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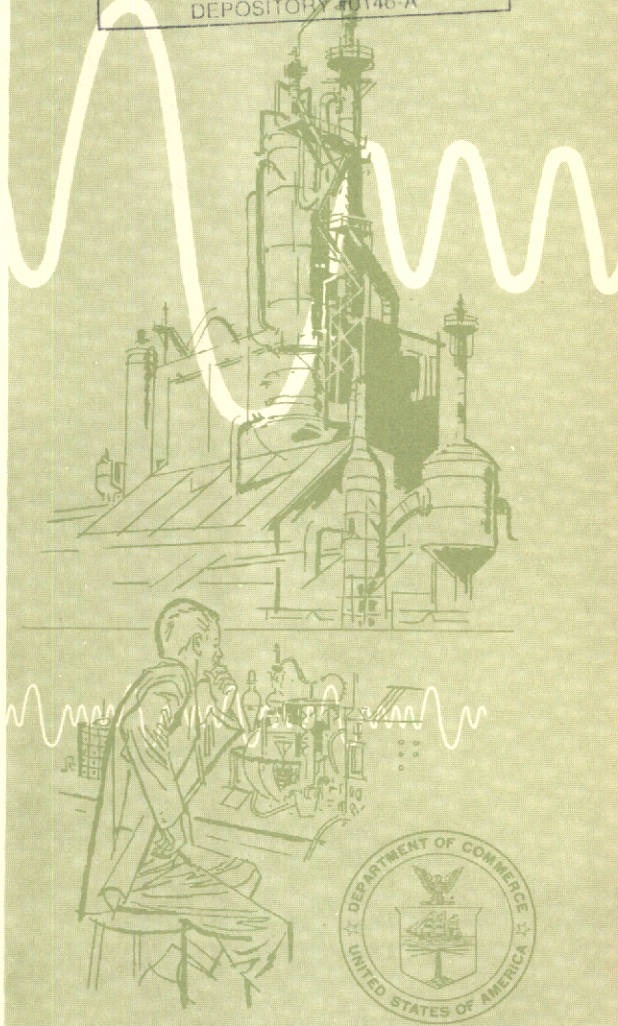

U. S. DEPARTMENT OF COMMERCE
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U. S. DEPARTMENT OF COMMERCE

OFFICE OF TECHNICAL SERVICES

Vol. 26, No. 4 October 19, 1956

Contents

Printed Reports Available from OTS Announced in This Issue

CHEMICALS AND ALLIED PRODUCTS

Organic Chemicals

Mechanism of inhibitors for chain reactions, by A. T. Ree and K. Yang. Utah. University, Salt Lake City, Utah. Jan 1956. 13p graphs, tables. Order from OTS. 50 cents. PB 121129

Using the theory proposed in this report, inhibition curves for butane, pentane, hexane, heptane, octane, nonane and decane are reproduced with good agreement with experiments. AF OSR TN 56-61. Contract AF 33(038)-20839.

Oxidation of activated carbons at room temperature, by R. E. Vander Vennen. U. S. Naval Research Laboratory. Aug 1956. 18p diagr, graph, table. Order from OTS. 50 cents. PB 121411

Activated carbons are oxidized by oxygen at room temperature, and the extent of oxidation depends on the kind of surface treatment the carbon has received. The oxidation of activated sugar carbon from a single source was investigated by varying the surface treatment of the carbon prior to oxidation, and by following the course of the oxidation at atmospheric pressure for 30 to 100 days. The effects of water, ethanol, hydrocarbons, surface alkalinity, and oxygen pressure were studied, and a rate equation was proposed. NRL R 4823.

Preparation of conjugated alkadienes. Final report for the period Sep 1, 1953-Aug 31, 1955 under Contract no. AF 18(600)-690, by Robert C. Krug, Teh Fu Yen and George R. Tichelaar. Virginia Polytechnic Institute. Dept. of Chemistry, Blacksburg, Va. Sep 1955. 25p. Order from LC. Mi $2.70, ph $4.80. PB 122192

The starting alkadienes, 1,3-butadiene and 2-methyl-1,3-butadiene, were selected for study since each of these is readily available in pure and in technical grades. AD 71632. AF OSR TR 55-25.

Plastics and Plasticizers

Adhesive and sealer problems (polyester sealers for threaded metal parts), by S. S. Stivala. U. S. Picatinny Arsenal, Dover, N. J. Jul 1951. 32p graphs, tables. Order from LC. Mi $3, ph $6.30. PB 120369

A series of sealers has been developed for fastening threaded metal parts together. It appears that these sealers will be widely usable in place of setscrews, lock washers, staking, and other techniques and devices for preventing the unscrewing of assembled parts. The sealers are unaffected, or only moderately affected, by moisture, temperature changes from -65°F to +160°F, and vibrating, but the sealer can be chosen so that subsequent unscrewing and disassembly will be possible at practically any specific torque which is desired. The sealers set at room temperature in about 3 to 4 hours. All materials used are commercially available. Appendix 1 contains condensed information on the selection, application, and use of sealers, this Appendix being specifically intended as a brief manual on these materials for the use of design engineers. Project TB 4-621, Report no. 1. PA TR 1856.

Evaluation of polyester film-laminated greaseproof barrier materials, by Howard M. Weiner and Mario E. Gigliotti. U. S. Picatinny Arsenal. Samuel Feltman Ammunition Laboratories, Dover, N. J. May 1955. 12p tables. Order from OTS. 50 cents. PB 121348

Two laminated polyester film constructions were evaluated for use as military greaseproof barrier materials. They show considerable promise if modifications are made in the laminating process to eliminate the nonconforming properties found in this study. Ordnance project TB4-672. Dept. of the Army project 593-10-010. PA TR 2174.

Resistance of glass reinforced plastics to temperature-humidity cycling, by E. Robert Barnet. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1955. 11p diagr, table. Order from OTS. 50 cents. PB 121173

A preliminary survey has been made to determine the resistance of glass reinforced plastics mate-

rials to temperature-humidity cycling in accordance with MIL-Std-354. Materials composed of some heat-resistant resins combined with specially finished glass fibers show little or no decrease in flexural strength over the entire 28 days of the test. Some of the standard materials, however, lose more than 50% of their strength during the same period. NAVORD 3910.

Weathering of glass-fabric-base plastic laminates, by Fred Werren and B. G. Heebink. U. S. Forest Products Laboratory, Madison, Wis. May 1956. 56p photos, tables. Order from OTS. $1.50. PB 121390

Eleven different glass-fabric-base plastic laminates, made with 9 different laminating resins, were subjected to outdoor weathering at 5 sites having entirely different weather conditions. After completion of the exposure cycles, the laminated panels were tested in tension, compression, and flexure at the U. S. Forest Products Laboratory. Data on the effect of exposure on the mechanical properties and the appearance of the laminates after exposure periods of 3 months and 12 months are presented in this report. Project no. 7340. Covers work from Jul 1954 to Sep 1955. AF WADC TR 55-319. Contract DO(33-616)-53-20 Amend. A2 (55-295).

Paints, Varnishes and Lacquers

Development of fire retardant paints and paint systems, by Harvey Miller. U. S. Army. Corps of Engineers. Engineer Research and Development Laboratories, Ft. Belvoir, Va. Apr 1952. 125p photos, graphs, tables. Order from OTS. $3.25. PB 111939

The purpose of this investigation was to develop exterior and interior fire retardant paints and paint systems, for use on combustible surfaces of wood and fibrous wallboard, and to prepare procurement specifications for both types of paint. Approximately thirty commercial fire retardant paints were evaluated. Four outdoor exposure sites used: Fort Churchill, Canada; Yuma, Arizona; Fort Sherman, Panama Canal Zone; and Fort Belvoir, Virginia. Thirty-seven exterior fire retardant paint formulations were developed and evaluated. Specifications for interior and exterior fire retardant paints were prepared. Declassified 8 Nov 1955. Project 8-93-14-001. ERDL R 1226.

Rain repellent coatings, by O. Davis Shreve. U. S. Naval Research Laboratory. Jun 1944. 69p photos, diagr, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 122753

The theory underlying the distinction between wettable and nonwettable substances is discussed, and it is shown that: (a) elimination of this distortion involves the transformation of the hydrophilic glass (or plexiglas) surface to a hydrophobic, or water repellent, surface and; (b) application of a thin transparent water repellent coating offers the most practical means of effecting this transformation. Water striking a windshield thus treated is resolved into descrete droplets which are immediately removed by the windstream and distortion of vision is eliminated or greatly diminished. The history of the development of a lacquer type repellent (N.R.L. No. 199) is outlined with composition and test data for 199 mixtures. Various test methods and apparatus designed during the course of the investigation are described. NRL P-2319.

Study of the compatibility of Silosyn - lacquer mixtures, by Gordon Mustin and Allen L. Alexander. U. S. Naval Research Laboratory. Apr 1942. 32p graphs, tables. Order from LC. Mi $3, ph $6.30. PB 120557

1. Seaplanes - Hulls - Paints 2. Silosyn (Trade name) 3. NRL P 1860.

Substitutes for toluene for use with organic coating, by Peter King. U. S. Naval Research Laboratory. Jul 1942. 12p tables. Order from LC. Mi $2.40, ph $3.30. PB 120535

1. Coatings, Protective - Materials 2. Toluene - Substitutes 3. NRL P 1914.

Temperature indicating paints. Report on a study of, by Peter King. U. S. Naval Research Laboratory. n.d. 10p photo, table. Order from LC. Mi $1.80, ph $1.80. PB 120559

Temperature indicating paints have been found quite useful in determining the ultimate temperature reached by certain pieces of radio equipment in service. At the request of the Radio Division of this Laboratory, this study was undertaken to prepare a series of paints giving definite and permanent color changes in certain temperature ranges. This report describes the preparation and performance of five such paints. Date of tests: Oct 1941 - Feb 1942. NRL P-1865.

Inorganic Chemicals

Direct and reverse addition reactions of nitriles with lithium aluminum hydride in ether and in tetrahydrofuran, by Louis M. Soffer and Manfred Katz. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Oct 1955. 23p tables. Order from LC. Mi $2.70, ph $4.80. PB 120236

The reductions of nitriles in ether and in tetrahydrofuran at various hydride-nitrile ratios have been investigated, using both direct and reverse addition procedures. The various reduction products include primary amines, aldehydes, hydrogen, 1,3-diamines (resulting from dimerization) and other higher products. Reaction sequences are proposed for the major processes in both types of reaction.

Evidence was not obtained for the presence of a carbon-lithium bond in the final reduction complexes. The presence of a small amount of carbon-aluminum bond, however, was indicated for the final reduction species from α-tolunitrile. A one-step preparation of aromatic anils, RCH = NCH_2R, from aromatic nitriles, RC ≡ N, is described. Dept. of the Army project no. 5B0302001. Ordnance research and development project no. TB3-0110. APG BRL R 958.

Equilibria and kinetics among substituted diboranes, by D. M. Ritter. Washington. University, Seattle Wash. Jun 1955. 38p tables. Order from LC. Mi $3, ph $6.30. PB 123089

This project has been concerned with the preparation of alkenyl borines by the dehydrohalogenation of haloalkyl borines. A new compound of molecular weight about 80 and extrapolated boiling point -65° has been prepared. It is formed by the reaction of boron bromide on monomethylborine trimethylamine and also by the spontaneous disproportionation of monomethyldiborane. There is spectroscopic evidence of boron-hydrogen and boron-hydrogen bridge bands. Carbon also seems to be present. Its volatility is much greater than that of any known boron-carbon-hydrogen compounds of like molecular weight. MCC-1023-TR-178. Contract NOa(s) 52-1023C.

Investigation of methods of producing single crystals of non-metallic ferromagnetic substances. Second quarterly report for the period 1 Oct-31 Dec 1955 under Contract no. AF 19(604)-1419, by John Koenig. Brush Laboratories Co., Cleveland, Ohio. Dec 1955. 16p photos, drawings (1 fold). Order from LC. Mi $2.40, ph $3.30. PB 122191

Experimental production of magnetite and ferric oxide-nickelous oxide by hydrothermal transfer in an autoclave chamber. Continues work under Contract AF 19(604)-867. AF CRC TN 56-157.

Near infrared emission from the H,O_3 reaction, by T. M. Cawthon and J. D. McKinley, Jr. Princeton University. James Forrestal Research Center, Princeton, N. J. Mar 1956. 14p photos, tables. Order from LC. Mi $2.40, ph $3.30. PB 122193

Wavelength measurements are reported for several rotational lines of eight vibration bands of hydroxyl ($^2\pi$) produced in the low pressure diffusion flame of ozone in atomic hydrogen. Vibrational levels derived from these measurements are compared with the literature values. Attempts to photograph OD bands from the ozone, deuterium atom flame were unsuccessful. Oxygen bands have been observed in the flames with atomic deuterium and atomic hydrogen. Technical note no. 30. Contents: I. Wavelength measurements of hydroxyl vibration-rotation bands. - II. Oxygen emission bands. AF OSR TN 56-148. AD 86307. Contract AF 33(038)-23976.

Preliminary examination of high pressure p-v-t data up to 1000°C, by Donna Price. U. S. Naval Ordnance Laboratory, White Oak, Md. Dec 1952. 25p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 122004

An examination of Harvard P-v-t data for H_2O to 1000°C and 2500 bars showed that for specific volumes of 5 cc./g. and less, $(\Delta P/\Delta T)_v$ is constant to within the limits of experimental error at the higher temperature end of the isochore. Up to 400 bars, the Harvard data appear to be less reliable than the International Steam Table data which have a precision of 1/1000. Harvard P-v-t data for CO_2 to 1000° and 1400 bars were obtained in the same manner the water study was made, but with improved apparatus and procedures. It is planned to use the CO_2 data and more precisely determined H_2O data for the computation of thermodynamic functions in the higher temperature regions that have not been previously explored. NAVORD 2673.

Reaction kinetics of graphite oxidation at low temperatures, by Arthur L. Ruoff and Henry Eyring. Utah. University. Salt Lake City, Utah. Aug 1955. 28p graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 122204

Data on the oxidation kinetics of graphite by oxygen are reported. Using all the available data concerning this reaction and applying absolute reaction rate theory, it was shown that adsorption is the rate controlling step. Technical note XIII. AF OSR TN 55-312. AD 72229. Contract AF 33(038)-20839.

Reactions of esters of phosphorus acids with metallic compounds, by Robert B. Fox and David L. Venezky. U. S. Naval Research Laboratory. Aug 1956. 21p graphs, tables. Order from OTS. 75 cents. PB 121210

An investigation of some of the reactions of esters of various phosphorous acids shows that the dialkyl esters of phosphorous acid can be mercurated directly with mercuric acetate, and that the resulting dialkoxyphosphinylmercuric acetates can be converted to the corresponding halides or pseudohalides. The same compounds can also be obtained directly from dialkyl phosphonates by reactions with mercuric oxide and a mercuric salt. It is shown that bis(dialkoxyphosphinyl)-mercury compounds are intermediates in this reaction. Thermal degradation of bis(dialkoxyphosphinyl)mercury is found to be a convenient method for the preparation of tetraalkyl hypophosphates. Studies of the reactions of some phosphorous esters with other metallic oxides and salts are also described. NRL R 4806.

Vibrational structure of the electronic spectra of simple molecules, III: Vibrational analysis of the 3800A absorption system of sulphur dioxide, by

R. K. Russell, B. L. Landrum, and E. E. Vezey. Texas. Agricultural and Mechanical College. Dept. of Physics, College Station, Tex. Jan 1956. 25p drawings, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 122202

AD 81060. Task no. 37506.
1. Sulfur dioxide - Absorption 2. Contract AF 18-(600)-439 3. AF OSR TN 56-68.

Viscosity of five gases: A re-evaluation, by Joseph Kestin and Hung-En Wang. Brown University. Division of Engineering, Providence, R. I. Mar 1956. 26p graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 122199

The report contains a re-evaluation of the experimental results for the pressure dependence of viscosity, based on an improved theory of the oscillating disk viscometer described by Kestin and Wang in the present series (PB 120013). The results for air, nitrogen, argon, helium and hydrogen are given in graphical and tabular form as well as in the form of empirical equations. Very good agreement with previously published data for nitrogen, air, and hydrogen has been reported. In the case of helium no comparative data could be found and in the case of argon there is good agreement with the data published by Michels and others but the difference in absolute values is somewhat higher than the preceding three gases. The agreement as to rate of change with pressures is excellent. Technical report no. 6 under Contract no. AF 18(600)-891. AF OSR TN 56-98. AD 82011.

Ordnance Chemicals

Generalized charts of detonation parameters for gaseous mixtures, by Bernard T. Wolfson and Robert G. Dunn. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeronautical Research Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Mar 1956. 26p fold graphs, tables. Order from OTS. 75 cents. PB 121261

Generalized charts of detonation parameters for gaseous mixtures, involving only dimensionless quantities, are presented. These charts are plots of generalized equations, previously presented by the authors, derived directly from the classical equations of detonation. It is shown that the chief usefulness of the generalized charts is to provide a means for visualization of all relationships among the detonation parameters for gaseous mixtures on a small number of Mollier-type diagrams. The use of the generalized charts is illustrated by several examples involving gaseous mixtures. Project 3012, Task 70164. AF WADC TR 54-585.

Miscellaneous Chemicals

Chemical kinetics in flow systems, by J. R. Streetman and F. A. Matsen. Texas. University. Dept. of Chemistry. Mar 1956. 5p. Order from LC. Mi $1.80, ph $1.80. PB 122200

In a previous technical note (number 18) from this laboratory, there was described a flow reactor suitable for the investigation of gas phase reactions up to 600°C. It is the purpose of this report to develop certain equations useful for the interpretation of the data obtained on this reactor. The treatment is an extension of that given in Chemical Process in Continuous Flow Systems, by H. M. Hulburt, in Industrial and Engineering Chemistry 36: 1012 (1944). Rate equations of arbitrary order have been integrated by means of a series expansion on the extent of reaction variable. Technical note 24. AF OSR TN 56-97. AD 82010. Contract AF 18-(600)-430.

Dielectric properties and molecular structures of certain partially fluorinated esters, by J. B. Romans and T. D. Callinan. U. S. Naval Research Laboratory. Aug 1956. 33p photos, graphs, tables. Order from OTS. $1. PB 121293

The dielectric constants and dielectric loss factors of six partially fluorinated esters were determined over the frequency range 60 cps to 70 Mc at 20°C and at power and audio frequencies over the temperature range -70° to 120°C. From the experimentally determined permanent electric moments, the most probable molecular structures were calculated for each of the esters. The introduction of fluorine into aliphatic diesters was found to result in an increase in dipole moment, higher dielectric constant, and an increase in dielectric loss. NRL R 4783.

Reactions of trifluoromethyl radicals with hydrogen isotopes, by John C. Polanyi. Princeton University. James Forrestal Research Center, Princeton, N. J. Mar 1956. 16p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 122194

AD 86306. Technical note no. 28. Project OSR Chem. 50-4.
1. Kinetic reactions, Chemical 2. Hydrogen - Nuclear reactions 3. Trifluoromethyl group - Reactions with hydrogen 4. Contract AF 33(038)-23976 5. AF OSR TN 56-147 6. PU FRC TN 28.

DETERIORATION STUDIES

Correlation of natural weathering and sheltered storage exposure tests with simulated environmental laboratory tests, by William E. Laesch and Warren W. Smith. South Florida Test Service, Miami, Fla. Jul 1955. 60p photos, graphs, tables. Order from OTS. $1.50. PB 121321

Metal and plastic specimens were exposed to natural direct weathering and sheltered storage conditions at Miami, Fla. for a period of 8 months.

The purpose of the project was to determine the rate of degradation of materials and also to establish what correlation, if any, can be made between natural and simulated environmental laboratory tests. Project no. 1111. See also PB 120688-120691. Contract AF 33(616)-2490. AF WADC TR 55-227.

ELECTRICAL MACHINERY

Communication Equipment

Development and test of gas-tight transmission line terminals, by Harold Granger. U. S. Naval Research Laboratory. Oct 1939. 12p photos, table. Order from LC. Mi $2.40, ph $3.30. PB 120447

Date of test 1 Mar-15 Sep 1939. BuEng. Problem B-1R.
1. Transmission lines - Terminals - Tests 2. NRL R 1559.

Reliable high-frequency communications. Second progress report for the period 1 Apr-31 Jul 1955 under Contract no. DA 36-039-sc-64486, by D. F. Bowman. Developmental Engineering Corp., Washington, D. C. Jan 1954. 47p photos, diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 120378

The object of this study is to investigate means of improving antennas, open-wire transmission lines and associated lumped-constant circuits for reliable high-frequency communications. The trend in reliable communications is toward power levels higher than those in use at present. A major emphasis in this study is to be placed on consideration of high-power levels, which for the purpose of this study are defined as those from 50 kw. to 500 kw. Dept. of the Army project no. 3-24-01-071. Signal Corps project no. 807A. Report no. 3-P-2. AD no. 70066.

Electronics

Amplification of plasma waves by an electron beam, by L. R. White and A. J. Ruhlig. U. S. Naval Research Laboratory. Aug 1956. 9p graphs. Order from OTS. 50 cents. PB 121223

For an idealized plasma, curves of propagation constant versus real frequency are presented for waves in the beam-plasma system covering the frequency ranges in which complex propagation constants occur. Also, it is shown that for sufficiently high ratios of thermal velocities to beam velocities the only growing waves in the solar corona resulting from beam-plasma interaction are those which propagate radially inward toward the center of the sun. NRL R 4764.

Analysis of three dimensional hyperbolic tracking systems, by D. J. Bordelon. U. S. Naval Ordnance Laboratory, White Oak, Md. Order separate parts described below from LC, giving PB number of each part ordered.

Part I. Dec 1952. 34p tables. Mi $3, ph $6.30. PB 122022

This report is a mathematical treatment of the problem of position determination, in 3 dimensions, based on difference of times of arrival of pulse signals at separated receivers. Finally, spherical tracking systems are discussed and compared with hyperbolic systems. NAVORD 2718.

Part II. Apr 1955. 20p. Mi $2.40, ph $3.30. PB 120817

An additional method of solution of the four hydrophone tracking problem, involving solution of four linear equations, and which is very similar to a solution obtained by Darboux using homogeneous hexaspherical coordinates, is derived. The relationship between the two solutions of the four hydrophone problem is established. NAVORD 3972.

Audio transformers, manufactured by the Molded Insulation Co. Report on test by M. H. Schrenck. U. S. Naval Research Laboratory. Feb 1937. 15p photos, tables. Order from LC. Mi $2.40, ph $3.30. PB 120647

1. Transformers, Audio - Tests 2. Transformers, Audio - Miniaturization 3. NRL R 1343.

Band change switch of models TBO and TBO-1 portable radio equipment, by R. H. Worrall. U. S. Naval Research Laboratory. Jun 1937. 16p photos. Order from LC. Mi $2.40, ph $3.30. PB 120655

1. Switches, Radio frequency - Tests 2. TBO (Radio equipment, Portable) 3. TBO-1 (Radio equipment, Portable) 4. Radio equipment, Portable 5. NRL R 1374.

Basic research in electronics, by ad hoc working group on basic research in electronics. U. S. Dept. of Defense. Technical Advisory Panel on Electronics. May 1956. 50p. Order from OTS. $1.25. PB 121486

Incorporates suggestions regarding basic areas of research in electronics which are in need of additional support. Dr. William L. Everitt, Chairman. PEL 216/1.

Bibliography of reports, memoranda, technical publications, papers and theses, 1945-1955. Texas. University. Electrical Engineering Re-

search Laboratory. Mar 1955. 47p. Order from LC. Mi $3.30, ph $7.80. PB 120412

Report no. 75. Report no. 66 covered 1945-1953. 1. Radio waves - Bibliography 2. Radio waves - Propagation - Bibliography 3. Engineering, Electrical - Research 4. Contract Nonr-375(01) 5. TU EERL 75.

Circularly polarized antenna for 350 to 1000 megacycle frequency range, by M. Heusinkveld. U. S. Naval Research Laboratory. Mar 1946. 21p photos, drawings, graphs. Order from LC. Mi $2.70, ph $4.80. PB 120716

1. Polarization, Circular 2. Antennas, Circular - Design 3. NRL R-2733.

Conductor heating losses in strip transmission lines with rectangular inner conductors, by Robert L. Pease. Tufts College. Dept. of Physics. Research Laboratory of Physical Electronics, Medford, Mass. Dec 1954. 23p diagrs, graph, tables. Order from LC. Mi $2.70, ph $4.80. PB 122378

Two expressions are derived for the a-c resistance per unit length due to conductor heating losses in a microwave strip transmission line with rectangular inner conductor of arbitrary dimensions. One expression is accurate in the low-impedance range and the other is accurate in the high-impedance range; the two check rather well in the region of intermediate impedance. Contract AF 19(604)-575, Interim report no. 7. AF CRC TN 55-395.

