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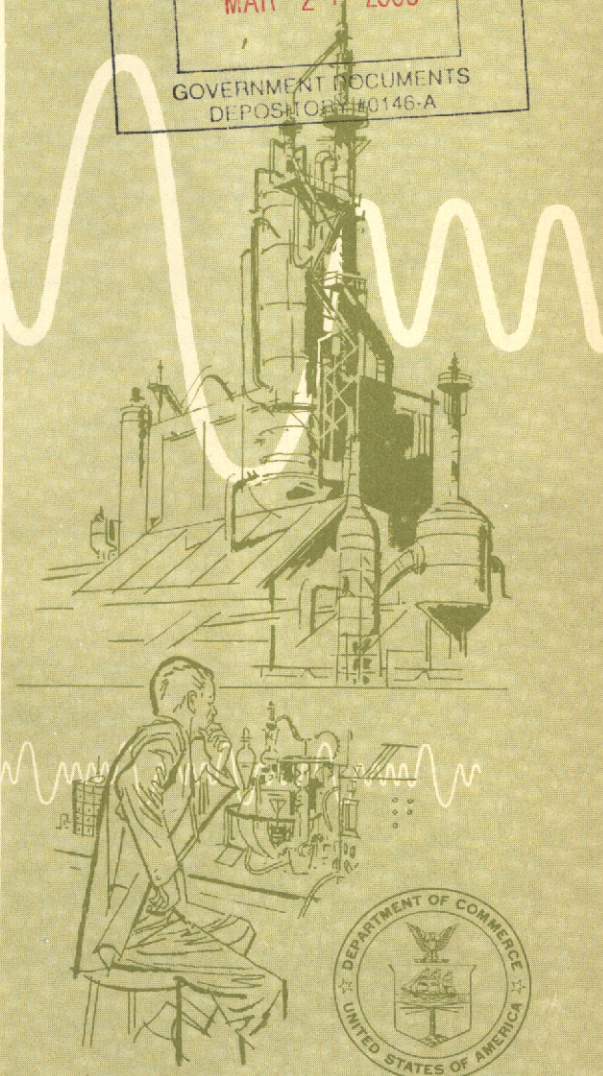
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U. S. DEPARTMENT OF COMMERCE  
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## CHEMICALS AND ALLIED PRODUCTS

## Drugs and Pharmaceuticals

Ueber den nachweis und die quantitative bestimmung von türkisrotöl in arzneispezialitäten und von pflanzenextrakten in türkisrotöhlhaltigen arzneimischen (On the identification and quantitative determination of Turkey-red oil in pharmaceutical specialties and of plant extracts in pharmaceutical mixtures containing Turkey-red oil), by Walther Awe. Translated and edited by Prof. F. A. Raven. Jan 1955. 10p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116903

Translated from Fette und Seifen, vol. 52, no. 8, 1950, p. 474-476.

1. Dyes, Turkey red - Germany 2. Pharmaceuticals - Analysis 3. NAVSHIPS T 571-B 4. STS 202B.

## Other Organic Chemicals

Cyclic polyolefins. XXXII: Cis- and trans-1, 3-diphenylcyclooctane, by Arthur C. Cope, Mark R. Kinter and Richard T. Keller. Massachusetts Institute of Technology. Dept. of Chemistry. Apr 1954. 14p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116878

Contract N5ori-07822, Project no. NR 356-096. Technical report 20. Prepared for publication in the Journal of the American Chemical Society.

1. Olefins, Cyclic - Preparation 2. Cyclooctane, cis- and trans-1,3 Diphenyl - Preparation 3. Cyclooctane, Diphenyl - Derivatives.

Decomposition of ascaridole and dihydroascaridole, by Robert Zand and Robert B. Mesrobian. Poly-

technic Institute of Brooklyn. Institute of Polymer Research, Brooklyn, N. Y. Apr 1954. 16p graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. PB 116877

The conductimetric study of the reaction between aluminum chloride and lithium aluminum hydride (whereby aluminum hydride is formed) is now complete in all important points, and a theory has been devised to account for the remarkable form of the titration curves observed in ethyl ether solution. The compound  $AlHCl_2 \cdot (C_2H_5)_2O$  has been prepared from aluminum hydride and aluminum chloride in ether solution, and its properties have been studied. A potentiometric determination of the end-point in the titration of lithium aluminum hydride with aluminum chloride has been shown to be possible in tetrahydrofuran solutions but not in ether solutions. A device for exposing cooled metal samples to the action of atomic hydrogen has been put into operation, and also a device for simultaneously preparing and sealing into glass, without exposure to air of moisture, several mixtures of small variable amounts of reactive solutions. Observations have been made which suggest that the precipitation of aluminum hydride polymer is a process sensitive to catalysis. Technical report VII under Contract N6onr-26309, Project no. NR 330-010.

Development history of bromochloromethane (CB), by Raymond R. Stasiak. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Equipment Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jan 1954. 24p tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$.75. PB 111622

1. Methane, Bromochloro 2. Fire extinguishers, Bromochloromethane 3. AAF WADC TR 53-279.

Final report under Contract N8onr-71600, Project NR 053 064 during the period Nov 1, 1948 to Oct 31, 1952, by Arthur F. Scott. Reed College. Dept. of Chemistry, Portland, Oregon. Apr 1954. 33p

diagr, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116885

Report covers history of research on light metal carbonyls, experiments on the preparation of carbonyls in liquid ammonia and on the identification of the stabilized products, discussion of the carbonyl reaction.

Fungistatic capacities of aromatic fluorine compounds in relation to cloth-rotting fungi. Part 2: Fluorinated phenols, nitrobenzenes, and anilines, by Leo R. Tebon and Sylvia Wolcyrz. Illinois. State Natural History Survey. Section of Applied Botany and Plant Pathology. Aug 1952. 63p photos, graphs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$1.75. PB 111591

Contract no. AF 33(038)-10897. For Parts 1, 3-4 see PB 111590, 111487-111488.

1. Fluorine compounds - Fungicidal properties  
2. Textiles - Fungus proofing 3. Phenols - Fungicidal properties 4. Benzene, Nitro - Fungicidal properties 5. Anilines - Fungicidal properties  
6. AAF TR 6518, Part 2.

Zur entstehung und fruhgeschichte des turkischrots (On the origin and early history of Turkey red), by Karl Reinking and Sabri Atayolu. Translated and edited by Prof. F. A. Raven. Jan 1955. 18p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116740

Translated from Melland Textilberichte, vol. 18, (1937), p. 382-384, 459-460.

1. Dyes, Turkey red - Germany 2. NAVSHIPS T571-A 3. STS 202 A.

## Agricultural Chemicals

Chemical investigations of fluorine compounds as fungicides, by G. C. Finger and F. H. Reed. Illinois. State Geological Survey. Div. of Fluorine Chemistry. Aug 1954. 38p diagrs, table Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$1.00. PB 111592

The syntheses and properties of fifteen aromatic fluorine compounds are described in detail except in cases of known or borrowed derivatives. Ten of the test samples are new to the scientific literature. Classes represented are fluorinated benzoic acids, phenols, anisoles, toluenes, biphenols, biphenyl sulfide, and benzyl derivatives. Cotton thread impregnated with the sulfur compound showed no discoloration or loss in tensile strength, and when treated with 1000 ppm solution was completely protected. Likewise, 2-fluoro-6-nitrophenol, a potent fungicide, and the difluorobiphenols did not appear to change the tensile strength of the thread. Contract no. AF 33(038)-26990. AAF WADC TR 54-148.

Investigation of sensitivity of fertilizer grade ammonium nitrate to explosion. U. S. Picatinny Arsenal, Dover, N. J. Order parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Report no. 2: Intermediate scale tests, by L. H. Eriksen. Apr 1948. 21p photos, drawings, tables Microfilm \$2.25, Photocopy \$4.00. PB 116892

Bagged FGAN can be caused to detonate by the application of heat alone if the confinement is such that the products of decomposition can develop a certain amount of gas pressure. It is calculated that the minimum gas pressure required may be no more than 100 psi. PATR 1675.

Report no. 3: Explosibility of Cal-Nitro and Uraform - ammonium nitrate fertilizers, by R. G. Ottoson. Mar 1948. 6p table Microfilm \$1.50, Photocopy \$1.50. PB 116893

Cal-nitro fertilizer is non-explosive, less reactive with paper and sawdust than fertilizer grade ammonium nitrate (FGAN), does not yield significant amounts of explosive gases when decomposed at relatively low temperatures, and the bagged material represents slightly less fire hazard than bagged FGAN. Uraform-ammonium nitrate fertilizer is more explosive than FGAN. PATR 1682.

Report no. 4: Deterioration during storage of paper bags containing fertilizer grade ammonium nitrate, by L. H. Eriksen. Jul 1948. 14p tables Microfilm \$2.00, Photocopy \$2.75. PB 116894

Small six-ply asphalt laminated paper bags stored with FGAN were adversely affected at temperatures of 140°F and higher during a period of eight weeks. Similar bags without FGAN were not appreciably affected by the same storage conditions. The properties of the FGAN stored in bags for eight weeks at temperatures as high as 190°F remained unchanged. PATR 1696.

Report no. 5: Relative sensitivity of pure, wax-coated and fertilizer grade ammonium nitrate, by Pierre Varrato. Mar 1949. 21p photos, graphs, tables Microfilm \$2.25, Photocopy \$4.00. PB 116895

Sensitivity to initiation and heating tests have been made of several types of ammonium nitrate so as to determine the effects of the presence of wax in the fertilizer grade of nitrate (FGAN). The results show that FGAN containing 0.4% of wax is not more sensitive to initiation than pure nitrate, but FGAN containing 0.7% or more of wax, is measurably more so. Heating test results indicate that FGAN undergoes more rapid decomposition than pure nitrate when subjected to heat, but the maximum temperature developed is no higher. No explosion occurred in either case. PATR 1720.



## Plastics and Plasticizers

Mechanical properties of rigid plastics at low temperatures, by Henry A. Tisch. U. S. Picatinny Arsenal, Dover, N. J. May 1954. 143p photos, graphs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$3.75. PB 111579

This report covers fifty-six different rigid plastics which comprise a representative selection from all of the currently available commercial types. The properties reported are tensile modulus of elasticity, proportional limit, elongation at break, ultimate tensile strength, work-to-produce failure, and Izod impact strength. The properties were determined at +77<sup>o</sup>, +10<sup>o</sup>, -40<sup>o</sup>, and -65<sup>o</sup>F. Most of the results obtained are qualitatively in agreement with expectations and with previously reported investigations. In a few instances, results were quite contrary to all expectations. Dept. of the Army project 593-13-004. Ordnance project TB4-7211. PATR 1898.

Progress reports under Contract no. DA-36-039-sc-42577, by N. H. Snyder and others. New Jersey Ceramic Research Station, Rutgers University, New Brunswick, N. J. Order parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Progress report no. I, from Dec 1, 1952 to Mar 1, 1953. Mar 1953. 107p diagr, graphs, tables Microfilm \$4.75, Photocopy \$14.00. PB 116690

Development of special ceramic bodies with high thermal conductivity, with good thermal shock resistance, with freedom from electrolytes, of dense cordierite type, or of ultra low weight loss during firing. SIG Contract DA36-039-sc-42577, Progress report no. 1.

Progress report no. II, from Mar 1 to Jun 1, 1953. Jun 1953. 125p diagrs, graphs, tables Microfilm \$5.25, Photocopy \$16.50. PB 116691

1. Ceramic materials - Thermal properties
2. Ceramic materials - Dielectric properties
3. Cordierite - Production
4. Furnaces, High temperature - Design
5. Thoria - Thermal properties
6. Magnesia - Thermal properties
7. Wollastonite - Tests
8. SIG Contract DA-36-039-sc-42577, Progress report no. 2.

## Paints, Varnishes and Lacquers

Case study data on productivity and factory performance: Paint and varnish. U. S. Bureau of Labor Statistics. Dec 1954. 95p photos, graph, tables Available from U. S. Bureau of Labor Statistics, Washington 25, D. C. PB 116800

1. Paints - Manufacture
2. Varnishes - Manufacture
3. BLS R 79.

Study of the effect of chromic acid and chromic phosphoric acid rinse solutions upon subsequently applied paint coatings, by Jodie Doss. U. S. Arsenal, Rock Island, Ill. Sep 1954. 21p photos Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$.75. PB 111578

The past and present use of a chromic acid or chromic acid-phosphoric acid rinse and the mechanism whereby these rinses enhance the corrosion resistance of phosphate coatings has been fully covered in PB 111397. This study employs various concentrations of chromic acid or chromic acid-phosphoric acid rinses on phosphate coatings which were then painted and later subjected to corrosion media. Two rinses of phosphoric acid were included in this investigation in order to ascertain whether phosphoric acid alone could be used as a rinse. Dept. of the Army project 593-14-006. Ordnance project TB4-302D, Report no. 14. RIAL R 52-3208.

## Analytical Chemistry

Determination of oxygen and hydrogen in inert gases, by Robert E. Bowman and Charles B. Hartley. U. S. Air Force. Air Research and Development Command, Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1953. 21p photos, diagrs, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116838

This report describes tests of a commercial apparatus which was used to determine the amount of O and H impurities in inert gases. The determination consists of measuring the temperature rise which occurs when O and H combine in the presence of O (or H) in the inert gas. The operation of the apparatus was checked by measuring the O and H impurities in a cylinder of welding grade argon. Oxygen and hydrogen impurities as low as 0.001% could be detected. AAF WADC TR 53-67.

Method for the determination of small quantities of carbon monoxide in air, by Giles F. Filley, G. Sigurd Balfour, Donald J. MacIntosh, Emilien Labelle and George W. Wright. Trudeau-Saranac Institute. Dept. of Physiology, Trudeau, N. Y. n.d. 14p drawing, graphs, table Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$.50. PB 111566

Date is 1952 or later. CNR Contract NR 112-214.  
1. Atmosphere - Carbon monoxide content  
2. Carbon monoxide - Determination.

Volumetric determination of nitrocellulose and nitroguanidine by transnitration of salicylic acid, by H. Stalcup and R. Williams. U. S. Naval Powder Factory, Indian Head, Md. Dec 1954. 15p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116644

This investigation was undertaken because of the need for a direct chemical method for the determination of percent nitrogen in nitrocellulose for specialized applications where the nitrometer was found to be either inapplicable or inaccurate. An adaptation of the procedure, for determining nitroguanidine in a nitroguanidine propellant, gave percentage values more precise than those found by the more time-consuming water extraction-gravimetric method. The method offers a new approach to the determination of nitramine-type ingredients in propellant-powder formulations. NAVORD 3054. NPF TR 83.

## Miscellaneous Chemicals

### Quarterly periodic status report under Contract

N5ori-07819, NR-092-008, by R. L. Wentworth. Massachusetts Institute of Technology. Hydrogen Peroxide Laboratories. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Sep 1952. 20p graphs, tables Microfilm \$2.00, Photocopy \$2.75. PB 116706

1. Hydrogen peroxide - Stability 2. Hydrogen peroxide - Research 3. Hydrogen peroxide - Oxidation 4. Propane - Oxidation 5. Hydrogen sulfide - Oxidation 6. Calcium peroxide - Oxidation.

Dec 1952. 15p tables Microfilm \$2.00, Photocopy \$2.75. PB 116707

1. Hydrogen peroxide - Stability 2. Hydrogen peroxide - Research 3. Propane - Oxidation 4. Hydrogen sulfide - Oxidation 5. Flame - Stability 6. Calcium peroxide - Oxidation.

Mar 1953. 9p graph, tables Microfilm \$1.50, Photocopy \$1.50. PB 116708

1. Hydrogen peroxide - Stability 2. Hydrogen peroxide - Research 3. Propane - Oxidation 4. Hydrogen sulfide - Oxidation 5. Flame - Propagation - Theory.

Jun 1953. 12p graphs, tables Microfilm \$2.00, Photocopy \$2.75. PB 116709

1. Propane - Oxidation 2. Hydrogen peroxide - Research 3. Hydrogen peroxide - Stability 4. Hydrogen peroxide - Vaporization.

Role of surface forces in water vapor adsorption on foreign nuclei. Report no. 2, Feb 1 - Apr 30, 1951, under Contract no. AF 19(122)-361, by Lowell V. Coulter and J. Mathilde Kland-English. Boston University. Dept. of Chemistry, Boston, Mass. May 1951. 11p photos, drawings, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116771

For final report see PB 112197.

1. Adsorption - Research 2. Adsorption - Measuring equipment 3. Water vapor - Adsorption 4. Silver iodide - Adsorption 5. Barium fluoride - Adsorption.

Schwefelsäureester und echte sulfonsäuren (Sulfuric acid esters and true sulfonic acids), by A. Hecking. Translated and edited by Prof. R. A. Raven. Jan 1955. 13p photos, drawings, diagrs, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116744

Translated from Fette und Seifen, vol. 45, no. 11, Nov 1938, p. 626-629.

1. Sulfuric acid - Esters - Germany 2. Sulfonic acids - Preparation - Germany 3. NAVSHIPS T568 4. STS 200.

Vapor pressure of L<sub>3</sub>-HCl mixtures, by R. E. Hall and W. M. Schaufelberger. U. S. Arsenal, Edgewood, Md. Nov 1918. 11p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 117161

1. Phosgene - Vapor pressure 2. Hydrochloric acid - Solubility 3. Hydrochloric acid - Reaction with phosgene 4. EACD 223.

## ELECTRICAL MACHINERY, EQUIPMENT AND SUPPLIES

### Electronics

Application of T-V techniques to spectrography, by George W. Wong. Boston University. Upper Atmosphere Research Laboratory, Boston, Mass. Feb 1952. 22p photos, drawings, diagr Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116767

This report presents the results of preliminary investigations using a "Vidicon" television system to report spectroscopic data. By employing the techniques of time storage and area scanning, a great increase in sensitivity is obtained. Intensity and densitometer plots are presented. Contract AF 19(122)-36. Technical note no. 14.

Artificial dielectric lens for use at microwave frequencies, by G. Bekefi and Eileen Major. McGill University. Eaton Electronics Research Laboratory, Montreal, Canada. Jun 1954. 31p photos, diagrs, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116641

A new method of making a metal powder artificial dielectric of low specific gravity was investigated, with the view of utilizing the material in the construction of large light-weight lenses for use in the centimeter wavelength region. The dielectric was

produced by first spraying thin sheets of styrofoam plastic with a vehicle containing small flake-shaped aluminum particles and then by bonding the sheets together into solid blocks. The electrical properties of the material were investigated at a wavelength of 3.20 cms; a detailed account of its refractive index, loss tangent, homogeneity and anisotropy is presented. The construction of a plano-convex lens, four feet in diameter and of about six and one-half feet focal length, weighing less than twenty pounds is described. Information concerning its behaviour was obtained from measurements of the field intensity distribution in its image plane. The results were found to be satisfactory. Report d7 on Contract AF 19(122)-81. Technical report no. 32. AAF CRC TN 54-169.

Electrodynamics of a superconducting torus, by Jules de Launay. U. S. Naval Research Laboratory. Apr 1949. 67f diags, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.25, Enlargement Print \$10.25. PB 116531

1. Superconductors 2. Electrodynamics - Theory 3. Magnetic fields - Theory 4. Gases - Electrical properties 5. Legendre functions 6. NRL P-3441.

Electron tube clipper diode rectifier, liquid cooled. Final report under Contract no. DA 36-039-sc-96, by George Rybakoff. Amperex Electronic Corporation, Hicksville, Long Island, N. Y. Mar 1952. 239p photos, drawings (part fold), diags, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$8.50, Photocopy \$30.25. PB 116694

This report summarizes all the activities and experimentation performed on the high voltage-high vacuum liquid-immersion cooled clipper diode-rectifier tube from June 1950 to March 1952. The entire development, from the point of its orientation, through its culmination in the form of a rugged and operable miniature diode, electrically to the JAN 3B29 tube, is reviewed herein. Dept. of the Army Project no. DA3-19-02-022. Signal Corps Project no. 27-312B-1. SIG Contract DA-36-039-sc-96, Final report.

Electron tube specification design in the field of vibration and impact shock, by Robert C. Radeloff. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Electronic Components Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Sep 1953. 69p diags, graphs, tables Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$1.75. PB 111576

The problem of obtaining electron tubes which will perform their intended function under adverse environmental conditions of vibration and impact shock is analyzed and a method of solution is outlined. Part 1 covers the functional structures of the over-all program for the improvement of tube operation in airborne equipment, while Part 2 defines the philosophies which serve as a basis of an impact

shock and vibration program. Example problems describing techniques and details of operation of the shock and vibration portions of the program are presented in Part 3. AAF WADC TR 53-479.

Electronic structure of solids. III: Configuration interaction in solids, by John C. Slater. Massachusetts Institute of Technology. Solid State and Molecular Theory Group. Apr 1954. 115p graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$5.00, Photocopy \$15.25. PB 116889

A mathematical treatment together with a bibliography of literature published from 1925 to 1953 on the configuration of atoms within solids. Contract N5ori-07856. Technical report no. 6. For Parts I-II see PB 113526 and PB 115261.

Elimination of ground clutter, by Ernest C. Pollard. Massachusetts Institute of Technology. Radiation Laboratory. Mar 1944. 17p photos, drawings, diags, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116672

Appendix: "Pulse Doppler" method of moving target indication. Contract OEMsr-262.

1. Radar, Pulse - Doppler 2. Targets, Moving - Detection 3. Airplanes - Detection - Radar 4. MIT Rad Lab 526 5. NDRC Div 14.

Far field data at close distances. Final report, section no. 2 under Contract no. AF 19(604)-1126, by Alan F. Kay. Technical Research Group, New York, N. Y. Oct 1954. 41p diags, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116616

1. Antennas - Radiation - Theory 2. Radar - Domes - Electrical properties 3. AAF CRC TR 54-157.

Field method for monitoring radar operator performance, by R. V. R. Merk. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Propagation Laboratory, Cambridge, Mass. Aug 1954. 72p diags, graphs, tables (part fold) Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.75, Photocopy \$10.25. PB 116761

This report reviews the detection process and the factors responsible for the instantaneous performance variability, with particular emphasis on the role of the radar operator. It is shown that while departures from average performance are to be expected, statistical control of some of the variables is possible. Methods of sampling the operator's alertness and of establishing and maintaining high but feasible performance levels are described. Tables of random numbers for use in operator testing are included. AAF CRC TR 54-106.

