

U. S. Government

RESEARCH REPORTS

August 16, 1957

Vol. 28, No. 2

A monthly listing of
Government research reports
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With Improved Heat Resistance

Dielectric Dispersion Behavior of
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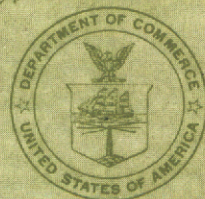
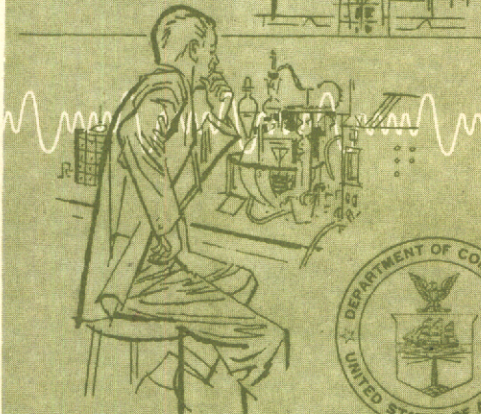
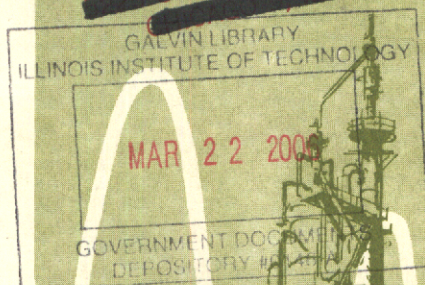
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Office of Technical Services

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

U. S. DEPARTMENT OF COMMERCE
Sinclair Weeks, *Secretary*

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Use of funds for printing this publication approved by the Director of the Bureau of the Budget, August 22, 1955.



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CARTOGRAPHY

Statistical symbols for maps, their design and relative values. Yale University. Map Laboratory, New Haven, Conn. Mar 1956. 114p diagraphs (part col.), graphs (part col.), tables. Order from LC. Mi \$6.00, ph \$18.30. PB 125567

Color will not reproduce. 1. Mapping - Symbols
2. Maps - Reading 3. Contract N onr 609(03) NR 088-006.

Studies, research and investigations of a positive working diazo sensitized print material. General Aniline and Film Corporation. Ozalid Division, Johnson City, N.Y. Contract DA 44-009-eng-1268. Dept. of the Army project no. 8-35-09-005. Order separate parts described below from LC, giving PB number of each part ordered.

Interim technical report, Sep 2 to Dec 2, 1952, by Maurice Dorfman. Dec 1952. 19p diagraph. Mi \$2.40, ph \$3.30. Sampled attached. PB 127344

In the refractive positive (R.P.) process, black paper is coated with a transparent colloid containing a diazo compound. This research is directed toward eliminating deterioration. Considerable positive progress has been made toward producing uniform sensitized material of high quality. A paper with a satisfactory black color and suitable for PVA experimental machine coatings has been obtained. Water resistance of PVA-R.P. layers has been significantly improved by appropriate surface treatment.

Interim technical report, Dec 2, 1952 to Mar 2, 1953, by Joseph Rennert. Mar 1953. 18p table. Mi \$2.40, ph \$3.30. Samples attached. PB 127343

During this quarter the work dealt with improvement of the water-resistance of RP papers, design and construction of a heat developing machine and development of testing methods.

Final technical report, Sep 2, 1952 to Jun 2, 1953, by Joseph Rennert. Jun 1953. 22p photos. Mi \$2.70, ph \$4.80. PB 127345

A new PVA-diazo formulation has been made which permits the preparation of RP paper in a single, rather than two, coating operation. Experimental heat developing machines were calibrated. Apparatus for testing the stability of RP material was set up.

CHEMICALS AND ALLIED PRODUCTS

Organic Chemicals

Dielectric dispersion behavior of selected natural polymers, by John L. Cooney, Charles F. Ferraro, John J. Maurer and Walter T. Zagar. Fordham University. Dept. of Chemistry, New York, N.Y. Jan 1957. 176p graphs, tables. Order from OTS. \$4.50. PB 121943

This report describes the results of studies on the variation of dielectric constant and loss factor with temperature and frequency for the esters of corn amylose, amylopectin, and cellulose. Electrical measurements were made from 10^2 to 10^7 cps from -70° to 150°C using bridge methods. The systems studied were: (1) solid disks of polymers, and (2) disks of the polymers containing varying amounts of plasticizers. Conclusions are made concerning: (1) rigidity of the polymer molecules, and (2) the effect on the polymer molecules produced by group substitution and plasticizer addition. AD 119051. Project 7340, Task 70338. Covers work from Mar 1955-Oct 1956 under Contract AF 33(616)-322, initiated Nov 1952 and terminated Oct 1956. AF WADC TR 56-577.

Infrared spectra of cyclopentamethylenedialkyl silanes in the 2-35 micron region, by Gordon D. Oshesky and Freeman F. Bentley. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, O. Feb 1957. 26p graphs, tables. Order from OTS. 75 cents. PB 131064

In this study the infrared spectra of a series of cyclic silanes has been correlated with their molecular structure and empirical assignments made for the absorption frequencies characteristic of the heterocyclic ring. The infrared absorption spectra of 21 cyclopentamethylenedialkylsilanes has been obtained in the liquid state over the range 2-35 microns using NaCl and CsBr prisms. The series begins with cyclopentamethylenedisilane. Absorption bands at 10.93 to 11.00 microns and 20.20 to 20.85 microns in the spectra of these compounds are tentatively assigned to vibrations arising from the heterocyclic ring. Absorption bands attributed to the alkyl-silicon linkage and the spectra of these molecules in the long wavelength region are also discussed. All the observed absorption bands are given in a table showing their position and relative intensities. AD 118046. Project 7360, Task 73602. Covers work from Sep 1955 - Mar 1956. AF WADC TR 56-434.

Agricultural Chemicals

Quenching of the fluorescence of β -naphthylamine by oxygen and nitric oxide, by Jean T. Dubois. U. S. Air Force. Air Research and Development Center. Aeronautical Research Laboratory, Wright-Patterson Air Force Base, Dayton, O. Mar 1956. 26p diags, graph. Order from OTS. 75 cents. PB 121266

Measurements of the relative quenching powers of oxygen and nitric oxide for the fluorescence of β -naphthylamine in the gas phase, was the main object of this work. All experiments were conducted at the Wright Air Development Center by the Physical Chemistry Section of the Chemistry Research Branch. It was found that both oxygen and nitric oxide have the same ability to cause the complex fluorescing molecule β -naphthylamine at 150°C. to be transferred to a nonfluorescing state. Project 3058, Task 70310. Appendix I. Paramagnetic behavior of O₂ and NO. - Appendix II. Vapor pressure of β -naphthylamine. AF WADC TR 55-382.

Study of the thermal decomposition of methane, by F. Wm. Cogle, Jr. Utah. University. Institute for the Study of Rate Processes. Dept. of Chemistry, Salt Lake City, Utah. Mar 1956. 12p. Order from OTS. 50 cents. PB 121450

A bibliography of the literature on the homogeneous pyrolysis of methane has been made. The known data are consistent with the assumed mechanism, assuming the usual steady state approximations. This leads to a calculated overall activation energy of 78 kcal in excellent agreement with the measured value of 79 kcal. Further the expression agrees with the experimentally determined order of the reaction over the investigated pressure range. A short discussion of the nitric oxide inhibition data is included. AD 86599. UU ISRP TN 19. Contract AF 33(038)-20839. AF OSR TN 56-177.

Vibrational spectrum of borine carbonyl, by George W. Bethke and M. Kent Wilson. Harvard University, Cambridge, Mass. Jun 1956. 54p diags, graphs, tables. Order from LC. Mi \$3.60, ph \$9.30. PB 124897

1. Raman spectra 2. Borine carbonyl - Infrared spectra 3. Spectra, Infrared 4. Contract AF 18 (600)-590 5. AF OSR TN 56-245. AD 88365 Chem 30-13.

Studies on organometallic compounds. The preparation of the compounds (CH₃)₃MCH₂COOH where M is C, Si, Ge or Sn, by J. A. C. Allison and E. G. Rochow. Harvard University. Dept. of Chemistry. Sep 1955. 16p. Order from LC. Mi \$2.40, ph \$3.30. PB 124899

1. Silicon compounds, Organometallic - Trimethyl
2. Germanium compounds, Organometallic - Trimethyl 4. Contract N5ori-07661

Agricultural value of phosphate fertilisers which economise in the use of sulphuric acid, by George W. Cooke. Organisation for European Economic Co-Operation, Paris. Sep 1956. 78p tables. Order from O. E. E. C. Publications Office, Suite 61, 2000 P St., N.W., Washington 6, D.C. \$1.00. PB 123908

The report summarizes and compares experimental results in regard to the agricultural value of each type of phosphate fertilizer studied. Project 162.

Plastics and Plasticizers

Development of metal-bonding adhesive with improved heat resistance, by J. M. Black and R. F. Blomquist. U. S. Forest Products Laboratory, Madison, Wis. Apr 1957. 20p tables. Order from OTS. 50 cents. PB 121856

Studies were conducted on an experimental phenol-epoxy resin tape adhesive, FPL-878, to determine the effects of glass and asbestos supporting mediums and of inorganic fillers on the resistance of bonded aluminum joints to aging at 500°F. Tests on antimony trioxide used as an inorganic filler in tapes of both FPL-878 adhesive and a straight epoxy resin adhesive showed this material was the best of the filler materials tested for resisting thermal degradation and also contributed to increased joint-strength. AD 118193. Project 7340, Task 73401. Covers work from Jul 1954 - Jun 1955 under Contract AF 33(616)-56-9. AF WADC TR 56-650.

Effect of thickness on strength of epoxy and phenolic laminates reinforced with glass fabric, by Kenneth H. Boller. U. S. Forest Products Laboratory, Madison, Wis. Mar 1957. 23p graphs, tables. Order from OTS. 50 cents. PB 131044

Results of tensile and compressive tests on laminates made with 3 types of resin and 2 types of reinforcement in thicknesses ranging from 1/100 inch to 1/8 inch showed that the stress at failure decreased with decreasing thickness. The magnitude of the decrease varies with the material. AD 118098. Project 7340, Task 73400. Covers work from Jan 1955 - Jun 1956 under Contract AF 33(616)-56-9. AF WADC TR 56-522.

Hydrolytic modification of cellulose caprate, by D. E. Field and R. B. Fox. U. S. Naval Research Laboratory. May 1957. 7p graphs, tables. Order from OTS. 50 cents. PB 131021

A method is described by which the softening point of commercial cellulose caprate may be raised to a level such that the material is suitable for the preparation of optical cement by a standardized procedure.

ture which consists of the partial hydrolysis of the ester by means of aqueous hydrochloric acid - methanol mixtures. Some of the factors involved in the changes in physical properties of cellulose caprate during hydrolysis are discussed, and methods are outlined for the analysis of small quantities of hydroxyl groups in cellulose esters. NRL R 4948.

Research on elevated temperature resistant inorganic polymer structural adhesives, by Harold H. Levine. Quantum, Inc., Mt. Carmel, Conn. Nov 1956. 30p graph, tables. Order from OTS. 75 cents. PB 121908

It is necessary to develop a structural adhesive that can satisfactorily withstand temperatures up to 1000°F. An inorganic adhesive stable at 800°F, with a room temperature shear strength of 285 lb./sq. in. has been obtained from the ammeline-phosphorus pentoxide reaction product. The use of titanium dioxide as a primer and dimethylformamide as an extractive solvent enabled the above shear strength to be obtained from an original value of 65 lb./sq. in. Evidence was obtained to indicate that the adhesion was a result of chemical interaction between the adhesive and the stainless steel surfaces. AD 110588. Project 7340. Covers work from Aug 15, 1955 - Aug 15, 1956 under Contract AF 33(616)-2555. AF WADC TR 55-271, Part 2.

Inorganic Chemicals

Kinetics of gaseous reactions in the range 1000° to 1800°C.; study at high temperatures of the reactions between nitrogen and metals, particularly magnesium and aluminum, by Farrington Daniels. Wisconsin. University. Dept. of Chemistry, Madison, Wis. Jul 1956. 32p photo, graphs, tables. Order from OTS. \$1.00. PB 121341

Contents: Vaporization of inorganic substances: B_2O_3 , TeO_2 and Mg_3N_2 , by John R. Soulen, Prasom Sthapitanonda and John L. Margrave. (Reprinted from Journal of Physical Chemistry, 59, 132, 1955). - Gaseous metal nitrides. I. Theoretical dissociation energies for diatomic nitrides, by John L. Margrave and Prasom Sthapitanonda (Reprinted from Journal of Physical Chemistry 59, 1231, 1955). Kinetics of nitridation of magnesium and aluminum, by John L. Margrave and Prasom Sthapitanonda. - Kinetics of the decomposition of nitric oxide, by Edward Lung Yuan and Farrington Daniels. - Preliminary study of the surface-catalyzed decomposition of nitric oxide, by E. L. Yuan, R. J. Williams and Farrington Daniels. - Preliminary study of the vapor pressure of sodium hydroxide, by Shin Suzuki and John L. Margrave. - Attempts to study the reactions between alkali halides in the gaseous phase, by Harold F. Mason and Farrington Daniels. AD 110498. Contract AF 33(616)-338, Final report. AF WADC TR 56-536.

New acid base concept applicable to aqueous systems, fused salts, glasses and solids, by W. A. Weyl. Pennsylvania State University, College of Mineral Industries, State College, Pa. Feb 1956. 70p diags, tables. Order from LC. Mi \$3.90, ph \$10.80. PB 125531

A new concept not based on water but upon screening of the core. Water is not used as a standard. Contract N6onr 269 T.O. 8, NR 032-264. ONR TR 67.

Nature of addition compounds of zirconium and hafnium tetrachlorides with phosphorus oxychloride, by Edwin M. Larsen and Layton J. Wittenberg. Wisconsin. University. Dept. of Chemistry, Madison, Wis. Jun 1955. 15p graph, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 124170

1. Hafnium tetrachloride - X-ray inspection
2. Zirconium tetrachloride - X-ray inspection
3. Zirconium tetrachloride - Molecular weight
4. Hafnium tetrachloride - Molecular weight
5. Contract N7 onr-28504, T.O. 4. Based on a thesis submitted by Layton J. Wittenberg. Presented at the New York meeting of the American Chemical Society before the Physical and Inorganic Division, Sep 1954.

1-Picryl-2, 2-diarylhydrazyl free radicals, by Robert I. Walter, Amedeo F. D'Adamo, Jr. Rutgers University. School of Chemistry, New Brunswick, N.J. Sep 1954. 18p table. Order from LC. Mi \$2.40, ph \$3.30. PB 124907

1. Hydrazyl compounds
2. Hydrazyl, 1-Picryl-2, 2-diaryl
3. Hydrazil - Derivatives - Reactions
4. Contract N7onr-45403, Technical report 6. Abstracted from a thesis by A. F. D'Adamo, Jr. - Rutgers University. Accepted for publication by the Journal of the American Chemical Society. For Final report under this Contract see PB 124908.

Self diffusion of silver and chlorine in silver chloride, by Walter Dale Compton. Illinois. University. Dept. of Physics. Jun 1955. 7p diagr, graph, tables. Order from LC. Mi \$1.80, ph \$1.80. PB 122162

The self diffusion coefficient of the silver ion has been re-measured at two temperatures with the use of a vacuum evaporation technique for applying the layer of radioactive silver chloride to the surface of the silver chloride crystal. In earlier experiments reported in PB 124094, the radioactive layer was applied by chemical precipitation from solution. Good agreement is found between measurements made using the two different techniques. Physics of the solid state, Contract N6 onr-07129, NR017-412. Technical report 17. Continuation of work reported in Technical report 16, (PB 124094).

Structure sensitivity of the low-temperature ionic

conductivity of NaCl crystals, by D. B. Fischbach and A. S. Nowick. Yale University, New Haven, Conn. Jan 1957. 16p graph Order from LC. Mi \$2.40, ph \$3.30. PB 125526

1. Crystals, Rock salt - Thermal conductivity - Tests 2. Crystals, Sodium chloride - Thermal conductivity - Tests 3. Contract AF 18(600)-850, R-355-40-14. 4. AF OSR TN 57-22. AD 115036

Ordnance Chemicals

Study of chemical relaxation behind shock waves, by M. Steinberg and T. F. Lyon. General Electric Co., Flight Propulsion Laboratory Dept. Jan 1957. 24p photo, diagrs, graph, table. Order from OTS. 75 cents. PB 131066

A shock tube apparatus has been constructed for the purpose of studying the kinetics of some high-temperature gas phase reactions pertinent to combustion systems. The tube is capable of generating temperatures up to 5000°K at pressures of 1 atm behind incident shocks in mixtures of a few per cent of reactants in argon. The technique offers a convenient method for studying rapid high-temperature reactions under thermal excitation in the absence of any sensitizers which might conceivably alter the course of the reactions. AD 118050. Project 3058, Task 70311. AF WADC TR 56-394.

Analytical Chemistry

Cabin air analysis in B-57 aircraft, by Richard W. Bancroft. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Feb 1956. 4p tables. Order from LC. Mi \$1.80, ph \$1.80. PB 125218

Air samples were collected from the pressurized cockpits of three B-57B aircraft during nine routine training flights and analyzed for carbon dioxide and carbon monoxide content. In none of these cabin air samples was there any indication of dangerous amounts of either carbon dioxide or carbon monoxide. These negative results tend to indicate that cabin air contamination in B-57 aircraft is not a chronic condition when the engines and pressurization systems are maintained to function in a normal manner. AF SAM R 56-17.

Determination of small amounts of carbon in metallic titanium and alloys by the conductometric method, by William R. Sheehan. U. S. Arsenal, Watertown, Mass. Aug 1954. 11p graph, tables. Order from OTS. 50 cents. PB 131119

Samples of titanium were analyzed for carbon content by using the Leco CD-10 Conductometric Carbon Determinator. To determine the homogeneity of the carbon content, analyses were performed on triplicate 0.1 gram, 0.2 gram and 0.25 gram

samples of WA-2. The results of the analyses performed are compared to the results obtained for the same samples by other members of the Task Force on Carbon. O.O. Project no. TB 4-15. D/A Project no. 593-08-021. WAL R 401/228.

Handbook of radiochemical analysis, by L. J. Beaufait, Jr., and H. R. Lukens, Jr. Tracerlab, Inc. Western Division, Berkeley, Calif. Order separate parts described below from OTS, giving PB number of each part ordered.

Volume I: Radiochemical techniques. May 1953. 152p drawings, graphs, tables. \$4.00. PB 121690

This handbook has been prepared to systematize and correlate the information considered necessary for a precise radiochemical analysis of certain fission product and non-fission product activities. This volume contains information on laboratory techniques, recording and calculating of data, preparation of general reagents and carriers, counting techniques and instructions, feather analysis of aluminum absorption curves, tables, graphs, and drawings of special apparatus. NP 5056.

Volume II: Radiochemical procedures. Mar 1952. 129p tables. \$3.25. PB 121689

This volume has been organized for the purpose of clarifying the chemistry and standardizing the techniques used in analyzing for several fission product and non-fission product isotopes. Three main chemical tasks involved are the dissolution of the sample with steps to provide for the exchange between the active isotopes and the added carrier elements, the separation of the individual activities from the solution, and the decontamination and de-termination of the desired activities. NP 5057

Method for the study of lattice inhomogeneities combining X-ray microscopy and diffraction analysis, by Sigmund Weissmann. Rutgers University. College of Engineering. Bureau of Engineering Research, New Brunswick, N.J. Dec 1955. 27p diagrs, graphs. Order from LC. Mi \$2.70, ph \$4.80. PB 124281

An X-ray diffraction method has been developed which establishes a direct correlation between the spot reflections on the Debye-Scherrer lines and the lattice regions on the specimen surface giving rise to these reflections. After this correlation has been accomplished an analysis of the spot reflections based on the double diffractometer principle is carried out. Technical report no. 6, Contracts DA 30-069-ord-791 and N7onr-404-09.

Final report under Contract N7onr-45403, by H. C. Torrey. Rutgers University. Dept. of Physics and School of Chemistry, New Brunswick, N. J. Feb 1956. 6p. Order from LC. Mi \$1.80, ph \$1.80. PB 124908

Attention was concentrated on the systematic search for paramagnetic compounds which would exhibit narrow magnetic resonance which would be discernable in the earth's field. Two materials were finally synthesized which produced sufficiently narrow magnetic resonances: tri-p-aminophenylammonium perchlorate and tri-p-anisylammonium perchlorate. Several radicals of the triarylammonium salt series were synthesized and their resonances determined. A list of technical reports, publications, and papers is included.

Properties of flames supported by chain-branching reactions, by J. Calvin Giddings and J. O. Hirschfelder. Wisconsin University. Naval Research Laboratory, Madison, Wis. Nov 1956. 18p graph, tables. Order from OTS. 50 cents. PB 131156

In a recent paper the authors outlined chemical reaction schemes which made feasible the mathematical treatment of flames supported by chain-branching reactions. The flame problem treated in that paper was concerned with a non-Semenoff type reaction scheme in which the chain-breaking step was second order in radical concentration. The work reported here is a continuation of the study on chain-branching flames. The kinetic scheme used is of the Semenov type--the chain-breaking step is first order in radical concentration (FOB). Profiles are obtained for all flame properties, and the way in which they depend upon kinetic and diffusion parameters is studied. Project Squid, Technical report WIS-5-P. Paper to be presented at the 9th International Congress of Applied Mechanics Sep 4-13, 1956 at Brussels. Contract N6 ori-105, T.O. III, NR 098-038. WIS-5-P.