Construction of a Mark III BL antenna kit for use with SC and SC-1, by C. R. Lundquist, P. A. Lantz and R. J. Adams. U. S. Naval Research Laboratory. Jan 1944. 29p photos, drawings, diagrs (part fold), graphs. Order from LC. Mi $2.70, ph $4.80. PB 120738

1. Mark III BL antenna kit 2. SC (Radar equipment) 3. SC-1 (Radar equipment) 4. Antennas, Radar - Design 5. NRL R 2204.

Demountable diode for cathode studies, by A. Eichenbaum and H. Farber. Polytechnic Institute of Brooklyn. Microwave Research Institute, Brooklyn, N. Y. Mar 1955. 23p photos, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 119937

A demountable planar diode with a movable anode is described. This tube can be used for carrying out a variety of cathode studies. It has been used to confirm an experimental method for determining the motional transconductance of a diode. It has also been used to compare two distinctly different methods for measuring the conductivity of oxide coated cathodes. Several modifications are suggested for improving the tube and for extending its usefulness. Contract N6 ori-98, Task Order IV, NR 075-214. PIB 348. PIB R 416-55.

Frequency control equipment. Report of test submitted by Bendix Aviation Corporation under Contract NOs-81045, by G. Pida and C. H. Grogan. U. S. Naval Research Laboratory. Jul 1942. 36p photos, graphs, tables. Order from LC. Mi $3, ph $6.30. PB 120536

1. Frequency stabilization - Tests 2. NRL B 1910.

Interaction of an electron beam with a periodic circuit, by Roy W. Gould. California Institute of Technology, Pasadena, Calif. Mar 1955. 23p drawing, graphs. Order from LC. Mi $2.70, ph $4.80. PB 120413

A field theory of a space-harmonic traveling wave tube is developed using a stationary field matching procedure. The circuit is the circularly symmetric disc loaded waveguide. Two cases are studied: a solid low current electron beam which completely fills the openings between sections, and a hollow beam of arbitrary radius. Technical report no. 1 under Contract no. Nonr-220(13).

Jeep mounting of "RCA" MAR antenna, by J. W. Burkert. U. S. Naval Research Laboratory. Oct 1946. 11p photo, drawings, graphs. Order from LC. Mi $2.40, ph $3.30. PB 120733

1. Antennas - Mounts 2. MAR (Antenna) 3. NRL R 2999.

MAR vehicular antenna, by K. W. Bewig. U. S. Naval Research Laboratory. Oct 1946. 24p photos, drawing, graphs. Order from LC. Mi $2.70, ph $4.80. PB 120731

1. Antennas - Impedance 2. NRL R 2998.

Methods of analysing fading records from spaced receivers, including preliminary analysis of such data at 75 Kc/S, by R. B. Banerji. Pennsylvania State University. Ionosphere Research Laboratory, University Park, Pa. Jan 1956. 56p drawings, graphs, table. Order from LC. Mi $3.60, ph $9.30. PB 120225

The statistics of the fading of radio waves from spaced receivers has been reconsidered to interrelate the existing methods of drift measurement and compare their effectiveness. An extension of the Putter technique has been made to the case of random motions and indications are given concerning the extension to the case of anisotropy. Contract AF 19(604)-1304. AF CRC TN 56-250. PSC IRL SR 81.

Model DBD medium frequency direction finder equipment for small craft, by Allan G. Thompson. U. S. Naval Research Laboratory. Apr 1946. 24p photos, drawing, diagrs (part fold). Order from LC. Mi $2.70, ph $4.80. PB 120719

1. DBD (Shipboard radio direction finder equipment) 2. SCR-269F (Radio compass) 3. Radio direction finders - Equipment 4. NRL R 2754.

Model for non-thermal radio source spectra, by N. G. Roman and F. T. Haddock. U. S. Naval Research Laboratory. Mar 1956. 8p graphs. Order from OTS. 50 cents. PB 111710

A model is presented to explain the observed radio spectrum of Cassiopeia A on the assumption that the underlying non-thermal emission process has an intrinsic spectrum. With only minor adjustments the same model can explain several rather different source spectra. NRL R 4712.

Modification of indicator group OA-184/CPN-18, by Joseph J. Bogart. U. S. Air Research and Development Command. Wright Air Development Center, Wright-Patterson Air Force Base, Dayton, Ohio. Mar 1955. 23p photos, drawings, diagrs. Order from LC. Mi $2.70, ph $4.80. PB 120415

Investigation of improving the stability and accuracy of the AN/CPN-18 indicator for displaying a PPI presentation required in a traffic control system was initiated. The investigation was completed and extensive modifications to the indicator group OA-184/CPN-18 are recommended. The stability and accuracy are much improved with the recommended modifications and the PPI presentation is considerably enhanced. Task No. 64540. AD 71748. AF WCT 54-117.

Multiple mode excitation of the trimode turnstile waveguide junction, by R. S. Potter. U. S. Naval Research Laboratory. Aug 1956. 18p diagr, tables. Order from OTS. 50 cents. PB 121040

The microwave junction whose study is extended in this report is a seven port variation of a turnstile waveguide junction with a coaxial arm axially opposing the circular waveguide. With the assumptions that all waveguide characteristic impedances are normalized, that the junction is lossless, that only TE_{10}, TE_{11}, and TEM modes are propagated respectively in the rectangular, circular, and coaxial arms, and that all sources and terminations are matched, the scattering matrix of the junction is determined explicitly for each of the three possible combinations of two different types of matched ports. These three different scattering matrices are then used to determine the amplitude and phase relationships of the output voltages at each part as the junction is excited by a number of different rectangular arm TE_{10} modes. It is shown that there are unique properties occurring in each of the three different specific scattering matrices which may be utilized to determine each of the matching conditions by a single measurement. NRL R 4802.

Noise generation in high-power microwave gas discharges, by R. C. Jones and W. J. Graham. U. S. Naval Research Laboratory. Aug 1956. 28p photos, diagrs, graphs, tables. Order from OTS. 75 cents. PB 121338

Experimental measurements were made on noise output, electron temperature, and electron density of rare gas discharges excited by up to 300 watts cw at 1850 Mc. The general objective of the study was to determine what noise amplitudes and bandwidths are feasible; a specific objective was to determine if a noise level of the order of 1 milliwatt/Mc could be generated over a band 200 Mc wide in the S-band region. Probe studies were made of electron temperature and density. A brief discussion is given of the theory of possible noise-generation mechanisms. The chief advantages of the noise source described here are: (1) the quality of the noise is very good - it does not have any repetitive component common to devices utilizing pulse trains or mechanically commutated arcs, and (2) it does not have the serious sputtering limitation on tube life common to high power discharges using metal electrodes. The chief disadvantage is a low efficiency. NRL R 4808.

Power handling capacity of strip transmission lines having rectangular inner conductors with semi-circularly rounded edges, by Robert L. Pease. Tufts College. Dept. of Physics. Research Laboratory of Physical Electronics, Medford, Mass. Mar 1955. 14p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 122377

An expression is obtained for the maximum power which can be carried by a strip transmission line having an inner conductor with rounded edges without breakdown. For a typical transmission line of half-inch plate separation and 50-ohm impedance the result is of the order of 0.25 megawatt per millimeter of inner conductor thickness. Contract AF 19(604)-575, Interim report no. 8. AF CRC TN 55-396.

Proposed very long range radar with height finding, by A. A. Varela. U. S. Naval Research Laboratory. Feb 1946. 20p graphs. Order from LC. Mi $2.40, ph $3.30. PB 120720

1. Radar, Long range 2. Radar - Rangefinders 3. NRL R 2759.

Quarterly progress report no. 11 for the period Aug 1-Nov 1, 1955 under Contract no. AF 18-(600)-497, Project no. R-357-10-6. Duke University. Dept. of Physics. Microwave Laboratory. Nov 1955. 103p drawings, graphs, tables. Order from LC. Mi $5.70, ph $16.80. PB 120152

Contents: Superconductivity at millimeter wave frequencies, by Gilbert S. Blevins, Walter Gordy, and William M. Fairbank. - Microwave spectroscopy of biological substances. I: Paramagnetic resonance in X-irradiated amino acids and proteins, by Walter Gordy, William B. Ard, and

Howard Shields. - II: Paramagnetic resonance in X-irradiated carboxylic and hydroxy acids, by Walter Gordy, William B. Ard, and Howard Shields. - III: Paramagnetic resonance in plants, by Howard Shields, William B. Ard, and Walter Gordy. - The quadrupole spectrum of $BiCl_3$, by Hugh G. Robinson. - The magnitude of the splitting of the lowest level in chromium alum, by Paul H. E. Meijer. For 8th-10th reports see PB 116802, 118093, 118465.

Radar homing system for expendable radio sono buoy AN/CRT-1B, by J. M. Miles. U. S. Naval Research Laboratory. Jan 1947. 16p photos, drawings (part fold). Order from LC. Mi $2.40, ph $3.30. PB 120732

1. AN/CRT-1B (Buoy, expendable radio sono) 2. Buoys, Radio-sonic 3. Radar - Homing devices 4. NRL R 2991.

Radar simulator for use in air traffic control studies, by W. Carroll Hixson, George A. Harter and C. E. Warren. Ohio State University. Dept. of Electrical Engineering and Laboratory of Aviation Psychology, Columbus, Ohio. Jan 1954. 29p photos, diagrs. Order from LC. Mi $2.70, ph $4.80. PB 123088

The radar simulator described in this report will be capable of simulating thirty moving aircraft targets on a plan-position type radar indicator. Control of target heading, velocity, position, and turn rate will be available at each aircraft target operating station. The following additional features will be available. 1. Simulation of wind drift effect. 2. Distinctive coding symbol on each target. 3. Automatic variation of aircraft airspeed as a function of altitude. 4. Continuous display of targets on the CRT indicator or alternative simulation of the standard PPI scan. The radar indicator is a 12-inch electronic deflection CRT. The target signals are generated by stabilized electronic integrators and are fed to the indicator through a 30-position electronic time-sharing switch. The targets are switched at a rate of 30 cycles per second. When suitable optical filters are used in conjunction with the P-7 or P-19 phosphor CRT's visual flicker is eliminated. Each indicator is designed to display a 50-mile or a 10-mile maximum range. AD 33463. Contract AF 33-(616)-43. AF WADC TR 53-418.

Redesign of AN/CRT-1B expendable radio sono buoy, by F. J. Hollweck. U. S. Naval Research Laboratory. May 1946. 13p photos. Order from LC. Mi $2.40, ph $3.30. PB 120771

This report describes the redesign of the expendable radio sono buoy AN/CRT-1B. Extensive use of these buoys in anti-submarine warfare suggested several improvements could be introduced, in particular a means of releasing the parachute when the buoy was waterborne and a battery power supply that would have improved storage characteristics. In general all elements of the design have been satisfactorily completed, including the metal top cap, parachute and dye bag assembly, flexible antenna hydrophone release, water activated battery and actuating device. Drop tests of several units proved the basic design was sound, though failures were experienced due to some defects, in particular, faulty carbo-wax plugs. NRL R 2844.

Report on test of model RAG receiving equipment, by R. H. Herrick and S. A. Greenleaf. U. S. Naval Research Laboratory. Nov 1934. 150p graphs, tables. Order from LC. Mi $7.20, ph $22.80. PB 120489

1. RAG (Receiving equipment) 2. Radio receivers - Tests 3. NRL R 1093.

Research in physical electronics. Quarterly report no. 12 for the period 15 Jun-15 Sep 1955 under Contract no. AF 19(604)-524, by Ladislas Goldstein and Heinz Von Foerster. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory. Electron Tube Research Section, Urbana, Ill. Oct 1955. 53p photos, diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 120278

For 3d-11th reports see PB 112885, 113471, 114240, 115048, 115548, 116696, 116980, 118292, and 118863. Contents: Part I. Introduction. - Part II. High speed oscillography and micro-time analysis, by H. M. von Foerster. - 1. Secondary electron multipactor, by Fu Fang. - 2. Folded transmission-line tube, by V. J. Fowler. - Part III. Gaseous electronics, by L. Goldstein. - 1. Electromagnetic wave propagation in ionized gaseous media: Interaction of electromagnetic waves, cross modulation, and associated effects, by J. M. Anderson. - 2. The magneto-electron resonance phenomenon, by L. P. M'Grath. AF CRC TN 55-979.

Second experimental track symposium, held at the Hotel Knickerbocker, Hollywood, California and the Air Force Flight Test Center, Edwards AF Base, California, 26-28 Sep 1955: Seminar reports and abstracts of papers. U. S. Air Force. Air Research and Development Command. Flight Test Center, Edwards Air Force Base, Calif. Sep 1955. 55p. Order from OTS. $1.50. PB 121406

Contents: Seminar I. Role of liquid propellants in high speed track testing. - Seminar II. Instrumentation for experimental tracks. - Seminar III. Parachute development testing. - Seminar IV. Escape systems testing. - Seminar V. Track testing development problems. - Seminar VI. Future requirements for track testing support. - Abstracts of papers and biographical sketches of authors.

Simulation study for the period 1 Sep-31 Oct 1955 under Contract no. AF 30(635)-2815, Task no. IV, 45360, Project no. 4506. Columbia University. Dept. of Electrical Engineering. Electronics

Research Laboratories. Nov 1955. 49p diagrs (part fold), graphs. Order from LC. Mi $3.30, ph $7.80. PB 122375

During this period, work has continued on the stimulation program which includes the development of a digital multi-target radar simulator of high realism and precision, and the further improvement and extension of the existing single-target radar simulator in connection with its application to beam splitting and automatic track-while-scan problems. Work on the single-target simulator included the design and partial construction of a basic clutter simulation channel. Considerable effort was devoted to testing various beam-splitting procedures at CUERL using the existing single-target search radar simulator and AFCRC digital beam splitter. Project Lion. Progress report P-4/128. CU-16-55-AF-2815-EE. For earlier reports see PB 118824 and PB 118857. AF CRC TN 56-356.

Some proposals for improving aircraft radio systems, by F. E. Boyd, K. L. Huntley and P. D. Shupe. U. S. Naval Research Laboratory. Jun 1946. 13p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 120773

In the course of the work carried on by the Systems Operational Survey Group of the Naval Research Laboratory, a number of ideas for improving aircraft radio and electronic systems have been originated. Many of these suggestions have been presented in reports on the individual problems. It is the purpose of this report to consolidate these suggestions and to present other new ideas for a long range program. NRL R 2854.

Survey study on antennas for forward ionospheric scatter transmission. Pickard and Burns, Inc., Needham, Mass. Feb 1956. 59p drawings, diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 122372

The material presented covers first a study and survey of propagational effects associated with ionospheric forward scatter transmission, then an examination of various antenna types having possible use, and finally a comparison of the advantages and disadvantages of the various antennas. Project no. P-164. P & B pub. no. 346. Contract AF 19(604)-1529, Final report. AF CRC TR 56-152.

Test of model YG-1 homing beacon equipment, by L. G. Robbins. U. S. Naval Research Laboratory. Jan 1944. 159p photos, graphs, tables. Order from LC. Mi $7.50, ph $24.30. PB 120734

Date of test 11 Sep-1 Nov 1943. Contractor: Stewart-Warner Corporation, Chicago, Ill.
1. YG-1 (Homing beacon equipment) 2. Radio beacons - Transmitter equipment 4. NRL R 2193.

Test of the wide band I-F amplifier type D-153034 relative to its use in the radar equipment Mark 34 MOD 2, by A. B. Moulton. U. S. Naval Research Laboratory. Jan 1946. 15p photos, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 120717

1. D-153034 (Amplifier) 2. Amplifiers, Wide band - Tests 3. NRL R 2739.

Type approval tests for TN-103/APX "Black Maria" transpondor (for IFF Mark III), by D. P. Heritage. U. S. Naval Research Laboratory. Jan 1946. 21p graphs. Order from LC. Mi $2.70, ph $4.80. PB 120718

This is the final report on the type approval tests for the TN-103/APX "Black Maria" transpondor. The interim report covered electrical and atmospheric tests whereas this report deals with the AS-174/APX antenna as well as vibration tests on the "Black Maria" unit. Horizontal and vertical directivity patterns were taken of the antenna and horizontal patterns for the "S" band portion over the band of frequencies required. The standing wave ratios of the antenna for both "S" and "G" bands were measured at several points throughout the range over which the antenna was designed to operate. Vibration of the "Black Maria" unit in the vertical and horizontal planes was performed and the results are included in this report as Appendix 1. NRL R 2740.

Generators, Motors, Transmission

Electrostatic machines, influence type, by Isadore Kessler. U. S. Army. Corps of Engineers. Engineer Research and Development Laboratories, Ft. Belvoir, Va. Apr 1955. 49p photos, diagrs, graphs, tables. Order from OTS. $1.25. PB 121122

Covers the development and engineering tests of four electrostatic machines: a 20-Kv, electric-motor-driven machine, a 6-kv, electric-motor-driven machine, a 20 kv, spring-motor-driven machine, and a 6-kv, spring-motor-driven machine. The object was to investigate the applicability of electrostatic generators for operating infrared image tubes. Project 8-23-02-008. ERDL 1394.

Modification of Kohler emergency generator for operation on 60 cycle current, by R. R. Zirm. U. S. Naval Research Laboratory. Mar 1940. 6p. Order from LC. Mi $1.80, ph $1.80. PB 120760

1. Generators, High voltage - Design 2. NRL R 2778.

Remote control wide-band multichannel telemeter, by E. E. Bissell, Jr., and M. W. Oleson. U. S. Naval Research Laboratory. Jul 1956. 27p photos, diagrs, graphs. Order from OTS. 75 cents. PB 121246

The remote control telemeter, as finally produced after three years of evaluation and development, is capable of simultaneous transmission of 8 channels of data information, varying in frequency from dc to 10 kc, on a common radio-frequency carrier. Basically the telemeter system breaks down into two main parts: the telemeter transmitting electronics and the telemeter receiving electronics. The remote control of the telemeter transmitting equipment is accomplished by reception of a pulse-coded tone transmitted in the 140-Mc region from the telemeter receiving station. Different operations of a telemetered system are possible by transmission of a different pulse code; and, when a different telemeter transmitting equipment is to be controlled, the same code is used but a different audio tone is transmitted. NRL R 4776.

Typical overload behavior of low-power traveling-wave-tube amplifiers, by G. P. Ohman and F. A. Kittredge. U. S. Naval Research Laboratory. Jul 1956. 16p diagrs, graphs. Order from OTS. 50 cents. PB 121039

The RCA Type A-4395 TWT, selected as a typical low-power traveling-wave-tube amplifier, was subjected to input overloads of various kinds and degrees, and the output in most cases was recorded photographically. In the overload region, this tube can be an extremely nonlinear device. When the overload is a single pulse, much distortion of pulse shape and length may occur. Although the traveling-wave tube may function properly as an amplifier to a low-level signal by itself, the simultaneous introduction of a second, high-level signal somewhere in the passband of the tube can render it ineffective as an amplifier to the low-level signal and even cause this signal to disappear altogether from the output. Spurious signals may appear in the output being generated in the traveling-wave tube by the heterodyne between two other signals provided that one overloads the tube. NRL R 4799.

Voltage-drop compensators for D-C microammeters, by W. Poppelbaum. Illinois. Engineering Experiment Station. Electrical Engineering Research Laboratory, Urbana, Ill. Sep 1954. 14p diagrs, table. Order from OTS. 50 cents. PB 111723

Discusses the advantages of a compensating device, various devices exhibiting negative apparent resistance, theory and performance of the balanced cathode-follower circuit, and the number of balanced two-tube circuits usable as compensators. Technical report no. 3 under Contract N6 ori-07140, Project no. NR 072 161. ILU EES TR 3.

FUELS AND LUBRICANTS

Analysis of combustor performance based on simplified chemical kinetics, by Ernest Mayer. ARDE Associates, Newark, N. J. Mar 1956. 37p drawing, graphs. Order from LC. Mi $3, ph $6.30. PB 122203

The performance of an idealized combustor is investigated for conditions of rapid mixing where a chemical reaction rate law is the rate controlling step in the combustion process. By the use of recently developed forms of the basic aerothermodynamic equations, together with simplified reaction rate laws applicable to hydrocarbon fuel-air mixtures, the combustor performance is described in terms of relatively few chemical and aerothermodynamic parameters. The analytic results obtained for the combustor model lend themselves to analytic treatment of composite combustors, and to consideration of the effect of mixing delay on combustor performance. AD 80552. Technical note 4555-1. Contract AF 18(600)-1560. AF OSR TN 56-40.

Effect of fuel-carried dirt and ice on turbo jet power control systems, by C. R. Bloomquist, F. F. DeMuth, J. C. Lee, O. E. Teichmann. Armour Research Foundation, Chicago, Ill. Sep 1950. 185p photos, diagrs, graphs, tables (part fold). Order from LC. Mi $8.40, ph $28.80. PB 122468

The contamination of JP-1 and JP-3 fuels was investigated experimentally and the type, quantity and size distribution of contaminants of fuels from various sources and under various service conditions were determined. A similar investigation was carried out to determine the effect of fuel carried ice on the same type of controls. The behavior of dissolved water and suspended water in the fuels at temperatures down to -40°F was studied. It was found that suspended water and dirt will emulsify causing severe malfunction. Fuel containing moisture below and up to the saturation point has a much smaller tendency of causing malfunction. AF TR 6441. AD 99392. Contract AF 33(038)-6494.

High-temperature antioxidants for synthetic base oils. Virginia. University. Cobb Chemical Laboratory, Charlottesville, Va. Contract AF 33(038)-22947. Order separate parts described below from OTS, giving PB number of each part ordered.

Part 3: Thermal decomposition of di-(2-ethylhexyl) sebacate, by Earl E. Somers and Thomas L. Crowell. Dec 1953. 41p diagr, graphs, tables. $1.25. PB 121079

A brief survey of the literature is given describing the postulated mechanisms by which esters of the type in question decompose. The determination of the rate of thermal decomposition of di-(2-ethylhexyl) sebacate in the liquid phase in the temperature range from 260° to 305° C is described. For Parts 1-2, see PB 121077-121078. AF WADC TR 53-293, Part 3.

Part 4: Studies in the copper-phenothiazine-di (2-ethylhexyl) sebacate-system in the neighborhood of 200°C (400°F), by James W. Cole, Jr. and Lewis G. Cochran. Dec 1953. 48p diagrs, graphs, tables. $1.25. PB 121080

This is a detailed study at several temperatures in the neighborhood or 200° C of anomalous behavior encountered in the oxidation studies of diester lubricants in the presence of phenothiazine and copper and was designed to shed more light on the mechanisms of inhibitor action and metal catalysis. The behavior of phenothiazine in di (2-ethylhexyl) sebacate under controlled oxidation conditions was followed by noting the change in the characteristic ultraviolet absorption spectra and by chemical methods. A rate equation is derived for the disappearance of phenothiazine and the mechanisms proposed are related to the possibility of predicting antioxidants for higher temperatures. AF WADC TR 53-293, Part 4.

Part 5: Evaluation of additives, synthesis of new compounds, and mechanism studies, by James W. Cole, Jr., Gordon P. Brown and A. Schmalz. Jun 1955. 217p photos, drawings, graphs, tables. $5.50. PB 121081

The oxidation characteristics have been determined of various blends of selected additives with fluids of the di-ester, silicate, silicone and tri (ortho-chlorophenyl) phosphate types in the absence and presence of aluminum, copper, magnesium, silver, cold-rolled steel and titanium. The temperature range was 200-250 C with the majority of the runs at 240 C. A few runs with D. C. silicone 550 were conducted at 600 and 700 F. Two experimental methods were employed. The results of an extensive synthetic program on phenothiazine derivatives are reported. Photos will not reproduce well.

Kinetic study of methyl chloride combustion, by Hubert T. Henderson and George Richard Hill. Utah. University, Salt Lake City, Utah. Aug 1955. 16p photos, drawing, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 122205

A study of the burning of methyl chloride has been carried on by the tube method of Gerstein, Levine, and Wong. Burning velocity data have been taken in air and in oxygen. The burning velocity and limit data for methyl chloride are compared with methane and methyl alcohol and with some other chlorinated hydrocarbons. In addition, the influence of tube diameter for the Gerstein et. al. tube method has been studied and found to be much the same as for the Coward-Hartwell method. A new generalized procedure for calculating flame front areas has been used. AD 72227. Technical note XIV. AF OSR TN 55-310. Contract AF 33(038)-20839.

Method for the estimation of the aromaticity of aviation gasolines. Second report, by A. D. Swenson. U. S. Naval Research Laboratory. May 1943. 34p photos, drawing, graphs, tables. Order from LC. Mi $3, ph $6.30. PB 120523

Part I is NRL P 1872 (PB 120564).
1. Fuels, Aviation - Aromatization - Tests 2. NRL P 2096.

Method of analysis for antioxidant in the new synthetic B-0-100 lubricants, by Herbert A. Pohl. U. S. Naval Research Laboratory. Aug 1944. 16p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 120757

1. Antioxidants - Analysis 2. B-0-100 (Lubricant, Synthetic) 3. Lubricants, Synthetic - Analysis 4. NRL P-2359.

Micro lubricant test methods. Part 2: Swelling of synthetic rubber, color of lubricating oil and petroleum hydrolytic stability, by John B. Christian and Harry M. Schiefer. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Mar 1956. 21p diagrs, tables. Order from OTS. 75 cents. PB 121386

This report introduces micro methods for the determination of the swelling of synthetic rubbers in aircraft greases and hydraulic oils, the determination of color of lubricating oil and petroleum through the use of the A.S.T.M. Union Colorimeter, and the determination of hydrolytic stability of aircraft oils. These methods were arrived at through the comparison of modified small scale tests with the full scale tests. Project no. 3044. Covers period of work from July 1955 to Sep 1955. For Part 1 see PB 121355. AF WADC TR 55-449, Part 2.

