U. S. Government

RESEARCH REPORTS

January 18, 1957
Vol. 27, No. 1

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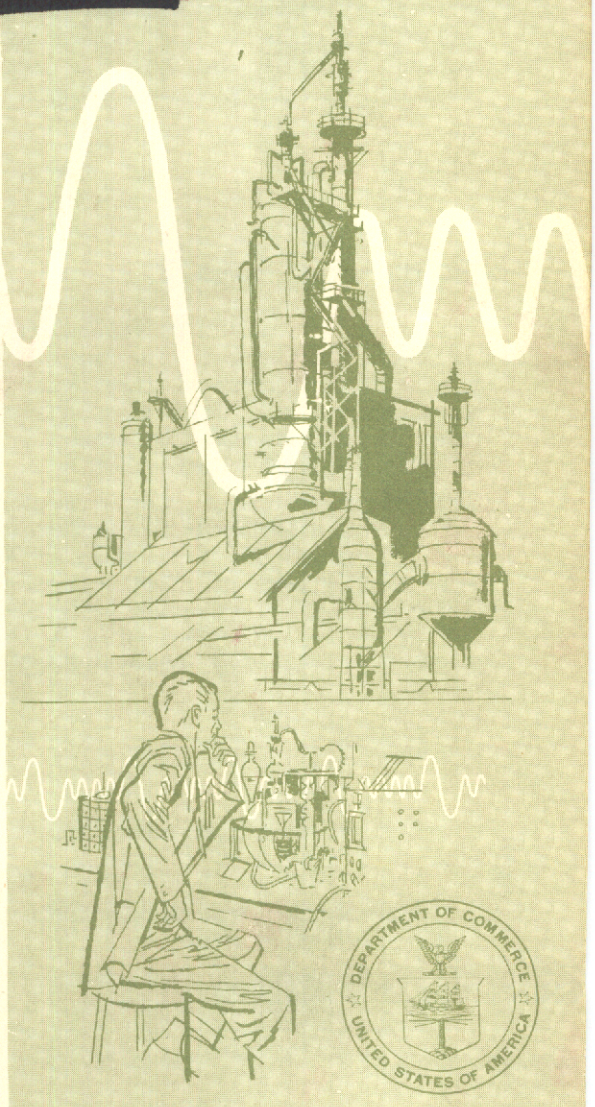

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OFFICE OF TECHNICAL SERVICES
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U. S. DEPARTMENT OF COMMERCE

OFFICE OF TECHNICAL SERVICES

U. S. Government RESEARCH REPORTS

Vol. 27, No. 1 January 18, 1957

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Printed Reports Available from OTS Announced in This Issue

CHEMICALS AND ALLIED PRODUCTS

Organic Chemicals

Electrode processes IV: Mechanism of oxidation of chlorate to perchlorate at the platinum anode, by L. O. Morgan and Warren H. Philipp. Texas. University. Dept. of Chemistry, Austin, Texas. Sep 1955. 37p tables. Order from LC. Mi $3, ph $6.30. PB 123467

On the basis of the results of electrolytic and chemical oxidation experiments with chlorate solutions a mechanism was postulated for the electrolytic oxidation of chlorate to perchlorate at a platinum anode. It was proposed that platinum (VI) oxide forms at the anode surface under the conditions favorable for chlorate oxidation and that an intermediate species is formed between the oxide and chlorate ions. The intermediate species then decomposes into platinum (IV) oxide and perchlorate ions. Mechanisms proposed by earlier observers were discussed with reference to their failure to explain satisfactorily the experimental results. For Part V see PB 123735. Contract Nonr-375(04), NR 051-312, Report no. 4.

Equations governing vibrational relaxation phenomena in carbon dioxide gas, by R. N. Schwartz. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1954. 17p table. Order from LC. Mi $2.40, ph $3.30. PB 122045

Carbon dioxide exhibits more than one excited mode of vibration at the temperatures reached in shock tube investigations of relaxation phenomena. Relaxation equations have been developed which are applicable to the more complex case of the thermal excitation of the two lowest modes of vibration in carbon dioxide. These equations have been applied to the shock tube. The exact behavior of the gas depends on the relative magnitude of two independent relaxation times which is unknown at higher temperatures. NAVORD 3701. NOL ARR 234.

Kinetics and mechanism of the decomposition of organic nitrates, by K. J. Laidler. U. S. Naval Ordnance Laboratory, White Oak, Md. May 1951. 31p graph, tables. Order from OTS. $1. PB 121258

The various reactions which occur during the decomposition of organic nitrates are discussed, from the standpoints of their kinetic mechanisms and of the heats liberated or absorbed. Appendix: Thermochemical considerations. See also PB 110898, 112300, 121167 and 121179. Unclassified Oct 8, 1954. NAVORD 1808.

Mechanism of inhibitor action for chain processes, II, by Kang Yang, Taikyue Ree and Henry Eyring. Utah. University. Institute for the Study of Rate Processes, Salt Lake City, Utah. Mar 1956. 31p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 122195

AD 82520. For Part I see PB 121129.
1. Chain reactions - Theory 2. Chemical compounds, Organic - Reaction mechanisms 3. Hydrocarbons - Decomposition 5. AF OSR TN 56-124 6. UU IS RP TN 18.

Studies on the gas phase oxidation of cyclohexene, by G. H. Hembree and F. H. Verhoek. Ohio State University Research Foundation, Columbus, Ohio. May 1956. 9p graphs, tables. Order from LC. Mi $1.80, ph $1.80. PB 123474

The gas phase reaction of cyclohexene and oxygen has been investigated in a static system to determine the effect on the rate of the reaction of (1) change in oxygen pressure at constant cyclohexene pressure, (2) change in cyclohexene pressure at constant oxygen pressure, (3) change in ratio of reactant pressures at constant total pressure, (4) added inert gas, and (5) change in temperature. AD 90010. Contract AF 18(600) 787. AF OSR TN 56-298. OSURF Proj. 572, Technical note 1.

Synthesis and antioxidant activity of some new polyfluoroalkyl sulfides and selenides, by P. D. Faurote, C. M. Murphy, J. G. O'Rear, and H. Ravner. U. S. Naval Research Laboratory. Nov 1956. 15p tables. Order from OTS. 50 cents. PB 121568

Two new fluoroalkyl selenides and a sulfide were synthesized and tested as high-temperature antioxidants. Thermally induced reactions of $H(CF_2CF_2)_n$-CH_2I with sulfur and selenium proceed smoothly to give the respective sulfides and selenides. A free radical mechanism involving the homolytic cleavage of the C-I bond is postulated. Both selenides apparently decompose under test conditions to give products which can attack the glass system. These products resemble those previously noted from fluoroesters subjected to excessive temperature. NRL R 4859.

Plastics and Plasticizers

Adhesives attachment investigation. Pt. II: Development of high strength tubular joints, by H. E. Mathews, Jr. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1951. 49p photos, drawings, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 122434

Tests were conducted to determine the merits of two bonding techniques for the assembly of tubular structures. Cycleweld C-3 primer with Redux adhesive was evaluated in a bag molding technique employing the application of heat and pressure. Mixtures of room temperature setting rigid and flexible resins, Paraplex P43HV and P13 were

studied in tubular scarfed joints. Various combinations of adherends were included. Water leakage rates, and static as well as dynamic strength tests were conducted to determine magnitudes, and the gross effects of joint variables and environmental exposures on these magnitudes. Unclassified. Continues and completes work reported in NOL M 10420. NAVORD 1802.

Development of Air Material Command AT 6C glass outer wing panel. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aircraft Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Apr 1947. 186f photos, drawings (2 fold.), graphs, tables. Order from LC. Mi $8.40, enl pr $30.30. PB 123712

This report covers the preliminary development, design, fabrication and static test of the Air Material Command AT-6C laminated glass outer wing panel for the AT-6C airplane. The primary objective of this development was to determine the suitability of new materials and structural design using low pressure reinforced plastic laminates for aircraft structures. To achieve this objective, the outer wing panel of the AT-6C airplane was selected for the design and fabrication of a laminated glass fiber wing structure. In this way it was desired to develop a satisfactory laminated glass fiber wing, which would compare favorably on a strength weight basis with a conventional metal wing, in order to determine the feasibility and advantages of using this new material in the structure of a complete airplane. In addition to this objective, the development of a structural design utilizing sandwich constructions was desired. This type of construction would permit a simplified design of the outer panel by the elimination of internal ribs and structural bracing. ATI 16259. AF TR 5576. AF TSEAC 12-45131-2-2T.

Development of 5"/54 cartridge case plugs; progress report no. II, the fragmentation characteristics of experimental cork and foam plastic plugs, by F. Ramsdell. U. S. Naval Ordnance Laboratory, White Oak, Md. Aug 1951. 25p photos, diagr, table. Order from LC. Mi $2.70, ph $4.80. PB 122440

Experimental cork and foam plastic plugs were evaluated against the standard cork plugs Mk 3 and Mk 6 (particle size considered satisfactory) for fragmentation characteristics, weight of particle size and penetration through 1/4" beaverboard. Unclassified. NAVORD 2161.

Development of heat-resistant interlayer materials for laminated plastic and laminated glass, by Robert F. Cox, Luther L. Yaeger, Ralph W. Buetow, and Robert J. Roth. Bjorksten Research Laboratories, Inc., Madison, Wis. Jul 1954. 44p photos, tables. Order from OTS. $1.25. PB 121665

The objective of the work described in this report was the development of transparent interlayer materials for laminated glass and laminated plastic that could withstand temperatures up to 400 F. for various periods of time. Possible interlayer materials which were investigated included: polyamides (nylons), mixed polyesters, cellulosic materials, fluorinated resins of the Exon type, plasticized epon resins, Mylar, silicone-acrylate copolymers. AD 49905. AF WADC TR 54-57. Contract AF 33(600) 22723.

Development of a lightweight plastic cartridge case. Interim report, by F. L. Ramsdell. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1952. 38p photos, drawings, diagrs, graph, tables. Order from LC. Mi $3, ph $6.30. PB 122443

A comparison was made of the properties of a variety of plastic materials over a wide temperature range with the physical properties of the pulp-rubber-resin material at normal temperatures, 77°F, the temperature at which pulp-rubber-resin cases had been found to be satisfactory. The properties of laminates of glass cloth-polyester resin, glass cloth-phenolic resin and rayon-cotton cloth-phenolic resin were the only materials that matched most nearly those properties. Unclassified. Previous work reported in NAVORD 1517. For Report no. 3 see PB 120979. NAVORD 2238.