Versuch einer mathematischen theorie der koagulationskinetik kolloidal losungen. (An attempt at establishing a mathematical theory of the coagulation kinetics of colloidal solutions) by M. von Smoluchowski. Translated by David Kraus and John G. Estam. Dec 1954. 31p graph. Order from LC. Mi \$3.00, ph \$6.50. PB 122246

1. Mathematical research - Germany 2. Kinetic theory - Germany 3. Colloids - Research - Germany 4. Contract AF 19 (604)-1364. Translated for the Air Force Cambridge Research Center Library, by the American Meteorological Society, from Zeitschrift für physikalische chemie, 92: 129-147, 167-168, 1918.

Communication Equipment

Effects of repeating the initial sounds of words on the intelligibility of air messages, by Henry M. Moser, John J. Dreher, John O'Neill and Sol Adler. Ohio State University Research Foundation, Columbus, O. Jun 1956. 38p graph, tables. Order from LC. Mi \$3.00, ph \$6.30. PB 124138

On the basis of experimental evidence on connected speech as well as collateral studies involving the transmission of isolated words, it is concluded that intelligibility of air messages might be significantly and importantly increased by the judicious use of the single bounce technique in voice delivery. Further research with a wider range of test materials and with operational personnel trained specifically in using this method is recommended to assess its practical possibilities. Contents: I. Comparison of single- and double- bounce transmission upon the intelligibility of operational words. -II. Comparison of the single- bounce and normal transmission methods with control tower messages. OSURF Proj 664. OSURF TR 30. AF CRC TN 55-69. Contract AF 19 (604)-1577.

Nonmetallic ferromagnetic materials. Part VII: Microwave ferrites, by Herbert C. Rothenberg and Earl B. Mullen. General Electric Company. Electronics Div., Syracuse, N.Y. Dec 1955. 49p photos, diags, graphs, tables. Order from OTS. \$1.25. PB 131053

The work presented here covers the investigations carried out under the microwave ferrite program. Theoretical considerations and measurement techniques are discussed, results of materials development are given, and conclusions are stated. AD 110616. Project 4155, Task 41640. Covers work from 1 Apr 1943 - 31 Oct 1955 under Contract AF 33(616)-2009. For Parts 1-5 and 8, see PB 121858, 121861, 121868-121869, 121874 & 131052. AF WADC TR 56-274, Part 7.

Electronics

Airborne radio, results of engineering performance tests on model TS-329/U phantom antenna, by William J. J. Klemm and O.L. Wilkins. U. S. Naval Research Laboratory. Sep 1946. 18p photos, diagr, graphs. Order from LC. Mi \$2.40, ph \$3.30. PB 122765

Unclassified 15 Dec 1956. 1. TS-329/U (Radio antenna) 2. Radio, Airborne - Tests 3. NRL R 2965.

Arbitrarily polarized antenna for use at X-band, by H. N. Chait. U. S. Naval Research Laboratory. Mar 1949. 13p photos, drawings, diags, graphs. Order from LC. Mi \$2. 40, ph \$3. 30.

PB 123145

Unclassified 1 Aug 1952. 1. Antennas, Radar - Design 2. Antennas, Radar - Performance 3. Antennas - Polar diagrams 4. Antennas, Radar - Bands X 5. NRL R 3416

Automatic monitor system for radio ranges, by J. M. Lee. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jan 1947 55p photos, maps, diags, graphs. Order from LC. Mi \$3. 60, ph \$9. 30. PB 123550

Technical rept. 51. 1. Radio range - Performance 2. Monitors, Radar - Design 3. CAA TDR 51

Circularly polarized antenna for 2500 to 3500 megacycle frequency range, by M. Heusinkveld and H. F. Carlson. U. S. Naval Research Laboratory. Aug 1945. 28p photos, fold drawing, diagr, graphs. Order from LC. Mi \$2. 70, ph \$4. 80. PB 123353

Unclassified 15 Dec 1953. 1. Antennas, Circular - Design 2. Radar - Jamming equipment 3. MBE (Antenna) 4. NRL R 2512

Dependence of the effectiveness of clipped-noise jamming on the radar receiver bandwidth, by K. M. Watson. U. S. Naval Research Laboratory. Jul 1945. 16p photos, diagr, graphs, table. Order from LC. Mi \$2. 40, ph \$3. 30. PB 123359

Supplement to NRL R.2495. Unclassified 15 Dec 1953. 1. Radar - Jamming equipment - Tests 2. Radar - Receivers - Sensitivity 3. Jamming transmitters - Tests 4. NRL R 2498

Design methods for magnetic amplifiers and saturable reactors, by James R. Walker and Max Frank. Wayne University. Wayne Engineering Research Institute, Detroit, Mich. Jul 1956. 628p drawings, diags (1 fold), graphs, tables. Order from OTS. \$9. 50. PB 121765

This report is a Design Manual for magnetic amplifiers describing various design methods for the standard magnetic amplifier circuits. The step by step procedures are especially intended for the inexperienced designer in the magnetic amplifier art. The basic full-wave circuits of the centertap, doubler, and bridge connections are considered, in addition to some of the more recent half-wave circuits. The first portion of the Manual is concerned with the theory of operation of each of the various circuits, describing the function of the core and rectifier components and the effects of their properties

upon amplifier response. Also included in this section are discussions of the problems of stability resulting from a variance of environmental factors, amplifiers, in cascade, and various types of loads together with some of the techniques of compensation. The second part contains the design procedures for the different circuits including examples. Designs with core configuration of toroids, U laminations, and C cores are described. Materials of construction for magnetic amplifiers form the last part of the Manual. Magnetic cores, rectifiers, wires, insulations, and encapsulation and potting materials are discussed. Testing procedures, matching techniques, and some of the characteristics of these materials are also included. The appendices contain the theoretical analyses that form the basis for the design relationships contained in the Manual. AD 110431. Project 4155. Task 41647. Contract AF 33(616)-217. AF WADC TR 56-281.

Development, admnstment, and application of the Z-marker, By W. F. Jackson and H. I. Metz. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jul 1938. 29p photos, diags, graphs. Order from LC. Mi \$2. 70, ph \$4. 80. PB 123544

Reprinted 1941. 1. Z-marker (Antenna) 2. Indicators, Position - Design 3. Radio range stations 4. CAA TDR 14

Development of an experimental directive response homing system, by R. W. Hayward. U. S. Naval Research Laboratory. Apr 1945. 25p diags (part fold), graph, table. Order from LC. Mi \$2. 70, ph \$4. 80. PB 123354

Unclassified 15 Dec 1953. 1. Radio - Homing devices 2. Radio direction finders - Equipment 3. NRL R 2511

Development of the antenna (identification) Mark 18 Mod O, by P. A. Lantz and R. J. Adams. U. S. Naval Research Laboratory. Oct 1946. 34p photos, diags (1 fold), graphs, tables. Order from LC. Mi \$3. 00, ph \$6. 30. PB 123331

Unclassified 15 Dec 1953. 1. Mark 18 Mod O (Antenna) 2. Antennas, Radar - Lobing 3. Fire control equipment - Design 4. NRL R 2924

Electronic material at elevated temperatures, by James W. Ballard. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Electronic Components Laboratory, Wright-Patterson Air Force Base, Dayton, O. May 1957. 10p. Order from OTS. 50 cents. PB 131157

Electronic materials for use above 200°C, based on requirements for electronic component materials and devices of current Air Force contracts, are

discussed. Magnetic, ferroelectric, dielectric and insulating, conductor, semiconductor and miscellaneous categories are covered. Marginal improvements have proved insufficient and major breakthroughs in research are essential to assure future supremacy in the application of electronic materials at elevated temperatures. Project 4150. AF WADC TN 57-211.

Engineering study of radio interference suppression, by T. F. Knapp. Lear, Inc., Grand Rapids, Mich. Nov 1954. 64p photos, drawings, diags, graphs. Order from LC. Mi \$3.90, ph \$10.80. PB 119043

Project no. 6060. Formerly PB 111925. 1. Radio interference - Elimination 2. Instruments, Measuring - Radio interference 3. Contract AF 33 (616)-332 4. AF WADC TR 54-399

Handbook of piezoelectric crystals for radio equipment designers, by John P. Buchanan. Philco Corporation, Philadelphia, Pa. Oct 1956. 702p photos, drawings, diags (part fold), graphs, tables (part fold). Order from OTS. \$7.00. PB 111586r

The report covers material considered useful in the design of crystal oscillators for electronic equipment. It is a comprehensive manual of piezoelectric control of radio frequencies, containing background material, circuit theory, and components data. Appendices contain a bibliography, a list of manufacturers, specifications and standards, and conversion charts. Contract AF 33(616)-2453. Supersedes WADC TR 54-258 (PB 111586) dated Dec 1954. AD 110448. AF WADC TR 56-156.

Heater-cathode leakage investigation. First quarterly report for the period 1 Feb - 1 May 1956. under Contract AF19(604)-1734, by Paul E. Carroll, Julius Cohen and J. V. Florio. Sylvania Electric Products Inc. Products Development Laboratories, Kew Gardens, N. Y. Jun 1956.

The purpose of the present experimental program is three-fold: 1. To obtain a phenomenological description of heater-cathode leakage under typical life test conditions of military tube types. 2. To determine the nature and relative importance of mechanisms responsible for heater-cathode leakage and to investigate the physical and chemical parameters governing the important heater-cathode leakage mechanisms. 3. To utilize the experimental findings through specific recommendations concerning (a) the use of improved materials, (b) the use of improved processing and aging, and (c) the use of operating conditions conducive to the detrimental effects of heater-cathode leakage. Report YF 56 (B7-3028-1). AF CRC TN 56-586.

Limiting conditions in a ferroresonant trigger circuit, by J. G. Skalnik. Yale University. Dunham

Laboratory of Electrical Engineering, New Haven, Conn. Oct 1955. 54p diags, graphs. Order from LC. Mi \$3.60, ph 9.30. PB 124754

The basic component of a ferroresonant trigger circuit is a series L-C circuit containing a nonlinear inductor. Two such L-C circuits with associated excitation generator and series impedance form a complete ferroresonant trigger circuit. The basic L-C circuit is considered separately and the magnitudes of current and voltage allowing at least two possible states of operation are developed. Both the loss-free and the lossy cases are considered. The results of the analysis on the basic L-C circuit are used to predict the behavior of the complete ferroresonant trigger circuit for various conditions of operation. For the loss-free case, equations are developed for the boundary values of voltage and current. Similar boundary values are developed for the lossy case but, in general, these boundary values must be read from charts. These charts are presented in a normalized form applicable to any given circuit. Restrictions on the permissible range for the excitation frequency are also presented. For Reports 7 - 9, and 11, see PB 118343, PB 118405, PB 123019, and PB 124174. Contract Nonr-433(00), Report no. 10.

Platinum-oxygen electrode in molten silicates, by A. E. Pedler and E. G. Rochow. Harvard University. Dept. of Chemistry. Sep 1955. 17p graph, diags, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 124900

1. Electrodes, Platinum-oxygen - Tests 2. Glass, Silicate - Research 3. Contract N5 ori-07761

Potential-theoretic analog of a diffraction problem, by C. J. Bouwkamp. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Antenna Group, Berkeley, Calif. Jun 1955. 20p. Order from LC. Mi \$2.40, ph \$3.30. PB 124869

The following two-dimensional potential problem is solved: A plane conductor of finite width at unit potential is located midway between, and parallel to, two infinite parallel plates connected to earth. The charge distribution on the conductor is calculated from an integral equation that is similar to the integral equations encountered in the diffraction theory of slits and ribbons. The potential problem serves a useful purpose in illustrating various points important in diffraction theory. UC IER Series 60, Issue no. 140.

Practical handbook for location and prevention of radio interference from overhead power lines, by J. C. Senn and D. B. Wright. U. S. Naval Civil Engineering Research and Evaluation Laboratory, Port Hueneme, Calif. Nov 1956. 48p drawings, diags, graphs. Order from OTS. \$1.25.

PB 131017

This handbook is written primarily for the use of public works personnel responsible for the design, construction, and maintenance of overload power distribution systems which must be free of electromagnetic interference. It describes in nontechnical terms the common causes of power line interference and lists practical measures required for the location and elimination of these causes. Project NY 411 002-1. NCEREL TM M 116.

Quarterly scientific report no. 12 covering period
1 Apr - 1 Jul 1956 under Contract no. AF 19
(604)-786. Harvard University. Cruft Labora-
tory. 1956. 15p graphs. Order from LC. Mi
\$2.40, ph \$3.30. PB 125152

For quarterly reports 7-9 and 11 see PB 117771, 118497, 122355 and 123464. Contents: Variational corrections to cylindrical scattering, by R. D. Kodis. - Back-scattering measurements, by R. V. Row. - Scattering of plane waves by obstacles, by S. I. Rubinow. - Back-scattering from dielectric-coated infinite cylindrical obstacles, by C. Tang. - Pulse R-F back-scattering measurements, by C. Tang. - Scattering of plane waves by conducting obstacles at high frequencies, by L. Wetzel. - Investigation of high-frequency current distribution on conducting obstacles, by L. Wetzel. HU CL QSR 12. AF CRC TN 56-569.

Radio propagation measurements between Pikes
Peak and Mount Evans at a wavelength of 8.6
millimeters, by C. W. Tolbert and A. W. Strai-
ton. Texas. University. Electrical Engineer-
ing Research Laboratory, Austin, Tex. Sep
1955. 21p photos, graphs, tables. Order from
LC. Mi \$2.70, ph \$4.80. PB 123971

1. Radio waves - Propagation - Measurements
2. Radio waves - Propagation - Measuring equip-
ment 3. Water vapor - Absorption 4. Contract
Nonr-375(01), NR 071-032 5. TU EERL 77

Reduction of instrumental error in model DAB direc-
tion finding equipment, by A. G. Loveberg, Jr.
U.S. Naval Research Laboratory. Nov 1945.
51p photos, drawings (part fold), diags, graphs,
tables. Order from LC. Mi \$3.60, ph \$9.30.
PB 123380

1. DAB (Direction finder) 2. Radio direction find-
ers - Components 3. Radio direction finders -
Errors 4. NRL R 2672

Research in high-power beam tubes. Scientific re-
port 4 for the period 15 Mar - 15 Jun 1956 under
Contract AF 19(604)-1494. Stanford University.
W. W. Hansen Laboratories of Physics. Micro-
wave Laboratory, Stanford, Calif. Jun 1956.
27p photos, drawings, diags. Order from LC.
Mi \$2.70, ph \$4.80. PB 125154

Projects assigned to this contract fall into two

groups. Relatively speaking, the first group is of a more applied nature, and the second of a more basic nature. Projects in the applied group involve developmental work on new microwave tube devices and will be carried to the point of constructing experimental models suitable for evaluation by equipment groups. The first three projects in this report are in this group. Projects in the basic group will provide better understanding of fundamental electron-bunching phenomena and will furnish important design data for microwave tubes. The last two projects in this report are in this group. AF CRC TN 56-553. SU ML R 318.

Spark breakdown in uniform fields, by Leonard B.
Loeb. U.S. Office of Naval Research. Jul 1954.
147p photos, diags, graphs, tables. Order
from OTS. \$3.75. PB 131134

Discusses sparking criterion and sparking mechanisms, growth and fluctuations of a Townsend discharge and its relation to Paschen's law, visual manifestations of sparks, and streamer mechanism of the spark (history, theories and properties). Formerly PB 118404 (See U.S. Government Research Reports, vol. 24, no. 5, p. 177).

Test of impedance matching transformer, type CFL-
47119, by S. A. Greenleaf. U.S. Naval Research
Laboratory. Nov 1938. 30p photos, diags,
graphs. Order from LC. Mi \$2.70, ph \$4.80.
PB 123288

Unclassified. 1. CFL-47119 (Transformer)
2. Transformers, Impedance - Tests 3. NRL R
1489.

Test of jamming transmitter using L600N tube in
the range of 200 to 1000 megacycles, by F. T.
Powles. U.S. Naval Research Laboratory. Apr
1945. 11p graphs. Order from LC. Mi \$2.40,
ph \$3.30. PB 123361

Unclassified 15 Dec 1953. 1. Radar - Transmitters - Tests 2. Jamming transmitters 3. Radar - Jamming equipment - Tests 4. NRL R-2490

Test of model RDZ-1 radio receiving equipment, by
W. E. W. Howe. U.S. Naval Research Labora-
tory. Aug 1946. Order from LC. Mi \$3.90,
ph \$10.80. PB 123332

Unclassified 15 Dec 1953. 1. RDZ-1 (Radio receiver) 2. Radio receivers - Tests 3. NRL R 2929.

Theoretical and experimental investigation of ferro-
resonant circuits, by Mustafa N. Parlar. Poly-
technic Institute of Brooklyn. Microwave Re-
search Institute, Brooklyn, N. Y. Apr 1955.
83p photos, diags, graphs, table. Order from
LC. Mi \$4.80, ph \$13.80. PB 124089

In the first part of this report; the nonlinear characteristic of the iron core reactors are investigated. In the second part, the series ferroresonant circuit is analyzed with the aid of well-known classical methods as discussed briefly in the text. In the last part, the effect of the hysteresis on the volt-ampere characteristic is shown, which, with the stability consideration, explains the existence of the subharmonics of the first kind. Contract Nonr-839(15), NR375-214. PIB 352 PIB R420-55.

Theoretical and experimental investigation of microwave printed circuits, H. S. Keen. Airborne Instruments Laboratory, Inc., Mineola, N. Y. Nov 1956. 22p graphs. Order from OTS. 75 cents. PB 131019

This investigation of microwave printed circuits was initiated in Feb 1953 for the purpose of studying uses and applications of symmetrical strip transmission line in practicable microwave circuits. Most of the investigations conducted under this contract used air as the dielectric. Symmetrical strip transmission line involves the use of two parallel ground planes (electrically equivalent to the outer conductor of coaxial line) and a centrally mounted strip conductor (electrically equivalent to the center conductor of coaxial line). A partial list of strip-transmission-line applications benefiting from this study is included in the Appendix. Contract AF 19 (604)-780, Final report. AF CRC TR 56-180. AD 110154. Report no. 2830-4.

Theory, design and engineering evaluation of radio-frequency shielded rooms, by C. S. Vasaka. U.S. Naval Air Development Center. Aeronautical Electronic and Electrical Laboratory, Johnsville, Pa. Aug 1956. 120p photos, drawings, diags, graphs, tables. Order from OTS. \$3.00. PB 121927

Fundamental shielding theory for cylindrical and spherical shields is considered and reconciled with design parameters and performance characteristics of the plane-surface shields of shielded enclosures. Formulas, correction factors, and tables are included for calculating shielding effectiveness of sheet metal enclosures and screen rooms. Shielding effectiveness tests are described for various fields and frequencies. The NADC-AEEL Take-down Cell-Type Screen Room is described and evaluated. TED project no. ADC EL 538. NADC EL 54129.

Transition metal phosphides. Interim report from Dec 1953 to Jul 1955 under Contract N6 ori-071 (50), NR 052-341, by S. S. Hsu, P. N. Yocom and T. C. C. Cheng. Illinois. University, Urbana, Ill. Jul 1955. 99p photo, diags, graphs, tables. Order from LC. Mi \$5.40, ph \$15.30. PB 125530

Phosphides of the transition metals have been known for a long time to have excellent corrosion-resisting properties in most mineral acids. At the Uni-

versity of Illinois, phosphides of iron and cobalt have been made and studied as anodes. Although the results indicated that they are still far from satisfactory, they do indicate that some of the transition metal phosphides may have favorable properties as anode materials in certain kinds of solutions for some specific purposes. It is for this reason that the present investigation was undertaken.

Twelve guides to reliable electronic design, by Gordon G. Johnson. U.S. Naval Ordnance Test Station, China Lake, Calif. Apr 1955. 57p diags, tables. Order from OTS. \$1.50. PB 121123

This report is based primarily on an extensive literature survey. Reliability topics discussed include the effects of increased equipment failure, techniques of reliable design, and selection of components. Vacuum tubes, resistors, and capacitors are the only components discussed at any length. Resistors and capacitors are considered from the viewpoint of comparative specifications rather than experimentally determined reliability. Tube-reliability factors briefly covered are: filament current surges, cathode-interface formation, tube envelope temperatures, new cathode designs, and the use of special tubes. Also given is a bibliography of 89 of the better articles reviewed. NOTS 1064. NAVORD 3461.

Vee corner absorbers, by Walter H. Weber. U.S. Naval Research Laboratory. Apr 1945. 14p photos, diags. Order from LC. Mi \$2.40, ph \$3.30. PB 123352

Unclassified 15 Dec 1953. 1. AN APS/4 (Radio transmitters) 2. Radar - Screens - Absorption - Tests 3. Radar - Bands X - Radiation - Absorption 4. NRL R 2516

Generators, Motors, Transmission

Experiments with electrostatically focused velocity-jump amplifiers, by William M. Mueller. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Microwave Tube Group, Berkeley, Calif. Mar 1957. 66p drawings, diags, graphs, tables. Order from OTS. \$1.75. PB 131031

This report is devoted chiefly to the results of experiments with two velocity-jump amplifiers consisting of a helix input, the drift tubes, and a helix output. The electrostatic lenses existing between the various electrodes were used for focusing. It was established that instead of the confined flow plasma frequency reduction factors those for ion-neutralized flow are more correct for electrostatically focused flow. Because of the long plasma wavelengths corresponding to these reduction factors it does not seem possible to construct a tube of this type with practical gain. Several suggestions are

made concerning tubes consisting of short sections of helix operating at different potentials which could be made practical for low current densities. Oscillations were discovered at a number of frequencies and a helix oscillator requiring no focusing is proposed to make use of these resonances. AD118188. Project 4156, Task 41570. Contract AF 33(616)-3278. AF WADC TR 56-620.