Gain limitations on equalizers and matching networks, by Herbert J. Carlin. Polytechnic Institute of Brooklyn. Microwave Research Institute. Apr 1954. 28p drawing, diags, graph Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116855

If an equalizer amplitude response curve is specified, it is shown that the minimum flat loss obtainable with physical networks is determined. If the output impedance is purely reactive, the limitations on maximum voltage transfer are obtained from a consideration of the open circuit impedance parameters of the system. Examples are given comparing the performance of matched and lossless equalizers. In many practical cases the latter do not have substantially higher gain than the matched equalizer. Contract no. Nonr-839(05). PIB R 375-54. PIB 309.

Guided wave propagation in gyromagnetic gaseous discharge plasmas, by J. E. Etter and L. Goldstein. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. Oct 1954. 90p photos, drawings, diags, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$4.00, Photocopy \$11.50. PB 116612

The subject of this report is an experimental investigation of the Faraday rotation of guided electromagnetic waves using the electron gases of gaseous discharge plasmas as the gyromagnetic material. In addition, associated phenomena such as resonances and polarization changes are considered. Contract AF 19(604)-524, Technical report no. 3. AAF CRC TN 54-367.

Horizontally polarized long-slot array, by R. C. Honey. Stanford Research Institute, Stanford, Calif. Aug 1954. 43p photos, drawing, diags, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.75, Photocopy \$6.50. PB 116647

Contract no. AF 19(604)-266.

1. Antennas, Radar - Design 2. Antennas, Radar - Theory 3. Antennas, Slot - Theory 4. SRI Proj 591, Technical report 47 5. AAF CRC TN 54-191.

Investigation of an array of traveling wave slot antennas, by Walter Rotman. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Antenna Laboratory, Cambridge, Mass. Oct 1954. 30p photos, drawings, graphs (part fold), table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116639

The design of a flush-mounted radar antenna which uses dielectric-filled, traveling-wave, tapered-guide radiating elements and a corporate structure feed is described. An X-band experimental model has been constructed. Tests showed agreement between theory and experiment. Methods of improving performance and some applications to airborne radar systems are suggested. AAF CRC TR 54-113.

Investigation of printed circuit methods of three dimensional applications. Interim engineering report no. 4 for the period from 9 Mar 1954 to 9 Jun 1954 on Contract no. AF 33(616)-486, by Albert Zack. Sylvania Electric Products Inc. Transformer Dept., Ipswich, Mass. Jun 1954. 34p diags, graphs, tables Available from Library of Congress Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116705

Designs of the required pulse transformer and power transformer have been completed. Initial samples of the pulse transformer show encouraging results both from an electrical standpoint and physical size. Test results of wafer coil construction type show improved rise time and wave shape characteristics as compared to conventional units and curves of results are shown. Sample work for the power transformer has been started using Class A materials to determine physical problems of assembly; studies of Class H materials have begun and a summary of preliminary results included. Also included are further tests of Class A materials. Electrical tests of conventional power unit (Class A) are shown along with the initial tests of the first wafer coil sample (primary only). Curves showing r.f. characteristics of wafer coils are included. Tests of an r.f. packing coil are included to indicate effectiveness of coatings and field tests started to show up any possible operational difficulties.

Length of ionized meteor trails, by L. A. Manning, O. G. Villard, Jr., and A. M. Peterson. Stanford University. Electronics Research Laboratory, Stanford, Calif. Dec 1951. 23p diags, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116662

Contract N6 onr-251, Consolidated task no. 7 (NR-078-360).

1. Meteors - Radio detection 2. SU ERL TR 40.

Linear filtering of sampled data, by Gene Franklin. Columbia University. Dept. of Electrical Engineering. Electronics Research Laboratories. Dec 1954. 31p diags Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116764

This report is an application of least squares filtering theory to situations where a time stationary random message and additive noise are sampled before being filtered. Such a situation might possibly occur with a pulsed radar or data link or in a system where an instrument measures only samples. Contract AF 18(600)-677. Project no. R-357-50-3 OSR TS-55-21. Technical report T-5/B. CU-7-54-AF-677-EE. CUN ERL TR T-5/B.

Long wave measurements, by Bradford B. Underhill. Pennsylvania State College. Dept. of Electrical Engineering. Contract W28-099-ac-208. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Progress report no. 18, covering period Jun 1, 1948 to Aug 31, 1948. Aug 1948. 23p diagrs, graphs Microfilm \$2.25, Photocopy \$4.00. PB 116659

1. Noise, Atmospheric - Measuring 2. Noise, Atmospheric - Measuring equipment 3. Ionosphere - Measuring equipment 4. Antennas, Dipole - Impedance 5. Waves, Electromagnetic - Propagation - Ionosphere.

Progress report no. 19, covering period Sep 1, 1948 to Nov 30, 1948. Nov 1948. 15p diagrs Microfilm \$2.00, Photocopy \$2.75. PB 116660

1. Ionosphere - Measuring equipment 2. Waves, Electromagnetic - Propagation - Ionosphere 3. Transmitters, Thyatron - Design.

Final report, covering period Jul 1, 1946 - Jan 31, 1949. Jan 1949. 30p photos, fold, diagrs Microfilm \$2.25, Photocopy \$4.00. PB 116661

Most of the work done on this project has been directed toward the development of adequate equipment to sound the ionosphere at vertical incidence at 150 kc/s. A hydrogen thyatron discharge transmitter has been developed that is capable of delivering approximately 3 megawatts, peak pulse power to a folded dipole antenna. This transmitter drives a 3,000 foot horizontal folded dipole antenna that is supported 85 feet off the ground by 13 masts. Analysis of data has just begun. Appendix A: Bibliography. Project to be consolidated with Contract W 28-099-ac-143.

Mass transfer in electrode processes. I: Concentration polarization and limiting currents, a critical review of existing theories, by Morris Eisenberg, Charles W. Tobias, and Charles W. Wilke. California. University. Dept. of Chemistry and Chemical Engineering, Berkeley, Calif. Jan 1952. 40p diagrs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116710

This work represents the first phase of a research program designed to study the role of ionic diffusion and mass transfer in electrode processes. The basic concepts of total polarization, concentration, and chemical polarization are considered. The relationship between concentration polarization and the rate of mass transfer to or from electrodes is discussed. A detailed review and history of the development of theories for interpretation of diffusional and convective effects upon polarization, limiting current and related phenomena are presented. The correlations developed for mass and heat transfer for other fields of application are shown to be of value in the analysis of electrode phenomena. Technical report no. 1 under Contract no. Nonr 222(06), Project no. NR 359-270. For Parts II-III see PB 114943 and 114495.

Microwave measurements with a lossy variable short circuit, by H. M. Altschuler and A. A. Oliner. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N. Y. Sep 1954. 42p

diagrs, graph, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$6.50. PB 116728

The use of a lossy variable short circuit becomes an undesirable necessity in certain measurement situations, while in others its deliberate use facilitates the measurement of low loss structures. In both of these cases, the present approach permits the analysis of the data to proceed in a manner identical to that employed when lossless short circuits are used. It results in a composite four-pole from which the desired parameters are separated via particularly simple relations. Applications are made to a variety of measurements, including those of dissipative, lossless and symmetric four-poles, attenuation and attenuation constants. Contract AF 19(604)-890. AAF CRC TN 54-385. PIB R-399-54. PIB 332.

Microwave research. Quarterly progress reports under Contract no. W-19-122-ac-35, by Walter Gordy. Duke University. Dept. of Physics, Durham, N. C. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Feb 1, 1951 - May 1, 1951. May 1951. 71p graphs, tables (part fold) Microfilm \$3.75, Photocopy \$10.25. PB 116774

Contents: Bibliography of publications done under the contract. - Abstracts of current projects. - Special reports: no. 1. Resonant absorption of oxygen at 2.5 millimeter wave length, by Roy S. Anderson, Charles M. Johnson and Walter Gordy. - no. 2. Molecular quadrupole moments of N<sub>2</sub> and O<sub>2</sub>, by Charles Greenhow and William V. Smith. - no. 3. Paramagnetic resonance absorption of microwaves, by Forrest W. Lancaster and Walter Gordy.

May 1, 1951 - Aug 1, 1951. Aug 1951. 67p diagr, graphs, tables Microfilm \$3.25, Photocopy \$9.00. PB 116775

Contents: Bibliography of publications done under the contract. - Abstracts of current projects. - Special reports: no. 1. Microwave spectroscopy in the region from two to three millimeters, part II, by Charles M. Johnson, Ralph Trambarulo, and Walter Gordy. - no. 2. On the spin and quadrupole moment of Cl 36, by Charles M. Johnson, Walter Gordy, and Ralph Livingston. - no. 3. Extension of King-Hainer-Cross's table of asymmetric top energy levels, by William V. Smith and C. R. Greenhow. - no. 4. Microwave spectra and molecular structures of POF<sub>3</sub>, PSF<sub>3</sub>, COCl<sub>3</sub>, and PSCl<sub>3</sub>, by Quitman Williams, John Sheridan, and Walter Gordy. - no. 5. A molecular-beam modulation microwave spectrograph, by Walter Gordy and Clarence F. Luck.

Aug 1, 1951 - Nov 1, 1951. Nov 1951. 69p photos, drawings, graphs, tables Microfilm \$3.25, Photocopy \$9.00. PB 116776

Contents: Bibliography of publications done under the contract. - Abstracts of current projects. - Special reports: no. 1. Spectroscopy above 60 KMc, by Walter Gordy. - no. 2. Microwave spectra and molecular structures of trifluoromethyl bromide, iodide, and cyanide, by John Sheridan and Walter Gordy.

Nov 1, 1954 - Feb 1, 1955, Feb 1955. 94p diags, graphs, tables Microfilm \$4.50, Photocopy \$12.75. PB 116802

Contents: Technical reports: no. 1. Methyl alcohol. I: Microwave spectrum, by Putcha Venkateswarlu, Howard D. Edwards, and Walter Gordy. - no. 2. Methyl alcohol. II: Molecular structure, by Putcha Venkateswarlu and Walter Gordy. - no. 3. Variation of line width with rotational state and temperature in the microwave spectrum of OCS, by Roy S. Anderson. - no. 4. One- to- two millimeter wave spectra of TCl and TBr, by Charles A. Burrus, Walter Gordy, Ben Benjamin and Ralph Livingston.

Miniature shock-proof control relay, by Harry R. Powell. Boston University. Upper Atmosphere Research Laboratory, Boston, Mass. Jul 1951. 27p photos, drawings Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116766

Contract AF 19(122)-36. Technical note no. 12. 1. Rockets, Upper air - Equipment 2. Relays, Electronic - Miniaturization 3. Electronic equipment - Miniaturization.

Modified method of protecting a VHF antenna from severe icing, by F. V. Cairns and J. R. Dawson. National Research Council of Canada. Radio and Electrical Engineering Division. Dec 1954. 13p photo, diags Available from National Research Council of Canada, Ottawa, Canada. \$ .10. PB 115702s

Supplement to PB 115702.  
1. NRCC 3544 2. NRCC ERA 281.

Moving target selector using deflection modulation on a storage mosaic, by R. A. McConnell, A. G. Emslie, F. Cunningham. Massachusetts Institute of Technology. Radiation Laboratory. Jun 1944. 18p photos, drawing, diagr, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116674

The detection of moving targets in the presence of ground clutter in pulse radar depends upon the storage and comparison of echo patterns. The television mosaic fulfills the general requirements for a static storage method. The mosaic has been used as a Moving Target Selector, by scanning it with a deflection modulated, high velocity, electron beam. The theory of operation and the results obtained are reported herein. As much as 15 db discrimination be-

tween fixed and moving targets has been achieved. Contract OEMsr-262. NDRC Div 14. MIT Rad Lab 562.

Noise studies on CW klystrons. Period report no. 1, 1 May 1954 - 31 Jul 1954, under Contract no. AF 19(604)-1080, by G. A. Espersen and R. A. La Plante. Philips Laboratories, Inc., Irvington-on-Hudson, N. Y. Jul 1954. 6p Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116849

Case 34-98.

1. Vacuum tubes, Klystron - Design 2. Vacuum tubes, Klystron - Noise - Measurements 3. Vacuum tubes, Klystron - Modulation 4. Vacuum tubes, Klystron - Noise - Measuring equipment 5. AAF CRC TN 54-355.

Oscillating circuit incorporating a choke with rectangular magnetization curve, by Theodor Buchhold and Ernst Stuhlinger. Compiled, edited and published by the Guided Missile Development Group, Technical and Engineering Division, U. S. Redstone Arsenal, Huntsville, Ala. Apr 1952. 50p diags Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.75, Photocopy \$6.50. PB 116866

A theory concerning the properties of the oscillating circuit is presented. Oscillations in such a circuit are governed by comparatively simple laws. Knowledge of those laws will permit such technical applications of the circuit as voltage stabilizers, frequency meters, square wave generators, and pulse generators. RSA TR 70.

Pulse Doppler for detection of moving ground targets, by R. F. Thomson. Massachusetts Institute of Technology. Radiation Laboratory. Apr 1944. 11p diagr, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116673

A study has been made of the use of "Pulsed Doppler" system in the detection of moving objects on the ground. This report includes a discussion of the limitations and frequencies generated with "X" and "S" band equipment. Signal return from a fixed target is used to provide the reference frequency. Vehicles and men moving in a given sector included by one beam and pulse width can be readily detected. Approximately six minutes would be required to search a sector 180 degrees by 2000 yds. Noise introduced by trees makes detection of velocities below 3 m.p.h. extremely difficult. Contract OEMsr-262. NDRC Div 14. MIT Rad Lab 553.

Radar-siting methods and procedures, a handbook, by A. L. Baker. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Propagation Laboratory, Cambridge, Mass. Jun

1954. 99p diags, (1 fold), tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$4.50, Photocopy \$12.75. PB 116763

Phase I, preliminary system studies, deals with procedures for system planning, criteria for site selection, and procedures for obtaining preliminary operational coverage boundaries from aerial reconnaissance, maps, and radar performance curves. Phase II, field work, includes methods and procedures for data collection related to: the radar antenna site, engineering and construction, and communications. Phase III, office work, covers data processing and evaluation, the preparation of predicted operational coverage boundaries from field data, and the writing of the siting report. AAF CRC TR 54-17. AAF CRL E 5119.

Radio interference suppression techniques, a guide for manufacturers. U. S. Camp Coles Signal Laboratory, Fort Monmouth, N. J. Nov 1953. 267p photos, drawings, diags, graphs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$6.75. PB 111611

This manual was prepared as an aid to manufacturers of U. S. Army equipment in meeting the requirements of the radio-interference specifications. It contains information on approved suppression components and systems and their application, and an explanation of the procedures recommended for obtaining approvals, requesting tests by the Signal Corps, and securing help from the Signal Corps in solving special problems. It concludes with a brief outline of basic principles. SIG Contract DA36-039-sc-42596.

Reaction occurring on thoriated cathodes, by Michael Hoch and Herrick L. Johnston. Ohio State University. Dept. of Chemistry. Cryogenic Laboratory, Columbus, Ohio. Apr 1954. 22p drawing, graph, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116822

The vapor pressure of thorium dioxide was determined by the method of Knudsen, between 2398° and 2677° K. ThO<sub>2</sub> vaporizes mostly undissociated as ThO<sub>2</sub>(g), the heat of vaporization being  $\Delta H_{298}^{\circ} = 170 + 1$  kcal/mole. Some of the material (2-10%) vaporizes as ThO. No reaction occurs between ThO and W. The study of the reaction Th(l) + ThO(s)  $\rightleftharpoons$  2ThO(s) by a high temperature x-ray diffraction technique showed the formation at 2050°K of solid ThO. The ThO has a cubic, face-centered lattice, with a = 4.31 Å. The formation of thorium on the thoriated cathodes is thus due to the decomposition of the ThO<sub>2</sub> to ThO at 2500°K and above; the ThO disproportionates to Th and ThO<sub>2</sub> on cooling to 2000°K. Contract no. N6ori-17, T. O. IV, Project no. NR 058 059. Technical report no. 12. Project RF-280.

Research in physical electronics. Quarterly progress report no. 8 on Contract no. AF 19(604)-524, for the period 15 Jun 1954 to 15 Sep 1954. Illinois.

Engineering Experiment Station, Electrical Engineering Research Laboratory, Urbana, Ill. Oct 1954. 59p photos, drawings, diags, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.00, Photocopy \$7.75. PB 116696

1. Oscillography, High speed 2. Electron beams - Density 3. Waves, Electromagnetic - Propagation 4. Gases - Diffusion 5. Resonance - Mathematical analysis 6. Helium - Energy measurements 7. Neon - Thermodynamic properties 8. AAF CRC TN 54-362.

Study of the environmental temperature and pressure effects on the plate dissipation rating of receiving tubes, by Bernhard M. Schmidt. Dayton, University. Electrical Engineering Dept., Dayton, Ohio. Oct 1953. 47p photos, diagr, graphs Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$1.25. PB 111575

Reliable operation of receiving type electron tubes in high effective environmental temperatures is possible only if the plate temperature is held to a defined safe value. A practical means of extrapolating the plate dissipation rating is suggested whereby the plate temperature may be held to this safe value. A method of testing the validity of this extrapolation is suggested. Summarizes work done from 10 Feb 1952 to 27 Oct 1953. Contract no. AF 33(616)-113. Appendix I: Details of construction, instrumentation, and experimental procedure of plate dissipation rating tests, by Bernhard M. Schmidt and Adrian J. Morgan. AAF WADC TR 53-433, Part 1.

Study of the generation and detection of electromagnetic waves in the millimeter wave region. Report no. 1, Jun 1, 1954 to Aug 31, 1954 under Contract 19(604)-1115, by J. H. Rohrbaugh. New York University. Washington Square College of Arts and Science. Physics Dept. Sep 1954. 47p drawings (1 fold), diags, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.75, Photocopy \$6.50. PB 116645

1. Waves, Electromagnetic - Transmission 2. Waves, Electromagnetic - Detection 3. Spectrometers - Design 4. Bolometers - Manufacture 5. Magnetic fields - Conductivity 6. Harmonic analysis 7. AAF CRC TN 54-361.

Study of microwave double-layer pillboxes. Part I: Line source radiators, by Walter Rotman. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Antenna Laboratory, Cambridge, Mass. Jul 1954. 58p photos, drawings, diags, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.00, Photocopy \$7.75. PB 116642

Special methods for controlling spherical aberrations in concentric systems were devised and four

semicircular double-layer pillboxes were built to test the principles. The application of these wide-angle scanning models to other uses, such as line source radiators for use with external cylindrical reflectors or lenses is emphasized. A non-scanning pillbox with parabolic reflector has also been built. Appendix A: Geometric ray tracing in parallel plate systems. AAF CRC TR 54-102.

Study of microwave noise in beam-type devices, by Glen Wade, Stanford University. Electronics Research Laboratory, Stanford, Calif. Apr 1954. 172p diags, graphs, table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$6.75, Photocopy \$22.75. PB 116850

Contract N6onr 251(07), NR 073 360.

1. Electron beams - Deflection 2. Electron beams - Noise - Measurement 3. Tubes, Traveling wave - Noise - Measurement 4. Vacuum tubes - Noise 5. SU ERL TR 75.

Study of radiating structures for perpendicularly-polarized flush radar antennas, by Edward M. T. Jones and Seymour B. Cohn. Stanford Research Institute, Stanford, Calif. Jul 1954. 60p diags, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.00, Photocopy \$7.75. PB 116646

This report describes an investigation of three different types of surface structures for flush-mounted radar antennas that radiate energy polarized perpendicular to the plane of the antenna. The first surface analyzed is the multiple-layer dielectric slab line, which radiates as an end-fire antenna. Calculations of the phase velocity, power distribution, and surface electric field of the trapped mode in this antenna are presented for various parameters. Both theoretical and experimental results are presented for an unshielded strip transmission-line array having equispaced series gaps. An H-plane array of waveguides coupled to space through transverse slots is also investigated theoretically and experimentally. Contract no. AF 19(604)-266, SRI Proj 591, Technical report 44. AAF CRC TN 54-176.

Synthesis of radio signals on overwater paths, by A. H. LaGrone, A. W. Straiton, H. W. Smith. Texas University. Electrical Engineering Research Laboratory. Apr 1954. 36p graphs, maps Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116848

The fluctuations of radio signals at microwave frequencies on overwater paths are explained on the basis of a periodic rise and fall of the water level. From this study, it is seen that the variations in the radio signal strength will contain the frequency of the water level cycles and also the second and third harmonics of the water level cycles. Although the model assumes reflection from a plane surface, the results of the study successfully explain most of the features of the observed fluctuations of the radio signals on two overwater paths. Contract Nonr 375(01), NR 071 032. TU EERL 71.

D-C current transformers and magnetic frequency doublers, by Theodor Buchhold. U. S. Ordnance Dept. Research and Development Division. Sub-office (Rocket), Fort Bliss, Texas. Apr 1950. 30p diags, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116867

1. Transformers, Current - Theory 2. Frequency changers - Theory 3. CRDD R TR 63.

Magnetic frequency doublers, by Erich Manteuffel. Compiled, edited and published by the Guided Missile Development Division, Ordnance Missile Laboratories. U. S. Redstone Arsenal, Huntsville, Ala. Mar 1953. 28p diags, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116865

Two magnetic frequency doublers have been developed by this installation. Type "A" was presented in Technical Report no. 63 (PB 116867) and is summarized in section I, with some calculations concerning its current-voltage characteristics. Section 2 describes a new type "B", which has a symmetrical output voltage curve which can not be obtained with Type "A" but is necessary for certain applications. Calculations for the practical design are given. RSA TR 74.

Short-circuit calculations and test results for DC power systems, by J. Cybulski and J. P. O'Connor. U. S. Naval Research Laboratory. Jan 1955. 20p photos, diags, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116860

A method is developed for the calculation of a fault on a dc power system composed of rotating machines and one composed of rotating machines and a battery. Comparisons are made between the calculated and actual short circuits on dc power systems. The limitation on the operating time of protective equipment is discussed in connection with machine flashover during fault conditions. A method which requires only five basic machine constants is developed and illustrated for approximating the effective transient resistance of dc machines. NRL R 4482.

Transient characteristics of DC machines. Short-circuit calculations and test results, by J. Cybulski and J. P. O'Connor. U. S. Naval Research Laboratory. Jan 1955. 30p diags, graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116844

A comparison of the calculated and test data for thirty-one tests indicates good accuracy for the computations of peak armature current whenever there was no flashover. Similar comparison for the shunt field current, the initial rate of rise of armature and shunt field currents, and their respective peak times



indicates somewhat greater inaccuracies in the order stated. Methods are developed and illustrated for approximating the various short-circuit characteristics when only limited information on design constants is available. NRL R 4474.