Report on the chemical de-leading of gasoline, by D. E. Neunherz. U. S. Naval Research Laboratory. Jul 1943. 14p graph, tables. Order from LC. Mi $2.40, ph $3.30. PB 120525

1. Gasoline - Deleading - Methods 2. NRL P 2109.

INSTRUMENTS

Apparatus for obtaining optical absorption spectra at pressures to 6000 bars, by D. S. Hughes and W. W. Robertson. Texas. University. Dept. of Chemistry, Austin, Texas. Feb 1956. 8p photo, drawings. Order from LC. Mi $1.80, ph $1.80. PB 122198

A compact and simple high-pressure apparatus has been designed that makes possible the obtaining of optical absorption spectra at pressures to 6000 bars. The absorption cell has sapphire windows and a path

length adjustable from zero to three centimeters. Pressures are measured by a manganin wire resistance gauge. Technical note 26. AD 82012. AF OSR TN 56-99. Contract AF 18(600)-430.

Comparative study of optical systems for range finding instruments. Report of tests made of range finder optical systems at California Institute of Technology, by J. A. Anderson, I. S. Bowen, W. V. Houston, J. J. Johnson and P. E. Lloyd. California Institute of Technology, Pasadena, Calif. Oct 1942. 46f photos, diagrs. Order from LC. Mi $3.30, enl pr $9.30. PB 123011

The present problem was to investigate certain stereoscopic and coincidence optical arrangements which were substantially different from the standard methods in the manner of presentation of the images to the observer. The approach was with a view to the problems of anti-aircraft range finding. A single instrument, embodying all of the optical arrangements, was designed and built at the California Institute of Technology, and tested by a number of selected observers. Although used only in the laboratory, the instrument was able to simulate most of the conditions of actual range taking. In its general characteristics, the instrument is not unlike the Eastman Trainer. A detailed description of the optical and mechanical system is given in the appendix. Report to the services no. 51. Includes supplement. Appendix is detailed description of the instrument. OSRD 1257. NDRC Div. 7, Report 51.

Computer components fellowship no. 347. Quarterly report no. 8, second series, for the period Jul 1-Sep 30, 1955 under Contract no. CLN AF 19(604)-943. Mellon Institute of Industrial Research, Pittsburgh, Pa. Oct 1955. 122p photos, drawings, graphs, tables. Order from LC. Mi $6.30, ph $19.80. PB 122361

For 1st-7th reports, second series, see PB 114377, 114976, 115560, 117013, 117590, 117776, and 118861. Contents: I. High temperature capacitors, by A. Milch and Robert L. Serenka. - II. High temperature resistors, by C. H. Wilkins. - III. Printed circuitry via xerography, by Martin N. Haller. - IV. Masks for vacuum evaporation, by Robert L. Serenka. - V. Electroluminescence: Dielectric imbedded screens, by J. J. Mazenko and A. Milch. - VI. Thermoluminescence: Thermolescence measurements of electroluminescent ZnS: Mn films, by R. E. Freund. Contract CL NAF 19/604-943, Report no. 8. AF CRC TN 55-965.

Controlled atmosphere melting of magnetic materials, by J. F. Nachman and W. J. Buehler. U. S. Naval Ordnance Laboratory, White Oak, Md. Jan 1954. 18p photos, drawing, tables. Order from OTS. 50 cents. PB 121168

Reviews basic equipment required to perform quality controlled atmosphere melting. The equipment described includes a tightly sealed pumping system, and gas purification system. A detailed step-by-step melting procedure is given using this equipment. Careful consideration which must be made in the choice of melting crucible and mold wash for different alloys, including two very successful mold wash mixtures, are presented in detail. NAVORD 3607.

Eddy current type flaw detectors. Fifth partial report: Application to inspection of aluminum alloy propeller blades, by J. E. Dinger. U. S. Naval Research Laboratory. Aug 1942. 21p photos, drawings, diagr, graphs. Order from LC. Mi $2.70, ph $4.80. PB 120537

The eddy current type flaw detector using a 60 cycle/sec frequency has been applied to the inspection of aircraft propeller blades. The phase and amplitude sensitive vacuum tube circuit is described in detail. A motor driven scanner with suitable scanning jig is described for facilitating the scanning of the propeller. For 1st report see Journal of Applied Physics 13: 377-383(1942). 2d-4th reports issued as NRL reports 0-1683 (PB 98796), 0-1792, 0-1837. NRL O-1923.

Effects of the intermittent visibility of low contrast targets on stereo range measurements, by G. A. Fry, C. S. Bridgman and V. J. Ellerbrock. Ohio State University, Columbus, Ohio. Jun 1943. 132f drawings, diagrs, graphs, tables. Order from LC. Mi $6.90, enl pr $22.80. PB 123013

The purpose of the experiment is to determine at various levels of contrast between the target and its background the percentage of time during which the target is visible and the frequency of the visibility-invisibility cycles when the target is presented to both eyes and to each eye taken separately. NDRC Div 7. Contract OEMsr-637.

Field evaluation of Askania cine-theodolites (instruments nos. 629 and 670). U. S. Air Force. Air Research and Development Command. Missile Test Center, Patrick Air Force Base, Fla. Apr 1956. 86p photos, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 122380

The design of the test and the actual test procedures for the field evaluation of Askania Cine-Theodolites using two "Inclose" targets at different elevations are described. The methods followed to reduce and analyze data are outlined. The test results as applicable to two Askania instruments are shown and indicate that the standard deviations of the random errors inherent in the system are approximately 20 - 30 seconds of arc. It is also shown that appreciable fixed bias is present in Askania data. Several known error sources are examined and their influence on the test results are analyzed. Suggestions for further study and operational procedure changes are made. The statistical methods used in analyzing the test data are described. Quality control technical note no. 15-C. Contents: Part I: Test design and results, by Ernest

Stern. - Part II: Statistical analysis, by R. J. Nichol. AF MTC TN 56-18.

International pressure gage for instantaneous static and dynamic pressure measurements, by M. P. Peucker. U. S. Naval Ordnance Laboratory, White Oak, Md. Feb 1954. 28p photos, drawings, diagrs, table. Order from OTS. 75 cents. PB 121171

This report describes a new precision electrical pressure gage for measuring absolute or differential pressures as low as 10 mm of mercury full scale with an accuracy of 0.1 percent full scale or as high as one atmosphere. NAVORD 3630. NOL ARR 216.

Oxygen pressure apparatus for filling service cylinders for aviators from decomposed oxygen bearing materials. Sixth partial report, by W. C. Lanning and R. R. Miller. U. S. Naval Research Laboratory. Jul 1940. 13p drawings, graph, tables. Order from LC. Mi $2.40, ph $3.30. PB 120457

1. Pressure, Oxygen - Measurement 2. Decomposition, Thermal - Apparatus 3. Oxygen gasification process 4. Oxygen - Production - Apparatus 5. NRL P 1632.

Penetrometer, canister testing DOP. U. S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Oct 1953. 248p drawings. Order from LC. Mi $10.20, ph $36.30. PB 123206

Drawings only. CWL-56-2172. Drawings are: E-76-2-1865. Electronic chassis assembly. - E-76-2-1866. Interconnection diagram. - D-76-2-1870. Owl unit panel. - E-76-2-1871. Owl unit. - D-76-2-1876. Penitrometer panel assembly. - E-76-2-1877. Penitrometer diagram. - D-76-2-1882. Heat control assembly. - D-76-2-1883. Relay control diagram. - D-76-2-1888. Hi voltage assembly. - D-76-2-1889. Power panel diagram. - D-76-2-1894. Power supply. - D-76-2-1895. Power supply diagram.

Precision drag balance of one component, by J. M. Kendall. U. S. Naval Ordnance Laboratory, White Oak, Md. Oct 1952. 28p photos, diagrs. Order from LC. Mi $2.70, ph $4.80. PB 120937

In the design of the drag balance of one component, considerable effort was made to design a balance capable of yielding precise measurements of drag. The novel design arrived at here eliminates static friction of all moving parts, including the sting, by supporting them on a system of rotating bearings. The axial force of the model applied to the sting can then be transmitted to a precision spring of isoelastic material whose resulting stretch is measured with an accuracy of 0.00002 inch by means of a linear variable differential transformer and associated electronic equipment. Task no. NOL-188-52. NAVORD 2420.

Real solutions of numerical equations by high speed machines, by Saul Gorn. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Oct 1955. 55p diagrs, tables. Order from LC. Mi $3.60, ph $9.30. PB 122950

This report discusses methods of finding real solutions of single numerical equations in one real variable from the point of view of high speed computation. Beside the usual questions of isolation and finding of solutions, the possibility of automatic error analysis is considered. Some examples are cited, among which is a description of the computation of significance levels of the von Neumann distributions, the ratios of the mean squared higher order differences to the variance. Tabulations of these significance levels are given. Dept. of the Army project no. 5B0306002. Ordnance research and development project no. TB 3-0007. APG BRL R 966.

Screw conveyors, by G. G. M. Carr-Harris. National Research Council of Canada. Technical Information Service, Ottawa, Canada. Apr 1956. 14p table. Order from OTS. 50 cents. PB 121324

In response to numerous inquiries on the subject these notes have been prepared to assist the reader in planning the construction of a simple conveyor. Their object is to put him in touch with a number of selected publications likely to be available in technical libraries. NRCC TIS 49.

Stereo activity in relation to accommodation and vergence, by G. A. Fry, C. S. Bridgman and M. J. Allen. Ohio State University, Columbus, Ohio. Aug 1943. 24f diagrs, graphs. Order from LC. Mi $2.70, enl pr $6.30. PB 123014

The relationship between stereo acuity and stimulation of accommodation can be distinguished. Departures from the region of maximum stereo acuity in the direction of greater or less stimulation of accommodation result in losses in stereo acuity. The blurredness curve has the same shape in general. Because of this it is concluded that the losses in stereo acuity are dependent on losses in clarity of the retinal image. This blurring results from the inability of the accommodative mechanism to produce the total change in focus required by the stimuli presented. It is concluded that the safest procedure in range finding is to keep the accommodative level of the operator as near zero as possible for the purpose of maintaining as clear an image as possible. It is also recommended that all refractive errors be corrected, or compensated in the eyepieces, for the same purpose. NDRC Div 7. Contract OEMsr-637, Report no. 6.

Transistor spin sonde for use in Naval Ordnance Laboratory aeroballistic ranges, by R. J. Smollett. U. S. Naval Ordnance Laboratory,

White Oak, Md. Jun 1954. 22p photos, diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 122047

This report gives the construction details and design considerations for an instrument used to determine the spin rate of small missiles and projectiles. Test results are given and instrument limitations are discussed. Task no. B3D-452-2-54. NAVORD 3726.

MEDICAL RESEARCH AND PRACTICE

Effect of delayed rapid warming on experimental frostbite, by R. B. Lewis and C. G. Hoak. U. S. Air Force. School of Aviation Medicine. Dept. of Pathology, Randolph Field, Texas. Jul 1955. 4p table. Order from LC. Mi $1.80, ph $1.80. PB 122395

The legs of rabbits were rewarmed in warm water (42° C.) ½, 1, 2, and 4 hours after they had been frozen at -15°C. for 30 minutes. Only in those delayed ½ hour was there significantly less gangrene than in controls similarly frozen but thawed in air. AF SAM R 55-59.

Hand and finger blood flow rates under different temperature conditions, by Albert H. Hegnauer and Evangelos Angelakos. Boston University. School of Medicine, Boston, Mass. Dec 1953. 55p graphs, table. Order from LC. Mi $3.60, ph $9.30. PB 122186

Existing literature dealing with the circulation through the hand and fingers; volume flow in relation to ambient temperature; its reflex control and role in body thermal balance is reviewed. The vascular anatomy of the hands and fingers is described and their importance in temperature response emphasized. The two chief methods (calorimetrically or plethysmographically) of estimating hand and finger blood flow rates are discussed and range of variation included. AF WADC TR 53-501. AD 28898. Contract AF 18(600)-65.

Pharmacologic action of anesthetic agents in irradiated animals, by James E. Wilson. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jul 1955. 9p drawing, table. Order from OTS. 50 cents. PB 111844

Results of this investigation showed that the administration of the common anesthetic agents (cyclopropane, ethylene, nitrous oxide, ether, and thiopental sodium) under the conditions tested failed to show any marked detrimental effect with respect to either increasing the thirty-day mortality or decreasing the survival time of X-irradiated rats. Ethylene exhibited beneficial effects by significantly increasing the survival time. AF SAM Proj 21-3501-0005, Report no. 20.

Results of in-flight testing of SAM portable respirator on poliomyelitic patients, by Syrrel S. Wilks and Joseph F. Tomashefski. U. S. Air Force. School of Aviation Medicine. Dept. of Physiology and Biophysics, Randolph Field, Texas. Oct 1954. 10p photos, graphs, table. Order from LC. Mi $1.80, ph $1.80. PB 122394

A lightweight, vacuum type, high-speed motor impeller unit has been used as a power source for a lightweight, full-body respirator. The unit can be used in ambulances, aircraft, and seacraft. It can be used as a resuscitator or respirator for patients under any degree of respiratory embarrassment. AF SAM Proj 21-1201-0007, Report no. 5.

Screening semi-quantitative method for the determination of carbon monoxide in blood, by Jack Mayer. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Apr 1956. 26p photos (1 col.), tables. Order from OTS. 75 cents. PB 121221

A simple diffusion technique is presented for the determination of carbon monoxide in blood. Statistical evaluation of the data derived from quantitative estimation of the carboxyhemoglobin by matching the unknown reaction with a standard chart proves the definite reliability of this procedure. Project no. 7159. Initial research started in Nov 1954 and evaluation of the test was completed in Jan 1956. Appendix: Statistical evaluation of the palladium precipitation test of the percent carbon monoxide saturation in blood, by Richard L. Deininger and James E. Smithson. AF WADC TR 56-143.

Studies on oxygen poisoning. Rochester. University. Dept. of Physiology. Feb 1955. 38p photos, graphs, tables. Order from OTS. $1. PB 111955

Contents: Ascorbic acid content of adrenal glands of rats in oxygen poisoning, by Rebeca Gerschman and Wallace O. Fenn. - Role of adrenalectomy and the adrenal-cortical hormones in oxygen poisoning, by Rebeca Gerschman, Daniel L. Gilbert, Sylvanus W. Nye, Perry W. Nadig, and Wallace O. Fenn. - Survival of paramecium in high oxygen pressures (preliminary study), by Oliver Wolcott. - Oxygen poisoning and X-irradiation: A mechanism in common, by Rebeca Gerschman, Daniel L. Gilbert, Sylvanus W. Nye, Peter Dwyer, and Wallace O. Fenn. - Influence of X-irradiation on oxygen poisoning in mice, by Rebeca Gerschman, Daniel L. Gilbert, Sylvanus W. Nye, and Wallace O. Fenn. - Protective effect of β-mercaptoethylamine in oxygen poisoning, by Rebeca Gerschman, Sylvanus W. Nye, Daniel L. Gilbert, Peter Dwyer, and Wallace O. Fenn. - Effects of high oxygen concentrations on the eyes of newborn mice, by Rebeca Gerschman, Perry W. Nadig, Albert C. Snell, Jr., and Sylvanus W. Nye. - Further report on the pro-

tective effects of drugs of varied chemical nature, by Rebeca Gerschman, Sylvanus W. Nye, and Daniel L. Gilbert. - Survival time of newborn rats and mice in high oxygen pressure (HOP, by Rebeca Gerschman, Daniel L. Gilbert, and Sylvanus W. Nye. AF SAM Proj 21-1201-0013, Report no. 10.

Study of the mechanism of visual acuity in the central retina, by Brian O'Brien and Norma D. Miller. Rochester. University, Rochester, N. Y. May 1953. 59p photos, diagrs, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 122206

Measurements of transverse sections of human retinas provide precise cone spacing data from center to edge of fovea. Measurements with an electric wave model confirm the mechanism concentrating and isolating light by each cone, which thus serves as an isolated receptor. Correlation of these histological data with measured acuity shows cone spacing and reciprocal acuity varying together from center to edge of the fovea. Measurements with a new ballistic flash technique of cone thresholds, of eye movements, and of double star acuity show high uniformity of thresholds among foveal cones, in disagreement with the Hecht theory. No significant effect of involuntary eye movements is found, and acuity for double stars proves substantially independent from illumination level. High and reproducible accuracy of fixation is demonstrated by a new technique utilizing local areas of tilted cones as retinal landmarks. Removal of optical aberrations by an interference method shows that retinal structure and not the optical system sets the final limit on acuity. AD 23895. AF WADC TR 53-198. Contract W33-(038)-ac-18317.

Toxicity of certain lubricants, engine oils, and certain of their constituents, with particular reference to the products of their thermal decomposition, by Joseph F. Treon, Frank P. Cleveland and John Cappel. Cincinnati. University. Kettering Laboratory. Nov 1954. 93p photos, drawings, graphs, tables. Order from LC. Mi $5.40, ph $15.30. PB 122187

Di-2-ethylhexyl sebacate, di-sec-amyl sebacate, di-2-ethylhexyl adipate, and formulations WS-2211 and PRL-3313, when given undiluted in a single oral dose to animals are either slightly toxic or practically non-toxic. The esters and formulations WS-2211 and PRL-3039 when maintained in contact with either the intact or abraded skin of rabbits for 24 hours are practically non-toxic. Repeated applications of large doses of WS-221 upon the skin of rabbits resulted in irritation. High concentrations of the mists of these substances were generally tolerated without untoward reactions. The highest tolerable dosage and the lowest lethal dosage for one or more species of animals exposed to fog of the thermal decomposition products formed from these materials at 700°F have been established and are expressed in terms of milligrams of the substance delivered into the Inconel furnace per liter of air passing through it. AF WADC TR 54-344. AD 62764. Contract AF 33(038)-26456.

Use of heparin in the treatment of experimental frostbite, by Josef Pichotka and R. B. Lewis. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jun 1949. 10p tables. Order from LC. Mi $1.80, ph $1.80. PB 122393

A total of 153 rabbits had their legs exposed to temperatures of -25°C. or -15°C. for 30 minutes and subsequently treated with heparin administered intravenously for a period of six days. Twelve animals received 20 mg. of heparin every four hours, 39 received 30 mg. every 12 hours, and 102 received 30 mg. every six hours. A statistical analysis of the results showed that tissue necrosis from frostbite was not significantly less in the heparin treated animals. AF SAM Proj 21-02-079, Report no. 1.

METALS AND METAL PRODUCTS

Composite spectrophotometric procedure for the analysis of low-alloy steels and of aluminum alloys, by S. B. Simmons. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1955. 41p graphs, tables. Order from OTS. $1.25. PB 121216

Spectrophotometric analysis for constituents in low alloys of steel and alloys of aluminum give the same results as those obtained by conventional gravimetric and volumetric methods, but the time is less than 50% of that required for the conventional gravimetric or volumetric methods. This report outlines steps and techniques that can be performed by semi-skilled analysts. Project no. 7360. AF WADC TR 54-45.

Correlations of high temperature creep data, by Oleg D. Sherby and John E. Dorn. California. University. Institute of Engineering Research. Minerals Research Laboratory, Berkeley, Calif. Jun 1955. 37p graphs, table. Order from OTS. $1. PB 121287

Fundamental experiments on aluminum and nickel reveal that creep at high temperatures is controlled by a single thermal activation process. This fact suggests the use of simple parameters to correlate creep strain, secondary creep, stress-rupture and tensile data for metals at elevated temperature data for Pt, δ-Fe, Au, Cu, Mo, Be and Nb as well as to commercial steels, cast irons and complex high temperature alloys. In addition, ceramic materials also appear to follow the same relations. The activation energies for creep of high purity metals are shown to equal the respective activation energies for self-diffusion. Forty-first technical report under Contract N7 onr-295, Task order II, NR 031-048. UC IER Series 22, Issue 41.

Determination of germanium in steel, by A. Weissler. U. S. Naval Research Laboratory. Jul 1943. 9p drawing, tables. Order from LC. Mi $1.80, ph $1.80. PB 120524

The purpose of this paper is to describe a procedure for the gravimetric analysis of germanium in steel which is free from any known interference. The method consists of (a) separation of germanium by distillation of the tetrachloride, (b) precipitation of the germanium in the distillate with tannin, and (c) ignition to the oxide. NRL M-2107.

Development of a forgeable high-strength, high-temperature, chromium-rich, chromium-iron alloy, by D. P. Moon, H. A. Blank, A. M. Hall. Battelle Memorial Institute, Columbus, Ohio. Jan 1954. 24p photos, tables. Order from OTS. 75 cents. PB 121112

The development of a forgeable high-strength, high-temperature, chromium-rich, chromium-iron alloy is described. Experimental alloys were produced by induction melting 4- and 12-pound charges of commercially available melting stock, casting into rammed zirconite molds, and forging to 5/8-inch-square bars for testing. It is concluded that the 70Cr-30Fe-base alloy containing about 9Mo, 2 to 3Ti, and up to 1/2Al shows promise as a material of construction for turbine buckets in turbojet aircraft. For Part 2 see PB 121111 AF WADC TR 53-451.

Development of a substitute or improvement of chromium electrodeposits, by Jesse E. Stareck, Edgar J. Seyb, Jr. and Angelo C. Tulumello. United Chromium, Inc., New York, N. Y. Contract AF 33(616)-234. Order separate parts described below as indicated, giving PB number of each part ordered.

Part I. Jul 1953. 114p photos, drawing, diagr, graphs, tables. Order from LC. Mi $6, enl pr $19.80. PB 122098

The fatigue limit of heat-treated steel was studied with chromium deposits from various solutions with varying plating conditions. Baseline information was obtained from the conventional sulfate bath and the newer high speed CR-110 bath. The data is interpreted to show that residual tensile stress in electrolytic chromium is the primary mechanism for the lowering of the fatigue limit in chromium plated steel. AF WADC TR 53-271, Part 1.

Part II. Mar 1955. 161p photos, diagrs, graphs, tables. Order from OTS. $4.25. PB 121264

The effect of a chromium deposit on the fatigue limit of chromium plated, heat-treated steel is correlated with the stress possessed by the chromium deposit. High tensile stress results in severe lowering of the fatigue strength of steel and conversely low stress gives much less fatigue strength lowering. This fundamental knowledge about the mechanism of fatigue in chromium plated steels led to the development of baths and plating conditions which give greatly improved fatigue properties for the unbaked plate and also other deposits giving equally good fatigue properties after baking. Covers the period from Jul 1, 1953 to Dec 31, 1954. Project no. 7312. AF WADC TR 53-271, Part II.

Development of austenitic iron-base sheet alloy, by Roy R. Rothermel. Crucible Steel Company of America, Pittsburgh, Pa. May 1956. 25p photos, tables. Order from OTS. 75 cents. PB 121438

Results of the investigation of the weldability of a type II, AD30 alloy (conducted in the welding laboratory of the contractor) indicate that this material can be welded when adequate measures are taken to limit stresses set up during welding and where proper protection from the atmosphere is afforded the material during welding. Satisfactory welds were made in representative types of weld joints by the metallic arc process using types 310 and 312 mod. (2-3% Mo) electrodes and by the inert gas process using AD30 filler. Satisfactory welds were obtained by the butt flashwelding process. Bend test results of various welded specimens show good ductility, an evidence of formability of a welded section in the as-welded, solution treated condition. Short time tensile test results indicate welded specimens to have strengths (at a 1500°F testing temperature) comparable to the AD30 base material. Project no. 7351. Covers work conducted from 15 Oct 1954 to 31 Dec 1955 under Contract AF 33(616)-2047. AF WADC TR 54-472, Part 2.

Effect of silicon on transverse mechanical properties and on retained austenite content of high strength wrought steels, by John Vajda, John J. Hauser and Cyril Wells. Carnegie Institute of Technology. Metals Research Laboratory, Pittsburgh, Pa. Dec 1955. 47p photos, graphs, tables. Order from OTS. $1.25. PB 111793

The variation of transverse mechanical properties and retained austenite content with cooling rate and the effects of added 1% and 1.5% Si on this variation were studied in an AISI 4340 steel in both the "as-quenched" and the quenched and tempered states. The influence of 1% and 1.5% added Si on hardenability is shown by means of both Jominy and end-quenched 7 in. round hardenability curves. The influence of silicon on transverse tensile and impact properties of both fully quenched and slack-quenched structures is presented for these steels, heat-treated to tensile strengths in the range 150,000 to 300,000 psi. The importance of silicon to the retention and stabilization of austenite is shown. Experimental findings of retained austenite content in standard Jominy test bars and some data on the effects of multiple tempering and refrigeration on retained austenite decomposition are included. Project no. 7351. AF WADC TR 55-474. Contract AF 33(616)-2286.

Effect of tin on cast steels, by K. L. Clark and D. J. Carney. U. S. Naval Research Laboratory. Mar 1945. 29p photo, graphs (1 fold), tables. Order from LC. Mi $2.70, ph $4.80. PB 120765

Tensile and impact tests were made upon a number of cast steels which contained varying quantities of tin. The results show that tin is not harmful to the tensile properties but it has a detrimental effect upon notch sensitivity, particularly at low temperatures. Quenched and tempered tin-bearing steels are temper-brittle unless molybdenum is present. NRL M 2482.