Magnetically sensitive electrical resistor material. Quarterly report no. 2, for the period 1 Nov 1953 - 31 Jan 1954 under Contract DA 36-039-sc-52601, by E. Katz, L.P. Kao, W. Tantraporn and H. Patterson. Michigan. University. Engineering Research Institute, Ann Arbor, Mich. Mar 1954. 32p photo, diagr, graphs, tables. Order from LC. Mi \$3.00, ph \$6.30. PB 125572

The theory of Davis and of Seitz on the magneto resistance effect is summarized and its extension in several directions is begun. The case where the temperature is not close to absolute zero is briefly indicated, and the necessary formalism is also set up to deal with noncubic crystals. A new theorem is found regarding the absence of any magneto-resistance effect, either at a low temperature or at all temperatures. Experiments are described measuring A_{pp} under various circumstances. Using a field of the order of 500 Gauss, most of the experiments deal with Bi and its anisotropy effects under various conditions of preparation. For earlier report see PB 125568. MU ERI Project 2136-1-P.

Operating instructions for crystal controlled micro-volt signal generator, model 191X. Hickok Electrical Instrument Co., Cleveland, O. n. d. 32p photos, diagrs, graphs, drawings, tables (part fold). Order from Hickok Electrical Instrument Co., 10514 DuPont Ave., Cleveland 8, O. 50 cents. PB 125831

Basic issue. 1. 191X (Signal generator) 2. Generators, Signal - Operation 3. NA 16-5S-531

Permanent-magnet generators, Part II: Design considerations, by D.S. Toffolo and D.J. Hanrahan. U.S. Naval Research Laboratory. May 1957. 27p diagrs, Order from OTS. 75 cents. PB 121946

The permanent-magnet-generator theory developed in Part I (NRL Report 4912, PB 121862) was utilized to derive expressions for optimizing the output power per pound and/or achieving a minimum regulation for a given output. These expressions were derived by relating the armature winding constants to the permeances of the rotor, air gap, and stator in the equivalent magnetic circuit. The exact form and applicability of each relationship depend upon the method used to stabilize the magnets. Expressions are given for three types of generators: air-stabilized, short-circuit-stabilized, and load-stabilized generators. NRL R 4931.

Servo amplifier for 1-hp Diehl low inertia servo motor, by Howard M. Ikerd. U.S. Naval Research Laboratory. Jul 1946. 9p photo, drawing, table. Order from LC. Mi \$1.80, ph \$1.80. PB 123330

Unclassified 15 Dec 1953. 1. Amplifiers, Servo - Design 2. NRL R 2916

Transient-controlled magnetic amplifier, by George Schohan. U.S. Naval Ordnance Laboratory, White Oak, Md. Mar 1956. 23p photos, diagrs, graphs, tables. Order from OTS. 75 cents. PB 131011

This report describes a 2-core magnetic amplifier which exhibits a unique type of self-balancing action and has gain characteristics normally obtained only with far more complicated circuitry. This amplifier appears particularly well suited for servo applications. NAVORD 4258.

FOOD AND KINDRED PRODUCTS

Frozen fish, improved quality and packing as a way to improved marketing and consumption, compiled by Gerhard Meseck. Organization for European Economic Co-Operation, Paris. Aug 1956. 154p diagrs, graphs, tables. Order from O. E. E. C. Publications Office, Suite 61, 2000 P Street, N. W., Washington 6, D. C. \$1.25. PB 123909

The European Productivity Agency sponsored a training course on "The Improved Quality and Packing of Frozen Fish", organized by the Ministry of Food, Agriculture and Forestry of the German Federal Republic, and held at Kiel from the 14th - 19th of March 1955. The report includes the country statements presented at the training course, the technical papers read, and a summary of the conclusions and recommendations reached by the participants during their discussions. Project 523.

Studies on radiation sterilization of sliced apples, by R.T. Milner. Illinois. University. College of Agriculture. Dept. of Food Technology, Urbana, Ill. Aug 1956. 77p diagrs, tables. Order from OTS. \$2.00. PB 121962

Preliminary experiments were carried out to examine various blanching and chemical treatments that might prevent browning of apple slices. The effects of radiation dose, atmosphere within the metal container, presence of calcium and pre-irradiation temperature were also investigated. Project 7-84-01-002. S-544-Rpt #5. Covers period 15 Aug 1955-14 Aug 1956. Contract DA 19-129-QM-513, Final report.

FUELS AND LUBRICANTS

Injection and combustion of liquid fuels, by A. A. Purnam, F. Bennington and others. Battelle Memorial Institute, Columbus, O. Mar 1957. 786p photos, drawings, diagsr, graphs, tables. Order from OTS. \$9.00. PB 131008

This monograph contains a review of material in the unclassified literature relating directly to the fundamental physical phenomena involved in steady flow processes in high-intensity combustors. To systemize the presentation, the report has been divided into six parts, as follows: I. Atomization of liquid fuels; II. Ballistics of droplets; III. Evaporation of droplets; IV. Fluid dynamics; V. Homogeneous combustion; and VI. Heterogeneous combustion. AD 118142. Project 3012, Task 70148. Project was initiated in 1950. Contract AF 33(038)-13501. AF WADC TR 56-344.

On the optimum rate of burning the fuel of an ascending rocket, by H. Lewy. U.S. Aberdeen Proving Ground. Ballistics Research Laboratories, Aberdeen, Md. Dec 1944. 8p graphs. Order from LC. Mi \$1.80, ph \$1.80. PB 125140

A (time-dependent) rate of discharge of fuel is determined which, at any height, gives the maximum velocity obtainable with equal expenditure of fuel. A numerical example is carried through and compared with a trajectory for constant rate of burning. ORDC Project I-184. APC BRL R 508.

HIGHWAYS AND BRIDGES

Culvert-flow characteristics. Highway Research Board. 1956. 30p photos, diagsr, graphs, tables. Order as HRB Bul 126 from Highway Research Board 2101 Constitution Avenue, N.W., Washington 25, D.C. 60 cents. PB 123942

Presented at the thirty-fourth annual meeting, Jan 11-14, 1955. Contents: Demonstration of possible flow conditions in a culvert, by M.R. Carstens and A.R. Holt. Tests on circular-pipe-culvert inlets, by R.E. Schiller. HRB Bul 126. NRC 413.

INSTRUMENTS

Application of dynamic strain gages to the measurement of continuous and average thrust of pulse jet engines, by Paul Torda, Walter Ira Weiss,

Erich Shatzki and Joseph Lovingham. Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Sep 1948. 21p photos, diagsr, graphs. Order from OTS. 75 cents. PB 131149

This memorandum presents a method developed at PIBAL for continuously measuring and recording the thrust of pulse jet engines. The exposition of the method offered herein includes (a) the design of a pulse jet engine suspension system, (b) the design of a thrust sensitive linkage, and (c) the results of some test runs. In this developmental work, a Dyna-jet engine served as a pilot model prior to full-scale investigations. Contract N6ori-98, T.O. II, NR 220-059. Project Squid.

Application of Statham pressure transducers to the continuous recording of instantaneous pressures, by Walter Ira Weiss. Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Jul 1948. 19p photos, drawing diagsr, graphs. Order from OTS. 75 cents. PB 131146

The primary purpose of this work is to describe the equipment developed for the application of the Statham pressure transducer to the continuous recording of instantaneous pressures. The paper includes a brief survey of existing types of dynamic pressure detectors and a short discussion of their individual merits and limitations. A brief discussion of the requirements of such detectors as applied to work on pulse jets is also presented. Contract N6ori-98, T.O. II, NR 220-039. ATI 206-228. Project Squid. PB AL 125.

Automatic recording extensometer system, by Raymond J. Flynn and Milton Stoll. Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Jun 1948. 8p drawings, diagr. Order from OTS. 50 cents. PB 131143

This paper presents the design of an instrument for the measurement of elongation through the primary, secondary, and tertiary stages of creep phenomena. The system offered herein provides a means of automatic recording and, being reversible in its operation, allows for the shrinkage accompanying allotropic change in the material under observation. The design incorporates electrical strain gages with a system of beams which are constrained at both ends. As the beam bends, the longitudinal fibres either lengthen or shorten, depending upon their positions with regard to the neutral axis and upon the direction of bending. Contract N 6ori-98, T.O. II, NR 220-039. Project Squid. PIB-3-M.

Calibration method and equipment for dynamic pressure detectors, by Paul Torda and Walter Ira Weiss. Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Jul 1948. 8p drawings. Order from OTS. 50 cents. PB 131148

The purpose of this report is to present a calibration method for dynamic pressure detectors as developed at PIBAL. The necessity for a reliable pro-

cedure for calibration of these gages was indicated by a survey of the pertinent literature and by consultations with research groups familiar with the use of dynamic pressure detectors. These investigations indicated that essentially two methods have response of such instruments. These two methods are described briefly and their shortcomings pointed out. The requirements for a valid procedure, together with the necessary equipment, is described. No actual results could be included, since only preliminary data have been obtained so far due to late delivery of the calibrating equipment by the contractor. Also high persistency of the scope screen falsified the records taken by the camera and only visual observation was possible. Contract N6ori-98, T.O. II, NR 220-039. Project Squid. PIB-8-M.

Design and construction of a human calorimeter.

Final report for period from 31 Dec 1953 - 1 Sep 1955 under Contract N8 onr-64901-2, by R. G. Huebscher. American Society of Heating and Air-Conditioning Engineers, Inc., New York, N. Y. Sep 1955. 24p photos, diagrs. Order from LC. Mi \$2.70, ph \$4.80. PB 124894

Work included the development of test methods and the testing of the instrument for accuracy and speed of response over a wide range of conditions. AD 71856.

Development of non-destructive tests for structural adhesive bonds, by J.S. Arnold. Stanford Research Institute, Menlo Park, Calif. Feb 1957. 62p photos, drawings, diagrs, graphs, table. Order from OTS. \$1.75. PB 131046

An ultrasonic technique for the evaluation of structural adhesive bonds (the STUB-meter) is being developed and tested. The operation of the instrument is based on the empirically observed fact that the behavior of a ferroelectric transducer, when mechanically coupled to a test specimen, is affected by the structural properties of the test specimen. To define more closely the scope of the technique, an evaluation program is being carried out in co-operation with organizations in the aircraft industry. Initial data have already provided improved means of choosing optimum frequency ranges. Laboratory development of the STUB-meter has included work on probes for curved surfaces and for standard lap shear specimens; electrodes with improved wear resistance; visualization of vibration modes; effects of loading; and improved circuitry. AD 118083. Project 7340, Task 73401. Covers work from Jan 1-Oct 31, 1956 under Contract AF 33(616)-2035. For Parts 3-4 see PB 111678 and 121495. Parts 1-2 not available. AF WADC TR 54-231 Part 5.

Differential thermal analysis apparatus for temperatures up to 1575°C, by Kenneth G. Skinner. U.S. Naval Research Laboratory. May 1957. 15p. Order from OTS. 50 cents. PB 121999

The determination of mineralogical and/or physical-chemical parameters up to 1575°C is vital in the evaluation of ceramic materials, such as barium titanate. The use of a differential thermal analysis (d. t. a.) apparatus aids in determining such parameters. A d. t. a. apparatus designed and built at the Naval Research Laboratory combines the advantages of operation to 1575°C and of holders which do not react with the sample. NRL R4942.

Electronic signaller to reduce quench-cracking of steel. First partial report, by L. D. Jaffe, D. C. Buffum and I. L. Preble. U.S. Arsenal, Watertown, Mass. Jun 1952. 38p photos, tables. Order from OTS. \$1.00. PB 131111

An instrument has been developed to signal, electrically, when a steel part being quenched has hardened to a predetermined degree. At the signal, the part is withdrawn from the quench, and, after its temperature has equalized, it is slowly cooled to minimize development of internal stresses and consequent cracking. The instrument is sensitive to the increase in magnetic permeability accompanying the austenite-to-martensite transformation. It employs as the detecting element a coil immersed in the quench tank. Two models have been built: one for laboratory or tool room heat treatment of parts up to 2 inches diameter by 8 inches long in a 50 gallon tank, the other for pilot plant heat treatment of parts up to 10 feet long in an 1800 gallon tank. The former operates at a re- quench of 60 cycles/second, the latter at 3/4 cycle/second. O. O. project no. TB4-121. WAL R 310/169.

Design, develop and produce a limited number of functional production-type models of a self-contained infant protector for the U.S. Army Chemical Corps. Peter Schladermundt Associates, New York, N. Y. Contract DA 18-108-CML-5142. Project 4-80-02-022. Order separate parts described below from LC, giving PB number of each part ordered.

Bimonthly report no. 9 for the period Oct 1954 to Dec 1954. Dec 1954. 17p photos, diagrs. Mi \$2.40, ph \$3.30. PB 124216

1. Protectors, Child - Design AD 70400.

Bimonthly report no. 10, covering period 26 Dec 1954 - 26 Feb 1954. Feb 1955. 24p. Mi \$2.70, ph \$4.80. PB 124215

1. Protectors, Child - Design AD 70399.

Practical external cardiac pacemaker-defibrillator, by Terence F. McGuire, Stanley C. White and Donald A. Rosenbaum. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright-Patterson Air Force Base, Dayton, O. Dec 1956. 29p photos, diagrs. Order from OTS. 75 cents. PB 121888

Interest in the subject of cardiac arrest (i. e., ventricular fibrillation or standstill) has increased greatly in recent years, largely because of increased recognition of the situation and the subsequent development of relatively simple surgical techniques. With the growth of our understanding have come such electronic aids as internal cardiac defibrillators and external cardiac pacemakers. To augment the medical armamentarium, an external/internal cardiac defibrillator has been built and combined with a time-tested external cardiac pacemaker; this simple and compact instrument, properly used, is designed to allow cardiac resuscitation without the necessity of surgical intervention. It is hoped that it will render necessary human experimentation more safe by protecting against the rare but always possible cardiac emergency and that it may, in a large percentage of cases, obviate the necessity of thoracotomy when cardiac arrest occurs during surgery. AD 110656. Project 7160, Task 71812. Work was started in Jan 1955. AF WADC TR 56-642.

Storage-type air heater for an intermittent-flow supersonic wind tunnel, by John E. Weiler. Texas. University. Defense Research Laboratory. Nov 1956. 84p photos, drawings (part fold), diagrs, graphs, tables. Order from LC. Mi \$4. 80, ph \$13. 80. PB 124769

This report describes the development of a storage-type air heater for supplying the bulk of the heat to the supply air of a 6" x 6" blowdown wind tunnel. Several special and auxiliary units necessary for control and refinement of operation are also described. AD 110394. Contract AF 18(600)-589, T.O. 17500. AF OSR TN 56-572. TU DRL 393.

Study, high performance cabin cooling unit, by Arthur P. Lane. Fairchild Engine and Airplane Corp. Stratos Division, Bay Shore, N. Y. Oct 1954. 159p photos, diagrs, graphs (3 fold), tables. Order from OTS. \$4.00. PB 121284

Appendix I. Heat exchanger design. - Appendix II. Theoretical investigation of wet heat exchangers. - Appendix III. Description of tests. - Appendix IV. Sample calculation-performance of HPCC system. A study of the problems involved in designing a high performance air cycle cabin conditioning system for jet airplanes is discussed. The performance data used in the study pertain to bomber airplanes in present use. As a result of the study, a high performance cooling system has been selected, based on the specified operating conditions. The system is a regenerative bootstrap incorporating a split regenerative heat exchanger. The prediction of the capabilities of the system necessitated the development of an analytical method for determining the performance of a heat exchanger when moisture is condensed from the cooled air. Such a method is given together with a description of the test program undertaken to assure the reliability of the analytical method. Contract AF 33(600)-23989. AF WADC TR 54-389.

Surface temperature determination by X-ray diffraction technique, by Alfred Bender and I. Fankuchen. Polytechnic Institute of Brooklyn, N. Y. Jun 1948. 10p photo, drawings, diagr, graph. Order from OTS. 50 cents. PB 131145

The experimental investigation described in this technical memorandum is an extension of the work described in the Quarterly Progress Report of Project Squid, July, 1947. It represents further research in the use of x-ray diffraction methods for the determination of surface temperatures in combustion chambers. Experiment in this field is based on the theory that macroscopic thermal expansion of solids is a manifestation of the more fundamental expansion of the crystal lattice of the material with increase in temperature. Since back reflection x-ray scattering is sensitive to changes in the lattice constants, this thermal expansion can therefore be correlated to temperature changes in the material. In the present investigation more satisfactory equipment was designed and constructed, and a specimen made of a material used in the walls of jet engines was employed. An x-ray camera and a high temperature furnace were designed and constructed. The tests were made on a specimen of AISI # 347. Project Squid. Tables mentioned in text are omitted. Contract N6 ori-98, T. O. II, NR 220-039. PIB-5-M.

Test set TS-148/UP spectrum analyzer, by James R. Ambrose. U.S. Naval Research Laboratory. Jul 1946. 20p photos, diagr, table. Order from LC. Mi \$2. 40, ph \$3. 30. PB 123327

Unclassified 15 Dec 1953. 1. TS-148/UP (Spectrum analyzer) 2. Spectrum analyzers - Tests 3. Spectrum analyzers - Design 4. NRL R 2910

True stress vs. elongation recorder, by D. E. Driscoll and T. S. DeSisto. U.S. Arsenal, Watertown, Mass. Jul 1955. 22p photos, diagrs, graphs, table. Order from OTS. 75 cents. PB 131104

The true stress recorder can be used on practically all ferrous and non-ferrous metals to produce results that will usually have an error of not more than 1%. It saves time and effort in the computations of true stress vs. elongation curves. By eliminating manual diameter and elongation measurements and manual calculations the human error is minimized. O.O. Project no. TB 4-21. D/A Project no. 593-08-022. WALR 111/23.

LUMBER AND WOOD PRODUCTS

Molded wood fiber shipping guards for clustered bombs (U), by H. R. Simpers. U.S. Chemical Corps. Chemical and Radiological Laboratories, Army Chemical Center, Md. Jul 1956. 24p photo photos, tables. Order from LC. Mi \$2. 70, ph \$4. 80. PB 125525

Report describes design, development, and prototype construction of molded wood fiber shipping guards for protection of 1,000 lb. and 750-lb. bomb cluster adapters during shipment and storage. Project 4-91-06-001 and Project 4-91-06-002. CC CRLR 564.

MACHINERY

Calibration of the Charpy impact machine and procedure for inspection and testing Charpy V-notch impact specimens, by D. E. Driscoll. U.S. Arsenal, Watertown, Mass. May 1952. 36p drawings, photos, diags, graph, tables. Order from OTS. \$1.00. PB 131117

Four separate and distinct features that could cause variations in Charpy test results (1. The calibration and maintenance of the testing machine. 2. The preparation of the test specimen. 3. The technique used in conducting the test. 4. The quality and uniformity of the material being tested) are discussed. The impact test is more sensitive to these factors than are other mechanical property tests. Impact testing No. 1. Appendix A: Method of notching impact test specimens, by S. E. Sieman. WALR 112/89.

Construction and characteristics of heat-treating facilities at the Watertown Arsenal Laboratories, by S. Valencia. U.S. Arsenal, Watertown, Mass. Oct 1955. 29p photos, diagr. Order from OTS. 75 cents. PB 131116

The new facilities incorporate the latest equipment for the treatment of ferrous and non-ferrous metals to serve efficiently all phases of the research and development programs at the Watertown Arsenal Laboratories. The heat-treating equipment includes a tube-type electric furnace, two box-type electric furnaces, an oil-tempering furnace, an air-tempering furnace, seven salt-bath furnaces, three salt-bath furnaces, two box type electric furnaces, an endothermic gas generator, an exothermic gas generator, a freezing unit and a controlled oil quenching system. The single, room length instrument panel-board contains all the instruments for control of each furnace. O.O. Project TX3. D/A Project 5X9003001. WAL R630/21.

High-vacuum filament furnace for gas analysis of metals, by George A. Consolazio and William J. McMahon. U.S. Arsenal, Watertown, Mass. Oct 1955. 13p diags, graph. Order from OTS. 50 cents. PB 131121

A high-vacuum, filament-type, all glass resistance furnace has been designed, constructed and adapted to the inlet system of a conventional mass spectrometer. The specimen is installed either as a small filament between two nickel electrodes or in

a small crucible accommodated within a filament coil connected between these electrodes inside the Pyrex shell of the furnace. In this way, temperature and temperature rates are much more closely controlled, operation is simpler, and the installation is more economical than is possible with induction heating. O.O. Project No. TB4-161. D/A Project No. 593-08-024. WAL R847/47.

METALS AND METAL PRODUCTS

Anodic behavior of iron, by Norman Hackerman and William H. Wade. Texas. University. Dept. of Chemistry, Austin, Tex. Jul 1955. 71p diags, graphs, tables. Order from LC. Mi \$4.50, ph \$12.30. PB 124488

The anodic behavior of pure iron electrodes was studied in 0.1 M Na_2SO_4 at 5°C . Oxygen overvoltage measurements in acid solutions showed the mechanism to be the oxidation of water molecules to adsorbed hydroxyl radicals, next, the dehydration of two of these radicals to give an adsorbed oxygen atom, followed by the desorptive combination of two of these oxygen atoms. In alkaline solutions overvoltage measurements and potential-time decay curves both led to the conclusion that the passive iron surface is primarily covered with adsorbed hydroxyl ions. Contract Nonr-375(02).

Behavior of metals under impact loading and the mechanism of cratering, by Xavier de Callatay. Utah. University. Institute for the Study of Rate Processes. Explosives Research Group, Salt Lake City, Utah. Oct 1956. 50p photos, diags, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 125534

The objective of this study was to investigate jet formation, jet structure and the initial stages of target penetration by lined cavity charges as regards impulsive loading. The jet formation and structure studies were carried out to provide some needed information for interpeting ultra-high speed photographs of the penetration of targets by multi-particle projectiles. Contract AF 18(603)-100, T.O. II, UU ISRP TR2.