### Miscellaneous

Further studies on the anodization of lead in sulfuric acid solution, by J. J. Lander. U. S. Naval Research Laboratory. Jan 1955. 33p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116881

From existing thermodynamic data, the potentials for the occurrence of various oxidizing reactions were calculated, and experimentally it was found that most of these reactions occur at their expected potentials. In addition the solid-phase reaction,  $\text{PbO}_2 + \text{Pb} \rightarrow 2 \text{PbO}$  is indicated to occur below a certain potential. The relatively large number of reactions occurring resulted in a complicated corrosion-rate vs. potential relationship. Kinetic treatment was only partially successful. In other potential ranges only qualitative descriptions of the rate-controlling processes are as yet possible. NRL R 4475.

"Infinite gain" amplifier, by R. K. Saxe. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Sep 1952. 9p diags Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116952

A very convenient clipper and amplifier combined consists of a duo-triode in the so-called "infinite gain amplifier" circuit. This is described briefly in Volume 18 of the Radiation Laboratory series (Valley, George E. and Wallman, Henry, "Vacuum Tube Amplifiers") (PB 95594) in connection with its use as an integrator. The present notes are intended to expand on the basic information given in the cited reference, and to offer specific design information for those attempting to use the circuit. Dept. of the Army project no. 3-99-12-021, Signal Corps project no. 132A. For description of amplifier see PB 95594. SCEL TM M-1464.

Progress report for Oct - Dec 1954. National Research Council of Canada. Radio and Electrical Engineering Division. Jan 1955. 22p photo, graphs Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. Limited supply available free from National Research Council of Canada. Radio and Electrical Engineering Division, Ottawa, Canada. PB 116743

1. Antennas - Research - Canada 2. Tubes, Electron - Research - Canada 3. Electromedical research - Canada 4. Engineering, Electrical - Research - Canada 5. Dielectric research - Canada 6. Noise, Solar - Research - Canada 7. Wave propagation - Research - Canada 8. Birds - Effects of radiation - Canada 9. Navigational aids - Canada 10. NRCC ERA-279.

Resumé of existing specifications for electrical wire and cable used in aircraft, by Armand Malo. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Electronic Components Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Apr 1954. 6p tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116712

1. Airplanes - Materials - Wire 2. Wire, Electric - Specifications 3. Cables, Electric - Specifications 4. AAF WCRE TN 54-5.

Thermodynamics of the lead-acid storage cell, by Herbert S. Harned and Walter J. Hamer. Yale University. Dept. of Chemistry, New Haven, Conn. Sep 1934. 59f graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.00, Enlargement Print \$9.00. PB 116538

1. Batteries, Storage - Lead acid 2. Sulfuric acid solutions - Thermodynamic properties 3. NRL P-1071.

### FOOD AND KINDRED PRODUCTS

Jellies, jam, preserves, marmalades and fruit butters: Manufacture, by Carl H. Moulton. U. S. Office of Technical Services. Jan 1955. 15p Available from Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D. C. \$50. PB 111595

1. Jam - Manufacture 2. Jelly - Manufacture 3. Canning and preserving 4. OTS IR 14081 5. TAS 108.

Nutrient requirements for domestic animals, number IX: Nutrient requirements for rabbits, prepared by the Subcommittee on Rabbit Nutrition, S. E. Smith, Chairman, G. S. Templeton, W. C. Weir. National Research Council. Division of Biology and Agriculture. Committee on Animal Nutrition. 1954. 17p photos, tables Available from NAS-NRC Publications Office, 2101 Constitution Ave., N. W., Washington 25, D. C. \$50. PB 116729

This is the ninth in a series of reports on the proper feed combinations for farm animals. The members of the subcommittee who prepared the report are men trained in basic and applied animal nutrition, with experience in rabbit nutrition gained by research with this species and by contact with practical field problems. Included in the report are tables of feed composition, suggested feed mixtures and discussions of the symptoms of nutritional deficiencies. NRC 331.

## FUELS AND LUBRICANTS

Antioxidants for greases. Interim report no. 1, by S. Fred Calhoun. U. S. Arsenal, Rock Island, Ill. Jun 1954. 31p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116739

Twenty-four compounds or formulations have been tested for their ability to act as antioxidants when used in lithium, calcium, or lithium-calcium soap greases. The fluids used were mineral oil, diesters, and monoesters. Some of the compounds or formulations used are commercially available and at present are being used for inhibitors in greases. Some have been used in rubber or in oil as inhibitors, while several have no previous record of such use. Their ability to stabilize a grease was checked for at least 500 hours unless failure occurred before that length of time. The percentage of inhibitor ranged from 0.1% to 0.75% but was generally kept at 0.3% or less. Copper corrosion, penetrations and Shell four ball wear tests were also run on the greases prepared. Bibliography and list of prior reports attached. Ordnance project no. TB5-4010E, Report no. 10. Dept. of the Army project no. 593-21-053. RIAL R 54-1988.

Boundary lubrication of steel with fluorine- and chlorine-substituted methane and ethane gases, by S. F. Murray, Robert L. Johnson and Max A. Swikert. U. S. National Advisory Committee for Aeronautics. Feb 1955. 17p photos, drawing, graphs, tables Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116654

Sliding-friction experiments were made with steel surfaces in atmospheres of halogenated gases. Under the conditions of this investigation, the most stable or fully fluorinated gases gave no surface protection. Several fluorinated compounds containing two or more chlorine atoms per molecule served as effective boundary lubricants (reduced friction and prevented excessive wear, surface welding, and metal transfer) in a manner comparable with a conventional liquid lubricant. Run-in procedure, bearing materials, and moisture availability appear to be critical in boundary lubrication by gaseous materials. NACA TN 3402.

Chain breaking and branching in the active-particle diffusion concept of quenching, by Frank E. Belles and A. L. Berlad. U. S. National Advisory Committee for Aeronautics. Feb 1955. 37p graphs, tables Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116726

General quenching-distance equations that take into account gas-phase chain breaking and branching and the effect of the wall efficiency for destruction of active particles are derived as extensions of the ori-

ginal simple theory of quenching by diffusion of active particles. The general characteristics of the equations are discussed. Quenching distance data from the literature for propane-oxygen-nitrogen mixtures are treated in a consistent manner. The effects of elevated initial mixture temperature are predicted and agree qualitatively with observed trends. It is found that the simple theory correlates all the data satisfactorily. NACA TN 3409.

Le comportement des systemes hydrocarbures-asphaltenes. Un facteur important pour la stabilité et la compatibilité des fuel-oils résiduels (Behavior of hydrocarbon-asphaltene systems, an important factor for the stability and the compatibility of residual fuel oils), by W. J. van Kerkvoort, A. J. J. Nieuwstad, and M. van der Waarden. Translated by L. C. Stevens, edited by F. A. Raven. Jan 1955. 28p graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116765

Translated from IVe Congres du Chauffage Industriel, group II, section 22, no. 220, p. 1-8 (Manuscript received 14 Jun 1952).

1. Cil fuel - Stability - Netherlands 2. Fuels - Residues - Netherlands 3. Asphaltenes - Reactions with hydrocarbons - Netherlands 4. Hydrocarbons - Reactions with asphaltenes - Netherlands 5. NAVSHIPS T573 6. STS 204.

Development of qualification test methods for gear lubricants. Progress report no. 25, for period Nov 15, 1954 to Dec 15, 1954, under Contract DA-11-022-ORD-905, by J. N. Foster and H. Ruwe Barton. Armour Research Foundation, Chicago, Ill. Dec 1954. 9p table Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116883

Project no. TB5-3010. Appendix A: Report to CLR Moisture corrosion sub-panel: Study of moisture corrosion produced by momentary venting.

1. Gears - Lubrication - Corrosion tests 2. Lubrication - Testing equipment 3. Corrosion - Tests - Humidity 4. Corrosion - Tests - Temperature 5. ARF Proj L030, Report 25.

Effects of pulse-repetition frequency and contamination on the breakdown voltage of transformer oil, by T. S. Golden and D. F. Hemenway. U. S. Naval Research Laboratory. Jan 1955. 31p photos, diags (1 fold), graphs, tables Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116701

A repetitive-pulse voltage of the type normally encountered in radar applications was used to determine the dielectric strength of mineral transformer oil. Tests were performed on (a) oil as taken from the supply drum, (b) dried oil, (c) oil wet with distilled water, (d) wet oil with kraft paper fibers added, and (e) oil which had been subjected to high vacuum. Pulse-repetition frequency was varied between 100

and 3000 pps for each oil condition tested. Results indicated that the effect of added contaminants apparently depends to a great extent on the past history of the oil and its container. The breakdown gradient for the oil was an inverse function of the pulse-repetition frequency. The general values of oil breakdown were found to be on the order of 2500 to 3000 volts per mil. NRL R 4466.

Further developments in the test for bleeding tendencies in greases, by S. Fred Calhoun. U. S. Arsenal, Rock Island, Ill. Jan 1955. 16p photos, drawing, graph, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116738

Sixteen greases have been tested for bleeding rate under various conditions of temperature and pressure in the test tube type of tester. A new tester utilizing air pressure has been developed and six of them constructed and put into operation. The results of the several methods and conditions show good correlation. The results obtained by use of the air pressure type tester are higher and show a greater spread than any obtained by use of the test tube type. It is recommended that the pressure method of determining the bleeding tendencies of greases be adopted and made a part of any specification where applicable. Ordnance project no. TB5-4010A, Report no. 1. Dept. of the Army project no. 593-21-053. RIAL R 55-66.

Interaction of a free flame front with a turbulence field, by Maurice Tucker. U. S. National Advisory Committee for Aeronautics, Mar 1955. 57p diags, graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116932

Theoretical values are obtained for the root-mean-square flame-generated turbulence velocities and the attenuating pressure fluctuations resulting from a linearized interaction of a constant-pressure combustion front with a field of isotropic turbulence. The anisotropic flame-generated turbulence is found to be of about the same intensity as the incident turbulence. A brief discussion of turbulent flame speed is given. NACA TN 3407.

Investigation of drains discharging liquid into subsonic and transonic streams, by Allen R. Vick and Frank V. Silhan. U. S. National Advisory Committee for Aeronautics, Mar 1955. 54p photos, diags, graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116873

Results of an investigation on the characteristics of drains discharging liquid into an airstream at Mach numbers from 0.5 to 1.3 are presented in the form of surface stain patterns, schlieren photographs of the flow, and drag measurements for drains of circular, elliptical, and airfoil cross-sectional shapes. Variables whose influence have been investigated include Mach number, liquid reservoir pressure, drain extension, angle of sweep, and end shape. Vent pres-

sure data are presented as differentials between the free-stream and drain static pressure for various tube configurations. NACA TN 3359.

Molybdändisulfid, ein neuartiges schmiermittel (Molybdenum disulfide, a new type of lubricant), by G. Spengler. Translated and edited by Prof. F. A. Raven. Jan 1955. 24p photos, drawings, diags, graphs, table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116689

Natural molybdenum disulfide in pure form due to its structure, its chemical and physical properties, and particularly owing to its anti-corrosion properties is excellently suited for use as a lubricant for special purposes. Thus, for example among other factors, for well-defined test conditions, the friction coefficients measured revealed the superiority of this new lubricant, compared to other lubricating agents. Translated from Zeitschrift des Vereines Deutsches Ingenieure, vol. 96, no. 17/18, 11 Jun 1954, p. 506-612. STS 198. NAVSHIPS T 566.

Sur l'analyse des constituants des huiles de graissage: Etablissement de la structure chimique. (Concerning the analysis of constituents of lubricating oils: Determination of the chemical structure), Michel Bestougeff. Translated by F. Rizzo. Nov 1954. 12p table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116745

Translated from Chimie et Industrie, vol. 47/48, p. 139-141.  
1. Lubricating oils - Analysis - France 2. NAVSHIPS T 574.

Synthetic lubricants, by W. E. McTurk. Standard Oil Development Co., Linden, N. J. Oct 1953. 167p photo, drawing, graphs, tables (part fold). Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$4.25. PB 111565

This study of means for increasing the availability of ester-type synthetic lubricants suitable for aircraft application has been approached in two ways: (1) a survey of the potential availability of raw materials, and (2) evaluation of many types of esters in an effort to find a wider selection of suitable products from which finished oils could be developed. It is believed that the most worthwhile contribution of this work has been obtained from the second approach, which has resulted in the cataloguing of some critical properties of a wide variety of esters. All of the information obtained during the years' work is compiled in the Appendices to this report, Appendix I covering the literature survey, Appendix II, the results of the additional work, and Appendix III, IV, & V giving the more important conclusions reached during these studies. Final report under Contract no. AF 33(038)-14593 for period Jul 8, 1950-Aug 7, 1952. Appendices 3-5 are 5th-7th quarterly progress reports. AAF WADC TR 53-88.

Temperatur und verlagerung von zylindrischen gleitlagern bei hoher drehzahl (Temperature and deflection of cylindrical friction bearings at high rpm's), by Hermann Stephan. Translated by F. A. Raven. Jan 1955. 108p photo, diagrs, graphs, tables (2 fold). Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$4.75, Photocopy \$14.00. PB 116806

From the hydrodynamic bearing theory, equations are deduced for the mean bearing temperature, the friction factor of the loss energy, and the feed rate of the oil consumption in a friction bearing. These equations have been supported by numerous tests. Considering the different shapes of the bearings and the flow and friction processes in the bearings, the calculations and the tests harmonize well. On the basis of the equations which are laid down for the mean bearing temperature, the friction coefficient, and the feed rate of the oil consumption of a bearing, its temperature, loss energy and oil consumption can easily be determined for all practical shapes and operating conditions. Translated from VDI-Forschungsheft no. 439. Supplement to Forschung auf dem gebiete des ingenieurwesens, Edition B, vol. 19, 1953. NAVSHIPS T 567. STS 199.

Temperature-composition limits of spontaneous explosion for nine alkylsilanes with air at atmospheric pressure, by Rose L. Schalla and Glen E. McDonald. U. S. National Advisory Committee for Aeronautics. Feb 1955. 13p drawing, graphs. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116725

Over a fuel concentration range of about 2 to 9 percent by volume, the fuels studied were nonexplosive below the following temperatures: tetramethylsilane (CH<sub>3</sub>)<sub>4</sub>Si, 450° C; trimethylsilane (CH<sub>3</sub>)<sub>3</sub>SiH, 300° C; diethylsilane (C<sub>2</sub>H<sub>5</sub>)<sub>2</sub>SiH<sub>2</sub>, 255° C; dimethylsilane (CH<sub>3</sub>)<sub>2</sub>SiH<sub>2</sub>, 220° C; ethylsilane (C<sub>2</sub>H<sub>5</sub>)SiH<sub>3</sub>, 215° C; isobutylsilane (i-C<sub>4</sub>H<sub>9</sub>)SiH<sub>3</sub>, 200° C; n-butylsilane (n-C<sub>4</sub>H<sub>9</sub>)SiH<sub>3</sub>, 185° C; methylsilane (CH<sub>3</sub>)SiH<sub>3</sub>, 125° C; and vinylsilane H<sub>2</sub>C=CH-SiH<sub>3</sub>, 90° C. NACA TN 3405.

Thermal equations for flame quenching, by A. E. Potter, Jr. and A. L. Berlind. U. S. National Advisory Committee for Aeronautics. Feb 1955. 18p graph, table. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116724

The equation is essentially an extension of a previously proposed diffusional concept. The equation was tested, using published quenching-distance data for propane-oxygen-nitrogen flames, which include the effect of oxygen-nitrogen ratio, equivalence ratio, pressure, and initial temperature. NACA TN 3398.

## HIGHWAYS AND BRIDGES

Load-carrying capacity of frost-affected roads, by C. L. Motl, Carl E. Vogelgesang, and W. W. Stiffler. Presented at the thirty-third annual meet-

ing, January 12-15, 1954. Highway Research Board. 1955. 29p photos, maps, graphs, tables. Available from Highway Research Board, National Research Council, 2101 Constitution Ave., N. W., Washington 25, D. C. \$.45. PB 116629

1. Roads - Surface treatment - Frost damage
2. HRB BUL 96 3. NRC 344.

Model tests to determine optimum key dimensions for keyed construction joints. Final report. U. S. Army. Corps of Engineers. Ohio River Division Laboratories, Rigid Pavement Laboratory, Mariemont, Ohio. Jun 1954. 21p photos, diagrs, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116751

The optimum vertical and horizontal dimensions for a keyed construction joint are: (1) a vertical depth equal to 2/10ths of the slab thickness, and (2) a horizontal depth equal to 1/10th of the slab thickness. Although the exact optimum may vary slightly from these values, they have been selected for their convenience for design purposes. With the exception of those test specimens having a horizontal key depth of 0.05 inch, the "open" joint condition was generally stronger than was the "closed" condition. The 0.025-inch opening allowed the loaded joints to rotate freely without the upper faces of the joints being compressed together. The compressive stresses resulting from the rotation of a tightly closed joint produced increased shearing stresses in the model slabs with a subsequent reduction in the load carrying capacity of the joint. Rigid pavement investigation: Model studies of pavement joints.

Retroreflectors for road signs and vehicles, by R. G. Giovanelli. Australia. Commonwealth Scientific and Industrial Research Organization, National Standards Laboratory. 1954. 17p diagrs, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116752

1. Reflectors - Australia 2. Reflection - Theory - Australia 3. Road markers - Reflectors - Australia 4. Vehicles - Reflectors - Australia 5. AUS CSIR NSL TP5.

## INSTRUMENTS

Analogue series computer, by Max G. Scherberg. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeronautical Research Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Aug 1954. 22p photos, diagrs, graphs. Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$.75. PB 111621

1. Computers, Analog - Design
2. Computers, Analog - Uses
3. Polynomials - Roots - Calculation
4. AAF WADC TR 54-174.

Analysis of vibrations recorded with Ampex model S3037, by Keith E. Rice. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Aug 1954. 29p photos, diags, graphs. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116953

Vibration records are analyzed by separating them into frequency bands and determining the magnitude of the disturbance in each band. The analysis of a vibration cannot be represented as a simple spectrum because the magnitudes and frequencies are not constant. A method of representing quantities which vary in an erratic manner is required. Three methods of examining the frequency bands are described and compared. Dept. of the Army project nr. 3-54-02-025. Signal Corps project nr. 2232E. SCEL TM M-1521.

Balloon borne conductivity meter, by S. C. Coroniti, A. Nazarek, C. G. Stergis, D. E. Kotas, D. W. Seymour, J. V. Werme. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate, Cambridge, Mass. Dec 1954. 25p photos, diags, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116807

Instrumentation for geophysical research, no. 3.  
1. Meters, Conductivity - Design  
2. Atmosphere - Electricity - Measuring equipment  
3. AAF CRC TR 54-206.

Bibliography on data storage and recording, by G. L. Hollander. Massachusetts Institute of Technology. Servomechanisms Laboratory. Feb 1953. 36p. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116930

1. Data storage systems - Bibliography  
2. MIT SL M8.

Cutting characteristics of dental burs as shown by high-speed microphotography, by Jack L. Hartley, Donald C. Hudson, W. T. Sweeney, and W. P. Richardson. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Oct 1954. 9p photos, graph. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116919

Two-microsecond flash still photographs were made of dental burs cutting glass and Bakelite cast resin at 5,000 r.p.m. with a load of 300 grams. Slow motion studies employing a high-speed motion picture camera at 3,000 frames per second were made of steel and carbide burs at 2,500 r.p.m. with a load of 300 to 500 grams, cutting human enamel, dentin,

and laboratory test materials. These methods permitted dynamic observations hitherto not recorded, of clogging, intermittent cutting, and eccentric rotation. A slight superiority of carbide over steel burs was noted when cutting human enamel and dentin. It is believed that this results from the extreme hardness of the tungsten carbide instruments and superior workmanship. AAF SAM Proj no. 21-1603-0001, Report no. 2.

Dynamic testing of materials and structures with a new resonance - vibration exciter and controller, by B. Lazan, A. Gannett, P. Kirmser, J. Klumpp, and J. Brown. Minnesota. University, Minneapolis, Minn. Dec 1952. 47p photos, drawing, diags, graphs. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.75, Photocopy \$6.50. PB 116825

A newly developed machine is described for exciting and controlling resonance or near resonance vibrations in materials and joints under various types of stress. This machine imposes an adjustable-while-running mechanical exciting force at a controllable frequency and by means of automatic electronic controls maintains (a) the desired vibration phase angle (usually  $90^\circ$  for resonance) by controlling the frequency of the exciting force, and (b) the desired magnitude of the excited force by automatically controlling the magnitude of the exciting force. Data are presented on the damping and elasticity properties of aluminum and mild steel, and these are compared with results procured in rotating cantilever beam equipment. Contract no. AF 33(038)-18903. AAF WADC TR 52-252.

Frequency control system for a periodically phase controlled oscillator, by Erich Christian. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Nov 1954. 44p photos, diags, (1 fold), graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.75, Photocopy \$6.50. PB 116954

The performance of the spectrum of a periodically phase controlled oscillator (PPCO) can be described by the spectrum envelope, that is, the amplitude characteristic of the spectrum frequencies. An investigation has been made of three basic types of frequency spectra and their corresponding time function. Theoretical results have been applied to develop a PPCO having considerable suppression of undesired adjacent harmonics and to control this mode of operation automatically. Dept. of the Army project no. 3-99-12-021. Signal Corps project no. 132A. SCEL TM M-1612.

General-purpose card-programmed control panel for the IBM type 602-A calculating punch, by Keith R. Henry and Joe H. Ward, Jr. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. Dec 1954. 23p diagr, tables. Available from Library of Congress,

Publication Board Project, Washington 25, D. C.  
Microfilm \$2.25, Photocopy \$4.00. PB 116908

The function of this panel is to program four basic arithmetical operations such that A can be operated on by B to give C. The particular operation to be performed is designated by an operation code punched in a card. The elements A and B may be taken from any of five storage units or from a card. The result C may be placed in storage or punched in a card. In addition, the panel permits alternate operations to be performed dependent on the results of a balance test. This device will be of interest to personnel responsible for programming the processing of data. Project no. 7702, Task no. 77053. AAF PTRC TR 54-72.