Dynamic properties of plastics and rubber-like materials. Final report, by R. A. Eubanks, D. Muster, and E. G. Volterra. Illinois Institute of Technology. Dept. of Mechanics, Chicago, Ill. Jun 1953. 53f photo, graphs, tables. Order from LC. Mi $3.60, enl pr $10.80. PB 123713

In the present report, the results obtained for a geon polyblend 503 compound, a geon polyvinyl chloride compound and a butyl rubber are given. A comparison is presented between the method which has been used for the computation of the experimental data at Illinois Institute of Technology and a previous method which was developed at Cambridge (England) for the computation of experimental data on plastics and rubber-like materials. Finally some general conclusions obtained from the experiments performed are given. AD 18614. Contract N7onr-32911, NR 064-369.

Evaluation of synthetic-sheathed detonating cords, by A. R. Timmins. U. S. Naval Ordnance Laboratory, White Oak, Md. Apr 1951. 42p photos, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 122432

The results of an evaluation program conducted on three recently developed, polyethylene sheathed, detonating cords, and the presently used detonating cord (standard reinforced) are reported. Tests performed included: safety (shock, flame, bullet impact, and passage of vehicle over the cord), low temperature, waterproofness, abrasion, breaking

strength, detonation velocity (normal conditions and after surveillance at 160°F), propagation sensitivity, and stiffness. Unclassified. NAVORD 1771.

Investigation and development of high-temperature structural adhesives, by Alfred S. Kidwell and Kenneth L. McHugh. Connecticut Hard Rubber Co., New Haven, Conn. Sep 1956. 75p drawing, graphs, tables. Order from OTS. $2. PB 121657

Wide variations in the composition of the CHR-M-60 epoxy-modified DC-2103 silicone resin with Asbestine X filler, which has shown shear strength values as a metal-to-metal adhesive in excess of 1000 psi at 500°F, have been made and the results plotted to indicate composition areas yielding maximum shear strength values. Extended high-temperature aging tests have shown DC-803 silicone resin and epoxy-modified DC-803 to have better aging resistance than DC-2103 and epoxy-modified DC 2103, respectively. A number of silicone-epoxy-phenolic resin blends were prepared, which showed shear strength values and high-temperature aging resistance slightly better than those for the epoxy-modified silicone resins. AD 97287. Project 3348. Covers work performed 1 May - 1 Nov 1955 under Contract AF 33(616)-2448. For Part 1 see PB 111768, Aug 1954. AF WADC TR 54-98, Part 3.

Mechanical properties of polyester laminates reinforced with high modulus glass fabric, by Fred Werren. U. S. Forest Products Laboratory, Madison, Wis. Sep 1956. 22p diagrs, tables. Order from OTS. 75 cents. PB 121683

Comparative strength tests were made of three polyester laminates fabricated at the U. S. Forest Products Laboratory. Two of the laminates were reinforced with H. M. 18 glass fabric, a fabric designed to produce laminates with a high modulus. One laminate had a resin content of 41.9 percent and the other of 34.8 percent. The third laminate was a typical laminate reinforced with 18.1 glass fabric, and it had a resin content of 36.7 percent. Tension, compression, and flexure tests were made of each laminate, and the strength and elastic properties are presented in this report. AD 97314. Project 7340. Covers period of work June 1955 to June 1956. AF WADC TR 56-206.

Performance of sandwich with cores of foamed silicone and modified polyester resins at elevated temperatures and at high humidity, by V. C. Setterholm and E. W. Kuenzi. U. S. Forest Products Laboratory, Madison, Wis. Oct 1956. 30p photos, graphs, tables. Order from OTS. 75 cents. PB 121707

Compression, tension, and shear properties of plastic sandwich with foamed-in-place cores were determined at temperatures from 75° to 700°F. Also presented are data on the weight and dimensional stability of silicone and Laminac 4231 cores exposed to 100 percent relative humidity at 100°F. for 21 days. Above 300°F., the strength of Laminac 4231 cores approaches the strength of silicone cores. The weight and dimensional stability of silicone cores were not affected by exposure to high humidity. Laminac 4231 cores showed increases in both weight and dimension after the high-humidity exposure. AD 110421. Project 7340 Task no. 73402. Covers period of work from June 1954 - Apr 1956 under Contract AF 33(616)-56-9. AF WADC TR 56-230.

Tensile-adhesion of accelerated room temperature setting adhesives in metallic adherent systems, by W. C. McCall and H. E. Mathews, Jr. U. S. Naval Ordnance Laboratory, White Oak, Md. Apr 1951. 30p photos, graphs, tables. Order from LC. Mi $2.70, ph $3.30. PB 122433

Accelerated room temperature setting resin adhesives have been investigated for potential use in the assembly of ordnance devices. The tensile-adhesion values were determined for use as a relative index of the characteristics of the resins, singly, in combinations and as modified with filler. Unclassified. NAVORD 1801.

Paints, Varnishes and Lacquers

Acoustic technique for measuring the effective dynamic bulk modulus of elasticity and associated loss factor of rubber and plastics, by Charles S. Sandler. U. S. Naval Ordnance Laboratory, White Oak, Md. Sep 1950. 30p diagrs, table. Order from LC. Mi $2.70, ph $4.80. PB 122428

For use in a program directed at the development of coating materials for underwater acoustic absorption, an apparatus has been constructed for measurement of the effective dynamic bulk modulus of elasticity and associated loss factor of viscoelastic materials, such as rubber and plastics. Unclassified. NAVORD 1534.

Low reflecting films of gilsonite for increasing the transmission of silver chloride at 8 - 13, u, by P. S. Smith and J. A. Sanderson. U. S. Naval Research Laboratory. May 1945. 11p graphs. Order from LC. Mi $2.40, ph $3.30. PB 123390

Unclassified 15 Dec 1953.
1. Gilsonite - Uses 2. Silver chloride - Coatings 3. Films, Reflection reducing 4. Films, Gilsonite - Reflection reduction 5. NRL H 2537.

Method of test for deep drying insulating varnishes, by Myron A. Elliot. U. S. Naval Research Laboratory. Jun 1942. 30p photos, drawings (part fold), graphs, table. Order from LC. Mi $2.70, ph $4.80. PB 120514

1. Insulating varnishes - Tests 2. NRL P 1891.

Navy tropicalization. Twenty-third report: Summary of completed investigations under Navy Contract Nord 6119, Task IX 601 X. Centro Research Laboratories, Inc., Briarcliff Manor, N. Y. Dec 1945. 278f drawings, tables. Order from LC. Mi $11.10, enl pr $45.85. PB 123719

The work described in this report is a summary of all work completed in the past year and one half under Contract Nord 6119 - Task 601. In the main, these investigations comprise the fungistatic efficiency of 54 fungicides tested with various engineering materials employed in the manufacture of radio and electronic equipment. This summary is devided into the following sections: 1. Fungicides, 2. Lacquers, varnishes, paints. 3. Plastics. 4. Waxes.

Analytical Chemistry

Research consisting of spectrographic analysis of samples and development of spectrographic methods for the determination of impurities in pure silicon. Third quarterly progress report covering the period Nov 1955-Jan 1956 under Contract no. AF 19(604)-1416, by James M. Morris. Metals Hydrides, Inc., Beverly, Mass. Mar 1956. 6p. Order from OTS. 50 cents. PB 121539

This contract has been established to provide research to improve the methods of spectrochemical analysis of high purity silicon, with particular emphasis on extending the lower limits of sensitivity of trace elements of Groups III, IV, and V, and to provide spectrochemical analysis of samples submitted. For reports 1-2 see PB 119576, PB 120227. AF CRC TN 56-386. Contract AF 19(604)-1416, Report no. 3.

ELECTRICAL MACHINERY

Communication Equipment

Signalling and detection with ultra-violet and infrared radiation. Supplementary report to report of 18 January 1934, by Ross Gunn. U. S. Naval Research Laboratory. Jun 1934. 8p photo, diagrs, table. Order from LC. Mi $1.80, ph $1.80. PB 120483

1. Infrared detection 2. Ultraviolet radiation - Detection 3. Signalling devices 4. NRL H 1060.

Study of type and frequency of communication messages aboard Naval vessels, by L. Doty, T. D. Hanley and M. D. Steer. Purdue University, Lafayette, Indiana. Apr 1955. 37p tables. Order from LC. Mi $3, ph $6.30. PB 123753

To determine the efficiency of voice communications systems aboard Naval vessels, recordings of messages transmitted during actual Naval operations were analyzed. The frequency of occurrence of various types of messages was tallied and the relative contribution of each message in terms of the information transmitted was determined. SDC TR 104-2-42. Contract N6ori-104.

Electronics

Analysis and matching of a trimode turnstile waveguide junction, by R. S. Potter. U. S. Naval Research Laboratory. Dec 1955. 51p diagrs, tables. Order from OTS. $1.50. PB 111867

The microwave junction studied in this report is a lossless seven-port variation of a turnstile waveguide junction with a coaxial port opposite and centered on the axis of the circular waveguide. The junction's scattering matrix, the normal modes, the normal mode scattering coefficients, the equations relating the elements of the scattering matrix to each other, and the equations relating the elements of the scattering matrix to the normal mode scattering coefficients are determined. These quantities reveal that the new junction cannot be matched from all ports simultaneously, but that it can be matched from any two different types of ports. Each possible combination of matched ports then specifies a unique set of microwave properties for the junction. These properties are tabulated for each combination of matched ports and each possible single mode of excitation. While the properties of this particular waveguide junction were being spelled out in detail, the existing theory for this kind of an analysis was extended and generalized so as to apply to any conceivable waveguide junction. NRL R 4670.

Corrective line sources for paraboloids, by C. J. Sletten, R. B. Mack, W. G. Mavroides and H. M. Johanson. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Antenna Laboratory, Bedford, Mass. Dec 1955. 53p photos, diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 122215

The notably poor wide-angle focusing characteristics of the paraboloidal reflector can be improved by corrective line sources. Studies of the caustic surfaces and focal fields of the reflector have led to the development of (1) a straight line source suitable for generating fan-shaped microwave beams, and (2) line sources that produce a pencil beam at a given acute angle with the axis of the reflector. Pillbox reflectors that collect arbitrary phase distributions on the pillbox aperture and focus them to a point have been derived by a new mathematical technique. AF CRC TR 55-122.

Detection of separations between adjacent signals on a simulated PPI radar scope, by Robert M. Herrick, Helmut E. Adler, John E. Coulson and Gerald L. Howett. Columbia University, New

York, N. Y. Jul 1955. 28p diagr, graphs, tables. Order from OTS. 75 cents. PB 121470

A simulated Plan Position Indicator (PPI) scope was used to evaluate the effects of a number of visual variables upon the minimum signal luminance increment ($\triangle$ I) required for the detection of a separation between two identical signals. Project no. 7186, Task no. 71544. AF WADC TR 55-424. Contract AF 33(038)-22616.