Catalytic effect of titanium on the oxidation stability of lubricants, by H. F. Campbell and M. M. Jacobson. U.S. Arsenal, Watertown, Mass. Jul 1955. 28p graphs, tables. Order from OTS. 75 cents. PB 131106

The purpose of the project was to determine the catalytic effect of several titanium alloys on the oxidation stability of selected lubricants under accelerated conditions by means of the Norma-Hoffmann Oxygen Bomb Method. O.O. Project No. TB-4-15. D/A Project No. 593-08-021. WAL R 401/233.

Changes in martensite structure as a record of temperature. Polytechnic Institute of Brooklyn, Brooklyn, N. Y. Contract N6 ori-98, T. O. II, NR 220-039. Project Squid. Order separate parts described below from OTS, giving PB number of each part ordered.

Part I, by Milton Stoll and George H. Schipperreit. Jun 1948. 10p photos, graph. 50 cents. PB 131142

A method of determining temperatures, temperature distribution and gradients, of the metal constructions used in rocket and jet propulsion units has been proposed and its theory and calibration is described herein. In this method the metals themselves act as their own thermal indicators. By calibration of known temperature-responsive changes occurring in the micro-structure, in the hardness, and in other physical properties, an indication of temperature at any one point is possible. In this initial research the tempering of martensite has been employed as the temperature indicator. The thermal changes have been checked by metallographic methods and hardness measurements. PIB-2-M.

Part II, by George H. Schipperreit and Otto H. Henry. Jun 1948. 14p photos, drawing, graph. 50 cents. PB 131144

This paper describes several efforts to prove the feasibility of determining temperatures in combustion chambers by use of changes in martensite. In a final and successful experiment a calibrated temperature-responsive steel venturi tube was fabricated and fired under controlled conditions of time and temperature. The temperatures encountered by the tube were approximately indicated by hardness measurements and microscopic examination. Results of the experiment reveal that temperature can be measured by the changes occurring in the tempering of martensite. Photomicrographs and hardness curves of the results thus far obtained are included in the report. PIB-4-M.

Compressive stress-strain properties of 2023-T3 aluminum-alloy sheet at elevated temperatures, by Eldon E. Mathauser. U.S. National Advisory Committee for Aeronautics. Nov 1956. 66p photo, graphs, table. Order as TN 3853 from National Advisory Committee for Aeronautics, 1512 "H" Street, N. W., Washington 25, D. C. PB 124407

Compressive stress-strain test results for 2024-T3 aluminum-alloy sheet are presented for temperatures up to 700°F and exposure times from 0.1 to 100 hours. All specimens were loaded parallel to the rolling direction of the sheet and tested at a strain rate of 0.002 per. minute. Significant design data obtained from the stress-strain curves (yield stress, Young's modulus, secant and tangent moduli,

and two stresses useful for determining the maximum compressive strength of plates) are presented in graphical and tabular form. A rate-process relationship is used to determine exposure time which produces a maximum yield stress for a given temperature, and a time-temperature parameter is used to present the yield stresses as a single master curve. NACA TN 3853.

Compressive stress-strain properties of 7075-T6 aluminum-alloy sheet at elevated temperatures, by Eldon E. Mathauser. U.S. National Advisory Committee for Aeronautics. Nov 1956. 54p photo, graphs, table. Order as TN 3854 from National Advisory Committee for Aeronautics, 1512 "H" Street, N. W., Washington 25, D. C. PB 124408

Test results for the same temperatures and exposure times as presented in PB 124407, are given in graphic and tabular form for the 7075-T6 alloy sheet. NACA TN 3854.

Continued research and development of titanium castings. Final technical report under Contract DA-19-059-ORD-1520. REM-CRU Titanium, Inc., Midland, Pa. n.d. 195f photos, drawings, diagrs, tables. Order from L.C. Mi \$8.70, enl pr \$31.80. PB 127336

This investigation consisted of the melting and casting of the following titanium-base materials: Unalloyed titanium; Ti-7Al; Ti-7Mn; Ti-4Al-4Mn. Cast properties obtained included: Impact values between 80 and 100 foot-pounds at both room temperature and 40°F for unalloyed titanium heats having room temperature tensile strengths above 50,000 psi and excellent tensile ductility. Tensile strengths in the 120 to 130,000 psi range for the Ti-4Al-4Mn alloy combined with good room temperature tensile ductility and impact values of about 10 foot-pounds at both room temperature and 40°F. It was shown that all castings had excellent chemical homogeneity. Project TB4-15. Contract DA 19-059-ORD-1520. WAL R401/208.

Creep properties of metals under intermittent stressing and heating conditions. Part 2. Intermittent heating, by Lawrence A. Shepard, C. Dean Starr, Carl D. Wiseman and John E. Dorn. California. University. Institute of Engineering Research, Berkeley, Calif. Jul 1954. 38p graphs, tables. Order from OTS. \$1.00. PB 131016

Intermittent temperature, constant load creep tests were performed on clad aluminum alloys, 75S-T6 and 24S-T3 at 450°F, and the test data are reported herein. Comparison of cyclic temperature creep data obtained in this investigation with isothermal data under the same conditions of stress reveal that approximately equivalent plastic strains are achieved when the comparison is made on the basis of net time at test temperature. A survey of existing literature on metallic creep under cyclic temperature conditions is also included. Contract AF

33(038)-11502. For Parts 4-5 see PB 121435 and PB 121476. AF WADC TR 53-336 Part 2.

Dendrites and growth layers in the electrocrystallization of metals, by Gösta Wranglén. Sweden. Kungl. Tekniska Hogskolan, Stockholm. 1955. 57p photos, diagrs, tables. Order from L.C. Mi \$3.60, ph \$9.30. PB 124924

Electrodeposited dendrites show a simple relation to the space lattice. The main type of dendrite in the f. c. c. lattice branches along (110). At high c. d., Pb develops dendrites branching along (100). Sn grows along (101) a low c. d. and along (110) at high c. d. Cd dendrites are complicated, but their main branching is along (100). The dendrite directions are the closest packed directions in the lattice. Metals of low overvoltage grow by the lateral extension of layers, about 1 μ thick. The planes of the growth layers are, in order of importance: For Pb, Ag and Cu 111 and 100, for Cd 001 and 100, for Sn 101 and 100. Inhibition increases the thickness and number of growth layers but decreases their rate of flow. Chemistry including Metallurgy series, vol. 4, no. 11. Also published as Kungl. Tekniska Hogskolans Handlingar nr. 94. Acta Polytechnica 182.

Design properties of high-strength steels in the presence of stress concentrations and hydrogen embrittlement: Part 3. The response of high-strength steels in the range of 180,000-300,000 PSI to hydrogen embrittlement from cadmium electroplating, by E.P. Klier, B.B. Muvdi and G. Sachs. Syracuse University. Syracuse, N. Y. Mar 1957. 129p photos, drawings, diagrs, graphs, tables. Order from OTS. \$3.25. PB 131034

The embrittlement of high-strength steels due to the action of hydrogen introduced by Cd-electroplating has been studied in sustained-load, rotating beam fatigue, and bending tests. Strength levels from 180,000 to 300,000 psi as suitable for the various steels were examined for a variety of initial conditions of stress concentration. All steels were found to be embrittled in some measure after Cd-plating and this embrittlement could not be fully eliminated, as determined in the bend test, through the baking treatment used. The improvement in properties which did result from baking was promoted by a redistribution and not an elimination of hydrogen from the steel. Failure promoted by Cd-plating is affected by the experimental conditions and has been discussed at length in the report. Both the sustained-load and bend tests are suitable tests for evaluation of hydrogen embrittlement in ultra-high strength steels. The rotating beam fatigue test is a relatively insensitive test of hydrogen embrittlement, but can be used to provide an excellent measure of the "static" notch strength of the steel. AD 118167. Project 7360, Task 73605. Covers work from Sep 1, 1955 - Aug 31, 1956. For parts 1-2 see PB 121847 and 121883. Contract AF 33(616)-2362, S/A 4 (56-445). AF WADC TR 56-395, Part 3.

Effects of inelastic action on the resistance to various types of loads of ductile members made from various classes of metals. Illinois University. Dept. of Theoretical and Applied Mechanics, Urbana, Ill. Contract AF 33(616)-2753. Project 7360, Task 73605. Order separate parts described below from OTS, giving PB number of each part ordered.

Part I: Eccentrically-loaded tension members having angle- and T-sections, by O.M. Sidebottom and M. E. Clark. Apr 1957. 110p photos, drawings, diagrs, graphs, tables. \$2.75. PB 131061

This load is found analytically from the intersection of a constant depth of yielding interaction curve and a momentload curve. General load and moment expressions used in the construction of the interaction curves were derived for cross-sections composed of rectangular elements. In the experimental investigation eccentric load tests were made on angle- and T-section members made from various classes of materials. The three materials used were S. A. E. 4340 alloy steel, type 304 stainless steel, and 7075-T6 aluminum alloy. In general the results of these tests corroborated the theoretical analyses. It was found that deviations from the theory could be explained by variations in the stress-strain properties of the material. Covers work between Feb 1953 and Mar 1956. AD 118178. AF WADC TR 56-330, Part I.

Part II: Inelastic behavior of aluminum alloy I-beams with rectangular web section cutouts, by William J. Worley and Shuji Taira. Apr 1957. 66p photos, drawings, diagrs, graphs, tables. \$1.75. PB 131028

This report contains an exploratory investigation of the plastic bending of aluminum alloy I-beams with rectangular web section cutouts. The mechanism method of analysis employing the upper bound theorem was employed in predicting the ultimate loads of the various beams. The experimental results are in good agreement with the predicted ultimate loads. Covers work from Jun 1955 to Mar 1956. AD 118185. AF WADC TR 56-330, Part II.

Electrodeposition of titanium on base metals, by Merle E. Sibert. Horizons, Inc., Cleveland, O. Dec 1953. 34p photos, drawing, tables. Order from OTS. \$1.00. PB 121958

An electrolytic method has been developed for cladding of base metals, notably steel, with titanium. The procedure entails a fused salt electrolysis under a protective inert atmosphere. Thin titanium layers are produced in thicknesses up to .003 inch. Relatively high temperatures are employed, and these produce a firm diffusion type bond which has no tendency toward exfoliation or cracking. Layers of greater thickness may be produced by repetitive

electrolysis. The salt bath employed has been a mixture of K_2TiF_6 and NaCl although other titanium halides and alkali or alkaline earth halides may be satisfactorily substituted. Electrolysis is carried out using a graphite crucible anode. Voltages of 3-6 are used, and temperatures of 850°C. AD 37702. Summarizes work from 15 Dec 1952 through 15 Dec 1953. AF WADC TR 53-503.

Elevated temperature properties of Hastelloy X, by W. Lee Williams. U.S. Naval Engineering Experiment Station, Annapolis, Md. Nov 1953. 10p photos, graphs, tables. Order from LC. Mi \$1.80, ph \$1.80. PB 122608

The tensile properties at room temperature and the creep and stress-rupture properties at 1350° and 1500°F were determined for annealed Hastelloy X bar stock. The alloy had a nominal composition of 22% Cr-45% Ni-9%Mo. The elevated temperature strength properties were roughly equivalent to those of the leaner 16% Cr-25% Ni-6% Mo alloy. NAV EES 040029C.

Engineering application of the absolute rate theory to the creep of lead, by Mervin B. Hogan. Utah. University. Institute for the Study of Rate Processes. May 1955. 83p drawings, graphs, tables. Order from OTS. \$2.25. PB 121127

Creep of lead data from three different published sources are analyzed from the standpoint of the absolute rate theory. The metallurgical complexity of lead and the influence of alloying elements and other factors upon its mechanical properties are discussed. The four-element mechanical model is used as the basis of the analyses. It is concluded that the absolute rate theory provides an excellent hypothesis for engineering application to the creep of lead. Contract N7 onr-45101, NR 032-168. UU ISRP TR 48.

Examination of a failed type 347 stainless steel drum used for the storage and shipping of fuming nitric acid, by P. R. Kosting and A. K. Wong. U.S. Arsenal, Watertown, Mass. Jun 1954. 23p photos. Order from OTS. 75 cents. PB 131112

Premature failure of the stainless steel drum was caused by corrosion of the chromium-depleted grain boundaries of the heat-affected zones adjacent to some welds. Niobium was the constituent used in the base metal to inhibit the precipitation of carbides in the grain boundaries. The Nb/C ratio in the base metal was only 7. It is decided that for greater protection the ratio should be 10. O.O. project no. TB 4-161. D/A project no. 593-08-024. WAL R 316/48.

Factors affecting the fluidity and hot cracking of magnesium alloys, by Howard F. Taylor and Merton C. Flemings, Jr. Massachusetts Insti-

tute of Technology. Jan 1957. 93p photos, drawings, diags, graphs, tables. Order from OTS. \$2.50. PB 131045

A vacuum fluidity apparatus was used to determine the fluidities of magnesium alloys. The alloy systems studied were: 1. Magnesium-aluminum binary system from 0 to 20% aluminum. 2. Magnesium-zinc ternary system up to 20% alloy content. 5. Magnesium-thorium-zirconium system from 0 to 20% thorium. Fluidity was determined as a function of temperature for each alloy. Then fluidity at 1400°F was plotted as a function of alloy content. Fluidity at 100°F superheat was plotted for those alloy systems for which the liquidus temperature had been established. Comparison of commercial alloys with the experimental alloys was good. Fluidity curves as a function of alloy content were found to vary as the inverse of computed, non-equilibrium freezing range curves. A hot tear pattern was adapted for studying the effect of geometry on the hot tearing of magnesium alloys, and for determining the susceptibility of various magnesium alloys to hot tearing; the pattern is stressed in simple tension during solidification. An experimental apparatus was developed for the measurement of alloy rupture stress and ductility at temperatures above and below the solidus. The apparatus permits stress rupture measurements without first cooling the cast alloy to room temperature. AD 118011. Project 7351, Task 73513 and 73514. Covers work from Jun 1955 - Jun 1956 under Contract AF 33(616)-2958. AF WADC TR 56-453.

Failure characteristics of pressurized stiffened cylinders, by Roger W. Peters and Norris F. Dow. U.S. National Advisory Committee for Aeronautics. Dec 1956. 18p photos, drawing, diags, graphs, tables. Order as TN 3851 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124405

Stiffened cylinders of 2024 and 7075 aluminum alloys, representative of fuselage construction, were tested under internal pressure and cyclic torsion. Fatigue cracks which developed in the skin resulted in both gradual and explosive types of failure. The types of failure depended upon the hoop stress and the structural configuration, and particularly upon the ratio of area in rings to associated skin area. The tests indicated that the 7075 alloy is somewhat more prone to the explosive type of failure. NACA TN 3851.

Grain growth of titanium and titanium alloys at normal hot-working temperatures, by Frank R. Larson. U.S. Arsenal, Watertown, Mass. Aug 1955. 28p photos, graphs, tables. Order from OTS. 75 cents. PB 131115

Four grades of titanium (RC 55, RC 70, RC 130A and RC 130B) have been studied to determine their grain growth characteristics at normal hot-working temperatures. It was found that two separate and distinct grain growth rates exist, namely, one for

the alpha-plus-beta duplex structure and one for the single-phase all-beta structure. O.O. Project no. TB4-15. D/A Project no. 593-08-021. WAL R 401/244.

Influence of forging temperature on mechanical properties of Al-V titanium alloys, by Leonard S. Croan and F.J. Rizzitano. U.S. Arsenal, Watertown, Mass. Feb 1957. 28p photos, drawings, graphs, tables. Order from OTS. 75 cents. PB 131118

An investigation to determine the effects of forging temperature on the mechanical properties after heat treatment of several heats of 6% Al-4% V and 7% Al-4% V titanium alloys was conducted at Watertown Arsenal. As a result of the study, a high-temperature production forging technique involving press forging from above the beta transus temperature and water quenching from the press has been developed. Toughness, as measured by V notch Charpy impact resistance at -40°F, may be increased by as much as 50% without any significant effect on strength. By applying these techniques, advantages of improved forgeability, optimum combination of the more important mechanical properties, and reduced costs may be realized. The forging techniques developed have already been applied in processing more than 10,000 pounds of closed-die forgings at Watertown Arsenal. O.O. Project TA 2-8055. D/A Project 5A12-15-003. WAL R 401/268.

Investigation of the mechanical properties of metal-arc welded Ti-6%Al-4%V, by Daniel M. Daley, Jr. and Carl E. Hartbower. U.S. Arsenal, Watertown, Mass. Sep 1956. 18p photos, drawings, graphs, tables. Order from OTS. 50 cents. PB 131114

Ti-6%Al-4%V will have satisfactory properties in the as-welded condition when using matching filler and base metal. The tensile joint-efficiency was approximately 100% with an ultimate strength of 150,000 psi. The notch-toughness of heat-affected-zone was found to exceed that of any other commercially-available alpha-beta alloy previously evaluated. O.O. Project TB4-31. D/A Project 592-05-007. WAL R 401/250.

Investment precision casting, by Donald A. Potter. U.S. Naval Research Laboratory. Dec 1945. 47p photos, drawing, diagrs, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 123387

Includes bibliography covering literature and patents. 1. Casting, Precision - Methods 3. NRL M 2726.

Minutes of physical metallurgy symposium, by Donald C. Buffum. U.S. Arsenal, Watertown,

Mass. Sep 1955. 72p graphs, table. Order from OTS. \$2.00. PB 131105

Contents: Effects of carbon, oxygen, and nitrogen on the mechanical properties of titanium and titanium alloys, by H.R. Ogden. - Effect of interstitial elements on the mechanical properties of titanium, by W.W. Wentz. - Notch tensile properties of titanium as affected by interstitial contaminant level, by E.P. Klier. - Effects of interstitial elements on mechanical properties and weldability of titanium alloy sheet, by J.B. Andrew. - Carbon, nitrogen and oxygen in titanium alloys, by H. Meyer. - Study of the air contamination on three titanium alloys, by J.E. Reynolds, H.R. Ogden and R.I. Jaffee. - Effects of interstitial impurities on the properties of heat treated Ti7Al-4V, Ti-140A and Ti-155A alloys, by D.L. Day and H.D. Kessler. - Hydrogen embrittlement in alpha-beta titanium alloys, by H.M. Burte. - Continued studies on the effect of hydrogen on the mechanical properties of titanium and titanium alloys, by G.A. Lenning. - Some effects of hydrogen on the properties and microstructure of an alpha-beta alloy, by H.A. Robinson, P.D. Frost and W.M. Parris. - Ti-Al-O and Ti-Al phase diagram, by E. Ence and H. Margolin. - Observations on annealing and isothermal transformation in Ti-Cu and Ti-Cu-Al alloys, by R.F. Bunshah. - Elevated temperature stability of commercial titanium alloys, by G.W. Bauer. - Elevated temperature stability of titanium base alloys, by F.A. Crossley. - Hydrogen contamination as a factor in elevated temperature stability of commercial titanium alloys, by E.F. Erbin and D.A. Wruck. - Composition and structural effects on thermal stability, by F.C. Holden. - True stress-true strain properties of commercial titanium alloys, by E.B. Kula and F.R. Larson. - Effect of intermediate holding temperatures on the transformation of beta titanium, by P. Farrar and H. Margolin. - Further observations on the effects of cerium on titanium and some commercial titanium alloys, by J.L. Taylor. - Effect of a second phase on grain size in titanium, by Y.C. Liu. - Grain growth of titanium at normal hot working temperature, by F. Larson. - Effect of work and heat treatment on grain size and physical properties of Ti-Al-V alloys, by L.S. Croan. AD 103638. Under the auspices of Metallurgical Advisory Committee on Titanium.

Notch toughness of weld deposits in commercial titanium alloys, by D.M. Daley, Jr. and C.E. Hartbower. U.S. Arsenal, Watertown, Mass. Jul 1956. 31p photo, drawings, graphs, tables. Order from OTS. \$1.00. PB 131109

Weldments, prepared by the inert-gas-shielded consumable-electrode process, using commercially-available titanium and titanium alloys, have been tested for weld metal toughness over a range of temperature by means of the V notch Charpy impact specimen. The base materials used during this investigation consisted of two heats of unalloyed titanium (one from each of two commercial sources), two heats containing manganese and two heats con-

taining chromium plus iron as the principal alloying additions. The welding electrodes investigated were unalloyed titanium, except for single heats of Ti-7%Mn and Ti-4%Cr-2%Fe. O.O. Project TB-4-31. D/A Project 592-05-007. WAL R 401/221.

Photometric determination of small amounts of aluminum in steel using 8-hydroxyquinoline, by Truman S. Licht and Andrew J. Frank. U.S. Arsenal, Watertown, Mass. Nov 1955. 18p graph, tables. Order from OTS. 50 cents. PB 131107

A tentative spectrophotometric method has been devised for the analysis of steels for small amounts of soluble aluminum. A brief electrolysis at a mercury cathode removes the bulk of iron and nearly all electroreducible metals present in the addition of tartrate and cyanide, and the aluminum is extracted into chloroform as the 8-hydroxyquinolate. The aluminum content of the organic extract is determined spectrophotometrically at 390 millimicrons. O.O. Project no TB4-121. DA Project no. 593-08-023. WAL R 120/75.

Precision investment cast tensile tests of low alloy steel, by I. Berman. U.S. Arsenal, Watertown, Mass. Sep 1949. 49p photos, drawings, tables. Order from OTS. \$1.25. PB 131120

A sound, low alloy steel tensile test of a .375" diameter was successfully cast when the overall length of the bar was reduced from 3-1/8" to 2" and a gate and riser were employed at each end. The shorter length bar produces strength and reduction of area results of the heat treated bar that are comparable to standard bars although the elongation measurements are influenced by the different gage lengths. Equipment and procedures used in making investment castings at Watertown Arsenal are illustrated. O.O. Project No. TB4-120B. WAL R 619/3.