Investigation of the applicability of automatic computing machinery to the solution of the gust problem, by Gabriel Isakson and Claude W. Brenner. Massachusetts Institute of Technology. Dept. of Aeronautical Engineering. Jul 1951. 33p diags, graphs. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116958

Analog computing machines offer little promise as suitable means of solving the present problems of gust loads on a rigid airplane. On the other hand, since digital solution has already been proven feasible manually, an automatic digital machine appears to be a good choice for the job. Of the digital machines investigated, the Whirlwind Computer most nearly fulfills the needs of the program because of its operational ease and speed. Contract NOas 51-183-c.

Periodic phase controlled oscillator with decadic frequency spectrum, by Erich Christian. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Jan 1954. 16p photos, diags, (part fold). Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116750

An oscillator is periodically phase-controlled by modulated pulses. Its output consists of a spectrum of harmonically related frequencies, the amplitude characteristic of which permits the identification of harmonics at predetermined intervals. Details are given about a periodically phase controlled oscillator which generates a spectrum, where the amplitude of each tenth harmonic is larger than that of the interspaced ones. Dept. of the Army project no. 3-99-12-021. Signal Corps project no. 132A. SCELTM M-1557.

Photometric correlator, by J. R. Clark and C. E. Warren. U. S. Air Force. Air Research and Development Command. Human Resources Research Center. Perceptual and Motor Skills Research Laboratory, Lackland Air Force Base, Texas. Nov 1953. 61p drawing, diags, graphs. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.25, Photocopy \$9.00. PB 116693

Contract AF 33(038)-10528. Project no. 509-020-0004. Thesis - Ohio State University.

1. Correlators, Photometric - Calibration 2. AAF HRRC RB 53-42.

Production control through electronic data processing: A case study, by R. G. Canning. California University, Los Angeles, Calif. May 1954. 53p diags. Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$1.50. PB 111580

The purpose of this report is to aid in establishing a path of communication between the potential users and producers of electronic data processing systems. While the report has been prepared by an electronic data systems engineer, every effort has been made to consider the background and interests of business management. The report first considers briefly some of the major principles involved in applying these new machines to business operations. Then, to illustrate the application of these principles, the report describes an in-plant research study, made at a medium size manufacturing plant in the Los Angeles area, and the electronic data processing system which was proposed to meet the production control requirements of this plant. Management sciences research project. Research report no. 30.

Programming for Whirlwind I, by Hrand Saxenian. Massachusetts Institute of Technology. Servomechanisms Laboratory. Electronic Computer Division, Cambridge, Mass. Jun 1951. 80p photos, diags, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.75, Photocopy \$10.25. PB 116730

The terminology and concepts of programming for WWI and of WWI itself, essential to an understanding of programming for the computer, are presented here in the section on Essentials of Programming and in the Appendix. A progressively developed set of examples of programs is included to indicate how programs are developed, to illustrate the nature of various ways of handling different processes, and to suggest the flexibility of programming techniques. Use is made of flow diagrams and of subroutine techniques, both in the analysis of problems and in the preparation of program. Includes: A short guide to coding, using the Whirlwind I code of Oct 1949. MIT SL R 196.

Radio interference measurements and modifications on Birtcher electro-surgical unit, by Irving Brown. Electro-Search, Philadelphia, Pa. Apr 1954. 38p drawings, diags, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116907

Contract Nobsr-63199. Technical report no. 156.  
1. Surgical instruments and apparatus 2. Diathermy apparatus - Interference.

Split flask to facilitate recovery of lyophilized proteins, by Daniel Steinberg and Frederick Highhouse. U. S. National Institute of Health. National Heart Institute. Laboratory of Metabolism, and Instrument Section. Jan 1954. 6p photo. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116937

1. Flasks, Chemical - Design
2. Proteins - Drying - Instruments.

Study of methods for measuring large changes in gravity on an inter-continental basis (supplement), by George P. Woollard, John C. Rose and Wayne Ault. Woods Hole Oceanographic Institution, Woods Hole, Mass. Dec 1954. 21p graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116842

Contract no. AF 19(604)-585. Unpublished manuscript.

1. Gravity - Measurement
2. Gravity - Measuring instruments
3. Chronometers
4. WHOI Ref 54-84 Supplement
5. AAF CRC TN 55-272.

Technical publication abstracts on IBM punched cards, I, by Ward C. Low. Boston University. Upper Atmosphere Research Laboratory, Boston, Mass. Jul 1952. 28p diagr, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116768

Contract AF 19(122)-36. Technical note no. 15.  
1. Punched card system - Uses.

Temperatures developed in rotating dental cutting instruments, by Donald C. Hudson and W. T. Sweeney. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Oct 1954. 12p photos, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116920

A direct approach to the problem of bur temperature measurements was undertaken by placing a thermocouple in the head of the bur. Behavior of dental burs of steel and carbide was studied at speeds up to 24,000 r.p.m., and data on temperature of the cutting bur were compiled. Cutting rates at various speeds were also determined and the data plotted as a function of the time required to accomplish fixed depth cuts in a synthetic dentin-like material. Results obtained from a number of burs indicated that temperatures well above the limit of tolerance of tooth structures to heat are attained by the cutting bur. AAF SAM Proj no. 21-1603-0001, Report no. 1.

## MEDICAL RESEARCH AND PRACTICE

Adrenal and pituitary relations to the formed elements of blood and blood-forming organs, by

Albert S. Gordon, Robert Gerstner, George J. Fruhman, Herbert Megel, and David Landau. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Nov 1954. 14p photos, graphs, table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116748

In the rat, removal of the hypophysis is attended by general hypoplasia of the bone marrow associated with reductions in the numbers of peripheral blood-elements. Respiratory activity of the marrow is lowered by hypophyseal removal. In the long-term hypophysectomized rat, marrow hypoplasia is intensified by cortisone. Growth hormone effects considerable repair of the marrow structure in the pituitary-deprived animal. Adrenal removal is associated with decreased numbers of nucleated erythrocytes in the bone marrow. The marrow structure of adrenalectomized rats is restored to normal by whole adrenal cortical extracts but not by the 11-oxycorticosteroids.

Air evacuation of patients with poliomyelitis, by Hal T. Wilson and Gerard B. Schroering, Jr. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jan 1954. 9p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116921

A review was made of 112 poliomyelitis patients transported by air. These cases were analyzed for evidence of in-flight and post-flight effects. A method of clinical observation and care was developed. Data collected by the new method will result in a more detailed evaluation of new cases. AAF SAM Proj 21-1602-0001, Report no. 1.

Biological and medical aspects of ionizing radiation. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Order parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

A multichannel automatic blood resistance recorder for coagulation studies, by Niel Wald and Everett O. Richey. Dec 1954. 7p photos, diagrs, graphs. Microfilm \$1.50, Photocopy \$1.50. PB 116590

A method is reported for obtaining accurate, objective, and reproducible results in the study of coagulation disorders. It permits a number of determinations to be performed concurrently and rapidly with constant automatic recording of results. The procedure is described for modifying a D.C. potentiometer recorder to carry out this method. AAF SAM Proj no. 21-3501-0005, Report no. 22.

Tolerance to simulated altitude after whole-body x-irradiation in guinea pigs, by Eugene B. Konecci. Oct 1954. 8p graphs, tables. Microfilm \$1.50, Photocopy \$1.50. PB 116589

The hypoxia tolerance curve as measured by the

onset of unconsciousness was obtained by using 190 normal, male guinea pigs averaging 300 grams in weight. Pilot experiments were performed with 100 guinea pigs, and 70 guinea pigs were used in an experiment which was evaluated statistically. Whole-body exposures with a dose rate of 145 r per minute of 260 KVP and 18 ma. x-radiation were used. AAF SAM Proj no. 21-3501-0005, Report no. 17.

tive scoring of windshields but disagree in overall level of scoring. NAM AML AE 4405, Part 2.

Part 3: Details of a proposed method for inspection aircraft transparencies for visually objectionable distortion, by John Lazo. Aug 1950. 12p. Microfilm \$2.00, Photocopy \$2.75. PB 116297

The studies made for Parts 1 and 2 of this project reached certain conclusions concerning those aspects of optical distortion in aircraft transparencies which can be used as predictors of pilot acceptability when applied to an inspection procedure. An inspection method has been detailed which utilizes the results of these studies and includes other criteria of acceptability which are believed to be required for a comprehensive inspection test. This "AMEL method" is detailed in Appendix A. Topical report XG-T-225. Appendix A: Details of "AMEL" inspection method for optical distortion in aircraft cockpit transparencies. - Appendix B: References on transparency distortion inspection. NAM AML AE-4405, Part 3.

Certain physical properties and reaction kinetics of carbon dioxide absorbents, by E. S. Brown. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. May 1954. 11p drawing, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116236

The flow method of measuring reaction rate is applied to the study of the absorption of CO<sub>2</sub> in gas mixtures by solid absorbents. The diffusion rates of ions within the solid absorbents are the limiting factors in absorption rate after partial exhaustion. "Resting" of soda limes only temporarily improves absorption efficiency and may be detrimental to time efficiency. Contract no. AF 18(600)-108. AAF SAM Proj, Un-numbered report.

Comparison of three N-word alternates in the modified ICAC alphabet, by Henry M. Moser and John J. Dreher. Ohio State University Research Foundation, Columbus, Ohio. Nov 1954. 7p diagr, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116282

Contract AF 18(600)316. RF Project 519 Report no. 17.

1. Alphabets, Phonetic - Comparison 2. Articulation 3. Speech - Intelligibility 4. International Civil Aviation Organization (ICAO) 5. OSURF 17 6. AAF CRC TR 54-88.

Development of inspection methods and criteria for optical distortion in cockpit enclosures. U. S. Naval Air Material Center. Aero Medical Equipment Laboratory, Naval Air Experimental Station, Philadelphia, Pa. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Part 2: Validation of an inspection test for windshield distortion, by Lloyd M. Crumley, William Atkinson, Dorothy E. Fletcher. Jun 1954. 24p photos, tables. Microfilm \$2.25, Photocopy \$4.00. PB 116296

An inspection test of aircraft windshield distortion was constructed so that it would agree in ordering windshields with a criterion of pilot judgements of the suitability of the windshields for use in aircraft on the basis of visual quality. The present cross-validation, with a selected set of windshields, indicates that the inspection test reliably predicts this criterion. Individual judges, using the inspection test, agree in rela-

Effect of adrenalectomy on the chemical composition of cardiac muscle in parabiotic and single rats, by Bernhard Hoelscher and Donald D. Van Fossan. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Oct 1954. 7p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116586

Marked differences in heart and thymus weights were found between intact and adrenalectomized parabiotic rats. This effect of adrenalectomy was not observed in single rats 2 or 3 days after operation. There were significant increases in potassium and decreases in sodium that occurred in hearts of adrenalectomized parabionts. The potassium-sodium ratios of hearts of adrenalectomized single rats were within a normal range. The electrolyte imbalance found in hearts of adrenalectomized parabionts suggests a parabiotic barrier which exists for the transfer of adrenal steroids through the anastomosis. AAF SAM Proj no. 21-1201-0001, Report no. 9.

Effect of continuous positive pressure breathing on venous distensibility measured plethysmographically, by James E. Wood. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Oct 1954. 5p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116923

Venous distensibility was measured in human subjects during pressure breathing. The venous system protects the circulating blood volume to a minimal extent when no chest counterpressure is worn. When chest counterpressure is used, no protection is present. AAF SAM Proj no. 21-1201-0001, Report no. 4.



Effects of work prolongation upon components of a perceptual-motor task, by George T. Hauty and Robert B. Payne. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Oct 1954. 9p diagr, graph, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116238

Proficiencies in the control of several simulated aircraft instruments were appraised throughout 7 hours of work to determine if the control of marginal instruments suffered greater progressive impairment than did the control of those instruments located centrally on the instrument panel. The rates of impairment for all instruments were not found to be significantly different. It is accordingly concluded that work prolongation alone does not account for the dissociative changes in the field of visual displays which have been noted to occur in other investigations of fatigue. AAF SAM Proj no. 21-1601-0004, Report no. 6.

Information of elementary auditory displays. II, by Irwin Pollack. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Operational Applications Laboratory, Bolling Air Force Base, Washington, D. C. Nov 1954. 6p diagr, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116643

Previous studies have shown that the amount of information transmitted with a simple one-dimensional auditory display is relatively small. This paper considers three conditions designed to increase the information transmission with elementary auditory displays. The three conditions or variables were (1) the frequency range of tones investigated; (2) the utilization of objective reference tones presented with the unknown tone; and (3) the "dimensionality" of the display--the number of independently varying stimulus aspects of the display. Little additional gain in information transmission is associated with the first factor; a moderate gain is associated with the second; and a relatively substantial gain is associated with the third. Reprinted from J. Acoust. Soc. Am. 25,765-769 (1953). AAF CRC TR 54-55.

Mechanisms of altitude adaptation: The effect of adrenalectomy on basal metabolism of parabiotic rats, by Bernhard Hoelscher. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Nov 1954. 9p photos, drawing, diagrs, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116922

Hemoglobin, hematocrit, and red blood cell count values in parabiotic rats were the same as in single rats and remained unchanged after adrenalectomy of one parabiont. Heart weight was invariably below normal in adrenalectomized and above normal in intact partners. The compensatory adrenal hypertrophy following adrenalectomy of one partner was accompanied by a significant reduction in thymus weight. The basal metabolic rates of adrenalecto-

mized parabionts were found below normal. Implications of these findings are discussed. AAF SAM Proj. no. 21-1201-0001, Report no. 10.

Otitis externa: Further bacteriologic studies, by Florence Young, Albert V. Hardy, and Roland B. Mitchell. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Nov 1954. 4p table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116587

The bacteriologic findings on cultures from 3,577 normal ears and from 1,137 infected external auditory canals are presented. The findings emphasize the prevalence of the enteric flora and particularly Pseudomonas in the exudate of otitis externa. Such organisms are comparatively rare in normal ears. Contract no. AF 33(038)-12465. AAF SAM Proj no. 21-1401-0005, Report no. 13.

Physical action of intense high frequency sound on vertebrate tissue, by W. J. Fry, F. J. Fry, R. B. Fry, D. Tucker, W. Welkowitz. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. Sep 1954. 160p photos, diagrs, graphs, tables. Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$4.00. PB 111619

Tissue of both the central nervous system and of muscle has been used in the work. Temperature changes accompanying acoustic propagation through tissue have been considered from the viewpoints of excessive level, rapid time rate of change, localized hot regions and heating at gas nuclei. The study of the temperature variable has led to an extended study of the method of temperature measurement by thermocouples in sound fields. A new type of acoustic probe has been developed as a primary result of this work. A theoretical mechanism to explain acoustic absorption in tissue has been proposed. Additional studies of the physical mechanism of acoustic action have been concerned with cavitation. Similar effects are produced by the sound on the tissue under one atmosphere pressure or under a hydrostatic pressure sufficiently high to insure that no cavitation could take place. Histological studies of irradiated tissue have been made and a more extensive histological investigation is planned. Contract no. AF 33(038)-20922. AAF WADC TR 54-152.

Relative intelligibility of language groups, by John W. Black and Gilbert C. Tolhurst. U. S. Naval School of Aviation Medicine, Naval Air Station, Pensacola, Fla., and Ohio State University Research Foundation, Columbus, Ohio. May 1954. 7p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 114724

French, British, and American listeners heard recorded intelligibility tests spoken by French, British, and American speakers. The American speakers were the most intelligible to the American listeners. The French speakers were the least

intelligible to all groups. The intelligibility of the French and British speakers was improved for American listeners when the listeners were indoctrinated for one hour in the dialects of the speakers. Contract N6onr-22525, Project NR 145-993, Report no. 21. NMRI Proj. NM 001 064.01.21.

Role of drive reduction in the classical conditioning of an automatically mediated response, by David Zeaman and Norma Wegner. Connecticut, University, Storrs, Conn. Mar 1954. 20p graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116349

Technical report no. 8 under Contract Nonr-631(00). 1. Neuroses, Anxiety - Effect on heart 2. Heart - Effect of anxiety.

Speech reception and temporary hearing loss as a function of exposure to high-level noise, by Gilbert C. Tolhurst. U. S. Naval School of Aviation Medicine, Pensacola, Fla. and Ohio State University Research Foundation, Columbus, Ohio. Oct 1954. 43p diagr, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.75, Photocopy \$6.50. PB 116579

Two studies were made to assess the effects of high level noise upon efficiency in speech reception and temporary hearing losses. It was found that: (1) Changes in noise level adversely affected speech reception while changes in spectra did not, always; time-in-noise did not progressively decrease scores; (2) threshold shifts of 4-5 db were found between pre- and post-two hours noise exposure, time-in-noise of two hours did not produce significant shifts in threshold. Certain spectra affected threshold shifts more than others. Joint project report no. 32, under Contract N6ONR 22525, Project no. NR-145-993. NMRI Proj NM001.064.01.32.

Studies on pleuropneumonia-like organisms. Annual progress report for period 1 Jan to 31 Dec 1953 under Contract no. Nonr-551(04), NR 135-199, by Harry E. Morton, Paul F. Smith, James G. Lecce, Raymond J. Lynn, Donald M. Peoples. Pennsylvania. University, Philadelphia, Pa. Jan 1954. 6p. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116492

1. Pleuro-pneumonia - Research.

Summaries of research reported on during calendar year 1954. U. S. Navy. Medical Research Laboratory, Naval Submarine Base, New London, Conn. Jan 1955. 22p. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116727

1. Medical research - Bibliography 2. Medicine, Naval - Research - Bibliography.

Volumes of distribution of sodium thiosulfate and inulin in normal dogs, by E. Lovell Becker, and Betty J. Joseph. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Oct 1954. 7p graph, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116918

The volume of distribution of sodium thiosulfate was found by the single injection technique, while the volume of distribution of inulin was determined by the constant infusion method. The average volume of distribution in 20 experiments was 24.6 percent of body weight for sodium thiosulfate and 20.4 percent of body weight for inulin. It was concluded that thiosulfate is consistently distributed in a larger volume than is inulin in the normal dog. AAF SAM Proj no. 21-1201-0001, Report no. 8.

## METALS AND METAL PRODUCTS

Abtrennung des eisens von aluminium durch ausschütteln mit diäthyläther und tetrahydrofuran (Separation of iron from aluminum by shaking out with diethyl ether and tetrahydrofurane), by Hermann Specker and Heinrich Hartkamp. Translated and edited by Prof. F. A. Raven, Jan 1955. 5p table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116904

Iron and aluminum may be separated quantitatively as rhodanide complexes in concentrations of 30 to 1 or of 1 to 30 by shaking out 2 or 3 times with ether and tetrahydrofurane. The separation can be effected in 10 minutes. Translated from Zeitschrift für Analytische Chemie, vol. 140, 1953, p. 353-355. STS 203B. NAVSHIPS T572B.

Activation energies for creep of cadmium, indium and tin, by Robert E. Frenkel, Oleg D. Sherby and John E. Dorn. California. University. Institute of Engineering Research. Minerals Research Laboratory, Berkeley, Calif. Apr 1954. 16p graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116836

The total plastic strain for high temperature creep of Cd, In and Sn under constant load appears to be a function of  $t e^{-\Delta H/RT}$ , where  $t$  = duration of test,  $R$  = gas constant,  $T$  = absolute temperature,  $\Delta H$  = activation energy. The activation energies for high temperature creep of Cd, In and Sn were found to be 22,000, 16,500, and 21,000 cal/mole respectively. Contract N7-onr-295, Task order II, NR-031-048, 36th technical report. UC IER Series 22, Issue 36.

Case study data on productivity and factory performance: Copper tube and brass rod. U. S. Bureau of Labor Statistics. Mar 1955. 115p photos, diagrs, graph, tables. Available from

1. Tubes, Copper - Manufacture 2. Rods, Brass -  
Manufacture 3. Copper - Production 4. Copper  
alloys - Production 5. BLS R 81.

Damping, elasticity, and fatigue properties of tem-  
perature - resistant materials, by B. J. Lazan and  
L. J. Demer. Syracuse. University, Syracuse,  
N. Y. Nov 1952. 42p photo, drawing, diagr, graphs,  
tables. Available from Library of Congress, Pub-  
lication Board Project, Washington 25, D. C.  
Microfilm \$2.75, Photocopy \$6.50. PB 116824

The damping, elasticity and fatigue properties of  
several temperature-resistant materials were in-  
vestigated in rotating cantilever-beam testing equip-  
ment. The room and elevated temperature tests  
were designed to reveal changes in damping energy  
and dynamic modulus of elasticity during constant  
cyclic stress fatigue tests at engineering stress  
levels. Contract no. AF 33(038)-18903. AAF WADC  
TR 52-243.

Diffusion of iron, nickel and cobalt into hot-pressed  
titanium carbide, by Robert C. Turnbull. New York  
State College of Ceramics, Alfred, N. Y. Jan 1953.  
31p photos, graphs, tables. Available from Office  
of Technical Services, U. S. Dept. of Commerce,  
Washington 25, D. C. \$1.00. PB 111612

The diffusion of Fe, Ni and Co into a hot-pressed  
TiC body has been studied using the radioactive  
isotopes of these transition metals. The calculation  
of the diffusion coefficients was made both by the  
surface decrease method and by the determination of  
the concentration gradient within the sample.  
Measurements of the diffusion coefficient were made  
at 900, 1000 and 1100°C but evidence is presented  
that D is dependent upon the structure of the sample.  
It appears that grain boundary diffusion is the pre-  
dominant type of diffusion occurring. Reproducibil-  
ity of results, while working with polycrystalline  
material, is difficult because of the variables present  
in such a system. Contract no. AF 33(038)-16190.  
Appendix: X-ray and microscopic examination of  
Co-TiC system. AAF WADC TR 53-1.

Effect of mean stress on the fatigue life of alclad  
24S-T3 and alclad 75S-T6 aluminum alloy, by I.  
Edward Wilks and Darnley M. Howard. U. S.  
National Bureau of Standards. Feb 1953. 35p  
photos, diagrs, graphs, tables. Available from  
Library of Congress, Publication Board Project,  
Washington 25, D. C. Microfilm \$2.50, Photocopy  
\$5.25. PB 116821

An investigation has been conducted to determine the  
effect of mean stress on the axial loading fatigue life  
of two alclad aluminum alloys in sheet form with  
stress concentrations. The alloys were 24S-T3 and  
75S-T6. The specimens were rectangular, 0.8 inches  
wide and 6.5 inches long with a 0.125 inch diameter  
hole drilled at the center. Tests were conducted  
using a lever type machine. Purchase order no. AF

33(038)-4061, Part A. Report on work performed  
during the period 1 Jul 1950 to 30 Jun 1952. AAF  
WADC TR 53-40.

