Calif. Jan 1955. 47p diagrs, graphs. Order from LC. Mi $3.30, ph $7.80. PB 119536

The analysis is based on a bistable oscillator with two degrees of freedom, forced with an external signal. The corresponding behavior is described by a simultaneous pair of second-order nonlinear differential equations for which no general solution is known. Graphical solutions for different values of the external voltage have been obtained with the aid of the IBM computer. To extend this idea, a ten-frequency decimal counter based on beat-frequency techniques is discussed. Finally, a new technique for frequency switching based on a single variable impedance is introduced and studied in terms of the behavior of the roots in the complex frequency plane. SU ERL TR 81. Contract N6 onr-251(07), NR373-360.

Low-noise L-band amplifier, by Lawrence Hoffman and Hill Montague. U. S. Naval Research Laboratory. Feb 1956. 8p photos, drawing, diagr. Order from OTS. 50 cents. PB 111907

A simple and compact coaxial cavity amplifier for the 1250-1350 Mc range has been designed using a GL-6299 (Z-3011) triode. The input is taken from a tunable TR cavity by means of an adjustable loop, and the output is fed to a Pound-type mixer. Tuning is accomplished by a simple susceptance screw parallel to the cavity axis. Noise figures ranging from 8.0 to 8.5 db were measured for a sample of five tubes tested. NRL R 4690.

Measurement of the microwave properties of ferrites at high power levels, by John L. Carter and Irving Reingold. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Apr 1955. 21p diagrs, graphs. Order from OTS. 75 cents. PB 111826

Results indicate that ferrite samples with satisfactory values of rotation and loss can be obtained for operation over a narrow frequency band. Two avenues of approach should be pursued in determining the microwave characteristics of ferrites: 1) the evaluation of the ferrite completely divorced from the microwave plumbing, and 2) an investigation of the ferrite in the microwave configuration in which it is to be used. Dept. of the Army project nr. 3-19-03-032. Signal Corps project Nr 323B. For earlier report see PB 112990. SCEL TM 1651.

Note on stray loading of phase bridges, by J. C. Williams. Harvard University. Cruft Laboratory. Jan 1955. 15p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 119524

The quadrature voltages derived by means of phase bridges are subject to error in relative magnitude or phase angle because of loading of the bridge output points by stray impedances. Two resistance-capacitance bridges with either resistance-capacitance or purely capacitive loading are considered, and it is shown that output voltages can be made errorless. HU CL TR 208. Contract N5 ori-76, T. O. 28.

Piezoelectric crystal studies and measurements, by Karl S. Van Dyke. Wesleyan University. Scott Laboratory of Physics, Middletown, Conn. Contract DA 36-039-sc-73. Dept. of the Army project no. 3-99-11-022. Signal Corps project no. 37-142B. Order separate parts described below from LC, giving PB number of each part ordered.

Eighth quarterly progress report for the period 1 Feb-30 Apr 1952. Jun 1952. 73p diagrs, graphs. Mi $4.50, ph $12.30. PB 119600

Investigations into the effects of varying the area and geometry of plated crystals on the

parameters of quartz oscillator plates; into the Q's of small quartz rings with a view of comparing the viscous properties of natural and synthetic quartz; and into the matrices of the properties of piezoelectric crystals. Appendix I. Thickness shear vibrations of quartz plates, by John H. Ahlberg. - Appendix II. Quartz crystals as meteorological elements, by Charles W. Deeley.

Tenth (final) quarterly report for the period 1 May 1952-31 Jan 1953. Apr 1953. 49p diagrs, graphs, tables. Mi $3.30, ph $7.80. PB 119602

Investigations into the effects of varying the area and geometry of plated crystals on the parameters of quartz oscillator plates; into the Q's of small quartz rings with a view to comparing the viscous properties of natural and synthetic quartz; and into the matrices of the properties of piezoelectric crystals. Includes letter report (9th) 1 May-31 Jul 1952. For supplement vol. 2 see PB 118261.

Quarterly progress report for the period 15 Jul-14 Oct 1955 under Contract no. AF 18(600)-1505, by Ernst Weber. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N. Y. Nov 1955. 22p diagrs. Order from LC. Mi $2.70, ph $4.80. PB 119553

Report R 452.1-55.
1. Electrodynamics - Theory 2. Electromagnetic theory 3. Networks - Theory.

Remarks on Alfven's perturbation method, by O. Fleischman and B. A. Lippmann. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research. Aug 1955. 13p. Order from LC. Mi $2.40, ph $3.30. PB119474

Alfven develops his method by the analysis of several special cases. In this report, we have rederived his perturbation scheme from a viewpoint that emphasizes general dynamical principles. Thus: 1) is derived directly from Hamilton's principle, 2) is proved by the adiabatic theorem, after noting that the moment of the 'equivalent dipole' is an action variable, while 3) is related to the conservation of angular momentum. AF CRC TN 55-854. NYU RR MH-4.

75 Kc/s high power pulse transmitter, by E. L. Blatt, D. C. Chaffee, and C. Volz. Pennsylvania State University. Ionosphere Research Laboratory, University Park, Pa. Oct 1955. 68p photos, diagrs. Order from LC. Mi $3.90, ph $10.80. PB 119453

This report is essentially an extension of Scientific Report No. 40 (PB 113229) and attempts to describe in some detail the conversion involved in changing the frequency of the Laboratory's high power, long-wave pulse transmitter from 150 kc/s to 75 kc/s. Scientific report no. 78 under Contract no. AF-19(604)-1304. Extension of Scientific report no. 40 (PB 113229). AF CRC TN 55-879. PSC IRL SR 78.

Some network theorems and their applications to wideband transistor amplifier design, by G. L. Matthaei and G. P. Plotnikoff. California, University. Division of Electrical Engineering. Electronics Research Laboratory, Berkeley, Calif. Feb 1955. 43p diagrs, graphs. Order from LC. Mi $3.30, ph $7.80. PB 119470

1. Amplifiers, Transistor - Design 2. Amplifiers, Wideband - Design 3. Networks - Theory 4. UC IER Series 60, Issue no. 134.

Studies of backward wave magnetron interaction, by J. W. Kluver. California, University. Division of Electrical Engineering. Electronics Research Laboratory, Berkeley, Calif. Aug 1955. 66p diagrs, graphs. Order from LC. Mi $3.90, ph $10.80. PB 119596

This study is related to beam-type magnetron tubes employing crossed d-c electric and magnetic fields. The conditions are given under which a laminar flow beam may be obtained in crossed fields. A relation between the involved parameters determining the start oscillation condition for the general case of four propagating waves is derived. Theoretical gain curves of the two-credit backward wave magnetron amplifier show the appreciable gain that is made possible with the two-circuit arrangement. A short description of the physical process by which gain is obtained with a negative circuit is given. Two slow-wave circuits are discussed: the zigzag line and the interdigital line. UC IER Series 60, Issue no. 143. Contract AF 33(616)-495.

Symposium on electronics maintenance, 3-5 Aug 1955. U. S. Dept. of Defense. Advisory Panel on Personnel and Training Research. Aug 1955. 214p photos, graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. $1. PB 111841

Chairman: Paul M. Fitts. Contents: Introductory remarks, by Paul M. Fitts. - Studies of field activities of Army electronics maintenance personnel, by George J. Wischner, Abram M. Barch and Joseph C. Hammock. - Summary of personnel research field activity research related to electronics maintenance, by Earl I. Jones. - Role of the operator in electronics maintenance, by Robert P. Irvine and Jack D. Smith. - Empirical evaluation of various job-analysis methods, by Glenn L. Bryan. - Methods of forecasting maintenance job requirements, by Robert M. Gagne. - Selecting Army personnel for electronics technician jobs, by E. Kenneth Karcher, Jr. - Selection of electronics personnel, by Abraham S. Levine. - Selection and

classification of airmen for electronics maintenance, by A. Carp. - Performance test for the AAFCS M-33 radar mechanic and observations on trouble-shooting behavior, by Robert Vineberg. - Development of proficiency measures for electronics technicians, by Glenn L. Bryan. - Development of proficiency measures for guided missilemen, by Robert Glaser. - Performance testing of electronics maintenance personnel, by Robert G. Demaree. - Approaches to evaluation of training effectiveness, by Eugene D. Carstater. - Approaches to training for trouble shooting of electronic equipment, by Joseph A. Tucker, Jr. - Relationship between operational effectiveness of electronic systems and maintenance minimization and training, by Albert C. Hall. - Dimensions of team performance and team training problems, by Robert Glaser and Murray Glanzer. - Studies in the organization of maintenance: Authority patterns in high- and low-performance wings, by Abbott L. Ferriss. - Next step in electronics maintenance research and development: General discussion. - Attendance list. RDB PPT 202/4.

VHF extra-diffraction propagation bandwidth at 200 miles, by L. A. Ames, E. J. Martin, and T. F. Rogers. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Propagation Laboratory, Cambridge, Mass. Jun 1955. 25p photos, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 119468

Photographs of television station WATV's test pattern were made throughout the first quarter of 1955 and signal amplitudes were simultaneously recorded. Appendix A calculates the diffraction field and Appendix B estimates signal-to-noise ratio. References are included. AF CRC TR 55-121.

VHF tropospheric overwater measurements far beyond the radio horizon, by L. A. Ames, P. Newman, and T. F. Rogers. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Propagation Laboratory, Cambridge, Mass. Jun 1955. 31p photos, map, graphs. Order from LC. Mi $3, ph $6.30. PB 119469

Using a high-power radar-type transmitter near Boston, Mass., point-to-point measurements have been made at a frequency of 200 Mcps on 200- and 400-statute-mile overwater paths extending along the east coast. Correlations between the shorter path field strength data and sea echo back-scatter near the transmitter site are indicated. Field strength measurements have also been made, with airborne equipment, out across the North Atlantic Ocean to a distance in excess of 400 miles; the variation of field strength with distance is graphically displayed by this technique. AF CRC TR 55-115.

Weather effects on radar, by D. Atlas, V. G. Plank, W. H. Paulsen, A. C. Chmela, J. S. Marshall, T.W.R. East, K.L.S. Gunn, and W. Hitschfeld. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate. Atmospherics Physics Laboratory, Cambridge, Mass. Dec 1952. 110p graphs, tables. Order from LC. Mi $5.70, ph $16.80. PB 119619

Research reported in Part I was sponsored under Contract AF 19(122)-217. Contents: Part I: Microwave properties of precipitation particles, by J. S. Marshall, T. W. R. East, and K. L. S. Gunn. - Part II: Atmospheric attenuation of the short microwaves, by David Atlas, V. G. Plank, W. H. Paulsen, and A. C. Chmela. - Appendix A: Oxygen absorption, by David Atlas. - Appendix B: Calculated sensitivity of airborne weather radars, by J. S. Marshall and Walter Hitschfeld. AF GRD SG 23. Contract AF 19(122)-217.

Generators, Motors, Transmission

Analysis of the diode mixer consisting of nonlinear capacitance and conductance and ohmic spreading resistance, by A. C. Macpherson. U. S. Naval Research Laboratory. Feb 1956. 16p diagrs. Order from OTS. 50 cents. PB 111786

A method is presented for calculating the mixer admittance matrix Y' which results when an ohmic impedance is connected in series with a diode mixer described by an admittance matrix Y. There are no restrictions on the frequency dependence of the ohmic impedance nor on the number of harmonic sidebands considered. The equations are worked out in detail for the "low Q" case in which signal, image, and intermediate frequencies are considered, and it is shown that Y' in this case is "nearly low Q." As a result of this analysis the usual criterion for good high-frequency mixing, i.e., that the product of the spreading resistance and the barrier capacitance be small compared with unity, is critized and a new figure of merit is proposed. NRL R 4667.

Preliminary analysis of the half-wave bridge magnetic amplifier, by H. H. Woodson. U. S. Naval Ordnance Laboratory, White Oak, Md. Feb 1954. 74p diagrs. Order from LC. Mi $4.50, ph $12.30. PB 119519

Two half-wave bridge magnetic amplifiers -- one with parallel reset circuits, the other with series reset circuits -- are analyzed using only linear circuit theory and Faraday's Law. The principal assumptions used in the analysis are rectangular B-H loop reactor core material and resistive rectifier impedances. The results of the analysis are discussed with particular emphasis on the effect the various circuit parameters have on the amplifier gain. Some design criteria are established and theoretically justified. NAVORD 3596.

Progress report under Contract N7 onr-41906, by Zoltan Bay and Nelson T. Grisamore. George Washington University, Washington, D. C. Feb 1955. 29p diagrs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119688

Discusses: I. National Union Electric Corporation's 7-stage grid-controlled multiplier tube. II. Pulse generator using the Phillips EFP-60 tube. III. High speed counting circuits.

Miscellaneous

Intensity spectra after half-wave detection of signals in noise. Harvard University. Cruft Laboratory. Contract N5ori-76, T. O. no. 1, NR 372-012. Order separate parts described below from LC, giving PB number of each part ordered.

I: Theoretical discussion, by Glenn E. Fellows and David Middleton. Feb 1955. 34p graphs. Mi $3, ph $6.30. PB 119641

When narrow-band noise centered about a frequency f_0 and an unmodulated carrier of frequency f_0 are added and passed through a nonlinear device, the intensity spectrum of the output wave consists of zones centered about harmonics of the frequency f_0. The spectral shape and the carrier and noise power in the first six harmonic zones have been determined both theoretically and experimentally for half-wave vth-law rectifiers ($v = 1/2, 1, 2$) over a wide range of input carrier-to-noise ratio. The theoretical aspects of this problem are presented in this report, along with a number of computed results. HU CL TR 217.

II: Experimental discussion, by Glenn E. Fellows. Feb 1955. 81p photos, diagrs, graphs. Mi $4.80, ph $13.80. PB 119462

This report describes the experimental measurement of the intensity spectrum at the output of a half-wave vth-law detector fed by narrow-band noise and an unmodulated carrier. Included is a discussion of the design of the analyser, based upon an analysis of expected statistical and system errors. HU CL TR 218.

FOOD AND KINDRED PRODUCTS

Ionizing radiations, their production, effects, and utilization, (with special reference to food and packaging technology). Order separate parts described below from OTS, giving PB number of each part ordered.

Supplements no. I and II. Aug 1955. 538p. $11. PB 111636s

Supplement to PB 111636.
1. NP 5297 Revised 2. QMC TL BS4, Part II, Supplement.

Supplements no. I and II: Subject index. Aug 1955. 161p. $4.25. PB 111637s

Supplement to PB 111637.
1. NP 5298 Supplement 2. QMC TL BS4, Part III, Supplement, Index.

Nutritive value of the wood-rotting fungi and their synthetic products. Annual progress report no. 4 for the period Jan-Dec 1954 under Contract no. Nonr-669(06), NR 132-099, by M. W. Jennison, Maurice Fagan, Carl Richberg, George Walter, Jr., and Nancy Snyder. Syracuse. University, Syracuse, N. Y. Jan 1955. 16p tables. Order from LC. Mi $2.40, ph $3.30. PB 119225

This research has as its broad objective a study of the nutritive value of the wood-rotting fungi and their products of synthesis, with a view of using these organisms or products as animal feed supplements or as sources of food materials for other purposes. Because of their marked synthetic powers and their high efficiency in using energy from cheap carbohydrates to convert elementary nutrients, these organisms may be valuable sources of protein, fats, vitamins, etc.

FUELS AND LUBRICANTS

Boundary lubrication studies of typical fluoroesters, by R. C. Bowers, R. L. Cottington, T. M. Thomas, and W. A. Zisman. U. S. Naval Research Laboratory. Dec 1955. 42p photo, graphs, tables. Order from OTS. $1.25. PB 111906

The boundary lubricating and wear preventive properties of some new fluorinated diesters which offer many advantages as high temperature lubricants have been investigated. These diesters were synthesized from aliphatic dibasic acids and nearly completely fluorinated alcohols. Friction and wear measurements were obtained using a "stick-slip" apparatus and a four-ball wear machine at temperatures from 77°F to 400°F. The rubbing surfaces included hard steel, soft steel, and bronze. Fluoroesters containg typical antiwear or oiliness additives were also studied. For comparative purposes results obtained with the familiar unfluorinated diester, bis(2-ethylhexyl) sebacate, are included. NRL R 4686.

Development of qualification test methods for gear lubricants. Progress report no. 34, Sep 1955, under Contract no. DA-11-022-ORD-905, by D. L. Powell and H. Ruwe Barton. Armour Research

Foundation, Chicago, Ill. 1955. 22p tables. Order from LC. Mi $2.70, ph $4.80. PB 119543

Activity was concentrated on a study of the proposed combination high-speed low-torque, and high-torque low-speed laboratory test. Three oils were involved. Project no. TB 5-3010. Appendix A: Combination high speed and high torque gear test procedure (Monsanto Chemical Co.) Revised. Mar 1, 1955. ARF Proj L030, Report no. 34.

Hydraulic fluids, lubricants, fuels and related materials, supplement I, by M. R. Fenske. Pennsylvania State University. Petroleum Refining Laboratory, State College, Pa. Sep 1949. 234p drawings, diagrs, graphs, tables. Order from LC. Mi $10.20, ph $36.30. PB 119124s

The present report includes studies on the effect of tricresyl phosphate concentration of the wear and lubricating properties of hydrocarbon-base fluids, the development of low-temperature aviation oils, evaluations of a filter element and antiwear agent, a study of viscous damping fluids, and rubber evaluations. Declassified 20 Oct 1955. Supplement to PB 119124. PSC PRL 3.42-3.47. AF TR 5756 Suppl. 1. Contract NOrd-7958.

Organosilanes and related compounds as high-temperature lubricants. Part I: Synthesis and properties of dodecyltrialkylsilanes, by Harold Rosenberg, James D. Groves, and Elizabeth J. Bartholomew. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jul 1955. 22p graphs, tables. Order from OTS. 75 cents. PB 121003

A series of studies was conducted to uncover new types of organosilicon compounds with suitable properties for extreme-temperature lubricant and hydraulic fluid applications. An introduction to these investigations in the form of a study of the synthesis and properties of one class of unsymmetrical tetraalkylsilanes is presented. A series of dodecyltrialkylsilanes was prepared and certain of the physical properties of these compounds correlated with molecular structure. These materials were found to be liquid over a wide temperature range and, in certain cases, to possess extremely high boiling points. On the basis of preliminary evaluation, these compounds appear to have promise as base stocks for certain extreme-temperature fluid and lubricant applications. Project no. 7340. AF WADC TR 54-613, Part I.