Development of an automatic sonar transducer test set using a pulse modulated signal, by W. D. Nupp and M. Barron. U. S. Naval Air Development Center. Aeronautical Electronic and Electrical Laboratory, Johnsville, Pa. Jul 1955. 48p photos, diagrs, graphs. Order from LC. Mi $3.30, ph $7.80. PB 123001

The development of a laboratory test set was undertaken to provide quick automatic plotting and recording of the directivity and frequency response characteristics of sonar transducers. This unit allows a reading of only the direct received signal. Undesired reflected waves and signal build-up transients are eliminated by gating the receiver in synchronism with the transmitted pulse. This feature allows using the equipment in a small body of water such as a water tank. Appendix A: Proposed requirements for a transducer pulse measuring equipment. NADC EL 54118.

Development of isolators for heavy airborne electronic equipment, by Leonard C. Lindblom. United States Rubber Co., Ft. Wayne, Ind. Mar 1955. 36p photos, drawings, graphs. Order from OTS. $1. PB 121317

Models of six isolator design variations were evaluated for isolation efficiency and shock absorption characteristics at room temperature. All evaluations were confined to designs which utilized a steel coil spring in conjunction with a dry friction damper for isolating vibration amplitudes and a silicone pad for absorbing shock accelerations. This resulted in a basic design which was adaptable with a maximum number of interchangeable parts into five different load ranges. Project no. 4157. Covers work from Jun 1952 to Mar 1955 under Contract AF 33(600)-20237. AF WADC TR 55-248.

Development of the ultra-high-frequency radio range. Part I: Ultra-high-frequency aural radio range, by J. C. Hromada and P. B. King. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jun 1944. 75p photos, diagrs, graphs, tables. Order from LC. Mi $4.50, ph $12.30. PB 123549

For Part 2 see PB 122281.
1. Radio range (UHF) - Tests 2. CAA TDR 42.

Effect of air exposure on various cathodes for demountable vacuum systems, by G. A. Haas and J. T. Jensen, Jr. U. S. Naval Research Laboratory. Nov 1956. 10p photos, graphs. Order from OTS. 50 cents. PB 121563

Various nickel matrix and tungsten matrix cathodes have been investigated for applications in demountable vacuum systems. The two W matrix cathodes (Philips BP-1B and CP-2B) displayed true diffusion properties which allowed the emission level to recover after each air exposure. However, both of these cathodes have the disadvantage of lengthy activation time and show a strong susceptibility to self-poisoning if the tube parts cannot be cleaned or baked after each air exposure. It appears that if the flaking problem can be controlled the standard oxide cathode would show most promise as an electron emitter for demountable vacuum systems and present effort is being placed in that direction. NRL R 4856.

Errors due to cable connecting two control synchros, by Nathan B. Allison. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1953. 19p diagrs, table. Order from LC. Mi $2.40, ph $3.30. PB 120957

1. Circuits, Equivalent - Theory 2. Connectors, Electric 3. Synchronous machines - Mathematical analysis 4. NAVORD 2357.

Four-loop VOR antenna, by Sterling R. Anderson, Hugh F. Keary and William L. Wright. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Jun 1953. 14p photo, drawings, diagrs, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 123578

This report presents the results of the development and operational tests conducted at TDEC on the four-loop VOR antenna system. Except for the antenna, standard VOR equipment and a 35-foot diameter counterpoise 15 feet in height were used for the tests. Results from similar tests on a standard five-loop VOR at the same site are included for comparison. CAA TDR 210.

Microwave receiving facility, by Solomon Krasnick. U. S. Camp Evans Signal Laboratory, Belmar, N. J. Aug 1954. 23p photos, diagrs (2 fold), tables. Order from LC. Mi $2.70, ph $4.80. PB 123421

Dept. of the Army project no. 3-27-01-013. Signal Corps project no. 2051B. Unclassified 5 Jun 1956.
1. Radio receivers, Microwave - Design
2. SCEL TM M 1600.

Hermetic sealing terminals, by George A. Forster. Armour Research Foundation, Chicago, Ill. Apr 1956. 48p photos, diagr, tables. Order from OTS. $1.25. PB 121535

The purpose of this project was to determine the requirements for hermetic sealing terminals in military airborne electronic equipment and to compare these requirements with the capabilities of present terminals. Information from the Air Force, manufacturers, and users of hermetic terminals was analyzed to determine requirements and tests suitable for terminals. The important electric characteristics are dielectric strength, corona voltage, current capacity, and insulation resistance. Tests related to environmental conditions include temperature aging, temperature cycling, temperature shock, vibration, mechanical shock, moisture resistance, terminal strength, salt spray and gas leakage. Approximately 100 groups of 20 each, of all typical types and manufacture of hermetic terminals, were tested. Project 4155. Covers work from Jul 15, 1954 to Apr 30, 1956 under Contract AF 33(600) 27674. AF WADC TR 56-251.

Point-contact transistor life test under pulse conditions, by John A. Di Giorgio. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Communications Laboratory, Bedford, Mass. Feb 1956. 21p diagrs, graphs. Order from OTS. 75 cents. PB 121560

Working data were obtained by taking periodically voltage margins of the emitter and collector supply voltages on a group of 30 high-speed nonsaturating flip-flop circuits. Three types of transistors were used for the test. Some life test results of 16 stages of a regenerative pulse amplifier circuit, employing transistors which have gone over the 5000 hour mark, are also included. AF CRC TR 56-107.

Power supply characteristics and standards for transistorized airborne electronic equipment, by Andrew B. Jacobsen. Motorola Incorporated. Phoenix Research Laboratory, Phoenix, Arizona. Dec 1955. 120p diagrs, graphs, tables. Order from OTS. $3. PB 121525

In order to derive a tentative standard supply voltage for transistorized electronic equipments, this report presents the problems associated with the operation of such equipments from various sources of primary power. The result of this study is a recommendation for adoption by the Air Force of a standard power-supply output rating of 18 volts (V) direct current (dc). A power-supply designed according to the specifications outlined in this report would function equally well from either an alternating-current (a-c) or d-c power line in an aircraft; from vehicular power sources, or from batteries. A bibliography of 13 pages included. Project 4155, Task 41755. Covers work from 15 Nov 1954 to 1 Oct 1955 under Contract AF 33(616)-2708. AF WADC TR 56-78.

Quarterly progress report no. 13, Feb 1-May 1, 1956, under Contract no. AF 18(600)-497, Project R-357-10-6. Duke University. Dept. of Physics. Microwave Laboratory, Durham, N. C. May 1956. 37p graphs, tables. Order from LC. Mi $3, ph $6.30. PB 122956

AD 87516 and AD 87517. Contents: (A) Abstracts of current projects. - (B) Technical reports: - 1. Effects of X-irradiation upon some organic substances in the solid state. Simple alcohols, amines, amides, and mercaptans, by Clarence E. Luck and Walter Gordy. - 2. Millimeter wave spectrum, molecular structure, and dipole moment of hydrogen selenide, by Albert W. Jache, Paul W. Moser, and Walter Gordy. AF OSR TN-56-204. AF OSR TN-56-203.

Study of properties of single crystals for use as detectors and crystal counters, by S. J. Czyzak, W. M. Baker, R. C. Crane, H. Payne and J. R. Ignatowski. Detroit. University, Detroit, Mich. Oct 1955. 42p photos, drawings, graphs, tables. Order from OTS. $1.25. PB 121537

Single crystals of CdS and ZnS with and without controlled impurity additions (In, Mn, Pb, and O) were grown. The crystals were examined for index of refraction, absorption coefficient, dielectric constant, resistivity, photoconductivity, rectification and photovoltaic effects. Also, preliminary experiments on the radiation effects from high energy electrons were made. Contract Nonr 1511(01), NR 015-218.

Generators, Motors, Transmission

Errors due to cable connecting two control synchros, by Nathan B. Allison. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1953. 19p diagrs, table. Order from LC. Mi $2.40, ph $3.30. PB 120957

1. Circuits, Equivalent - Theory 2. Connectors, Electric 3. Synchronous machines - Mathematical analysis 4. NAVORD 2357.

Investigation of mixing in traveling-wave tube amplifiers, by Glenn A. Gray. California. University. Division of Electrical Engineering. Electronics Research Laboratory. Microwave Tube Group, Berkeley, Calif. Nov 1955. 48f drawing, diagrs, graphs. Order from LC. Mi $3.30, enl pr $7.80. PB 123917

This report is a preliminary study to evaluate the mixing of two signals on an electron beam by means of backward-wave interaction. The method employs two-helix type backward-wave structures in tandem, one of which acts as a voltage-tunable oscillator while the other furnishes a means of introducing the signal onto the beam. This study has indicated that conversion efficiencies of the order of those obtainable from crystal mixers should be possible with this type of tube. UC IER Series 60, Issue no. 151. Contract AF 33(616)-495.

Lightweight engine generators, 150 watts to 60 kw; study of (MCEB project no. S 818), by H. K. Alberts. U. S. Marine Corps. Basic School, Quantico, Va. Jun 1954. 19p graphs, tables. Order from LC. Mi $2.40, ph $3.30. PB 123725

MCEB Project S-818.
1. Generators, Diesel - Tests 2. Generators, Direct current 3. Generators, Alternating current - Tests.

New type instantaneous logarithmic wide-band amplifier (Ein neuartiger, momentan logarithmischer breitband-verstärker,)by G. Epprecht. Translated and edited by F. A. Raven. May 1955. 14p diagr, graphs. Order from OTS. 50 cents. PB 121485

The present case is concerned with an amplifier which contains non-linear network elements so that the logarithm of the input voltage appears directly at the output. The log-function is a combination of linear partial segments in first approximation. The exactitude of the approximation is calculated and the effect of the various design parameters is discussed. A short description of a practically built amplifier illustrates the principle involved. Reprinted from Technische Mitteilungen PTT, no. 5, 1951. NAVSHIPS T 592. STS 219.

60-cycle magnetic servo amplifier with electronic preamplifier, by George Schohan. U. S. Naval Ordnance Laboratory, White Oak, Md. May 1955. 8p diagr, table. Order from LC. Mi $1.80, ph $1.80. PB 120819

The combination of a vacuum-tube preamplifier with a half-wave magnetic-amplifier output stage is described. This combination is used to solve a particular 60-cycle servo problem where the main requirements of high gain and low dynamic error are made possible by the unique damping employed. NAVORD 3976.