Formation of metallic aerosols, by Donald K. Werle  
and C. Roland McCully. Armour Research Foun-  
dation, Chicago, Ill. Sep 1954. 36p photos,  
drawings. Available from Library of Congress,  
Publication Board Project, Washington 25, D. C.  
Microfilm \$2.50, Photocopy \$5.25. PB 116600

Metallic aerosols have been made by the use of (1)  
a nichrome resistance furnace (1000°C), (2) a  
graphite resistance furnace (2200°C), (3) a tungsten  
filament (3000°C), and (4) exploding wires (over  
5000°C) in a laboratory investigation of metal aero-  
sol formation. Indications are that the less reac-  
tive metals when condensed from vapor in air or in  
nitrogen will probably result in aerosols having  
larger particles than those produced from metals  
that are easily oxidized, such as magnesium, alum-  
inum, and iron. Contract no. AF 19(122)-472. ARF  
Proj C 022, Report no. 17. AAF CRC TN 54-286.

Fundamental study in the principles governing  
seizing and galling. Final summary report for  
year ending Feb 5, 1953, under Contract no. AF-  
18-600-75, by E. S. Machlin, W. R. Yankee, and  
R. Duncan. Columbia University. School of  
Mines, New York, N. Y. Feb 1953. 36p tables.  
Available from Library of Congress, Publication  
Board Project, Washington 25, D. C. Microfilm  
\$2.50, Photocopy \$5.25. PB 116931

Titanium surfaces seize equally well or better to  
metal oxides as compared to clean metals for the  
case where the free energy of formation of the  
metal oxides, at room temperature, is less than  
for Ti O per mole of oxygen. The only case tested  
where the free energy of oxide formation exceeds  
that of Ti O (the metal Mg) showed an increased  
seizability of Ti to clean Mg than to the oxide layer  
on Mg produced in air. Lack of mutual solid solubi-  
lity of metal pairs does not imply lack of solid  
phase weldability, in general. Mutually insoluble  
pairs have been found to seize at room temperature  
as well or better than mutually soluble pairs.  
Photographs are omitted.

Fundamentals of the transition temperature pheno-  
menon in steel. Quarterly progress report no. 10  
for period from 1 Jan 1954 to 31 Mar 1954, under  
Contract Nonr 266(07), by M. Gensamer, J. O.  
Brittain, L. C. Chang and H. Hahn. Columbia  
University. School of Mines, New York, N. Y.  
Apr 1954. 8p diagrs, table. Available from Lib-  
rary of Congress, Publication Board Project,  
Washington 25, D. C. Microfilm \$1.50, Photo-  
copy \$1.50. PB 116880

The internal friction studies of a 1020 steel have  
established a peak at 62°K and indicate that several  
additional peaks exist at lower temperatures.  
Strain-aging experiments, while showing some indi-  
cation of a strain-aging behavior at low tempera-

tures, have not conclusively established the source of the strain-aging. For 9th report see PB 116097.

Handbook on titanium, by Heinrich K. Adenstedt. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Aug 1954. 210p photos, drawings, diags, graphs, tables. Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$3.00. PB 111631

Information has been collected on specific properties and processing of titanium by literature survey and by personal contact with the proper persons and institutions. The data have been evaluated and are condensed in this report. The three major sections of titanium technology covered are: production, physical metallurgy and properties. Contract no. AF 33(616)-2222. AAF WADC TR 54-305, Part 1.

Hydrogen contamination in titanium and titanium alloys. Part I: Hydrogen embrittlement in alpha-beta titanium alloys (Report of WADC technical meeting 29 Oct 1954). Edited by Ralph J. Kofila and Harris M. Burte. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jan 1955. 184p photos, diags, graphs, tables. Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$4.75. PB 111620

Project no. 7351. Contents: Welcome, by J. V. Hearn, Jr. - Role of interstitials in titanium and titanium alloys, by R. J. Kofila. - Hydrogen embrittlement of alpha-beta titanium alloys, by Harris M. Burte. - Mechanical property test methods used for the evaluation of hydrogen embrittlement, by R. F. Klinger and W. H. Rector. - Hydrogen embrittlement of alpha-beta titanium sheet alloys, by G. T. Hahn. - Shear cracking of commercial Ti-8% Mn sheet, by G. T. Hahn. - Effects of heat treatment on hydrogen embrittlement of a high strength titanium alloy, by E. F. Erbin. - Creep embrittlement of titanium alloys, by D. A. Wruck. - Effects of hydrogen on the mechanical properties of titanium, by Robert I. Jaffee. - Hydrogen levels in titanium alloy materials used for current aircraft and engine production, by J. W. Seeger. - Analysis of titanium, by R. E. Brocklehurst. - Quality requirements for titanium and titanium alloys, by H. J. Middendorp. AAF WADC TR 54-616, Part 1.

Influence of isotopic mass on some physical properties of iron, by James O. McCaldin. California Institute of Technology. Physical Metallurgy Laboratory, Pasadena, Calif. Apr 1954. 70p photos, diags, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.25, Photocopy \$9.00. PB 116888

This report presents the results of an experimental study to determine whether atomic mass has an appreciable influence on certain physical properties of

metals. Iron was chosen for this investigation, several specimens of natural iron of high purity and two specimens of iron enriched in the isotopes Fe<sup>54</sup> and Fe<sup>57</sup> being available. Measurements of the temperature coefficients of electric resistance between 67° and 270°K indicate an isotopic effect in qualitative agreement with deductions from the Gruneisen theory. No isotopic influence of thermoelectric power at temperatures between 80° and 270°K is found. Measurements of the temperature of the alpha-gamma allotropic transformation do not indicate an isotopic effect on this temperature. Contract N6onr-24430, Project NR 031-355, 4th technical report.

Intergranular corrosion of high-purity aluminum in hydrochloric acid. I: Effects of heat treatment, iron content, and acid composition, by M. Metzger and J. Intrafer. U. S. National Advisory Committee for Aeronautics. Feb 1955. 38p photos, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116684

The intergranular corrosion of high-purity aluminum in hydrochloric acid was studied as a function of iron content, heat treatment, and acid composition under conditions where the rate of intergranular penetration was of the order of 1 millimeter per week. The behavior of specimens quenched to retain a single-phase structure indicated the rate of attack on the high-angle grain boundaries to be influenced by the segregation in these boundaries of iron and possibly other impurity atoms. NACA TN 3281.

Investigation of axial loading fatigue properties of heat-resistant alloy N-155. Minnesota. University, Minneapolis, Minn. Contract no. AF 33(038)-18903. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Part 1, by B. J. Lazan and F. De Money. Mar 1953. 23p diags, graphs, table. Microfilm \$2.25, Photocopy \$4.00. PB 116827

Dynamic creep and rupture data are presented on N-155 at room temperature and 1000°F., correlated to some extent with prior work. Temperature increases were observed in certain temperature and stress ranges immediately after the application of alternating stress to a test specimen. These are discussed in terms of the internal damping capacity of the material and the possibility of utilizing these observed temperature increases as a qualitative indication of damping is suggested. AAF WADC TR 52-226, Part 1.

Part 2: Exploratory investigation of the effect of temperature, time, and stress on fracture characteristics and metallographic structure of N-155 and hardness of N-155 and S-816, by Fred W. De Money. Feb 1953. 42p photos, graphs, table. Microfilm \$2.75, Photocopy \$6.50. PB 116828

An exploratory study of effect of the test variables on the macroscopic appearance of the fracture surface was continued. Fracture profiles were investigated microscopically and an attempt made to quantitatively analyze the nature of the fracture profile. From this analysis is shown that the tendency for an intercrystalline fracture to occur decreases with increasing stress ratio. Investigation of the metallographic structure and hardness of unstressed N-155 verifies prior work concerning the precipitation hardening characteristics of this material. AAF WADC TR 52-226, Part 2.

Investigations on aluminum hydride, by Gordon G. Evans, with the assistance of M. John Rice, Jr., J. Kevin Kennedy, Harold Agahigian, Frank P. Del Greco, George Chizinsky, and Thomas R. P. Gibb, Jr. Tufts College. Dept. of Physics, Medford, Mass. Apr 1954. 35p drawings, diagr, graphs, table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116879

Contract ONR-494(04).

1. Aluminum hydride - Conductivity 2. Magnesium hydride - Conductivity.

Metallurgical evaluation of refractory compounds for containing molten titanium, by E. J. Chapin and H. W. Friske. U. S. Naval Research Laboratory. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Part I: Oxides, by E. J. Chapin and W. H. Friske. Nov 1954. 42p photos, drawings, diagrs, graphs, tables. Microfilm \$2.75, Photocopy \$6.50. PB 116628

The investigation of selected metallic oxides to determine their suitability as crucible materials for melting titanium showed that desirable inertness was generally lacking. All of the oxides reacted with titanium in varying degree of severity. In certain cases localized attack of the crucibles occurred even before melting was achieved as evidenced by the bonding of heated titanium to the hot crucible upon contact. The metal was contaminated by reaction products which caused hardness increases, embrittlement, and the presence of duplex microstructures. NRL R4447.

Part II: Carbon, graphite, and carbides, by E. J. Chapin and H. W. Friske. Dec 1954. 25p photos, tables. Microfilm \$2.25, Photocopy \$4.00. PB 116631

Crucibles of high purity carbon with exceptionally smooth dense surfaces and of commercially pure and spectroscopically pure graphite were investigated to determine if purity and surface finish were beneficial factors. The results were negative. The monocarbides of Ti, Zr, V, Nb, Ta, and W were investigated for their suitability as crucible materials for melting titanium. All the carbides were attacked by molten titanium resulting

in general solution of the crucible and contamination of the melt, principally with carbon. TiC was found to be the main carbide phase occurring in the metal, derived from reduction of the crucible carbide by molten titanium at the liquid-solid interface. The carbides are not considered suitable crucible materials. NRL R4467.

Minutes of titanium symposium on diffusion and mechanical behavior, held at Columbia University, New York, N. Y., 9 and 10 June 1954. U. S. Ordnance Dept. Metallurgical Advisory Committee on Titanium. 1954. 59p. Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$1.50. PB 111567

Contents: Diffusion of hydrogen, nitrogen, and oxygen in titanium, by G. L. Kehl and R. J. Wasilewski. - Volume diffusion of carbon in titanium, by E. Bucur, F. C. Wagner, and M. A. Sleinberg. - Diffusion studies at the Jet Propulsion Laboratory, by H. E. Martens. - Effect of hydrogen on ultrasonic attenuation in titanium, by C. F. Ying and R. Truell. - Effect of temperature on slip and twinning in titanium, by F. Rosi, F. Perkins, and L. L. Seigle. - Plasticity of beta titanium, by P. A. Albert. - Flow curves of titanium, by F. C. Holden, H. R. Ogden and R. I. Jaffe. - Effect of martensitic transformation on uniform elongation, by S. Weing and E. S. Machlin. - Fatigue characteristics of titanium and titanium alloy rod at minus 40°F, room temperature, and 600°F, by A. L. Blank and J. H. Port. - Basic study of the behavior of titanium alloys under repeated load, by E. D'Appolonia. - Effect of strain rate on the creep and tensile performance of titanium alloys, by D. R. Luster, W. W. Wentz, and J. P. Catlin. - Intermediate temperature creep and rupture behavior of titanium and titanium alloys, by J. W. Freeman, J. V. Gluck, and H. M. Burte. - Creep rupture behavior of titanium and two of its alloys at high temperatures, by L. S. Richardson and N. J. Grant. - Tensile and impact properties of Ti-75A over a range of temperatures, by L. Sama and A. Opinsky. - Effect of strain rate, temperature, notches and hydrogen content on the mechanical properties of high-purity and commercial-purity titanium and RC-130A alloy, by G. A. Lenning, C. M. Craighead, and R. I. Jaffe. - High strength titanium alloys of good ductility and toughness, by S. Abkowitz. - Summary, by L. D. Jaffe.

Poisson's ratio of aircraft sheet materials for large strains, by Stanley Goodman and Stanton B. Russell. U. S. National Bureau of Standards. Feb 1953. 68p photos, drawing, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.25, Photocopy \$9.00. PB 116820

Maximum values of Poisson's ratio obtained were: 0.434 for XA78S-T6 alclad aluminum alloy; 0.473 for 75S-T6 alclad aluminum alloy; 0.445 for 24S-T3 alclad aluminum alloy; 0.622 for FS-1h magnesium alloy; 0.769 for commercially pure titanium; and 0.544 for RC-130-A titanium alloy. Contract no. PO 33(038)51-4061. AAF WADC TR 53-7.

Properties of temperature - resistant materials under tensile and compressive fatigue stress, by B. J. Lazan and E. Westberg. Syracuse. University, Syracuse, N. Y. Nov 1952. 45p photo, drawings, diagrs, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.75, Photocopy \$6.50.  
PB 116823

Newly developed grips and machine improvements are described for fatigue loading under direct stress (tension-compression) ratios of alternating to mean stress from zero to infinity. Data are presented to indicate the uniformity of stress distribution possible with these grips and accuracy of the average stress. Dynamic creep, rupture and ductility data are reported on N-155, S-590 and Vitallium at 1350° and 1500° F. under direct stress combinations from static to reversed loading. Contract no. AF 33(038)-18903. AAF WADC TR 52-227.

Report on the proceedings of the liquid metal utilization conference, convened by the Atomic Energy Research Establishment and held in the Roysse Room, Guildhall, Abingdon on the 16th May 1953, edited by C. G. Banister, C. J. Heming, N. F. Goodway, B. L. Tozer. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment, Mar 1954. 131p photos, drawings, diagrs, graphs, table. Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. \$4.50.  
PB 116716

Appendix 1: Introductory notes to the liquid metals conference, May 1953, by S. G. Bauer. - Appendix 2: Design and operation of apparatus for handling liquid sodium and similar fluids, by W. B. Woolen. - Appendix 3: Electromagnetic pumping of liquid metals, by D. A. Watt. - Appendix 4: Use of liquid metals for high temperature heat transfer, by C. D. Boadle. - Appendix 5: Heat transfer experiments with liquid sodium, by W. B. Hall. - Appendix 6: Design and construction of a sodium - steam superheater test plant, by R. L. J. Hayden. - Appendix 7: Study of sodium heated steam generating plant, by J. E. B. Perkins. - Appendix 8: Application of liquid metals to reheating in steam turbine plant, by B. J. Terrell. AERE X/R 1381.

Review of experimental investigations of liquid-metal heat transfer, by Bernard Lubarsky and Samuel J. Kaufman. U. S. National Advisory Committee for Aeronautics. Mar 1955. 117p graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C.  
PB 116814

Experimental data of various investigators of liquid-metal heat-transfer characteristics were reevaluated using as consistent assumptions and methods as possible and then compared with each other and with theoretical results. The reevaluated data for both local fully developed and average Nusselt numbers in the turbulent flow region were found still to have considerable spread, with the bulk of the data being lower than predicted by existing analysis. NACA TN 3336.

Soft magnetic materials. Ninth quarterly progress report, under Contract no. W-36-039-sc-38243 covering period Mar 1, 1951 to May 31, 1951, by J. P. Martin. Allegheny Ludlum Steel Corp., Brackenridge, Pa. Jun 1951. 51p graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.00, Photocopy \$7.75.  
PB 116831

The investigation of 2 mil strip cold rolled 98 per cent includes results on the effect of temperature on the recrystallization in a magnetic field as determined by D. C. hysteresis loops and magnetization curves. The effects of heat treatment and metallurgical history on the expansion, critical temperatures and specific gravity of various alloys of cobalt iron from 36 - 74 percent cobalt are described. Data on the anomalous results of A. C. core loss measurements of Deltamax annealed in a magnetic field are reported and discussed. Dept. of the Army Project no. 3-99-15-022. Signal Corps Project no. 32-152B-O. SIG Contract W36-039-sc-38243, Report no. 9.

Some fundamental experiments on high temperature creep, by John E. Dorn. California. University. Institute of Engineering Research. Minerals Research Laboratory, Berkeley, Calif. Apr 1954. 63p photos, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.25, Photocopy \$9.00.  
PB 116837

At high temperatures, the creep strain,  $\epsilon$ , appears to be a function of a temperature (T) compensated time (t), namely  $te^{-\Delta H/RT}$ , and the stress. X-ray analyses and plastic properties reveal that the same structures are developed at the same values of  $te^{-\Delta H/RT}$  following creep at the same stress. Contract N7-onr-295, Task order II, NR-031-048, 35th technical report. Prepared for presentation at the International Conference on Creep and Fracture of Metals at High Temperatures, to be held under the auspices of the National Physical Laboratory in Teddington, Middlesex, May 31 to June 2, 1954. UC IER Series 22, Issue 35.

Spectrochemical analysis of titanium metal and alloys. Final report under Contract no. DA-20-018-ORD-11511, by J. H. Enns. Michigan. University. Engineering Research Institute, Ann Arbor, Mich. Jul 1954. 32p graphs, tables. Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$1.00. PB 111587

Spectrochemical analysis of titanium and its alloys by a solution-spark technique provide for the determination of Al, V, Cr, Mn, Fe, B, Mg and Cu. This method is designed to analyze titanium sponge and titanium metal in chip or powder form. For Interim reports no. 1-3 see PB 108884-108885, 116209. MU ERI Proj M973. WAL R 401/98-37.

Strain hardening of latent slip system in zinc crystals, by Eugene H. Edwards, Jack Washburn and Earl R. Parker. California. University. Institute

of Engineering Research. Minerals Research Laboratory, Berkeley, Calif. Apr 1954. 21p photo, drawing, graphs. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00.

PB 116835

When a zinc crystal is deformed in simple shear, anisotropic strain hardening occurs in which the inactive slip systems are hardened more than the active one. The permanent loss of a portion of the strain hardening when the direction of straining is reversed may be due to annihilation of some of the dislocations trapped in the crystal during the first strain. Contract N7-ONR-29516, NR 039-009, Tenth technical report. UC IER Series 27, Issue no. 10.

Study of effects of microstructure and anisotropy on fatigue of 24S-T4 aluminum alloy, by H. A. Lipsitt, G. E. Dieter, G. T. Horne and R. F. Mehl. U. S. National Advisory Committee for Aeronautics. Mar 1955. 46p photos, diagr, graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C.

PB 116875

This report presents the results of an investigation of the statistics of the effects of variation in microstructure (extruded and extruded plus recrystallized) on the fatigue properties of 24S-T4 aluminum alloy notched specimens tested in both the longitudinal and transverse directions. NACA TN 3380.

Trennung arsen, antimony, zinn mit thioformamid (Separation of arsenic, antimony, and tin with thioformamid), by A. Musil, E. Gagliardi, and K. Reischl. Translated and edited by Prof. F. A. Raven. Jan 1955. 15p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75.

PB 116746

An exact method of separation of arsenic, antimony and tin by use of thioformamid is described, which can be carried out simply and without specialized apparatus. The separation of arsenic and antimony from tin can be effected in 10 minutes, the separation of the two latter metals from each other takes 30 minutes; hence, the total operation is completed in one hour at most. By combination of gravimetric and volumetric analyses, the end results are obtained rapidly. The limit of error lies within a few tenths of a milligram. Translated from Zeitschrift fur Analytische Chemie, vol. 140, 1953, p. 342-349. STS 203A. NAVSHIPS T572-A.

## METEOROLOGY AND CLIMATOLOGY

Analysis of the meson component of cosmic rays in the atmosphere, by Stanislaw Olbert. Massachusetts Institute of Technology. Laboratory for Nuclear Science and Engineering. Apr 1954. 72p graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.75, Photocopy \$10.25.

PB 116861

Contract N5ori-07806, NR-026-001.

1. Cosmic radiation - Intensity 2. Spectra, Mesotron 3. MIT LIR TR 61.

Atmospheric nitrous oxide and the nitrogen cycle, by Arthur Adel. Arizona State College, Flagstaff, Arizona. Oct 1951. 20p photos, drawings, diagraphs, table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75.

PB 116787

The discovery and confirmation of nitrous oxide in the atmosphere and in the soils of the earth are reviewed. The relationship of nitrous oxide in the soil to the nitrogen cycle, and the origin of atmospheric nitrous oxide are discussed. Nitrous oxide, emerging from the soils and the seas, is regarded as a vehicle for returning nitrogen to the atmosphere. Contract no. AF 19(122)-198, Scientific report HA-1.

Creep of single crystals of ice, by D. T. Griggs and N. E. Coles. California. University. Institute of Geophysics. Dec 1954. 26p photos, diagraphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00.

PB 116804

Final report on Contract DA-21-018-ENG-220. Dept. of the Army Project 8-66-02-004.

1. Ice crystals - Growth 2. Ice crystals - Creep 3. SIPRE 11.

Dye-tracer technique for experimentally obtaining impingement characteristics of arbitrary bodies and a method for determining droplet size distribution, by Uwe H. von Glahn, Thomas F. Gelder and William H. Smyers, Jr. U. S. National Advisory Committee for Aeronautics. Mar 1955. 74p photos, drawings, graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C.

PB 116815

A dye-tracer technique has been developed from which the droplet impingement characteristics of bodies can be determined by colorimetric analysis. The technique is applicable to various wind tunnels provided the humidity of the air stream can be maintained near saturation. A method is also presented whereby the droplet size distribution of the impinging cloud may be determined by relating the experimental impingement characteristics of a body to the theoretical trajectory results for the same body. NACA TN 3338.

Height and geographical distribution of the oxygen isotopes, by Malcolm Dole. Northwestern University. Dept. of Chemistry, Evanston, Ill. Contract no. AF 19(122)-157. Order separate reports described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each report ordered.