Polyhalo organic compounds as less flammable aircraft hydraulic fluids, by James C. Mosteller. U. S. Air Materiel Command. Engineering Division. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jan 1949. 61p photos, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 119626

A study of the various properties of polyhalo organic compounds, available in sufficient quantity to warrant their investigation, was made to determine the possibilities of utilizing these compounds in this formulation of a less flammable aircraft hydraulic fluid. Blends of fluorine containing organic compounds and the mineral oil base stock of Specification AN-O-366 hydraulic oil exhibit good reduced flammability characteristics, as described by the Aircraft Industries Association test procedures, as well as meeting the requirements of Specification AN-O-366. Declassified 20 Oct 1955. For Part I see PB 99145. AF TR 5746. AF TSEAM M 5323, Part II.

Spectrophotometric-cuprethol method for the quantitative determination of copper in aviation fuels, by O. M. Ballentine. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1955. 14p graph, tables. Order from OTS. 50 cents. PB 111888

A method has been established for the quantitative determination of ionic copper in aviation fuels in concentrations as low as 1 ppm of copper. In this method the cupric ion reacts with a compound prepared from carbon disulfide and diethanolamine to form the yellow salt complex of bis(2-hydroxyethyl)-dithiocarbamic acid. The concentration of copper is determined by first measuring the optical density of the resulting solution, at the maximum wave length, with an absorption spectrophotometer and then relating this optical measurement to a previously prepared concentration optical density curve. Project no. 3048. AF WADC TR 54-596.

Squid conference on atomization, sprays, and droplets held at Northwestern Technological Institute, Sep 24-25, 1953. Princeton University. James Forrestal Research Center, Princeton, N. J. Feb 1955. 118p diagrs, graphs, tables. Order from LC. Mi $6, ph $18.30. PB 119685

Technical report NTI-1-C. For abstracts only see PB 119023. Contains abstracts of papers 1-17 and Appendix no. 1-4. Appendix 1 (Paper no. 3). Characteristics of sprays and droplets, by J. Mason Pilcher. - Appendix 2 (Paper no. 4). Drop-size distributions and their averages, by Ralph E. Thomas. - Appendix 3 (Paper no. 5). Review of mass and energy transfer between liquid droplets and surrounding gases, by Charles C. Graves and D. W. Bahr. - Appendix 4 (Paper no. 12). Injection in afterburning turbojets, by D. G. Samaras.

HIGHWAYS AND BRIDGES

Abatement of highway and fumes, presented at the thirty-fourth annual meeting Jan 11-14, 1955.

Highway Research Board. 1955. 53p photos, diagrs, graphs, tables. Order from NAS-NRC Publications Office, 2101 Constitution Avenue, Washington 25, D. C. 90 cents. PB 119490

Contents: Abatement of highway noise, with special reference to roadside design: 1st-2d reports of Special Task Committee on Roadside Design, by Wilbur H. Simonson. - Motor vehicle noise studies, by D. M. Finch. HRB Bul 110. NRC 363.

Soil stabilization report, by Carlton Molineaux. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate. Terrestrial Sciences Laboratory, Cambridge, Mass. Sep 1952. 15p. Order from LC. Mi $2.40, ph $3.30. PB 119491

A report of the soil stabilization conference, sponsored by the military services and the Massachusetts Institute of Technology, is presented. Established and proposed methods of soil stabilization are enumerated, with emphasis on mechanical, soil cement, bituminous, chemical, and electrical means. Methods are referenced to particular soil types, with qualifying remarks on necessary equipment, expense, and time factors, etc. Conclusions are made as to the most suitable methods for present and future use. AF GRD SG 10.

Ungraded aggregates in bituminous mixes, presented at the thirty-fourth annual meeting, Jan 11-14, 1955. Highway Research Board. 1955. 54p photos, diagrs, graphs, tables. Order from NAS-NRC Publications Office, 2101 Constitution Ave., N. W., Washington 25, D. C. 90 cents. PB 119495

Contents: Mortar theory for use of ungraded aggregates in bituminous mixes, by Ladis H. Csanyi and Hon-Pong Fung. HRB Bul 109. NRC 361.

INSTRUMENTS

Battery analyzer for use in storage battery studies, by G. W. Work and C. P. Wales. U. S. Naval Research Laboratory. Feb 1955. 20p photos, drawings, diagrs, graphs, table. Order from OTS. 50 cents. PB 111932

Instrumentation and techniques for more complete storage battery analysis have been developed. This battery analyzer features simplicity and accuracy of control, a wide scope of variables measured and a complete, continuous record. Optional equipment adapts the basic unit to many types of cycle operation including time and voltage cutoffs. NRL R 4693.

Computer components fellowship no. 347. Quarterly report no. 9, Oct 11, 1952-Jan 10, 1953, under Contract no. CLN AF 19/122/376, by J. R. Boroman, F. A. Schwertz, A. Milch, B. Moffat, R. T. Steinback, and J. J. Mazenko. Mellon Institute of Industrial Research, Pittsburgh, Pa. Jan 1953. 128p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $6.30, ph $19.80. PB 119729

Report developed in 4 sections. First two sections summarize findings about the use of nonlinear resistors in logical switching circuits and of the influence of various experimental parameters on the voltage-current characteristics of such resistors. Section III contains an account of a chemical which shows color hysteresis in the range between 0°C and 100°C. This chemical appears to be potentially adaptable to the design of long-term storage devices or to high-speed printing. Section IV covers a discussion of a scheme for using saturable reactors as gates. For other reports under this contract see PB 109935-109936, 108646, 109937-109940, 110761, 110930, 112801, 113794.

Distribution analyzer, by M. F. Gordon and A. E. Noyes. Brown University. Division of Engineering, Providence, R. I. Jan 1955. 22p diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 119535

An eight channel distribution analyzer was constructed to measure the probability distributions of gated and processed signals in the presence of noise. Due to the varied nature of the experimental studies contemplated, the analyzer was designed to be as flexible as possible without sacrificing stability. The analyzer was essentially completed and preliminary checks had been made on various test signals; the noise sources and necessary auxiliary equipment for the measurements was in the process of construction at the termination of the effort. Third and final report under Contract Nonr-562(05).

Ground calibration of the VOR, by Robert B. Flint and William L. Wright. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Oct 1955. 21p photos, diagrs, graphs. Order from OTS. 75 cents. PB 121012

This report describes a simple and accurate method of calibrating VOR stations with a portable detector mounted on the edge of the counterpoise. An accurate method of measuring phase was developed using existing equipment. The ground-calibration method provides a means for readily determining the calibration curve without interrupting the service of the station, and it can be used as an aid in routine and preventive maintenance. The counterpoise detector also can be used to measure the antenna radiation patterns during tune-up of the station. The calibration data obtained from ground checks were confirmed by flight tests. CAA TDR 227.

Inorganic replica techniques for use with the electron microscope, by George E. Dieter. U. S. Aberdeen Proving Ground. Ballistic Research

Laboratories, Aberdeen, Md. Aug 1955. 23p photos, diagrs. Order from LC. Mi $2.70, ph $4.80. PB 119472

The polystyrene-silica two-step replica technique for the preparation of replicas from metal surfaces for examination in the electron microscope has been described in detail. The problem of interpretation of electron micrographs made from these replicas has been considered in detail. The polystyrene-carbon replica technique has been described and compared with the polystyrene-silica method. Dept. of the Army project no. 5B0302001. Ordnance research and development project no. TB 3-0110. APG BRL R 949.

Instantaneous sound spectrograph, by R. D. Misner. U. S. Naval Research Laboratory. Jan 1956. 35p photos, diagrs (1 fold), graphs. Order from OTS. $1. PB 111864

A sound spectrograph which presents an instantaneous plot of the energy of an audio signal in the frequency and the time domains has been developed at the Naval Research Laboratory. Relatively wide use has been made of the spectrograph for the analysis of a variety of signals. This use has precipitated the design of a second model. Both the first model and plans for the second model are described in some detail. The discussion is intended to portray the scope of the spectrograph in sufficient detail to enable the reader to judge its usefulness in terms of his requirements. NRL R 4671.

Instrumental changes for increasing the precision of the Beckman spectrophotometer, model DU, by Åke S:son Stenius. 1955. 6p. Order from LC. Mi $1.80, ph $1.80. PB 119564

Reprinted from Acta Chemica Scandinavica 9 (1955) 702-706.
1. Beckman spectrophotometer (Model DU) - Sweden 2. Spectrophotomers - Design - Sweden 3. Svenska Träforskningsinstitutet. Träkemi och Pappersteknik. Meddelande 182.

Mark-14 illuminated sight, by Raymond W. Wengel. Eastman Kodak Co. Development Dept., Rochester, N. Y. Dec 1945. 93f photos, drawings, diagrs, graphs, tables. Order from LC. Mi $5.70, enl pr $16.80. PB 119728

Will not reproduce well. Declassified June 18, 1954.
1. Gun sights, Aircraft - Design 2. Lenses, Photographic - Fabrication 3. NDRC Div 7, Report 104 4. OSRD 6281 5. Contract OEMsr-56.

Naval Research Laboratory research reactor. Part I: Instrumentation tests at Oak Ridge National Laboratory, by C. W. Peters, F. E. Jablonski, and M. P. Young. U. S. Naval Research Laboratory. Jan 1956. 19p photos, diagrs, graphs, tables. Order from OTS. 50 cents. PB 111859

The NRL reactor instrumentation channels with two compensated ionization chambers and a multiple plate safety chamber were taken to the Oak Ridge National Laboratory to be tested in the Bulk Shielding Reactor. The compensation and dynamic range characteristics and the sensitivities of the detectors were investigated. The performance of the logarithmic and linear recording channels under reactor operating conditions was observed. The equipment performed within the limits required for use in the NRL reactor. NRL R 4668.

Operating instruction manual for odograph, land, model M-1. International Business Machines Corp., Endicott, N. Y. Sep 1943. 92p photos, drawings, diagrs, maps, graphs. Order from LC. Mi $5.40, ph $15.30. PB 119632

1. M-1 (Odograph) 2. Odographs - Operation 3. WD TM 5-9411.

Precision determination of lattice constants with a Geiger-counter X-ray diffractometer, by A. Smakula and J. Kalnajs. Massachusetts Institute of Technology. Laboratory for Insulation Research. Feb 1955. 30p diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119464

It is shown that the Geiger-counter X-ray diffractometer can be used for precision determination of lattice constants. The limiting factor in the accuracy of the lattice constants determination is not in the error of the diffractometer, but in the X-ray wavelength. Contracts no. N5ori-07801 and Ordnance Corps DA 19-020-ord-3429. MIT LIR TR 92.

Rate measurement of marine chronometers, gimbal-mounted chronometer watches, and non-gimbal navigating watches under controlled climatic conditions. Part III: The estimated over-all error of three rate measuring methods, by H. M. Suski. U. S. Naval Research Laboratory. Dec 1955. 61p photos, diagrs, graphs, tables. Order from OTS. $1.75. PB 111774

Use is made of the definition for the term "rate of a timepiece" in analyzing the visual, photo, and photo-record methods of daily rate measurement. These titles are descriptive of the means employed in obtaining the initial and final timepiece indications from which the rate is determined. The methods are described, the significant sources of errors and mistakes are considered in detail, and estimates of the over-all error E (the combined effect of errors and possible mistakes) are made. For each of the three methods, the sensitivity S (the smallest value of rate which can be detected in the absence of errors and mistakes) is established. For parts 1-2 see PB 118514 and PB 118513. NRL R 4645.

Simple thermocouple needle thermometer with high sensitivity, by E. K. Weise and A. C. Hershberger.

Illinois. Engineering Experiment Station, Urbana, Ill. Oct 1955. 9p drawing, diagr, graph. Order from LC. Mi $1.80, ph $1.80. PB 119554

A thermocouple needle thermometer was built and used directly with a sensitive galvanometer and a salt bath as reference, for temperature measurements in living animal tissues. Technical note no. 4 under Contract no. AF 33-038-12644. OSR Project no. 52-670A-85. OSR TN 55-423.

Speech analyzer for a formant-coding compression system, by James Loton Flanagan. Massachusetts Institute of Technology. Acoustics Laboratory. May 1955. 124p photos, diagrs, graphs. Order from LC. Mi $6.30, ph $19.80. PB 119473

The development of an electronic analyzer for extracting formant and vocal excitation information from continuous speech is described. The analyzer is designed for use in a bandwidth compression system operating on formant-coding principles. The purpose of the analyzer is to code input speech information in the form of narrow bandwidth control signals and to transmit these signals to a synthesizer that is, in effect, a terminal analog of the human vocal mechanism. The synthesizer utilizes the control information to recreate the speech at the receiver. Scientific report no. 4 under Contract no. AF 19(604)-626. AF CRC TN 55-793.

Transcendental function analogue computation with magnetic cores, by D. H. Schaefer and R. L. Van Allen. U. S. Naval Research Laboratory. Feb 1956. 11p photos, diagrs, graphs, table. Order from OTS. 50 cents. PB 111900

A rugged, fast, static method of performing analogue computations has been evolved which utilizes a square loop magnetic core in conjunction with switching transistors. Computations are dependent only upon the waveform of periodic functions and the ability of a high remanence magnetic core to store a given number of volt-seconds for a half cycle of a supply frequency. Output voltages proportional to functions of the input, such as trigonometric functions, inverse trigonometric functions, powers and roots have been obtained as well as output voltages proportional to the product of two input voltages. Computation accuracy of 2% or better has been obtained with input signal power comparable to that of magnetic amplifiers using similar cores. NRL R 4681.

LUMBER AND WOOD PRODUCTS

Reference guide for the construction and inspection of wood pallets, by M. Toscano. U. S. Naval Supply Research and Development Facility, Bayonne, N. J. Jul 1954. 115p photos, diagrs, map, graph, tables (1 fold). Order from OTS. $2. PB 111998

Project NT 003-020(p), sub-project SE 52-76. Engineering report no. 2.4182. Contents: Section I. Pallet definitions. - II. Requirements. - III. Inspection of lumber for pallet. - IV. Principal woods used for pallets. - V. Moisture relations in wood. - VI. Limitations of defects in pallet lumber.

MEDICAL RESEARCH AND PRACTICE

Amino acid metabolism of man in health and disease. Annual progress report for the period Jan 1-Dec 31, 1954 under Contract no. Nonr-1167(00), NR 120-975, by Anthony A. Albanese. St. Luke's Hospital. Nutritional Research Laboratory, New York, N. Y. Dec 1954. 9p. Order from LC. Mi $1.80, ph $1.80. PB 119244

1. Amino acids - Metabolism.

Autoclave-sterilized medium for the detection of urease activity, by William L. Tidwell, C. D. Heather and Cherrie Merkle. Texas. Agricultural and Mechanical College. Dept. of Biology, and Agricultural and Mechanical Research Foundation, College Station, Texas. Jul 1955. 3p. Order from LC. Mi $1.80, ph $1.80. PB 119479

An autoclave-sterilized medium for the detection of urease activity is described. The medium is a modification of that of Rustigian and Stuart. Comparative tests were run with their medium and the new modification with identical results obtained. It was shown that the urea is not completely destroyed by standard autoclaving and that those decomposition products formed do not lead to the production of false positive results. AF SAM R 55-56.

Biologic effects studies on microwave radiation. Time and power thresholds for the production of lens opacities by 12.3 cm. microwaves, by Daniel B. Williams, John P. Monahan, William J. Nicholson, and James J. Aldrich. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Aug 1955. 28p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119482

Lens opacities were produced in 32 of 58 anesthetized rabbits (10-15 weeks old) subjected to 12.3 cm. microwave radiation. Threshold requirements for a single exposure ranged between 5 minutes at 0.59 watt/cm. to 90 minutes at 0.29 watt/cm. The indications were that threshold requirements are influenced by factors which increase body heat production or otherwise affect the body's capability for dissipating heat. It is suggested that the present threshold be regarded as hazardous for human exposure until more definitive information is available. A method is given for measuring

microwave energy at positions of exposure in free space. AF SAM R 55-94.

Citric and lactic acid content of tissues and susceptibility to infection as influenced by acclimatization to altitude, by L. Joe Berry. Bryn Mawr College. Dept. of Biology, Bryn Mawr, Pa. Jul 1955. 11p tables. Order from LC. Mi $2.40, ph $3.30. PB 119486

During the acclimatization of mice to simulated altitude the citric acid concentration of several organs was significantly lowered. The lactic acid concentration was unaltered in the same tissues. The susceptibility of mice exposed to altitude for 3 weeks and then infected intraperitoneally with either Salmonella typhimurium or pneumococci was compared to the susceptibility of infected normal mice following injections of Krebs cycle inhibitors or intermediates. AF SAM Proj no. 21-1401-0004, Report no. 5.

Control of pain. Annual progress report for the period Jan 1, 1954-Dec 31, 1954 under Contract no. 761-01, NR 105-003, by Brian Blades. George Washington University, Washington, D. C. Jan 1955. 3p. Order from LC. Mi $1.80, ph $1.80. PB 119228

These are abstracts of results on control of pain. Part I. Control of postoperative pain by intermittent caudal anesthesia. Part II. By adequate potassium replacement. Part III. Devise a satisfactory method for measurement of pain.