Elevated temperature fatigue properties of SAE 4340 steel, by W. J. Trapp. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Dec 1952. 57p photos, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 123093

This report presents the test procedures and results of a fatigue investigation at room and elevated temperatures on S.A.E. 4340 steel, oil quenched and tempered to 160,000 psi in the unnotched and notched condition. The notch used in the investigation is a 60^{o} V-notch with 0.010" radius and 0.025" depth. In general, the fatigue strength was found to decrease with increasing temperature at all stress levels and all stress-ratios except for the life times between 105 and 15 x 10^{6} cycles in the notched condition, where at 600^{o} the value is lower than at 800^{o} and even lower than at 1000^{o}, dependent upon stress ratio. This can probably be related to an increase in brittleness in the 600^{o} region, which is also confirmed by the fact, that the notch sensitivity at 600^{o} was found to be higher than at any of the other temperatures investigated. AD 8716. AF WADC TR 52-325, Part 1.

Experimental production of thin ferrite films and a survey of the magnetic properties of thin films, by R. J. Miller. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1955. 46p diagr, graphs, table. Order from OTS. $1.25. PB 121177

This paper describes experiments which resulted in the production of thin ferromagnetic films. The theories pertaining to the properties of thin ferromagnetic films and existing experimental data concerning the deviation of magnetization and other parameters of thin films from that of the bulk material are reviewed. A bibliography of 98 references is included. NAVORD 3962.

Fabrication and properties of alfenol alloys (Al-Fe) containing 10 to 17 percent aluminum, by J. F. Nachman and W. J. Buehler. U. S. Naval Ordnance Laboratory, White Oak, Md. Dec 1955. 26p photos, graphs, tables. Order from OTS. 75 cents. PB 111552s

Magnetic data is given for a number of laminated cores of Alfenol varying in aluminum content from 10% to 17%, remainder iron. Alfenols with 13% or less aluminum yield the best static magnetic properties in the ordered state, while Alfenols with 14% or more aluminum (approximately Fe_3Al composition) are best in the disordered condition. A list of potential applications for these materials is given. Improved methods of melting and casting, to obtain a fine equiaxed cast grain structure, are described. Metallurgical data such as tensile properties, hardness, recrystallization temperatures, machinability, and sheet fabrication characteristics are given. Supplements NAVORD 2819 (PB 111552). NAVORD 4130.

Fundamental study of natural and synthetic films on magnesium and its alloys. Dow Chemical Co., Midland, Mich. Aug 1954. 168p photos, drawings, diagrs, graphs, tables. Order from OTS. $4.25. PB 121322

Describes the development of techniques for the study of the films which are formed on magnesium during surface treatments or corrosion. Among the techniques described are electrical resistance measurements on isolated films and on surface treated electrodes during aqueous exposures, anodic polarization studies on magnesium alloys in inhibited electrolyte systems, and the microstructural study of surface treatment and corrosion films. Project no. 7351, Task no. 70608. Contract AF 33(038)-16655. AF WADC TR 54-222.

Fundamentals of the transition temperature phenomenon in steel. Quarterly progress report no. 13 for the period 1 Oct 1954-31 Dec 1954 under Contract no. Nonr-266(04), by M. Gensamer, J. O. Brittain, H. Hahn, F. Deronja, and R. P. Dudley. Columbia University. School of Mines, New York, N. Y. Mar 1955. 21p fold drawings, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 119645

Testing of a series of vacuum melted 1020 carbon steel has been initiated and while not completed has provided some preliminary data. The construction of a liquid helium cryostat for low temperature testing has been initiated. Two series of vacuum melted iron have been tested and the transition temperatures determined. A third series of vacuum melted iron is being outgassed prior to testing. The modified internal friction apparatus has been calibrated at the carbon and nitrogen peaks. For 8th-12th reports see PB 114670, 116097, 116880, 117792, 119047.

Improved tungsten carbide-cobalt compacts by electric-resistance sintering, by Perry G. Cotter, J. A. Kohn and R. A. Potter. U. S. Bureau of Mines. Jan 1955. 22p photos, graphs, tables. Order from LC. Mi $2.70, ph $4.80. Limited supply available free from U. S. Bureau of Mines, 4800 Forbes St., Pittsburgh 13, Pa. PB 123094

This paper presents a description of the electric-resistance sintering of tungsten carbide-cobalt compacts and the results of comparative physical tests. BM RI 5100.

Investigation of the degassing effect of ultrasonics on aluminum alloy, by J. Byron Jones and John G. Thomas. Aeroprojects, Inc., West Chester, Pa. Feb 1954. 61p photos, diagrs, graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 123091

In this study an attempt has been made to degas molten aluminum by causing gas to collect and rise to the surface from the nodes of sound waves introduced into a melt. The apparatus for effecting this phenomena has been successfully built and demonstrated. In this work certain problems remain unanswered however, since the degassing was erratic and accompanied by serious contamination of the melt by erosion of the transducer coupler material. Efforts to solve the problems will be made in future work. AD 31527. AF WADC TR 53-527. Contract AF 18(600)-32.

Iron-manganese-nickel alloys for heavy armor and forgings, by L. R. Kramer, S. L. Toleman and W. T. Haswell, Jr. U. S. Naval Research Laboratory. Nov 1944. 18p photo, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 120756

1. Armor plate - Ballistic tests 2. Armor plate - Mechanical properties 3. Iron-manganese-nickel alloys - Mechanical properties 4. Steel alloys - Mechanical properties 5. NRL M 2393.

Magnetic properties of low permeability alloys, by T. R. McGuire and J. Samuel Smart. U. S. Naval Ordnance Laboratory, White Oak, Md. Feb 1954. 16p diagr, graphs, table. Order from OTS. 50 cents. PB 121169

Susceptibility measurements made on Elgiloy, Inconel, and Colmonoy indicate that the first two have mainly paramagnetic contributions to the permeability, while Colmony has contributions from both paramagnetism and ferromagnetic impurities which are more nearly equal. Both Elgiloy and Inconel become ferromagnetic below room temperature. A relatively simple experimental arrangement for measuring low permeabilities in fields of about 100 gauss is described. NAVORD 3625.

Nicrobrazing tubes to a plate, by G. Comenetz, J. W. Salatka and J. L. McShane. Westinghouse Research Laboratories, East Pittsburgh, Pa. Jan 1953. 35f photos, diagrs, tables. Order from LC. Mi $3, enl pr $7.80. PB 123008

The end of a stainless steel tube which passes through a hole in a stainless steel plate is brazed to the plate with "Nicrobraz" alloy. Heat for the brazing is applied via the tube bore by radiation from a tungsten filament which forms part of a portable hydrogen-filled "brazing lamp". Few if any seals leak. AD 92392. Research report R-94476-1-C.

Operation of NRL-1 carbon steel loop at the materials test reactor, by V. J. Linnenbom, G. E. MacVeigh, H. S. Dreyer and G. M. Dinnick. U. S. Naval Research Laboratory. Aug 1956. 30p photos, diagr, graphs, tables. Order from OTS. 75 cents. PB 121319

The effects which might be encountered in the operation of a pressurized water reactor whose primary coolant system is constructed of carbon steel were investigated using a carbon steel loop. In this loop water at 600°F and 2200 psi could be circulated at velocities up to 30 ft/sec past fuel element assemblies and corrosion specimens in two thimbles, one located in-pile and the other out-of-pile. From the standpoint of deposition of corrosion products on exposed fuel element surfaces, water purification data, and the accessibility as determined by the various radioactive species within the system, carbon steel appears to suffer no serious disadvantages when compared to stainless steel. From weight changes of the corrosion specimens, there appears to be no increase in corrosion due to radiation. NRL R 4798.

Photoconductivity in lead selenide, by James N. Humphrey. U. S. Naval Ordnance Laboratory, White Oak, Md. May 1955. 105p photos, diagrs, graphs. Order from OTS. $2.75. PB 121174

The mechanism of photoconductivity in thin films of lead selenide has been investigated through the use of starting materials prepared in various ways, by using various sensitizing agents, and by varying the film thickness and the conditions of preparation of the films. The range of conditions producing sensitivity as well as the differences in sensitivity are used to formulate a model for the mechanism. Sensitizing agents used were oxygen, sulfur, selenium, and the halogens. Submitted as a thesis to University of Maryland. Appendix: Derivation of the expression for photoconductive response. NAVORD 3922.

Preparation of radiographic standards. Summary report, by H. F. Taylor, H. F. Bishop, E. A. Rominski, H. F. Kaiser and A. L. Christenson. U. S. Naval Research Laboratory. Jul 1942. 50p photos, drawings, graph, tables. Order from LC. Mi $3.30, ph $7.80. PB 120534

1. Steel castings - X-ray inspection 2. Radiography - Standardization 3. NRL M 1909.

Research of the weldability of iron alloys. Third partial report, by W. H. Bruckner. U. S. Naval Research Laboratory. Jul 1937. 72p photos (part fold), drawing, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 120656

Methods are described for reproducing the conditions existing in the transition zone of a weld by heating small samples to high temperatures and quenching in liquid baths. The heat treatment, called "weld-quench" in the report, gives fair reproducibility and for individual materials quenched, is usually within 90% or better of attaining the maximum hardness in the transition zone of welded plates. Exact temperature-time curves for the thermal cycle undergone by metal in the transition zone have been experimentally determined. Several curves for this thermal cycle are presented. 1st-2d reports are NRL M 1258 and M-1303. NRL M-1382.

Self-diffusion of silver in silver-palladium alloys, by Norman H. Nachtrieb. Institute for the Study of Metals, Chicago, Ill. Feb 1956. 20p graphs (part fold), table. Order from LC. Mi $2.40, ph $3.30. PB 122201

The self-diffusion of silver has been studied in alloys containing 0.00, 1.49, 3.69, 9.87, and 21.84 atom percent palladium at four temperatures: 715.4, 799.4, 861.8, and 942.0°C. The rate decreases with increasing palladium atom fraction. AD 82003. AF OSR TN 56-89. Contract AF 18(600)-1489.

Static fatigue in twelve heats of 4340 steel embrittled with hydrogen, by H. H. Johnson, R. D. Johnson, R. P. Frohmberg and A. R. Troiano. Case Institute of Technology, Cleveland, Ohio. Aug 1955. 41p drawings, diagrs, graphs, tables. Order from OTS. $1.25. PB 121063

All twelve heats of 4340 steel exhibited delayed failure over a substantial stress range at strength levels of 230,000 psi and 270,000 psi after electrolytic introduction of hydrogen. The static fatigue limit was independent of strength level and chemical composition. The failure time increased linearly with increasing charged notch tensile strength. The failure time and charged notch stength decreased with increasing amounts of phosphorus plus sulfur. At the higher strength level these relationships were partially obscured by the extreme strength level sensitivity of the charged notch tensile strength. The tempempering characteristics were related to variations in carbon content. Ductility decreased with increasing carbon content and increasing amounts of phosphorus plus sulfur. Project no. 7351. Task no. 70645. AF WADC TN 55-306. Contract AF 33(038)-22371.

Substitution of manganese for nickel in STS armor plate. Partial report, by B. M. Loring. U. S. Naval Research Laboratory. Mar 1942. 21p photo, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 120558

This report describes the effect on STS armor compositions of replacement of nickel by manganese. The manganese is increased from 0.39 percent to 2.01 percent and the nickel correspondingly decreased from 3.49 percent to 0 percent. It is shown that manganese substitution for nickel does not lower the ballistic limit compared to standard STS at equal hardness and does not lower the critical hardness for the ductile, high energy absorption type of plate deformation. NRL M-1861.

Survey of low-alloy aircraft steels heat treated to high strength levels. Part 2: Fatigue, by George Sachs. Syracuse University, Syracuse, N. Y. Aug 1954. 112p diagrs, graphs, tables. Order from LC. Mi $6, ph $18.30. PB 123090

In Part II the information available on fatigue characteristics of high-strength steels is assembled. It appears that any specific steel exhibits fatigue-strength characteristics which may be particularly unfavorable at certain tempering temperatures. High-hardenability high-strength steels usually possess endurance limits considerably above those of other steels heat-treated to high strength levels. AD 43526. AF WADC TR 53-254, Part 2. Contract AF 33(616)-392.

Vacuum evaporation of heavy metallic films, by W. R. Turner. U. S. Naval Research Laboratory, White Oak, Md. Jun 1955. 34p photos, diagrs, graph, table. Order from OTS. $1. PB 121175

This report describes the development and operation of vacuum evaporation equipment capable of forming metallic films 10 to 40 times the thickness obtained in commercial practice. Although only a limited number of metals have been evaporated, the method is believed to be applicable to a wide range of metals, alloys, and non-metals. NAVORD 3948.

Zinc and light metal die-casting. Organization for European Economic Co-operation, Paris. Oct 1955. 141p photos, diagrs, graphs, tables. Order from O.E.E.C. Mission, 2000 "P" Street, N. W., Washington 6, D. C. $2. PB 120135

This report contains the observations and recommendations of the members of Tecaid Mission No. 155, which visited the United States in the spring of 1954 under the auspices of the Organisation for European Economic Co-operation and the American Foreign Operations Administration. The chapters of the report cover virtually the same ground as the four groups of the Mission, which studied: 1. Die casting machines, die design and die construction; 2. Metallurgy; 3. Foundry practice; 4. Finishing die castings. OEEC TAR 155(54)-1.

Zirconium purification, using a basic sulfate precipitation, by R. H. Nielsen and R. L. Govro. U. S. Bureau of Mines. Mar 1956. 16p diagrs, graphs, tables. Order from LC. Mi $2.40, ph $3.30. Limited supply available free from U. S. Bureau of Mines, Washington 25, D. C. PB 123095

A new, cheaper precipitation scheme has been developed to produce purified zirconium oxide.

Technical-grade sulfuric acid is used to precipitate a basic zirconium sulfate from a hot dilute hydrochloric acid solution. With close control of temperature, pH, and zirconium - sulfate ratio, excellent purification and complete zirconium recovery can be attained. BM RI 5214.

METEOROLOGY AND CLIMATOLOGY

Atmospheric refraction over water, by H. W. Yates. U. S. Naval Research Laboratory. Jul 1956. 19p photos, diagrs, graphs. Order from OTS. 50 cents. PB 121295

The positions of the horizon and of six distant lamps arranged in a vertical array were observed through a number of 24-hour periods. Two sensitive dip meters were used at stations whose elevations above mean low water were 14 feet and 117 feet. The observations were made from the Chesapeake Bay Annex of the Naval Research Laboratory situated on the west shore of the bay near Chesapeake Beach, Maryland. The results show the measured positions of horizon and lamps and the calculated (no refraction) positions. The temperatures of the water and of the air at the two observing stations are also shown. Appendix A: Calibration of telescopes. - Appendix B. Calculation of horizon distance and dip. NRL R 4786.

Empirical and theoretical studies of baroclinic instability, by Robert G. Fleagle and Yutaka Izumi. Washington. University. Dept. of Meteorology and Climatology. Sep 1955. 75p drawing, graphs, tables, maps. Order from LC. Mi $4.50, ph $12.30. PB 120414

The study reported here has consisted of empirical determination of the fields of three-dimensional motion, pressure, and temperature in a selected weather situation and a theoretical attack on certain features revealed by the data or from other related sources. The theoretical studies are directed at understanding of some of the prominent aspects of cyclone and anticyclone development. Discussion indicates the theoretical results to be sonsistent with the facts of the general circulation, viz, development of maximum zonal speed in middle latitudes, and the greatest instability exhibited north of the maximum in zonal speed. Scientific report no. 1; Occasional report no. 3; Air motion study, 1. Contract AF 19(604)-314. AF CRC TN 55-877.

Estimating soil tractionability from climatic data, by C. W. Thornthwaite. Drexel Institute of Technology. Laboratory of Climatology, Centerton, N. J. Jan 1956. 47p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 122190

Emphasis was directed toward modification of the Thornthwaite water balance bookkeeping system and the development of simplified yet rational procedures for evaluating the water balance on both a daily and a monthly basis. The new procedure for making the computations of water storage, water surplus, and water deficit has been tested and found to provide satisfactory results. The central thought in the work undertaken was that it should be directed toward the achievement of two principal goals. a) Complete utilization of all existing knowledge in improving and simplifying the empirical formula and procedures now used, and b) Development of new information to serve as a basis for clarification, improvement, and revision of current concepts and assumptions. AF CRC TR 56-264. Contract AF 19(604)-1306.

Final report under Contract no. AF 19(604)-600. Wentworth Institute, Boston, Mass. Feb 1956. 42p photos, fold drawing, fold diagr. Order from LC. Mi $3.30, ph $7.80. PB 122348

Services, materials, and facilities were provided for the adaptation of upper air research experiments to suitable vehicles for participation in the program being carried on by the United States Air Force for the acquisition of greater knowledge of the properties and phenomena of the upper atmospheric region. Rocket instrumentation systems, including payload racks and experimental apparatus, as well as supporting equipment, power supplies, and allied cabling, were assembled for flight in the forward, or nose, section of the Aerobee sounding rocket. Associated rocket-borne equipment was also designed and constructed, as was apparatus, including the basic balloon flight gondolas, utilized in a series of balloon launchings devoted to the sky brightness study. Contract AF 19(604)-600. AF CRC TR 56-252.

Heating models for extended- and long-range numerical weather forecasting and the study of the general circulation, by Yale Mintz. California. University. Dept. of Meteorology, Los Angeles, Calif. Nov 1955. 23p. Order from LC. Mi $2.70, ph $4.80. PB 120153

Scientific report no. 2 under Contract no. AF 19-(604)-1286.
1. Atmosphere - Circulation - Forecasting
2. Weather forecasting - Mathematical analysis
3. Weather forecasting, Long range 4. Contract AF 19(604)-1286, Scientific report no. 2.

Impingement of cloud droplets on a cylinder and procedure for measuring liquid-water content and droplet sizes in super-cooled clouds by rotating multicylinder method, by R. J. Brun, W. Lewis, P. J. Perkins and J. S. Serafini. U. S. National Advisory Committee for Aeronautics. 1955. 47p photos, drawings, graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 40 cents. PB 122478

The amount of water impinging in droplet form, the area of impingement, and the rate of impingement

per unit area on a cylinder surface are calculated from droplet trajectories and presented in terms of dimensionless parameters to cover a wide range of flight and atmospheric conditions. The rotating multicylinder method for in-flight determination of liquid-water content and droplet size is described, including the theory of operation, the apparatus required, the technique of obtaining data in flight, and detailed methods of calculating the results. Necessary charts and tables are presented. Appendix E: Alternate method of reducing rotating multicylinder data, by Paul T. Hacker. Supersedes TN 2903 (PB 108789), TN 2904 (PB 109102) and RM E53D23. NACA TN 2903 Revised. NACA TN 2904 Revised. NACA 1215.

Ionosphere propagation studies. Scientific report no. 1-1 for the period Jun 1-Aug 31, 1955 under Contract no. AF 19(604)-1413, by Leonard C. Edwards. Raytheon Manufacturing Co., Waltham, Mass. Sep 1955. 19p photos, diagrs. Order from LC. Mi $2.40, ph $3.30. PB 122350

This program is basically a continuation of a study conducted under Contract AF 19(604)-712 for Air Force Cambridge Research Center during 1953 and 1954. It is intended that data collected during the earlier program be utilized in the present work. The object of the work is to further evaluate the effect of ionospheric focusing on the shape of the backscatter pattern. The contract calls for three separate studies: the first, item 1a, of the focusing factor and its effect on calculated backscatter patterns; the seond, item 1b, of continuous level signals observed on frequencies above the so called maximum usable frequency (MUF) with a view toward determining this mode of propagation; and the third, item 1c, of the accuracy which can be obtained in using beacon transponding equipment at remote sites before data collection can begin. Emphasis was placed on these two programs during the first quarterly period. Contract AF 19(604)-1413.

Meteorological analysis of clear air turbulence (report on the U. S. synoptic high-altitude gust program), by Herman Lake. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate, Bedford, Mass. Feb 1956. 71p tables, maps. Order from LC. Mi $4.50, ph $12.30. PB 122347

An intensive and detailed study of 598 pilots' reports of the occurence or non-occurrence of high-altitude turbulence at 30 - 39,000 feet collected during the U. S. Synoptic High Altitude Gust Program held 18 - 21 March 1953 was made. The objective of the analysis of the appropriate meteorological variables, upper air features and the aircraft turbulence reports by means of standard and non-standard synoptic charts was to determine the usefulness of the statistical relationships between the atmospheric processes and clear air turbulence. The variables used were the wind speed, wind direction, wind shear, thermal stability and the Richardson number. The synoptic features that were studied included the distance from the tropopause, tropopause breaks, and jet stream axis. AF CRC TR 56-201. AF GRD P 47.

Preliminary study on the correlation of atmospheric transmission with back scattering, by J. A. Curcio, G. L. Knestrick and L. F. Drummeter. U. S. Naval Research Laboratory. Aug 1956. 22p photo, diagr, graphs, tables. Order from OTS. 75 cents. PB 121373

The relative back-scattered flux from an ultraviolet light pulse has been measured at night under various atmospheric conditions including clear weather, fog, drizzle, and snow. For each of the measurements, the transmission of one thousand feet of atmosphere was measured at a wavelength of 6650 angstroms with the aid of a telephotometer which consisted of a modified commercial optical pyrometer. NRL R 4818.

Synoptic study of horizontal deformation, by William P. Elliott and H. Albert Brown and Study of kinematic components in frontogenesis, by Ledolph Baer. Texas. Agricultural and Mechanical College. Dept. of Oceanography, College Station, Texas. Feb 1956. 49p drawing, maps, graph, table. Order from LC. Mi $3.30, ph $7.80. PB 122346

Scientific report no. 6 under Contract no. AF 19-(604)-559. A and M project 57. Reference 56-5T. 1. Deformation, Geostrophic - Theory 2. Frontogenesis - Components 3. Contract AF 19(604)-559 4. AF CRC TN 56-280.

MINERALS AND MINERAL PRODUCTS

Construction features and physical properties of thermo-con cellular concrete as used for residential housing, by William R. Lorman. U. S. Naval Civil Engineering Research and Evaluation Laboratory, Port Hueneme, Calif. Sep 1955. 93p photos, drawings, diagrs, graphs, tables. Order from OTS. $2.50. PB 121370

This is a revision of PB 116692 (Listed in USGRR vol. 23, no. 6, June 17, 1955, p. 217). Factual information previously developed by National Bureau of Standards, Army Corps of Engineers, and a commercial testing laboratory is discussed with reference to the NCEREL investigation. Project YD 400-1. Technical memorandum M-092. NCEREL M-092 Revised.

Investigation of a method of casting alloy-titanium carbide cermets, by E. J. Soxman. New York State College of Ceramics, Alfred, N. Y. Dec 1953. 29p photos, drawing, table. Order from LC. Mi $2.70, ph $4.80. PB 123092

Equipment was constructed and used for the purpose of developing a method for the casting of cermets. This method involved the dispersion of a ceramic material, liquid or solid, in molten metal. This apparatus was called the turbo-crucible. In its final version, the turbo-crucible consisted of a twelve pound capacity tilting induction furnace positioned in such a way that a graphite rotor mounted on a standard drill press head and driven by a variable speed motor could be lowered into the charge in the crucible, then withdrawn. The charge could be cast into a suitable mold by tilting the furnace. Using this equipment a dispersion of titanium carbide in nickel was obtained. The microstructures of such specimens are discussed and compared with the microstructures of similar charges melted in graphite crucibles. AD 27514. Summarizes work from Aug 1951 to Dec 1953. AF WADC TR 53-370, Contract W33(038)-ac-14233.

Iron bonded titanium carbide, by Roger E. Wilson. New York State College of Ceramics, Alfred, N. Y. Dec 1953. 39p photos, drawings, graphs, tables. Order from OTS. $1. PB 121323

This report concerns the development of techniques for the hot pressing of the various shapes necessary, and the determination of the physical properties of an iron bonded titanium carbide cermet, containing small additions of molybdenum and silicon. From these properties it is concluded that this cermet is inferior to nickel-titanium carbide cermets. AD 29399. Covers work during 1952 and 1953. Contract W33(038)-14233. AF WADC TR 53-369.

Preparation of single crystals of the oxides of the transition elements, by E. J. Scott. U. S. Naval Ordnance Laboratory, White Oak, Md. Jun 1955. 25p photo, drawing, diagrs, tables. Order from OTS. 75 cents. PB 121176

Single crystals of the oxides of the transition elements have been prepared by the flame fusion process. The elements considered are aluminum, chromium, manganese, iron, cobalt, and nickel. Single crystals of the oxides of each of these individual elements were obtained, together with an additional 17 specimens in which two of these oxides were combined in crystal compounds. The construction and operation of the flame fusion apparatus and the preparation of suitable powders by the calcining of the ammonium sulfate salts of the elements are described. NAVORD 3960.