Miscellaneous

Simple, objective, test for cable noise due to shock, vibration or transient pressures, by Thomas A. Perls. U. S. National Bureau of Standards. May 1955. 24p photos, drawings, graphs. Order from OTS. 75 cents. PB 121583

A test method has been developed to obtain an objective, reproducible "noise index" for cables in which the low noise properties are of interest. The mechanical and electrical features of the test method are described, together with theoretical and experimental considerations which led to their choice. Sample noise indices are given for three widely used coaxial cables and for the recently developed NBS low-noise cable. Noise indices for commercially available low-noise cables were found to cover a range of over 10,000 to 1. NBS 4094.

Sintered-plate nickel-cadmium cell, by G. W. Work. U. S. Naval Research Laboratory. Oct 1956. 15p graphs (1 fold) tables. Order from OTS. 50 cents. PB 121533

A nickel-cadmium alkaline secondary cell with sintered-plate construction has been studied. An evaluation of over 700 cycles under varied conditions of temperature, charge and discharge rates, and stand indicates that this type of cell is relatively unaffected by operation at $0^{\circ}F$, is capable of being fully charged in less than one hour, and may be discharged without excessive capacity loss in a few minutes. After 700 cycles the capacity is still 20 percent above the rated capacity. Since a single cell was studied, variations from one cell to another could not be determined. NRL R 4852.

FOOD AND KINDRED PRODUCTS

Ionizing radiations, their production, effects, and utilization (with special reference to food and packaging technology) Supplement no. III and subject index (two parts). U. S. Quartermaster Food and Container Institute, Chicago, Ill. Jun 1956. 250p. Order from OTS. $4.75. PB 111636s2

Supplement to PB 111636.
1. Food - Radiosterilization - Bibliography
2. Radiation, Ionizing - Biological effects - Bibliography.

FUELS AND LUBRICANTS

Cyanogen-oxygen flame, by J. B. Conway, A. V. Grosse, and R. H. Wilson, Jr. Temple University. Research Institute, Philadelphia, Pa. Aug 1952. 24f drawings, graphs, tables. Order from LC. Mi $2.70, enl pr $6.30. PB 123714

The flame temperature was measured by a line-reversal method depending on the sun as the comparison radiator. Discusses methods of preparation of cyanogen, thermodynamic data, theoretical flame temperature, design of the torch tip, structure of cyanogen-oxygen flames, and data obtained. U 25547. Contract N9onr-87301.

Further investigation of disturbances due to oil films in journal bearings, by John F. Lewis and Graham B. Fulton. Rensselaer Polytechnic Institute. Dept. of Aeronautical Engineering, Troy, N. Y. May 1956. 29p photos, diagrs, graphs, Order from OTS. 75 cents. PB 121519

Two flexible rotors (65 lbs. and 130 lbs.) having critical speeds of about 1300 rpm were run in six journal bearings to study instability characteristics. With few exceptions, whirl impending speeds

were very near twice critical and a slight decrease in whirl impending speed was noticed with decreasing viscosity. No stable range was observed above the speed at which whirl set in. A method for determining the running speed position of a journal bearing by photographic means is described and several determinations of running speed position are presented. The ratio of the maximum stable speed to the critical speed is plotted as a function of inlet oil viscosity. Some interesting trends of whirl impending speed with L/D ratio, clearance and temperature are presented. AD 97140 Project 3066, Task 70503. Extension of work reported in WADC TR 54-188. AF WADC TR 56-259. Contract AF 33(616) 3107.

Hydrogen-fluorine torch, by R. H. Wilson, Jr., J. B. Conway, A. Engelbrecht, and A. V. Grosse. Temple University. Research Institute, Philadelphia, Pa. Aug 1951. 31f drawing, graphs. Order from LC. Mi $3, enl pr $7.80. PB 123716

Discusses the theoretical reactions of fluorine with other substances to produce high temperature flames. Wenner's method of calculating theoretical flame temperatures was applied to the hydrogen-fluorine reaction. The torch is described and its flame temperature measured by the spectrum line-reversal method. It is concluded that the maximum temperature of the hydrogen-fluorine flame, at one atmosphere pressure, occurring for about 46% fluorine, is 4300°K, with a probable error of about 150°. U 68792. Contract N9onr-87300.

Survey of the literature on antioxidants and anticorrosion additives for lubricants at elevated temperatures, by James W. Cole, Jr., Alfred Burger, Arthur F. Benton. Virginia. University. Dept. of Chemistry, Charlottesville, Va. May 1954. 830p tables. Order from OTS. $10. PB 121726

Literature was surveyed on oxidation and corrosion inhibitors in various media at elevated temperatures. Particular attention was given to phenothiazine types of additives and to lubricants of the synthetic-base type Media, such as rubber, were included where the effects noted might have analogies in synthetic base lubricants. The survey covered the period 1916 to June 1952. Approximately 2500 abstracts of research reports, patents, reviews, articles, etc., were recorded on punch cards of special design and a coding system devised. AD 34186. For reports on Phases I-II of this study see PB 121077-121081. Contract AF 33(038)-22947. AF WADC TR 53-353.

Water bearings and air bearings with pressure lubrication, by Fr. Gottwald. Translated by F. Rizzo. Jul 1955. 13p drawing, graphs. Order from OTS. 50 cents. PB 121405

Lubricant, water or air, is fed into the bearing under pressure; and additional application of it to build up pressure ensures the advantage of a safe load-carrying film of lubricant, under all working conditions; such as at low r.p.m., even down to stand still. These bearings do not compete with the usual slide bearings. Since their friction moment is proportional to their rotational speed, their principal field of application is in the low speeds, in which they show superiority over the customary bearings. This report gives the results of calculations and experiments on such a type of bearing conducted about ten years ago at the Institute for Technical Physics, of the Darmstadt University. Translated from Z. VDI, Bd. 96, Nr. 30, 21 Oct 1954. NAVSHIPS T 593.

INSTRUMENTS

Calibration of the Brush hydrophone type BM-108, serial numbers 3 and 4, by P. C. Rand, M. L. Beck, and C. J. Does. U. S. Naval Ordnance Laboratory, White Oak, Md. Jun 1952. 34p diagrs, graphs. Order from LC. Mi $3, ph $6.30. PB 122441

Two Brush hydrophones, type BM-108 serial numbers 3 and 4, were calibrated at the Barcroft Underwater Acoustic Facility and the data are presented in a series of graphs. Unclassified. NAVORD 2186.

Design and construction of the gun tube temperature simulator, by George Mackas. U. S. Naval Ordnance Laboratory, White Oak, Md. Feb 1952. 28p photos, drawings, diagrs, graph, table. Order from LC. Mi $2.70, ph $4.80. PB 122444

The purpose of the gun tube temperature simulator is to determine in the Laboratory the cook-off time and characteristics of fuzes for 3-inch guns. It consists of a 3"/50 gun barrel, cut in half lengthwise, hinged to permit each half to be opened and its interior surface heated by gas burners to the same temperature conditions as in a real gun during rapid firing. At the conclusion of heating, the two halves are closed and clamped together, a dummy round with live fuze is inserted and its cook-off time and characteristics are measured and observed. Propane gas is the fuel used for heating. Unclassified. NAVORD 2242.

Effectiveness of a collimated reticle as an aid to visual detection of aircraft at high altitude, by R. H. Brown. U. S. Naval Research Laboratory. Nov 1956. 14p diagr, graphs, tables. Order from OTS. 50 cents. PB 121429

Pilots and observers in planes at high altitudes have reported difficulties in visual detection of other aircraft. The purpose of the present tests is to determine if a collimated reticle aids in detection by correcting for the near-sightedness which may be induced by an empty field. The method simulated search for other aircraft against a bright uniform background. Relative to operational

applications, two conclusions were drawn: (1) Use of a collimated reticle does not increase the range of detection effectively under conditions simulating visual search for other aircraft at high altitudes. (2) Information is needed on the relation between the visual detection ranges for observers flying at high altitudes and the refractive conditions of their eyes. NRL R 4863.

Elements of instrumentation. Massachusetts Institute of Technology. Laboratory for Applied Biophysics, Cambridge, Mass. Contract N5ori-07882. Order separate parts described below as indicated, giving PB number of each part ordered.

I: Mathematically operating elements (analog methods), by K. S. Lion in collaboration with R. A. Davis. Jun 1954. 122p drawings, diagrs. Order from LC. Mi $6.30, ph $19.80. PB 123905

1. Mathematical instruments - Design 2. Computers, Analog - Design 3. Instruments, Electric - Design 4. MIT LAB TR 2.

II: Temperature transducers, by K. S. Lion and W. L. Harries. Jun 1955. 37p diagrs, graphs, tables. Order from OTS. $1. PB 121296

The two most widely used temperature transducers are the resistance thermometer and the thermocouple or thermoelement. The resistance thermometer is described in Part 1, metallic resistance thermometers in Part 1a, semiconducting resistance thermometers in Part 1b, the electrolytic transducer in Part 1c, the capacitative temperature transducer in Part 2, two forms of inductive temperature transducers in Part 3, thermoelectric temperature transducers in Part 4, and the noise thermometer in Part 5. MIT LAB TR 3.

Ellipsometry. I: General and theoretical considerations. II: Application to the fundamental examination of adhesion, by R. L. Patrick, D. A. Ross, and W. A. Vaughan. Quantum, Inc., Mount Carmel, Conn. Mar 1956. 44p photo, diagrs, graph, tables. Order from OTS. $1.25. PB 121663

New fields of investigation in the biological, chemical and physical sciences have been opened up by the ability to measure films in terms of their molecular thickness. A simple, versatile tool for determining these thicknesses is the ellipsometer, or polarizing spectrometer. Precise determinations of the order of a few angstroms are possible and a number of these instruments have been constructed and are now in use. Project 7340, Task 70337. AF WADC TR 55-479. Contract AF 33(616) 2465.

Equipment for high temperature high pressure solid-gas reaction rate studies, by W. Martin Fassell, Jr. and Robert C. Peterson. Utah. University. Dept. of Metallurgy, Salt Lake City, Utah. Aug 1953. 19f photos, drawings, graphs. Order from LC. Mi $2.40, enl pr $4.80. PB 123815

The basic concepts of the effect of oxygen concentration on the rates of oxidation of metals are considered. The experimental equipment and the techniques employed at high temperatures and pressures are described in detail. Some typical oxidation rate curves are included to illustrate the precision of the methods employed. Dept. of the Army Project no. 599-01-004. Ordnance Research and Development Project no. TB2-0001 and TB4-901. Contract DA-04-495-ORD-237, Technical report no. 4.