Enzymic factors concerned with the virulence of certain bacterial species. Annual progress report for period Sep 1 to Dec 31, 1954 under Contract Nonr-1514(00), by Herman C. Lichstein. Minnesota. University, Minneapolis, Minn. Dec 1954. 1p. Order from LC. Mi $1.80, ph $1.80. PB 119583

1. Enzymes - Research 2. Isonicotinic acid - Reactions.

Field study of detectability of colored targets at sea, by Rita M. Halsey, Charles E. Curtis, Dean Farnsworth. U. S. Navy. Medical Research Laboratory. Human Engineering Branch. May 1955. 42p photos, diagrs, graphs, tables. Order from OTS. $1.25. PB 121016

Air-to-sea sightings of various colored targets were made in fair weather. Observers were stationed in an aircraft flying at 700 feet altitude in an established search pattern. Targets were aluminum spheres painted with different test colors as follows: 16 ordinary paints of varying brightnesses and saturations in the yellow through red range, including certain Army-Navy standard colors; black and white; and four fluorescent paints. Targets were presented singly, and the distance at which each was detected was recorded. Colors which were detected at the greatest distances were the yellow-red and orange-red fluorescents; next in detectability were ordinary paints of high brightness and/or saturation. The effects of certain operational and observational variables are discussed. The data may be used as guides in selecting colors for survival gear and in establishing rescue search patterns. Color vision report no. 31. NAV MRL 265. NMRI Proj NM 002 014.09.03.

Immunochemical criteria of purity of proteins and polysaccharides. Annual progress report under Contract no. Nonr 266(13), NR 121-100 for period Jan 1, 1954 to Dec 31, 1954, by Elvin A. Kabat, Mary E. Carsten, and Peter Z. Allen. Columbia University, New York City, N. Y. Dec 1954. 5p. Order from OTS. 50 cents. PB 111836

Objectives of this research are: 1) To evaluate existing methods and to develop new immunochemical methods for establishing purity of proteins and polysaccharides. 2) To study fundamental mechanisms of antigen-antibody combinations. 3) To correlate structure of polysaccharides with immunochemical specificity. Contract Nonr 266(13), NR 121-100.

Intracellular changes in trauma, depletion and repair, with special reference to burns. Annual progress report for the period 1 Jan-31 Dec 1954 under Contract no. N5 ori-76, Project XIII, NR 114-198, by Oliver Cope. Harvard University, Cambridge, Mass. Jan 1955. 17p. Order from LC. Mi $2.40, ph $3.30. PB 119220

The improvement of the therapy of trauma through study of its cellular and metabolic effects. Patients suffering burns, a perforated ulcer, and other forms of trauma have been investigated. Endocrine diseases related to trauma such as Cushing's disease have been compared. The studies have been carried out both at fundamental physiologic and at practical clinical levels.

Neurological mechanisms in epilepsy. Annual progress report for the period Jan 1954-Jan 1955 under Contract no. SAR/Nonr-609(08), NR 113-320, by J. M. R. Delgado. Yale University, New Haven, Conn. Jan 1955. 6p. Order from LC. Mi $1.80, ph $1.80. PB 119226

1. Epilepsy - Research 2. Neurology.

Research on the biological effects of the heavy particle cosmic rays, by Berry Campbell. Minnesota. University. Dept. of Anatomy. Dec 1955. 16p. Order from LC. Mi $2.40, ph $3.30. PB 119489

The experimental study reported here has not succeeded in producing critical material for assess-

ment of this problem. Animals which have been examined after exposures on high altitude balloon flights have shown no damage but adequate material from longer, higher and more northern flights needs to be studied. The laboratory approach, via cyclotron accelerators, was explored. A sufficiently useful model of heavy particle cosmic ray exposure was not found in the available beams of 190 MEV deuterons. AF HADC TR 55-8.

Simple micromethod for blood carbon monoxide determination, by Herman I. Chinn, Nancy E. R. Pawel, and Robert F. Redmond. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Jul 1955. 5p drawing, tables. Order from LC. Mi $1.80, ph $1.80. PB 119483

A rapid, simple method for estimating the CO content of blood is described. The CO is liberated from finger blood by potassium ferricyanide and drawn through a tube containing a CO-sensitive chemical. The color change induced is compared with standards prepared at various saturation levels. AF SAM R 55-109.

Solution of discrimination-reversal problems by normal and irradiated monkeys, by J. M. Warren, S. J. Kaplan, and D. D. Greenwood. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Apr 1955. 5p graph, tables. Order from LC. Mi $1.80, ph $1.80. PB 119488

Three normal monkeys and seven monkeys which had received sublethal doses of neutron and gamma radiation were tested on a series of 108 discrimination-reversal problems. The following results were obtained: (1) There was no significant difference between groups in prereversal learning. (2) The radiated subjects made significantly more errors than normal controls on the postreversal trials. (3) The error scores of individual irradiated monkeys were not correlated with differences in individual dose levels. AF SAM Proj no. 21-3501-0003, Report no. 16.

Studies on intracellular growth of viruses. Final progress report for the period 1 Mar 1952-28 Feb 1955 under Contract no. Nonr-668, Task Order II, NR 135-091, by Herbert R. Morgan. Rochester. University, Rochester, N. Y. Feb 1955. 5p. Order from LC. Mi $1.80, ph $1.80. PB 119227

1. Psittacosis - Virus - Inoculations 2. Polyomyelitis - Virus - Inoculations 3. Virus infections.

Study of the effects of hypoxia upon the course of fever in dogs and monkeys, by William G. Kubicek. Minnesota. University. Medical School. Dept. of Physical Medicine and Rehabilitation, Minneapolis, Minn. May 1955. 22p photos, graphs, tables (part fold). Order from LC. Mi $2.70, ph $4.80. PB 119475

Experiments upon dogs and monkeys revealed that hypoxia may aggravate fever especially when the circulatory system is in poor condition. Reduced blood sugar and elevated plasma creatinine noted in these experiments indicated the possibility of serious metabolic impairment during hyperpyrexia. Reduced blood CO_2 content with a small rise in pH was a usual finding. Blood O_2 content increased along with hematocrit increases. Oxygen consumption, sedimentation rate, and leukocyte counts were studied. AF SAM R 55-10.

Study of the mechanism of sulfate transfer and glucuronic acid binding with the aid of phenol conjugation as a model process. Final report for the period Feb 1, 1951-Jan 31, 1955, under Contract no. Nonr-229(00), NR 122-048, by Romano H. De Meio. Jefferson Medical College, Philadelphia, Pa. Jan 1955. 3p table. Order from LC. Mi $1.80, ph $1.80. PB 119224

1. Sulfuric acid - Esters - Preparation 2. Androsterone, Dehydro - Synthesis.

METALS AND METAL PRODUCTS

Applications of differential spectrophotometry to the determination of uranium in various binary and ternary uranium base alloys, by A. Bacon and G. W. C. Milner. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Sep 1955. 25p graphs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 63¢ plus mail handling. PB 119317

S. O. code no. 91-3-2-22.
1. Atomic power - Research - Gt. Brit. 2. Uranium - Determination - Gt. Brit. 3. Uranium compounds - Spectrophotometry - Gt. Brit. 4. Spectrophotometry, Differential - Gt. Brit. 5. AERE C/R 1749.

Corrosion in engine cooling systems containing aluminum, a literature survey, compiled by Mildred Benton. U. S. Naval Research Laboratory. Jul 1955. 34p. Order from OTS. $1. PB 111817

A bibliography of publications, and their abstracts, pertinent to corrosion in naval diesel engines in which cooling water is circulated by aluminum, steel, chromium plate, and copper-nickel alloy surfaces. Bibliography no. 5.

Development of brazing alloys for joining heat resistant alloys, by Forbes M. Miller, Homer S. Gonser, and Robert L. Peaslee. Wall Colmonoy Corp. Research Laboratory, Detroit, Mich.

Jul 1955. 73p diagrs, graphs, tables. Order from OTS. $2. PB 121001

Fifteen different alloy systems were tested and studied for brazing characteristics, chemical and physical properties. These alloys were nickel base binary and ternary systems containing such metals and metalloids as phosphorus, silicon, chromium, manganese, molybdenum, tungsten and iron. Studies also showed that phosphorus and manganese contributed the most toward improving the flow and wetting properties of the alloys, while silicon and chromium contributed the most toward improving the oxidation resistance and strength properties of the alloys. Project no. 1252. AF WADC TR 55-213. Contract AF 33(616)-2287.

Development of improved titanium-base alloys, by Herbert A. Robinson, W. Maxwell Parris, and Paul D. Frost. Battelle Memorial Institute, Columbus, Ohio. Jun 1955. 104p photos, graphs, tables. Order from OTS. $2.75. PB 111988

The research program during the past year was centered around six alloys which had shown considerable promise in earlier work as potential aircraft structural materials. The tensile properties of the alloys, as affected by variations in hot working procedures and heat treatments, were evaluated. Outstanding properties were obtained in two alloys: Ti—3Mn—1Cr—1Fe—1Mo—1V and Ti-5Mn-2.5Cr. Several ingots of the Ti-3Mn-complex alloy were prepared. These ingots have been forged and rolled to bar stock for evaluation by several industrial organizations. Project no. 7351. Covers period of work from Dec 1953 to Dec 1954. Contract AF 33(616)-384.

Effect of gases in steel, by J A. Rinebolt and R. H. Raring. U. S. Naval Research Laboratory. Jan 1956. 23p photo, graphs, tables. Order from OTS. 75 cents. PB 111899

AISI 4340 steels melted in air, in vacuum, and in an argon atmosphere were heat-treated to strength levels ranging from 150,000 to 290,000 psi and compared with respect to tensile properties, Charpy V-notch properties, susceptibility to static fatigue failure in a notch tensile test, and susceptibility to embrittlement resulting from cathodic charging and cadmium plating. No significant benefits were conferred by vacuum melting or by melting in argon. NRL R 4683.

Effect of hydrogen on the mechanical properties of titanium. First summary report, July 31, 1952, by G. A. Lenning, C. M. Craighead, and R. I. Jaffee. Battelle Memorial Institute, Columbus, Ohio. Nov 1952. 70p photos, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 119544

This report covers the effect of hydrogen on tensile and impact properties, the constitution, and the density of high-purity iodide titanium. The solubility of the hydride phase in alpha titanium was investigated, and the solvus line of the high-purity base alloys is presented. Preliminary data are given on the effect of hydrogen on the tensile and impact properties, and on the microstructure of commercially pure titanium. Project no. TB 4-15. WAL R 401/79-14. Contract DA 33-019-ORD-220.

Electroforming of copper for high-vacuum applications, by L. H. LaForge, Jr. Stanford University. W. W. Hansen Laboratories of Physics. Microwave Laboratory, Stanford, Calif. Feb 1955. 23p photos, diagrs. Order from OTS. 75 cents. PB 111960

Waveguides and similar microwave components were formed to a thickness of 0.150 in. on stainless-steel mandrels in an acid copper bath at room temperature with current density of 10 amp/ft^2, after suitable cleaning of the mandrel. Linear-accelerator sections were also formed. The compositions and operation of the various solutions are given in detail, and many of the significant variables are mentioned. SU ML R 255. Contract Nonr-255(06), NR 022-166. Contract N6 onr-25123, NR 373-361.

Evaluation of a molybdenum boride cutting tool in turning titanium alloy Ti 150A, by Eugene DiCesare. U. S. Arsenal, Watertown, Mass. Jun 1955. 20p photos, diagrs, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 119738

A molybdenum-nickel boride cutting tool material, identified as K boride, has been evaluated as a single point lathe turning tool for machining titanium alloy Ti 150A. Machinability tests and a metallurgical examination of K boride and two grades of cemented tungsten carbides bonded with cobalt were conducted and the results compared. The cutting speed range for an equivalent tool life of the K boride was found to be better than that of a tungsten carbide grade comparable in hardness and structural coarseness, but poorer than that of the grade found to be optimum for machining titanium. A metallurgical examination of the K boride suggests that improvement of the microstructure would increase its value as a cutting tool. Dept. of the Army project no. 593-08-021. O. O. Project no. TB 4-15. WAL R 401/237.

Investigation of the metallurgical characteristics of the 36% aluminum titanium-base alloy, by J. B. McAndrew and D. J. McPherson. Armour Research Foundation, Chicago, Ill. Jan 1955. 66p photos, diagr, graphs, tables. Order from OTS. $1. PB 121005

The second year of work on a project directed toward an assessment of the potentialities of 36% aluminum titanium-base alloys as aircraft structural materials is reported. Experimental data are given concerning the stress-rupture strength of Ti-36% Al at 800°, 900°, 950° and 1000°C; the

room temperature and 1000°C tensile strength of Ti-36% Al; the impact strength of the same alloy at room temperature, 700°, and 1000°C; and the oxidation resistance of this material at 1000° and 1200°C in still air environments. Less extensive data are reported concerning the effects of ternary additions, especially niobium and tantalum, on the properties of the base alloy. Casting and powder metallurgy techniques applicable to this type of alloy are discussed. Project no. 7351. Covers work conducted from Jun 1953 to Aug 1954. AF WADC TR 53-182, Part II. Contract AF 33(616)-196.

Malleable chromium and its alloys, by Earl T. Hayes. U. S. Bureau of Mines, Northwest Electrodevelopment Laboratory, Albany, Oregon. Mar 1952. 61f photos, diagrs, graphs, tables. Order from LC. Mi $3.90, enl pr $12.30. PB 119721

Improvements in production of high purity chromium metal by magnesium reduction of anhydrous chlorides and by hydrogen treatment of electrolytic chromium is reported. The arc melting of hydrogen treated chromium has been accomplished and the forging, rolling, and swaging of this arc melted material has been successful. Experiments in drip melting, deoxidizing element additions, and treatment with molten calcium and calcium hydride are recorded. Brinell hot hardness values on arc melted chromium have been obtained at various temperatures up to 800°C. The heat resistance of chromium has been investigated. Research from Aug 15, 1950 to Aug 15, 1951. AF WADC TR 52-54. Contract AF 33(038)-50-1084E.

Precipitation hardening and embrittlement of high-strength titanium alloys, by W. M. Parris, C. M. Schwartz, and F. D. Frost. Battelle Memorial Institute, Columbus, Chio. Jun 1955. 74p photos, diagr, graphs, tables. Crder from OTS. $2. PB 111990

The structure of the metastable transition phase, omega, which is involved in the age hardening of titanium alloys, was determined. The formation of the omega phase during aging was found to be inhibited by increasing alloy content. Mechanical-property tests on quenched and aged Ti-4Fe and Ti-8Cr alloys confirmed the severe embrittling effect of the omega phase. Further aging to convert omega to alpha resulted in high strengths with recovery of some ductility. Attempts to detect the omega phase by metallography or autoradiography were not successful. Project no. 7351. Covers work conducted from 15 Apr 1954 to 28 Feb 1955. AF WADC TR 54-355, Part II. Contract AF 33(616)-445.

Procedures for risering steel castings, by H. F. Bishop and W. H. Johnson. U. S. Naval Research Laboratory. Dec 1955. 20p photos, drawings, graphs. Order from OTS. 50 cents. PB 111871

The applications of rules for scientifically risering steel castings, are shown for several commercial type castings. Cases are shown where riser locations are determined using formulae for (1) riser feeding range in uniform sections, (2) feeding range in heavy and light parent-appendage combinations, and (3) the application of chills to increase riser feeding range. Procedures for the calculation of minimum riser dimensions for these castings are shown. NRL R 4677.

Study of effects of alloying elements on the weldability of titanium sheet, by Herbert M. Meyer. Armour Research Foundation, Chicago, Ill. Jun 1955. 316p photos, graphs, tables. Order from OTS. $4. PB 121006

The two-fold objective was first, to control the modifications of solid phases which might occur over the various zones of weldment and, second, to control the impurities. The study's first year concerned mainly structural improvement of weldments by heat-treatment, and the present, second year is directed toward an understanding of the influence of three interstitials on weldability. Project no. 7351. Covers work conducted from Aug 1953 to Aug 1954. AF WADC TR 53-230, Part II. Contract AF 33(616)-206.

METEOROLOGY AND CLIMATOLOGY

Atmosphere, by N. C. Gerson. U. S. Air Force, Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate, Cambridge, Mass. Sep 1955. 75p diagrs, maps, graphs. Order from OTS. $2. PB 111966

A concise review of the properties of the earth's high atmosphere. Its objective is to provide the meteorologist and non-specialist with a brief description of the outer atmospheric shells. Most information has been obtained from: (a) auroral physics, (b) ionospheric physics, (c) geomagnetism, and (d) cosmic rays. The practical importance of these fields is discussed, followed by a description of the atmosphere. AF GRD SG 73. AF CRC TN 55-216.

Auroral zone absorption of radio waves transmitted via the ionosphere. Final report for the period Mar 1, 1954-Feb 28, 1955 under Contract no. DA-36-039-sc-56739, by K. L. Bowles, R. B. Dyce, and C. G. Little. Alaska. University. Geophysical Institute. Feb 1955. 93p photos, diagrs, graphs, tables. Order from LC. Mi $4.80, ph $15.30. PB 119549

Investigation on scattering of HF and VHF radio waves from the aurora, E clouds and meteors. Dept. of the Army project no. 3-99-03-022. Signal Corps project no. 182B.

Characteristics of tropospheric refractive index fluctuations observed during a 1955 measurement program in the Colorado and Florida areas, by C. M. Crain and H. Chapman. Texas. University. Electrical Engineering Research Laboratory. Oct 1955. 69p graphs. Order from LC. Mi $3.90, ph $10.80. PB 119492

This report is concerned with the reporting in summary form and the preliminary analysis of a series of refractive index fluctuation recordings taken with an airborne microwave refractometer in the Florida and Colorado areas over the period from 20 February to 31 May 1955. In addition to these summaries a number of specific reproductions of the recordings are presented and preliminary meteorological correlations are made. AF CRC TN 55-772. TU EERL R 6-12. Contract AF 19(604)-494.

Cloud physics research: Investigation of the characteristics of a tangential flow vortex thermocouple housing, by George V. Owens. Chicago. University. Dept. of Meteorology. Aug 1955. 32p drawings, graphs. Order from LC. Mi $3, ph $6.30. PB 119443

It is shown that the flow in the vortex housing approaches solid rotation and that droplets large enough to wet the thermocouple should be centrifuged. However, results of wind tunnel tests imply that the housing operates at its wet bulb temperature within a cloud and approaches the clear air wet bulb temperature immediately on exit from a cloud. A constant negative error is shown to be the result of an anomalous static pressure at the exhaust of the housing. Suggestions are made for correcting and eliminating these effects. Technical note no. 3 under Contract no. AF 19(604)-618. AF CRC TN 55-859.