Thin dielectric film of bentonite clay for cathode-ray storage tubes, by Franklin H. Harris. U. S. Naval Research Laboratory. Jul 1956. 7p photos. Order from OTS. 50 cents. PB 121328

Thin dielectric films which bridge the openings of a fine mesh nickel screen have been developed using bentonite clay. The film is dried from a hydrosol of bentonite clay which is applied directly to one surface of the screen. Laboratory procedures have been found for forming the film and for converting it to a dielectric similar to mica. Dielectric films as thin as 20 millimicrons (0.8×10^{-6} inches) have been formed. These surfaces of bentonite clay on nickel screen are suited for use in cathode-ray storage tubes, and may be of interest in other applications. NRL R 4804.

ORDNANCE AND ACCESSORIES

Effect of hardness of the steel used upon the results of the steel dent test of detonators, by L. D. Hampton. U. S. Naval Ordnance Laboratory, White Oak, Md. May 1955. 10p diagrs, tables. Order from LC. Mi $1.80, ph $1.80. PB 120980

A study was made of the depth of dent produced in different samples of steel by several different detonators in order to determine what effect, if any, the variation in the hardness of the steel would have upon the depth of the dent produced by the detonator. The results indicate that this effect is negligible if the hardness of the steel is reasonably uniform. It is indicated that this uniformity can be obtained by specifying the use of SAE 1020 steel for the steel dent test of detonators. NAVORD 3983.

Evaluation of the detonators MK 58 MOD O and MK 65 MOD O and the primer MK 105 MOD I which replaces components containing mercury fulminate, by J. H. Herd and W. C. Pickler. U. S. Naval Ordnance Laboratory, White Oak, Md. Jul 1955. 43p photos, diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 120981

1. Detonators - Tests 2. Primers - Tests 3. Mercury fulminate - Substitutes 4. NAVORD 3971.

Investigation and determination of causes for excessive duddage in current production lots of Mk 13 Mod 7 rear fittings for T-73 fuze, by E. H. Mullins. U. S. Naval Ordnance Laboratory, White Oak, Md. Dec 1953. 29p photos. Order from LC. Mi $2.70, ph $4.80. PB 120992

Bureau of Ordnance Task Assignment NOL-Re2b-1-4-54.
1. T-73 (Fuze) 2. Fuzes, Mortar - Failures 3. NAVORD 3611.

Light armor investigation. First partial report: Survey of literature, by D. L. Hay. U. S. Naval Research Laboratory. Jul 1935. 14p. Order from LC. Mi $2.40, ph $3.30. PB 122667

1. Armor plate - Bibliography 2. NRL Q 1173.

Sensitivity testing of the detonator Mk 54 Mod O in the test set Mk 220 Mod O, by G. U. Graff. U. S. Naval Ordnance Laboratory, White Oak, Md. Jun

1952. 15p photos, diagr, tables. Order from LC. Mi $2.40, ph $3.30. PB 120938

Task NOL-Re2b-1-1-52.
1. Mk 54 Mod O (Detonator) 2. Mk 220 Mod O (Detonator) 3. Detonators - Tests 4. NAVORD 2393.

Spalling produced by detonation of explosives in very heavy-walled metal tubes, by L. E. Starr and J. Savitt. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1952. 15p photos, diagr, graphs. Order from LC. Mi $2.40, ph $3.30. PB 122079

A method is described for obtaining experimental compression wave velocities in metals. Measurements of the shock wave velocity in copper were made and found to be in good agreement with theoretical predictions. An explanation for the discrepancy between the wave velocity in copper reported by Rinehart and Pearson, and the velocity reported in this paper is presented. NAVORD 2369.

PERSONNEL APTITUDE TESTING

Comparison of supervisor, co-worker, and self-ratings of WAF job performance, by Marvin H. Berkeley. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, San Antonio, Texas. Sep 1955. 27p tables. Order from LC. Mi $2.70, ph $4.80. PB 120240

This study is one of a series having as ultimate goals the discovery of (a) the major determinants of positive and negative morale among enlisted WAF personnel and (b) how morale and attitude factors are related to job satisfaction and job performance. This report concerns the development of a criterion measure of job performance and gives some preliminary comparisons of supervisor, co-worker, and self-ratings on this measure. Project no. 7705, Task no. 77113. AF PTRC TN 55-25.

Development and validation of MDAP English proficiency examination form A, by John A. Cox, Jr. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, San Antonio, Texas. Jul 1955. 26p photos, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 120242

This report concerns the development and validation of a test of English comprehension. The test is intended for use with foreign nationals who are scheduled to attend United States Air Force pilot training schools. Project no. 7701, Task no. 77027. AF PTRC TN 55-17.

Experimental battery for measurement of proficiency of electronics technicians, by Glenn L. Bryan, Nicholas A. Bond, Jr., and Harold R. DaPorte, Jr. University of Southern California. Dept. of Psychology, Los Angeles, Calif. Mar 1955. 100p photos, tables. Order from OTS. $2.50. PB 121121

This report is one of a series concerned with the analysis and measurement of electronics trouble shooting proficiency. An experimental battery consisting of nine paper and pencil electronics tests and the AUTOMASTS test was administered to a large group of electronics and aviation technicians from the Pacific fleet. Results are interpreted in relation to the problems of developing adequate criteria of electronics trouble shooting. Composite proficiency scores are derived. The final section presents the conclusions of the research, discusses their implications, and makes recommendations for future research. Technical report no. 12 under Contract Nonr-228(02), Project NR 153-093.

Identification of job skills in air force recruits, by Robert L. Thorndike and Elizabeth P. Hagen. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, San Antonio, Texas. Aug 1955. 29p tables. Order from LC. Mi $2.70, ph $4.80. PB 120241

This report discusses scoring techniques and the results of several administrations of the experience record at Sampson, Lackland, and Parks Air Force Bases. The research herein reported suggests that the use of the experience record prior to career counseling is practicable and that such a utilization could be expected to result in a saving of counselor hours spent in the identification of bypassed specialists. Contract AF 33(038)-13474. AF PTRC TN 55-19.

Learning curves for operators of stereoscopic rangefinders, by D. C. Beier. Wisconsin. University, Madison, Wis. Nov 1944. 26f graphs, tables. Order from LC. Mi $2.70, enl pr $6.30. PB 123012

This investigation is a practical study of the progress of learning under training school conditions and was designed to answer practical curricular problems of how much practice may be profitably spent on various types of drill. The data used in this study are based on the rangefinder operation performance of Fire Controlmen. The criterion of rangefinder proficiency used is the scatter score, which is a measure of the variability of the operator's range errors which are determined from "true" or reference ranges obtained by means of radar equipment with experienced operators. Applied Psychology Panel. Project N-114, Report no. 12. OSRD 4349. Contract OEMsr-1171.

Operational suitability test of apprentice still photographer graduates of TTAF course no. AF23230, photo and laboratory technician. U. S. Air Force. Air Proving Ground Command. Eglin Air Force Base, Fla. Sep 1955. 27p. Order from LC. Mi $2.70, ph $4.80. PB 120418

Project no. APG/CSC/579-A, Final report. AD 71833.
1. Photographers - Training 2. Photographic printing 3. Photographic processing 4. Films (Photography) - Processing 5. APG Proj CSC/579-A.

PHOTOGRAPHIC AND OPTICAL GOODS

Application of sound motion pictures for recording billet analysis information, by Edward P. McCoy and Charles J. McIntyre. Pennsylvania State University, University Park, Pa. Nov 1953. 172p photos. Order from LC. Mi $8.10, ph $27.30. PB 120350

This study is an attempt to systematically explore and develop methods, procedures and techniques of production and use of motion pictures for recording and communicating information for billet analysis. NAV PERS TB 53-6. Contract N6 onr-269, T. O. VII.

Broad-band blue lighting system for radar air traffic control center, by Conrad L. Kraft and Paul M. Fitts. Ohio State University. Dept. of Electrical Engineering and Laboratory of Aviation Psychology, Columbus, Ohio. Jan 1954. 51p photo, diagr, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 123087

This report contains detailed specifications for the installation and use of a broad-band-blue lighting system for a radar air traffic control center which will permit scope observers, maintenance personnel, and other individuals to work in the same room while engaged in a 24-hour-a-day operation. The varied requirements of a lighting system are stated, the relevant psychophysiological and physical facts summarized, alternative lighting systems are critically evaluated, and the results of preliminary operational suitability tests of the proposed system are given. AD 37701. Contract AF 33(616)-43. AF WADC TR 53-416.

Dielectric lenses for scanning, by Russell M. Brown, Jr. U. S. Naval Research Laboratory. Aug 1956. 29p diagrs, graphs. Order from OTS. 75 cents. PB 121294

A study has been made of the scanning properties of solid dielectric bifocal lenses. A point-by-point technique used in computing the lens curves is discussed. The optical aberrations and the radiation patterns of three lenses are described. In an appendix the results of a companion study of aplanatic lenses (lenses obeying the Abbé sine condition) are presented. NRL R 4784.

Observations of a searchlight beam to an altitude of 28 kilometers, by E. O. Hulbert. U. S. Naval Research Laboratory. Jun 1937. 18p photos, graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 120654

1. Searchlights - Intensity 2. NRL H 1372.

Techniques for making and projecting stereoscopic slides, by Clarence W. Kendall and William H. Richards. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aerial Reconnaissance Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Jan 1956. 35p photos, diagrs, tables. Order from OTS. $1. PB 121282

Causes of eyestrain and other annoyances encountered by persons viewing stereopictures are analyzed. Practical, easy-to-follow procedures which will result in the best possible visual presentation of information through the medium of stereoscopic slides are presented. By placing emphasis on close-up views and making a critical study of the procedure for photographing, mounting, and projecting the close-up views, a system was devised which will work equally well with all stereopictures. Slides prepared by the procedures outlined may be used in either hand-operated or automatic stereoprojectors. A jig was designed and fabricated for properly aligning, positioning, rotating, locating, and framing the pictures for use in a completely automatic projector. Project no. 6245. AF WADC TR 56-75.

PHYSICS

General

Bibliography on microseisms, part 2, edited by B. Gutenberg and F. Andrews. California Institute of Technology. Seismological Laboratory, Pasadena, Calif. Jan 1956. 41p. Order from LC. Mi $3.30, ph $7.80. PB 122207

For Part 1 see PB 107936.
1. Microseisms - Bibliography 2. Contract AF 19(122)-436 3. AF CRC TN 56-267.

Boundary-layer growth and shock attenuation in a shock tube with roughness, by Paul W. Huber and Donald R. McFarland. U. S. National Advisory Committee for Aeronautics. Mar 1956. 49p

photos, diagrs, graphs, table. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 120110

Measurements of unsteady-flow turbulent boundary-layer characteristics using a new bullet technique involving study of the bullet bow-wave shape and of shock-wave attenuation have been made in a shock tube with wall roughness. The boundary-layer-thickness measurements agreed well with both steady-flow data and theory. The measured velocity profiles were considerably less full than the steady-flow theoretical profiles but agreed with some of the steady-flow data. The shock-attenuation measurements were in agreement with a simple theory at small values of displacement thickness but were much lower than theory at the large values. NACA TN 3627.

Calculations of laminar heat transfer around cylinders of arbitrary cross section and transpiration-cooled walls with application to turbine blade cooling, by E. R. G. Eckert and J. N. B. Livingood. U. S. National Advisory Committee for Aeronautics. 1955. 23p graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 25 cents. PB 122479

An approximate method for development of flow and thermal boundary layers in laminar regime on cylinders with arbitrary cross section and transpiration-cooled walls is obtained by use of Karman's integrated momentum equation and an analogous heat-flow equation. Incompressible flow with constant property values throughout boundary layer is assumed. Shape parameters for approximated velocity and temperature profiles and functions necessary for solution of boundary-layer equations are presented as charts, reducing calculations to a minimum. The method is applied to determine local heat-transfer coefficients and surface temperatures in the laminar region of transpiration-cooled turbine blades for a given flow rate. Coolant flow distributions necessary for maintaining uniform blade temperatures are also determined. NACA 1220.

Coding schemes for estimating correlation coefficients, by J. Pomerantz. U. S. Naval Ordnance Laboratory, White Oak, Md. Dec 1952. 21p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 122014

The boundaries and weights to be assigned to grouped data when correlation coefficients are being estimated are presented. A test of significance is given for the correlation coefficient obtained from data grouped in two categories for the case where successive values of the observations are independent. A comparison is made of results obtained by the two and three category methods. NAVORD 2679.

Commutative linear differential operators, by Harley Flanders. California. University. Dept. of Mathematics, Berkeley, Calif. Aug 1955. 41p. Order from LC. Mi $3.30, ph $7.80. PB 123166

1. Equations, Differential - Linear 2. Operators (Mathematics) 3. Contract Nonr-222(37), NR 041-157, Technical report no. 1.

Eddy-current phenomena in ferro-magnetic materials, by H. M. McConnell. Carnegie Institute of Technology. Dept. of Electrical Engineering, Pittsburgh, Pa. Aug 1953. 29f diagrs, graphs. Order from LC. Mi $2.70, enl pr $6.30. PB 122831

This paper correlates existing theories of eddy currents in saturated iron. In particular an approach originally suggested by A. G. Ganz is treated in a comprehensive mathematical analysis based on classical field theory. It is shown that the method is useful also in more conventional applications, such as inductive and conductive heating of solid iron. AD 21116. Magnetic amplifiers, Technical report no. 14. Contract N7 onr-30306, NR 975-272.

Estimation of the proportion of a population lying above a fixed value of the variate, by F. A. Sorensen. U. S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Oct 1955. 10p. Order from LC. Mi $1.80, ph $1.80. PB 120233

An expression is obtained for the asymptotic variance of a certain estimate of the proportion of a population lying above a fixed value. For several populations, the asymptotic variance of this estimate is compared with that of the estimate obtained by counting the number of observations, in a sample, lying above this fixed values. The relative efficiencies of the two estimates are presented. Dept. of the Army project no. 5B0306002. Ordnance research and development project no. TB3-0007. APG BRL M 935.

Exact solutions of laminar-boundary-layer equations with constant property values for porous wall with variable temperature, by Patrick L. Donoughe and John N. B. Livingood. U. S. National Advisory Committee for Aeronautics. 1955. 23p graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 25 cents. PB 122483

Solutions were computed for a Prandtl number of 0.7 and a range of cooling-air flows, and pressure and wall temperature gradients. For each case, boundary-layer thicknesses and heat-transfer and friction coefficients were also computed and tabulated. Steeper temperature profiles for a given coolant flow were obtained by increased wall temperature gradients. Supersedes TN 3151 (PB 115219) NACA 1229. NACA TN 3151 Revised.

Experimental investigation of free-convection heat transfer in vertical tube at large Grashof numbers, by E. R. G. Eckert and A. J. Diaguila. U. S. National Advisory Committee for Aeronautics. 1955. 16p photos, drawings, diagrs, graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 20 cents. PB 120120

Local free-convection heat-transfer coefficients and temperature fields in the turbulent flow range were obtained within a vertical, stationary tube closed at the bottom, heated along its walls, and having a length-to-diameter ratio of 5. Convective heat-transfer coefficients were correlated by the general relations for free-convection heat transfer. These coefficients, converted to dimensionless Nusselt numbers were 35 percent below known relations for vertical flat plates. Air temperature measurements within the tube indicated a thin boundary layer along the heated wall surface and unstable conditions in the air flow. Supersedes NACA RM E52F30. NACA 1211.

Experimental investigation of the interaction of overtaking shock waves in air, by E. M. Fisher. U. S. Naval Ordnance Laboratory, White Oak, Md. Aug 1953. 26p diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 120907

1. Shock waves - Measurements 2. Air blast - Shock waves 3. NAVORD 2909.

Exploratory investigation of boundary-layer transition on a hollow cylinder at a Mach number of 6.9, by Mitchel H. Bertram. U. S. National Advisory Committee for Aeronautics. May 1956. 38p photos, diagrs, graphs, table. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122499

At a given Mach number it appears that the Reynolds number based on leading-edge thickness is an important parameter that must be considered in comparisons of flat-plate transition data from various facilities. Appendix A: Theoretical boundary-layer profiles. NACA TN 3546.

Flow past an unswept- and a swept-wing-body combination and their equivalent bodies of revolution at Mach numbers near 1.0, by Walter F. Lindsey. U. S. National Advisory Committee for Aeronautics. Jun 1956. 18p photos. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122532

The complete flow fields past an unswept- and a swept-wing-body combination and their equivalent bodies of revolution at Mach numbers around 1.0 have been observed by means of motion-picture schlieren photography. The results of these observations indicate that the shock growth and positions on the wing-body combinations are closely reproduced in the flow past their respective equivalent bodies. Supersedes RM L54A28a. NACA TN 3703.

General test plan for the collection of data which are to be analyzed by the probit method, by Paul B. Morgan. U. S. Naval Ordnance Laboratory. May 1953. 12p graphs. Order from LC. Mi $2.40, ph $3.30. PB 122037

A general plan to direct the efficient collection of "go, no-go" data on which the probit method of analysis is to be used, is presented. While this plan was developed to use in the field for arming tests of impact type fuzes, it is often applicable in other situations where data suitable for the probit analysis technique are desired. The plan is explained and the resulting data from two tests where such a plan was used is presented. NAVORD 2879.

Influence of large amplitudes on flexural motions of elastic plates, by George Herrmann. U. S. National Advisory Committee for Aeronautics. May 1956. 45p diagr, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122500

A nonlinear plate theory of motion, valid for large deflections, is developed and discussed in the light of other theories. The influence of large rotations is demonstrated by solution of the resulting equations for the case of straight-crested waves. A study is made of the origin of certain terms appearing in nonlinear plate theories. NACA TN 3578.

Initial behavior of a spherical blast, by J. A. McFadden. U. S. Naval Ordnance Laboratory, White Oak, Md. May 1952. 30p graphs. Order from LC. Mi $2.70, ph $4.80. PB 120960

In this report an analytic method is applied to an idealized problem with discontinuous initial values -- the problem of the "spherical shock tube". The behavior immediately after the "explosion" is described by analytic solutions. These solutions should provide (1) a qualitative picture of the behavior at later times, (2) starting values for stepping ahead numerically, after the initial discontinuity has been smoothed out, and (3) an early quantitative check on any numerical method which surmounts the starting difficulty. NAVORD 2378. NOL ARR 91.

Interim research report on ultrasonic propagation in solid materials. Scientific report no. 1 for the period Jul 1-Sep 30, 1955 under Contract no. AF 19(604)-1423. Anderson Laboratories, Inc., West Hartford, Conn. Sep 1955. 10p drawings, graphs. Order from LC. Mi $1.80, ph $1.80. PB 122349

During the period covered by this report, design work was accomplished toward the fabrication of a long delay line with a large variation, and the quartz ordered. Servo control circuits for varying the time delay are under consideration. In improving and measuring delay line performance, various techniques are being investigated for increasing

bandwidth, and a different testing procedure gives what is felt to be a more accurate bandwidth check. Some preliminary work has been done in the determination of the temperature coefficient of delay as a function of temperature, and it is planned that a performance study of other characteristics over a wide temperature range be included. AF CRC TN 55-950.

Investigation of the effects of heat transfer on boundary-layer transition on a parabolic body of revolution (NACA RM 10) at a Mach number of 1.61, by K. R. Czarnecki and Archibald R. Sinclair. U. S. National Advisory Committee for Aeronautics. 1955. 18p photos, drawings, diagrs, graphs, table. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 20 cents. PB 122490

This report presents the results of an investigation of the effects of heat transfer on boundary-layer transition on a parabolic body of revolution (NACA RM-10). This report includes also a study of the effectiveness of cooling on boundary-layer transition with the model surface roughened and with tunnel disturbances impinging on the model. The tests were made at a Mach number of 1.6 and over a Reynolds number range from 2.5×10^6 to 35×10^6. A comparison is made between the experimental results and theory. NACA 1240. NACA TN 3165 Revised. NACA TN 3166 Revised.

Investigations on the behavior of solutions of a non-linear differential equation, connected with problems of turbulence and shock waves, by J. M. Burgers and the Technische Hogeschool, Delft, Holland. U. S. Naval Ordnance Laboratory, White Oak, Md. Jul 1951. 54p diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 122063

Shock wave phenomena and turbulence are significant factors that must be taken into account in the design of supersonic missiles. For instance, the base drag and the heating properties of the surface of a missile are considerably influenced by the state of turbulence of the boundary layer of the missile in flight. This report contains a detailed investigation of the properties of the solutions of the non-linear differential equation connected with the study of turbulent flow and the formation of shock waves. Exact particular solutions of the equation are obtained and investigated. NAVORD 1587. NOL ARR 12.

Laminar, transitional, and turbulent flow in triangular passages, by Ernest R. G. Eckert, Thomas F. Irvine, Jr. and Roger Eichhorn. Minnesota, University, Minneapolis, Minn. Oct 1954. 101p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $6, ph $16.80. PB 120266

An experimental and theoretical investigation was conducted on the flow characteristics of passages with triangular cross-section. Two ducts were used in the experiments with a length equal to 71 and 66 hydraulic diameters, the cross-sections of which were isoceles triangles with ratios of the height to base equal 5 to 1 and 2.5 to 1. The measurements were made with air and covered a Reynolds number range from 500 to 43,000. Static pressures were measured along the duct length and the velocity field measured in a cross-section near the downstream end of the passage. Additionally, the flow was made visual by injection of smoke. A sensitive micromanometer was developed which measures accurately, pressure differences of the order 10^{-4} inches of water. AD 66443. Project no. 3080. Contract AF 33(616)-474. AF WADC TR 54-443.

Method for the numerical solution of a heat conduction problem, by R. P. Eddy. U. S. Naval Ordnance Laboratory, White Oak, Md. Dec 1952. 8p diagr, graphs. Order from LC. Mi $1.80, ph $1.80. PB 122023

A scheme, due to J. von Neumann, for the numerical integration of parabolic or hyperbolic partial differential equations is here set up for use in solving a particular problem in heat conduction. A crude stability analysis is given. NAVORD 2725. NOL ARR 86.

Non-iterative numerical solutions of boundary-value problems, by Morton A. Hyman. U. S. Naval Ordnance Laboratory, White Oak, Md. Oct 1951. 43p tables. Order from LC. Mi $3.30, ph $7.80. PB 120910

Boundary-value problems occur prominently in many fields of physics and engineering, three being hydrodynamics, electromagnetism, and gas dynamics. Many important boundary-value problems must be attacked by numerical methods, because either an analytical solution does not exist or it is too complicated to use on a large scale. The numerical methods in current wide-spread use are iterative, and are very time-consuming and laborious when applied to a large-scale problem. The present paper describes an effective procedure for the non-iterative numerical solution of boundary-value problems. Use is made of the exact analytical solution of a related difference-equation problem, which can be found under a large variety of circumstances. NAVORD 1813. NOL ARR 26.

On panel flutter and divergence of infinitely long unstiffened and ring-stiffened thin-walled circular cylinders, by Robert W. Leonard and John M. Hedgepeth. U. S. National Advisory Committee for Aeronautics. Apr 1956. 52p diagrs, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 120404

A preliminary theoretical investigation of the panel flutter and divergence of infinitely long, unstiffened and ring-stiffened thin-walled circular cylinders is described. Analytical criteria for the location of

stability boundaries are presented along with a limited number of computed results. NACA TN 3638.

On the interative solution of a system of equations, by R. A. Good and R. P. Eddy. U. S. Naval Ordnance Laboratory, White Oak, Md. Aug 1952. 14p. Order from LC. Mi $2.40, ph $3.30. PB 120886

1. Mathematical equations and solutions 2. NAVORD 2577.

On turbulent fluid motion, by Max M. Munk. U. S. Naval Ordnance Laboratory, White Oak, Md. Nov 1950. 15p drawing. Order from LC. Mi $2.40, ph $3.30. PB 122060

The tendency of fluids to move in turbulent fashion is traced back qualitatively to kinematics and simple dynamics. It is demonstrated that vortices cumulate discriminatively; i.e., only those vortices that turn corotationally with the general fluid motion cluster together. This tendency leads to increase of energy supply, and thus a foundation for generation and for maintenance of turbulence is laid. NAVORD 1572. NOL ARR 8.

Review of investigations on turbulent flow with heat transfer at smooth walls, by Phrixos J. Theodorides. U. S. Naval Ordnance Laboratory, White Oak, Md. Nov 1953. 83p graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 120902

This is a survey of recent developments about turbulent motion with heat transfer at smooth walls. Characteristics are discussed for such a flow in prismatic ducts with symmetric cross sections (closed or open) as well as in the boundary layer of a flat plate. NAVORD 2958.

Shock location in front of a sphere as a measure of real gas effects, by R. N. Schwartz and J. Eckerman. U. S. Naval Ordnance Laboratory, White Oak, Md. Feb 1955. 22p drawings, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 120816

Spheres were fired at supersonic speeds into monatomic gases and into chlorine gas. The position of the shock wave which forms in front of the sphere depends on the Mach number and gas state before and after crossing the shock wave. Measurements made in monatomic gases agree fairly well with aerodynamic theory. NAVORD 3904. NOL ARR 266.

Shock-turbulence interaction and the generation of noise, by H. S. Ribner. U. S. National Advisory Committee for Aeronautics. 1955. 22p diagrs, graphs, table. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 25 cents. PB 122487

Interaction of convected field of turbulence with shock wave is analyzed to yield modified turbulence, entropy spottiness, and noise generated downstream of the shock. Analysis is generalization of single-spectrum-wave treatment of TN 2864 (PB 108523). Formulas for spectra and correlations are obtained. Turbulence of 0.1 percent longitudinal component generates about 120 dbs of noise. NACA 1233. NACA TN 3255, Revised.