Equipment for testing the creep properties of metals under intermittent stressing and heating conditions, by Lawrence A. Shepard and John E. Dorn. California. University. Institute of Engineering Research, Berkeley, Calif. Jul 1952. 30p photos, drawing, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 124052

Very little is known about the separate or combined effects of intermittent heating and stressing on the elevated temperature creep and creep-rupture characteristics of aircraft structural metals. Such information is important since aircraft and engines will be subject to these conditions. A description of four creep testing machines, specially designed for this program, with automatic electronic control units is given herein. This equipment is designed to produce any combination, separately or simultaneously, of intermittent heating and stressing of creep-rupture specimens, in or out of phase. AD 167643. For Part 2 see PB 121265. AF WADC TR 52-101, Part 1. Contract AF 33(038)-11502.

Induction velocity gauge for explosives damage studies, by L. Glickman and H. G. Snay. U. S. Naval Ordnance Laboratory, White Oak, Md. Jun 1951. 18p photos, drawing, diagr, graphs. Order from LC. Mi $2.40, ph $3.30. PB 120276

A velocity gauge for use in damage studies is described. In this gauge the mass of the moving part is very small, so it is particularly suitable for small-scale tests. Unclassified. NAVORD 1869.

Large barium - titanate accelerometer for shock-velocity measurements, by Thomas A. Perls and Charles W. Kissinger. U. S. National Bureau of Standards. Jun 1955. 19p photo, drawings. Order from OTS. 50 cents. PB 121584

The new instrument is a large barium-titanate accelerometer with sufficient charge sensitivity to permit integration with a passive network and still retain enough output voltage, so that an impulsive change of velocity of 5 ft per second can be recorded with good amplitude on any high-impedance 10-millivolt recorder. NBS 4121.

Narrow-band lock-in analyzer for detailed spectrum analysis, by A. Z. Robinson. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1952. 61p photos, diagrs, graph. Order from LC. Mi $3.90, ph $10.80. PB 122439

A new type of narrow-band wave analyzer is described. This analyzer is different from the conventional analyzers in that the signal frequencies are heterodyned down to a zero beat and passed through low-pass filters rather than being heterodyned to some fixed pass-band which is higher in the frequency spectrum than the components being analyzed. The general theory of the instrument is described in detail and some of the analyses made with it are presented. Its latent possibilities are discussed for the detection and for the reduction of ships' noise. The operating instructions and most of the construction details of the latest model are described. Unclassified 15 Dec 1953. NAVORD 2142.

Precision potentiometers approaching infinite resolutions, by Max Bialer and Terry T. Crow. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Electronic Components Laboratory. Wright-Patterson Air Force Base, Dayton, Ohio. Feb 1956. 19p photo, diagrs, graphs. Order from OTS. 50 cents. PB 121530

Three basic methods are in use today for producing precision potentiometers which have resolution approaching "infinite resolution." These methods are slide-wire types, various film types, and conductive plastics (which may be considered a type of film). The various advantages, disadvantages, methods of measurement, and some characteristics of each are discussed. Project no. 4155, Task 41724. AF WADC TN 56-61.

Result of tests on the interferometer or "Buck Gauge" used for the measurement of shock wave parameters in air, by E. M. Fisher. U. S. Naval Ordnance Laboratory, White Oak, Md. Oct 1950. 18p diagr, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 122429

This report has been written to describe the results that can be obtained from the Interferometer Gauge in measuring air blast parameters from eight pound TNT explosive changes. Three interferometer gauges were mounted at three distances from an 8 lb. spherical TNT charge. The gauges were mounted flush with the ground. The data yielded peak pressures and positive impulses which are compared to like data obtained from tourmaline piezoelectric gauges. Unclassified. NAVORD 1715.

Series-tube core memory, by E. J. Otis. U. S. Air Force. Air Research and Development Command. Cambridge Research Center. Electronics Research Directorate. Computer Laboratory, Bedford, Mass. Sep 1955. 44p photos, diagrs, graphs. Order from OTS. $1.25. PB 121558

Usefulness of magnetic cores as components of digital equipment, especially in the buffer and permanent storage sections, is evident by their incorporation in many of the existing digital data-handling systems. One of the problems in using magnetic cores for permanent high-speed storage is that of selecting the few cores representing a storage register and then providing the high currents necessary for reading out or writing information into this register. Furthermore, it is desired to achieve this with as few driving tubes as possible. This paper solves the problem with the following assumptions; (a) the achievement of speeds comparable to those of presently available memories; (b) minimizing the number of vacuum tubes used; (c) the selection to be done external to the memory cores. This last assumption would make the memory system independent of core characteristics and would not require a matching of the cores used. This solution requires a diode to be used with each core. The resulting core memory achieves a random access time of two microseconds. It requires 3n+K driving tubes for n^2, K-bit storage registers. A theoretical analysis and synthesis procedure is given for the series-tube driving circuit on which this solution is based. Experimental results obtained from the operation of sixteen single-bit registers with the series-tube selection are also given. AF CRC TR 55-116.

Sensitive method for studying gyromagnetic media, by R. S. Hebbert. U. S. Naval Ordnance Laboratory, White Oak, Md. Aug 1954. 14p photos, drawing, diagrs, table. Order from LC. Mi $2.40, ph $3.30. PB 122049

Apparatus is described sensitive to Faraday rotations as small as one one-thousandth of a degree. It was constructed to aid in the development and confirmation of a theory of the susceptibility tensor of multiple sublattice ferrites. Several such ferrites were studied but this report is concerned mainly with the experimental techniques necessary to achieve high sensitivity rather than the results of these investigations. NAVORD 3744.

Serum agar measuring aid (SAMA), by William G. Glenn. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jun 1956. 5p photos, diagr, graph, table. Order from OTS. 50 cents. PB 121671

The Serum Agar Measuring Aid (SAMA) is an accessory device for the photronreflectometer. The combination permits photometric quantitation of serum agar column reactions. Results and evaluation indicate that with the use of SAMA accurate measurement of the density and diffusion of zones of precipitation can be made by beginning laboratory technicians. SAMA can also be used to quantitatively determine antibody response, follow protein fractionation, and identify unknown participants in precipitin reactions. AF SAM R 56-83.

Theory and operation of a dynamic tester for evaluating package cushioning material, by A. D. Klingenberg. U. S. Air Force. Air Research and

Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Sep 1956. 42p photos, diagr, graphs. Order from OTS. $1.25. PB 121692

The principles of cushioning design are presented. The characteristics of several possible types of dynamic cushion testers are discussed, and the reasons shown for selection of the free fall platform tester. A description of the tester and the dynamic cushion test procedure is given. A method for data reduction of test results is shown. The reliability of the cushion tester is proven by statistical techniques. Sample drop test results are given. It is shown how deflections caused by dropping a series of weights can be computed on the basis of a measured deflection occurring in the first drop. AD 97327. Project 7312. Covers period of work Sep 1954 - Jun 1956. AF WADC TR 56-342.

Van der Waals Laboratory of Amsterdam, by Donna Price. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1952. 49p photos, drawings, diagrs, table. Order from LC. Mi $3.30, ph $7.80. PB 122078

This report describes a survey of high pressure operations and equipment at the Van der Waals Laboratory. The information which was obtained is to be used by the Thermodynamics group in making similar studies of gases at high pressure with the aid of equipment of the Van der Waals' design. NAVORD 2322.

Very low frequency sound recording system, by I. L. Robey and A. Z. Robinson. U. S. Naval Ordnance Laboratory, White Oak, Md. Oct 1951. 13p diagrs. Order from LC. Mi $2.40, ph $3.30. PB 122442

A low frequency sound recording and playback system has been developed for disc recording. A suppressed carrier technique is used. The new system has a dynamic range of approximately 60 db. A brief description of the operation of the system is given with block diagrams and also detailed circuit diagrams of an experimental model. Unclassified. NAVORD 2209.

MEDICAL RESEARCH AND PRACTICE

Acceleration of burn and wound healing with methionine zinc. Progress report for period Jan 1, 1954 to Dec 31, 1954 under Contract N6 onr-24111, by William H. Strain, Arthur M. Dutton, Hannelore B. Heyer, Walter Pories, and George H. Ramsey. Rochester. University. Dept. of Radiology, Rochester, N. Y. Dec 1954. 27p photos, tables. Order from LC. Mi $2.70, ph $4.80. PB 123792

Good results were obtained on rats and humans. Details are given. Some zinc complexes are also under study. For progress report, 1953, see PB 116404. Includes Annual progress report for period Jan 1, 1954-Dec 31, 1954.

Aspects of the realtionship between irradiation injury and mammalian host defense mechanisms: A review, by David M. Donaldson and Stanley Marcus. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jun 1956. 22p. Order from OTS. 75 cents. PB 121746

This study reviews and evaluates the principal work, accomplished to date, pertaining to the effect of irradiation on the ability of the host to resist an infection. Included in the survey are sections on celluler defenses, humoral defenses, respiratory tract clearance, and trauma—as related to irradiation. AF SAM R 56-50.

Attempt to demonstrate a lethal toxin in the blood of irradiated rats, by James R. Lott and James L. Wilding. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jun 1956. 5p graph, tables. Order from OTS. 50 cents. PB 121673

A series of experiments was conducted in an attempt to demonstrate a circulating toxin in the blood of irradiated rats. At 1, 6, and 24 hours postradiation, 5 ml. of blood from irradiated animals were transfused into normal animals which had been simultaneously exsanguinated in identical amounts. A total of 101 rats was irradiated by Co60 gamma radiation in doses of 1,000 r through 20,000 r and their blood transfused into normal rats. It was found that after an initial weight loss all surviving animals gained weight over a 30-day period and no deleterious effects of the transfused irradiated blood were observed. AF SAM R 55-110.

Effects of gravitational stress upon visual acuity, by William J. White and Warren R. Jorve. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aero Medical Laboratory, Wright Patterson Air Force Base, Dayton, Ohio. Nov 1956. 36p photos, drawings, graphs, tables. Order from OTS. $1. PB 121709

It was the purpose of this study to determine the relationship between increased gravitational force and visual acuity when the factor of reduced cerebral circulation is minimized by the use of protective measures known to ameliorate the gross visual symptoms associated with g stress. It was found that gravitational stress has a significant and progressive effect upon visual acuity. Hypotheses are advanced to account for the difference in visual performance during gravitational stress. AD 110444. Project 7193, Task 71611. Thesis - Ohio State University, Columbus, Ohio. AF WADC TR 56-247.

Efficiency of impaired ears in noise: D. Relationship between type of impairment and auditory masking, by Charles Lightfoot. U. S. Air Force. School of Aviation Medicine, Randolph Field, Tex. Jun 1956. 10p graphs, tables. Order from OTS. 50 cents. PB 121747

Several variables are considered with respect to their relationship to auditory masking produced by thermal noise. Particular attention is given to an experimental study of the roles played by type of ear (normal, conductively impaired, and perceptively impaired), "effective level" (Z) of the masking noise, and kind of masked stimulus. For parts A - C see PB 112894, 112314, 113580. AF SAM R 55-121.