Comparison of theoretically derived and observed drop-size distributions in clouds and rain, by Roland J. Boucher and Shepard Barinoff. Tufts College. Dept. of Physics. Research Laboratory of Physical Electronics, Medford, Mass. Jul 1955. 30p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119241

Scientific report no. 4 under Contract AF 19(604)-550.
1. Raindrops - Size - Distribution 2. Statistical analysis.

Experiment in forecasting the displacement of troughs and ridges. Chicago. University. Dept. of Meteorology. Jul 1955. 79p diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 119271

Contents: Introduction. - General features of wave pattern, by Chester W. Newton and William L. Schallert. - Linear extrapolation, extrapolation with acceleration, and the grid method, by Keith D. Hage. - Petterssen's wave formula, by Carl O. Erickson. Rossby's long-wave formula, by John O. Ellis. - Constant absolute vorticity trajectories, by Carl O. Erickson. - Streamline-isotherm amplitude relationships, by John O. Ellis. - Pressure-kinematic extrapolation, by Dorothy L. Bradbury and William L. Schallert. - Fjörtoft's barotropic-graphical numerical forecasting technique, by Mariano A. Estoque and John M. Mihaljan. - Comparison of trough forecasts by different methods, by Chester W. Newton. - References to literature. AF CRC TN 55-696. Contract AF 19(604)-1293, Technical report no. 5.

Experiments using window to measure high-altitude winds, by A. D. Anderson and W. E. Hoehne. U. S. Naval Research Laboratory. Jan 1956. 11p graphs, tables. Order from OTS. 50 cents. PB 111901

Strips of metal foil (window), dispersed by balloon and aircraft, have been tracked by radar to measure wind velocities at altitudes up to 74,000 feet. These wind velocities have been compared with those measured over the same altitude range by GMD-1A equipment and radar-target tracking. The results indicate promise for obtaining high-altitude winds by this new technique. Further experiments envisioned for the altitude range from 100,000 to 200,000 feet will necessitate the use of rockets to carry and eject the window. NRL R 4682.

Meteors and radio propagation. Part A: Meteor ionization trails; their formation and radio-echoing properties, by Von R. Eshleman. Stanford University. Radio Propagation Laboratory, Stanford, Calif. Feb 1955. 71p graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 119460

In this, the first of a series of three reports on the subject of meteors and radio propagation, a summary account is given of the characteristics of radio reflections from meteor ionization trails. Also treated are the astronomical and physical characteristics of meteors which control the number, length, electron density, and orientation of their ionized trails which are formed in the upper atmosphere. Technical report no. 44 under Contract no. N6 onr-25132, NR 373-362. SU RPL TR 44.

Proceedings of the Conference on Atmospheric Electricity held at Wentworth-by-the-Sea, Portsmouth, N. H., May 19-21, 1954. Edited by Robert E. Holzer and Waldo E. Smith. Nov 1955. 255p photos, drawings, diagrs, graphs, tables. Order from OTS. Limited supply available at $4. PB 121004

Contents: Present status of atmospheric electricity, by W. F. G. Swann. - Synoptical researches on atmospheric electricity, by H. Israël. - Study of the variation of potential gradient with altitude and

correlated meteorological conditions, by L. Koenigsfeld. - Aircraft investigation of the large-ion content and conductivity of the atmosphere, by Rita Callahan Sagalyn and Gerard A. Faucher. - Conductivity measurements in the stratosphere, by C. G. Stergis, S. C. Coroniti, A. Nazarek, D. E. Kotas, D. W. Seymour, and J. V. Werme. - On the variation of electrical conductivity of air with elevation, by Gerhard F. Schilling. - Atmospheric electricity associated with jet streams, by Vincent J. Schaefer. - Diurnal variations in atmospheric radioactivity, by E. S. Cotton. - Survey of air-earth current observations, by A. R. Hogg. - Measurement of the air-earth current density, by H. W. Kasemir. - Program of simultaneous measurement of air-earth current density, by R. E. Holzer. - Atmospheric electrical measurements in the Pacific ocean, by S. Ruttenberg and R. E. Holzer. - Some results of atmospheric electricity measurements on the Greenland icecap, by P. Pluvinage. - Photo-electric counter and its application for measuring diffusion coefficients, by P. J. Nolan. - Effects of wind and space charge on corona point discharge, particularly from aircraft, by Seville Chapman. - Report on some observations on atmospheric electricity, by Josef Fuchs. - Effects of radioactive debris from nuclear explosions on the electrical conductivity of the lower atmosphere, by D. Lee Harris. - Theories of thunderstorm electrification--some general considerations, by T. W. Wormell. - Thunderstorm charge structure and suggested electrification mechanisms, by S. E. Reynolds. - Possible mechanism for the formation of thunderstorm electricity, by Bernard Vonnegut. - Some remarks concerning the effectiveness of the lightning rod and the distribution of lightning currents in the earth, by J. Bricard. - Analysis of electric field after lightning discharges, by Yuichi Tamura. - Magnetic-field variations in the vicinity of lightning, by Harald Norinder. - Experimental study of electrification of snow, by Harald Norinder and Reinhards Siksna. - Point discharge, by J. Alan Chalmers. - Electric charge of raindrops, by L. G. Smith. - Systematic electrification of precipitation by ionic diffusion, by Ross Gunn. AF CRC TR 55-222. AF GRD RP 42.

Properties of vertical motion, January 1-10, 1953, by H. A. Panofsky, Albert Miller, Robert Curtis, Raymond Deland, and David L. Jones. Pennsylvania State University. Mineral Industries Experiment Station. Dept. of Meteorology. 1955. 54p maps, tables. Order from LC. Mi $3.60, ph $9.30. PB 119206

This report first summarizes the various methods available for the computation of vertical motion, and then describes the actual determination of vertical motion for the period of January 1 - 10, 1953. In comparing the results of the different computations, some considerable nonadiabatic heating is found for air moving southward; also a method is suggested for determining the effect of friction on vertical motion. Finally, the probability of rain, overcast and clear is evaluated as function of dew point depression and vertical motion. Scientific report no. 1 under Contract no. AF 19(604)-1025. AF CRC TN 55-850.

Some features of the rainfall at Guam, by Charles L. Jordan. Chicago. University. Dept. of Meteorology. Feb 1955. 18p maps, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 119687

1. Rain and rainfall - Guam 2. Climatology - Research 3. Contract N6 ori-02036.

Stability of a simple baroclinic flow with horizontal shear, by Leon S. Pocinki. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate, Cambridge, Mass. Jul 1955. 94p graphs. Order from OTS. $2.50. PB 121013

The stability of disturbances superimposed on a zonal baroclinic flow with horizontal shear is investigated by means of an examination of the equations for equivalent baroclinic flow. The result indicates that the principal mechanism for the development of large-scale disturbances in the atmosphere is the conversion of potential energy into kinetic energy. Observational data indicate that relatively small values of the kinetic energy of north-south motions are associated with values of the vertical wind shear below 2×10^{-3} sec^{-1}. For a synoptic example, the wavelength of maximum instability predicted for baroclinic flow with no horizontal shear shows satisfactory agreement with the wavelength of an observed disturbance. Condensation of a thesis submitted to Massachusetts Institute of Techology, Dept. of Meteorology. AF CRC TR 55-212. AF GRD P 38.

Study of ionospheric winds. Scientific report no. 3 under Contract AF 19(122)-476: Observations of ionospheric drifts and related phenomena with spaced radio receivers, by Donald G. Yerg. Puerto Rico. University. College of Agriculture and Mechanic Arts, Mayaguez, P. R. Aug 1955. 77p diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 119550

Radio fading records have been obtained at spaced receivers since January 1954. The six-point correlation method has been applied to 86 records corresponding to 2.33 Mcs and to 68 records corresponding to 4.57 Mcs. The method of similar fades has been applied to 448 records for 2.33 Mcs and to 271 for 4.57 Mcs. A general expression for drift velocity is derived and related to correlation analysis.

K teorii zvezdnoi peremennosti, II (O sdvige fazy mezhdu kolebaniiami bleska i kolebaniiami luchevoi skorosti u tsefeid i u dolgoperiodicheskikh peremennykh) (Theory of stellar variability, II

(On the phase displacement between the variations of brightness and of radial velocity among Cepheids and long-period variables), by S. A. Zhevakin. Translated by Michael M. Dane and David Kraus. Sep 1955. 30p diagr. Order from LC. Mi $2.70, ph $4.80. PB 119368

The failure of current attempts to explain the phase displacement between the variations of radial velocity and brightness of variable stars is demonstrated herein. A multilayered discrete model of a pulsating nonadiabatic stellar envelope is constructed. On the basis of this model, a theory of nonadiabatic pulsations of the envelope is developed. This theory is of interest in the study of autopulsations of the 'Great Sequence' variable stars, autopulsations that are maintained by the negative dissipation in the zone of the critical ionization of He II. This theory is also of interest in the investigation of the conditions that give rise to the phase displacement between the variations of radial velocity and brightness (characteristic of Cepheids and long-period variables). Translated from Astronomicheskii zhurnal, vol. 31, p. 141-153, 1954, by the American Meteorological Society under Contract AF 19(604)-1364. Part I issued in Astr. zhurn. 30: 161, 1953.

Verbreitung der höhenträge in der 500 mb-fläche und ihr einfluss auf das klima der gemässigten breiten (Distribution of upper troughs in the 500-mb surface and their influence upon the climate of the temperate latitudes), by W. von Dammann. Translated by Edith Kulstein and James Gough, Jr. May 1955. 15p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 119579

The American synoptic weather maps contain daily 500 mb charts, thus making a frequency count of the upper troughs possible for the entire Northern Hemisphere. The results of this count are represented graphically and are discussed with a view to the climatic effect of upper troughs. Translated from Germany. Deutscher Wetterdienst in der U. S. Zone. Berichte, vol. 42, p. 195-199, 1952, under Contract AF 19(604)-1364 with American Meteorological Society.

MINERALS AND MINERAL PRODUCTS

Behavior of brittle-state materials, by O. K. Salmassy, W. H. Duckworth, and A. D. Schwope. Battelle Memorial Institute, Columbus, Ohio. Jun 1955. 153p photos, drawings, diagrs, graphs, tables. Order from OTS. $4. PB 111987

The factors influencing the fracture of brittle ceramic materials were studied; the effects of size and stress state were given primary consideration. In addition, initial consideration was given to the effects of strain rate and temperature. The effects of combined stresses on the fracture strength were studied by means of tests conducted on cylinders of plaster subjected to internal pressure and axial loading. The effect of superposed bending stresses on tension-test data was analyzed using Weibull's theory. Analysis of the standard compression test indicated that fracture data from this type of test were unreliable and that the standard compression test could not be used in a research program where precise quantitative fracture data were required. Exploratory studies were made of the effect of varying the strain rate or the stress rate on the fracture of plaster of Paris. The relation between the effects of rate of loading and stress duration (static fatigue) was considered. Project no. 7350. Third annual report, covering the period 21 Feb 1952 to 21 Feb 1953. For 1st-2d reports see PB 108095 and PB 111416. AF WADC TR 53-50, Part I. Contract AF 33(038)-8682.

Development of capacitor, variable, hermetically sealed, three sections. Final report under Contract no. DA 36-039-sc-15356. Sprague Electric Co., North Adams, Mass. Jun 1955. 139p photos, drawings (1 fold), diagrs, graphs, tables. Order from OTS. $3.50. PB 111961

This final report describes and reviews in detail the activities conducted in an attempt to produce a hermetically sealed, oil filled, three-gang tuning capacitor suitable for operation at high altitudes over the temperature range of -70°C to 200°C which would be unaffected by humidity and vibration. As a result of the first thorough mathematical study, a revised approach was set forth and experimental capacitor elements produced. In the course of this phase of the work, considerable effort was spent obtaining a matched dielectric enamel-ceramic base combination. Further extensive electrical measurements were made on dielectric oils of potential interest as fillants.

Effect of temperature and additives on the creep properties and recrystallization of aluminum oxide, by Harold P. Cahoon and Carl J. Christensen. Utah. University. Institute for the Study of Rate Processes, Salt Lake City, Utah. Jan 1955. 115p photos, drawing, diagrs, graphs, tables. Order from OTS. $3. PB 121000

Creep rates of recrystallized alumina, alumina with 0.285% magnesium addition, and of cuprite as a function of temperature at constant load have been measured. Shrinkage, porosity, and crystal development as observed in thin sections have been employed in a study of the sintering and recrystallization of alumina. Various sources of alumina, method of preparation, controlled amount of impurities, and temperature were the variables investigated. It has been observed that impurities may either increase or decrease both crystal size and rate of recrystallization. 29 additives to alumina have been studied in concentrations up to approximately 5%. UU ISRP TR 42.

Metall-keramickrohren, Teil I: technologie (Technology of metal-ceramic tubes). Translated by F. Rizzo. U. S. Bureau of Ships. Apr 1951. 65f. Order from LC. Mi $3.90, enl pr $12.30. PB 119725

The production of ceramic raw material, the coating with metal, and soldering to a metal base in the manufacture of a metallized ceramic anode is described. NAVSHIPS T 410.

Research investigations of magnetic material, permanent ceramic type. Second quarterly progress report for the period Nov 1, 1954-Jan 31, 1955 under Contract no. DA-36-039-sc-56759, by Frank G. Brockman, Paul W. Beck, and Walter G. Steneck, Jr. Philips Laboratories, Irvington-on-Hudson, N. Y. Feb 1955. 22p diagr, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119610

Samples of anisotropic material with energy products of 3 x 10^6 gauss-oersteds and over were supplied to the Signal Corps. Studies of the chemical reaction involved were continued using (a) magnetic analysis and (b) differential thermal analysis. Case no. 12-102. Dept. of the Army project no. 3-93-00-500. Signal Corps project no. 2005A. For reports on previous contract (DA 36-039-sc-42503) see PB 113551-113554.

PHOTOGRAPHIC AND OPTICAL GOODS

Adjustment and triangulation of fixed camera observations, by Duane Brown. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Oct 1955. 53p diagrs. Order from LC. Mi $3.60, ph $9.30. PB 119494

The triangulation of rays determined by fixed cameras of known orientation is studied, and several procedures for the least squares adjustment of the original plate coordinate observations are derived. A general theory for the transformation of the orientation of a photogrammetric camera to different rectangular coordinate systems is developed, and practical applications are outlined. Additional topics include error propagation, statistical tests of significance, approximation solutions, geodetic transformations, and the application of refraction corrections. The major results are illustrated by a comprehensive numerical example. Dept. of the Army project no. 5B030007. Ordnance research and development project no. TB 3-0838. APG BRL R 960.

Ion exchange process for rejuvenation of photographic solutions. Polytechnic Institute of Brooklyn, Brooklyn, N. Y. Contract no. W-36-039-sc-38269. Dept. of the Army project 3-99-04-052. Signal Corps project 39-195B. Order separate parts described below from LC, giving PB number of each part ordered.

Report no. 1 for the period Jun 7-Sep 5, 1949, by H. P. Gregor and N. N. Sherman. Sep 1949. 37p diagrs, graphs, table. Mi $3, ph $6.30. PB 119743

The fundamental properties of a number of anion exchange resins were characterized. Initial experiments were carried out on the rejuvenation of used fix solutions. Beds of various anion exchangers were first calibrated with fresh fix solution, then a quantity of used fix containing dissolved silver bromide was passed through the bed. Appreciable quantities of silver and bromide ions were removed by this process. This was particularly noticeable for Amberlite IRA 400, Dowex 2, and Ionac A300. It was found that appreciable quantities of reducing agents, probably aldehydes, were leeched from the resin in its fresh state. This reducing agent interfered seriously with the determination for bromide by potentiometric titration with silver. It was found that a thorough preconditioning of the resin removed this material. Several studies on the nature of the anion exchange process are in progress.

Report no. 2 for the period Sep 6-Dec 5, 1949, by H. P. Gregor, B. R. Sundheim, and R. G. Berner. Dec 1949. 18p graphs, tables. Mi $2.40, ph $3.30. PB 119745

Investigations were made on the exchange capacity of Dowex 2 toward solutions of F-5 fix containing varying amounts of silver bromide. It was found that the anion exchange capacity of Dowex 2 was 2.13 meq. per gram and that the resin is in the $(R_4N)_2\ S_2O_3$ state. Shaking tests performed on Dowex 2 show that the silver and bromide uptake of the resin increases with increasing silver bromide concentration in the fix and that bromide is taken up more strongly than silver. A rapid film test for silver bromide in fix is described.

Report no. 3 for the period Dec 6, 1949-Mar 5, 1950, by H. P. Gregor, B. R. Sundheim and R. G. Berner. Mar 1950. 25p graphs, tables. Mi $2.70, ph $4.80. PB 119746

Investigations were made on the exchange capacity of IRA-400 and Ionac A-300 and compared with that of Dowex 2. The anion exchange capacity of these resins was determined towards thiosulfate. No difference was found in the uptake of silver and bromide by Ionac A-300 when using F-1 or F-5 fix. Fix does not change in its properties, as shown by the "time to clear test", after being in contact with either Ionac A-300 or Dowex 2 for a period of at least five weeks. Amberlite IRA-400 did, however, appear to effect the fix. Work was started on fix rejuvenation in a continuous, flowing system. Regeneration tests of

exhausted resin by sodium nitrate were initiated. An attempt was made to regenerate used D-72 developer by passing through a column of Dowex 2. Preliminary results on the external properties of anion exchange resins show the importance of steric and polarization effects.

Report no. 4 for the period Mar 6-Jun 5, 1950, by H. P. Gregor, B. R. Sundheim and R. G. Berner. Jun 1950. 132p graphs, tables. Mi $6.90, ph $21.30. PB 119747

The capacities of three commercially available ion exchange resins toward silver and bromide were determined and it was found that Ionac A-300 had the greatest capacity toward silver while all three had the same capacity to bromide. Appendix A: Present status of ion exchange chemistry.