Shock waves in solids: Reduction of pin technique data, by H. Dean Mallory. U. S. Naval Ordnance Laboratory. Apr 1953. 22p photo, graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 122035

It is shown that high precision measurements of shock waves in metals and of the associated translational motions can be made using the pin technique. Selection of a suitable observation equation and the least square fitting of randomized data is emphasized. Equations for the probable errors of quadratic functions and the least square constants are given and applied in a test for systematic errors by way of a worked out example. NAVORD 2866.

Spin effects on base pressure of cone cylinders at M = 2.86, by R. Lehnert and S. M. Hastings. U. S. Naval Ordnance Laboratory, White Oak, Md. Oct 1953. 22p photos, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 120903

1. Cones - Pressure distribution 2. Spin - Effects 3. NAVORD 2956 4. NOL ARR 190.

Taylor's hypothesis and the acceleration terms in the Navier-Stokes equations, by C. C. Lin. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1952. 17p. Order from LC. Mi $2.40, ph $3.30. PB 120954

1. Navier-Stokes equation 2. Mathematical equations and solutions 3. NAVORD 2306.

Temperature recovery factors in the transitional and turbulent boundary layer on a 40-degree cone cylinder at Mach number 2.9, by K. H. Gruenewald. U. S. Naval Ordnance Laboratory, White Oak, Md. Jul 1953. 58p photos, diagr, graphs, tables. Order from LC. Mi $3.60, ph $9.30. PB 122025

Temperature recovery factors have been determined on the cylindrical surface of a number of 40° cone cylinder models at zero angle of attack and at a Mach number of 2.86. The results of the investigation are compared with the theoretical and experimental findings of other investigators. NAVORD 2742. NOL ARR 168.

Theoretical and experimental investigation of heat transfer by laminar natural convection between parallel plates, by A. F. Lietzke. U. S. National Advisory Committee for Aeronautics. 1955.

9p. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 15 cents. PB 122480

For the experimental work, parallel walls (one heated uniformly and the other cooled uniformly) were simulated by an annulus with an inner-to-outer diameter ratio near 1. The theoretical results are presented in equations for the velocity and temperature profiles and the ratio of actual temperature drop across the fluid to temperature drop for pure conduction. No experimental measurements were made of the velocity and temperature profiles, but the experimental results are compared with theory on the basis of the ratio of the actual temperature drop to the temperature drop for pure conduction. Good agreement was obtained between theory and experiment for axial temperature gradients above 40° F/ft. NACA 1223. NACA TN 3328, Revised.

Theoretical loss relations for lowspeed two-dimensional-cascade flow, by Seymour Lieblein and William H. Roudebush. U. S. National Advisory Committee for Aeronautics. Mar 1956. 46p diagr, graphs, table. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 120115

Appendix: Loss coefficient for complete mixing. 1. Flow, Incompressible - Theory 2. Cascades (Aerodynamics) - Theory 3. NACA TN 3662.

Theory for the elastic deflections of plates integrally stiffened on one side, by Robert F. Crawford. U. S. National Advisory Committee for Aeronautics. Apr 1956. 21p diagrs, graph. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 120252

An elastic-deflection theory is presented for anisotropic plates which exhibit coupling between bending and stretching. In particular, the theory provides a basis for analyzing plates integrally stiffened on one side. Example calculations show that, in the case of a simply supported square plate loaded in compression and having equal flexural stiffnesses in the principal directions, coupling may significantly lower the inplane compressive load at which deflections grow rapidly. NACA TN 3646.

Unified two-dimensional approach to the calculation of three-dimensional hypersonic flows, with application to bodies of revolution, by A. J. Eggers, Jr. and Raymond C. Savin. U. S. National Advisory Committee for Aeronautics. 1955. 29p drawings, diagrs, graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 30 cents. PB 122492

A procedure for calculating three-dimensional steady and nonsteady supersonic flows with the method of characteristics is developed and discussed. An approximate method is deduced from the characteristics method and shown to be of practical value at high supersonic speeds. Supersedes TN 2811 (PB 107823). NACA 1249. NACA TN 2811, Revised

Nuclear

Disordering of polyatomic solids by neutrons, by E. G. Harris. U. S. Naval Research Laboratory. Aug 1956. 12p table. Order from OTS. 50 cents. PB 121202

A general method is outlined for calculating the number of vacant lattice sites or interstitial atoms produced in a polyatomic solid by neutron radiation. It is assumed that the colliding atoms are in the energy range for which the orbital picture is valid and are of sufficiently low energy for no appreciable fraction of their energy loss to occur in inelastic collisions. The theory is also extended to include charged particle radiation. NRL R 4807.

Flux measurements of fast neutrons with a recoil counter in the energy range of 50-2000 Kev, by W. D. Allen and A. T. G. Ferguson. Gt. Brit. Ministry of Supply. Atomic Energy Research Establishment. Jun 1955. 24p drawing, graphs. Order from British Information Services, 30 Rockefeller Plaza, New York 20, N. Y. 63 cents plus mailing handling. PB 120143

Flux measurements of fast neutrons in the energy range of 50 to 2000 kev have been made with a recoil counter in which the self-consistency for different counters filled with H_2 or CH_4 at different pressures is 2 to 3%. The measurement was crosschecked at 200 kev by comparison with two RdTh—D_2O sources of identical construction but widely differing intensities: the agreement was within 1% and 2% respectively. This report describes the details of the experimental studies undertaken in the course of the work. S. O. Code no. 91-3-2-15. AERE NP/R 1720.

Progress report for the period Nov 30, 1954-Feb 28, 1955 under Contract no. AT(30-1)-905. Massachusetts Institute of Technology. Laboratory for Nuclear Science. Feb 1955. 67p graphs, tables. Order from LC. Mi $3.90, ph $10.80. PB 120151

1. Atomic power - Research 2. Nuclear chemistry - Research 3. Cosmic radiation 4. Particles - Scattering 5. Cyclotrons 6. Synchrotrons 7. Contract AT(30-1)-905 8. Contract N5 ori-07806.

Report of the Bureau of Yards and Docks mission to Japan, 1945. U. S. Bureau of Yards and Docks. Order separate parts described below from LC, giving PB number of each part ordered.

Part III: Incidents in Hiroshima, section 2. 1945? 175p photos, drawings. Mi $8.10, ph $27.30. PB 122840

A 16-1 (Crossroads).
1. Damage, Bomb - Japan 2. Damage, Bomb - Photographs - Japan.

Part IV: Incidents in Nagasaki. 1945? 197p photos, drawings. Mi $8.70, ph $30.30. PB 122841

1. Damage, Bomb - Japan 2. Damage, Bomb - Photographs - Japan.

Part V: Damage from high-explosive and incendiary bombs at Kure and other targets. 1945? 142p photos, drawings, fold map, tables. Mi $7.20, ph $22.80. PB 122842

1. Damage, Bomb - Japan 2. Damage, Bomb - Photographs - Japan 3. Bombs, High explosive - Effects - Japan 4. Bombs, Incendiary - Effects - Japan.

Part VI: Dynamics of structures under atomic bombing. 1956? 108p diagrs, tables. Mi $5.70, ph $16.80. PB 122843

1. Bombs, Atomic - Explosions - Engineering aspects.

Part VII, Section 1: Theory of dynamic resistance and design of structures subjected to atomic bombs. 1945? 188p diagrs, graphs, tables. Mi $8.40, ph $28.80. PB 122844

1. Bombs, Atomic - Explosions - Engineering aspects 2. Structures - Shock resistance 3. Loads, Structural - Dynamic - Theory.

Part VII, Section 2: Theory of dynamic resistance and design of structures subjected to atomic bombs. 1945? 203p photos, diagrs, graphs, tables. Mi $9.30, ph $31.80. PB 122845

1. Bombs, Atomic - Explosions - Engineering aspects 2. Structures - Shock resistance 3. Loads, Structural - Dynamic - Theory 4. Buildings, Bomb-proof - Design.

PSYCHOLOGY

Attitude survey of AFROTC cadets, by J. W. Bowles and Donald V. Torr. 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 1955. 53p tables. Order from LC. Mi $3.60, ph $9.30. PB 122390

The purpose of the survey was to provide information on the AFROTC population with regard to the current attitude toward flight training, the program, and its instructors. The report should be of interest to military psychologists, to personnel in planning and procurement, and to professors of air science. AF PTRC TN 55-40.

Bibliography of human engineering reports (unclassified). Revised. U. S. Office of Naval Research. Special Devices Center, Port Washington, N. Y. Jan 1956. 21p. Order from OTS. 75 cents. PB 121452

For earlier edition see PB 102925.
1. Psychology, Applied - Bibliography 2. NAVEXOS P 1491.

Experimental studies of prolonged wakefulness, by Walter D. Chiles. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Dec 1955. 22p photo, graphs, tables. Order from OTS. 75 cents. PB 121393

Two experiments were carried out concerning the effects of prolonged wakefulness and of fatigue on performance of psychomotor and psychological tasks. The first experiment involved four subjects, each of whom sat individually in an aircraft cockpit for 56 hours. During this time, measures of reaction time and alertness were taken, and, at the end of the experiment, two of the subjects flew ILAS passes in a Link Trainer. The second experiment involved the assessment of the effects of 30 hours of wakefulness with continuous work (painting a barracks) on the performance of 15 subjects on a psychological and a psychomotor task. In addition, the effects of two different drugs, d-amphetamine sulphate and cortisone, were compared with those of a placebo. The psychological test involved the summing of rows of figures, and the psychomotor test involved arm-hand steadiness. It was concluded that the two drugs improve performance on the addition test, whereas they tend to decrease arm-hand steadiness as a function of time. Project no. 7193, Task no. 71612. AF WADC TR 55-395.

Factor-analytic study of planning. II: Administration of tests and analysis of results. Studies of aptitudes of high level personnel, by J. P. Guilford, R. M. Berger and P. R. Christensen. University of Southern California. Psychological Laboratory, Los Angeles, Calif. May 1955. 23p tables. Order from OTS. 75 cents. PB 121340

This study is the fifth in a series designed to explore abilities considered important in the successful performance of high-level personnel. This paper reports the concluding phases of an attempt to isolate and define the abilities that may be important in the domain of planning, particularly as they enter into the activities of supervisory, military, and research personnel. For Part I see PB 117627. USC PL 12. Contract N6 onr-23810.

Some correlates of instructor job satisfaction, by John T. Lanzetta and Dorothy M. Knoell. U. S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Crew Research Laboratory, Randolph Air Force Base, Texas. Sep 1955. 56p tables. Order from LC. Mi $3.60, ph $9.30. PB 122386

The importance of the instructor in determining both the quality of training and the motivation of trainees is generally recognized. In the Air Force a continuous program has been carried out to improve instructor selection and to maintain high morale in the instructor groups. This report is based on questionnaire data obtained from 765 instructors at eight CTAF bases, between December 1953 and March 1954. Six scales were developed from the items in the survey, one of which defined an area of satisfaction with job assignment. The instructor scoring high on this scale apparently sees his job as appropriate for his skills and is well satisfied with his assignment. Project 7731, Task no. 77427. AF PTRC TN 55-28.

Use of expert judgments in the development of flight simulator training courses, by Edward R. Jones and Philip H. DuBois. U. S. Air Force. Air Research and Development Command. Human Factors Operations Research Laboratory, Bolling Air Force Base, Washington, D. C. Jul 1955. 27p tables. Order from LC. Mi $2.70, ph $4.80. PB 120244

This report presents research developments based on judgments of aircraft commanders, pilots, and flight engineers concerning their squadrons' training needs. Although the aircraft (the B-50D) involved in this study is not a new type, the method can be used with any plane for which pertinent information is unavailable from other sources. HFORL Project no. 504-080-0010. AF PTRC TN 55-14.

RUBBER AND RUBBER PRODUCTS

Compounded rubbers and rubber-like materials for linings in gasoline tanks, by Dan Fore, Jr. U. S. Naval Research Laboratory. May 1940. 13p photo, tables. Order from LC. Mi $2.40, ph $3.30. PB 120397

1. Tanks, Fuel - Linings 2. NRL P 1622.

Development of fluoro-silicone elastomers, by Paul Tarrant and George W. Dyckes. Peninsular Chemresearch, Inc. May 1956. 24p tables. Order from OTS. 75 cents. PB 121394

A study has been made of the effect of various initiators or catalysts on the addition reaction involving a single olefin-silane system. The use of platinum supported on charcoal gives highest yields and allows shorter reaction times and lower temperatures for this reaction. Compounds resulting from the addition of CF_2Br_2 and $CF_2BrCFClBr$ to vinyltrimethylsilane have been made to undergo reactions involving loss of halogen. The properties of the new unsaturated compounds have been determined. Project no. 7340. Covers work from Apr 5 through Dec 13, 1955. AF WADC TR 55-220, Part 2. Contract AF 33(600)-26593.

Elastomeric polyphosphates, by R. A. Hubbard II and U. P. Strauss. Rutgers University, New Brunswick, N. J. May 1956. 37p diagr, graphs, tables. Order from OTS. $1. PB 121391

The purpose of the work was to prepare an elastomer whose backbone is the polymetaphosphate chain. The part with which this report is concerned was the cross-linking of polyphosphate chains. Preparation of the possible cross-linking agent neopentane tetraphosphonic acid and its derivatives was attempted. A mixture of acids was prepared by the Arbuzov rearrangement from pentaerythrityl bromide which appears to be primarily the triphosphonic acid. Attempts to prepare a cross-linked polyphosphate from this mixture by fusion of the phosphonic acid with KH_2PO_4 at 320°C were unsuccessful, due to the thermal instability of the neopentane carbon structure. The molecular weights of several samples of potassium polyphosphate were determined viscometrically in order to obtain an idea of the degree of polymerization of the samples used in the cross-linking studies. It was found that the molecular weight of crystallized $(KPO_3)x$ can reach 3×10^6. Project no. 7340, Task no. 73404. Covers period of work from 1 Dec 1954 to 30 Nov 1955. Contract AF 33(616)-2059. AF WADC TR 54-599, Part 2.

STRUCTURAL ENGINEERING

Appraisal of the Prot method of fatigue testing. Illinois. University. Dept. of Theoretical and Applied Mechanics, Urbana, Ill. Contract N6 ori-071(04), NR 031-005. Order separate parts described below from LC, giving PB number of each part ordered.

Part I, by A. P. Boresi and T. J. Dolan. Jan 1953. 37f drawing, diagr, graphs. Mi $3, enl pr $7.80. PB 123010

A recent proposal by Prot suggests that both the expense and the duration of fatigue tests may be lessened by a progressive load method which consists of subjecting a test specimen to a completely reversed stress whose amplitude increases regularly with time until the specimen fails. The validity of the Prot equations has been investigated for two materials, ingot-iron and 75S-T aluminum alloy. Conventional

fatigue test data were also obtained for comparison with the values of E predicted by the progressive loading tests. Technical report no. 34.

Part II, by H. T. Corten, Todor Dimoff, T. J. Dolan and Masaki Sugi. Jun 1953. 49f graphs, tables. Mi $3.30, enl pr $9.30. PB 123009

The Prot progressively increasing load method of fatigue testing has been investigated by comparing the experimental results for three ferrous metals with conventional fatigue data. Both notched and unnotched specimens have been studied. Technical report no. 35. AD 15781.

Bibliography of the material damping field (with abstracts and punched card codings), by L. J. Demer. Minnesota. University, Minneapolis, Minn. Jun 1956. 105p diagrs. Order from OTS. $2.75. PB 121437

A project was initiated which was devoted to a compilation of reports and published articles dealing with the damping of materials and structures. As developed, the bibliography is set up to be used with a punched card system of indexing and filing. An explanation of the system and directions for its use are included in this report. Alternately, however, a researcher may select the desired entries from the bibliography and use any type of indexing or classification system which he so desires. Project no. 7360. Covers work from May 1954 through Dec 1955. Contract AF 33(616)-2803. AF WADC TR 56-180.

Some effects of joint conductivity on the temperatures and thermal stresses in aerodynamically heated skin-stiffener combinations, by George E. Griffith and Georgene H. Miltonberger. U. S. National Advisory Committee for Aeronautics. Jun 1956. 62p diagrs, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122531

Temperatures and thermal stresses in aerodynamically heated skin-stiffener combinations were calculated with the aid of an electronic differential analyzer. Variations were made in an aerodynamic heat-transfer parameter, a joint conductivity parameter, and the ratio of skin width to skin thickness. The results indicate that decreasing the joint conductivity or increasing the heat-transfer coefficient increases the peak thermal stresses in the skin and may appreciably increase the peak stresses in the stiffener, whereas increasing the ratio of skin width to skin thickness produces some increase in the peak stiffener stresses but a corresponding decrease in the peak skin stresses. NACA TN 3699.

Underground installations. Guy B. Panero, New York, N. Y. Contract W-49-129-Eng-59. Order separate parts described below from LC, giving PB number of each part ordered.

Summary. Oct 1948. 42p drawings, diagrs, maps, tables. Mi $3.30, ph $7.80. PB 123058

The purpose of this study was to determine the feasibility and cost of constructing and operating strategic defense plants underground. Both construction and operating costs in each instance were estimated, comparing costs above ground, costs in an existing mine, and costs in sites excavated solely for the purpose. Foreign underground installations, working conditions, sites and geological formations strategically located in this country, excavation and construction methods, and problems relating to emergency use were investigated.

Foreign installations. Oct 1948. 98p drawings, maps, graphs, tables (part fold). Mi $5.40, ph $15.30. PB 123064

Specific phases of the investigations include foreign installations, geological formations, construction methods, equipment and working conditions. The major part of the report deals with German installations since 16.6 million of the 22 million square feet of all foreign underground floor space actually constructed was in greater Germany. Installations in most other countries, while advanced in specific instances, particularly in Sweden and England, were not sufficiently comprehensive in scope to yield important data pertaining to this study. Investigation of Swiss installations was impossible because of military restrictions. Data from other countries have been combined with the German information wherever such data extended the material of the specific field under discussion.

Adaptations of existing mines for emergency use. Oct 1948. 52p maps, tables (part fold). Mi $3.60, ph $9.30. PB 123060

The characteristics of representative industries which might be installed underground and of available existing mines are analyzed, the minimum alterations necessary to convert available mines to short term industrial use are described, and costs under varying conditions are estimated. The report stresses the necessity of overall industrial planning of underground units to make the maximum effective use of the existing space, and gives an example of an industrial complex, concentrated underground.

Excavation and construction methods. Oct 1948. 91p drawings, diagrs, graphs, tables. Mi $5.40, ph $15.30. PB 123059

This report summarizes data on site investigations, general methods of excavation, relative costs of tunnel sections, interior design and construction, mechanical installations, field organization, excavation and equipment for a specific site, and foreign practices. It has been prepared for the additional function to serve as guide to engineers in the construction of underground installations.

Sites and geological formation. Oct 1948. 76p maps (1 fold), tables (part fold). Mi $4.50, ph $12.30. PB 123062

This report summarizes the available data on geological formations in the United States as well as in Germany and other foreign countries. It also establishes the magnitude, physical characteristics, suitability and distribution of geological formations in the strategic areas of the United States.

Working conditions. Oct 1948. 35p. Mi $3, ph $6.30. PB 123061

The purpose of this report is to collate and summarize special problems, hazards, and physiological and psychological factors which may have a bearing on working conditions in underground installations. The factual information contained in the report is based on investigations made by this office of existing foreign installations, windowless plants in this country, and of mines, bank vault areas, and other types of sub-surface areas where work has been in progress over an extended period.

Chemical process plant. Oct 1948. 49p tables. Mi $3.30, ph $7.80. PB 123063

The report compares the cost of construction and operation of a chemical process plant in three types of installation: (1) above ground, (2) in a suitably located existing mine, and (3) in a selected underground site. Foreign underground process plants were examined and the domestic chemical industry was canvassed to obtain factual information.

Precision manufacturing plant. Oct 1948. 70p map, diagr, tables. Mi $3.90, ph $10.80. PB 123067

The report compares the cost of construction and operation of a precision manufacturing plant in three types of installations; (1) above ground, (2) in a suitably located existing mine, and (3) in a selected underground site. Foreign underground instrument plants were examined and the domestic precision industry was canvassed to obtain factual information.

Precision manufacturing plant. Appendix - Volume I. Oct 1948. 122p photos, drawings, diagrs (1 fold), map, tables (part fold). Mi $6.30, ph $19.80. PB 123068

Precision manufacturing plant. Appendix - Volume II. Oct 1948. 143p photos, maps, tables. Mi $7.20, ph $22.80. PB 123069

Storage depot. Oct 1948. 72p tables. Mi $4.50 ph $12.30. PB 123065

The report compares the cost of construction and operation of a storage depot in three types of installation: (1) above ground, (2) in a suitably located existing mine, and (3) in a selected underground site. Foreign storage depots were examined and the domestic storage depot field was canvassed to obtain factual information.

Storage depot. Appendix. Oct 1948. 112p photo, tables (1 fold). Mi $6, ph $18.30. PB 123066

TEXTILES AND TEXTILE PRODUCTS

Development and evaluation of improved coated fabrics for cold weather clothing, by R. Briganti. U. S. Naval Supply Activities. Clothing Supply Office, Brooklyn, N. Y. Apr 1956. 25p tables. Order from OTS. 75 cents. PB 121116

This report examines the influence of the interaction between twist and twill directions in woven cloth. Consideration is given to the phenomena of nesting between warp and filling yarns, as affected by the local helix angles of bent yarns. Lateral displacement of yarn segments is shown to follow from the asymmetric yarn pressures along the twill line. The effect of this displacement is to alter both the nesting angle and the local yarn twist. Changes in felting shrinkage, twill prominence and yarn pull-out resistance occur with nesting and local tightening of yarn structure -- and hence with selected combinations of twist and twill directions. Observations of the effect of twist-twill relationships are reported for worsted, rayon and cotton fabrics. Project NT 001-008. Research and Development Division report no. 8. NAVSANDA 3950-2.

Development of high strength nylon parachute fabrics, by Hamilton J. Bickford, Thomas L. Rusk, Jr., and Donald K. Kuehl. Cheney Bros., New York, N. Y. May 1956. 39p tables. Order from OTS. $1. PB 121400

Seven nylon fabrics were developed that should give stability to dry air for use at temperatures up to 250°F for at least 16 hours with little or no significant difference in effect between continuous or intermittent exposure. Severe degradation takes place when exposed to temperatures of 350°F. Permeability and strength requirements were met and certain information on the relationship between permeabilities at different pressure levels developed. Project no. 7320. Covers work from Jan 1955 to Dec 1955 under Contract AF 33(600)-29135. AF WADC TR 55-465.

Effect of five synthetic lubricants on USAF fabrics, by Richard A. Sublette. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. May 1956. 19p tables (part fold). Order from OTS. 50 cents. PB 121395

This investigation was conducted to determine if textile fibers and fabrics employed by the USAF are subject to deterioration or degradation when

exposed to synthetic lubricants. In order to accomplish the desired program, two series of fabrics, composed of fibers that are commonly used in USAF fabrics, were prepared by immersing one series in synthetic lubricants at room temperature and the other series in a similar group of lubricants at 160°F. Both series were immersed in the lubricants for 72 hours. After exposure, laundering and dry cleaning tests were conducted on the fabrics. Diaphragm burst strength tests indicated the synthetic lubricants did not cause a loss in strength of the fabrics. Project no. 3044, Task no. 73314. Covers work from Apr 1955 to May 1955. AF WADC TR 55-379.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Analytical study of the icing limit for an all weather interceptor aircraft in view of current operational criteria, by Richard H. Herald. U. S. Air Force, Air Research and Development Command, Wright Air Development Center, Wright-Patterson Air Force Base, Dayton, Ohio. Jun 1955. 50p drawing, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 120372

Calculations have been made for F-86D aircraft to determine the icing limit of the NACA 0012-64 model airfoil at angles of attack representing air-speeds of 143 to 700 mph. Results show that aerodynamic heating alone will not provide ice free surfaces for such flight operating conditions as military climb at altitudes above 5,000 feet, maximum power climb at altitudes above 8,800 feet and descent at altitudes above 6,300 feet. For loiter conditions, thermal protection is necessary at all altitudes. AD 70018. AF WCT 55-28.

Effect of structural flexibility on aircraft loading. Massachusetts Institute of Technology. Aeroelastic and Structures Research Laboratory. Contract AF 33(038)-7267. Order separate parts described below from LC, giving PB number of each part ordered.

Part I: Ground-loads, by T. F. O'Brien and T. H. H. Pian. Jul 1951. 202p diagrs, graphs, tables. Mi $9.30, ph $31.80. PB 122917

The research reported was undertaken to assist the contracting agency in revising their present design criteria so that the effects of flexibility upon the stresses which occur in the load carrying components of the airplane may be taken into account. It includes a general discussion of structural design criteria, of their application to present and future airplanes, of the significance of flexibility with respect to the criteria, and of the flexible airplane as a unified system rather than as a system of components. An historical review of previous investigations pertinent to the ground-loads problem, combined with a general discussion, is given. A brief review of previous ground-loads investigations at M. I. T. up to 1951 follows. Also included are the results of present analytical investigations of the ground-loads problem. Appendices contain the theory and detailed results of the analytical work. AF TR 6358, Part 1. AD 149164.