Research on the influence of ultrasonic waves on metallic corrosion, by A. Reggiori and T. Songa. Breda Istituto di Ricerche Scientifiche Applicate all'Industria, S.p.A., Milan, Italy. Nov 1956. 83p photos, drawings, diagrs, graphs, tables. Order from OTS. \$2.25. PB 121964

Equipment and techniques have been developed to make corrosion tests of metals in solutions in different conditions namely: (a) stagnant, (b) with ultrasonic waves, (c) with mechanical agitation, (d) with mechanical agitation and ultrasonic waves. The ultrasonic waves were imparted by a quartz transducer to the solution in which the corrosion specimens were immersed. The corrosion was measured by the potential of the sample under test against a saturated calomel electrode and by determination of the total iron dissolved in the attacking solution in the course of the test. It has been found that the presence of ultrasonic waves in the electrolyte increases the rate of corrosion on both stain-

less steel and Armco iron. A magnetostrictive ultrasonic waves generator has been built for further work. AD 115033. Relazione n° 2371. Contract AF 61(514)-873. AF OSR TR 57-3.

Room temperature tensile properties of several titanium alloys after being heated in argon at temperatures of 1400-1800°F, by William H. Diffy. U.S. Arsenal, Watertown, Mass. Jul 1954. 36p photos, graphs, tables. Order from OTS. \$1.00. PB 131110

Samples of unalloyed titanium and three alloys of titanium were heated for varying periods of time up to 24 hours in argon at 1400°F and 1800°F and were either furnace cooled or air cooled. Tensile specimens were machined from the treated samples, and tested at room temperature. The effect of heating on the microstructure was determined by microscopic examination of polished and etched specimens. Alloys used were commercially pure titanium (RC 55); 8% manganese titanium alloy (RC 130A); 4% manganese-4% aluminum titanium alloy (RC 130B); and 2.7% chromium -1.3% iron titanium alloy (Ti-150A). O.O. Project no. TB 4-15. D/A Project no. 593-08-021. WAL R 401/219.

Some wear characteristics of titanium, by H. F. Campbell. U.S. Arsenal, Watertown, Mass. Mar 1956. 18p photos, tables. Order from OTS. 50 cents. PB 131113

Various combinations of titanium, coin silver, steel, Monel, and Babbitt metal were tested under conditions of reciprocating sliding wear, with and without lubrication. Bearing pressures were of the order of 2500 psi excepting those tests involving Babbitt metal where the pressures were only 500 psi. Wear was determined on the basis of visual examination for evidence of seizing and galling and by computing weight loss of the fixed rubbing specimen per unit area of the wear path. O.O. Project no. TB4-15. D/A Project no. 593-08-021. WAL R 401/234.

Studies of factors affecting thermal stability of titanium-base alloys, by Frank C. Holden, Horace R. Ogden and Robert I. Jaffee. Battelle Memorial Institute, Columbus, O. Feb 1957. 62p photos, drawing, graphs, tables. Order from OTS. \$1.75. PB 131043

Studies were made to determine the factors that influence the stabilization and the thermal stability of alpha-beta titanium alloys. Thermal stability for three commercial alloys, MST-6A1-4V, Ti-155A, and C-130AM, was good for three heat-treatment conditions under creep exposure tests through 800F. Some loss of ductility was observed for the Ti-155A and C-130AM alloys fabricated in the beta field and annealed in the alpha-beta field. Substitutions of various beta stabilizers in a Ti-5Cr-5Mo alloy were made to check their effects on thermal stability. The active eutectoid formers, nickel,

copper, and chromium, were detrimental; thermal stability was improved by substitutions of manganese or molybdenum, and by aluminum additions. Small amounts of strain, introduced either before equilibration or before stabilization, had no significant effect on thermal stability of a Ti-5Cr-5Mo alloy. AD 110748. Project 7351, Task 73510. Covers work from Oct 1955 - Oct 1956 under Contract AF 33(616)-3208. AF WADC TR 56-597.

Surface hardening of titanium with metalloid elements, by A. Siede and V. Pulsifer. Final technical report under Contract DA 11-002-ORD-1319 for Jun 1, 1953 - May 31, 1955. Armour Research Foundation, Chicago, Ill. May 1955. 991 photos, diags, graphs, tables. Order from OTS. \$2.50. PB 131103

The hardness and wear resistance of the nitrided surface are very high compared to the untreated material, but the depth of hardening produced by nitriding appears small for many applications. The introduction of oxygen as a hardening agent in conjunction with nitrogen increases the case depth attainable, but at the same time increases the brittleness of the hard surface formed during treatment. In general, the surface hardening processes described herein satisfy the requirements for producing a hard, wear resistant, and antigalling surface on titanium and its alloys. Contract DA 11-002-ORD-1319, Final report. ARF Project B-056-0. O.O. Project no. TB 4-15. D/A Project no. 593-08-021. WAL R 401/84-55.

Temperature measurements at the metal cutting tip-shank interface. Interim report, by William O. Wood, U.S. Arsenal. Rodman Process Laboratory, Watertown, Mass. May 1956. 18p drawing, tables, graphs. Order from OTS. 50 cents. PB 131004

Annealed FS 4140 medium alloyed steel was used in all tests as the standard work piece material. All tests were performed on a standard 18-inch lathe. The cutting speed ranges, in surface feet per minute, were from 415 to 1530 for ceramics, 150 to 480 for cemented carbides, and 60 to 130 for high speed steel tips. Temperatures attained at the bond surface of the tool tip were measured, using an iron-constantan thermocouple and a recording potentiometer. Production engineering measure program directive no. 40301750-30-10504. WAL RPL 42/3.

Tensile deformation of aluminum as a function of temperature, strain rate, and grain size, by R.P. Carreker, Jr. and W.R. Hibbard, Jr. General Electric Co. Research Laboratory, Schenectady, N.Y. Jul 1955. 27p photos, graphs, tables. Order from OTS. 75 cents. PB 121143

True-stress, true-strain data are presented for two lots of high-purity aluminum annealed to produce several different grain sizes from each lot. The

testing temperature range 20° to 873° K (0.021 to 0.94 T/Tm) was explored and the effect of strain rate was measured at 77° and 300° K. Project no. 7351, Task no. 70627. Contract AF 33(616)-2120. AF WADC TR 55-113.

Tensile properties of aircraft-structural metals at various rates of loading after rapid heating, by Joseph D. Morrison and J. Robert Kattus. Southern Research Institute, Birmingham, Ala. Nov 1956. 199p photos, diags, graphs, tables. Order from OTS. \$4.75. PB 121812

The purpose of the work described in this report was to determine the effects of variations in strain rate and holding time on the tensile properties of several aircraft-structural metals after they had been heated within 10 seconds to test temperatures up to 1200° F. The work was primarily directed toward determining these effects on the yield and ultimate strength. Other properties such as modulus of elasticity, proportional limit and total elongation were also determined but only as by-products and for the purpose of establishing trends. This investigation covered strain rates from 0.00005 in./in./sec. to 1.0 in./in./sec. holding times at test temperature from 10 seconds to 30 minutes, and the following materials: 1. Sheet metals: annealed Stellite-25, precipitation-hardened Inconel-X, half-hard Type 301 stainless steel, 17-7PH stainless steel in both the annealed and the TH 1050 conditions, AISI-4130 steel in both the normalized and the quenched and tempered conditions, hot-rolled SAE-1020 steel, and A110-AT and Ti-140A titanium alloys. 2. Cast metals: ZH-62T5 magnesium alloy and 356-T6 aluminum alloy. AD 110540. Project 7360, Task 73605. Covers work from Nov 1954 to April 1956 under Contract AF 33(616)-424. For Part I see PB 121137. AF WADC TR 55-199, Part 2.

To conduct research in and promote development of production of titanium alloy castings for ordnance application. Final technical report under Contract DA 19-059-ORD-188. REM-CRU Titanium, Inc., Midland, Pa. n.d. 44f photos, tables. Order from LC. Mi \$3.30, ph \$9.30. PB 127334

This final technical report summarizes work under this contract which has been detailed in the following three interim technical reports: 1. "The design, construction and operation of a 25 pound, bottompour, skull, arc melting furnace". 2. "The rehabilitation and operation of a 100-pound, tilt-pour, skull arc, melting furnace." 3. "The skull furnace pouring and casting of titanium shapes and casting of titanium shapes and their properties." Castings made were evaluated and shown to be sound, strong tough, good-surfaced and accurately dimensioned. Both machined graphite and carbon molds were evaluated and shown to be satisfactory for the casting of titanium and its alloys. Encouraging progress was made towards the manufacture of satisfactory economical molds using powdered

METEOROLOGY AND CLIMATOLOGY

ARDC model atmosphere, 1956, by R. A. Minzner and W. S. Ripley. U.S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate, Bedford, Mass. Dec 1956. 227p graphs, tables. Order from OTS. \$3.75. PB 131095

Standard atmospheres have been used for nearly a hundred years for altimetry purposes. The earliest of these were very simple and were based on an isothermal atmosphere. Brombacher amplified the Gregg Standard Atmosphere in 1926 and again in 1935 by adding tables of altitude as a function of pressure for altimetry purposes. In addition to using different altitudes and temperatures for the tropopause, the ICAN and U.S. Standard also used different values for the acceleration of gravity at sea level, 9.8 and 9.80665 respectively. AD 110233. AF CRC TN 56-204. AF GRD SG 86.

Brightness of the twilight sky and the density of the atmosphere to about 60 km, by E. O. Hulburt. U.S. Naval Research Laboratory. Mar 1938. 29p graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 123286

1. Sky - Brightness - Measurements 2. Atmosphere - Density - Measurements 3. Light - Scattering - Measurements 4. NRL H 1432

Cloud refractive index studies, by Robert M. Cunningham, Vernon G. Plank and Charles F. Campen, Jr. U.S. Air Force. Air Research and Development Command. Cambridge Research Center. Geophysics Research Directorate. Oct 1956. 137p photos, diags, graphs (part fold), tables. Order from OTS. \$3.50. PB 131135

Special problems inherent in the measurement of refractive index in cloudy regions are considered and reasons for refractive index change in and near clouds are discussed. Various theories of cumulus convection are reviewed for later reference. Measurement methods, data gathering procedures, and analysis aims and techniques are described. Data analyzed to date are presented and the tentative conclusion is drawn that with judicious use of radiosonde data a good estimate can be made of the refractive index changes in and around clouds. The complex character of these refractive index changes is tentatively explained. AD 110259. AF CRC TR 56-210. AF GRDP 51.

Composite charts of some synoptic features of

squall lines, by Gaylen H. Baird. New York University. College of Engineering. Research Division. Dept. of Meteorology and Oceanography. Aug 1956. 36p diags, tables. Order from LC. Mi \$3.00, ph \$6.30. PB 124757

1. Precipitation - Forecasting 2. Weather forecasting - Use of upper air charts 3. Atmosphere - Turbulence - Meteorological aspects 4. Contract AF 19(604)-1387, Scientific report 1. Severe Weather Project, Scientific report no. 1. AF CRC TN 56-675.

Pattern in the vertical of snow generation, by R. H. Douglas, K. L. S. Gunn and J. S. Marshall. McGill University. MacDonal Physics Laboratory. Stormy Weather Research Group. Jul 1956. 155p photos, diags, graphs, tables. Order from LC. Mi \$7.50, ph \$24.30. PB 124864

A radar of moderate power has been in use with its fixed beam pointing vertically upward. The echoes that it receives from precipitation are recorded photographically against coordinates of height and time. Records from seven winter weeks have been compared with upper air analyses of standard meteorological data to obtain some information about the process of snow formation. Contract AF 19(122)-217. AF CRC TN 56-489. MW-21.

Scientific report no. 4 for the period 15 Mar - 30 Jun 1956, under Contract AF 19(604)-1491, by Palmer W. Carlin and James W. Warwick. Colorado. University. High Altitude Observatory, Boulder, Colo. Sep 1956. 12p diags, graphs, table. Order from LC. Mi \$2.40, ph \$3.30. PB 124776

The objectives of the research carried out under this contract are measures of ionospheric absorption and refraction of the radiation from discrete radio noise sources at relatively low frequencies. Scientific report no. 3, PB 122219, under this contract presented a theory of the phase-switching in interferometer. The last section of the present report supplements this analysis by giving details on the effects of phase-shifts in the RF circuits of the receivers. For Scientific reports no. 1-3 see PB 122219-PB 122221. Contract AF 19(604)-1491, Scientific report no. 4. AF CRC TN 56-793.

Seasonal variations of the six-hourly planetary pressure and temperature waves, by W. Kertz. New York University. College of Engineering. Research Division. Dept. of Meteorology and Oceanography. Oct 1956. 43p diagr, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 125216

The 6-hourly pressure wave and its seasonal variation is described on the basis of more than 60 stations, and the components of this wave and their geographic distributions are determined by harmonic

analysis. The 6-hourly temperature wave, which is needed for a theoretical discussion of the 6-hourly pressure wave, was determined theoretically from considerations involving the incoming radiation, turbulent mass exchange, and outgoing radiation. The picture thus obtained is compared with empirical data given by Pramanik. The comparison between pressure and temperature wave leads to various questions concerning the nature of the exciting temperature waves and the resonance properties of the atmosphere. Contract AF 19(604)-1006, Scientific report no. 5. AF CRC TN 56-851.

Seismic studies in the southern half of the Atlantic coastal plain. Progress report for period Oct 1, 1954 to Sep 30, 1955, under Contract N7 onr-285(12), by G.P. Woollard. Wisconsin University. Dept. of Geology, Madison, Wis. Dec 1955. 7p maps, graphs, table. Order from LC. Mi \$1.80, ph \$1.80. PB 124811

1. Seismology - Research 2. Ocean bottom - Measurement 3. Contract N7 onr-285(12)

Study of the rainfall pattern and some related features in a dissipating hurricane, by Sterling C. Gilbert and N.E. LaSeur. Florida State University. Dept. of Meteorology, Tallahassee, Fla. Aug 1956. 24p maps, table. Order from LC. Mi \$2.70, ph \$4.80. PB 124822

1. Rain and rainfall - Measurements 2. Hurricanes - Seismological data 3. Contract AF 19(604)-753, Scientific report no. 2 4. AF CRC TN 56-494

24 hour component of the diurnal pressure oscillation on Haleakala Mountain, Hawaii, by Robert L. Pyle. California University. Institute of Geophysics. Oahu Research Center, Oahu, Hawaiian Islands. Nov 1955. 24p map, graphs, diags, table. Order from LC. Mi \$2.70, ph \$4.80. PB 124192

The 24 hour component of the diurnal pressure oscillation was measured at eleven stations between sea level and 10,000 ft., and was found to vary greatly with altitude and with orographic exposure. A possible physical explanation of these variations in terms of daily solar heating is discussed. Continuation of work reported in Scientific report 2 (PB 114707). Contract AF 19(604)-546, Scientific report no. 15.

MINERALS AND MINERAL PRODUCTS

Cation distributions in ferros spinels. II: Magnesium-manganese ferrites, by C.J. Kriessman and Sol E. Harrison. Remington Rand, Inc., Eckert-Mauchly Division, Philadelphia, Pa. Oct 1955. 16p graphs, tables, diags. Order from LC. Mi \$2.40, ph \$3.30. PB 124119

In this paper, the saturation magnetization as a function of quench temperature is measured for the ferrite system $Mg_{1-x}Mn_xFe_2O_4$. From this data the ionic distribution of Mg ions is evaluated and compared to the theoretical thermodynamic analysis developed in the preceding paper. In Part I, the thermodynamic relationship between the ionic distributions and the non-thermal portion of the internal energy function has been developed. The motivation of that study was to permit empirical observations on cation distributions to be interpreted in terms of the energy functions. Contract N onr-162400, Technical report no. 1.

Improvement of the impact resistance of cermets, by A.C. Pezzi and H.P. Kling. Sylvania Electric Products, Inc., Bayside, N.Y. Apr 1957. 33p photos, graphs, tables. Order from OTS. \$1.00. PB 131093

This program investigated the possibility of improving the impact resistance of cermets by the application of a well bonded ductile metallic coating to the surface. Commercially available bars of K161B were used as a base cermet. Coating methods investigated included diffusion bonding of electrodeposited nickel, infiltration of porous sintered coatings, direct application of high temperature brazes, diffusion bonding to shaped tubing and vacuum casting. AD 118195. Project 7350, Task 73500. Covers work from May 1, 1955 - May 1, 1956 under Contract AF 33(616)-2911. AF WADC TR 56-329.

PERSONNEL APTITUDE TESTING

Development of an interview procedure for USAF officer applicants, by Michael A. Zaccaria, John T. Dailey, Ernest C. Tupes, Arlen R. Stafford, Harry G. Lawrence and Kenneth A. Ailsworth. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Personnel Research Laboratory, Lackland Air Force Base, Tex. Feb 1956. 33p tables. Order from LC. Mi \$3.00, ph \$6.30. PB 124133

1. Psychology, Applied 2. Interviewing - Procedures 3. Tests, Officer qualification 4. AF PTRC TN 56-43. Project 7701, Task 77022.

Evaluation of four week and eight-week basic training for men of various intelligence levels, by Victor B. Cline, Alan Beals, and Dennis Seidman. George Washington University. Human Resources Research Office, Washington, D.C. Nov 1956. 42p diagr, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 124722

The purpose of this study was to determine what gains and losses in trainee performance occur when an accelerated four-week basic training program is

substituted for the conventional eight-week program. To examine possibilities for more efficient utilization of high-aptitude personnel, especial attention was given to their comparative performances. GWU HRRO TR 32.

Follow-up study of Air Force cadet examinees, by Elizabeth Hagen and Robert L. Thorndike. Columbia University. Teachers College. May 1956. 52p tables. Order from LC. Mi \$3.60, ph \$9.30. PB 124126

This report deals with a pilot study to determine methods and potential of a large-scale follow-up survey and provides information for determining size, design, and techniques of such a study. AF PTRC TN 56-58. Contract AF 33(031)-13474. Project 7701, T.O. 77038.

Request for renewal of funds for rehabilitation of Naval disciplinary offenders under Contract Nonr-1535-(00). San Francisco Family Relations Center, San Francisco, Calif. May 1955. 18p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 122142

1. Personnel, Naval - Training

PHOTOGRAPHIC AND OPTICAL GOODS

Application of the Faraday magneto-optic effect to the optical study of explosive and shaped charge mechanisms, by Morton Sultanoff and Robert Bailey. U.S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Nov 1951. 17p photos, diagr. Order from LC. Mi \$2.40, ph \$3.30. PB 125141

The employment of the "Rapatronic" Faraday type magneto-optic shutters of 4 and 1 microsecond exposure times as developed by Edgerton, Germeshausen & Grier, in the study of various mechanisms of explosive reactions is described. ORD project: TB 3-0112K. APG BRL R 791.

Exploding wire backlighting for the study of detonation, shock and shaped charges, by Richard E. Holtzworth and Donald J. Hinz. U.S. Aberdeen Proving Ground. Ballistics Research Laboratories, Aberdeen, Md. May 1952. 22p photos, diagrs, graph. Order from LC. Mi \$2.70, ph \$4.80. PB 125142

In order to improve optical methods for the investigation of fast transient shock phenomena, these Laboratories have developed an exploding wire backlighting source. This light source is designed specifically to be used with the Bowen RC-3 rotating-mirror camera and the one microsecond magneto-optic shuttered camera. The investigations report-

ed herein indicated that tungsten wire, electrically exploded by the energy from a bank of capacitors, is an excellent light source of high intensity and long duration. Well directed light from the wire is obtained by interposing a condensing lens between the exploding wire and the detonation phenomenon. Backlighted and non-backlighted exposures are compared to illustrate the necessity of backlighting in some phases of the study of fast transient shock phenomena. ORD project: TB 3-0112. APG BRL R 818.

Resolution of the photographic plate and information theory, by L.S.G. Kovaszny and Y.K. Pien. John Hopkins University. Dept. of Aeronautics, Baltimore, Md. Nov 1956. 29p photos, graph. Order from OTS. 75 cents. PB 131141

The amount of information that can be carried on a photographic plate is limited by the random grain pattern. The actual computation of the maximum amount of information per unit area, or per average grain number, will depend on the statistical parameters of the grain structure and also on the statistical parameters of the set of photographs to be considered. The present paper is an attempt to estimate the limit of the amount of information for a simplified case. Contract N 6 ori-105, T.O. III, NR 098-038. Project Squid. JHU-14-P.

Technical conference on optical phenomena in supersonic flow, by R.J. Seeger. U.S. Bureau of Ordnance. May 1946. 99p photos, diagrs, graphs, tables. Order from LC. Mi \$5.40, ph \$15.30. PB 124158

1. Flow, Supersonic - Photographic analysis
2. Flow, Supersonic - Wind tunnel tests
3. Schlieren effect
4. Photography, Shadow
5. NAVORD 74-46. Report constitutes the minutes of the second conference held at the Palmer Physics Laboratory, Princeton University, Princeton, N.J., 4 Jun 1945. Contents: I. Interferometric analysis of supersonic jets, by R. Ladenburg. - II. Applications of Schlieren photography to wind-tunnel testing, by A.E. Puckett. - III. Evaluation of optical data on supersonic flow, by F.J. Weyl. -IV-XV. Discussions.

PHYSICS

General

Aggregation of variables in dynamical systems, by Herbert A. Simon. Carnegie Institute of Technology, Graduate School of Industrial Administration, Pittsburgh, Pa. Jun 1955. 24p. Order

from LC. Mi \$2.70, ph \$4.80. PB 124781

Preliminary report. 1. Mathematical research
2. Aggregates 3. Matrix theory 4. Contract Nonr-76001, NR 047001 5. ONR RM 31

Analysis of elastic thermal stresses in thin plate with spanwise and chordwise variations of temperature and thickness, by Alexander Mendelson and Marvin H. Hirschberg. U.S. National Advisory Committee for Aeronautics. Nov 1956. 41p graphs. Order as TN 3778 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124367

An approximate method for calculating thermal stresses in a thin plate with variable thickness and temperature distributions in both the spanwise and chordwise directions is presented. Several examples are worked out and plotted. NACA TN 3778.