Elementary statistical approach to microbiological research, by James L. Mahan. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Sep 1956. 59p tables. Order from OTS. $1.50. PB 121713

The statistical approach is illustrated by making an analysis of data obtained from an experiment which was designed to evaluate a number of commercial fungicidal treatments on cotton webbing. The Newman-Keuls test is used to arrange the significant treatment combinations according to their effectiveness. The results of the analysis of variance and the Newman-Keuls test are considered in relation to information concerning the phenomena associated with the use of fungicides. The information obtained from the analysis of variance and the statistical summary of the data are used to estimate the minimum sample size required for tests of fungicides according to specification requirements. The importance of random sampling is discussed briefly and illustrated. References to selected books concerning experimental design are given. AD 97279. Project 7312. Covers work from Jan - Jul 1956. AF WADC TR 56-431.

Histochemical approach to the sweat retention problem, by Walter C. Lobitz and John B. Holyoke. Hitchcock Clinic and Dartmouth Medical School, Hanover, N. H. Apr 1956. 50p photos. Order from LC. Mi $3.30, ph $7.80. PB 122912

Histochemical findings are reported on the human skin in studies of the cause of heat rash (miliaria rubra) which has become a year-round problem since the development of vapor barrier clothing and footwear. A new material was found lining the lumen of the eccrine (thermal) sweat glands. In individuals who are subject to miliaria rubra this lining material is heavier in amount and at times actually forms "casts" or "plugs", filling the entire lumen. The course of recovery of skin and sweat glands from injury was studied with particular attention to the appearance and disappearance of glycogen, which probably represents stored energy for subsequent growth or repair processes. In individuals subject to miliaria rubra the presence of glycogen in certain cells suggested previous injury. Project reference 7-64-12-004D. QMC EP TR 23.

Mechanisms of natural acclimatization: Capillary studies at high altitudes, by Enrique Valdivia. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jun 1956. 7p tables. Order from OTS. 50 cents. PB 121748

Natural acclimatization to high altitudes was investigated including observations on the number of capillaries and their relationship to the number of fibers in striated muscles of guinea pigs living natively at sea level (Lima) or high altitudes (natives of Junin, altitude 13,800 feet, taken to Morococha, 14,900 feet). The number of muscle fibers was about the same for both groups. A significantly greater number of capillaries per square millimeter of muscle tissue and a higher ratio of number of capillaries per number of muscle fibers in the same area were observed in the high altitude group as well as a greater number of blood capillaries around each muscle fiber and a higher concentration of blood hemoglobin. AF SAM R 55-101.

Subcutaneous administration of plasma substitutes with hyaluronidase: Studies with dextran, by William J. Pyles and Louis B. Dotti. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Jun 1956. 16p graphs, tables. Order from OTS. 50 cents. PB 121672

Influence of hyaluronidase on the adsorption of dextran (in saline) from subcutaneous tissue was studied in normal rabbits, dogs, and man. Conclusions: (1) Solutions of clinical dextran in saline are absorbed from the subcutaneous tissue. (2) Hyaluronidase facilitates spread and absorption. (3) The early blood dextran levels are not high enough for the treatment of acute hemorrhagic shock. (4) Plasma volume is not diminished after hypodermoclysis. (5) Low molecular weight dextran offers no advantage over clinical dextran. AF SAM R 55-2.

Test for antibacterial properties and marginal bacterial percolation characteristics of various dental filling materials, by Norman O. Harris and Theodore E. Fischer. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. Aug 1956. 9p photos, graph, tables. Order from OTS. 50 cents. PB 121675

A simple, reproducible, and inexpensive method of testing for the combined antibacterial and percolation characteristics of resinous filling materials consists of two phases: (1) the establishment of the relative potency of the contained antibacterial agents; and (2) the determination of the combined effect of physical properties and antibacterial action on the percolation characteristics of the

material. It is possible by the use of selected antibacterial agents to increase the antibacterial properties of autopolymerizing resinous filling materials. However, there is a rapid loss of such action following exposure of the test filling to accelerated laboratory testing or to intra-oral environment. AF SAM R 56-60.

METALS AND METAL PRODUCTS

Abstract compilation of the literature on high temperature oxidation of metals. Part III, by W. Martin Fassell, Jr. and Robert C. Peterson. Utah. University. Dept. of Metallurgy, Salt Lake City, Utah. Feb 1954. 169f. Order from LC. Mi $7.80, enl pr $27.30. PB 123814

Additional literature on metals from aluminum to zirconium, inclusive. For Parts I-II see PB 113029-113030. Contract DA-04-495-ORD-237, Technical report no. 3, Part 3.

Anomalous electron emission from metallic surfaces, by Franz R. Brotzen. U. S. Naval Research Laboratory. Apr 1956. 12p drawing, graphs. Order from OTS. 50 cents. PB 111938

Low-melting metals and alloys were heated in a Geiger-Muller free-flow tube and the electron emission from their surfaces was observed. The solidification process in tin, bismuth, and cadmium is associated with an anomalously high emission rate. No emission peaks were observed during the solidification of lead, lead-tin alloys, and cadmium-tin alloy. In the cases of lead and a cadmium-tin alloy, however, emission peaks were observed during the heating cycle at temperatures below the melting point. Earlier work of the emission effect (Kramer effect) is reviewed and possible mechanisms are discussed. NRL R 4733.

Classification of contractors' standards for the procurement of Bureau of Aeronautics aluminum and magnesium castings, by N. Modine and E. L. Criscuolo. U. S. Naval Ordnance Laboratory, White Oak, Md. May 1956. 26p graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 123470

1. Aluminum castings - Specifications 2. Magnesium castings - Specifications 3. NAVORD 4270.

Corrosion properties of various materials in high temperature waters, by C. J. Lancaster. U. S. Naval Engineering Experiment Station, Annapolis, Md. Jun 1953. 24p photos, diagr, tables. Order from OTS. 75 cents. PB 121503

Results are presented for a number of experiments that relate to the behavior of selected alloys in high temperature waters. Descriptions of the test follow: (a) Static test of stressed and unstressed Types 347 and 310 stainless steel in 500°F distilled water with 300 ppm NaCl added. (b) Static test of stressed and unstressed Types 347 and 304 stainless steel in 500°F boiler feedwater with various concentrations of constituents. (c) Dynamic loop test of several alloys at 10 ft/sec in 500°F water containing from 1 to 3 ml/l oxygen. (d) Dynamic autoclave test of various prestressed alloys in 550°F natural sea water at 10 ft/sec. NS-200-020. NAV EES 040028B.

Development of low alloy Ti-B steels for high temperature service applications. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. Apr 1952. 77f photos, graphs, tables. Order from LC. Mi $4.50, enl pr $13.80. PB 123915

Ti-B type ferritic steels have been investigated and their creep and rupture properties evaluated and improved for service temperatures in the neighborhood of 1200°F. It was demonstrated that such a composition not only could be steel mill processed satisfactorily on a semi-commercial basis, but also that 1200°F rupture and creep strength properties equivalent to Cr-Ni stainless steels could be obtained for several hundred hours of life. As the result of studies made on a variety of compositions of 30-lb. laboratory heats of Ti-B steels with varying C, Ti, B, Mo, Cr, W, and V, it was possible to determine the effect of these alloys on the high temperature strengths of the ferritic steels. Contract W33-039-ac-21094. AF WADC TR 52-77.

Effect of variation of temperature and pressure on composition of alloys, by William M. Spicer. Georgia Institute of Technology. State Engineering Experiment Station, Atlanta, Ga. Dec 1955. 56p diagrs, graphs, tables. Order from OTS. $1.50. PB 121235

Experiments were performed on several solid alloys in an attempt to show that concentration gradients might develop as a result of a pressure gradient or a temperature gradient. The results on the pressure effect were inconclusive. However, the results on the temperature effect, especially those on the Pb-14.8 per cent Sn and the Al-21.9 per cent Zn alloys, indicate strongly that a concentration gradient did develop as a result of the temperature gradient. With the Al-21.9 per cent Zn alloy, the percentage of zinc attained a maximum of 25.57 per cent and a minimum of 18.12 per cent in one of the three runs. Final report under Contract AF 18(600)-974, project no. R-355-20-14, Jan 1, 1954 through Dec 31, 1955. Project no. A-136, Final report.

Electrochemical behavior of gold in chloride solutions, by Guido Poli. Politecnico di Milano, Laboratorio di Elletrochimica, Chimica Fisica e Metallurgica, Milan, Italy. Jul 1955. 35p graphs (1 fold), tables. Order from LC. Mi $3, ph $6.30. PB 122405

Anodic and cathodic behavior of gold in various chloride solutions with added KCl, at temperatures of 25, 50, 75°C, has been thoroughly investigated. The influence of chloride ions, temperature, stirring and aurous ions on voltage-current density curves have also been investigated. AD 82509. Technical note no. 2. AF OSR TN 56-113. Contract AF 61(514)-733C.

Electrodeposition of titanium, by Walter E. Reid, Jr., Jean H. Connor and Abner Brenner. U. S. National Bureau of Standards. Sep 1956. 18p. Order from OTS. 50 cents. PB 121721

The possibility of using sodium or potassium borohydride instead of lithium borohydride to prepare the titanium and zirconium borohydrides was examined. Among the new compounds prepared for use in the titanium-aluminum alloy bath were chloroborohydride etherates of titanium. Some work was done on the use of organometallic aluminum compounds in a titanium alloy bath rather than the hydride aluminum bath previously used. Alloys of titanium or zirconium with magnesium were obtained from a hydride type of bath. Codeposition of some metals similar to titanium, namely hafnium and thorium, with aluminum from the borohydride bath was studied for purposes of comparison with the titanium-aluminum alloys. A number of reactions between reactive organic compounds and titanium salts were performed in the search for a suitable titanium plating bath. This included an unsuccessful attempt to prepare ethyltitanium and a tetraphenyl borate derivative of titanium. AD 110402. Project 7312, Task no. 73120. Covers work from Jan 1955 to Mar 1956 under Contract AF 33(616)-53-11. For Part 2 see PB 111876. AF WADC TR 54-485, Part 3.

Fatigue, creep, and rupture properties of heat resistant materials, by F. H. Vitovec and B. J. Lazan. Minnesota. University, Minneapolis, Minn. Aug 1956. 213p photos, diagrs, graphs, tables. Order from OTS. $5.50. PB 121580

Fatigue, rupture, and creep data at various temperatures obtained under various combinations of mean and alternating stress are presented for the alloys Stellite 31, S-816, 6.3% Mo-Waspalloy, 7% Mo-Waspalloy, M-252, Inconel X-550, 16-25-6 Timken, Crucible 422, Lapelloy and Stainless type 403. Tests were performed under axial stress on unnotched specimens and specimens having theoretical stress concentration factors of 2.4 and 3.4. The data are presented as S-N curves and stress range diagrams to show the effect on the fatigue and creep properties of specimen notch, temperature, ratio of alternating-to-mean stress, and stress magnitude. The role of both creep and fatigue as design factors and the relation of notch sensitivity to loading conditions are discussed with particular reference to temperature and ratio of alternating-to-mean stress. AD 97240. Project 7360. Covers work from Jun 1953 - Dec 1955. AF WADC TR 56-181. Contract AF 33(616)-2803.