Part II: Spanwise airload distribution, by T. H. H. Pian and H. Lin. May 1951. 214p diagrs, graphs, tables. Mi $9.60, ph $33.30. PB 122918

The problem of determining the spanwise airload distribution over elastic wings of conventional plan form and having general aerodynamic inertial and elastic properties is formulated to cover various design conditions in the subsonic speed range. An approximate method for rapid calculation of spanwise airload distribution is also developed. In addition, a quick method of estimating the effects of various loads on the modification of the spanwise airload distribution is presented. The methods of analysis are illustrated by an application to the XB-47 airplane. ATI 128687. AF TR 6358, Part 2.

Part III: Maneuvering load dynamic overstress, by Gabriel Isakson and Norman P. Hobbs. Aug 1951. 29p graphs, table. Mi $2.70, ph $4.80. PB 122919

The problem of dynamic overstress in an airplane wing due to a rapidly executed symmetrical maneuver is investigated. A simple one-degree-of-freedom analysis yields the criterion that when the ratio of time-to-peak-value of the normal load to the period of the fundamental wing mode of vibration is greater than 1.4 dynamic overstress becomes insignificant. A method for applying this criterion to specific airplane parameters is developed for a step-function elevator displacement; and generalized charts are presented, permitting a rapid application of the criterion in preliminary design. Illustrative examples of some recent Air Force airplanes are given, showing that wing dynamic overstress is becoming significant in large high-speed airplanes with highly flexible structures. ATI 149162. AF TR 6358, Part 3.

Part IV: Horizontal tail maneuvering loads, by Gabriel Isakson and Claude W. Brenner. Aug 1951. 125p drawings, graphs, tables. Mi $6.30, ph $19.80. PB 122920

The effect of structural flexibility on the horizontal tail loads in a pull-up maneuver is in-

vestigated. Two methods of analysis are developed, one involving a correction of the stability derivatives for structural flexibility effects and a subsequent solution for the airplane response in the conventional manner; the other involving the application of Lagrange's equations. Calculations for the tail load are performed on the Boeing B-47 airplane, first assuming the airplane to be rigid, and then using the two methods developed for the flexible airplane. A condition corresponding to the upper left-hand corner of the flight envelope is assumed, and the center of gravity of the airplane is taken to be in its most aft position. These are the conditions for maximum upward load on the tail. It is found that because of compensating effects, the tail load on the B-47 is not affected much by structural flexibility. ATI 149163. AF TR 6358, Part 4.

Part V: Rapid estimation of some effects of aeroelasticity on airload distribution at an abrupt aileron deflection, by T. H. H. Pian and H. Lin. Apr 1952. 41p graphs, tables. Mi $3.30, ph $7.80. PB 122921

A rapid method of estimating the effects of various antisymmetric loads on the modification of the spanwise airload distribution over an elastic wing for the case of an abrupt aileron deflection at subsonic speeds is presented. The method is applied to a typical sweptback elastic wing for purposes of illustration. AD 14797. AF TR 6358, Part 5.

Part VI: Approximate method for determining spanwise airload distribution over an elastic wing in subsonic flow, by H. Lin and T. H. H. Pian. Sep 1952. 59p graphs, tables. Mi $3.60, ph $9.30. PB 122922

An approximate method for rapid calculation of spanwise airload distribution over an elastic wing at subsonic speed is formulated. Both symmetric and antisymmetric flight conditions are considered. An illustration is made by applying the method to a typical elastic wing of conventional subsonic planform. AD 14798. AF TR 6358, Part 6.

Part VII: Graphical method for determining the dynamic load of a nonlinear two-degrees-of-freedom system, by H. Lin and T. H. H. Pian. Aug 1953. 35p drawings, graphs. Mi $3, ph $6.30. PB 122923

A graphical method in the velocity-acceleration plane is developed for determining the dynamic load of a nonlinear two-degrees-of-freedom system that is subjected to an arbitrary forcing function. Both the spring stiffness and the forcing function are approximated by oblique straight-line segments. The method is applied to a bilinear system that is subjected to a triangular pulse which simulates the spin-up drag load during landing. A parametric study is made for this case, and some conclusions are noted in regard to the effects of various parameters on the alleviation of the dynamic load on a buckled bilinear system. AD 25383. AF TR 6358, Part 7.

Part VIII: Symmetric airload distribution over a thin elastic delta wing with subsonic leading edge at supersonic speed, by H. Lin and T. H. H. Pian. Sep 1953. 76p drawings, graphs, tables. Mi $4.50, ph $12.30. PB 122924

The problem of determining the symmetric airload distribution over a thin elastic delta wing moving at supersonic speed has been treated for the case of subsonic leading edge. The formulation involves the solution of a matrix equation the order of which depends upon the degree of accuracy desired. To illustrate the computation procedure, the method is applied to a typical delta wing. For the stiffness and configuration of the wing analyzed, it indicates that flexibility effect on airload distribution over a delta wing is small and that the shift of center of pressure location due to flexibility appears to follow the trend of a sweptback wing. AD 25382. AF TR 6358, Part 8.

Part IX: Lift and moment growths on a swept, tapered, rigid wing upon entering a gust, by F. O. Carta, T. H. H. Pian and H. Lin. Jan 1953. 102p drawings, graphs, tables. Mi $5.70, ph $16.80. PB 122925

The lift and moment growths upon entering a sharp-edged gust are determined analytically for a swept, tapered, rigid wing. Lift and moment growth ratios are presented in tabular and in graphical forms over a range of configuration parameters of practical interest. A numerical example is given to illustrate a method of determining the responses of a rigid airplane upon entering a sharp-edged or a cosine gust, utilizing the curves of the lift and moment ratios. AD 17095. AF TR 6358, Part 9.

Part X: New lifting-line theory for the unsteady lift of a swept or unswept wing in an incompressible fluid, by S. F. Shen. Jul 1953. 50p drawings, graphs, tables. Mi $3.30, ph $7.80. PB 122926

A lifting-line theory is formulated for the calculation of the unsteady lift of swept and unswept finite wings in an incompressible fluid by simplifying the relationship between the prescribed unsteady downwash and the unknown growth of lift while still preserving the correct two-dimensional relationship. In the steady state, this theory is reduced to that of the Weissinger lifting-line type. Applications to various practical problems are demonstrated. Possible methods of solution for the three-dimensional equivalents of the Wagner, Küssner, and Theodorsen functions are discussed. An estimate is made of the "apparent mass" effect, and a formula is provided for the "apparent mass" of a rigid plate in terms of its starting lift. AD 25290. AF TR 6358, Part 10.

Part XI: A general parametric study of maneuvering horizontal tail loads on a flexible airplane, by K. A. Foss. Jul 1953. 69f graphs, tables. Mi $3.90, enl pr $12.30. PB 122916

A parametric study is made of the effects of structural flexibility on the horizontal tail loads in a pull-up maneuver. An inverse method of solution is used in which the stability derivatives are modified by simple approximate aeroelastic correction factors. This investigation indicates that the neglect of flexibility effects is likely to result in unconservative horizontal tail load criteria. AD 25381. AF TR 6358, Part 11.

Part XII: Gust response of a sweptback tapered wing including bending flexibility, by A. Codik, H. Lin and T. H. H. Pian. Oct 1953. 62p drawings, graphs. Mi $3.90, ph $10.80. PB 122927

The response of a sweptback tapered wing free only in bending to a cosine gust is given in terms of the acceleration ratio at the fuselage. The analysis includes a tip mass of such a value that the frequency of the equivalent system is equal to the first bending frequency of the actual wing. The acceleration ratio at the wing tip is also determined in order to account for the dynamic overload. The equations of motion are solved by a numerical procedure and expressed in matrix form. To illustrate the method, a sample calculation is made for a typical highly flexible sweptback wing. For this particular case, the simple method of using a modified lift-curve slope in the revised gust formula gives an unconservative estimate of the fuselage acceleration ratio. AD 25289. AF TR 6358, Part 12.

Part XIII: Vertical tail maneuvering loads without banking degree of freedom, by J. F. McCarthy, Jr. and A. A. Kirsch. Nov 1953. 85p drawings, graphs, tables. Mi $4.80, ph $13.80. PB 122928

The analysis of the effects of structural flexibility on vertical tail maneuvering loads is simplified by neglecting the rigid body angle-of-bank degree of freedom and, thus, considering only sideslip and yaw. A quasi steady-state aeroelastic approach is used to account for flexibility effects. The aerodynamic stability derivatives are modified accordingly, and additional derivatives due to the accelerations are introduced into the equations of motion. Vertical tail loads and rudder pedal forces are calculated for a typical fighter and a typical bomber for different maneuvers. For a given pilot effort, the analysis shows that flexibility causes the maximum vertical tail loads to decrease for the bomber, which is highly flexible, but to increase slightly for the fighter, which is relatively rigid. There is a significant decrease in the damping of the lateral oscillation of both airplanes due to flexibility. AD 43760. AF TR 6358, Part 13.

Part XIV: Analogue study of horizontal tail maneuvering loads at various speeds for a typical bomber, by S. J. Engel and J. F. McCarthy, Jr. Apr 1954. 44p photos, drawings, diagr, graphs, tables. Mi $3.30, ph $7.80. PB 122929

The horizontal tail loads on a typical bomber which result from a pull-up maneuver begun in level flight are determined by an electronic analogue computer for the rigid and elastic cases at various points on the flight envelope and at extreme locations of the center of gravity. AD 43814. AF TR 6358, Part 14.

Part XV: A parametric study of symmetrical landing and taxiing loads by means of analogue computations, by Mihran Ayvazian and T. F. O'Brien. Nov 1953. 103f diagrs, graphs, tables. Mi $5.70, enl pr $18.30. PB 122915

The equations of motion for symmetrical landing gear impact loads on a rigid airplane with an oleopneumatic strut are developed in nondimensional form. A set of nine independent dimensionless parameters is found for the system, exclusive of the metering pin. Incremental load factors resulting from landings and from taxiing over square wave and displaced-cosine obstacles were calculated using an electronic analogue computer. Significant ranges of all parameters and four metering pins were considered in the calculations. The results are presented in graphical form in order to compare various parameter combinations and to show the trends in the variation of the load factor. The physical phenomena contributing to similarities or dissimilarities in the results are given considerable discussion. On the basis of the results qualified recommendations are made for an extension of the presented investigation and for other future work. AD 43811. AF TR 6358, Part 15.

Part XVI: Estimation of the dynamic overstress in straight wing airplanes, by T. H. H. Pian and P. H. Winter. Feb 1954. 51p drawings, graphs, tables. Mi $3.60, ph $9.30. PB 122930

A simple method has been outlined for estimating the dynamic overstress in a straight wing structure under symmetrically applied loads. The solution is based on the time-history of the normal acceleration of a rigid airplane. The aerodynamic damping is estimated by the assumption of a parabolic bending deformation mode. Sample calculations indicate that the envelope of the dynamic response factors which correspond to the rigid body stress and vibratory inertia force distributions provide, in general, a conservative estimation of the dynamic load. AD 43813. AF TR 6358, Part 16.

Part XVII: Analogue study of nonsymmetrical landing and taxiing loads and a rational information of the symmetrical spinup loads problem, by T. F. O'Brien and M. Ayvazian. Apr 1954. 101p drawings, diagrs, graphs, tables. Mi $5.70, ph $16.80. PB 122931

The nonlinear equations of motion are derived for two ground loads problems: the nonsymmetrical landing and taxiing problem for an airplane with oleopneumatic landing gear struts which have lateral flexibility, and the symmetrical spinup loads problem for an airplane with oleopneumatic struts which have fore-and-aft flexibility. No solutions are calculated for the second problem, but forty-eight taxiing cases and thirty-five landing cases are calculated for the nonsymmetrical problem by means of an electronic analogue computer. The results are tabulated and also presented in graphical form. AD 43812. AF TR 6358, Part 17.

Part XVIII: Vertical tail maneuvering loads with banking degree of freedom, by A. A. Kirsch and J. F. McCarthy, Jr. Mar 1954. 104p drawings, graphs, tables. Mi $5.70, ph $16.80. PB 122932

The analysis of Part XIII of the present series of reports is extended to include a third rigid body degree of freedom, i. e., angle of bank. As in Part XIII, a quasi steady-state aeroelastic approach is used to account for the effects of flexibility. The aerodynamic stability derivatives are modified accordingly, and additional derivatives due to the accelerations are introduced into the equations of motion. AD 43816. AF TR 6358, Part 18.

Part XIX: Parametric study of the gust response of swept wing airplanes including a wing-bending degree of freedom, by K. A. Foss, D. Sternlight and T. H. H. Pian. Mar 1954. 59p diagr, graphs, tables. Mi $3.60, ph $9.30. PB 122933

A parametric study of the gust respose of swept wing airplanes with free-body heaving and wing-bending degrees of freedom. The results indicate that the combination of wing sweepback and wing flexibility usually produces a considerable alleviation of the free-body response of an airplane to a gust and, occasionally, a large reduction in the structural dynamic response of the wing. AD 43815. AF TR 6358, Part 19.

Part XX: Summary report, by T. H. H. Pian, K. A. Foss and T. F. O'Brien. Apr 1954. 99p drawings, graphs, tables. Mi $5.40, ph $15.30. PB 122934

The results of research on the effect of structural flexibility on aircraft loading, given in detail in nineteen previous reports, are summarized here under four section headings: Airload distribution on wings, Gust loads, Horizontal and vertical tail maneuvering loads, and Ground loads. With the exception of the final section on ground loads, each section also contains a complete review of the results from prior research as reported in the available literature. A list of the pertinent references is given at the conclusion of each section. AD 43817. AF TR 6358, Part 20.

Operational suitability test of automatic restraint and extraction system for aerial delivery of heavy equipment. U. S. Air Force. Air Proving Ground Command. Eglin Air Force Base, Fla. Jun 1955. 37p photos, tables. Order from LC. Mi $3, ph $6.30. PB 122130

The object of this project was to determine the operational suitability of the Automatic Restraint and Extraction System for the aerial delivery of heavy equipment by parachute from C-119 type aircraft. The system tested has a number of existing and potential operational advantages over the present standard heavy drop system. This report lists deficiencies which must be corrected before the system can be considered operationally suitable. Project no. APG/TAT/99-A, Final report. AD 71831.

Preliminary investigation of the effectiveness of a sliding flap in deflecting a propeller slipstream downward for vertical take-off, by Richard E. Kuhn and Kenneth P. Spreemann. U. S. National Advisory Committee for Aeronautics. May 1956. 25p photos, drawings, diagrs, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122527

The model consisted of a semispan wing equipped with a 50-percent-chord sliding flap and a 25-percent-chord plain flap. The tests were conducted at zero forward speed in a large room and included the effects of flap deflection, proximity to the ground, a leading-edge slat, and a chord-extension. The results indicate that the diving moments associated with the sliding flap were appreciably smaller than those of the slotted-flap configuration previously investigated. NACA TN 3693.

RADC-WADC evaluation of TACAN (NETT report), by R. Brooks and R. C. Anderson. U. S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, Rome, N. Y. Jun 1956. 89p photos, map, diagrs, graphs (part fold), tables (part fold). Order from OTS. $2.25. PB 121453

This report summarizes the joint Rome Air Development Center and Wright Air Development Center engineering tests and evaluation of production AN/TRN-6 (AN/URN-3) and AN/ARN-21's, obtained through cross service procurement from the U. S. Navy. The period of the tests was three months beginning 1 January 1956 and ending 31 March 1956, and for purposes of identification was called the NETT (North East TACAN Test) program. Measurements were made of the system azimuth accuracy, range, pattern coverage, reliability, altitude capability, traffic capacity, and channel interference. The methods of tests, data accumulated, and flight tests are defined and the results summarized. Recommendations for correction of system deficiencies are also made. AF RADC TR 56-60

Study of the high-speed performance characteristics of 90° bends in circular ducts, by James T. Higginbotham, Charles C. Wood and E. Floyd Valentine. U. S. National Advisory Committee for Aeronautics. Jun 1956. 28p diagrs, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122528

Four 90° bends in ducts of constant diameter with ratios of radius of curvature to diameter (r/d) of 0.75, 1.00, 2.50, and 4.00 have been investigated with both a thin and a thick inlet boundary layer to determine the choke Mach number and general performance of each of the elbows. NACA TN 3696.

Engines and Propellers

Development of low voltage shunted surface gap spark and igniter plugs for reciprocating and gas turbine engines, by Louis H. Segall. Bendix Aviation Corporation. Scintilla Magneto Division, Sidney, N. Y. Jan 1955. 113p photos, diagrs, graphs, tables. Order from LC. Mi $6, ph $18.30. PB 120263

A shunted-surface gap spark plug was developed for reciprocating engines which operates on low sparking voltages, allowing use of a lightweight, low-loss ignition system. A similar plug was developed for gas turbine applications which increased the efficiencies of these ignition systems and resulted in the delivery of higher spark energy at the plug. Detailed descriptions are given of theory, test results, test equipment, gap geometry, materials, and of "best" designs. AD 75507. Project no. 3074. Contract AF 33(600)-15362. AF WADC TR 55-191.

Fire-detection studies of the Northrop F-89 power plant, by Allen V. Young. U. S. Civil Aeronautics Administration. Technical Development Center, Indianapolis, Ind. Jul 1956. 20p photos, diagrs, graph, tables. Order from OTS. 50 cents. PB 121447

This report presents the results of an investigation of the fire- and overheat-warning systems in the F-89 power plant. The existing systems were evaluated by full-scale tests for their over-all effectiveness. The changes considered necessary were incorporated in improved configurations. CAA TDR 286.

Selection of optimum configurations for heat exchanger with one dominating film resistance, by E. R. G. Eckert and T. F. Irvine, Jr. U. S. National Advisory Committee for Aeronautics. Jun 1956. 48p diagrs, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122535

1. Turbines, Gas - Cooling 2. Heat exchangers - Design 3. Heat - Transference - Theory 4. NACA TN 3713.

Training and Training Devices

Evaluation of the language arts aspects of the basic training program, by Don C. Shanley and Robert G. Smith, 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. Nov 1955. 16p tables. Order from LC. Mi $2.40, ph $3.30. PB 122388

The utilization of airmen of low ability has many facets. One aspect of the problem is that of providing remedial training in reading, writing, and spelling so that these airmen may be better able to understand written directions and instructional material. The results of this study indicate that the Language Arts Program was effective in improving the degree of comprehension of written material. Project 7705. AF PTRC TN 55-36.

Improving equipment maintenance by means of a preplanning technique, by John V. Moore, Eli Saltz and Arthur J. Hoehn. 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. Sep 1955. 16p tables. Order from LC. Mi $2.40, ph $3.30. PB 122385

The present study tested a preplanning technique that was designed to improve trouble-shooting effectiveness. The technique substantially increased the percentage of students in the generator phase of an electrical course who were able to find a malfunction. Despite the fact that all students in the course were repeatedly instructed to preplan, it was found that students who were not instructed in the preplanning technique devised by the experimenters either did not preplan at all, or did so in an inferior manner. Project 7714, Task no. 67002. AF PTRC TN 55-26.

Improving landing performance using a contact landing trainer, by T. A. Payne, D. J. Dougherty, S. G. Hasler, J. R. Skeen, E. L. Brown and A. C. Williams, Jr. Illinois. University, Urbana, Ill. Mar 1954. 37p drawings, tables. Order from LC. Mi $3, ph $6.30. PB 120357

This study was designed to test the effectiveness of: 1. A contact landing display developed for use in connection with the Cycloramic Link Trainer. 2. A program of instruction called 'principles training' tailor-made to meet the requirements of the above training aid. Students used in the experiment were primary flight students, learning to make their first approaches in an SNJ aircraft. Project 20-L-1. Contract N6 ori-71(16). SDC TR 71-16-11.

Aerodynamics

Approximate indicial lift functions for several wings of finite span in incompressible flow as obtained

from oscillatory lift coefficients, by Joseph A. Drischler. U. S. National Advisory Committee for Aeronautics. May 1956. 26p graphs, table. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122503

1. Flow, Incompressible - Theory 2. Lift coefficient 3. NACA TN 3639.

Calculated spanwise lift distributions, influence functions, and influence coefficients for unswept wings in subsonic flow, by Franklin W. Diederich and Martin Zlotnick. U. S. National Advisory Committee for Aeronautics. 1955. 70p graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 50 cents. PB 122482

Supersedes TN 3014 (PB 112071).
1. Flow, Subsonic - Theory 2. Wings, Unswept - Aspect ratio 3. Wings, Unswept - Span load distribution 4. Wings, Unswept - Taper and twist 5. NACA 1228 6. NACA TN 3014, Revised.

Comparison between experimental and predicted downwash at a Mach number of 0.25 behind a wing-body combination having a triangular wing of aspect ratio 2.0, by Norman E. Sorensen and Edward J. Hopkins. U. S. National Advisory Committee for Aeronautics. May 1956. 29p photos, drawing, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122539

1. Mach number - Effect 2. Downwash (Aerodynamics) - Theory 3. Downwash (Aerodynamics) - Measurement 4. NACA TN 3720.

Comparison of the experimental and theoretical distributions of lift on a slender inclined body of revolution at $M = 2^1$, by Edward W. Perkins and Donald M. Kuehn. U. S. National Advisory Committee for Aeronautics. May 1956. 39p photos, diagrs, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122537

1. Lift - Measurement 2. Lift - Theory 3. Bodies of revolution - Pressure distribution 4. NACA TN 3715.

Correlation by means of transonic similarity rules of experimentally determined characteristics of a series of symmetrical and cambered wings of rectangular plan form, by John B. McDevitt. U. S. National Advisory Committee for Aeronautics. 1955. 25p graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 25 cents. PB 122484

Supersedes NACA RM A 51L17b and NACA RM A 53G31.

1. Similarity, Law of 2. Wings, Rectangular - Aerodynamics 3. Correlation (Statistics) 4. NACA 1253.

Correlation, evaluation, and extension of linearized theories for tire motion and wheel shimmy, by Robert F. Smiley. U. S. National Advisory Committee for Aeronautics. Jun 1956. 143p diagrs, graphs, table. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122502

1. Loads, Landing - Theory 2. Equations of motion 3. Tires, Aircraft - Elastic constants 4. Wheel shimmy - Theory 5. NACA TN 3632.

Determination of vortex paths by series expansion technique with application to cruciform wings, by Alberta Y. Alksne. U. S. National Advisory Committee for Aeronautics. Apr 1956. 40p photos, diagrs, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122510

1. Wings, Cruciform - Aerodynamics 2. Vortex motion - Theory 3. NACA TN 3670.

Dynamic measurements in wind tunnels, by Lee Arnold. Arnold, Lee, Associates, Inc., New York, N. Y. Aug 1955. 75p drawings, graph. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 120349

The state of the art of measuring unsteady aerodynamic forces and of testing dynamically similar models in wind tunnels, both from the standpoint of dynamic stability and flutter. A description of accepted procedures developed in NATO countries. References included. AGAR Dograph 11.

Dynamic-response characteristics of a 35° swept-wing airplane as determined from flight measurements, by William C. Triplett, Stuart C. Brown and G. Allan Smith. U. S. National Advisory Committee for Aeronautics. 1955. 27p diagrs, graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 25 cents. PB 122493

Supersedes NACA RM A51G27 and NACA RM A52I17.
1. Airplanes - Aerodynamics 2. Stability, Lateral - Dynamic tests 3. Stability, Longitudinal - Dynamic tests 4. Damping derivatives - Stability 5. NACA 1250.

Error in airspeed measurement due to the static-pressure field ahead of an airplane at transonic speeds, by Thomas C. O'Bryan, Edward C. B. Danforth and J. Ford Johnston. U. S. National Advisory Committee for Aeronautics. Feb 1956.

15p photos, diagrs, graphs. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 20 cents. PB 122489

Supersedes NACA RM L9C25, NACA RM L50L28 and NACA RM L52A17.
1. Air speed - Calculation - Errors 2. Flow, Transonic - Pressure distribution 3. Static pressure - Measurements - Errors 4. NACA 1239.

Experimental evaluation of supersonic wind tunnel performance with solid wall test sections--supersonic diffuser--scavenging scoop combinations, by R. V. DeLeo and J. Huerta. Minnesota. University. Institute of Technology. Dept. of Aeronautical Engineering. Rosemount Aeronautical Laboratories. May 1956. 93p photos, drawing, diagr, graphs, tables. Order from LC. Ml $5.40, ph $15.30. PB 122345

This report presents an experimental evaluation of wind tunnel performance within a test section Mach number range of 1.5 to 4.4. In order to evaluate the effect of the addition of various scavenge ducts to the basic wind tunnel configuration, the performance of a solid wall test section - adjustable diffuser combination was determined both with and without a scavenging duct present. A brief study was also conducted to determine the influence of Reynolds number variation and the addition of test models upon minimum operation conditions. References included. AD 88602. Contract AF 40(600)-5. AF AEDC-TR-56-6.