Diffusion of hydrogen ions in a uniform magnetic field, by K.S.W. Champion and A.B. de Saint Maurice. Tufts University. Dept. of Physics. Research Laboratory of Physical Electronics, Medford, Mass. Jul 1956. 24p graphs, table. Order from LC. Mi \$2.70, ph \$4.80. PB 125149

A new method has been used to measure ion diffusion coefficients in the presence of a magnetic field. A high power pulse discharge was produced in a small diameter quartz tube inserted into a long cylindrical microwave cavity. The TM_{010} mode was used to produce the discharge and the TE_{115} mode utilized to measure the electron density in the afterglow. A specially designed coil was mounted to produce a uniform magnetic field. Considerable care was taken with the vacuum technique to insure the purity of the hydrogen gas used in the measurements. AD 98751. Contract AF 19(604)-1040, Scientific report no. 2. AF CRC TN 56-683.

Discordant permutations and the menage problem. Part I: Menage circulants, by Jack Levine. North Carolina State College. Dept. of Engineering Research, Raleigh, N.C. Nov 1955. 32p Order from LC. Mi \$3.00, ph \$6.30. PB 124290

Menage numbers and menage circulants are treated by means of permanents. A method based on a generalization of the idea of Rook polynomials used by Kaplansky and Riordan was also found useful. This will be taken up in Part II. Contract Nonr-870 (00).

Extrusion of soft solids through a tube, by Wayne S. Brown and Ivan B. Cutler. Utah. University. Institute for the Study of Rate Processes, Salt Lake City, Utah. Jun 1955. 9p drawings, graphs, tables. Order from LC. Mi \$1.80, ph \$1.80. PB 125908

Two materials with distinctly different physical properties were selected for this study. The metal lead was selected because of its plastic character. The other material was a paraffin wax with a melting point of 48°C. AD 71478. Published in Journal of Colloid Science. Contract N 7onr-45101, NR 032-168. UU ISRP TR 50.

Flow disturbances induced near a slightly wavy contact surface, or flame front, traversed by a shock wave, by G.H. Markstein. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Oct 1956. 6p. Order from OTS. 50 cents. PB 131140

Recent observations of the effects of shock waves on flame structure were originally interpreted in terms of Taylor instability. However, it was later realized that the concept of Taylor instability had to be modified in order to account for the effect of sudden acceleration of very short duration associated with passage of a shock wave. Although the following analysis is based on fairly drastic simplifications, it should yield at least order-of-magnitude estimates of the effects to be expected. Project Squid. To be submitted for publication in the "Reader's Forum" of the Journal of the Aeronautical Sciences in 1956. Contract N6 ori-105, T.O. III, NR 098-038. CAL-70-P.

General theory of piecewise linear plasticity, by P.G. Hodge, Jr. Polytechnic Institute of Brooklyn. Dept. of Aeronautical Engineering and Applied Mechanics. Brooklyn, N.Y. Nov 1955. 23p diags, graphs, table. Order from LC. Mi \$2.70, ph \$4.80. PB 124758

Previous theories of strain-hardening plasticity, for the most part, have been based upon the assumption that the strain-hardening is isotropic, or that the elastic range is constant (Bauschinger effect). The present paper develops a general theory which can account for any combination of isotropy and Bauschinger effect. The theory assumes that the yield condition is made up of a finite number of linear functions of the stress, and that the plastic stress-strain curve can be approximated by a single straight line. Elastic strains are neglected. It is shown that for certain restricted types of loading the flow law can be integrated to yield a deformation law, but that in general the final strains depend upon the loading path. The theory is illustrated by application to a circular plate under uniform pressure. Contract Nonr 839(11), NR 064-416. PIB AL 335.

Influence of gas dissociation on heat transfer, by John L. Beal and Ray L. Lyerly. Cornell Aeronautical Laboratory, Inc., Buffalo, N.Y. Sep 1956. 52p photo, drawings, diags, graphs, tables. Order from OTS. \$1.50. PB 131040

An experimental apparatus was designed and built to study the heat transfer and recovery factor pheno-

mena that take place in a boundary layer of dissociating gas. The heat transfer tests were correlated in two different ways. One was an empirical correlation in which the specific heat across the boundary layer was considered constant and the heat transfer coefficient was evaluated as a function of a new variable, the temperature difference between the wall and the stream. The second method followed the general plan recommended in the literature for dissociating systems and used a specific heat which varied across the boundary layer. From the data of the recovery factors tests, several types of recovery factors were computed. An enthalpy recovery factor based on the wall condition and on the mean stream condition resulted in values which were both above and below unity. Data scatter prevented any precise conclusions about its value. AD 118074. Covers work from May 1955 to July 1956 under Contract AF 33(616)-2954. AF WADC TR 56-494.

Kohn-Hulthen variational procedure for the scattering operator and the reactance operator. Part I: Elementary form of the variational principles, by Harry E. Moses. New York University. Institute of Mathematical Sciences. Division of Electromagnetic Research. Jun 1956. 33p. Order from LC. Mi \$3.00, ph \$6.30.

PB 124741

It is shown how the Kohn-Hulthen variational procedure may be used to approximate both the scattering operator and the reactance operator in terms of an abstract formalism. The procedure for obtaining these operators is then given explicitly for the radial equation ($l=0$), and one- and three-dimensional scattering problems, and the problem of the scattering of an electron by a heavy atom. AD 98707. Contract AF 19(604)-1705. NYU RR CX-26. AF CRC TN 56-652.

Lecture notes on quantum field theory, by R.L. Arnowitt. Princeton University. Institute for Advanced Study, Princeton, N.J., Sep 1955. 111f diags. Order from LC. Mi \$6.00, enl pr \$19.80. PB 127335

Naval Research Laboratory Document 147340.
1. Quantum mechanics 2. Quantum theory
3. Equations of motion 4. Equations, Differential

Magneto optic rotation. Precise determination of the magnetic field strength of a poleoid coil using nuclear magnetic resonance, by Charles E. Waring, Richard H. Spencer and Robert L. Custer. Connecticut. University, Storrs, Conn. Oct 1950. 34p photos, diags, graph, table. Order from LC. Mi \$3.00, ph \$6.30.

PB 125527

The purpose of this research was to obtain a precise value of the magnetic potential per ampere of current through a solenoid used in measurements of the Faraday effect over the length of the polarimetric cell commonly used. The value obtained is 2:52.6

gauss cm per ampere with an uncertainty of about $\pm 0.03\%$. This result in combination with other data will make it possible to calculate absolute Verdet Constants with a precision of near $\pm 0.05\%$. Abstracted from a thesis by Richard Spencer, University of Connecticut. Contract N 6 ori-216, T.O. I, NR 050-048, Technical report no. 4.

Measurement of rapid temperature fluctuations in pulsating gas flow, by Richard G. Lefeber. Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Jul 1948. 25p diags. Order from OTS. 75 cents. PB 131147

The purpose of this paper is to reveal the work carried out in an attempt to find a method for measuring the time variation of temperature throughout the cycle of a pulse jet engine. This paper offers a detailed exposition of techniques and work carried out in a study of this problem with particular reference to a method proposing the use of an ultrasonic beam for measuring gas temperatures as suggested by Professor I. Fankuchen of the Polytechnic Institute of Brooklyn. Contract N6 ori-98, T.O. II, NR 220-039. Project Squid, Technical memorandum no. PIB-7-M.

Moments of order statistics from a normal population, by R.C. Bose and Shanti S. Gupta. North Carolina State College. Institute of Statistics, Raleigh, N.C. Oct 1956. 14p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 125167

Institute of Statistics mimeograph series no. 154.
1. Statistical analysis 2. Statistical theory
3. Contract AF 18(600)-83

Note on the relation of isotopic spinspace to spacetime, by R.L. Ingraham. Maryland. University. Institute for Fluid Dynamics and Applied Mathematics, College Park, Md. Nov 1956. 12p. Order from LC. Mi \$2.40, ph \$3.30. PB 124910

It is shown that the familiar spacetime transformations continue to induce their familiar Dirac spinor transformations, while the new spacetime transformations in general induce isotopic transformations as well. The detailed correspondence is worked out for a theory of $T = 1$ bosons coupled to $T = 1/2$ fermions. AD 110391. For other reports under this Contract see PB 124623 (BN-79), PB 124678 (BN-88) Contract AF 18(600)-1315. UM BN 89. AF OSR TN 56-570.

On Magnus effects caused by the boundary layer displacement thickness on bodies of revolution at small angles of attack, by John C. Martin. U.S. Aberdeen Proving Ground. Ballistic Research Laboratories, Aberdeen, Md. Jun 1955. 48p diags, graphs, tables. Order from LC. Mi \$3.30, ph \$7.80. PB 125143

The effect of the boundary layer displacement thickness on Magnus effects is investigated by analyzing the laminar boundary layer of a cylindrical portion of a slender body of revolution. A solution of the three dimensional boundary layer equations is obtained. The displacement thickness is found and then is used to calculate the Magnus force and center of pressure by slender body theory. The Magnus effects caused by turbulent boundary layers are investigated under certain assumptions, and values from the resulting expression for the center of pressure are compared with data obtained from range firings. Dept. of the Army project: 5B03-03-001. ORD project: TB 3-0108. Supersedes edition of June 1953. APG BRL 870 Revised.

On Riemann's functional equation, by S. Bochner and K. Chandrasekharan. Princeton University. Institute for Advanced Study. Sep 1955. 39p. Order from LC. Mi \$3.00, ph \$6.30.

PB 122154

1. Mathematical equations and solutions 2. Riemann's method 3. Contract AF 18(600)-1189 4. Contract AF 18(600)-1379 5. AF OSR TN 55-291. Project R-354-10-70. Project 1-1750, T.O. 17501. AD 72175.

On the conjugacy of real Cartan subalgebras, by Bertram Kostant. Chicago, University. Dept. of Mathematics. 1955. 16p tables. Order from LC. Mi \$2.40, ph \$3.30.

PB 125189

1. Mathematical equations and solutions 2. Tables, Mathematical. Partially supported by Contract N6 ori-02053.

Ordvac solutions of $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{k}{y} \frac{\partial u}{\partial y} = 0$ for

boundary value problems and problems of mixed type, by David Young and Harry Shaw. Maryland. University. Dept. of Mathematics, College Park, Md. Sep 1955. 29p diags, tables. Order from LC. Mi \$2.70, ph \$4.80.

PB 122127

AD 71850. Interim technical report 14. DA project 5B 99-01-004. 1. Mathematics, Applied 2. ORDVAC (Ordnance discrete variable automatic computer) 3. Computers, Digital - Uses 4. Equations, Differential 5. Dirichlet equation 6. Contract DA 36-034-ORD-1486.

Particle size determination of spherical colloidal particles by light scattering. II: The specific scattering at 90°, by Richard M. Tabibian. Wayne University. Dept. of Chemistry, Detroit, Mich. Sep 1955. 30p diags, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80.

PB 123738

The purpose of this report is to describe the experimental methods by which particle diameters

can be determined from measurements of the specific scattering at 90° and a comparison of the results thus obtained with the Mie theory. Contract Nonr-736(000), NR 330-027. Technical report 15. For Part I, see Report 10 (PB 117786).

Procedure for the elastic stress analysis of threaded connections including the use of an electrical analogue, by J.H. Flanagan and J. I. Bluhm.

U.S. Arsenal, Watertown, Mass. Mar 1955. 42p photos, diags, graphs, tables. Order from OTS. \$1.25. PB 131108

It has been observed that screw threads fail in several ways; however, failures in ductile thread materials clearly indicate that tensile fillet stresses caused by bending rather than shear over the base area of the thread is one of the primary causes of failure. For convenience, the analysis of such connection may be considered as consisting of two phases, namely: (a) evaluation of the lead distribution from thread to thread, and (b) evaluation of the tensile fillet stresses in the most severely loaded thread. Two solutions of the phase (a) problem are given: the first in the form of equations which are convenient for joints having a large number of engaged threads; second, an electrical analogue, convenient for more general use. Two solutions are also presented for phase (b). The first is a photoelastic procedure and the second an empirical equation based on photoelastic tests. The latter of these two methods is more convenient than the first, but probably best applied to large fillet radius profiles, like the Whitworth rather than the American Standard. O.O. project no. TR 3-3027. D/A project no. 501-01-006. WAL R 893/166.

Propagation of sounds through moisture-laden atmosphere, by L.P. Delsasso. California. University. Dept. of Physics, Los Angeles, Calif. Jan 1956. 32p graphs (part fold) photos. Order from LC. Mi \$3.00, ph \$6.30. PB 125173

This report covers the experimental information obtained on the transmission of audio-frequency sounds in moisture-laden atmospheres to 1 Jan 1956. It represents the concluding work done under Contract Nonr 233-(14) through the Office of Naval Research and the more recent measurements made under Contract 51-0796 with the Sandi Corporation. It constitutes a progress report on a long term program aimed at obtaining experimental information on the attenuation and velocity fluctuations of sound in the free atmosphere under normal and extreme meteorological conditions.

Quarterly report, covering period Jan - Mar 1956 under Contract no. AF 19(604)-626. Massachusetts Institute of Technology. Acoustics Laboratory. 1956. 31p photos, diags, graphs, tables. Order from LC. Mi \$3.00, ph \$6.30.

PB 125150

Research items contained in this report are brief

statements of all significant research progress in the Laboratory during this quarter, with list of reports in scientific journals. AF CRC TN 56-594.

Simplified procedures for the calculation of heat transfer to surfaces with non-uniform temperatures, by J.P. Hartnett, E.R.G. Eckert, Roland Birkebak and R.L. Sampson. Minnesota. University. Dept. of Mechanical Engineering. Heat Transfer Laboratory, Minneapolis, Minn. Dec 1956. 84p diagr, graphs, tables. Order from OTS. \$2.25. PB 121938

A calculation procedure is developed for obtaining the local and total laminar and turbulent heat flows for a constant property fluid with no pressure gradient and for an arbitrary wall temperature distribution. Examples using several wall temperature distributions are given to illustrate the calculation procedure. An alternative calculation method is also presented which employs approximate expressions developed from the above-mentioned procedure. This alternate method simplifies the calculations and allows the engineer to obtain the heat flows in considerably less time and still maintains sufficient accuracy for engineering applications. For high-speed flows with variable physical properties, it is suggested that the reference temperature method be modified and used in conjunction with the simplified calculation scheme to obtain the heat transfer rates. AD 110450. Project 1367, Task 70173. Contract AF 33(616)-3038. AF WADC TR 56-373.

Subharmonic functions and generalized Tricomi equations, by Alexander Weinstein. Maryland. University. Institute for Fluid Dynamics and Applied Mathematics, College Park, Md. Nov 1956. 26p. Order from LC. Mi \$2.70, ph \$4.80. PB 124911

Classical properties of mean values of subharmonic functions are extended to solutions of the singular Cauchy problem for the Euler-Poisson-Darboux equation by using a generalized Tricomi transformation occurring in the theory of transonic flow. AD 110396. For other reports under this Contract see PB 124623 (BN-79), PB 124678 (BN-72) and PB 124910 (BN-89). Results of this report were summarized in the Proceedings of the International Colloquium on Partial Differential Equations, Nancy (France), April 1956, and presented to the American Mathematical Society, 1956. Contract AF 18 (600)-573. UM BN 88. AF OSR TN 56-574.

Theoretical investigation of the temperature field in the laminar boundary layer on a porous flat plate with fluid injection, by Shao Wen Yuan. Polytechnic Institute of Brooklyn, Brooklyn, N. Y. Sep 1947. 26p graphs. Order from OTS. 75 cents. PB 131152

A theoretical investigation of the flow of hot fluid over a porous flat plate under the condition of uniform fluid injection from the bottom of the plate was

made. The momentum equation and the corresponding energy equation for the boundary layer were set up with the velocity of injection assumed to be uniformly distributed along the plate. Contract N6ori-98, T.O. II. Project Squid, Technical report no. 4. PIB TR 11-R.

Transpiration cooling in the turbulent flow through a porous-wall pipe, by S.W. Yuan and L.S. Galowin. Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Jul 1956. 18p graphs. Order from OTS. 50 cents. PB 131151

The effect of coolant injection through a porous-wall pipe on the velocity and temperature distributions of a fully developed turbulent fluid-flow has been investigated. The velocity distribution and skin friction, and the temperature distribution and the rate of heat transfer are obtained from the Reynolds equations and the eddy heat transfer equation, respectively. The agreement between the theoretical results and the experimental data is found to be satisfactory. A significant reduction in heat transfer to the wall with a low rate of coolant injection is indicated. Contract N6 ori-105, T.O. III, NR 098-038. Project Squid, Technical report PIB-30-P.

Nuclear

Biological effects of atomic radiation. National Research Council. Order separate parts described below from NAS-NRC Publications Office, 2101 Constitution Ave., N.W., Washington 25, D.C.

Report of the Committee on pathologic effects of atomic radiation. 1956. 211p graphs, tables. Order as NRC Pub 542. \$1.00. PB 124015

Consists of 8-page summary and reports of various committees as appendices: I. Subcommittee on acute and long time hematological effects, with bibliography covering publications from 1900 through Mar 1956, prepared by Marjorie Comstock, Brookhaven National Laboratory; II. Subcommittee on toxicity of internal emitters; III. Subcommittee on acute and chronic effects of radioactive particles on the respiratory tract; IV. Subcommittee on permanent and delayed effects of ionizing radiation from external sources; V. Summaries by various panel members. NRC 452. Chairman: Shields Warren.

Summary reports from a study by the National Academy of Science. 1956. 121p. F. O. PB 124184

The reports published in this volume summarize the first technical findings and recommendations of six committees established to carry on a continuing study of the biological

effects of atomic radiations from the point of view of genetics, pathology, meteorology, oceanography and fisheries, agriculture and food supplies, and the disposal and dispersal of radioactive wastes.

Summary report to the public from a study by the National Academy of Sciences. 1956. 41p. Free. PB 124182

Summarizes findings of a group of scientists appointed in 1955 to investigate the effects of high-energy radiation on living things, with funds provided by the Rockefeller Foundation. It is intended for the lay reader and extracts from more detailed reports those aspects of more general interest. A summary of reports in PB 124184.

Boundary layer radioactive tracer technique. Part 2: Application, by Kenneth O. Beatty, Jr., James K. Ferrell and Frances M. Richardson. North Carolina State College. Dept. of Engineering Research, Raleigh, N.C. Sep 1956. 61p photos, drawings, diagrs, graphs (part fold), tables. Order from OTS. \$1.75. PB 121652

The tracer displacement technique has been applied to fluid-dynamic studies with aqueous solutions in tubes of one-half and one-inch diameter under conditions of (a) turbulent flow in smooth tubes, (b) laminar flow in artificially roughened tubes, (c) laminar flow with superposed fluid vibration, (d) non-Newtonian flow at low velocities, and (e) flow accentuating mass transfer effects. Laminar flow studies in smooth tubes and a detailed description of the technique and instrumentation have been given previously in Part I of this report. An appendix is included listing the various runs which have been made in each of the several categories of tests. AD 97302. Project 1363, Task 70159. Covers period of work from Sep 1953 -Dec 1955 under Contract AF 33(616)-31. For Part I see PB 111677. AF WADC TR 54-100, Part 2.

Vacuum system for 300-Mev nonferromagnetic synchrotron, by W.B. Jones, H.R. Kratz, J.L. Lawson and others. General Electric Co. Research Laboratory, Schenectady, N.Y. Jun 1955. 16p diagrs, table. Order from LC. Mi \$2.40, ph \$3.30. PB 124162

The vacuum system for the 300-Mev nonferromagnetic synchrotron is described. The factors entering into the present design of this system are considered. Typical operational data for the system are given. Some experiments conducted in a test chamber indicated that condensable vapors diffuse to the surface of the plastic from deep within, and the important factor determining the time constant of the pump-down is the total volume of plastic rather than the surface-to-volume ratio. GE RL 55-1315.

Eye as a control mechanism, by R.B. Lockard and J.L. Fozard. U.S. Naval Ordnance Test Station, Inyokern, China Lake, Calif. Aug 1956. 48p photos, diagrs, graphs. Order from LC. Mi \$3.30, ph 7.80. PB 124121

This paper discusses the use of the human eye as an optical error-sensing and self-positioning device. Types of eye movements are discussed, standard eye-movement recording techniques are reviewed, the tracking accuracy of the eye is experimentally approximated, and applications are discussed. NOTS 1546.

Probability of seeing functions for near-instantaneous foveal thresholds, by Lawrence R. Wilcox. U.S. Air Force. Air Research and Development Command. Rome Air Development Center, Griffiss Air Force Base, Rome, N.Y. Sep 1956. 24p diagr, graphs, table. Order from LC. Mi \$2.70, ph \$4.80. PB 124642

Results are given of a series of experiments covering foveal threshold values obtained within a short period following the cessation of adapting luminances. Specially designed apparatus and three subjects with normal vision were employed to obtain measurements of the probability of seeing as a function of stimulus intensity. Measurements were made following adaptation to luminances ranging from near cone threshold to 10,000 millilamberts. AD 97769. Part of the work prepared under Contract N6 onr-271, T.O. IX. Project: UN-12. AF RADC TR 56-104.

Upper speed threshold for the discrimination of visual movement as a function of stimulus luminance, by Robert H. Brown. U.S. Naval Research Laboratory. Nov 1956. 16p graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 124542

The problem of the present report was to determine how stimulus luminance affects the upper speed threshold. The observer viewed the center of a circular black area surrounded by a dimly illuminated area. The moving spot of white light traversed the path of a horizontal line centered in the circle. At high speeds, the observer reported a stationary line and could not indicate the direction of movement. At slow speeds, he indicated the direction (right or left). Two subjects made 50 responses, one 26 responses, to each of several combinations of luminance and speed of the moving spot. The speed and luminance were systematically varied in a counter-balanced order. The results are interpreted in terms of previous research and certain similarities and dissimilarities in the functioning of the eye to that of a camera. NRL R 4862.