Fundamental properties of metal-ceramics mixtures at high temperatures. Final report for the period Jun 1, 1946-Jan 1, 1955 under Contract no. N6 ori-143, NR 032-022, by E. L. Swarts and W. B. Crandall. Alfred University, Alfred, N. Y. Jan 1955. 103p drawings, diagrs, graphs, tables. Order from OTS. $2.75. PB 121413

The purpose of this investigation was first to formulate from mixtures of metals and oxides new compositions which might possess the more favorable characteristics of both classes of materials. Attempts were also to be made at using the lesser known metalloid and intermetallic compounds in these mixtures. Second, in order to evaluate these compositions, it was necessary to establish criteria and methods of testing. Finally, it seemed essential that theoretical concepts be developed to account for observed behavior of these new materials. The following general problems were studied: 1. Mechanism of heat transfer (thermal diffusivity). 2. Thermal shock. 3. Metal oxidation. 4. Solid state diffusion. Four appendices are also included. The first of these presents the results of a development program for synthesizing oxidation-resistant compositions. Appendix II describes the major pieces of equipment and apparatus developed for the performance of this contract. Appendices III and IV list the publications and technical reports generated during the course of this research program. AD 76956. References pp. 70-72.

High pressure oxidation of metals. Utah. University. Dept. of Metallurgy, Salt Lake City, Utah. Dept. of the Army project no. 599-01-004. Ordnance Research and Development project no. TB2-0001 and TB4-901. Office of Ordnance Research project no. 25. Order separate parts described below from LC, giving PB number of each part ordered.

Technical report no. 2: Tantalum, by William McKewan and W. Martin Fassell, Jr. Sep 1952. 17f graphs, tables. Mi $2.40, enl pr $4.80. PB 123810

Tantalum samples were oxidized in pure oxygen at temperatures of 500°C to 600°C. The pressure was varied from 14.7 psi to 500 psi. The linear law was observed in every case. An Arrhenius plot was made of the data at 14.7 psi and two activation energies were determined, 77.7 k cal/mol from 500°C to 540°C and 46.1 k cal/mol from 540°C to 600°C. The oxidation rate was found to vary directly with the pressure according to the equation $k = (0.297P + 10.0)$ mg/cm^2/hr., where P is in atmospheres. A mechanism was proposed involving a constant thickness film on the surface of the metal. This mechanism appears to explain the experimental data and the pressure effect.

Technical report no. 5: Tantalum in oxygen, by Robert C. Peterson, W. Martin Fassell, Jr. and Milton E. Wadsworth. Oct 1953. 30f photos, diagrs, graphs, tables. Mi $2.70, enl pr $6.30. PB 123816

The temperature and pressure dependence of the reaction of tantalum in oxygen were investigated from 500°C to 1000°C at pressures from 10 mm Hg. to 600 psi. totaloxygen pressure. Tantalum was found to oxidize linearly under the above conditions. Three distinct regions of temperature dependence were found with different energies of activation.

Technical report no. 6: Molybdenum in oxygen, by Robert C. Peterson and W. Martin Fassell, Jr. Sep 1954. 19f graphs, tables. Mi $2.40, enl pr $4.80. PB 123817

The temperature and pressure dependence of the reaction of molybdenum in oxygen were investigated from 525 to 700°C at pressures from one atmosphere to 47.6 atms. (700 psia). Molybdenum was found to oxidize linearly from 525 to 650°C at all pressures investigated.

Technical report no. 7: Oxidation of metals under conditions of a linear temperature increase, by John P. Baur, Donald W. Bridges and W. Martin Fassell, Jr. Oct 1954. 16f graphs, tables. Mi $2.40, enl pr $4.80. PB 123818

A method of studying the oxidation behavior of metals has been developed wherein the metal sample is subjected to a linear temperature increase at constant oxygen pressure. The linear temperature increase method was applied to the metals Ta, Nb, Mo, Cu, Zr, Mg, Ti and W. The results are in good agreement with those of previous investigations made in this laboratory. Theoretical considerations show that the results could be explained by imposing the conditions of a linear temperature increase on a general type rate equation.

Investigation of stress relief procedures for titanium and titanium alloys, by Franklin J. Gillig. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. Aug 1956. 82p photos, diagrs, graphs, tables. Order from OTS. $2.25. PB 121570

The causes and effects of residual stresses in titanium aircraft parts were critically examined and a means of reducing these residual stresses to a practical value by thermal treatments was evolved. The purpose of the work was twofold: (a) To present a summary of residual stress effects and attempted residual stress measurements in titanium aircraft parts; (b) To obtain experimental data on the effectiveness of various time-temperature combinations for stress relief of elastically restrained unalloyed and alloyed titanium sheet. The fundamental principles underlying the build-up of residual stress are reviewed. The difference between macro and micro stresses is discussed and the relationship between these stresses and the properties of the material are pointed out. Methods of relieving residual stresses are outlined. The X-ray diffraction, brittle lacquer and strain relaxation methods of residual stress analysis were attempted. All but the latter were unsuccessful. The method of setting up simulated residual stresses in a simple beam specimen and measuring their decay with time and temperature is described. Using this method, relaxation tests were made on four titanium compositions. As a result of these tests, recommended stress relief treatments are given for the above alloys. Project no. 7351. Covers period of work from 1 Nov 1954 to 31 Dec 1955 under Contract AF 33(616) 2688. AD 97200. AF WADC TR 55-510.

Investigation of the compressive, bearing, and shear creep-rupture properties of aircraft structural metals and joints at elevated temperatures, by Frank J. Vawter, Glen J. Guarnieri, Luke A. Yerkovich, and George Derrick. Cornell Aeronautical Laboratory, Inc., Buffalo, N. Y. Sep 1956. 95p graphs, tables. Order from OTS. $2.50. PB 121656

Tensile creep data are included for A-70 commercially-pure titanium, C-110M titanium alloy and SAE 4130 alloy steel sheet. Bearing creep data are presented for A-70 and C-110M titanium, 4130 steel and type 321 stainless steel. In addition, results of shear-pin deformation tests on 2117-T4 aluminum, Monel and type 301 stainless steel wire and compression creep test results for 2024-T3 aluminum sheet and plate and C-110M titanium alloy sheet are included. AD 97283. For Part 1 see PB 121436. Project 7360. Covers work Dec 1953 - Dec 1954 under Contract AF 33(616)-190. AF WADC TR 54-270, Part 2.

Light alloys. Blast furnace process (Hochofenverfahren). British Intelligence Objectives Sub-Committee. Jan 1943-Nov 1943. 97p drawings, diagrs (part fold), graphs, tables. (Text in German). Order from LC. Mi $5.40, ph $15.30. PB 123647

Contents: Bernard Berghaus A. G. - Notes on the expense accounts of Dr. Kretzschmar in letter of 16.11.1953. - Short summary of experiments and expense accounts of Kopsch 26.1.1943. - Bauxite information: Description of the Leichtmetallwerk Bernhard Berghaus en Engerau, by W. E. Krebs. 7 Jan 1943. - Reprint from Stahl und Eisen, vol. 735, 27 Aug 1942, on production of aluminum from bauxite by electrolysis. - Notes on interview with Prof. Peschke of Clausthal, 7.7.1941 - TRV process (Alumina - crude iron - compounding process) 21 Jun 1943.- Alumina production process at Bernhard Berghaus, Engerau plant 20.4.1943. - Report on cement slime from TRV-process, by Herr Hiedler, Herr Marx, Dr. Menzen. 29.4.1943. - Drawings, diagrms and graphs.

Lighting, viewing, and communication system for the NOL 8'D x 30' pressure vessel, by H. F. Koch. U. S. Naval Ordnance Laboratory, White Oak, Md. Jun 1955. 33p photos, drawings. Order from LC. Mi $3, ph $6.30. PB 120985

For details of pressure vessel see NAVORD 3586.

1. Pressure vessels - Design 2. Pressure vessels - Lighting 3. Pressure vessels - Viewing systems 4. NAVORD 3924.

Magnetic properties of 6.4% silicon-iron sheet material, by J. F. Nachman and W. J. Beuhler. U. S. Naval Ordnance Laboratory, White Oak, Md. May 1956. 20p graphs, fold table. Order from OTS. 50 cents. PB 121545

Preparation techniques and magnetic properties evaluation of 6.4% silicon-iron sheet material are described. The evaluation includes the effect of annealing variations and minor alloying element additions. High permeability, moderately square hysteresis loop, low magnetostriction, and non-strategic aspects make this alloy particularly interesting. NAVORD 4304.

Materials-property-design criteria for metals. Part 3: Fatigue evaluation of magnesium alloys, by W. S. Hyler and F. H. Lyon. Battelle Memorial Institute, Columbus, Ohio. Aug 1956. 27p graphs, tables. Order from OTS. 75 cents. PB 121579

A study was made of three magnesium alloys FS-1a (AZ31A-O), J-1 (AZ61A-F), and O-1 (AZ80A-F) under conditions of completely reversed stress for the three kinds of loading. Results suggest that the discrepancies noted in ANC-5 data between rotating-beam fatigue data and data from the other two types of tests are real. Certain other inconsistencies in the data suggest that additional fatigue studies should be made to provide more reliable information. A review of methods of presenting fatigue data in ANC-5 was made. It is suggested that a more consistent method of presentation be followed for the various alloy systems for which fatigue data are reported. AD 97212. Project 7360, Task no. 73605. Covers work from Oct 1954 to Jun 1955 under Contract AF 33(616) 2303. AF WADC TR 55-150, Part 3.

Mechanical properties of porosity-graded 195 alloy. Part I: Tensile properties, by Irving J. Feinberg. U. S. Naval Ordnance Laboratory, White Oak, Md. Jun 1956. 44p photos, graphs, tables. Order from OTS. $1.25. PB 121546

The radiographic classification procedure followed to obtain reliable grade assignments for test material is described. Quantitative determinations of the damage by elongated hydrogen gas porosity to ultimate tensile strength, to yield strength, and to percent elongation were obtained. Expected minimum properties for material containing seven degrees of porosity are given. NAVORD 4293.