Flight tests at supersonic speeds to determine the effect of taper on the zero-lift drag of sweptback low-aspect-ratio wings, by Murray Pittel. U. S. National Advisory Committee for Aeronautics. Jan 1956. 20p photos, drawings, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122529

1. Wings, Sweptback - Aspect ratio 2. Wings, Sweptback - Drag 3. Wings, Sweptback - Taper and twist 4. NACA TN 3697.

Investigation at supersonic speeds of the variation with Reynolds number and Mach number of the total, base, and skin-friction drag of seven boattail bodies of revolution designed for minimum wave drag, by August F. Bromm, Jr. and Julia M. Goodwin. U. S. National Advisory Committee for Aeronautics. Jun 1956. 20p photo, diagrs, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122533

1. Flow, Supersonic 2. Bodies of revolution - Drag, Viscous - Wind tunnel tests 3. Reynolds number - Effect 4. Mach number - Effect 5. NACA TN 3708.

Investigation by the transonic-bump method of a 35° sweptback semispan model equipped with a flap operated by a series of servovanes located ahead of and geared to the flap, by William H. Phillips and Robert F. Thompson. U. S. National Advisory Committee for Aeronautics. Apr 1956. 39p photo, drawings, diagrs, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 'H'' St., N. W., Washington 25, D. C. PB 122523

1. Wings, Sweptback - Controls 2. Controls, Servo - Wind tunnel tests 3. NACA TN 3689.

Investigation of lateral control near the stall, by Fred E. Weick and H. Norman Abramson. Texas. Agricultural and Mechanical College, College Station, Texas. Order separate parts described below from NACA, giving NACA TN number of each part ordered.

Report no. 2: Flight tests with high-wing and low-wing monoplanes of various configurations, by Fred E. Weick and H. Norman Abramson. Jun 1956. 34p photos, drawings, diagrs, graphs, tables. PB 122515

1. Controls, Lateral - Tests 2. Stability, Lateral - Tests 3. Airplanes - Flight tests 4. NACA TN 3676.

Report no. 3: Analysis for required longitudinal trim characteristics and discussion of design variables, by Fred E. Weick and H. Norman Abramson. Jun 1956. 91p drawings, diagrs, graphs, tables. PB 122516

1. Controls, Lateral - Theory 2. Stability, Longitudinal - Static 3. NACA TN 3677.

Investigation of the lift, drag, and pitching moment characteristics of AGARD calibration models A and B, by C. J. Schueler and W. T. Strike. U. S. Air Force. Air Research and Development Command. Arnold Engineering Development Center, Tullahoma, Tenn. Feb 1956. 52p photos, drawings, diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 120218

An investigation of the lift, drag, and pitching moment characteristics of AGARD Calibration Models A and B has been made in Tunnel E-1 of the Gas Dynamics Facility, Arnold Engineering Development Center. The tests on Calibration Model A covered a Mach number range of 2.0 to 4.0 and a Reynolds number range of 1.5×10^6 to 27×10^6. Calibration Model B was tested over a Mach number range of 1.7 to 4.0 and a Reynolds number range of 3×10^6 to 22×10^6. Included in the investigation, but limited in scope, were tests to determine the effects of model sting size on base pressure measurements. AD 81581. AF AEDC-TN-55-34.

Investigation of the maximum lift of wings at supersonic speeds, by James J. Gallagher and

James N. Mueller. U. S. National Advisory Committee for Aeronautics. 1955. 30p photos, diagrs, graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 30 cents. PB 122481

Supersedes RM L7J10.
1. Flow, Supersonic - Wind tunnel tests 2. Wings - Lift 3. Wings, Triangular - Pressure distribution 4. Wings, Rectangular - Pressure distribution 5. Mach number - Effect 6. NACA 1227.

Marine Transportation

Heat treatment of stockless anchors. Summary report, by K. L. Clark. U. S. Naval Research Laboratory. Jul 1943. 39p photos, drawings, tables. Order from LC. Mi $3, ph $6.30. PB 120532

1. Anchors - Heat treatment 2. NRL M 2123.

Photoelastic investigation of deck structure, by H. B. Maris, J. A. Sanderson and D. H. Andrews. U. S. Naval Research Laboratory. Jan 1937. 86p photos, drawings, tables. Order from LC. Mi $4.80, ph $13.80. PB 120646

The photoelastic method has been applied to the determination of stresses in celluloid models of a deck containing fifteen openings symmetrically arranged about the center line. The discontinuities in structure presented by the juncture of bulkheads with the base plate result in concentrations of stress not observed when no bulkheads were present. The maximun concentration factor so produced is 2.3. It has been found that: (1) doubling the plate thickness at these points of concentration, (2) breaking the union of bulkhead and base plate at points of concentration, and (3) addition of a special reinforcement designed to distribute load from the bulkheads over a more extended region of the deck, all fail to decrease the stress concentration. A modification of coaming plate structure in which longitudinal coaming plates of contiguous openings are extended beyond the transverse boundaries of the openings and joined together resulted in decreased stresses at the intersection of four such openings. Appended plates show the directions of principal stress, lines of equal stress difference, and results of stress integrations over the deck. Supplements NRL H 1317. NRL H-1342.

Preliminary investigation of self-excited vibrations of single planing surfaces, by Elmo J. Mottard. U. S. National Advisory Committee for Aeronautics. Jun 1956. 19p photos, diagrs, graphs. Order from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 122530

Supersedes RM L55J27.
1. Planing surfaces - Hydrodynamics 2. Planing surfaces - Vibration 3. Loads, Landing - Measurement 4. NACA TN 3698.

MISCELLANEOUS

Report of NRL progress. U. S. Naval Research Laboratory. Sep 1956. 53p. Order from OTS. $1.25. Also available at annual subscription rate of $10.00 a year in U. S. A., foreign subscription rate $13.00 a year. PB 121511

Contents: Articles: Project Rockoon, by H. Friedman, James Kupperian, and Talbot Chubb. - Development of high visibility paints, by F. M. Noonan and J. E. Cowling. - Thermoluminescence of CaF_2: Mn and its application to dosimetry, by R. J. Ginther and R. D. Kirk. - Scientific program: Problems accepted. - Problem notes: Astronomy and astrophysics: Nine celestial radio sources detected at a wavelength of 1.87 cm.... New receiving system for radio astronomical studies at 0.86 cm wavelength....Digital computer routines used in earth satellite trajectory calculations. - Chemistry: Marine borer control, Part V: Studies on the leaching of creosote from wood; Part VI: Evaluation of creosote after the removal of various distillation fractions.... Oxidation of activated carbons at room temperature. - Electricity: Performance reliability of an electric power system analyzed in terms of voltage and frequency. - Mechanics: Recovery of low-carbon steel from elastic shock ... Effect of short-duration, constant load on the yield delay of a pearlitic steel.... Results of matrix iteration technique as done by digital computer to calculate normal mode coefficients for structural dynamic problems.... Progress on development of a valveless pulsejet shipboard deicer. - Metallurgy and ceramics: Quantitative determination of metallic beryllium films on nickel foil.... Hall effect in monovalent metals at room temperature....Cathodic protection of naval vessels. - Nuclear and atomic physics: NaI efficiency calculations for absolute measurement of gamma-ray intensities.... Gas gain in the proportional counter....Solubility and the products of reaction between iron and water at 26° C and 300° C. - Radio: Investigation of a crystal-controlled oscillator circuit....Whistling atmospherics.... Results of actual transmission trials of automatic teleprinter systems.... Analog system for computing correlation coefficients. - Solid-state physics: Photographic technique aids crystal growth studies.... Electron lattice effects in cubic metallic elements. - Published reports. - Papers by NRL staff members. - Patents.

Transition from development to production, by D. E. Marlowe. U. S. Naval Ordnance Laboratory, White Oak, Md. Feb 1954. 10p. Order from OTS. 50 cents. PB 121170

This report considers the process through which a new device is advanced from the stage of a requirement to the stage of mass production. For developments which take place within the framework of cooperation between a Navy operated laboratory and a capable industrial manufacturer, these phases are identified and the requirements for each phase defined. NAVORD 3627.

SELECTED LIST OF ATOMIC ENERGY REPORTS OF INTEREST TO INDUSTRY

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

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

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

Biology and Medicine

Effects of ultraviolet radiation on chloroplast reactions and plant metabolism. Technical report no. 16, by Donald R. Anderson, John D. Spikes, and Berger C. Mayne. Utah. Univ., Salt Lake City. Jun 1955. Contract AT(11-1)-82. 40p. Order from LC. Mi $3.30, ph $7.80. AECU-3186

Intermediary metabolism of the photosynthetic bacteria. Final report. Arkansas. Univ., Little Rock. School of Medicine. Nov 1955. Contract AT(40-1)-1077. 46p. Order from LC. Mi $3.30, ph $7.80. AECU-3187

The Chicago sunshine method. Absolute assay of strontium-90 in biological materials, soils, waters, and air filters, by E. A. Martell. The Enrico Fermi Institute for Nuclear Studies. Univ. of Chicago, Chicago, Ill. May 1956. Contract AT(11-1)-281. Order from OTS. 59p. 40 cents. AECU-3262

Quarterly report of biological and medical research division, by A. M. Brues. Argonna National Lab., Lemont, Ill. Apr 1956. Contract W-31-109-eng-38. 101p. Order from OTS. 50 cents. ANL-5576

High radiopasteurization as a "new" food process, by L. E. Brownell and S. N. Purohit. Engineering Research Inst. Univ. of Michigan, Ann Arbor, Mich. Oct 1955. Contract AT(11-1)-162. 37p. Order from OTS. 30 cents. COO-210

Radioactivity levels of the Columbia River below Richland, Washington for the period July, August, September 1955, by R. E. Rostenbach. Hanford Atomic Products Operation, Richland, Wash. Mar 1956. Contract W-31-109-eng-52. 9p. Order from LC. Mi $1.80, ph $1.80. HW-42181

Fallout countermeasures for AEC facilities. Preliminary report, by Alfred J. Breslin and Leonard R. Solon. Health and Safety Laboratory, New York Operations Office, New York, N. Y. Dec 1955. 63p. Order from OTS. 40 cents. NYO-4682-A

Chemistry and Chemical Engineering

The recovery of uranium from Mallinckrodt chemical "306 residues". Problem report for period August 24, 1944—October 25, 1944, by F. B. Stilmar. Du Pont de Nemours (E. I.) and Co. Jackson Lab., Wilmington, Del. Dec 1945. Decl. Dec 1955. Contract W-7412-eng-151. 6p. Order from LC. Mi $1.80, ph $1.80. A-3502

Development of an ion exchange process for the recovery of vanadium, by D. C. McLean, E. T. Hollis and R. A. Eisenhauer. American Cyanamid Co., Winchester, Mass. Jul 1954. Contract AT-(49-1)-533. 68p. Order from OTS. 40 cents. ACCO-63

Proposed flow sheet for recovery of uranium and vanadium from Temple Mountain ore, by H. P. Ehrlinger, III and R. W. Stephens. University of Nevada, Reno, Nevada. Dec 1953. 17p. Order from OTS. 20 cents. AECD-3725

Progress report on Contract OEMsr-290. Supplement 2, by Charles A. Kraus. Brown Univ., Providence. Oct 1942. Decl. Dec 1955. 8p. Order from LC. Mi $1.80, ph $1.80. AECD-3867

Guide to alkali metals handling. Liquid metals safety committee manual LMSC-1, by W. W. Kendall, L. H. B. Peer, W. J. Scheiber, and F. C. Steiner. Knolls Atomic Power Lab., Schenectady, N. Y. Jul 1954. Contract W-31-109-eng-52. 32p. Order from OTS. 25 cents. AECU-3143

Progress report no. 40 for period December 1, 1955 through February 29, 1956. Massachusetts Inst. of Tech., Cambridge. Lab. for Nuclear Science. Contracts AT(30-1)-905 and N5ori-07806. 78p. Order from LC. Mi $4.50, ph $12.50. AECU-3253

Thermal decomposition of uranyl nitrate hexahydrate, by J. Robert Bridge, Carl W. Melton, Charles M. Schwartz, and Dale A. Vaughan. Battelle Memorial Inst., Columbus, Ohio. Jul 1956. Contract W-7405-eng-92. 18p. Order from OTS. 25 cents. BMI-1110

Adsorption of uranium from phosphate solutions by activated carbon, by Iver Igelsrud and E. F. Stephan. Battelle Memorial Inst., Columbus, Ohio. Jun 1949. Decl. Mar 1956. Contract W-38-094-eng-27. 44p. Order from OTS. 30 cents. BMI-JDS-196

Preliminary measurements of the density and viscosity of composition 43 (Na_2UF_6), by S. I. Cohen and T. N. Jones. Oak Ridge National Lab., Tenn. Oct 1953. Contract W-7405-eng-26. 7p. Order from LC. Mi $1.80, ph $1.80. CF-53-10-86

Density and cost relations for D_2O and solutions of UO_2SO_4 in D_2O. TBR memorandum no. 2, by A. L. Gaines. Oak Ridge National Lab., Tenn. Oct 1954. Contract W-7405-eng-26. 14p. Order from LC. Mi $2.40, ph $3.30. CF-54-10-86

Raw materials economic studies: A preliminary estimate of the cost of solvent extraction using amine reagent, by B. B. Klima, W. T. Ward, and R. R. Wiethaup. Oak Ridge National Lab., Tenn. Mar 1955. Decl. Apr 1956. Contract W-7405-eng-26. 13p. Order from LC. Mi $2.40, ph $3.30. CF-55-3-110

Raw materials economic studies: Preliminary estimate of the cost of uranium extraction from sixty percent slurry using D2EHPA reagent, by B. B. Klima, W. T. Ward, and R. R. Wiethaup. Oak Ridge National Lab., Tenn. Mar 1955. Decl. Apr 1956. Contract W-7405-eng-26. 13p. Order from LC. Mi $2.40, ph $3.30. CF-55-3-193

Preliminary laboratory evaluation of an electrodialytic method for the treatment of radioactive waters, by M. S. Seal and D. A. Pecsok. Oak Ridge National Lab., Tenn. May 1955. Contract W-7405-eng-26. 20p. Order from LC. Mi $2.40, ph $3.30. CF-55-5-171

Raw materials process testing. Engineering section progress report for February 1956, by A. D. Ryon and K. O. Johnson. Oak Ridge National Lab., Tenn. May 1956. Contract W-7405-eng-26. 21p. Order from LC. Mi $2.70, ph $4.80. CF-56-5-134

Determination of microgram amounts of zirconium in uranyl nitrate solutions, by E. R. Russell. E. I. du Pont de Nemours & Co., Savannah River Lab. May 1956. Contract AT(07-2)-1. 7p. Order from OTS. 15 cents. DP-161

Apparatus for remote chemical operations, by M. D. Snyder. E. I. du Pont de Nemours & Co., Savannah River Lab. Jun 1956. Contract AT-(07-2)-1. 27p. Order from OTS. 25 cents. DP-162

Determination of traces of thorium in uranium solutions, by M. O. Fulda. E. I. du Pont de Nemours & Co., Savannah River Lab. Jun 1956. Contract AT(07-2)-1. 10p. Order from OTS. 15 cents. DP-165

Purification and determination of uranium in impure solutions using versene, by O. A. Vita, C. F. Trivisonno, and F. S. Voss. Goodyear Atomic Corp., Portsmouth, Ohio. Jul 1956. Contract AT(33-2)-1. 12p. Order from OTS. 15 cents. GAT-186

The determination of thorium by proportional counting of thoron, by W. B. Silker. Hanford Atomic Products Operation, Richland, Wash. Apr 1956. Contract W-31-109-eng-52. 14p. Order from OTS. 20 cents. HW-32436 (Rev.)

Thermal annealing kinetics of C_0 spacing damage in irradiated graphite, by R. E. Nightingale. Hanford Atomic Products Operation, Richland, Wash. Jun 1955. Contract W-31-109-eng-52. 8p. Order from LC. Mi $1.80, ph $1.80. HW-37376

Electrical precipitator for aerosol collection on electron microscope screens, by J. W. Baum. Hanford Atomic Products Operation, Richland, Wash. Sep 1955. Contract W-31-109-eng-52. 8p. Order from LC. Mi $1.80, ph $1.80. HW-39129

Polarography: An intermediate scanning rate polarograph, by C. E. Michelson. Hanford Atomic Products Operation, Richland, Wash. Dec 1955. Contract W-31-109-eng-52. 30p. Order from OTS. 25 cents. HW-40962

Spectrophotometric determination of uranium in highly impure solutions, by Robert B. Kimball and James E. Rein. Phillips Petroleum Co. Idaho Operations Office, Idaho Falls, Idaho. Jul 1956. Contract AT(10-1)-205. 14p. Order from OTS. 20 cents. IDO-14380

Application of liquid-liquid extraction for the separation of zirconium from hafnium, by R. A. Foos and H. A. Wilhelm. Ames Lab. Iowa State Coll., Ames, Iowa. Jul 1954. Contract W-7405-eng-82. 38p. Order from OTS. 30 cents. ISC-693

Application of liquid-liquid extraction to the separation of tantalum from niobium, by Raymond A.

Foos and H. A. Wilhelm. Ames Lab. Iowa State Coll., Ames, Iowa. Jul 1954. Contract W-7405-eng-82. 71p. Order from OTS. 45 cents. ISC-694

Annotated bibliography of 1,2-cycloheptanedionedioxime, by Charles V. Banks and Howard B. Nicholas. Ames Lab. Iowa State Coll., Ames, Iowa. Jun 1956. Contract W-7405-eng-82. 10p. Order from OTS. 15 cents. ISC-737

Sludge sampling system, by A. A. Abbatiello. Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn. Dec 1948. Decl. Dec 1955. Contract W-7405-eng-26. 16p. Order from LC. Mi $2.40, ph $3.30. K-316

The spectrographic analysis of zirconium and hafnium, by D. A. Del Grosso and F. P. Landis. Knolls Atomic Power Lab., Schenectady, N. Y. May 1956. Contract W-31-109-eng-52. 52p. Order from OTS. 35 cents. KAPL-1539

Flotation of uraninite from other minerals, by Gilman Yost Murray. Dept. of Metallurgy. Massachusetts Inst. of Tech., Cambridge, Mass. May 1947. Decl. Apr 1956. 57p. Order from OTS. 40 cents. MITG-A30

Hot cell apparatus for pyroprocessing experiments, by James R. Foltz, Weldon J. Gardner, and Fred D. Rosen. Atomics International Div., North American Aviation, Inc., Canoga Park, Calif. Jun 1956. Contract AT-11-1-gen-8. 67p. Order from LC. Mi $3.90, ph $10.80. NAA-SR-1227

Experimental techniques for the determination of oxygen in sodium and in NaK by the butyl bromide method, by Louis Silverman and Mary Shideler. Atomics International Div., North American Aviation, Inc., Canoga Park, Calif. Jun 1956. Contract AT-11-1-gen-8. 15p. Order from LC. Mi $2.40, ph $3.30. NAA-SR-1509

A review of the reaction kinetics of deuterium and tritium compounds. IV. Exchange and substitution reactions, by Lawrence M. Brown. National Bureau of Standards, Washington, D. C. May 1956. 80p. Order from OTS. 50 cents. NBS-4611

Solid-liquid equilibrium in the lithium-lithium hydride system. I. Apparatus; melting and freezing points of lithium hydride and lithium hydride-rich mixtures. Period covered: May 2, 1954 to December 1, 1955, by Charles E. Messer, Edwin B. Damon, and P. C. Maybury. Tufts Univ., Medford, Mass. Dec 1955. Contract AT(30-1)-1410. 16p. Order from OTS. 20 cents. NYO-3958

Separation of fission products from aluminum waste solutions by ion exchange, by R. E. Blanco, L. R. Higgins, and A. H. Kibbey. Oak Ridge National Lab., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 47p. Order from OTS. 40 cents. ORNL-301(Rev.)

Effects of gamma radiation on explosives. Final and summary report on Army Ordnance Project TA3-5003R; stability and reactions of explosives, by H. Rosenwasser. Oak Ridge National Lab., Oak Ridge, Tenn. Dec 1955. Contract W-7405-eng-26. 28p. Order from OTS. 25 cents. ORNL-1720

Decontamination of the homogeneous reactor experiment, by D. O. Campbell. Oak Ridge National Lab., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 39p. Order from OTS. 35 cents. ORNL-1839

Solvent extraction of uranium (and vanadium) from acid liquors with trialkylphosphine oxides, by C. A. Blake, K. B. Brown, and C. F. Coleman. Oak Ridge National Lab., Oak Ridge, Tenn. Aug 1955. Contract W-7405-eng-26. 106p. Order from OTS. 60 cents. ORNL-1964

Determination of alkali metal and alkaline-earth elements by flame photometry: A bibliography, by Jeanne R. French. Oak Ridge National Lab., Oak Ridge, Tenn. Oct 1955. Contract W-7405-eng-26. 20p. Order from OTS. 25 cents. ORNL-2001

Decontamination of the ORNL Thorex Pilot Plant, by K. H. McCorkle and W. R. Winsbro. Oak Ridge National Lab., Tenn. Jul 1956. Contract W-7405-eng-26. 31p. Order from LC. Mi $2.70, ph $4.80. ORNL-2058

X-ray diffraction data for some uranium compounds, by H. W. Dunn. Oak Ridge National Lab., Oak Ridge, Tenn. Aug 1956. Contract W-7405-eng-26. 45p. Order from OTS. 35 cents. ORNL-2092

Determination of tin in solutions of uranyl sulfate, by O. Menis, D. L. Manning, and R. G. Ball. Oak Ridge National Lab., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 16p. Order from OTS. 25 cents. ORNL-2111

Measurement and analysis of the holdup of gas mixtures by charcoal adsorption traps, by W. E. Browning and C. C. Bolta. Oak Ridge National Lab., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 21p. Order from OTS. 25 cents. ORNL-2116

Sorption of chromate by Dowex 1, by R. W. Woodard and L. Hampton. Dow Chemical Co. Rocky Flats Plant, Denver, Colo. Jul 1956. Contract AT(29-1)-1106. 34p. Order from OTS. 25 cents. RFP-64

Polonium, edited by Harvey V. Moyer. Jul 1956. 392p. Order from OTS. $1.75. TID-5221

The preparation of leucylalanine-2-C^{14}, by Rosemarie Ostwald. Univ. of Calif. Rad. Lab., Berkeley, Calif. May 1956. Contract W-7405-eng-48. 8p. Order from OTS. 15 cents. UCRL-3214

Chemistry division quarterly report March, April, May 1956. Univ. of Calif. Rad. Lab., Berkeley, Calif. Jun 1956. Contract W-7405-eng-48. 70p. Order from OTS. 45 cents. UCRL-3415

Disposal of radioactive wastes in the U. S. Atomic Energy program, by Abel Wolman, A. E. Gorman, and J. A. Lieberman. Division of Reactor Development, Washington, D. C. May 1956. 14p. Order from OTS. 20 cents. WASH-408

The recovery of uranium from sulfate leach liquors by the TBP-thiocyanate process, by Henry G. Petrow and Harold N. Marenburg. Raw Materials Development Lab. National Lead Company, Inc., Winchester, Mass. Nov 1955. Contract AT(49-6)-924. 17p. Order from OTS. 20 cents. WIN-24

Laboratory investigation of Thornburg Los Ochos ore, by E. S. Porter, P. N. Thomas, H. I. Viklund, and G. Trueman. National Lead Company, Inc., Winchester, Mass. Oct 1955. Contract AT(49-6)-924. 31p. Order from OTS. 25 cents. WIN-25

The recovery of uranium from ore pulps using fixed ion exchange resin beds, by Galen W. Clevenger and James T. Lynch. Raw Materials Development Lab. National Lead Company, Inc., Winchester, Mass. Dec 1955. Contract AT(49-6)-924. 25p. Order from OTS. 25 cents. WIN-26

Engineering

Value of money—equivalence, by H. E. Schweyer. Oak Ridge National Lab., Tenn. Jul 1952. Contract W-7405-eng-26. 22p. Order from LC. Mi $2.70, ph $4.80. CF-52-7-167

Electrical and thermal conduction. Part 1. Electrical conduction, by J. G. Daunt. Oak Ridge National Lab., Tenn. Apr 1953. Contract W-7405-eng-26. 96p. Order from LC. Mi $5.40, ph $15.30. CF-53-4-113

Boiling experiment transient effects, by M. Richardson and L. G. Alexander. Oak Ridge National Lab., Tenn. Jan 1955. Contract W-7405-eng-26. 13p. Order from LC. Mi $2.40, ph $3.30. CF-55-1-104

Physical properties and heat transfer characteristics of an alkali nitrate—nitrite salt mixture, by H. W. Hoffman. Oak Ridge National Lab., Tenn. Jul 1955. Contract W-7405-eng-26. 13p. Order from LC. Mi $2.40, ph $3.30. CF-55-7-52

Test to determine velocity of leakage across the pass partition of the HRT heat exchanger, by P. P. Holz. Oak Ridge National Lab., Tenn. Jan 1956. Contract W-7405-eng-26. 9p. Order from LC. Mi $1.80, ph $1.80. CF-56-1-31

Improvements in the operation of Westinghouse 200A slurry pump, by W. O. Hullings and A. S. Kitzes. Oak Ridge National Lab., Tenn. Feb 1956. Contract W-7405-eng-26. 7p. Order from LC. Mi $1.80, ph $1.80. CF-56-2-33

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