Report no. 5 for the period Jun 6-Sep 5, 1950, by H. P. Gregor, B. R. Sundheim and R. G. Berner. Sep 1950. 30p graphs, tables. Mi $2.70, ph $4.80. PB 119748

Further experiments were carried out on developer rejuvenation with Dowex 2. While some uptake is observed, this resin appears to be unsuitable. Work was completed on the exchange capacity of Dowex 2 and Ionac A-300 towards F-5 fix containing varying amounts of silver bromide. It was shown that Ionac A-300 is superior in some respects.

Final report no. 6 for the period Sep 6, 1950-Mar 31, 1951, by H. P. Gregor. Mar 1951. 145p photos, graphs, tables. Mi $7.20, ph $22.80. PB 119744

A process was developed for the rejuvenation of photographic fixing solutions. This process consisted in conditioning a bed of anion exchange resin with a solution of fresh fix, followed by passing a depleted fix solution through this bed. Substantially all of the silver and bromide was removed from the depleted fix, rejuvenating it completely. Experimental data was presented on the various variables in the process. Attempts were made to rejuvenate photographic developer solutions by conditioning an anion exchange bed with fresh developer containing no bromide, then passing depleted developer through the bed. Some bromide uptake was effected. A study was carried out on the properties of weak base and strong base anion exchange resins. Some of the general principles concerning the mechanism of anion exchange processes were elucidated. Attempts were made to prepare high capacity anion exchange resins. Appendix A: Strong base anion exchange resins and processes. - Appendix B: Weak base anion exchange resins and processes.

Laboratory experimental continuous-strip camera, by Floyd Redding. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Weapons Component Division. Photographic Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jan 1951. 12p photos. Order from LC. Mi $2.40, ph $3.30. PB 119594

An experimental strip camera was built by the Photographic Laboratory to determine the future design of focal plate, driver rollers, film transport, and slit assembly of continuous-strip cameras. It is concluded that a flat flocal plate, a belt-driven film transport, and small drive rollers are practical and desirable and should be used to minimize weight and size of continuous-strip cameras. AF TR 6314.

Stabilization of cameras to eliminate loss of resolution by airplane movement and vibration. Summary and theory of essential requirements, by Bruno K. Wernicke. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Photographic Reconnaissance Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Apr 1951. 43f diagr, graphs (part fold). Order from LC. Mi $3.30, enl pr $9.30. PB 119727

A new aerial camera mounting system is proposed which will eliminate, to the maximum extent, the detrimental effect of aircraft acceleration. The essence of the new system is to steady a camera in an airplane within the limits which are required to fully exploit the optical qualities of the camera and of the sensitized film material, for any focal length chosen according to tactical viewpoints, and for extremely long exposure times up to 1/4 second or to 1 second. The system provides the basis for a proper compensation of the image motion caused by the forward motion of the airplane, thus maintaining the full steadiness of the image relative to the film. This quality of steadiness also is guaranteed under military conditions which limit certain suppositions. AF TR 6316.

PHYSICS

General

Analysis and tabulation of the M-position experiment integral and related error function integrals, by R. H. Urbano. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Computer Laboratory, Cambridge, Mass. Apr 1955. 31p tables. Order from LC. Mi $3, ph $6.30. PB 119430

1. Equations, Integral 2. Tables, Mathematical 3. Radio - Signals - Detection 4. AF CRC TR 55-100.

Analysis of turbulent heat transfer, mass transfer and friction in smooth tubes at high Prandtl and Schmidt numbers, by Robert G. Deissler. U. S. National Advisory Committee for Aeronautics. 1955. 16p graphs. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 20 cents. PB 119589

The expression for eddy diffusivity from a previous analysis was modified in order to account for the effect of kinematic viscosity in reducing the turbulence in the region close to a wall. By using the modified expression, good agreement was obtained between predicted and experimental results for heat and mass transfer at Prandtl and Schmidt numbers between 0.5 and 3000. The effects of length-to-diameter ratio and of variable viscosity were also investigated for a wide range of Prandtl numbers. Supersedes NACA TN 3145 (PB114209). NACA 1210.

Elementary review of the Mathieu-Hill equation of real variable based on numerical solutions, by S. J. Zaroodny. U. S. Aberdeen Proving Ground, Ballistic Research Laboratories, Aberdeen, Md. Apr 1955. 30p graphs (1 fold). Order from LC, Mi $2.70, ph $4.80. PB 119425

Dept. of the Army project no. 503-03-001. Ordnance research and development project no. TB3-0108.
1. Mathematical equations and solutions 2. Mathieu-Hill equation (Variables) 3. APG BRL M 878.

Generalization of analysis of variance and multivariate analysis to data based on frequencies in qualitative categories of class intervals, by S. N. Roy and Marvin A. Kastenbaum. North Carolina State College. Institute of Statistics, Raleigh, N.C. Jun 1955. 28p. Order from LC. Mi $2.70, ph $4.80. PB 119236

Mimeograph series no. 131.
1. Variance - Analysis 2. Statistical analysis 3. Contract AF 18(600)-83 4. OSR TN 55-167.

Introduction to the study of chemical reactions in flow systems, by S. S. Penner. California Institute of Technology. Daniel and Florence Guggenheim Jet Propulsion Center, Pasadena, Calif. 1955. 94p diagrs, graphs, tables. Order from the Interscience Publishers, Inc., 250 Fifth Avenue, New York 1, N. Y. $3. PB 119166

The present discussion is intended as an introduction to the study of chemical reactions in moving ideal gas mixtures. It aims, (1) to present an adequate summary of the principles of classical chemical kinetics, which is intelligible to investigators without previous training in chemical kinetics; (2) to provide the necessary basic material for intelligent formulation of flow problems with chemical reactions.

Matrix treatment of the general problem of least squares considering correlated observations, by Duane Brown. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. May 1955. 24p. Order from LC. Mi $2.70, ph $4.80. PB 119279

The most general type problem considered in least squares is formulated and solved with the aid of matrix algebra for the case in which the observations have the general multivariate normal distribution. The criterion for adjustment is the principle of maximum likelihood. Such related topics as the inversion of the normal equations, variance-covariance propagation, direct adjustment of functions of observations, statistical tests of significance, and the geometrical interpretation of the adjustment are considered. It is pointed out that the results of the conventional method of least squares are special cases of the present theory. Dept. of the Army project no. 5B0306011. Ordnance research and development project no. TB3-0538. APG BRL R 937.

Method and tables for determining the time response to a unit impulse from frequency-response data and for determining the Fourier transform of a function of time, by Carl R. Huss and James J. Donegan. U. S. National Advisory Committee for Aeronautics. Jan 1956. 38p graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119372

Methods are presented for rapidly determining the time response to a unit impulse from frequency-response data and for obtaining the Fourier transform of a function of time. Tables are presented which facilitate the necessary computations of the methods. Appendix: Numerical evaluation of Duhamel integral. NACA TN 3598.

Partially hierarchal models in the analysis of variance, by H. Leon Harter and Mary D. Lum. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeronautical Research Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Mar 1955. 139p. Order from OTS. $3.50. PB 111878

Pure hierarchal and partially hierarchal models are discussed in addition to non-hierarchal (factorial) models. Rules for determining expected mean squares and error terms are given. Degrees of freedom, sums of squares, expected values of mean squares, test ratios, and alternate tests are tabulated in the Appendix for all two-factor, three-factor, and four-factor models with complete replication, equal subclass numbers, and all nesting factors random. Sections on Kempthorne's rule, confidence intervals for variance components, and individual comparisons are included. Project no. 7060. Second of a series of

reports on analysis of variance. First report is WADC TR 53-23 (PB 112386). AF WADC TR 55-33.

Population estimation based on change of composition caused by a selective removal, by Douglas G. Chapman. Washington. University. Dept. of Mathematics. Laboratory of Statistical Research, Seattle, Wash. Jan 1955. 25p tables. Order from LC. Mi $2.70, ph $4.80. PB 119235

Technical report no. 19 under Contract N8 onr-520, Task Order II, Project no. NR 042-038.
1. Population - Estimates 2. Population - Statistics 3. Mathematical equations and solutions.

Solution of a class of integral equations reducible to ordinary differential equations, by Gordon Latta. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Jan 1955. 30p. Order from LC. Mi $2.70, ph $4.80. PB 119223

Technical report no. 32 under Contract Nonr-225(11), NR 041-086.
1. Equations, Integral 2. Equations, Differential 3. Boundary layer - Mathematical analysis 4. SU AMSL TR 32.

Souriau-Frame characteristic equation algorithm on a digital computer, by George E. Forsythe and Louise W. Straus. California. University, Los Angeles, Calif. Dec 1954. 11p tables. Order from LC. Mi $2.40, ph $3.30. PB 119239

ONR project NR 044-144. Ordnance research project TB 2-0001(1210).
1. Algorithms 2. Tables, Mathematical 3. Mathematical equations and solutions.

Stability of invariant manifolds, part I, by John McCarthy. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Feb 1955. 26p diagrs. Order from LC. Mi $2.70, ph $4.80. PB 119461

The main object of this paper is to prove a stability theorem for invariant manifolds. Section 2 discusses the existence of invariant manifolds and gives counterexamples to some optimistic conjectures. Section 3 contains the stability theorem. Section 4 discusses possible relaxation of the hypotheses of the stability theorem, relates the results of this paper to those found by others, and discusses some examples. Technical report no. 36 under Contract Nonr-225(11), NR 041-086. SU AMSL TR 36.

Studies in eigenvalue problems. Kansas. University. Dept. of Mathematics, Lawrence, Kans. Contract Nonr-58304. Order separate parts described below from LC, giving PB number of each part ordered.

Technical report 11: Operators in reproducing kernel spaces, by Alan K. Jennings. 1954. 98p. Mi $5.40, ph $15.30. PB 119088

1. Linear systems - Analysis 2. Hilbert space (Mathematics) 3. Transformations (Mathematics) 4. Operators (Mathematics).

Technical report 14: Conference on partial differential equations, University of Kansas, summer 1954. 1955. 149p diagrs. Mi $7.20, ph $22.80. PB 119214

Contents: Elliptic differential equations. Boundary value problems, eigenfunction expansions, and asymptotic distribution of eigenvalues, by Lars Garding. - Initial value problems for non-linear hyproblic equations, by Peter D. Lax. - Functional spaces, functional completion and differential problems, by Kennan T. Smith. - Boundary values of functions with finite Dirichlet integral, by N. Aronszajn. - On coercive integro-differential quadratic forms, by N. Aronszajn. - An isoperimetric inequality on surfaces of variable Gaussian curvature, by Alfred Huber. - Closable hermitian forms and perturbation theory, by Herbert C. Kranzer. - Spectral theory of functions on semigroups and the separation of variables, by Peter D. Lax. - New bounds in harmonic and biharmonic problems, by L. E. Payne and H. F. Weinberger. - Some recent results on the exterior integration formulae for the normal hyperbolic equation, by Edwin W. Titt.

Studies in relativity theory, quantum mechanics and low temperature phenomena, by Simon A. Friedberg. Carnegie Institute of Technology, Dept. of Mathematics, Pittsburgh, Pa. Oct 1955. 6p. Order from LC. Mi $1.80, ph $1.80. PB 119539

Three investigations of properties of solids at low temperatures have received partial support from this contract. Their present status is discussed in the report which follows. The first is concerned with the determination of the thermal conductivities of metals above 1.5°K. The second involves a study of electrical and galvanomagnetic properties of germanium down to temperatures below 1°K. The last topic for investigation has been the specific heat above 15°K of several non-metallic substances in particular carbon in the form of diamond. OSR TR 55-30.

Table of binomial coefficients: Exact values, by M. Lotkin and M. E. Young. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Jan 1954. 43p tables. Order from LC. Mi $3.30, ph $7.80. PB 119424

Dept. of the Army project no. 503-06-002. Ordnance research and development project no.

TB3-0007. Rounded values were issued as Memorandum Report 652 (PB 109850).
1. Tables, Mathematical 2. Coefficients, Binomial 3. APG BRL M762.

Table of z-transform and modified z-transform of various sampled data systems configurations, by E. I. Jury and G. Farmanfarma. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Sep 1955. 8p table. Order from LC. Mi $1.80, ph $1.80. PB 119448

1. Tables, Mathematical 2. Sampling (Statistics) 3. Transformations (Mathematics) 4. UC IER Series 60, Issue no. 136a.

Technique for elastic wave measurements, by E. A. Ripperger. Stanford University. Division of Engineering Mechanics, Stanford, Calif. Jun 1952. 41f photos, diagrs. Order from LC. Mi $3.30, enl pr $9.30. PB 119529

Discusses requirements which must be imposed on a system for measuring strains having amplitudes of the order of 10^{-6} and rise times of 10^{-6} seconds or less. It is shown that, in general, wire resistance strain gages are unsatisfactory as transducing elements for measuring strains having such characteristics. Piezoelectric barium titanate ceramic in the form of thin wafers proved to be a satisfactory substitute for the wire resistance gages. These elements and their characteristic properties are discussed. A method for making dynamic calibrations of the piezoelectric elements is described. SU ME TR 12. Contract N6 onr-251, T. O. 12, NR 064-241.

Nuclear

Absorption curves of Ru^{103} and Ru^{106}, by A. W. Kenny and W. R. E. Maton. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Apr 1950. 14p drawing, graphs, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 36¢ plus mail handling. PB 119320

Unclassified 1955. S. O. code no. 91-3-2-10.
1. Atomic power - Research - Gt. Brit. 2. Ruthenium - Isotopes - Energy levels - Gt. Brit. 3. Ruthenium - Isotopes - Absorption - Gt. Brit. 4. Radiation counters - Design - Gt. Brit. 5. Aluminum - Atomic stopping power - Gt. Brit. 6. AERE C/R 513.

Approximate determination of neutron spectrum for the case of $\frac{1}{v\sigma_a}$ -absorption cross-section, by M. E. Mandl. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Aug 1950. 14p. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 45¢ plus mail handling. PB 119295

Unclassified 1955. S. O. code no. 91-3-2-19.
1. Atomic power - Research - Gt. Brit. 2. Neutrons - Absorption spectra 3. Neutrons - Cross sections 4. Neutrons - Energy 5. Neutrons - Spectra 6. AERE T/R 560.

High-energy electron scattering and the charge distributions of selected nuclei, by Beat Hahn, D. G. Ravenhall, and Robert Hofstadter. Stanford. University. Dept. of Physics, Stanford, Calif. Oct 1955. 38p graphs, tables. Order from LC. Mi $3, ph $6.30. PB 119582

Experimental results are presented of electron scattering by Ca, V, Co, In, Sb, Hf, Ta, W, Au, Bi, Th, and U, at 183 Mev and (for some of the elements) at 153 Mev. SU HEPL 68. OSR TN 55-320. Contract AF 18(600)-646.

Method of preparing a model showing surface detail of the terminal phalanx of a finger, by W. Graham-Smith, M. McCarthy, R. H. Brown, and T. Dyke. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Nov 1950. 14p drawings. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 27 cents plus mail handling. PB 119292

Unclassified 1955. S. O. code no. 91-3-2-16.
1. Atomic power - Research - Gt. Brit. 2. Radiation injuries - Therapy - Gt. Brit. 3. Dermatitis - Therapy - Gt. Brit. 4. AERE MED/R 562.

Nuclear magnetic resonance saturation and rotary saturation in solids, by Alfred G. Redfield. Harvard University. Cruft Laboratory. Feb 1955. 71p graphs, table. Order from LC. Mi $4.50, ph $12.30. PB 119463

This paper reports an experimental and theoretical study of nuclear magnetic resonance in solids at high rf magnetic field intensity. Metallic copper and aluminum were experimentally investigated, and the original objective of this work was to obtain nuclear spin-lattice relaxation times in these metals for comparison with the observed Knight shifts and the theory of Korringa, which relates the relaxation times and Knight shifts to the electronic structure of the metals. The spin lattice relaxation times were measured by the method of saturation. The validity of these theories as applied to solids was reexamined, and a theory was developed along somewhat different lines which appears to agree with experiment for rf magnetic field intensities well above the saturation level. Technical report no. 206 under Contract no. N5 ori-76, Task Order no. 1, NR 372-012. HU CL TR 206.

Preliminary investigations of scintillation counter techniques for the measurement of radioactivity from the human body, by F. Wade. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Jun 1955. 17p drawings, graphs. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 45¢ plus mail handling. PB 119334

S. O. code no. 91-3-2-7.
1. Atomic power - Research - Gt. Brit. 2. Radiation counters - Uses - Gt. Brit. 3. Body, Human - Radioactivity - Measurement - Gt. Brit. 4. AERE EL/M 92.

Progress report, 35th, for the period Sep 1-Nov 30, 1954. Massachusetts Institute of Technology. Laboratory for Nuclear Science. Nov 1954. 69p graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 119616

1. Atomic power - Research 2. Nuclear chemistry - Research 3. Cosmic radiation 4. Particles - Scattering 5. Cyclotrons 6. Synchrotrons 7. Contract N5 ori-07806, Report no. 35.

Pseudorandom numbers and collision parameters for Monte Carlo shielding calculations, by R. B. Theus and L. A. Beach. U. S. Naval Research Laboratory. Feb 1956. 9p graphs, table. Order from OTS. 50 cents. PB 111951

Since the Monte Carlo method involves random sampling under probability distribution functions which describe the phenomenon being studied, a modified "midsquare" method of generating pseudorandom numbers for Monte Carlo calculations has been developed. The numbers have been generated and analyzed for uniformity of population by the NAREC. Distribution functions used in radiation shielding problems were obtained from these numbers and they compare favorably with the theoretical expectations. NRL R 4695.