Report no. 1, 3 Oct 1949 to 31 Dec 1949. Dec 1949. 12p photo, drawing, table. Microfilm \$2.00, Photocopy \$2.75. PB 116664

1. Oxygen - Isotopes - Distribution 2. Water - Density - Measuring equipment - Design.

Report no. 2, 1 Jan 1950 to 17 Mar 1950. Mar 1950. 17p photos, graphs, tables. Microfilm \$2.00, Photocopy \$2.75. PB 116665

1. Oxygen - Isotopes - Distribution 2. Mass spectrometers - Tests 3. Air - Sampling equipment - Design.

Report no. 3, 18 Mar 1950 to 30 Jun 1950. Jun 1950. 20p diagsr. Microfilm \$2.00, Photocopy \$2.75. PB 116666

1. Oxygen - Isotopes - Distribution 2. Oxygen - Collecting equipment - Design 3. Air - Sampling.

Report no. 4, 1 Jul 1950 to 30 Sep 1950. Oct 1950. 13p photo, diagsr. Microfilm \$2.00, Photocopy \$2.75. PB 116667

1. Oxygen - Isotopes - Distribution 2. Mass spectrometers - Tests 3. Electrometers 4. Amplifiers, Vibrating reed.

Report no. 5, 1 Oct 1950 to 31 Dec 1950. Jan 1951. 8p diagr. Microfilm \$1.50, Photocopy \$1.50. PB 116668

1. Oxygen - Isotopes - Distribution 2. Mass spectrometers - Design.

Report no. 6, 1 Jan 1951 to 31 Mar 1951. Apr 1951. 30p photos, drawing, diagr, graphs, tables. Microfilm \$2.25, Photocopy \$4.00. PB 116669

1. Oxygen - Isotopes - Distribution 2. Mass spectrometers - Design.

Report no. 7, 1 Apr 1951 to 30 Jun 1951. Jul 1951. 35p diagsr, graphs, tables. Microfilm \$2.50, Photocopy \$5.25. PB 116670

1. Oxygen - Isotopes - Distribution 2. Air - Sampling 3. Air - Sampling equipment - Design 4. Mass spectrometers - Uses 5. Sea water - Oxygen content.

For Final report see PB 114037.

Introduction to numerical weather prediction. U. S. Air Force. Air Weather Service, Andrews Air Force Base, Washington, D. C. Nov 1954. 31p diagsr. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116627

1. Weather forecasting - Methods 2. AAF AWS TR 105-120.

Ionosphere propagation research: Supplementary technical report covering Contract item I under Contract no. AF 19(604)-712 for period Apr I, 1954

to Jul 31, 1954, by L. C. Edwards. Raytheon Manufacturing Co., Waltham, Mass. Aug 1954. 87p photos, diagsr, map, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$4.00, Photocopy \$11.50. PB 116841

This supplementary technical report covers the work done during the period of the contract extension and summarizes the results of the entire effort. For Technical report no. 1 see PB 113979. AAF CRC TN 54-369.

Marine meteorology: WHOI airplane turbulence and flux measurements, O'Neill, Nebraska, August 21-28, 1953, by Andrew F. Bunker. Woods Hole Oceanographic Institution, Woods Hole, Mass. Apr 1954. 26p photo, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116864

The primary purpose of this report is to distribute data obtained over the plains of Nebraska to other participants of the Great Plains Turbulence Field Program at O'Neill. Technical report no. 29 under Contract N6onr-27702(NR-082-021). Unpublished manuscript. WHOI 54-25.

Physical chemical factors involved in atmospheric phase transitions. Report no. 5, Dec 15, 1950 to Mar 15, 1951, under Contract no. AF 19(122)-168, by Howard Reiss and Howard Saltsburg. Boston University. Dept. of Chemistry, Boston, Mass. Mar 1951. 22p diagsr. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116769

1. Cloud chambers - Design 2. Cloud chambers - Operation 3. Vapor pressure - Measurement 4. Atmosphere - Physical properties.

Proceedings of the Conference on Auroral Physics, London, Ontario, Canada, 1951, edited by N. C. Gerson, T. J. Keneshea, R. J. Donaldson, Jr. Jul 1954. 467p photos, diagsr, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$9.25, Photocopy \$59.00. PB 116583

Sponsored jointly by Dept. of Physics, University of Western Ontario, London, Ontario, and Geophysics Research Directorate, Air Force Cambridge Research Center, Cambridge, Mass. Contents: I. Introduction, by N. C. Gerson. - II. Observations of the aurora and airglow. A. The aurora. Protons and the aurora, by A. B. Meinel. - Intensities of ultraviolet features of the auroral spectrum, by W. Petrie and R. Small. - Near-infrared spectrum of the aurora, by A. B. Meinel. - Sunlit aurorae, by C. Störmer. - Radio wave reflections from aurorae, by P. A. Forsyth. - B. The airglow. Investigation of the green line emission in the night airglow, by D. Barbier, J. Dufay, and D. R. Williams. - Diurnal variation of the (OI) 5577A radiation in the night airglow, by F. E. Roach. - III. Laboratory investi-



gations of atmospheric reactions. Laboratory methods of investigating processes important in the high atmosphere, by H. S. W. Massey. - Laboratory studies of auroral afterglow, by L. and R. Herman. - IV. Interpretation of atmospheric emissions. Excitation of the spectrum of molecular nitrogen in the laboratory and in the high atmosphere, by R. G. Bernard. - Intensity distribution in the rotation-vibration spectrum of the OH molecule, by H. S. Heaps and G. Herzberg. - Kinetics of excitation of molecular nitrogen and other molecules, by R. W. Nicholls. - Atomic and molecular processes, by D. R. Bates. - Identification of lines and bands in the night airglow and aurora, by R. W. B. Pearse. - V. Geomagnetic storms and the aurora. Theory of the aurora polaris, by S. Chapman. - Theories of the aurora, by H. Alfvén and S. Chapman. - VI. Solar phenomena and magneto-hydrodynamic waves. Emission of corpuscles from the sun, by K. O. Kiepenheuer. - Magneto-hydrodynamic waves in the sun, by H. Alfvén. - VII. Atmospheric absorption. Absorption of solar radiation by the atmosphere, by A. and E. Vassy. - VIII. Addenda. Closing remarks. Author index. Subject index. AAF GRD RP 30. AAF CRC TR 54-203.

Quarterly progress reports on Contract no. AF 28(099)-1. American Institute of Aerological Research, Pasadena, Calif. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

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Part I: Evaluation of forecast aids. Part II: World-wide weather studies. Part II is an extension and continuation of work done under Contract no. W 28-099 ac-430.

Quarterly progress report no. 3, Mar - May 1949. May 1949. 96p maps, graphs, tables. Microfilm \$4.50, Photocopy \$12.75. PB 116786

1. Weather forecasting - Aids 2. Weather reconnaissance.

Research in the physical properties of the upper atmosphere. Temple University. Research Institute, Philadelphia, Pa. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

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1. Atmosphere, Upper - Ionization - Theory  
2. Atmosphere, Upper - Physical properties  
3. Atmosphere, Upper - Pressure - Measurement  
4. Microphones, Crystal - Design.

Report no. 5, by A. N. Lucian, J. Lloyd Bohn, and Francis H. Nadig. Jun 1949. 18p photos,

diagr. Microfilm \$2.00, Photocopy \$2.75. PB 116656

1. Atmosphere, Upper - Physical properties  
2. Rockets, Upper air - Equipment  
3. Amplifiers - Miniaturization  
4. Microphones, Crystal - Design.

Report no. 10, Jul 1, 1950 to Sep 30, 1950, by J. Lloyd Bohn and Francis H. Nadig. Dec 1950. 72p photos, drawings, diags, graphs, tables. Microfilm \$3.75, Photocopy \$10.25. PB 116657

1. Atmosphere, Upper - Physical properties  
2. Rockets, Upper air - Equipment  
3. Rockets, Upper air - Firing  
4. Blossom IV (Rocket)  
5. Microphones, Crystal - Calibration.

Report no. 11, Oct 1 to Dec 31, 1950, by J. Lloyd Bohn and Francis H. Nadig. May 1951. 45p photos, drawings, graphs, table. Microfilm \$2.75, Photocopy \$6.50. PB 116773

1. Atmosphere, Upper - Physical properties  
2. Rockets, Upper air - Equipment  
3. Noise, Atmospheric - Absorption  
4. Noise, Atmospheric - Measuring equipment  
5. Microphones, Crystal - Design  
6. Blossom IV (Rocket).

Research on experimental hydrodynamics in relation to large-scale meteorological phenomena. Chicago. University. Hydrodynamics Laboratory. Contract AF 19(122)-160. Order separate reports described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Progress reports no. 1 and 2, 1 Oct 1949 through 31 Mar 1950, by Robert R. Long. Oct 1950. 13p photo, drawings. Microfilm \$2.00, Photocopy \$2.75. PB 116780

The general objectives of this project are to study the mechanics and hydrodynamics of the motions that may be produced by various thermal and mechanical means in stationary and rotating fluid layers, with a view to the further development and verification of the principles applicable to such motions in the atmospheres of the earth and other planets. Comparisons with certain other relevant astrophysical and geophysical phenomena may also be possible.

Progress reports no. 3 and 4, 1 Apr 1950 to 30 Sep 1950, by Robert R. Long. Nov 1950. 12p photos, drawings, diags, graphs, tables. Microfilm \$2.00, Photocopy \$2.75. PB 116781

1. Rotation - Control equipment - Design  
2. Flow, Fluid - Measurement  
3. Rotoscopes - Design  
4. Vortex motion - Photographic analysis  
5. Hydrodynamics - Research.

Progress report no. 5, 1 Oct 1950 to 31 Dec 1950, by Robert R. Long. Jan 1951. 56p photos, diags, graphs, table. Microfilm \$3.00, Photocopy \$7.75. PB 116782

1. Rotation - Control equipment - Design  
2. Flow, Fluid - Measurement 3. Vortex motion  
- Photographic analysis 4. Hydrodynamics -  
Research.

Progress reports no. 6 and 7, 1 Jan 1951 to 30  
Jun 1951, by Robert R. Long. Jul 1951. 9p.  
Microfilm \$1.50, Photocopy \$1.50. PB 116783

1. Flow, Fluid - Measurement 2. Flow, Fluid -  
Heat transfer 3. Flow, Fluid - Photographic  
analysis 4. Hydrodynamics - Research.

Progress report no. 8, 1 Jul 1951 to 30 Sep 1951,  
by Dave Fultz. Nov 1951. 6p. Microfilm \$1.50,  
Photocopy \$1.50. PB 116784

1. Flow, Fluid - Measurement 2. Flow, Fluid -  
Heat transfer 3. Flow, Fluid - Photographic  
analysis 4. Hydrodynamics - Research.

State of the earth's atmosphere in the Arctic.

Alaska. University. Geophysical Institute. Con-  
tract no. W28-099-ac-445. Order separate reports  
described below from Library of Congress, Pub-  
lication Board Project, Washington 25, D. C.,  
giving PB number of each part ordered.

Research report no. 2, by S. S. West, Mark W.  
Jones, John R. Bauer, J. Jones, and William R.  
Cashen. Nov 1948. 72p photos, drawings, diagrs,  
graphs, tables. Microfilm \$3.75, Photocopy  
\$10.25. PB 116790

Contents: Part I. Searchlight technique for ex-  
ploring the Arctic, by John R. Bauer. - Part II.  
Ozone, by J. Jones. - Part III. Ionization in the  
upper atmosphere, by M. W. Jones. - Part IV.  
Diurnal variation of F-ionization, by S. S. West.  
- Part V. Study of the methods for studying the  
aurora borealis, by J. Jones.

Research report no. 3, by S. S. West, M. W. Jones,  
John R. Bauer, William R. Cashen, J. Jones. Feb  
1949. 62p diagrs, graphs, tables. Microfilm  
\$3.25, Photocopy \$9.00. PB 116791

1. Atmosphere, Upper - Ionization 2. Atmos-  
phere, Upper - Ozone - Measurement 3. Ionos-  
phere - F-layer - Ionization 4. Solar radiation -  
Absorption 5. Light - Scattering - Measuring  
equipment.

Research report no. 5, by M. W. Jones, John R.  
Bauer, William R. Cashen, J. Jones, Agnes L.  
Fitzgerald. Aug 1949. 61p diagrs, graphs,  
tables. Microfilm \$3.25, Photocopy \$9.00.  
PB 116792

1. Oscillations, Lunar - Effects 2. Ionosphere -  
F-layer - Temperature 3. Ionosphere - E-layer  
- Temperature 4. Light - Scattering - Measur-  
ing equipment 5. Atmosphere, Upper - Ozone -  
Measurement 6. Spectrophotometers.

Table of daily integers, 1902-1952, seasonal, solar,  
lunar and geomagnetic, by Julius Bartels. Alaska  
University. Geophysical Institute. Dec 1954. 121p

tables. Available from Library of Congress, Pub-  
lication Board Project, Washington 25, D. C.  
Microfilm \$8.25, Photocopy \$29.00. PB 116742

Tables of integers are given, characterizing each  
mean solar day from 1902 to 1952 inclusive, accord-  
ing to season (SN) sunspot activity (R), phase in the  
lunar month (L), the phase of the principal harmonic  
in the lunar tidal potential that depends on the varia-  
tions of lunar distance (N), and the magnetic activity  
(A). The day to which the integers refer, except in  
the case of A, is the Greenwich day beginning  $O^h$  U.T.  
(universal time); thus all the integers except A are  
appropriate for use in the reduction of geophysical  
data for any station whatsoever. The integers A  
refer to the day beginning at  $3^h$  U.T., and are appro-  
priate for the magnetic classification of the magnetic  
data for Sitka. Some uses of these tables in the ana-  
lysis of geophysical data are briefly indicated.  
Scientific report no. 2 under Contract AF 19(604)-503.

Thunderstorm electricity. Report of Conference on  
Thunderstorm Electricity held at Chicago, Apr 10-  
14, 1950. U. S. Air Force. Air Research and De-  
velopment Command. Cambridge Research Center.  
Geophysics Research Directorate, Cambridge,  
Mass., and Chicago. University. Dept. of Metro-  
rology. Oct 1950. 266p photos, drawings, diagrs,  
graphs, tables. Available from Library of Con-  
gress, Publication Board Project, Washington 25,  
D. C. Microfilm \$9.25, Photocopy \$34.00.  
PB 116663

Contract no. AF 19(122)-194. Contents: Structure  
and dynamics of the thunderstorm, by Horace R.  
Byers and Roscoe R. Braham, Jr. - Thunderstorm  
research program at the New Mexico School of  
Mines, by E. J. Workman and S. E. Reynolds. -  
Problem of the formation of precipitation in cumu-  
lombus clouds, by Helmut Weickmann. - Charge  
distribution in a thunderstorm, by Joachim Kuettner.  
- Contributions to the Thunderstorm Electricity  
Conference from the University of California at  
Berkeley, by Leonard B. Loeb. - Thunderstorm  
electricity, by Ross Gunn. - Hydrometeors and  
thunderstorm electricity, by Seville Chapman. -  
Problems of atmospheric activity, by O. H. Gish. -  
Electric charge carried to ground through thunder-  
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transients investigation of the Lightning and Tran-  
sients Research Institute, Minneapolis, Minn., by  
M. M. Newman. - Power line protection, by E. L.  
Harder and J. M. Clayton. - Lightning protection for  
buildings, by Harold Norinder. - Aircraft phases  
with respect to lightning protection, by M. M.  
Newman. - Suggestions and plans for future work.

ORDNANCE AND ACCESSORIES

Chromatographic studies of smokeless powder and  
related substances, II, by Robert B. Corey and  
W. A. Schroeder. California Institute of Techno-

logy, Pasadena, Calif. Dec 1944. 125p drawings, diagraphs, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$5.25, Photocopy \$16.50.

PB 116731

The chromatographic properties of many compounds encountered in powder chemistry are outlined and new methods are given for the chromatographic separation and quantitative determination of several constituents of smokeless powder. Our knowledge of the mechanism of the stabilization of smokeless powder by diphenylamine has been considerably advanced by the application of these techniques; the results of this work are given in some detail. The qualitative and quantitative chromatographic analysis of foreign powders is described. Progress report under Contract OEMsr-881. Service projects: OD-158 and NO-274. NDRC 8.1. OSRD 4431.

Stabilization of smokeless powder by diphenylamine.

I: Transformation products of diphenylamine in double base powder, by W. A. Schroeder. California Institute of Technology, Pasadena, Calif. Nov 1945. 96p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$4.50, Photocopy \$12.75.

PB 116713

This report describes chromatographic-spectrophotometric procedures for the isolation and roughly quantitative determination of the individual transformation products of diphenylamine in smokeless powders, together with the results of the application of these procedures to samples of smokeless powder. A mathematical treatment of the results is given. Contract OEMsr-881. NDRC Div 8. OSRD 5965.

Stabilization of smokeless powder by ethyl centralite.

I: Transformation products of ethyl centralite in double base powder, by Kenneth N. Trueblood. California Institute of Technology, Pasadena, Calif. Oct 1945. 134p drawing, diagraph, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$5.75, Photocopy \$17.75.

PB 116732

A qualitative and quantitative study has been made of the transformation products of ethyl centralite in various double base powders which have been stored at elevated temperatures. In addition, investigations have been made of the mechanisms of the transformations of centralite through a study of the effects of various reagents on the pure compound. The results of all of these experiments are presented and their interpretation discussed. A scheme has been proposed to explain the transformations of centralite in double base powder. Although the chemistry of stabilization by centralite has been advanced considerably several important problems remain. Methods of attack on these problems have been suggested. Service projects: NO-274 and OD-158. Contract OEMsr-881. NDRC 8. OSRD 5967.

PERSONNEL APTITUDE TESTING  
AND JOB TRAINING

Administration of the aviation cadet-officer candidate qualifying test under operational versus part-timed conditions, by Jane McReynolds. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. Dec 1954. 10p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50.

PB 116737

1. Personnel, Flying - Tests 2. Tests, Officer qualification 3. AAF PTRC TR 54-78.

Development of attitude scales relevant to combat crew membership, by Dorothy M. Kneell and Glen F. Stice. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Crew Research Laboratory, Randolph Air Force Base, Texas. Nov 1954. 32p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25.

PB 116635

Project no. 7713.

1. Crew, Air - Psychological factors 2. Personnel, Flying - Psychological records 3. Psychological tests - Rating scales 4. AAF PTRC TR 54-63.

Development of a measure of pilot instructor proficiency based on the critical requirements of the instructor's job, by Richard L. Krumm. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Basic Pilot Research Laboratory, Goodfellow Air Force Base, Texas. Dec 1954. 68p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.25, Photocopy \$9.00.

PB 116805

Contract no. AF 33(038)-23183. Project no. 7710, Task no. 77166.

1. Instructors, Aviation - Evaluation 2. Personnel, Flying - Training 3. AAF PTRC TR 54-111.

Differential performance of fleet and recruit personnel in Torpedoman's Mates School, by Roger B. Allison, Jr. Educational Testing Service, Inc., Princeton, N. J. Apr 1954. 26p diagraph, graph, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00.

PB 116859

The purpose of this study was to evaluate the influence that certain background and training factors

may have upon the relationships between test scores and criterion measures. The results of the study indicate that the fleet subjects earned higher grades in a Torpedoman's Mates School than did recruit subjects who had similar scores on tests from the Navy Basic Battery. Contract Nonr-694(00), Project NR 151-113.

Empirical evaluation of work partner choices after limited contact, by Thornton B. Roby. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Crew Research Laboratory, Randolph Air Force Base, Texas. Dec 1954. 33p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116638

Project no. 7713, Task no. 77231.  
1. Psychological tests - Evaluation 2. Crew, Air - Psychological factors 3. AAF PTRC TR 54-69.

Evaluation of selected machinist tests for possible use as Air Force machinist proficiency measures, by Nicholas A. Fattu, Egbert L. Pfeiffer, Robert G. Demaree, and Carlton E. Wilder. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Training Aids Research Laboratory, Chanute Air Force Base, Ill. Nov 1954. 16p drawing, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116633

A work-sample test was developed which requires a machinist to follow a blueprint drawing and to use a lathe and milling machine in the tooling of a product. A method of scoring the product for accuracy and workmanship was developed. Project no. 507-012-0002. AAF PTRC TR 54-54.

Factor analyses of Airman Classification Battery AC-1A and selected Air Force and civilian tests from the 1949 normative survey, by Gabriel Friedman and Howard M. Detter. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. Dec 1954. 20p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116736

Project no. 7700.  
1. Personnel, Flying - Classification 2. Personnel, Flying - Tests 3. Airman Classification Battery 4. AAF PTRC TR 54-75.

Factor analysis of the airman classification battery AC-1B, the USES general aptitude test battery, experimental vision and spatial tests and psychomotor tests, by Gabriel Friedman and Frank C. Ivens. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. Dec 1954. 17p

tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116636

Project no. 7700.  
1. Psychological tests - Evaluation 2. Personnel, Flying - Psychological records 3. Psychomotor tests 4. Ability tests 5. AAF PTRC TR 54-67.

Navy group Rorschach as a research instrument: Reliability and norms, by J. R. Rohrer, E. L. Hoffman, J. W. Bagby, Jr., Robert S. Herrmann and W. L. Wilkins. Tulane University. Urban Life Research Institute, New Orleans, La. Apr 1954. 28p diagr, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116845

ONR Contract N7onr-43404.  
1. Rorschach tests 2. Personality tests 3. Psychological tests - Rating scales.

Recent experiments on knowledge of results with psychomotor devices, by Edward A. Bilodeau. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Skill Components Research Laboratory, Lackland Air Force Base, Texas. Dec 1954. 16p. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116637

Project no. 7707, Task no. 77130.  
1. Psychomotor tests - Rating scales 2. Personnel, Flying - Training equipment 3. Scoring devices 4. AAF PTRC TR 54-68.

Relationships between length of acquaintance and nature of trait rates and agreement between raters, by Russell J. Mays. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. Nov 1954. 24p photos, drawings, diagrs, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116634

Project no. 503-001-0007.  
1. Psychological tests 2. Personnel, Flying - Psychological records 3. AAF PTRC TR 54-55.

Relative predictive efficiency of three methods of utilizing scores from biographical inventories, by Evan W. Pickrel. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. Dec 1954. 27p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116891

Thesis - Univ. of Texas. Project no. 503-001-0015.  
1. Ability tests 2. AAF PTRC TR 54-73.

Television in Army training: Evaluation of television in Army basic training, by Joseph H. Kanner, Richard P. Runyon, Otello Desiderato, George Washington University. Human Resources Research Office, Washington, D. C. Nov 1954. 65p photos, diagrs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.25, Photocopy \$9.00.  
PB 116695

The major aim of the present study was to obtain a measure of the relative teaching effectiveness of television instruction as compared to regular instruction, utilizing Army basic training subject matters. In this comparison, current teaching procedures, subject-matter content, and sequence were not altered. The study was not designed to change or reorganize regular Army instruction for television purposes, or to systematically pursue factors leading to the most effective television presentation. GWU HRRO TR 14.

Use of previous flying experience as a predictor variable, by Joseph A. Tucker, Jr. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Texas. Dec 1954. 12p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75.  
PB 116735

Project no. 7701.