PSYCHOLOGY

Attitudinal correlates of role-selection processes in organized groups, by Donald W. Olmsted and Philip C. Sagi. Minnesota. University. Dept. of Sociology, Minneapolis, Minn. May 1955. 20p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 122250

This study attempts to advance the development of the special role concept, and several related concepts, by focussing on certain attitudes which might be expected to accompany group roles. These are posited as having a dual aspect: the attitudes of group members who are filling a given role, and the attitudes of other members toward them. Contract N8 onr 66216, Technical report no. 2.

Effects of practice with and without correction upon discrimination learning under absolute conditions, by Charles W. Eriksen. Johns Hopkins University. Institute for Cooperative Research, Baltimore, Md. Feb 1957. 21p graphs, tables. Order from OTS. 75 cents. PB 131023

This report describes an investigation of the ability of observers to learn to discriminate among a series of stimuli under conditions of absolute judgment. Discrimination learning was determined as a function of the discriminability of the stimulus series and as a function of knowledge of errors. The results show a clear improvement in discrimination with practice for all six stimulus series although the amount of gain with practice appeared to be inversely related to the discriminability of the stimulus series. AD 118027. Project 7192, Task 71598. Contract AF 33(616)-2918. AF WADC TR 57-71.

Experimental study of the effects of individual and group presentation of the Rorschach plates, by J.H. Rohrer, Barbara W. Edmonson and Barbara L. Lemann. Tulane University. Urban Life Research Institute, New Orleans, La. Aug 1955. 14p tables. Order from LC. Mi \$2.40, ph \$3.30. PB 124616

This study was designed to test three hypotheses related to problems of Rorschach testing. An earlier study of a technique for presentation of standard Rorschach cards to groups suggested two of the hypotheses: (a) The protocols obtained by a group administration of the Rorschach plates produce essentially the same frequency distribution in the various scoring categories as would be obtained by individual administration of the cards, and (b) Group administration of the Rorschach plates results in a protocol that more validly reflects an individual's psychological dynamics since distortions due to examiner-examinee interactions are minimized under conditions of group administration. AD 12223. Contract Nonr 475(01).

Factors related to the collaboration and resistance behavior of U.S. Army PW's in Korea, by Julius Segal. George Washington University. Human Resources Research Office, Washington, D. C. Dec 1956. 114p graphs, tables. Order from LC. Mi \$6.00, ph \$18.30. PB 124791

A sample of 579 PW's was selected for study from the population of 3,323 repatriated Army PW's, and three distinct groups of PW's--Participators, Resisters, and Middle--were contrasted on over 300 items of information drawn from interrogations conducted by the Army. Recommendations for the content of troop orientation programs are made, and the specific resistance skills and attitudes required for resistance are identified. Contract DA-44-109-qm-650. Dept. of the Army project: 095-85-001. GWU HRRO TR 33.

Human engineering aspects of radar air traffic control. Parts II and III. Experimental evaluations of two improved identification systems under high density traffic conditions, by Lowell M. Schipper, John Versace, Conrad L. Kraft and James C. McGuire. Ohio State University. Laboratory of Aviation Psychology and Department of Electrical Engineering, Columbus, O. Jul 1956. 54p photos, diags, graphs, tables. Order from OTS. \$1.50. PB 121799

These experiments represent the first two major systems research studies on the OSU Air Traffic Control Simulator. The two types of identification systems were (1) the Clock Code omnipresent system using a symbolic code attached to each blip, and (2) the Light Pencil interrogator system which gave on demand identification. The controller's environment included noise-free displays with an idealized lighting system and was generally conducive to superior performance. The basic problems were simulated return-to-base missions of jet and propeller-driven military aircraft under complete IFR conditions. Traffic densities ranged from 25 to 40 aircraft per hour. All traffic was handled by a single controller. According to these measures it is concluded that the two identification systems are equally satisfactory from an over-all human engineering viewpoint. AD 110527. Continued under Contract AF 33(616)-3612. Project 7192, Task 71596. For Part 1 see PB 121524. Contract AF 33(616)-43. AF WADC TR 56-68.

Judgment of authority from recorded voices. A scaling problem, by E.L. Hoffman, J.H. Rohrer and J.H. L. Roach. Tulane University. Urban Life Research Institute, New Orleans, La. Aug 1955. 8p tables. Order from LC. Mi \$1.80, ph \$1.80. PB 124589

The research study reported here is one of a series of studies conducted at the Urban Life Research Institute of Tulane University for the Neuro-psychiatry Branch of the Bureau of Medicine and Surgery of the Navy. This series of studies is concerned with the systematic determination of personality factors

associated with leader-follower behavior. AD 72222. Contract Nonr 475(01).

Layout of work places, by Jerome H. Ely, Robert M. Thomson and Jesse Orlansky. Dunlap and Associates, Inc., Stamford, Conn. Sep 1956. 113p drawings, diagrs, graphs, tables. Order from OTS. \$3.00. PB 121802

A critical factor affecting operator performance in any man-machine system is the layout of his work-place. This report provides a compilation of human engineering recommendations concerning various aspects of workplace layout. The report is divided into four main parts, entitled: General considerations, workplace dimensions, location of controls and displays, direction-of-movement relationships. Check lists, figures and tables are used frequently as means of presenting recommendations. AD 110507. Project 7180, Task 71501. Chapter V of the Joint Services Human Engineering Guide to Equipment Design. Contract AF 33(616)-419. AF WADC TR 56-171.

Several treatments of inter-group differences and their effect on the reliability and predictability of performance ratings, by Robert R. Mackie and Clark L. Wilson. Management & Marketing Research Corp., Los Angeles, Calif. Jan 1956. 21p graph, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 125576

In personnel research where ratings of performance serve as criterion measures, it is often necessary or desirable to combine ratings for different small subgroups of personnel into a single distribution of performance scores. Because of wide differences in raters' objectivity, and because rating scales do not insure absolute judgements, a real problem then arises with respect to how comparable the ratings assigned by one rater to a particular subgroup are to the ratings assigned by another rater to a different subgroup. The overall purpose of the study was to validate certain selection procedures employed by the Medical Research Laboratory, New London. The men comprising the sample on which predictor information was available were scattered in small groups among sixteen submarines in the Pacific Fleet and represented a wide variety of rates and pay grades. In attempting to develop the most suitable criterion of shipboard performance certain corrections for systematic rater bias and certain assumptions about the genuineness of differences among different rating groups were made. For reports 1 and 2 see PB 118030 and PB 119040. Submarine personnel selection. Technical report 3 under Contract Nonr-1113(00), NR 151-141. Bu Med project 002-013.

RUBBER AND RUBBER PRODUCTS

Static and dynamic properties of rubberlike materials. Final report for the period 1 May 1946 - 31 Mar 1955 under Contract N6 ori-83, T.O. 1, NR 330-003. University of Notre Dame. Dept. of Physics, Notre Dame, Ind. May 1955. 16p. Order from LC. Mi \$2.40, ph \$3.30.

PB 122157

Summarizes technical reports issued under this contract as reprints of published articles, lists men receiving a doctors degree for work performed under the contract, with title of thesis. AD 70033.

STRUCTURAL ENGINEERING

Distribution of air within a room for year-round air conditioning. Part I, by Harold E. Straub, Stanley F. Gilman and Seichi Konzo. Illinois, Engineering Experiment Station, Urbana, Ill. Jul 1956. 50p photos, drawings, diagrs, graphs, tables. Order from University of Illinois, as Engineering Experiment Station Bulletin 435. 75 cents. PB 124299

Engineering data were obtained for selecting the proper types of supply outlets at floor, baseboard, and sidewall locations only, which would give satisfactory air distribution in residential rooms during all seasons of the year. For this purpose the air temperature and velocities were measured at 231 stations in the room for each different experimental arrangement. These data together with visual observations of the air motion by means of smoke provided a clear picture of the air distribution within the space. ILU EES B 435.

Experimental investigation of the strength of multiweb beams with corrugated webs, by Allister F. Fraser. U.S. National Advisory Committee for Aeronautics. Oct 1956. 17p photos, drawings, graphs, tables. Order as TN 3801 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 123636

The results of an experimental investigation of the strength of multiweb beams with corrugated webs are reported. Included in the investigation were two types of connection between the web and the skin. A comparison between the structural efficiency of corrugated-web and channel-web beams is presented, and it is shown that, for a considerable range of the structural index, corrugated-web beams can be built which are structurally more efficient than channel-web beams. NACA TN 3801.

Plane thermal shock, by F. W. Schmiedeshoff and C. Sutherland. Rensselaer Polytechnic Institute. Research Division, Troy, N. Y. Feb 1956. 15p graphs. Order from LC. Mi \$2.40, ph \$3.30. PB 124898

Thermal stresses are determined and compared for temperature distributions in a thin circular disk resulting from both constant and temperature dependent thermal conductivities. If the disk is heated at the edge, the stresses are reduced when the thermal conductivity increases with an increase in temperature. On cooling, the stresses are reduced when the thermal conductivity decreases with an increasing temperature. Rensselaer Polytechnic Institute Project: 454.01. Contract Nonr-591(02), Progress report no. 13.

TEXTILES AND TEXTILE PRODUCTS

Study of the effects of chemicals on the strengths of nylon and Dacron parachute fabrics, by David M. Cates. North Carolina State College. School of Textiles, Raleigh, N.C. Nov 1956. 236p photos, diags, graphs, tables. Order from OTS. \$6.00. PB 131030

The effects of certain organic solvents and solutions of inorganic substances on the strength of nylon and Dacron parachute fabrics was investigated. The fabrics were exposed to each of the reagents and then aged under different conditions for a period of six months. Breaking strength tests were made on the fabrics at monthly intervals. For each testing condition, the concentration of reagent, ageing temperature, and ageing condition were varied. Ageing was carried out under three kinds of conditions: namely, with the fabrics immersed in solution; with the fabric first immersed in the solution, then extracted and aged under low humidity conditions; with the fabrics first immersed in solution, then extracted and aged under high humidity conditions. AD 110558. Project 7320, Task 73201. Covers work from Mar 1955 - Jul 1956 under Contract AF 33(616)-2891. AF WADC TR 56-288.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Crash injury, by Gerard J. Pesman and A. Martin Eiband. U.S. National Advisory Committee for Aeronautics. Nov 1956. 36p photos, drawings, diags, graphs. Order as TN 3775 from National Advisory Committee for Aeronautics, 1512 "H"

Street, N.W., Washington 25, D.C. PB 124365

1. Airplanes - Safety devices and measures
2. Airplanes - Accidents - Injuries
3. NACA TN 3775

Proposed initiating system for crash-fire prevention systems, by Jacob C. Moser and Dugald O. B Black. U.S. National Advisory Committee for Aeronautics. Dec 1956. 18p diags. Order as TN 3774 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington, D.C. PB 124364

1. Fire prevention - Airplanes
2. NACA TN 3774

Engines and Propellers

Approximate theory of compressible air inflow through reed valves for pulse jet engines, by Paul Torda. Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Sep 1948. 13p drawings, diags, graphs. Order from OTS. 50 cents. PB 131155

This is one of a series of reports on the approximate theory of compressible air inflow between reed valves for pulse jet engines. In this report the opening period of the reed is treated. Only a qualitative comparison of the approximate and exact theories could be achieved at this time. The reason for this is that, due to sudden termination of the contract, no time was available for comprehensive numerical computations. From the experience gained during the numerical work for both theories, the conclusion can be drawn that the approximate theory will furnish sufficiently accurate determination of the inflow phenomena and thus it may be used for design purposes with confidence. Contract N6 ori-98, T.O. II, NR 220-039. Project Squid, Technical report no. 12. PIB 18-R.

Compressible flow through reed valves for pulse jet engines. Polytechnic Institute of Brooklyn, Brooklyn, N.Y. Contract N6 ori-98, T.O. II, NR 220-039. Order separate parts described below from OTS, giving PB number of each part ordered.

Part I: Hinged reed valves, by Paul Torda, I.P. Villalba and J.H. Brick. Jun 1948. 50p diags, graphs. \$1.25. PB 131153

Numerous calculations have been carried out in order to determine the simplest method useful for numerical work. It is thought that the presented closed form solution of the non-linear differential equations fulfills this requirement. Numerical examples are included as illustrations only. This analysis shows that when slender valves and tapered mass distribution are combined non-undulating motion of the reeds occurs. Thus smooth inflow results and adverse transverse accelerations

of the reeds are avoided. Appendix: Quasi one-dimensional flow between reed valves. Project Squid, Technical report no. 9. PIB-14-R.

Part II: Clamped reed valves, by Paul Torda. Jul 1948. 20p diagr. 50 cents. PB 131154

This paper deals with the inflow analysis between clamped reed valves used on conventional pulse jet engines. This analysis was based on the theory of non-steady, compressible, non-viscous flow with isentropic change of state of the gas, and employs a quasi-one-dimensional approach. The resulting non-linear differential equations have been integrated in closed form. To solve the problem in general manner, the time variation of the flow velocity at an arbitrary time and arbitrary cross section of the reed nozzle was prescribed and the corresponding pressure distribution on the combustion chamber side of the reeds was calculated. Project Squid, Technical report no. 10. PIB-17-R.

Training and Training Devices

Procedure for evaluating instructor technique during critiques of crew performance, by Irl A. Irwin, Edmund W. Milauckas and Bernard I. Levy. U.S. Air Force. Air Research and Development Command. Air Force Personnel and Training Research Center. Crew Research Laboratory, Randolph Air Force Base, Tex. Feb 1956. 38p tables. Order from LC. Mi \$3.00, ph \$6.30. PB 124849

As a first step, a description of effective instructor behavior in critiques was prepared on the basis of student evaluations of critique scripts, the results of previous critique studies, and general principles of effective teaching derived from educational psychology. A critique-scoring procedure was then designed to measure how well instructors conformed to this model. A summary critique evaluation score was significantly related to student reaction, instructor perception of student attitude change over a two-month training period and unrelated to student attitudes at the end of training. Since the proposed critique scores possess definitional validity (based upon expert judgement) and since they have been shown to be significantly related to measures reflecting critique effectiveness, they should be useful supplements to usual instructor training procedures. Project 7713, Task 77233. AF PTRC TN 56-32.

Review of research on Morse code learning, by Leonard J. West. 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. Dec 1955. 77p tables. Order from LC. Mi \$4.50, ph \$12.30. PB 124819

This review of research in Morse Code learning is specifically designed for the use of those who train radio operators in the Air Force and in other military services. It is hoped that the accounts of past research will furnish a base for evaluating current training procedures. More important, the review may serve as impetus and justification for introducing practices which appear to be desirable but which may not now be employed. Topics for future research are also suggested. The review treats only those issues which are the immediate concern of code instructors and which are considered to be directly related to the improvement of instructions. Project 7714, Task 77257. AF PTRC TN 55-52.

Airports and Airways

125-megacycle airport traffic control tests at Indianapolis, by W. E. Jackson and J. C. Hromada. U.S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jan 1938. 9p photos, diagrs, graphs. Order from LC. Mi \$1.80, ph \$1.80. PB 123553

Reprinted 1941. 1. Airports - Air traffic control - Tests 2. Airports - Control towers - Transmitters 3. CAA TDR 2

Aerodynamics

Aerodynamic characteristics and flying qualities of a tailless triangular-wing airplane configuration as obtained from flights of rocket-propelled models at transonic and low supersonic speeds, by Grady L. Mitcham, Joseph E. Stevens and Harry P. Norris. U.S. National Advisory Committee for Aeronautics. Nov 1956. 57p photos, drawing, graphs, tables. Order as NACA TN 3753 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington, D.C. PB 124361

1. Airplanes, Rocket assisted - Flight tests.
2. Airplanes - Stability, Dynamic - Tests
3. Damping derivatives - Stability. 4. Wings, Triangular - Stability 5. NACA TN 3753

Analysis of the stiffness and optimum weightstiffness of tubes with inclined ribs, by A. H. Hall. Canada. National Aeronautical Establishment. Jan 1954. 16p diagr, graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 122589

Expressions are derived for the effective stiffness in bending and in torsion, of tubes with inclined ribs, and the condition for optimum weight-stiffness is investigated. It is found that true optimum weight-bending stiffness configurations exist in the conventional wing range, but for torsion, the optimum condition is beyond applicable limits. Curves are plotted showing the relative skin and rib thicknesses for

the optimum weight-bending stiffness of certain rectangular tubes, as well as for the corresponding increases in bending and torsional stiffnesses. NAEC R 22. NAEC LR 89.

Characteristics of a 40° cone for measuring Mach number, total pressure, and flow angles at supersonic speeds, by Frank J. Centolanzi. U.S. National Advisory Committee for Aeronautics. May 1957. 36p drawings, graphs, tables. Order as TN 3967 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125657

1. Cones - Aerodynamics 2. Flow, Supersonic 3. Instruments, Aeronautical 4. Mach number - Effect 5. Reynolds number - Effect 6. NACA TN 3967

Development of a transonic slotted working section in the NAE 30-inch x 16-inch wind tunnel, by J.A. Laurmann and J. Lukasiewicz. Canada. National Aeronautical Establishment. Aug 1956. 57p photos, drawings, diagrs, graphs, tables. Order from LC. Mi \$3.60, ph \$9.30. PB 125113

Tests have been conducted in the 30-inch high speed wind tunnel of the N. A. E. to develop a slotted working-section free of solid blockage interference. Several designs have been tried and a final configuration obtained which gives reasonable flow uniformity (a maximum variation in Mach number of ± 0.01) in the working section up to a Mach number of 1.08. NAEC LR-178.

Experimental and predicted lateral-directional dynamic-response characteristics of a large flexible 35° swept-wing airplane at an altitude of 35,000 feet, by Stuart C. Brown and Euclid C. Holleman. U.S. National Advisory Committee for Aeronautics. Dec 1956. 74p photo, drawing, diagrs, graphs, tables. Order as TN 3874 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124424

1. Stability, Lateral - Static tests 2. Stability, Directional - Static tests 3. Stability, Lateral - Dynamic tests 4. Stability, Directional - Dynamic tests 5. NACA TN 3874

Experimental investigation of low speed of the effects of wing position on the static stability of models having fuselages of various cross section and unswept and 45° sweptback surfaces, by William Letko. U.S. National Advisory Committee for Aeronautics. Nov 1956. 77p photo, drawings, diagrs, graphs, tables. Order as TN 3857 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124409

1. Stability, Lateral - Static tests 2. Stability, Directional - Static tests 3. Stability - Longitudinal - Static tests 4. Airplanes - Stability - Effect of wing position 5. NACA TN 3857

Exploratory investigation of the effectiveness of biplane wings with large-chord double slotted flaps in redirecting a propeller slipstream downward for vertical take-off, by Robert H. Kirby. U.S. National Advisory Committee for Aeronautics. Oct 1956. 22p drawings, diagrs, table. Order from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 123635

1. Biplanes - Aerodynamics 2. Triplanes - Aerodynamics 3. Airplanes - Take-off - Vertical 4. Propellers - Slipstream - Deflection 5. Wing flaps - High lift devices 6. NACA TN 3800

Flight measurements of the vibrations encountered by a tandem helicopter and a method for measuring the coupled response in flight, by John E. Yeates, Jr. U.S. National Advisory Committee for Aeronautics. Dec 1956. 28p photos, diagrs, graphs, tables. Order as TN 3852 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124406

1. Helicopters - Rotors, Tandem - Stability 2. Helicopters - Rotors, Tandem - Flight tests 3. Helicopters - Vibration 4. NACA TN 3852

Heat-transfer measurements on two bodies of revolution at a Mach number of 3.12, by John R. Jack and N.S. Diaconis. U.S. National Advisory Committee for Aeronautics. Oct 1956. 36p photos, diagrs, graphs, tables. Order as TN 3776 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington, D.C. PB 124366

1. Heat - Transference - Aerodynamics 2. Bodies of revolution - Heat transference - Calculation 3. NACA TN 3776

Investigation of effectiveness of a wing equipped with a 50-percent-chord sliding flap, a 30-percent-chord slotted flap, and a 30-percent-chord slat in deflecting propeller slipstreams downward for vertical take-off, by Richard E. Kuhn. U.S. National Advisory Committee for Aeronautics. Jan 1957. 39p photos, drawings, diagr, graphs, table. Order as TN 3919 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124478

1. Wing flaps, Slotted 2. Propellers - Slipstream - Deflection 3. Airplanes - Performance - Theory 4. NACA TN 3919

Investigation of the effectiveness of boundary-layer control by blowing over a combination of sliding and plain flaps in deflecting a propeller slipstream downward for vertical take-off, by Kenneth P. Spreemann and Richard E. Kuhn. U.S. National Advisory Committee for Aeronautics. Dec 1956. 44p photo, drawings, graphs. Order as TN 3904 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124445

1. Propellers - Slipstream - Deflection
2. Stability, Longitudinal - Static tests
3. Wing flaps - High lift devices
4. Airplanes - Take-off - Vertical
5. Boundary layer - Control - Effect on stability
6. NACA TN 3904

"Linearized inflow" propeller strip analysis, by James P. Cooper. U.S. Air Force. Air Research and Development Command. Wright Air Development Center. Propeller Laboratory, Wright-Patterson Air Force Base, Dayton, O. Feb 1957. 55p diags, graphs, tables. Order from OTS. \$1.50. PB 121945

This report presents a propeller performance strip analysis method which employs, for simplicity, a linearized approximation to the induced propeller inflow problem. The information presented herein, in the form of aerodynamic data, problem work sheets, and sample problems is sufficient for performance calculations for single rotation propellers operating at subsonic tip velocities and advance ratios of approximately eight-tenths or greater. Additional data, of an unclassified nature, have been provided for supersonic section velocities. AD 118078. Project 3345, Task 33037. AF WADC 56-615.