Quarterly progress report no. 15 under Contract no. N5ori-07856. Massachusetts Institute of Technology. Solid-State and Molecular Theory Group. Jan 1955. 46p. Order from LC. Mi $3.30, ph $7.80. PB 119551

For reports no. 7-14, 15 (i.e. 16) see PB 108689, 109399, 110729, 114383, 115851, 116915, 117476, 118133, 117612. Contents: Extension of the valence-bond method, by J. C. Slater. - Notes for configuration interaction, by R. K. Nesbet. - Asymmetric Hartree-Fock solutions, by R. K. Nesbet. - Interpolation scheme for energy bands in solids, by L. C. Allen. - Developments of the augmented plane wave method, by M. M. Saffren. - Energy bands in graphite, by F. J. Corbato. - Impurity states arising from degenerate bands in the transition elements, by G. F. Koster and L. P. Howland. - Mechanization of molecular calculations, by A. Meckler. - Polarization effects in the fluorine ion, by L. C. Allen. - Nuclear electric quadrupole interaction in the Kcl molecule, by L. C. Allen.

Separation and mounting of some fission elements by electro deposition, by D. Lee and G. B. Cook. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Apr 1950. 22p drawings, diagr, tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 59¢ plus mail handling. PB 119333

Unclassified 1955. S. O. code no. 91-3-2-28.
1. Atomic power - Research - Gt. Brit. 2. Uranium - Fission products - Gt. Brit. 3. Uranium - Isotopes - Separation - Gt. Brit. 4. Fission products - Determination - Gt. Brit. 5. Fission products - Mounting - Gt. Brit. 6. Fission products - Separation - Gt. Brit. 7. Separation processes - Electrolytic - Gt. Brit. 8. AERE C/R 430.

Theory and practice of shielding, by C. C. Horton. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Nov 1954. 19p tables. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 45¢ plus mail handling. PB 119329

Unclassified 1955. S. O. code no. 91-3-2-24.
1. Atomic power - Research - Gt. Brit. 2. Radiation - Shielding - Gt. Brit. 3. Radiation - Shielding - Theory - Gt. Brit. 4. AERE RS/L 3.

PHYSIOLOGY

Arm strength at selected degrees of elbow flexion, by Paul A. Hunsicker. Michigan. University, Ann Arbor, Mich. Aug 1955. 66p photos, diagrs, graphs, tables. Order from OTS. $1.75. PB 111947

A selected summary of the strength testing literature forms the first part of this study. This is followed by a listing of the modifications that had to be made on the kinematic muscle study machine as a result of exploratory testing. The major portion of the investigation is concerned with the results of testing 55 young men on 60 arm strength tests in the sitting position and 60 in the prone position. Percentile tables and figures depicting arm strength in relation to degrees of elbow flexion are included. Recommendations for further use of the kinematic muscle study machine are offered. Project no. 7214. Appendix A: Description of kinematic muscle study apparatus. AF WADC TR 54-548. Contract AF 18(600)-43.

Digestive physiology of marine animals in relation to coral reef destruction. Annual progress report for the period Jul 1-Dec 31, 1954 under Con-

tract no. Nonr-1501(00), NR 165-264, by P. B. van Weel. Hawaii. University, Honolulu, Hawaii. Jan 1955. 7p. Order from LC. Mi $1.80, ph $1.80. PB 119230

1. Holothuria atra 2. Marine biology 3. Coral - Ecology 4. Contract Nonr-1501(00), NR 165-264.

Proposed continuation of research project entitled "Physiology of deep-sea animals," by William H. Sutcliffe, Jr. and Talbot H. Waterman. Bermuda Biological Station, St. George's West, Bermuda. n.d. 9p. Order from LC. Mi $1.80, ph $1.80. PB 119149

1. Biological research - Bermuda 2. Animals, Aquatic - Physiology - Bermuda 3. Orientation - Animals, Aquatic - Bermuda 4. Physiology, Underwater - Bermuda 5. Contract Nonr-1135(02), NR 163-231.

Research on the histological age changes on osteoclasts in the mandibular condyle in the guinea pig. Final progress report for the period 1 Mar 1953-Jul 31, 1954 under Contract no. Nonr-1108-(00), NR 180-031, by Hugh I. Meyers, Wayne L. Reeve, and Viola D. Flanagan. Kansas. University. School of Dentistry. Dec 1954. 17p photos, graphs, tables. Order from LC. Mi $2.70, ph $3.30. PB 119238

1. Bones - Development 2. Guinea pigs - Anatomy.

Studies of hyperventilation, by James P. Lillehei and Bruno Balke. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jul 1955. 7p graphs, tables. Order from LC. Mi $1.80, ph $1.80. PB 119480

Studies were made of the effect of hyperventilation on psychomotor performance and of the quantitative relationship of CO_2 depletion to hyperventilation tetany in normal young men. Hyperventilation in a full-body respirator resulted in severe tetany when the reservoir of CO_2 in the body was reduced an average of approximately 3.5 liters per square meter of body surface area. The size of this reservoir was apparently not affected by the ventilation rate or the total time of hyperventilation within the ranges tested. AF SAM R 55-62.

PSYCHOLOGY

Method for analysis of gross behavior, by Jackson B. Reid, Sylvan J. Kaplan, and William H. Melching. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jun 1955. 19p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 119487

A method of collecting data is described. This method presents results in a form suitable for analysis and quantitative comparison when error scores are lacking or are insufficient for meaningful interpretation of results. Future refinements and modifications should permit utilization of the technique in a wide variety of behavior studies. The examples demonstrating its use were selected from an investigation that involved observations of infrahuman primates undergoing exposure to ionizing radiation under conditions that precluded the scoring of successes and errors in accomplishment of any discrete task. Its use is by no means restricted to such investigation. AF SAM Proj. no. 21-3501-0003, Report no. 10.

Peer ratings as an immediate criterion of sonarman performance. II: Relationships between peer ratings and shipboard rating measures. U. S. Bureau of Naval Personnel. Naval Personnel Research Field Activity, San Diego, Calif. Sep 1955. 29p tables. Order from LC. Mi $2.70, ph $4.80. PB 119598

The purpose of this study was to evaluate the use of peer ratings obtained at the Fleet Sonar School, Dan Diego, as an immediate criterion of sonarman performance by relating them to shipboard performance as measured by the shipboard rating scale for sonarmen. Task assignment SC1056.9.4. NAVPERS TB 55-12. NAVPERS 18450.

Psychiatric screening of flying personnel. Personality structure in objective tests--study of 1,000 air force students in basic pilot training, by Raymond B. Cattell. Illinois. University. Dept. of Psychology. Laboratory of Personality Assessment and Group Behavior, Urbana, Ill. Jun 1955. 51p tables. Order from LC. Mi $3.60, ph $9.30. PB 119484

This battery of 50 group and 11 individual tests, yielding 124 separate scores, was administered to 1,012 aviation cadets and student officers on entering pilot training at Greenville Air Force Base, Miss., between April 1951 and July 1952. The composition and rationales of the tests and the results of two independently computed and rotated factor analyses, one on 500 cases and the second on 250 cases, are presented. Sixteen personality factors, matched in the two factorizations, were extracted and provisionally interpreted. AF SAM Proj. no. 21-0202-0007, Report no. 9.

Transfer of training between quickened and unquickened tracking systems, by J. G. Holland and J. B. Henson. U. S. Naval Research Laboratory. Feb 1956. 9p diagr, graph, table. Order from OTS. 50 cents. PB 111970

This study was designed to determine the direction and extent of transfer of training for subjects switched to a quickened tracking system after

having been trained with an unquickened system and for subjects switched to an unquickened tracking system after having been trained with a quickened system. Subjects received different amounts of practice on either the quickened or unquickened system and were then tested on the system with which they had had no practice. Transfer of training was evaluated by comparing the performance during this test session with the first training session of those subjects which originally were trained on the system in question. NRL R 4703.

RUBBER AND RUBBER PRODUCTS

Elastomeric dithiopolyesters, by F. W. Knobloch. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jun 1955. 25p graph, tables. Order from OTS. 75 cents. PB 111949

Elastomers have been prepared from an experimental liquid polymer formulation derived from a condensation product of mercaptoacetic acid and triethylene glycol. Two general types of these elastomers are discussed; one was obtained by reaction of the liquid polymer with organic and inorganic peroxides, the other by reaction of terminal mercapto groups with unsaturated aldehydes. Selected specimens of each type of elastomer were successfully compounded and vulcanized using conventional rubber processing equipment. The behaviour of these vulcanizates in fuels and synthetic ester base oils has been studied along with the effects of aging at elevated temperatures. Project no. 7340. Covers work conducted from 25 Aug-20 Oct 1954. AF WADC TR 55-117.

Poly FBA, a fluorinated acrylic elastomer for high temperature service in the presence of aircraft fuels and lubricants, by Horace C. Hamlin. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Nov 1955. 60p photos, graphs, tables. Order from OTS. $1.50. PB 111946

A large number of fluorine containing polymeric systems have been investigated by the Minnesota Mining & Manufacturing Company under Air Force Contract No. 33(038)-515 (See PB 116221-116223). One of the most successful developments, poly 1, 1-dihydroperfluorobutyl acrylate (poly FBA) exhibits good rubbery characteristics, excellent resistance to many fuels, lubricants, solvents, chemicals, and ozone, plus very good stability at elevated temperatures. Compounding and processing studies have been made, and tests conducted in various media at temperatures up to 550°F. Project no. 7340. Covers period of work from Dec 1951 to Aug 1955. AF WADC TR 55-381.

Study and evaluation of Kel-F elastomer, by R. E. Headrick. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Oct 1955. 41p graphs, tables. Order from OTS. $1.25. PB 111984

The optimum properties of Kel-F elastomer are obtained by using benzoyl peroxide as the curing agent. Compounded Kel-F elastomer has excellent resistance to RFNA. Results of the immersion tests in silicate ester type fluids indicate Kel-F elastomer should be useful in these fluids up to 400°F. The brittle point of Kel-F elastomer is approximately -50°F. Results of tests conducted at room temperature in 70-30 type fuel were very satisfactory and because Kel-F elastomer has excellent high temperature stability its use in contact with fuels at higher temperature may be possible. Project no. 7340. Covers work from Aug 1954 to Jan 1955. AF WADC TR 55-377.

STRUCTURAL ENGINEERING

Charts relating the compressive buckling stress of longitudinally supported plates to the effective deflectional and rotational stiffness of the supports, by Roger A. Anderson and Joseph W. Semonian. U. S. National Advisory Committee for Aeronautics. 1954. 21p diagrs, graphs, tables. Order from Superintendent of Documents, Goverment Printing Office, Washington 25, D. C. 25 cents. PB 119559

The stability of a plate under edge compressive stress is analyzed in terms of the deflectional and rotational stiffnesses of one or more longitudinal lines of support between the plate side edges. The results are presented in the form of charts which make possible the determination of the compressive buckling stress of plates supported by members whose sitffness may or may not be defined by elementary beam bending and twisting theory but yet whose effective restraint is amenable to evaluation. The deflectional and rotational restraint provided by longitudinal stiffeners and full-depth webs is discussed, and numerical examples illustrate the application of the charts to the design of wing structures. Supersedes NACA TN 2987 (PB 110886). NACA 1202.

Metal curtain walls. National Research Council. Division of Engineering and Industrial Research. Building Research Institute. Dec 1955. 189p photos, drawings, diagrs, graphs, tables. Order from NAS-NRC Publications Office, 2101 Constitution Ave., Washington 25, D. C. $4. PB 119615

Papers and discussions of a conference conducted in the Chamber of Commerce of the United States,

Washington, D. C., Sep 28-29, 1955. Contents: Part I: Recent studies of metal curtain walls. Survey of architects (Reprinted from Bulletin of the American Institute of Architects, Jul/Aug 1955, p. 99-104), by Walter A. Taylor. - Brab Survey, by William H. Scheick. - Detroit Edison survey, by John O. Blair. - Part II: Architectural design, by Max Abramovitz and Robert W. McLaughlin. - Part III: Performance requirements in panel design, by Tyler S. Rogers. - Part IV: Structural design techniques. Design of metal curtain walls, by John Hancock Callender. - Metal curtain wall structural design techniques, by Robert K. Posey. - Core material and adhesives for sandwich panel construction, by Jack M. Roehm. - Introduction to parts V, VI, and VII, by Harry B. Tour. - Part V: Panel insulation and condensation control. Thermal insulation and condensation control in metal curtain walls, by Elmer R. Queer. - Part VI: Sound transmission, by Robert B. Newman. - Part VII: Erection of metal curtain walls, by Norman S. Collyer. - Part VIII: Summary and future outlook, by Frederick J. Close and D. Kenneth Sargent. NRC 378.

Review of previous work on short-time tests for predicting fatigue properties of materials, by Franz H. Vitovec and Benjamin J. Lazan. Minnesota. University, Minneapolis, Minn. Aug 1953. 65p graphs. Order from LC. Mi $3.90, ph $10.80. PB 119548

Short-time fatigue testing methods are systematically reviewed and critically discussed. The classification of the methods is based on the relationship of fatigue properties to static properties, to stress-strain characteristics under reversed stress, and to other physical properties. Other methods discussed involve assumptions regarding the shape of the S-N curve. Also tests utilizing special loading conditions are reviewed. Advantages and applicability of the different methods are discussed. AF WADC TR 53-122. Contract AF 33(038)-20840.

Thermally induced vibrations of beams, by Bruno A. Boley. Columbia University. Institute of Air Flight Structures. Feb 1955. 17p diagr, graphs. Order from LC. Mi $2.40, ph $3.30. PB 119614

Treatment is patterned after Dirac's general exploration of Lagrangians leading to algebraic relations between canonical variables. CU-5-55-ONR-266(20)-CE. Contract Nonr-266(20), Project NR 064-401, Technical report no. 5.

TEXTILES AND TEXTILE PRODUCTS

Pile fabrics for insulation, by Charles W. Long. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jun 1955. 47p diagrs, graphs, tables. Order from OTS. $1.25. PB 111985

This is a report on pile fabrics made from synthetic fibers, cotton, wool and numerous blends thereof. Each sample was tested for warmth and compression characteristics to determine the effect, if any, of varying thicknesses, blends, and constructions. It was observed that the type fiber has little effect on the warmth of a pile fabric; however, orlon, dacron and dynel consistently appear slightly better. Results show that possibly a double thickness of a relatively thin pile fabric should deserve consideration. Also included in this report are the results of a study on the mathematical relationship between the warmth of a fabric and the physical properties of the fabric. Project no. 7320. Covers work conducted from Aug 1952 to Aug 1954. AF WADC TR 54-374.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Recommendations on cockpit-visibility standards for transport-type aircraft, by Thomas M. Edwards and Wayne D. Howell. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Feb 1956. 9p graphs. Order from OTS. 50 cents. PB 121011

The standards that are discussed in this report are recommended minimums for cockpit visual angles and were derived from technical information on the subject obtained through (1) an airline-pilot-questionnaire study, (2) a pilot-eye-movement study, (3) a collision-course study, and (4) development of a binocular camera for recording cockpit visual angles. These standards, when applied to initial aircraft-cockpit design, will improve the present safety level by affording the pilots better cockpit visibility, thus reducing the mid-air collision hazard. CAA TDR 275.

Instruments

Environmental criteria for ground support equipment, by Wallace S. Newton and Constantine G. Makrides. Corvey Engineering Co., Washington, D. C. May 1954. 33p. Order from LC. Mi $3, ph $6.30. PB 119537

The environmental criteria listed herein present general design parameters for USAF ground support equipment as well as more specific parameters

for fourteen functional categories of ground support equipment from the viewpoint of climatic and environmental factors to be encountered in the Arctic and subarctic, desert, and tropic regions. These criteria are based solely on the contractor's study of this field and have not been implemented by the Air Force. Written in conjunction with WADC TR 54-132 (PB 119369). AF WADC TR 54-133. Contract AF 33(616)-2278.

Free-flight simulation of the testing of supersonic inlet diffusers in a free jet wind tunnel with 50% area ratio in the Mach number range from 1.5 to 3, by Rudolf Hermann and Cheng-Ting Hsu. Minnesota. University. Institute of Technology. Dept. of Aeronautical Engineering. Rosemount Aeronautical Laboratories. Nov 1955. 233p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $10.20, ph $26.30. PB 119466

This report describes the testing of 50% axial symmetric ramjet models in the free-jet wind tunnel in order to determine if the free-flight condition can be simulated. AF AEDC TR 55-55.

Installation, operation, and maintenance instructions for ice indicator with piezoelectric sensing, by E. T. Maciag and M. G. Kullin. Clevite-Brush Development Co., Cleveland, Ohio. Jan 1955. 16p drawings (part fold). Order from LC. Mi $2.40, ph $3.30. PB 119534

Project 60054-G.
1. Indicators, Ice 2. Contract Nonr-1494(00).

Measurement of air flow through an aircraft generator during flight. Part IV: A practical method, by J. M. Marzolf. U. S. Naval Research Laboratory. Nov 1954. 31p drawings, graphs. Order from OTS. $1. PB 111903

A method developed at NRL to measure the air flow through an aircraft generator during flight utilizes the static-pressure drop across a calibrated generator. The accuracy of this method depends upon the generator speed and load as well as the inlet air temperature and altitude. A method is given for correcting observed data for a variable generator speed, if it is required. Detailed instructions are given for the manufacture and use of the various pressure and temperature pickups needed and the important considerations that affect the calibration, installation, and flight testing of such an instrumentation system. Included in this report is a section explaining in detail a simplified technique for the utilization of the line orifice as a laboratory standard for the measurement of air flow. For parts 1-2 see PB 106715 and PB 111069. NRL R 4445.

Preliminary engineering information on type tests of TUK localizer transmitter for instrument approach system. Text. Federal Telephone and Radio Corp., Clifton, N. J. n.d. 123p photos, drawing, diagrs (part fold.), tables. Order from LC. Mi $6.30, ph $19.30. PB 119710

Instruction book no. RA-3933-1. Text no. RA-5864-1. Designed in accordance with CAA Specification CAA-199, section 2.
1. TUK (Transmitter) 2. Transmitters - Design 3. Transmitters - Tests 4. Instrument approach system - Components 5. Contract CCA-14150.