1. Personnel, Flying - Records 2. Personnel, Flying - Training 3. AAF PTRC TR 54-71.

Validity of several non-cognitive tests as predictors of certain Naval Officer Candidate School criteria, by G. J. Suci and T. R. Vallance. American Institute for Research, Inc., Pittsburgh, Pa. Apr 1954. 20p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116858

Analysis by correlational methods indicated that the predictor tests did not show close enough relationships with OCS performance measures to justify their adoption as predictor instruments; however, the Rigidity Test and certain aspects of the Authoritarianism Test (F-scale) showed sufficient promise to justify further investigation. Contract Nonr 890(01). NAVPERS TB 54-5.

## PHOTOGRAPHIC AND OPTICAL GOODS

Bibliography of production, utilization and research on instructional films. Pennsylvania State University, State College, Pa. Nov 1953. 148p. Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$3.75.  
PB 111630

Instructional film research program. Contract N6-onr-269. Project 20-E-4.

1. Motion pictures, Educational - Bibliography  
2. SDC TR 269-7-40.

## PHYSICS

### General

Determination of effective stress by means of small cubes taken from photoelastic models, by Joseph S. Brock. U. S. David W. Taylor Model Basin. Sep 1952. 15p diagrs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116749

1. Stress analysis - Methods 2. Stresses - Measurement 3. DWTMB 829.

Development of the mapping function at an analytic corner, by R. Sherman Lehman. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. Mar 1954. 18p. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116306

Technical report no. 21. Contract Nonr 225(11) (NR-041-086).

1. Mapping, Conformal - Theory 2. Mathematical equations and solutions 3. SU AMSL TR 21.

Discrete vortices in the transition range of flow in a pipe, by John R. Weske. Maryland. University. Institute for Fluid Dynamics and Applied Mathematics. Feb 1955. 23p photos, diagrs, graphs. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116688

Results of experimental investigations of three-dimensional discrete vortices of the "Theodorsen Horseshoe" type produced in pipe flow at transition Reynolds numbers are presented. The behaviors of the observed vortex filaments is explained by reference to kinematic and dynamic effects in the flow. Contract no. AF 18(600)-893. Technical note BN-47.

Ducts for accelerated flow, by T. C. Lin. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Apr 1954. 37p diagrs, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116832

A method of design for two-dimensional contracting ducts for incompressible and inviscid flow has been developed which gives a rapid change of cross-section with no pressure discontinuity or adverse pressure gradient. While giving essentially uniform flow on both ends it yields ducts of smaller overall length and shorter wall length than those given by existing methods for any contraction ratio. The design is based on a fan-shaped boundary chosen in

the hodograph plane, for which the flow is found by conformal mapping. Contract N7onr-35801, T. O. I, NR-041-032. GDAM A11-110. GDAM TR 110.

Evaluation of non-Newtonian flow in pipe lines, by Ruth N. Weltmann. U. S. National Advisory Committee for Aeronautics. Feb 1955. 40p diags, graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116723

The advantages of properly designed rotational viscometers over capillary viscometers for measuring these flow curves and interpreting them to obtain the basic flow parameters are discussed. Dimensionless parameters are calculated from these basic flow data and are used to construct a generalized friction diagram to describe the flow characteristics of Newtonian and non-Newtonian materials in pipe lines. NACA TN 3397.

Experimental studies of a polar vortex, I, by Dave Fultz. Chicago. University. Hydrodynamics Laboratory. Jun 1950. 21p photos, diags, graphs, table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116777

Contract AF 19(122)-160, Technical report no. 1.  
1. Vortex motion - Theory 2. Vortex motion - Measuring equipment - Design 3. Rotoscopes - Design.

Flow of a liquid past a barrier in a rotating spherical shell, by Robert R. Long. Chicago. University. Hydrodynamics Laboratory. Jan 1952. 32p photos, drawing, diags. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116779

Contract AF 19(122)-160, Scientific report no. 3.  
1. Flow, Fluid - Measurement 2. Atmosphere - Circulation 3. Vortex motion - Theory.

Generalization of gas-flow-interferometry theory and interferogram evaluation equations for one-dimensional density fields, by Walton L. Howes and Donald R. Buchele. U. S. National Advisory Committee for Aeronautics. Feb 1955. 71p photos, drawings, diags, graphs. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116718

Theoretical limitations and systematic errors of the equations are investigated. Criteria for applicability and for avoiding apparent-ray-trace crossing are presented. The theory indicates that errors caused by an extended light source and test-section windows are negligible in practice. Analytical and experimental checks of the validity of the evaluation equations are presented. Theoretical results are compared with those of previous analyses. NACA TN 3340.

Integral of a symmetric unimodal function over a symmetric convex set and some probability inequalities, by T. W. Anderson. Stanford University. Dept. of Statistics, Stanford, Calif. Apr 1954. 11p. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116846

Technical report no. 22 under Contract N6onr-251, Task order III (NR-042-993).  
1. Gaussian law (Mathematics) 2. Equations, Integral 3. Mathematical equations and solutions 4. Modal response coefficients 5. Statistical methods.

Internal flow research. Progress report I-11 under Contract Nonr-248(33). Johns Hopkins University. Dept. of Mechanical Engineering. Aug 1953. 63p photos, drawing, diags, graphs, table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.25, Photocopy \$9.00. PB 116759

Contents: Operating manual for the twin bridge and amplifier hot-wire anemometer, by Salamon Eskinazi. - Spot welding of hot-wire probes, by John S. Gitt. - Correction of bi-stable phenomenon in the operation of the wind tunnel, by John L. Lumley. - Appendix: Precision inclined manometer.

Mathematical technique for the analysis of linear systems, by John R. Ragazzini and Arthur R. Bergen. Columbia University. Dept. of Electrical Engineering. Electronics Research Laboratories. Mar 1954. 27p diags, fold graph, table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116574

It is shown in this paper that the z-transformation developed originally for the analysis and synthesis of sampled-data systems is applicable to numerical solutions of continuous linear systems. A model of the continuous linear system is devised in which sampling is introduced at some convenient point. The sampled time function is then reconstructed into a polygonal approximation by means of a holding operator and the output of the system is readily computed as a train of pulses giving the values of the output at sampling instants. Both analytic and arbitrary inputs can be handled by this model. The system of analysis described in this paper is particularly useful to engineers because the procedures are simple, are related to the physical problem and can be applied by use of z-transform tables. Contract AF 18(600)-677, Project no. R-357-50-3. OSR-TN 54-43. CUNERI TR T-4/B.

Note on the effect of meridian curvature, by A. J. Acosta. California Institute of Technology. Hydrodynamics Laboratory, Pasadena, Calif. Apr 1954. 17p diags, graphs. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116084s

The effect of meridian curvature in a centrifugal impeller is estimated by assuming that the meridian streamlines may be replaced by "two-dimensional" surfaces of revolution. For the analysis, a shape was chosen that made the potential flow on this surface easy to solve. Contract N6onr-244, Task order II. Supplement to PB 116084. CIT HL E19.5.

On elastic plastic deformation in beams under dynamic loading, by J. A. Seiler. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Apr 1954. 26p diags, graphs. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116833

This paper gives an elastic-plastic analysis of a simply supported uniform beam subjected to a uniform pressure applied as a pulse of rectangular shape. Plastic flow is taken account of only at a plastic hinge at the mid-section of the beam. The resulting permanent deformations are compared with those predicted by a "rigid-plastic" type of analysis in which elastic deformations are neglected. Because of the failure of the elastic-plastic analysis to consider the plastic deformations at cross-sections other than the middle section, the two solutions do not agree even at large load values. The elastic-plastic results are in better agreement with an incorrect rigid-plastic treatment in which plastic hinge action is assumed to occur only at the mid-point. Contract N7onr-35801, T. O. I, NR-041-032. GDAM A11-109. GDAM TR 109.

On the asymptotic solutions of ordinary linear differential equations about a turning point, by Rudolph E. Langer. Maryland. University. Institute for Fluid Dynamics and Applied Mathematics. Apr 1954. 18p. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116914

Contract N7onr-28507. Lecture series no. 29.  
1. Equations, Linear 2. Mathematical equations and solutions.

On the design and comparison of certain dichotomous experiments, by Russell N. Bradt. Stanford University. Applied Mathematics and Statistics Laboratory, Stanford, Calif. May 1954. 55p. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.00, Photocopy \$7.75. PB 117000

Contract N6onr 25140 (NR-342-022).  
1. Statistical analysis 2. Probability - Theory  
3. Mathematical equations and solutions 4. SU AMSL TR 24.

Study of Cowling's theorem, by Eugene N. Parker. Utah. University. Dept. of Physics, Salt Lake City, Utah. Apr 1954. 27p diags, graph. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PE 116857

In this study a three dimensional magnetic field is expanded in a power series about the z axis. The

first order terms represent a portion of the field with a neutral line, in this case the z axis. The interaction of the magnetic field and a velocity field is studied subject to the restriction that the velocity field vanish at infinity. It is shown that all amplification of the field near a neutral point must terminate after a finite time. Thus, there is no possibility of building with a single interaction of a magnetic and velocity field a dynamo stationary in the average. It is concluded, then, that if a self-sustaining dynamo is possible, it must involve at least two stages of interactions with suitable feedback coupling. Technical report no. 3 under Contract Nonr 1288(00): Earth's magnetism and magnetohydrodynamics.

Theory for predicting the flow of real gases in shock tubes with experimental verification, by Robert L. Trimpi and Nathaniel B. Cohen. U. S. National Advisory Committee for Aeronautics. Mar 1955. 69p photos, diags, graphs, table. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116874

The nonlinear characteristic differential equations applicable to a quasi-one-dimensional unsteady channel flow with friction and heat transfer are linearized and integrated in functional form for the particular study of small perturbations from ideal shock-tube flows. Experimental measurements gave good agreement with the theoretical predictions. NACA TN 3375.

Theory of correlation between two continuous variables when one is dichotomized, by Robert F. Tate. Washington. University. Dept. of Mathematics. Laboratory of Statistical Research, Seattle, Wash. Apr 1954. 41p tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.75, Photocopy \$6.50. PB 116847

Technical report no. 14 under Contract N8onr-520, Task order II, Project NR-042-038.  
1. Correlation (Statistics) 2. Autocorrelation - Theory 3. Sampling devices - Tests 4. Statistical methods 5. Mathematical equations and solutions.

Theory of non-Newtonian flow. I: Solid plastic system, by Taikyue Ree and Henry Eyring. Utah. University. Institute for the Study of Rate Processes, Salt Lake City, Utah. Apr 1954. 25p graphs. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116856

Contract N7-onr-45101, Project no. NR-032-168. Technical report no. XLIII.  
1. Solids - Plastic deformation 2. Flow, Viscous - Theory 3. Plastics - Deformation - Measurements 4. Rubber, Synthetic - Deformation - Measurement 5. Eyring theory (Viscous flow).

Two-dimensional flow around a circular barrier in a rotating spherical shell, by Dave Fultz and Robert R. Long. Chicago. University. Hydrodynamics Laboratory. Sep 1950. 16p photos, diags.

Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116778

Contract AF 18(600)1015. Technical report no. 12.  
1. Harmonic analysis 2. Molecular interactions  
3. Molecules - Collisions.

Contract AF 19(122)-160, Technical report no. 2.  
1. Flow, Two-dimensional - Measurement 2. Flow, Two-dimensional - Measuring equipment 3. Flow, Fluid - Measurement.

## Nuclear

Absorption of nitrogen atoms in the vacuum ultraviolet, by G. L. Weissler and A. W. Ehler. University of Southern California. Dept. of Physics, Los Angeles, Calif. Dec 1954. 11p diags. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116884

Contract no. AF 19(604)-151. Technical report no. 4.  
1. Nitrogen - Absorption 2. Spectroscopy, Ultraviolet 3. AAF CRC TN 55-283.

Absorption spectra of silicone fluids, by D. C. Smith, J. M. French and J. J. O'Neill. U. S. Naval Research Laboratory. Jan 1946. 56p graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.00, Photocopy \$7.75. PB 116632

This report concerns the application of infrared and ultraviolet absorption spectroscopy to the determination of composition and molecular structure of silicone fluids. The spectra of a number of pure reference compounds of open-chain, cyclic and branched dimethyl siloxanes have been obtained for the first time. The spectral data have been correlated with molecular structure and several useful relationships have been determined. The types of polymer structures in each of the silicones examined has been determined, but in some cases the exact structure of the polymer has not been deduced. Evidence concerning the mechanism of polymerization produced by several methods of treatment has been obtained and the results are discussed. NRL P-2746.

Actinium, a bibliography of unclassified and declassified Atomic Energy Project reports and references to the published literature, 1906-1953, by R. W. Clarke. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Aug 1954. 25p. Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. \$1.00. PB 116715

1. Actinium - Bibliography - Gt. Brit. 2. Atomic power - Research - Gt. Brit. 3. AERE Inf/Bib. 95.

Anharmonicity and monomolecular reactions, by R. H. Tredgold. Maryland. University. Physics Dept., College Park, Md. Feb 1955. 10p graph. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$1.50, Photocopy \$1.50. PB 116852

Electric monopole transitions in C<sup>12</sup> and O<sup>16</sup>, by L. I. Schiff. Stanford University. Dept. of Physics, Stanford, Calif. Feb 1955. 20p. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116811

Technical report no. 11, Contract AF 18(600)-545.  
1. Electrons - Interactions 2. Electrons - Scattering 3. Carbon - Molecular electric moments 4. Carbon - Nuclear reactions 5. Oxygen - Molecular electric moments 6. Oxygen - Nuclear reactions 7. Atomic power - Research 8. Nuclear reactions - Mathematical analysis.

Lattice space quantization of coupled meson and nucleon fields, by D. H. Holland. Stanford University. Dept. of Physics, Stanford, Calif. Jan 1955. 21p. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116810

Technical report no. 10, Contract AF 18(600)-545.  
1. Nuclear reactions - Mathematical analysis  
2. Mesotrons - Nuclear reactions 3. Mesotrons - Electron emission 4. Mesotrons - Formation  
5. Electrons - Lattice interactions 6. Atomic power - Research.

Nuclear dispersion contribution to high-energy electron scattering, by L. I. Schiff. Stanford University. Dept. of Physics, Stanford, Calif. Jan 1955. 20p. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116809

Technical report no. 9, Contract AF 18(600)-545.  
1. Electrons - Scattering 2. Nuclei - Dispersion  
3. Atomic power - Research.

Nuclear quadrupole resonance and crystal structure of solid iodine, by K. W. H. Stevens. Harvard University. Cruft Laboratory. Apr 1954. 15p diags, table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116890

Contract N5ori-76, Task order no. 1, NR-071-012.  
1. Iodine - Crystal structure 2. Iodine - Neutron absorption spectra 3. Molecular interactions 4. HU CL TR 197.

Quarterly progress report no. 12 under O.N.R. Contract N5ori-07856. Massachusetts Institute of Technology. Solid State and Molecular Theory Group. Apr 1954. 44p diagr, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.75, Photocopy \$6.50. PB 116915



Contents: - 1. Simplified tight-binding approximation for the body-centered cubic structure, by J. C. Slater and G. F. Koster. - 2. Energy bands in copper, by D. J. Howarth. - 3. Energy bands in chromium, by R. H. Parmenter. - 4. Transition probabilities for x-ray emission in the transition metals, by A. J. Freeman. - 5. Energy bands in graphite, by F. J. Corbato. - 6. An example of impurity levels in solids, by G. F. Koster. - 7. Atomic wave functions for Fe, by G. W. Pratt and J. H. Wood. - 8. Mechanization of molecular calculations, by A. Meckler. - 9. A revised VB method, by R. McWeeny. - 10. Evaluation of matrix elements in LCAO theories, by R. McWeeny. - 11. Nuclear electric quadrupole interaction in the KCl molecule, by L. C. Allen. - 12. Limited configuration interaction treatment of the NH<sub>3</sub> molecule, by H. Kaplan and E. Callen. - 13. The water molecule, by G. F. Koster and H. C. Schweinler. - 14. Scattering of slow neutrons by O<sub>2</sub>, by W. H. Kleiner. - 15. Thermal vibrations of Cu-Zn system crystals, by H. C. White.

Quartz-fibre dosimeters and charging units, by F. B. Whiting. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment, Aug 1954. 20p drawings, graphs, tables. Available from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. \$.75. PB 116714

1. Dosimeters - Design - Gt. Brit. 2. Dosimeters - Operation - Gt. Brit. 3. Gamma rays - Detection - Gt. Brit. 4. Gamma rays - Energy measurements - Gt. Brit. 5. Atomic power - Research - Gt. Brit. 6. AERE EL/L6.

Radiofrequency spectroscopy. Technical report no. VII under Contract N6ori-07126, Project no. 051 215, research performed in the period Oct 1952-Oct 1953. Illinois. University. Dept. of Chemistry, Urbana, Ill. Apr 1954. 60p photos, drawing, diags, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.00, Photocopy \$7.75. PB 116882

Twelve articles reprinted from various periodicals: 1. Nuclear magnetic resonance in thallium compounds, by H. S. Gutowsky and B. R. McGarvey (From Phys. Rev. 91: 81-86). - 2. Chlorine pure quadrupole resonances, by D. W. McCall and H. S. Gutowsky (From J. Chem. Phys. 21: 1300). - 3. Rb<sup>87</sup> and Cs<sup>133</sup> magnetic resonance shifts in the solid halides, by H. S. Gutowsky and B. R. McGarvey (From J. Chem. Phys. 21:1423-1424). - 4. Apparatus for nuclear magnetic resonance, by H. S. Gutowsky, L. H. Meyer and R. E. McClure (From Rev. Sci. Inst. 24: 644-652). - 5. Electron distribution in molecules. III: Proton magnetic spectra of simple organic groups, by L. H. Meyer, A. Saika and H. S. Gutowsky (From Journal of Amer. Chem. Soc., vol. 75, p. 4567-4573). - 6. Proton magnetic resonance in aqueous electrolytes, by H. S. Gutowsky and A. Saika (From J. Chem. Phys. 21: 1688-1694). - 7. Proton magnetic resonance of the CH<sub>3</sub> group. I: Investigation of six tetrasubstituted methanes, by J. G. Powles and H. S. Gutowsky (From J. Chem. Phys. 21: 1695-1703). - 8. Proton magnetic resonance of the CH<sub>3</sub> group. II: Solid solutions of t-butyl chloride in carbon tetrachloride,

by J. G. Powles and H. S. Gutowsky (From J. Chem. Phys. 21: 1704-1709). - 9. Hindered molecular rotation in liquid crystals, by R. D. Spence, H. S. Gutowsky and C. H. Holm (From J. Chem. Phys. 21, p. 1891). - 10. Nuclear magnetic resonance in metals. II: Temperature dependence of the resonance shifts, by B. R. McGarvey and H. S. Gutowsky (From J. Chem. Phys. 21: 2114-2119). - 11. Proton magnetic resonance in natural rubber, by H. S. Gutowsky and L. H. Meyer (From J. Chem. Phys. 21: 2122-2126). - 12. Note on the fluorine resonance shifts, by A. Saika and C. P. Slichter (From J. Chem. Phys. 22: 26-28).

## STRUCTURAL ENGINEERING

Analysis of behavior of simply supported flat plates compressed beyond the buckling load into the plastic range, by J. Mayers and Bernard Budiansky. U. S. National Advisory Committee for Aeronautics, Feb 1955. 44p drawing, diags, graphs. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116720

The method of analysis involves the application of a variational principle of the deformation theory of plasticity in conjunction with computations carried out on a high-speed calculating machine. Numerical results are obtained for several plate proportions and for one material. The results indicate plate strengths greater than those that have been found experimentally on plates that do not satisfy straight-edge conditions. NACA TN 3368.

Approximate methods in the limit design of structures, by J. Heyman and W. Nachbar. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Nov 1950. 29p diags, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116711

Starting from the principles of the statically admissible and kinematically sufficient multipliers, established by Greenberg and Prager, the collapse of plane frames under concentrated loads is treated by approximate methods to obtain upper and lower bounds on the collapse factor. The techniques are extended to include cases of distributed loading. Contract N7onr-358, T. O. 1, NR-041-032. GDAM A11-54. GDAM TR 54.

Effect of damping constants and stress distribution on the resonance response of members, by B. J. Lazan. Minnesota. University, Minneapolis, Minn. Dec 1952. 14p photos, drawings, diags, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116818

The amplitude of vibration of a member at resonance, as defined by its resonance amplification factor, is analyzed in relationship to the damping properties of materials. It is shown that the amplification in

vibration caused by resonance may be considered to be the product of three basic factors: (a) the mathematical factor, (b) the cross-sectional shape factor, and (c) the longitudinal stress-distribution factor. Contract no. AF 33(038)-18903. AAF WADC TR 52-320.

Elastic response of simple structures to pulse loading, by Paul D. Flynn. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Nov 1950. 25p diagsr, graphs, table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116816

This paper deals with the elastic response of some simple structures subjected to a pulse loading. The structures considered are the mass on a spring, the simply supported beam, the cantilever, the circular membrane, and the clamped circular plate. The loading considered is that of a triangular pulse of pressure uniformly distributed over the area of the structure normal to the direction of motion. A method is developed whereby the solutions for the triangular pulse may be modified to give directly the response of the structures to a general pressure-time loading. Ordnance Corps Project TB3-0112J. APG BRL M 525.

On the dynamic behavior of plastic-rigid beams under transverse load, by Carl-Fredrik A. Leth. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Apr 1954. 30p diagsr, graphs. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116830

This paper extends previous work on the dynamic response of simply supported and clamped beams to transverse impact loading. Solutions are obtained for the deformations caused by a general shape of the load-time curve. Numerical examples are computed for a symmetrically triangular load-time relation and compared with a rectangular load-time relation. Contract N7onr-35801, T. O. I, NR-041-032. GDAM A11-108. GDAM TR 108.

Plastic behavior of engineering materials. Illinois. Engineering Experiment Station. Dept. of Theoretical and Applied Mechanics. Contract no. AF 33-(038)-15677. Order separate parts described below from Library of Congress, Publication Board Project, Washington 25, D. C., giving PB number of each part ordered.

Part 1: Axial tension and bending interaction curves for members loaded inelastically, by D. O. Brush, O. M. Sidebottom, and J. O. Smith. Aug 1952. 46p photos, drawings, diagsr, graphs, tables. Microfilm \$2.75, Photocopy \$6.50. PB 116839

This paper presents a theoretical method for constructing dimensionless interaction curves for members subjected to combined tension and bending loads that produce inelastic strains, and presents experimental results which verify the theory. The problem of combined bending and axial com-

pressive loads is discussed and research based on the methods of analysis developed in this investigation is suggested for solving the buckling load of a member subjected to combined bending and axial compressive loads. Some illustrative problems are solved in the Appendix which show how the results of this investigation may be used. AAF WADC TR 52-89, Part 1.