Method for predicting lift increments due to flap deflection at low angles of attack in incompressible flow, by John G. Lowry and Edward C. Polhamus. U.S. National Advisory Committee for Aeronautics. Jan 1957. 29p diagr, graphs. Order as TN 3911 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124447

1. Wing flaps - Controls - Deflection
2. Wings - Lift
3. NACA TN 3911

Note on the Nilson method of variable supersonic wind tunnel design, by M.M. Callan. Canada. National Aeronautical Establishment. May 1956. 62p diags, graphs. Order from LC. Mi \$3.90, ph \$10.80. PB 124655

The Nilson method of nozzle design is discussed and extended, and from results obtained in calculations based on the method, certain tests for the basic function used in the development are suggested. NAEC LR-174.

Study of the zero-lift drag-rise characteristics of wing-body combinations near the speed of sound, by Richard T. Whitcomb. U.S. National Advisory Committee for Aeronautics. 1956. 24p photos, drawings, diags, graphs, tables. Order from Superintendent of Documents, Government Printing Office, Washington 25, D.C. 25 cents.

PB 124471

- Supersedes RML 52H08.
1. Wings - Aspect ratio
 2. Bodies of revolution - Transonic characteristics
 3. Bodies of revolution - Aerodynamics - Theory
 4. Bodies of revolution - Aerodynamics - Effect of Mach number
 5. Wings - Drag - Theory
 6. NACA 1273

Subsonic wind-tunnel investigation of the effect of fuselage afterbody on directional stability of wing-fuselage combinations at high angles of attack, by Edward C. Polhamus and Kenneth P. Spreemann. U.S. National Advisory Committee for Aeronautics. Dec 1956. 25p photo, drawings, diagr, graphs, tables. Order from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C., as TN 3895.

PB 124438

1. Stability, Directional - Static tests
2. Stability, Lateral - Static tests
3. Stability, Longitudinal - Static tests
4. Fuselages - Static tests
5. Fuselages - Stability - Wind tunnel tests
6. Wings - Stability - Effect of fuselage
7. NACA TN 3896

Theoretical investigation of the effects of configuration changes on the center-of-pressure shift of a body-wing-tail combination due to angle of attack and Mach number at transonic and supersonic speeds, by J. Richard Spahr. U.S. National Advisory Committee for Aeronautics. May 1957. 43p drawings, diags, graphs, tables. Order as TN 3966 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125656

- Supersedes RM A 55F02.
1. Wings - Mach number effects
 2. Wings - Pressure distribution - Theory
 3. Airframes - Tests
 4. NACA TN 3966

Theoretical lift due to wing incidence of slender wing-body-tail combinations at zero angle of attack, by Alvin H. Sacks. U.S. National Advisory Committee for Aeronautics. Nov 1956. 35p graphs. Order as TN 3796 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124372

1. Afterbodies, Cylindrical - Angle of attack - Theory
2. Interference, Aerodynamic - Theory
3. NACA TN 3796

Velocity distributions round elliptic sections due to thickness and angle of attack, by G.J. Mainwood. National Research Council of Canada. Division

of Mechanical Engineering. Oct 1956. 39p
diagrams, graphs (part fold), tables. Order from
LC. Mi \$3.00, ph \$6.30. PB 124696

Ordinates for elliptic sections of given thickness-length ratios are derived and tabulated, together with the velocity distributions round such sections due to thickness and angle of attack. The N.A.C.A. process of superimposing these velocities, together with the velocity resulting from camber is incidentally verified for sections of small thickness-length and camber ratios. A comparison is made between the velocity distributions round an elliptic section and those for the N.A.C.A. 16-series thickness distribution. NRCC MB-193.

Wind-tunnel investigation of jet-augmented flaps on a rectangular wing to high momentum coefficients, by Vernard E. Lockwood, Thomas R. Turner and John M. Riebe. U.S. National Advisory Committee for Aeronautics. Dec 1956. 51p drawings, diagr, graphs, tables. Order as TN 3865 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124416

1. Wing flaps, Jet assisted - Lift coefficients
2. NACA TN 3865

Wind-tunnel investigation of the aero-dynamic characteristics in pitch of wing-fuselage combinations at high subsonic speeds: Taper-ratio series, by Thomas J. King, Jr. and Thomas B. Pasteur, Jr. U.S. National Advisory Committee for Aeronautics. Dec 1956. 36p photos, drawings, graphs, table. Order as TN 3867 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124418

Supersedes RML53E20. 1. Flow, Subsonic - Wind tunnel tests 2. Stability, Longitudinal - Static tests 3. Lift coefficient 4. Wings - Drag - Effect of aspect ratio 5. Wings - Lift - Effect of aspect ratio 6. Fuselages - Stability - Wind tunnel tests 7. NACA TN 3867

Wind-tunnel technique for simultaneous simulation of external flow field about nacelle inlet and exit airstreams at supersonic speeds, by Gerald W. Englert and Roger W. Luidens. U.S. National Advisory Committee for Aeronautics. Jan 1957. 25p drawings, diagrams, graphs. Order as TN 3881 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 124476

1. Flow, Supersonic - Simulation 2. Wind tunnels, Supersonic - Air conditions 3. Flow, Jet mixing - Simulation 4. NACA TN 388

Marine Transportation

Effect of ship size on the characteristics of three classes of merchant vessels, by Cedric Ridgely-Nevitt. Stevens Institute of Technology. Experimental Towing Tank, Hoboken, N.J. Mar 1955. 22p graphs (part fold), tables (part fold), Order from LC. Mi \$2.70, ph \$4.80. PB 125092

This note is a collection of some of the principal characteristics of ships that have been designed in the past. The chief items considered are displacement-length ratio and the ratio of bow freeboard to the length of the ship. Both of these are known to affect the performance of a ship in a seaway. As subsidiary material, the proportions of length, beam and draft were also determined. Some of these show definite trends as ships increase in size and some do not. In general, however, this investigation was undertaken in order to establish what ranges of these variables have evolved in vessels of both the past and the present. SIT ETT N 329.

Gould Type ULX-65 submarine storage battery cell #18 from the USS S-45, by Edward J. Peebles. U.S. Naval Research Laboratory. Nov 1952. 25p photos, graphs, tables. Order from LC. Mi \$2.70, ph \$4.80. PB 120603

Unclassified. 1. Submarines - Batteries - Tests 4. NRL P-1957

Impact-loads investigation of chine-immersed models having concave-convex transverse shape and straight or curved keel lines, by Philip M. Edge, Jr. U.S. National Advisory Committee for Aeronautics. Feb 1957. 66p photos, drawings, graphs, tables. Order as TN 3940 from National Advisory Committee for Aeronautics, 1512 "H" Street, N.W., Washington 25, D.C. PB 125662

1. Hydrodynamics - Theory 2. Loads, Aerodynamic - Theory 3. Loads, Landing - Impact 4. Sea-plane floats - Landing impact 5. NACA TN 3940

Longshore safety survey, a survey of occupational hazards in the stevedore industry, by the Maritime Cargo Transportation Conference. National Research Council. Sep 1956. 76p diagrams, graphs, tables. Order from NAS-NRC Publications Office 2101 Constitution Ave., N.W., Washington 25, D.C. \$1.00. PB 124697

1. Maritime Cargo Transportation Conference 2. Cargo handling - Safety methods 3. NRC 459 Part of a program undertaken at the request of the U.S. Departments of Defense and of Commerce.

Manual on amphibious oceanography. California. University. Institute of Engineering Research, Berkeley, Calif. Contract N7 onr-29535, Project NR 252-003. Declassified 2 Apr 1957. Order

separate parts described below from LC, giving PB number of each part ordered.

Vol. I (sec. 1-3). Jul 1952. 825p photos, maps, diags, graphs, tables. Mi \$11.10, ph \$125.70. PB 127748

Contents: Introduction. - Glossary of terms. - Definitions. - Sec. I. Waves, tides and beaches. - Sec. II. Wave theory, useful graphs and tables of functions. - Sec. III. Wave forecasting.

Vol. II (sec. 4-9). Jul 1952. 928p photos, drawings, maps, diags, graphs, tables. Mi \$11.10, ph \$140.70. PB 127749

Contents: Sec. IV. Wave forces on objects, piling, vertical walls, and rubble mounds. - Sec. V. Beach trafficability and stabilization. - Sec. VI. Intelligence for amphibious operations. - Sec. VII. Surf characteristics and surfmanship. - Sec. VIII. Application to amphibious operations. - Sec. IX. Invasion harbors.

Observations on incipient wind-generation of ocean waves, by Basil W. Wilson. Texas. Agricultural and Mechanical College. Dept. of Oceanography, College Station, Tex. Feb 1956. 18p photos, maps, diags, graphs, tables. Order from LC. Mi \$2.40, ph \$3.30. PB 124909

Details are presented of observations and photographs of the sea surface in the Gulf of Mexico, near Galveston, obtained during a south-north run on a formal cruise of the A. A. JAKKULA, oceanographic vessel of the Texas A&M Research Foundation. The occasion was highlighted by the advent of a norther which provided an almost classic example of incipient wind-generation of waves from ripples. A&M project 24, Reference 56-6T. Contract N7 onr-487, T.O. II, NR 083-036.

Oceanographic research, final report covering period Mar 15, 1948 - Oct 31, 1955, under Contract N8 onr-520/III, by C. A. Barnes and P. M. McLellan. Washington. University. Dept. of Oceanography, Seattle, Wash. Dec 1955. 45p. Order from LC. Mi \$3.30, ph \$7.80. PB 124814

Reference 55-14. 1. Oceanography - Research - Puget Sound 2. Oceanography - Research - Bibliography 3. Sea water - Chemical analysis 4. Sea water - Physical analysis

On the solitary wave, by Robert R. Long. Johns Hopkins University. Dept. of Civil Engineering, Baltimore, Md. Jun 1955. 21p diags, graph, table. Order from LC. Mi \$2.70, ph \$4.80. PB 124918

1. Waves in water - Mathematical analysis
2. Contract Nonr 248(31), NR 082-104, Technical report no. 4.

Photoelastic studies of stresses around openings in deck plates reinforced with coaming, by J.S. Brock and H.B. Maris. U.S. Naval Research Laboratory. Oct 1940. 20p photos, diags, table. Order from LC. Mi \$2.40, ph \$3.30. PB 123319

1. Steel plates - Stresses 2. Stresses, Photoelastic - Analysis 3. Deck openings - Stresses 4. NRL H 1663

Planning of towing tank tests of ship models of widely different form in head seas, by B. V. Korvin-Kroukovshy. Stevens Institute of Technology. Experimental Towing Tank, Hoboken, N.J. Apr 1955. 21p diags, graph, table. Order from LC. Mi \$2.70, ph \$4.80. PB 125093

A program of towing tank tests intended to cover about two years of activity is presented, and it is estimated that, in this time, four ship models can be tested for behavior in waves and the results properly analyzed. A comparison of the model test data of the parent and lengthened models will indicate the effect of the displacement-length ratio on ship behavior, and will serve to check the indications of ETT Note 330 in this respect. In addition, a comparison of the performance of the lengthened models with that of other models of similar slenderness tested concurrently on other projects will serve to evaluate the effect of the type of sections used in trawlers and small boats but which are unusual for conventional large ships. In the light of the theory of ship motions, these differences of section shape are significant. ETT project CC 1626. SIT ETT N 332.

Shipboard cranes and burtoning gear: Evaluation of cargo handling equipment in the Liberty ship modernization program. Progress report no. 1, by the Maritime Cargo Transportation Conference. National Research Council. Jan 1957. 34p graphs, tables. Order from OTS. \$1.00. PB 121920

Prepared for the Maritime Administration of the Department of Commerce. This is a comparative evaluation of the cargo cranes installed aboard the MV Thomas Nelson and the orthodox boom and winch equipment placed on the S.S. Benjamin Chew. This is a report of the results of a series of tests conducted under controlled conditions during the summer of 1956. The results are not to be regarded as conclusive but merely as indicative of the capabilities of the equipment under the conditions prevailing during the tests. Performance under actual commercial operating conditions is currently being examined. Contract N7 onr-29151.

Tropical oceanography. Semi-annual report under Contract Nonr 840(01) for period 15 Nov 1954 - 15 May 1955, by Ilmo Hela, Lansing P. Wagner and Frank Chew. Miami. University. Marine Laboratory, Coral Gables, Fla. Sep 1955. 73p

maps, diagr, graphs, tables. Order from LC.
Mi \$4. 50, ph \$12. 30. PB 124891

This report is made up of five sections: Section I: The heat transport in the straits of Florida. Section II: Some surface velocity measurements in the straits of Florida. Section III: Using the bathypitotometer in the straits of Florida. Section IV: A further study of the velocity structure and the transport of the Florida current. Section V: Studies in and around the Old Bahama Channel. The Appendix lists the depths, temperatures, salinities and oxygens of cruises. Report 55-27. ML 10944. Contract Nonr 840(01).

MISCELLANEOUS

Abstracts of published papers and list of translations.

Australia. Commonwealth Scientific and Industrial Research Organization, Melbourne, Australia. Order separate parts described below from LC, giving PB number of each part ordered.

Vol. 4, no. 1, abstracts 1-52. Jan 1956.
27p. Mi \$2. 70, ph \$4. 80. PB 122887

For other reports see PB 119617, PB 122458 and PB 123070. 1. Scientific research - Bibliography - Australia 2. Industrial research - Bibliography - Australia

Vol. 4, no. 3, abstracts 94-144. Mar 1956. 28p. Mi \$2. 70, ph \$4. 80. PB 122888

1. Scientific research - Bibliography - Australia 2. Industrial research - Bibliography - Australia

Vol. 4, no. 11, abstracts 507-562. Nov 1956. 35p. Mi \$3. 00, ph \$6. 30. PB 124710

1. Scientific research - Bibliography - Australia 2. Industrial research - Bibliography - Australia

Nonprofit research and patent management in the United States, by Archie M. Palmer. National Research Council. 1956. Order as Publication 371 from Office of Patent Policy Survey, 2101 Constitution Ave., N.W., Washington 25, D.C. \$1. 00. PB 124174

1. Research, Industrial 2. Patents 3. NRC 371

Report of NRL Progress. U.S. Naval Research Laboratory. Jul 1957. 40p. Order from Office of Technical Services, U.S. Dept. of Commerce, Washington 25, D.C. \$1. 25. Also available on annual subscription rate of \$10 a year in the U.S.A., foreign rate \$13 a year. PB 131170

Contents: NRL progress in radio astronomy (1954-1957), by E. F. McClain. - Basic hydrogen-producing processes in electrolytic cells I: Platinum and palladium cathodes, by S. Schuldiner and J. P. Hoare. - A transistorized survey meter, by G. E. Leavitt. - Scientific program: Problems accepted: Problem notes: Astronomy and astrophysics: Atmospheric attenuation at K-band radio wavelengths... Effect of oblique propagation paths upon the NRL rocket studies of the ionosphere... Vanguard satellite thermal investigation... Random vibration testing of Vanguard satellite and other upper-atmosphere rocket components... Threshold count accelerometer for detecting free air turbulence can be incorporated in the standard radiosonde. - Mathematics: Statistical analysis of the effect of ocean surface waves upon the generation of sea clutter. - Metallurgy and ceramics: Friedel theory of thermoelectric power applied to dilute magnesium alloys... Steady-state creep of crystals... Electrical resistivity of the Mi-Pd alloy system between 300°K and 730°K... Helical dislocations. - Nuclear and atomic physics: On some applications of scattering theory Radio: A scatter propagation experiment... Rocket motor flame light intensity versus time... Ionization gages compared for linearity, ease of degassing, and reproducibility of readings. - Solid state physics: A new type of oscillatory magnetoresistance in metals. - Published reports. - Papers by NRL staff members. - Patents

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Biology and Medicine

- Maximum allowable concentration for air-borne beta contamination, by J. C. Bailey and H. F. Henry. Carbide and Carbon Chemicals Co. K-25 Plant, Oak Ridge, Tenn. July 5, 1951. Changed from official use only Nov. 1956. Contract W-7405-Eng-26. 15p. Order from LC. Mi \$2.50, ph \$3.30. AECD-3753
- Strontium-90 concentration data for biological materials, soils, waters and air filters, by E. A. Martell. Enrico Fermi Institute for Nuclear Studies, Univ. of Chicago, Chicago, Ill. Dec 1955. Contract AT(11-1)-281. 67p. Order from OTS. 40 cents. AECD-3763
- Study of the biological effects of irradiation. Progress report for period of Jan 16, 1953 to Jan 15, 1954, by Frank H. Bethell. Michigan Univ., Ann Arbor. Contract AT(11-1)-75. 109p. Order from LC. Mi \$5.70, ph \$16.80. AECU-3030
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DP -181

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LA-1159

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NYO-7780

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NYO-7786

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NYO-7787

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ORNL-2256

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RL-8.6.5

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RME-2035 (Rev.)

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RME-2045

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AECU-3393

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CF-57-1-89

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Sensitive continual monitor for the detection of airborne plutonium, by A. C. Lapsley. E. I. du Pont de Nemours & Co. Savannah River Lab., Augusta, Ga. Feb 1957. Contract AT(07-2)-1. 12p. Order from OTS. 15 cents. DP -201

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Application and operation of the 325 building well counter, by F. P. Brauer. Hanford Atomic Products Operation, Richland, Wash. Mar 1956. Contract W-31-109-Eng-52. 8p. Order from LC. Mi \$1.80, ph \$1.80. HW-42225

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Standardization of calibration wells, by E. E. Donaldson. General Electric Co. Hanford Atomic Products Operation, Richland, Wash. Jan 1957. Contract W-31-109-Eng-52. 6p. Order from LC. Mi \$1.80, ph \$1.80. HW-47576

SPERT I Instrumentation, by F. L. Bentzen. Phillips Petroleum Co. Idaho Falls, Idaho. Mar 1957. Contract AT(10-1)-205. 42p. Order from OTS. 30 cents IDO-16316

Development of the Argon Gammagraph: A wide-range continuously-recording Gamma monitor, by G. A. Smith. Carbide and Carbon Chemicals Corp. K-25 Plant, Oak Ridge, Tenn. Mar 1948. Changed from Official Use Only Nov 28, 1956. Contract W-7405-Eng-26. 19p. Order from LC. \$2.70, ph \$4.80. K-190

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Process instrument for continuous hydrogen analysis, by D. M. Papke. Carbide and Carbon Chemicals Co. K-25 Plant, Oak Ridge, Tenn. Apr 1956. Changed from Official Use Only Nov. 28, 1956. Contract W-7405-Eng-26. 24p. Order from LC. Mi \$2.70, ph \$4.80. K-1208

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Report of the Instrument and Mechanical Development Department on leak-proof packless valves. The Kellex Corp., New York City. June 1949. Decl. May 3, 1957. Contract W-31-109-Eng-52. 20p. Order from OTS. 30 cents.

KLX-1039

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Portable apparatus for the determination of tritium in liquid samples, by Jean McClelland, B. C. Eutsler, M. F. Milligan, and W. E. Wilson. Los Alamos Scientific Lab., N. Mex. May 1954. Changed from Official Use Only July 18, 1956. Contract W-7405-Eng-36. 19p. Order from LC. Mi \$2.70, ph \$4.80. LA-1678

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Resistance analogue device for studying axially symmetric magnetic fields, by Kenneth E. Wakefield. Princeton Univ., N. J. Project Matterhorn. Dec 1956. 57p. Order from LC. Mi \$3.60, ph \$9.30. NYO-7313

Fabrication of uranium clad fuel elements for the fast exponential experiment, by R. A. Noland, and C. C. Stone. Argonne National Lab., Lemont, Ill. Oct 1954. Decl. Feb 26, 1957. Contract W-31-109-Eng-38. 41p. Order from OTS. 40 cents. ANL-5299

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Crevice corrosion of uranium and uranium alloys, by J. W. Frank and A. H. Roebuck. Argonne National Lab., Lemont, Ill. Mar 1955. Decl. Mar 1, 1957. Contract W-31-109-Eng-38. 39p. Order from OTS. 40 cents. ANL-5380

Super power tube development. Quarterly report No. 14 for April, May, June 1954, by M. V. Hoover. Radio Corp. of America, RCA Victor Div., Harrison, N. J. July 1954. Changed from Official Use Only Aug. 6, 1956. Contract AT(11-1)-143. 16p + 1 fold. chart. Order from LC. Mi \$2.70, ph \$4.80. TID-5249

Fabrication of prototype fuel elements for the experimental boiling water reactor and the experimental breeder reactor. Yearly Report: July 1, 1954 to June 30, 1955, by H. F. Sawyer, P. Loewenstein, W. C. Paynton, and P. Corzine. Argonne National Lab., Lemont, Ill. and Nuclear Metals, Inc., Cambridge, Mass. May 1956. Decl. Apr 24, 1957. Contract W-31-109-Eng-38. 45p. Order from OTS. 40 cents. ANL-5568 (Del.)

Metallurgy and Ceramics

Density of basic rocks at very high pressures, by Darrell S. Hughes and Robert G. McQueen. Los Alamos Scientific Lab., N. Mex. (1956?) Contract W-7405-Eng-36. 21p. Order from LC. Mi \$2.70, ph \$4.80. AECU-3419

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Investigation of scaling of zirconium at elevated temperatures. Quarterly Status Report No. 15, Dec 2, 1956 to March 2, 1957, by H. B. Probst, E. B. Evans, and W. M. Baldwin, Jr. Case Inst. of Tech., Cleveland. Mar 1957. Contract AT(11-1)-258. 7p. Order from LC. Mi \$1.80,

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RICHMOND 19, VA., 1103 East Main Street
ST. LOUIS 1, MO., New Federal Bldg.
SALT LAKE CITY 1, UTAH, 222 S. W. Temple Street
SAN FRANCISCO 11, CALIF., 555 Battery Street
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