Engines and Propellers

Aircraft fire extinguishment. Part V: Preliminary report on high-rate-discharge fire-extinguishing systems for aircraft power plants, by Harvey L. Hansberry. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Feb 1956. 10p diagrs, graphs, tables. Order from OTS. 50 cents. PB 121010

In this report provisional formulas based on data obtained during fire tests of XR60-1 and XB-45 aircraft power plants are derived for the design of adequate high-rate-discharge fire-extinguishing systems in potential fire zones. These formulas apply to zones through which there is high airflow and in which the internal surfaces are smooth, and to zones through which there is very little or no airflow and the internal surfaces are rough to any degree. Tests have shown that zones of high airflow with uneven internal surfaces require quantities of extinguishing agent far in excess of quantities required for zones of equally high airflow but with smooth internal surfaces, the difference being as much as 200 per cent. Because of insufficient data on the effects of various degrees of surface unevenness on extinguishing-agent requirements, the important "turbulence factor" is not established in this report. For parts 1-2 and 4 see PB 99660-99661, 118914. CAA TDR 260.

Analog study of interacting and noninteracting multiple-loop control systems for turbojet engines, by George J. Pack and W. E. Phillips, Jr. U. S. National Advisory Committee for Aeronautics. 1955. 15p photos, diagrs, graphs. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 20 cents. PB 119587

Supersedes NACA TN 3112 (PB 113536).
1. Jet engines, Turbo-jet - Controls 2. Jet engines, Turbojet - Stability 3. Jet engines, Turbojet - Fuel systems 4. Fuel servicing equipment - Controls 5. Analogs, Electric 6. NACA TN 3112, Revised 7. NACA 1212.

Investigation of the bending stiffness of thin-walled pretwisted beams with application to propeller blades, by Leonard Maunder. Massachusetts Institute of Technology. Feb 1953. 24p diagrs,

graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119599

The influence of pre-twist on bending stiffness of pre-twisted beams has been shown to be small for constructions normally encountered in propeller design. Significant deviations from the results of conventional beam theory occur, however, in open thin-walled sections at larger values of pre-twist, and deformations of cross-sections contributing to this deviation are discussed and have been measured. Conventional beam theory applied to pre-twisted members is worked out in useful analytical form and an initial analysis is given taking account of the deformations of cross-sections. AF WADC TR 53-59. Contract AF 33(616)-5.

Numerical index of technical publications: Aircraft engine and associated equipment publications. U. S. Air Force. Dec 1955. 56p. Order from LC. Mi $3.60, ph $9.30. PB 119693

Basic issue of 19 Dec 1955. Supersedes edition of 19 Sep 1955 and supplements dated 20 Oct 1955 and 17 Nov 1955.
1. Airplanes - Technical orders - Indexes 2. Technical orders - Indexes 3. Engines, Aircraft - Technical orders - Indexes 4. AF TO 0-1-2.

Wind-tunnel investigation of the effects of thrust-axis inclination on propeller first-order vibration, by W. H. Gray, J. M. Hallissy, Jr., and A. R. Heath, Jr. U. S. National Advisory Committee for Aeronautics. 1954. 39p photos, diagrs, graphs, table. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 35 cents. PB 119557

1. Propellers - Vibration - Tests 2. Propeller blades - Wind tunnel tests 3. NACA 1205.

Training and Training Devices

Recognition training. U. S. Army. Aug 1954. 51p photos, drawings, table. Order from LC. Mi $3.60, ph $9.30. PB 119639

1. Training devices 2. Aircraft - Recognition 3. Visual perception - Training 4. WD FM 21-80.

Airports and Airways

Summary of investigations of effects of jet blast, fuel spillage, and traffic on experimental tar-rubber-concrete pavements. U. S. Waterways Experiment Station, Vicksburg, Miss. Nov 1955. 23p tables. Order from LC. Mi $2.70, ph $4.80. PB 119426

1. Airports - Pavements - Blast effects 2. Airports - Pavements - Heat effects 3. Airports - Pavements - Materials 4. WES TM 3-420.

Aerodynamics

Aerodynamic heating and heat transfer phenomena at Mach numbers 2.7 through 5.7, by D. G. DeCoursin, W. S. Bradfield and J. J. Sheppard. Minnesota. University. Institute of Technology. Dept. of Aeronautical Engineering. Rosemount Aeronautical Laboratories. Feb 1954. 112p photos, diagrs, graphs, tables. Order from OTS. $1.50. PB 121007

Steady state heated tests were performed with cones, ogives, and a parabolic model. The transient technique, both preheating and precooling, was utilized in turbulent boundary layer tests with a conical model. Heat transfer data from steady state tests were in good agreement with data obtained from transient tests and no significant difference was obtained between heat transfer results for heated and cooled cones. Measurements in the laminar boundary layer of cones and ogives were in good agreement with values predicted by the flat plate theory converted to cone flow. The turbulent heat transfer measurements indicated reasonable agreement with the theory of Van Driest. Project no. 1367. AF WADC TR 53-379. Contract AF 33(038)-10673.

Application of several methods for determining transfer functions and frequency response of aircraft from flight data, by John M. Eggleston and Charles W. Mathews. U. S. National Advisory Committee for Aeronautics. 1954. 26p diagr, graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 25 cents. PB 119558

Supersedes NACA TN 2997 (PB 110978).
1. Aerodynamics - Research - Methods 2. Stability, Longitudinal - Dynamic 3. Frequency, Radio frequency 4. NACA 1204 5. NACA TN 2997, Revised.

Development of the longitudinal dynamic equations of motion of an aircraft at the absolute ceiling, by Alfred C. Robinson and Bernard J. Doody. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Flight Control Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1955. 47p diagr, graphs. Order from OTS. $1.25. PB 111991

Equations of motion are developed which describe the behavior of an aircraft flying at or near its absolute ceiling. The method used is a small-perturbation expansion of forces acting on the airplane, but the expansion includes higher order terms than those used in the conventional small-perturbation analysis. After the equations are developed, they are applied to a jet airplane of conventional configuration for which considerable flight test data are available. The theory is shown

to agree with the flight test data well within the limits of accuracy of the data. Project no. 5106. AF WADC TR 55-210.

Flow studies on drooped-leading-edge delta wings at supersonic speed, by William H. Michael, Jr. U. S. National Advisory Committee for Aeronautics. Jan 1956. 29p photos, drawings, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119378

1. Flow, Supersonic - Theory 2. Wings - Pressure distribution - Theory 3. Mach number - Effect 4. NACA TN 3614.

Free-convection effects on heat transfer for turbulent flow through a vertical tube, by E. R. G. Eckert, Anthony J. Diaguila, and John N. B. Livingood. U. S. National Advisory Committee for Aeronautics. Dec 1955. 24p drawing, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119397

1. Turbines - Cooling 2. Heat - Transference - Theory 3. Heat - Transference - Measurements 4. Turbines, Gas - Cooling 5. Convection (Free) - Heat transfer 6. NACA TN 3584.

Minimum-drag ducted and pointed bodies of revolution based on linearized supersonic theory, by Hermon M. Parker. U. S. National Advisory Committee for Aeronautics. 1955. 11p diagr, graphs. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 20 cents. PB 119590

Supersedes NACA TN 3189 (PB 114211).
1. Flow, Supersonic - Theory 2. Bodies of revolution - Drag 3. NACA TN 3189, Revised 4. NACA 1213.

Preliminary investigation of the effects of frequency and amplitude on the rolling derivatives of an unswept-wing model oscillating in roll, by Lewis R. Fisher, Jacob H. Lichtenstein, and Katherine D. Williams. U. S. National Advisory Committee for Aeronautics. Jan 1956. 29p photos, diagrs, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119381

1. Wings, Unswept - Rolling moments - Calculation 2. Wings, Unswept - Yawing moments - Calculation 3. NACA TN 3554.

Pressure rise associated with shock-induced boundary-layer separation, by Eugene S. Love. U. S. National Advisory Committee for Aeronautics. Dec 1955. 32p graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119395

1. Wings - Boundary layer - Measurements 2. Flow, Laminar - Measurements 3. Flow, Supersonic - Measurements 4. Flow, Turbulent - Measurements 5. Mach number - Effect 6. Reynolds number - Effect 7. NACA TN 3601.

Revised gust-load formula and a re-evaluation of V-G data taken on civil transport airplanes from 1933 to 1950, by Kermit G. Pratt and Walter G. Walker. U. S. National Advisory Committee for Aeronautics. 1954. 11p graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 20 cents. PB 119586

Supersedes NACA TN 2964 (PB 109838) and TN 3041 (PB 112588).
1. Gust loads 2. Airplanes, Transport - Aerodynamics 3. NACA TN 2964, Revised 4. NACA TN 3041, Revised 5. NACA 1206.

Second-order shock-expansion method applicable to bodies of revolution near zero lift, by Clarence A. Syvertson and David H. Dennis. U. S. National Advisory Committee for Aeronautics. Jan 1956. 57p diagrs, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119374

1. Bodies of revolution - Pressure distribution - Theory 2. Bodies of revolution - Pitching moments 3. NACA TN 3527.

Summary of laminar-boundary-layer solutions for wedge-type flow over convection- and transpiration-cooled surfaces, by John N. B. Livingood and Patrick L. Donoughe. U. S. National Advisory Committee for Aeronautics. Dec 1955. 33p graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119399

1. Flow, Laminar - Theory 2. Heat - Transference - Aerodynamics 3. Turbines - Blades - Air cooling 4. Prandtl number - Effect 5. NACA TN 3588.

Theoretical span load distributions and rolling moments for sideslipping wings of arbitrary plan form in incompressible flow, by M. J. Queijo. U. S. National Advisory Committee for Aeronautics. Dec 1955. 45p graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 119396

1. Wings - Span load distribution 2. Wings - Rolling moments 3. Flow, Incompressible - Theory 4. Airplanes - Sideslip - Effects 5. NACA TN 3605.

Unsteady supersonic flow, by John W. Miles. California. University. Dept. of Engineering, Los Angeles, Calif. Mar 1955. 569p diagrs, graphs, tables (1 fold). Order from OTS. $6. PB 111993

This monograph is intended to survey the application of the theory of perfect fluid flow to the prediction of the aerodynamic forces that act on thin wings and slender bodies as a result of small, unsteady motions with respect to an equilibrium configuration of uniform, supersonic flight. In addition, certain aspects of the corresponding subsonic problem are taken up insofar as they afford informative comparisons with their supersonic counterparts. Some of the results are original with the writer, but an attempt has been made to cover the available literature at the time of writing. Contract AF 18(600)-432.

Wind-tunnel investigation at low speed of the effects of chordwise wing fences and horizontal-tail position on the static longitudinal stability characteristics of an airplane model with a 35° sweptback wing, by M. J. Queijo, Byron M. Jaquet, and Walter D. Wolhart. U. S. National Advisory Committee for Aeronautics. 1954. 31p photos, drawings, diagrs, graphs, table. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 30 cents. PB 119588

1. Wings, Sweptback - Stability - Effect of tail 2. Tail design, Aircraft - Stabilizing effect 3. Stability, Longitudinal - Effect of tail 4. Airplanes - Models - Wind tunnel tests 5. NACA 1203.

MISCELLANEOUS

Environmental testing techniques, by Richard J. Gifford. Rheem Manufacturing Co., Downey, Calif. Oct 1954. 40p. Order from OTS. $1. PB 111862

The testing techniques presented herein are meant to serve as aids in eliminating faulty test results from environmental testing to MIL-E-5272A. Because of the nature of environmental testing, it is impossible to formulate a set of rules which will yield perfect test results at all times. However, a method of attack is presented. It is based on four factors: analysis of the item of equipment; consideration of the interrelationship between equipment, required test setup, and available facility; reduction and analysis of data, and preparation of the test report. AF WADC TR 54-501. Contract AF 33(616)-2363.

Report of NRL progress. U. S. Naval Research Laboratory. Mar 1956. 50p. Order from OTS. $1.25. PB 121029

Contents: Articles: Cellulose caprate, a versatile cement, by D. A. Field. - NRL miniature paper machine, by V. A. Wente and R. T. Lucas. - An investigation of boron-trimethyl counters, by G. A. Ferguson, C. W. Peters, and F. E. Jablonski. - Scientific program: Problems accepted. - Problem notes: Applications research: Psychological research in target tracking. - Astronomy and astrophysics: A model to explain the observed radio spectrum of Cassiopeia A. - Chemistry: Further studies of the mechanism and role of cool flames in the combustion process of hydrocarbon fuels. - Electricity: A dividing circuit, employing switching transistors and a single high-remanance magnetic core. - Mathematics: The concept of virtual stress patterns and its application to problems of continuum mechanics. - Mechanics: Stress energy release rates for fracture caused by wedge action.... Comparison of dielectric absorption in condensers used for pressure-time measurements. - Metallurgy and ceramics: Effect of dispersion of the alpha phase on the high-temperature fatigue property of an alpha-beta brass. . . . Application of the hydrogen effusion method to studies of static corrosion rates in aqueous systems at elevated temperature and pressure. . . . Barium titanate fabrication difficulties alleviated. - Optics: Spectral response, quantum efficiency, and equivalent sunlight input of solar-blind ultraviolet detectors. - Radio: Investigation of sea clutter and terrain return phenomena.... A method of wavelength measurement for the centimeter and millimeter wave regions.... Limitations of the single-donor-level semiconductor model. - Solid-state physics: Edge emission in CdS.... Investigation of the excitation and emission of KCl:Tl at low temperatures.... Infrared cyclotron resonance in semiconductors.... Dielectric breakdown in crystals. - Sound: Diffraction of sound into the shadow zone in the case of an isovelocity layer above a negative gradient. Published reports. - Papers by NRL staff members. - Patents.

Research on animal orientation, with emphasis on the phenomenon of homing in pigeons. Annual progress report for the period Jan 1-Dec 31, 1954 under Contract no. Nonr-1181(03), NR 160-244, by J. G. Pratt. Duke University, Durham, N. C. Feb 1955. 17p diagrs, tables. Order from LC. Mi $2.40, ph $3.30. PB 119731

The general objective of the research is to discover the basis of the pigeon's homing ability. The method used thus far involves studying two aspects of homing behavior: (1) the bird's departure flight as observed from the release point; (2) homing success.

Research summary, 1954-55. California. University. Dept. of Engineering, Los Angeles, Calif. 1955. 176p. Order from LC. Mi $8.10, ph $27.30. PB 119208

1. Research, Scientific 2. Engineering - Research 3. Engineering, Electrical 4. Engineering, Mechanical 5. Minerals - Research.

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

The absorption and distribution of radiostrontium (Sr^{89}) and radioruthenium (Ru^{103}) in certain vegetable crops (thesis), by Charles Glenn Johns. Michigan State Univ., East Lansing, Mich. Sep 1955. Contract No. AT(11-1)-159. 28p. Order from OTS. 30 cents. AECU-3101

Mutation. Report of symposium held June 15 to 17, 1955. Brookhaven National Lab., Upton, N. Y. 231p. Order from OTS. $1.25. BNL-350 (C-22)

Sanitary engineering aspects of long-range fallout from nuclear detonations (thesis), by Carlos G. Bell, Jr. Harvard Univ., Cambridge, Mass. Jan 1955. Contract No. AT(30-1)-841. 230p. Order from CTS. $1.25. NYO-4654

Teletherapy design problems-cobalt^{60} teletherapy union. Quarterly progress report, by Marshall Brucer, Herbert D. Kerman, and J. E. Richardson. Medical Division. Oak Ridge Inst. of Nuclear Studies, Oak Ridge, Tenn. Jul-Sep 1953. Contract No. AT-40-1-gen-33. 53p. Order from OTS. 35 cents. ORO-109

Chemistry and Chemical Engineering

Organo uranium compounds. I. (Report for period January 21, 1941 to May 20, 1941), by Henry Gilman. Iowa State Coll., Ames. Decl. Dec 1955. 8p. Order from LC. Mi $1.80, ph $1.80. A-28

Organo uranium compounds. III. (Report for period June 16, 1941 to August 9, 1951), by Henry Gilman. Iowa State Coll., Ames. Decl. Dec 1955. 5p. Order from LC. Mi $1.80, ph $1.80. A-30

A new crystalline hydrate of uranium tetrafluoride, $2UF_4.5H_2O$, and its dehydration to anhydrous uranium tetrafluoride, by A. V. Grosse. Columbia Univ., New York. Mar 1941. Decl. Dec 1955. 9p. Order from LC. Mi $1.80, ph $1.80. A-99

Search for elements 94 and 93 in nature. Presence of 94^{239} in pitchblende, by Glenn T. Seaborg and Morris L. Perlman. California. Univ., Berkeley. Radiation Lab. Apr 1942. Decl. Dec 1955. 7p. Order from LC. Mi $1.80, ph $1.80. A-146

The hydrogen-water vapor exchange reaction on metal catalysts. Progress report. Princeton Univ., N. J. Mar 1942. Decl. Dec 1955. 9p. Order from LC. Mi $1.80, ph $1.80. A-149

Density of solid hex near the triple point, and the expansivity of the liquid from the triple point to 92°C, by Martin T. Wechsler and Harold J. Hoge. National Bureau of Standards, Washington, D. C. Feb 1943. Decl. Dec 1955. 4p. Order from LC. Mi $1.80, ph $1.80. A-456

High temperature heat content data for three solid substances, by George E. Moore. Bureau of Mines. Pacific Experiment Station, Berkeley, Calif. Dec 1942. Decl. Dec 1955. Contract OEMst-412. (1D-R-3). 8p. Order from LC. Mi $1.80, ph $1.80. A-502

Monthly report for utilization, by M. Kilpatrick. Columbia Univ., New York. Div. of War Research. May 1943. Decl. Dec 1955. Contract CEMsr-412. (2R-328). 20p. Order from LC. Mi $2.40, ph $3.30. A-708

Summarizing report of investigations relating to uranium covering the period September 1, 1942 to April 15, 1943, by Charles A. Kraus. Brown Univ., Providence. Jun 1943. Decl. Dec 1955. Contracts OEMsr-290, Suppl. 3 and OEMsr-688, Suppl. 1. (BT-22; 100XR-1200). 7p. Order from LC. Mi $1.80, ph $1.80. A-726

The reaction of tubealloy tetrafluoride with antimony pentafluoride. Progress report covering period October 15, 1942 to October 28, 1942, by A. L. Linch. Du Pont de Nemours (E.I.) & Co. Jackson Lab., Wilmington, Del. May 1943. Decl. Dec 1955. 3p. Order from LC. Mi $1.80, ph $1.80. A-728