Part 2: Partially plastic thick-walled cylinders, by M. C. Steele. Aug 1952. 65p drawings, diagsr, graphs, tables. Microfilm \$3.25, Photocopy \$9.00. PB 116840

This report presents experimental and theoretical work on the overstraining of thick-walled cylinders. Four mild steel cylinders (2:1 wall ratio) were subjected to internal fluid pressure and strains at the bore and the outside surfaces were measured. In addition, the mechanism of flow was studied by polishing the end and outside surfaces for the observation of Lueders lines. A theoretical analysis is given which is based on results from a quantitative comparison of certain previous theories and available experimental data. The solution is in closed form and is applicable to strain-hardening materials. It is concluded that theoretical analyses, in their present form, do not cope adequately with the inelastic problem concerning the wedge type of yielding in two and three dimensional, non uniform stress fields. Suggestions are given for further research. AAF WADC TR 52-89, Part 2.

Plastic deformations of a beam under a symmetric impulsive loading, by B. A. Cotter and P. S. Symonds. Brown University. Graduate Division of Applied Mathematics, Providence, R. I. Apr 1954. 36p diagsr, graph, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.50, Photocopy \$5.25. PB 116829

The deformation of a free-free beam subjected to a symmetric impulse loading is investigated here by means of a plastic-rigid analysis. The principal deformation magnitude is the final angle at the center of the beam. Results are presented here for this quantity in a general non-dimensional form. Contract N7onr-35801, T. O. I, NR-041-032. GDAM A11-104/26. GDAM TR 104.

## TRANSPORTATION EQUIPMENT

### Aeronautics

#### Aircraft

Analysis of accelerations, airspeeds, and gust velocities from three commercial operations of one type of medium-altitude transport airplane, by Thomas L. Coleman, Martin R. Copp, Walter G. Walker and Jerome N. Engel. U. S. National Advisory Committee for Aeronautics. Mar 1955.

32p diags, graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116796

1. Airplanes, Transport - Acceleration
2. Airplanes, Transport - Loads
3. Airplanes, Transport - Maneuverability
4. Airplanes, Transport - Operation
5. Wings - Loading
6. Gust loads
7. NACA TN 3365.

Analysis of accelerations, gust velocities, and air-speeds from operations of a twin-engine transport airplane on a transcontinental route from 1950 to 1952, by Thomas L. Coleman and Walter G. Walker. U. S. National Advisory Committee for Aeronautics. Feb 1955. 16p graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116722

1. Airplanes, Transport - Acceleration
2. Airplanes, Transport - Operation
3. Airplanes, Transport - Speed
4. Gust loads
5. NACA TN 3371.

Effect of lag of sidewash on the vertical-tail contribution to oscillatory damping in yaw of airplane models, by Lewis R. Fisher and Herman S. Fletcher. U. S. National Advisory Committee for Aeronautics. Jan 1955. 38p photos, diags, graphs, table. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116468

1. Sidewash - Damping effects

2. Tail surfaces - Yawing moment coefficient
3. Stability, Directional - Dynamic tests
4. Stability, Lateral - Dynamic tests
5. Damping derivatives - Stability
6. Airplanes - Yawing
7. NACA TN 3356.

1. Sidewash - Damping effects
2. Tail surfaces - Yawing moment coefficient
3. Stability, Directional - Dynamic tests
4. Stability, Lateral - Dynamic tests
5. Damping derivatives - Stability
6. Airplanes - Yawing
7. NACA TN 3356.

Flight measurements of the velocity distribution and persistence of the trailing vortices of an airplane, by Christopher C. Kraft, Jr. U. S. National Advisory Committee for Aeronautics. Mar 1955. 33p photos, drawing, graphs, table. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116798

1. Airplanes, Fighter - Wake
2. Wings - Wake
3. Vortex motion - Effects
4. Vortex motion - Photographic analysis
5. NACA TN 3377.

Gust-load and airspeed data from one type of four-engine airplane on five routes from 1947 to 1954, by Walter G. Walker. U. S. National Advisory Committee for Aeronautics. Jan 1955. 28p diags, graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116509

1. Airplanes - Speed - Measurements
2. Gust loads
3. NACA TN 3358.

Heat-transfer fluids for aircraft-equipment cooling systems, by C. J. Geankoplis, W. B. Kay, A. W. Lemmon and W. Robinson. Ohio State University

Research Foundation, Columbus, Ohio. Feb 1954. 181p graphs, tables. Available from Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. \$4.75. PB 111593

The primary objective of the present study was to determine the significant properties of liquids which would be suitable for application as heat transport fluids in aircraft equipment cooling systems up to 600°F. Among them, liquids normally available on aircraft, such as fuels, lubricants, and hydraulic fluids, were considered. The effects of heat transfer fluids on cooling system characteristics were evaluated. Physical, chemical and physiological properties were selected as being significant in the evaluation of heat transfer fluids tabulated for 26 fluids. Comparative values were established for several fluids in expendable systems and for two fluids in ram air systems. Contract no. AF 33(616)-147. For second report under this Contract see AAF WADC 54-359. AAF WADC TR 54-66.

#### Instruments

Accurate and rapid method for the design of supersonic nozzles, by Ivan E. Beckwith and John A. Moore. U. S. National Advisory Committee for Aeronautics. Feb 1955. 57p diags, graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116685

1. Wind tunnels, Supersonic - Nozzles - Design
2. Wind tunnels, Supersonic - Flow - Theory
3. NACA TN 3322.

Preliminary investigation of a stick shaker as a lift-margin indicator, by James P. Trant, Jr. U. S. National Advisory Committee for Aeronautics. Feb 1955. 19p photos, diags, graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116686

1. Control sticks - Vibration
2. Airplanes - Stalling - Warning devices
3. NACA TN 3355.

#### Engines and Propellers

Design study for the mechanical attachment of brittle material blades to gas turbine rotors. Final report under Contract Nonr 484(01), Task order NR 094-179, by C. H. Hoppe, Jr. Carter, J. C., Co., Pasadena, Calif. Apr 1954. 62p photos, drawings, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$3.25, Photocopy \$9.00. PB 116817

A design study was conducted resulting in the design of a mechanical attachment for a brittle turbine blade to a ductile rotor disk and an analytical determination of the maximum effective gas temperature and service life of the attachment in a

specific application. Included are brief analyses of the required assembly clearances to provide for dissimilar thermal expansion rates, the effect of rotor rim cooling on the attachment problem, and a detailed description of the methods used for the readers' reference. Report 101.

Experimental investigation of misaligning couples and eccentricity at ends of misaligned plain bearings, by G. B. DuBois, F. W. Ocvirk and R. L. Wehe. U. S. National Advisory Committee for Aeronautics. Feb 1955. 81p photo, drawings, diags, graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116719

1. Bearings, Journal - Stability
2. Bearings, Sleeve - Stability
3. Cornell University, Ithaca, N. Y.
4. NACA TN 3352.

Icing limit and wet-surface temperature variation for two airfoil shapes under simulated high-speed flight conditions, by Willard D. Coles. U. S. National Advisory Committee for Aeronautics. Feb 1955. 33p photos, drawing, graphs. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116653

1. Airfoils - Ice formation
2. Airfoils - Temperature
3. Heat - Transference - Aerodynamics
4. Ice prevention systems - Performance
5. NACA TN 3396.

Ingestion of foreign objects into turbine engines by vortices, by Lewis A. Rodert and Floyd B. Garrett. U. S. National Advisory Committee for Aeronautics. Feb 1955. 23p photos, drawings. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116651

Motion pictures prepared as a supplement to this report may be obtained on loan from NACA headquarters, Washington, D. C.

1. Jet engines, Turbo-jet - Air inlets - Ingestion of foreign objects
2. Jet engines, Turbo-jet - Ice formation
3. Ducts, Air - Ingestion of foreign objects
4. Vortex motion - Effects
5. Ice prevention systems - Performance
6. NACA TN 3330.

Investigation of effectiveness of large-chord slotted flaps in deflecting propeller slipstreams downward for vertical take-off and low-speed flight, by Richard E. Kuhn and John W. Draper. U. S. National Advisory Committee for Aeronautics. Jan 1955. 42p photo, drawing, diags, graphs, table. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116374

1. Wing flaps, Slotted - Deflection
2. Wings - Lift
3. Propellers - Slipstream
4. Helicopters - Stability, Longitudinal
5. Airplanes - Lift
6. Airplanes - Performance
7. Stability, Longitudinal - Static tests
8. NACA TN 3364.

Method for studying the transient blade-flapping behavior of lifting rotors at extreme operating conditions, by Alfred Gessow and Almer D. Crim. U. S. National Advisory Committee for Aeronautics. Jan 1955. 27p diags, graphs. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116375

1. Wings, Rotating - Theory
2. Autogiros - Blade motion
3. Helicopter blades - Tips - Flow patterns
4. Rotors - Stability
5. Rotor blades - Flutter - Theory
6. NACA TN 3366.

Methods for rapid graphical evaluation of cooled or uncooled turbojet and turboprop engine or component performance (effects of variable specific heat included), by Jack B. Esgar and Robert R. Ziemer. U. S. National Advisory Committee for Aeronautics. Jan 1955. 45p drawing, graphs. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116371

1. Jet engines, Turbo-jet - Thermodynamics
2. Jet engines, Turbo-jet - Hydrogen-carbon ratio
3. Compressors, Turbo - Pressure ratio
4. Turbines, Aerodynamic - Cooling
5. Mach number - Effect
6. NACA TN 3335.

Some effects of propeller operation and location on ability of a wing with plain flaps to deflect propeller slipstreams downward for vertical take-off, by John W. Draper and Richard E. Kuhn. U. S. National Advisory Committee for Aeronautics. Jan 1955. 28p photos, diags, graphs. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116469

1. Propellers - Rotation
2. Propellers - Slipstream - Deflection
3. Propellers - Lift
4. Airplanes - Take-off
5. Stability, Longitudinal - Static tests
6. NACA TN 3360.

#### Aerodynamics

Auftrieb einer geknickten ebenen platte (Lift on a bent flat plate), by F. Keune. Translated by Paul F. Byrd. Feb 1955. 15p diags, graphs. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116683

Translated from Bericht der Aerodynamischer Versuchsanstalt Göttingen, Luftfahrtforschung, Mar 20, 1936, p. 85-87.

1. Plates, Flat - Aerodynamics - Germany
2. Lift coefficient - Germany
3. NACA TM 1340.

Deformation analysis of tapered swept wings, by A. H. Hall. Canada. National Aeronautical Establishment. 1953. 11p photos, diags, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C.

Microfilm \$2.00, Photocopy \$2.75. Available for exchange from Director, National Aeronautical Establishment, Montreal Road, Ottawa, Canada.  
PB 116640

A method is outlined for applying the deformation relations derived in N.A.E. Laboratory Report LR-128 (PB 107103) for wings without taper, to the analysis of wings with a moderate degree of taper. The results indicate that within the range of taper ratios considered, the overall effect of root deformation can be closely approximated by use of a mean "root rectangle" in the equations previously derived, together with "effective" values of EI and GJ which allow for the stiffening effect of wing taper. Report 20, formerly LR-44. For LR-44 see PB 108881. NAEC LR 44 Revised. NAEC R 20.

Estimates of probability distribution of root-mean-square gust velocity of atmospheric turbulence from operational gust-load data by random-process theory, by Harry Fress, May T. Meadows and Ivan Hadlock. U. S. National Advisory Committee for Aeronautics. Mar 1955. 49p graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116795

1. Gust loads
2. Loads, Aerodynamic - Theory
3. Random distribution - Theory
4. NACA TN 3362.

Linearized equations of motion underlying the dynamic stability of aircraft, spinning projectiles, and symmetrical missiles, by A. C. Charters. U. S. National Advisory Committee for Aeronautics. Jan 1955. 101p diags. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116508

1. Equations of motion
2. Stability, Dynamic - Mathematical analysis
3. Aircraft - Stability, Dynamic - Theory
4. Missiles, Symmetrical - Stability, Dynamic - Theory
5. Projectiles, Spinning - Stability, Dynamic - Theory
6. NACA TN 3350.

Minimum-drag bodies of revolution in a nonuniform supersonic flow field, by Conrad Rennemann, Jr. U. S. National Advisory Committee for Aeronautics. Feb 1955. 25p diags, graphs. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116721

1. Bodies of revolution - Drag
2. Interference, Aerodynamic - Theory
3. Flow, Supersonic - Theory
4. NACA TN 3369.

Quelques mesures de corrélation dans le temps et l'espace en soufflerie (Some measurements of time and space correlation in wind tunnel), by A. Favre, J. Gaviglio, and R. Dumas. Translated by A. Favre. Feb 1955. 21p graphs. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116717

Translated from La Recherche Aeronautique, no. 32, Mar-Apr 1953, p. 21-28. Communication to the 8th International Congress on Theoretical and Applied Mechanics, Istanbul, Aug 1952.

1. Autocorrelation - France
2. Wind tunnels - Flow - Measurement - France
3. Time interval methods - France
4. NACA TM 1370.

Second-order subsonic airfoil-section theory and its practical application, by Milton D. Van Dyke. U. S. National Advisory Committee for Aeronautics. Mar 1955. 50p diags, graphs, tables. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116876

1. Airfoil theory
2. Airfoils, Two dimensional - Flow
3. Flow, Subsonic - Measurement
4. Flow, Compressible - Theory
5. Mach number - Effect
6. NACA TN 3390.

## Rockets and Jet Propulsion

Rocket fundamentals: Introduction to the theory and practice of military rocket engineering, prepared by members of the staffs of The Rocket Development Division, Research and Development Service, Office of the Chief of Ordnance, Washington, D. C.; The Rocket Research Division, Ordnance Research Center, Aberdeen Proving Ground, The National Bureau of Standards, Division 4, NDRC; The Explosives Research Laboratory, Bruceton, Pa., Division 8, NDRC; The Budd Wheel Company, Division 3, NDRC; The University of Minnesota, Division 3, NDRC; The George Washington University, Division 3, NDRC (Allegany Ballistics Laboratory), edited by Bryce L. Crawford, Jr. Dec 1944. 294p photos, drawings, diags, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$9.25, Photocopy \$37.75. PB 116734

The purpose is to explain fundamental principles governing the behavior of rockets and rocket engineering, exterior and interior ballistics, propellants, igniters, fuzes, launchers, and testing methods for rockets and rocket motors. Second edition of OSRD 3711 (ABL SR-1) (PB 50835). NDRC H.3. ABL SR 4. OSRD 3992.

La virata corretta stazionaria degli aeroplani azionati da turboreattori (Steady properly-banked turns of turbojet-propelled airplanes), by Angelo Miele. Translated by R. H. Cramer. Mar 1955. 35p diag, graphs, table. Available from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 116794

Translated from Rivista Aeronautica, vol. 27, no. 1, 1951, p. 23-35.

1. Airplanes - Turning - Italy
2. Airplanes, Jet propelled - Operation - Italy
3. Jet engines, Turbo-jet - Turning operations - Italy
4. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y.
5. NACA TM 1382.

Project Squid, semi-annual progress report for the period 1 Oct 1953 to 31 Mar 1954 under Contract N6ori-105, Task order III, NR-098-038. Princeton University. James Forrestal Research Center. Apr 1954. 183p diagr, graph, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$7.00, Photocopy \$24.00. PB 116870

For earlier reports see PB 107680 and PB 114392. A cooperative program of fundamental research as related to jet propulsion for the Navy, Air Force, and Army. Contents: Mixing of supersonic and subsonic gas streams (Princeton). - Fundamental investigation of nonstationary flow phenomena (Cornell Aeronautical Laboratory, Inc.). - Investigation of turbulence (Johns Hopkins). - Interaction of discontinuities (U. of Michigan). - Transport properties of liquids (Princeton). - Heat conductivity of gases (M.I.T.) - Prandtl number determination by recovery factor measurements (U. of California). - Physical properties of the oxides of nitrogen (California Institute of Technology). - Heat transfer from gases with large temperature differences between gas and wall (Purdue Univ.) - Investigation of coolant film stability in the two- and three-dimensional cases (Purdue Univ.) - Porous wall cooling studies (Polytechnic Institute of Brooklyn). - Vaporization and combustion of multi-component fuel droplets (Northwestern Technological Institute). - Combustion studies with premixed partly vaporized fuels (Dartmouth). - Gaseous combustion studies (Delaware Univ.) - Investigation of flame propagation and stability with particular reference to the interaction between flame and flow (Cornell Aeronautical Laboratory, Inc.) - Research on flame and ignition phenomena (U. S. Bureau of Mines. Explosives and Physical Sciences Div.) - Minimum spark ignition energy and the source of ionization in flames (Experiment, Inc.) - Combustion in high-velocity ducted burner (Experiment, Inc.) - High output combustion (M.I.T.) - Turbulent flames, flame stability, and rough burning (Atlantic Research Corp.) - Study of chemical kinetics and basic combustion processes (Princeton Univ.) - Ignition study of falling fuel droplets (Purdue Univ.) - Appendix A. Reports published Oct 1, 1953 to Apr 1, 1954.

## Marine Transportation

Cable ship Salerno, by Francisco Rossi. Translated by F. Rizzo. Feb 1955. 23p photos, drawings, diagrs, graphs. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116747

A novel system of providing power for propulsion and cable engines is foreseen. A form of direct current system is installed in which one or more generators are so controlled that they deliver a perfectly steady current of 800 amp., whatever the load. SALERNUM has every modern scientific device for efficient navigation and to enable cable faults to be located. Translated from International Congress of Naval Engineering and Navigation, International Exposition on Navigation, Sep 26 - Oct 1, 1954. NAVSHIPS T575.

Experiments with tanker models II, by Hans Edstrand, E. Freimanis and Hans Lindgren. Sweden. Statens Skeppsprovingsanstalt, Göteborg, Sweden. 1953. 23p drawings, diagrs, graphs, tables. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116760

1. Ship models - Tests - Sweden 2. Tank ships - Models - Sweden 3. Ships - Stability tests - Sweden 4. Sweden. Statens Skeppsprovingsanstalt, Göteborg, Sweden. Meddelanden nr. 26.

Notes on accessories for free divers: I. Construction of a hood for protection in cold water, by James H. Carpenter and Thomas C. Hopkins, Jr. II: A pack board harness for the aqua-lung, by James H. Carpenter and Richard C. Whaley. Johns Hopkins University. Chesapeake Bay Institute. Apr 1954. 11p photos, drawings. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.00, Photocopy \$2.75. PB 116887

Contract Nonr 248(30), Project NR 083-070. Reference 54-3.

1. Diving equipment - Design 2. Aqua-lung - Harnesses - Design.

Propagation and dissipation of long internal waves, by Maurice Rattray, Jr. Washington University. Dept. of Oceanography, Seattle, Wash. Mar 1954. 26p graph, table. Available from Library of Congress, Publication Board Project, Washington 25, D. C. Microfilm \$2.25, Photocopy \$4.00. PB 116314

The effect of friction on the propagation of long internal waves in a rotating ocean is investigated theoretically for the simple case of a two-layer system subjected to a constant eddy viscosity. Waves of inertial period are excluded. Typical distances for a 50% decrease in amplitude are found to be 1,000 to 2,000 km. Technical report no. 27 under Contract N8onr-520/III, Project NR 083-012. WU OR 54-11.

Survey report on human factors in undersea warfare, prepared by the Panel on Psychology and Physiology. Supplement. National Research Council. Committee on Undersea Warfare. 1954. 92p photos, diagrs, graphs, tables. Available from NAS-NRC Publications Office, 2101 Constitution Ave., Washington 25, D. C. \$.75. PB 111203s

Four chapters which were not published previously because of security restrictions have been declassified by authority of the Office of Naval Research and are being made available as a supplement to those now purchasing or already possessing the book. Supplement to PB 111203. Contents: A. The night lookout, by Carl H. Wedell. - B. Design and use of optical instruments, by Lorrin A. Riggs. - C. Visual display of complex information, by J. W. Gebhard. - D. Arrangement of equipment, by Ralph C. Channell and Martin A. Tolcott.

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Status report of Lobund study on comparative effects of total body radiation, by Helmut A. Gordon and William C. Scruggs. Lobund Institute. University of Notre Dame, South Bend, Ind. Nov 1953. Contract No. N6-ori-83. 13p. Microfilm \$2.00, Photocopy \$2.75. AECU-2977

The thyroid. Report of symposium held June 9 to 11, 1954. Brookhaven National Laboratory. 271p. \$1.75. BNL-305 (C-20)

Statistical analysis of the medical effects of the atomic bombs. From the report of the Joint Commission for the investigation of the effects of the atomic bomb in Japan, by Ashley W. Oughterson and others. Army Institute of Pathology. 288p. \$1.85. TID-5252

## Chemistry and Chemical Engineering

On the one-body model of alpha radioactivity. IV. Calculated wave amplitudes near the nucleus, by G. H. Winslow. Argonne National Laboratory. Jan 1955. Contract W-31-109-eng-38. 42p. Microfilm \$2.75, Photocopy \$6.50. ANL-5381

Radiations of Tl<sup>209</sup>, Pb<sup>209</sup>, Bi<sup>213</sup>, and Ra<sup>225</sup>, by L. B. Magnusson, F. Wagner, Jr., D. W. Engelkemeir and M. S. Freedman. Argonne National Laboratory. Contract W-31-109-eng-38. 23p. Microfilm \$2.25, Photocopy \$4.00. ANL-5386

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#### Instrumentation

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Calculations of shielding for burned-out reactor fuel elements, by H. E. Stern. Oak Ridge National Laboratory. Dec 1953. Contract No. W-7405-eng-26. 20p. \$.25. ORNL-1840

Negative pions from neutron bombardment of deuterons (thesis), by Myron William Knapp. Rad. Lab., University of Calif., Berkeley, Calif. Nov 1954. Contract No. W-7405-eng-48. 67p. \$.55. UCRL-2799

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... a compilation of published and unpublished data, the latter obtained from experts in the titanium field, which describe the undesirable features of this "glamorized" metal as well as its advantages.

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- **Consolidation of Titanium Sponge**
- **Processing of Titanium and Titanium Alloys**
- **Pure Titanium and Its Alloying Tendency**
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