Distillation of tubealloy hexafluoride (product 616), by J. C. Smith. Du Pont de Nemours (E.I.) & Co. Jackson Lab., Wilmington, Del. May 1943. Decl. Dec 1955. 7p. Order from LC. Mi $1.80, ph $1.80. A-731

Viscosity of liquid UF_6 at 70°C, by A. D. Kirshenbaum. Columbia Univ., New York. Div. of War Research. Jun 1943. Decl. Dec 1955. Contract W-7405-eng-50. 5p. Order from LC. Mi $1.80, ph $1.80. A-732

Production of fluorinated lube oil. Problem report, by R. G. Benner. Du Pont de Nemours (E.I.) & Co. Jackson Lab., Wilmington, Del. May 1943. Decl. Dec 1955. 34p. Order from LC. Mi $3, ph $6.30. A-740

Experimental production of fluorine. Problem report, by W. S. Calcott. Du Pont de Nemours (E.I.) & Co. Jackson Lab., Wilmington, Del. Jun 1943. Decl. Dec 1955. 20p. Order from LC. Mi $2.40, ph $3.30. A-748

Exchange of deuterium between mercaptans and water, by Clyde Hutchison and Daniel Gillies. Columbia Univ., New York. Div. of War Research. Jul 1943. Decl. Dec 1955. Contract W-7405-eng-50. 40p. Order from LC. Mi $3, ph $6.30. A-754

Uranium oxide-water slurries for the utilization of D_2O, by M. L. Eidinoff and G. F. Hiskey. Columbia Univ., New York. Aug 1943. Decl. Dec 1955. Contract W-7405-eng-50. 26p. Order from LC. Mi $2.70, ph $4.80. A-777

Preparative methods, by H. I. Schlesinger. Columbia Univ., New York. Div. of War Research. Feb 1943. Decl. Dec 1955. Contract OEMsr-368. 12p. Order from LC. Mi $2.40, ph $3.30. A-796

Progress report on fluorocarbon research at Purdue University, by E. T. McBee. Purdue Univ., Lafayette, Ind. Jun 1943. Decl. Nov 1955. Contract W-7405-eng-74. 32p. Order from LC. Mi $3, ph $6.30. A-888

Tentative methods for analyzing WE-22 (UF_4). Harshaw Chemical Co., Cleveland. Jul 1953. Decl. Dec 1955. 6p. Order from LC. Mi $1.80 ph $1.80. A-1008

Concentration of UX_1 /Th^{234}/ from UO_2, by H. Yeager and J. A. Kyger. Mallinckrodt Chemical Works, St. Louis. Feb 1944. Decl. Dec 1955. Contract W-14-108-eng-8. 3p. Order from LC. Mi $1.80, ph $1.80. A-1025

Preliminary plant process for the manufacture of sodium uranate from uranium hexafluoride containing o-dimethylcyclohexane (C_8F_{16}), by D. X. Klein. Du Pont de Nemours (E.I.) & Co. Jackson Lab., Wilmington, Del. Sep 1944. Decl. Dec 1955. 12p. Order from LC. Mi $1.80, ph $1.80. A-1058

Technical information report for the period January 1-January 31, 1945. Madison Square Area, Manhattan District, New York. Feb 1945. Decl. Dec 1955. 31p. Order from LC. Mi $3, ph $6.30. A-1072

Analytical information report for the period February 16-March 31, 1945. Madison Square Area, Manhattan District, New York. Apr 1946. Decl. Dec 1955. 57p. Order from LC. Mi $3.60, ph $9.30. A-1076

A shorter assay method for uranium materials and some interferences in the titration, by T. R. Barddock, C. L. French, G. L. Martin, and J. R. McCoy. Mallinckrodt Chemical Works, St. Louis. May 1945. Decl. Dec 1955. 11p. Order from LC. Mi $1.80, ph $1.80. A-1083

Thermodynamics of production of boron metal by reduction of boron halides, by Clyde A. Hutchison and James S. Smith. Columbia Univ. Div. of War Research, New York. May 1944. Decl. Dec 1955. Contract W-7405-eng-50. 50p. Order from LC. Mi $3.30, ph $7.80. A-1268

The thermal stability of uranium oxides and uranium oxide hydrates in water, by D. Vier. Columbia Univ., New York. Div. of War Research. May 1944. Decl. Dec 1955. Contract W-7405-eng-50. 55p. Order from LC. Mi $3.60, ph $9.30. A-1277

Analysis of constituents and impurities in BCl_3, by Charles M. Judson. Columbia Univ., New York. Div. of War Research. Nov 1944. Decl. Dec 1955. Contract W-7405-eng-50. 7p. Order from LC. Mi $1.80, ph $1.80. A-2157

Complete analysis of B samples, by Charles M. Judson. Columbia Univ., New York. Div. of War Research. Nov 1944. Decl. Dec 1955. Contract W-7405-eng-50. 13p. Order from LC. Mi $2.40, ph $3.30. A-2158

Factors in the precipitation of RO_4 which influence the state of the resulting oxide particularly with respect to its reactivity in the vapor phase reaction, by Charles A. Kraus. Brown Univ., Providence. Metcalf Research Lab. Jul 1945. Decl. Dec 1955. Contract W-7405-eng-73. 6p. Order from LC. Mi $1.80, ph $1.80. A-2314

Preparation of RCl_4 by vapor phase chlorination of RO_2 formed by reducing RO_3 with ethanol. Report no. II, by Charles A. Kraus. Brown Univ., Providence. Metcalf Research Lab. Sep 1945. Decl. Dec 1955. Contract W-7405-eng-73. 11p. Order from LC. Mi $1.80, ph $1.80. A-2321

The control of the HF concentration of electrolyte by electrical conductance measurements. Problem report for period February 23, 1944 to November 27, 1944, by S. G. Turnbull, Jr. Du Pont de Nemours (E.I.) & Co. Jackson Lab., Wilmington, Del. Jan 1945. Decl. Dec 1955. Contract W-7412-eng-151. 40p. Order from LC. Mi $3, ph $6.30. A-2553

Chambers works process for the manufacture of liquid phase crude $C_{21}F_{44}$ at blue products (M. W. 1088), by E. P. Higgins. Du Pont de Nemours (E.I.) & Co. Jackson Lab., Wilmington, Del. Jan 1945. Decl. Dec 1955. Contract W-7412-eng-2. 10p. Order from LC. Mi $1.80, ph $1.80. A-2588

The recovery of tuballoy (U) from carbon-parts. Summary report, by E. T. McBee, Thomas DeVries, and L. R. Evans. Purdue Research Foundation, Lafayette, Ind. and Purdue Univ., Lafayette, Ind. Nov 1945. Decl. Dec 1955. Contract W-7405-eng-74. 18p. Crder from LC. Mi $2.40, ph $3.30. A-2703

Summary report on determination of nonvolatile matter in tuballoy tetrachloride, by E. T. McBee, T. DeVries, and G. M. Rothrock. Purdue Research Foundation, Lafayette, Ind. and Purdue Univ., Lafayette, Ind. Dec 1945. Decl. Dec 1955. Contract W-7405-eng-74. 9p. Order from LC. Mi $1.80, ph $1.80. A-2705

Titrimetric determination of uranium with potassium dichromate, by M. M. Kruder, W. S. Barnhart, H. Hunt, E. S. Gantz, and M. G. Mellon. Purdue Univ., Lafayette, Ind. Mar 1946. Decl. Dec 1955. Contract W-7405-eng-74. 6p. Order from LC. Mi $1.80, ph $1.80. A-2709

The separation of uranium from other elements by the ethyl ether extraction of a nitrate solution, by A. M. Ribley, C. V. St. John, H. Hunt, T. DeVries, and M. G. Mellon. Purdue Univ., Lafayette, Ind. Mar 1946. Decl. Dec 1955. Contract W-7405-eng-74. 9p. Order from LC. Mi $1.80, ph $1.80. A-2710

Potentiometric titrimetric determination of uranium using potassium dichromate. Analytical report, by W. S. Barnhart, E. S. Gantz, T. DeVries, and M. G. Mellon. Purdue Research Foundation, Lafayette, Ind. and Purdue Univ., Lafayette, Ind. Mar 1946. Decl. Dec 1955. Contract W-7405-eng-74. 10p. Order from LC. Mi $1.80, ph $1.80. A-2711

The determination of uranium by metallic zinc reduction-dichromate titration. Analytical report, by A. M. Ribley, M. G. Mellon, H. Hunt, T. DeVries, and E. S. Gantz. Purdue Research Foundation, Lafayette, Ind. and Purdue Univ., Lafayette, In[illegible] Mar 1946. Decl. Dec 1955. Contract W-7405-eng-74. 7p. Order from LC. Mi $1.80, ph $1.80. A-2712

The evaluation of uranium tetrachloride. Analytical report, by R. E. Burns and T. DeVries. Purdue Research Foundation, Lafayette, Ind. and Purdue Univ., Lafayette, Ind. Mar 1946. Decl. Dec 1955. Contract W-7405-eng-74. 11p. Order from LC. Mi $2.40, ph $3.30. A-2714

Analytical information report for the period June 1-30, 1945. Madison Square Area, Manhattan District, New York. Jul 1945. Decl. Dec 1955. 14p. Order from LC. Mi $2.40, ph $3.30. A-2903

The determination of traces of uranium in leaf ash and soil, by G. W. Imirie, Jr. National Bureau of Standards, Washington, D. C. Nov 1946. Decl. Dec 1955. 10p. Order from LC. Mi $1.80, ph $1.80. A-2940

The specific heat, entropy, and enthalpy of TCl_3 (UCl_3) from 0^0 to 380^0K, by W. Julian Ferguson and John L. Prather. National Bureau of Standards, Washington, D. C. Nov 1944. Decl. Dec 1955. 5p. Order from LC. Mi $1.80, ph $1.80. A-3143

Dituballoy enneafluoride, by S. Weller, A. Grenall, R. Kunin, and P. A. Agron. Carbide and Carbon Chemicals Corp. Substitute Alloy Materials Labs., New York. Mar 1945. Decl. Dec 1955. 6p. Order from LC. Mi $1.80, ph $1.80. A-3226

The potentiometric titration of tuballyl ion with alkali, by R. Kunin. Carbide and Carbon Chemicals Corp. Substitute Alloy Materials Labs., New York. May 1945. Decl. Dec 1955. 10p. Order from LC. Mi $1.80, ph $1.80. A-3254

Further experiments on the preparation of UF_6, by William Krashny Ergen. Wisconsin Alumni Research Foundation. Jul 1942. Decl. Dec 1955. 4p. Order from LC. Mi $1.80, ph $1.80. A-3387

Rapid analysis for small amounts of uranium in Gyp cakes. Problem report for period November 2, 1944—December 3, 1945, by Alvan Donnan. Du Pont de Nemours (E. I.) & Co. Jackson Lab., Wilmington, Del. Dec 1945. Decl. Dec 1955. Contract W-7412-eng-151. 17p. Order from LC. Mi $2.40, ph $3.30. A-3506

Minimizing the uranium content of Gyp cakes. Problem report for period March 9, 1945 to September 25, 1945, by Alvan Donnan. Du Pont de Nemours (E. I.) & Co. Jackson Lab., Wilmington, Del. Dec 1945. Decl. Dec 1955. Contract W-7412-eng-151. 8p. Order from LC. Mi $1.80, ph $1.80. A-3507

A survey of the development of cells for the production of fluorine. Final summary report, by R. C. Downing. Du Pont de Nemours (E. I.) & Co. Jackson Lab., Wilmington, Del. Jan 1946. Decl. Dec 1955. Contract W-7412-eng-151. 44p. Order from LC. Mi $3.30, ph $7.80. A-3511

Production of compressed fluorine. Design, installation, purification, liquefaction, compression, and analysis of fluorine. Final report, by J. D. Compton. Du Pont de Nemours (E. I.) & Co. Jackson Lab., Wilmington, Del. Feb 1946. Decl. Dec 1955. Contract W-7412-eng-151. 45p. Order from LC. Mi $3.60, ph $9.30. A-3513

Chambers works process for the manufacture of sodium uranate from N. G. solutions of uranyl nitrate hexahydrate, by J. A. Alexander. Du Pont de Nemours (E. I.) & Co. Wilmington, Del. Jan 1945. Decl. Dec 1955. Contract W-7412-eng-3. 4p. Order from LC. Mi $1.80, ph $1.80. A-3550

Chambers works process for the manufacture of fluorine at the blue products area carbon anode cells (M. W. 38.0), by E. B. Trepper. Du Pont de Nemours (E. I.) & Co. Jackson Lab., Wilmington, Del. Jan 1945. Decl. Dec 1955. Contract W-7412-eng-2. 9p. Order from LC. Mi $1.80, ph $1.80. A-3552

Chambers works process for the manufacture of sodium uranate from sump drainings. (M. W. 348.06), by James A. Alexander. Du Pont de Nemours (E. I.) & Co. Engineering Dept., Wilmington, Del. Jan 1945. Decl. Dec 1955. Contract W-7412-eng-3. 3p. Order from LC. Mi $1.80, ph $1.80. A-3554

Preparation of certain polyhalo compounds. Summary report for the period May 1, 1943 to January 1, 1945, by E. T. McBee. Purdue Research Foundation, Lafayette, Ind. and Purdue Univ., Lafayette, Ind. Decl. Dec 1955. Contract W-7405-eng-74. 20p. Order from LC. Mi $2.40, ph $3.30. A-3747

"A" report on letter contract W-7412-eng-129 covering period from July 16, 1944 to July 31, 1944, by H. C. Brill. Du Pont de Nemours (E. I.) & Co. Pigments Dept., Wilmington, Del. Jul 1944. Decl. Dec 1955. 10p. Order from LC. Mi $1.80, ph $1.80. A-3904

"A" report on letter contract W-7412-eng-129 covering period from July 31, 1944 to August 15, 1944, by M. C. Londergan, R. A. Gagnon, D. W. Lyon, and W. D. Ross. Du Pont de Nemours (E. I.) & Co. Pigments Dept., Wilmington, Del. Aug 1944. Decl. Dec 1955. Contract W-7412-eng-129. 12p. Order from LC. Mi $2.40, ph $3.30. A-3905

Viscosity of deuterium oxide from 5° to 95°C, by R. C. Hardy and R. L. Cottington. National Bureau of Standards, Washington, D. C. (194?). Decl. Dec 1955. 6p. Order from LC. Mi $1.80, ph $1.80. A-3954

Preparation of thenoyltrifluoracetone, by James C. Reid and Dorothy M. Johnson. California. Univ., Berkeley. Radiation Lab. Oct 1946. Decl. Dec 1955. 5p. Order from LC. Mi $1.80, ph $1.80. A-3962

The colorimetric determination of uranyl ion with potassium ferrocyanide, by Robert H. Lafferty, Jr., Troy J. McCormick, and Herbert Myers. Kellex Corp., New York. Apr 1946. Decl. Dec 1955. (Research Paper no. D21). Order from LC. Mi $1.80, ph $1.80. A-4017

The determination of uranyl ion by direct titration with chromous sulfate, by Robert H. Lafferty, Jr. and Rasho Winget, Jr. Kellex Corp., New York. Apr 1946. Decl. Dec 1955. 6p. Order from LC. Mi $1.80, ph $1.80. A-4018

A micro method for the determination of gaseous fluoride, by K. J. Radimer, S. H. Smiley, and R. H. Lafferty, Jr. Kellex Corp., New York. Apr 1946. Decl. Dec 1955. 16p. Order from LC. Mi $2.40, ph $3.30. A-4022

Some reactions of uranyl ion in alkaline solution. (Research paper no. E-12A), by Robert H. Lafferty, Jr., S. C. Schuman, K. J. Radimer, and S. H. Smiley. Kellex Corp., New York. Apr 1946. Decl. Dec 1955. 10p. Order from LC. Mi $1.80, ph $1.80. A-4024

A colorimetric determination of C616 and TO_2 F_2 with 8-hydroxyquinoline, by Joseph Greenspan, Mathias J. Schuler, and Harry Goldenberg. Kellex Corp., New York. Jul 1944. Decl. Dec 1955. 6p. Order from LC. Mi $1.80, ph $1.80. A-4028

The recovery of uranium from machine wash solutions, by H. Hunt. Purdue Research Foundation, Lafayette, Ind. n.d. Decl. Dec 1955. 14p. Order from LC. Mi $2.40, ph $3.30. A-4062

The preparation of uranium tetrachloride from uranium oxides and uranyl solutions by chlorination with hexachloropropene (rough draft), by R. Mezey. Purdue Research Foundation, Lafayette, Ind. Mar 1946. Decl. Dec 1955. Contract W-7405-eng-74. 29p. Order from LC. Mi $2.70, ph $4.80. A-4064

The recovery of uranium from the ash of carbon parts (rough draft), by Thos. DeVries. Purdue Research Foundation, Lafayette, Ind. Mar 1946. Decl. Dec 1955. Contract W-7405-eng-74. 10p. Order from LC. Mi $1.80, ph $1.80. A-4065

On the precision of a method of T analysis, by N. Heerema and G. A. Garrett. Carbide and Carbon Chemicals Corp., K-25 Plant, Oak Ridge, Tenn. May 1947. Decl. Dec 1955. Contract W-7405-eng-26. 10p. Order from LC. Mi $1.80, ph $1.80. A-4174

Experimental work for the development of a process to treat Lukachukai ores, by Galen W. Clevenger. Atomic Energy Div. American Cyanamid Co., Watertown, Mass. Jun 1952. Contract No. AT(49-1)-533. 40p. Order from OTS. 30 cents. Decl. Sep 1955. ACCO-19

A regenerative electrolytic process for recovering uranium from ores, by Galen W. Clevenger. Raw Materials Development Lab. Atomic Energy Div. American Cyanamid Co., Winchester, Mass. Aug 1952. Contract No. AT(49-1)-533. 11p. Order from OTS. 20 cents. Decl. Sep 1955. ACCO-25

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