Metal and ceramic materials for jet propulsion devices (AC-75): Final report, by Howard C. Cross. Battelle Memorial Institute. Columbus, Ohio. Jan 1946. 47f photos, table. Order from LC. Mi $3.30, enl pr $9.30. PB 123902

This report discusses both metal and ceramic materials, and electroplated and vapor-phase coatings used for nozzles and other parts of jet propulsion devices. Some studies were made on plastic materials for use in an acid-aniline type of jet motor. Three spring materials were suggested for elevated temperature service. NDRC Research Project NRC-88. Unclassified Dec 17, 1954. Contract OEMsr-1345. OSRD 6571. NDRC Div 18 - M648.

Non-strategic substitute for Alnico magnets utilizing ultra-fine iron powder, by Edmond Adams. U. S. Naval Ordnance Laboratory, White Oak, Md. Apr 1951. 17p photos, diagrs, graph, table. Order from LC. Mi $2.40, ph $3.30. PB 122435

The various processes available for the production of fine iron are discussed and the most suitable iron powder was obtained by the decomposition of organic iron salts, such as ferrous formate. The preliminary work shows that the material has great promise as a non-strategic substitute for Alnico II with some theoretical basis for improvement of present magnetic properties. Unclassified. NAVORD 1826.

Parabolic-linear oxidation rate transition theory, by William McKewan and W. Martin Fassell, Jr. Utah. University. Dept. of Metallurgy, Salt Lake City, Utah. Feb 1952. 17f diagrs, tables. Order from LC. Mi $2.40, enl pr $4.80. PB 123811

A new theoretical concept is proposed to account for the type of oxidation followed by metals upon exposure to an oxidizing atmosphere at elevated temperatures. The hypothesis is based on the relative rates of oxidation and recrystallization of the tarnish coating. If the recrystallization rate of the oxide coating formed on the surface is greater than the oxidation rate of the metal, the coating will be protective and hence will follow the parabolic equation. If the reverse situation is true, the coating will be non-protective and the rate curve will be linear. Contract DA 04-495-ORD-237, Technical report no. 1.

Performance of stainless steel sandwich construction at high temperatures, by V. C. Setterholm and E. W. Kuenzi. U. S. Forest Products Laboratory. Madison, Wis. Sep 1956. 39p photos, graphs, tables. Order from OTS. $1. PB 121681

This report presents the results of edgewise-compression and flexure tests which were conducted on stainless steel sandwich constructions at temperatures ranging from 75° to 1,200° F. Although many of the panels were corroded and poorly bonded, results of edgewise-compression tests showed that specimens from panels weighing only 2.2 pounds per square foot can sustain facing stresses as high as 230,000 pounds per square inch at 75° F and 57,000 pounds per square inch at 1,200° F. AD 97288. Project 7340. Covers period of work from Oct 1953 to Oct 1955. AF WADC TR 55-417.

Polarographic determination of gallium in aluminum and aluminum alloys, by George W. Latimer, Jr. and Charles D. Houston. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory. Wright-Patterson Air Force Base, Dayton, Ohio. Sep 1956. 19p photo, graphs, tables. Order from OTS. 50 cents. PB 121720

Polarographic determinations of gallium have been limited to concentrations less than 3×10^{-5} molar because of the interference of the hydrogen wave. By adapting a method utilized by Williard and Dean to determine aluminum, the interference caused by the evolution of hydrogen is eliminated and gallium concentrations up to 15×10^{-5} molar can easily be determined. The gallium is separated from aluminum and most interfering ions by ethyl ether extraction from 5M H Cl The ether is evaporated and the gallium is complexed with Eriochrome Violet. This complex has a polarographic wave beginning at -.3v which is directly proportional to the concentration of gallium. AD 97280. Project 7360. Covers period of work from Jan to May 1956. AF WADC TR 56-263.

Preliminary investigation of silicon-iron alloys for magnetic applications, by J. F. Machman. U. S. Naval Ordnance Laboratory, White Oak, Md. Apr 1951. 28p photo, graphs, tables (1 fold). Order from LC. Mi $2.70, ph $4.80. PB 122616

An exploratory investigation was carried out to determine the possibility of producing unoriented silicon-iron alloys with improved magnetic properties. To accomplish this, a series of high purity silicon-iron alloys were prepared by melting under a hydrogen atmosphere. Laminations were then punched from 15 mil sheet rolled from the above alloys and subjected to the various heat treatments, including magnetic anneals of various field strengths, that were used in the previous investigations of nickel-iron alloys. The data include a series of curves summarizing the effects of the various annealing procedures upon magnetic properties; and also, x-ray diffraction and grain size studies of annealed laminations. It was found that the most promising results, with reference to maximum permeability and low coercive force, were obtained by magnetic annealing at low field strengths. NAVORD 1828.

Production of sound ductile joints in molybdenum by M. I. Jacobson, D. C. Martin and C. B. Voldrich. Battelle Memorial Institute, Columbus, Ohio. Jan 1954. 72f photos, drawings, graphs, tables. Order from LC. Mi $4.50, enl pr $13.80. PB 123916

Methods of welding and brazing molybdenum with the objective of producing sound ductile joints were investigated during the period 25 March 1952 to 25 September 1953. The results of tungsten-arc welding tests showed that, although ductile weld metal could be produced, the welded joints were brittle transverse to the direction of welding because of recrystallization in the base metal. Several brazing methods were investigated, with induction brazing in an argon atmosphere appearing to be the most satisfactory from the standpoint of braze quality and practicability. Brazed joints were tested at room temperature and at 1800°F. The brazing alloys that gave the best results at 1800°F were inconel and Haynes Alloy 25, which produced joints with 100-hour shear strengths of 5000 psi and 4500 psi, respectively. AF WADC TR 53-401. Contract AF 33(616)-10.

Simultaneous polarographic determination of cadmium and tin, by George W. Latimer, Jr., C. D. Houston and Keith E. Eubank. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Sep 1956. 13p tables. Order from OTS. 50 cents. PB 121685

The development of new and improved platings for copper sheets has led to a need for improved methods of analyzing the plated material. The simultaneous polarographic determination of cadmium and tin provides a rapid method of analyzing these coatings. Analysis of synthetic standards by this method shows that there are very few interfering substances and that this procedure is applicable to a wide range of concentrations with reasonable accuracy. AD 97281. Project 7360. Covers work from Oct-Dec 1955. AF WADC TR 56-299.

Stability of commercial alpha-beta titanium alloys, by Donald A. Wruck. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Materials Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Aug 1956. 35p photos, graphs, tables. Order from OTS. $1. PB 121655

An investigation was undertaken to observe the influence of various factors such as temperature, time-at-temperature, stress, and hydrogen contamination on the stability characteristics of commercial alpha-beta titanium alloys, as well as to gain an insight into the nature of the reactions responsible for the ductility loss in an unstable microstructure. Commercial alloys utilized in one phase or another in this program included Ti-150A, Ti-155A, Ti-140A, C-130AM, C-110M, Ti-6Al-4V, RS-140X, and 3Mn Complex. Tests show that in the absence of hydrogen contamination the alpha-beta type alloys can be rendered quite stable up to the maximum temperatures at which they retain useful strength for stressed applications. The Ti-150A alloy loses a considerable amount of room temperature ductility after being exposed to 800°F for 200 hours and can subsequently be rendered ductile by annealing at 1200°F for 24 hours. Machanisms of embrittlement are discussed, as well as the practical significance of stability. AD 97214. Project 7351, Task no. 73510. Covers research from Jan 1955 to Jun 1956. AF WADC TR 56-343.

Statistical evaluation of variation in endurance limit among several heats of propeller type steel, by W. L. Starkey, S. M. Marco, and R. R. Gatts. Ohio State University Research Foundation, Columbus, Ohio. Aug 1956. 147p photos, diagrs, graphs, tables. Order from OTS. $3.75. PB 121654

Samples from three heats of SAE 4330, five heats of SAE 4340, and four heats of SAE 4350 aircraft quality steel were subjected to Prot-type rotating bending endurance tests. All specimens were heat treated to approximately Rockwell C 43 hardness. Separate estimates of the arithmetic average and the standard deviation of the endurance limit were determined for each heat. An evaluation was made of the extent of agreement between the data obtained and a normal frequency distribution of the endurance limits of individual specimens. On the basis of normal distribution, confidence limits of 95% probability were established for each estimate of average endurance limit. The effects of various parameters on the average and on the standard deviation of specimen endurance limits were studied. Additional endurance tests were performed to compare the results of Prot-type tests with conventional endurance tests. AD 97190. Project 3346. Covers work 1 Apr 1954 - 1 Aug 1955 under Contract AF 33(616)-2468. AF WADC TR 55-483.

Stress corrosion cracking in type 403 stainless steel, by Mars G. Fontana. Ohio State University Research Foundation, Columbus, Ohio. Aug 1956. 59p photos, graphs, tables. Order from OTS. $1.50. PB 121414

The effect of austenitizing temperature on the hardness, impact strength, and microstructure of types 403, 420, and 431 stainless steel was determined. The optimum combination of these properties occurred with austenitizing temperatures of 1725°, 1850° and 1900°F respectively for the 403, 420, and 431 materials. Tempered structures displayed minimums in the impact strength, tempering temperature curves at 1000°, 900 and 1000°, 900 and 1000°F for the 403, 420 and 431 materials respectively. Metallographic studies were made of stress-corrosion specimens tested in a 1:1 HCl and water solution containing 1% SeO_2. Electron microscopy and diffraction studies were made of tempered type 403 stainless steel. Project no. 7351, Task no. 73512. Covers work during the period Mar 1, 1955 to Apr 30, 1956 under Contract AF 33(616)-2849. AD 97215. AF WADC TR 56-242.

Studies on ball bearing steels. Part II: Effect of some metallurgical factors on the life of ball bearing steels, by Manabu Ueno, Tetsutaro Mitsuhashi, and Yutaka Nakano. Translated by William K. Y. Tao. Jul 1956. 17p graphs. Order from OTS. 50 cents. PB 121427

The inner rings of ball bearings, whose life-span was known by test, were studied to search for the relationship between certain metallurgical factors and life-span. Some of the factors tested were the chemical composition, non-metallic inclusions, hardness, compressive loading on the inner ring, cementite content, grain size and degree of forging. Translated from Journal of the Iron and Steel Institute of Japan, Oct 1955, p. 1102-1107. NAVSHIPS T 612. STS 239.

Surface treatments of low alloy steels, by Sam Tour. Sam Tour and Co., Inc., New York, N. Y. Nov 1954. 261p tables. Order from OTS. $5. PB 121507

This report is to be used as a guide to Air Force contractors in the selection of surface treatments of low alloy steels for corrosion and oxidation resistance at a minimum expense in critical materials. Forty metallic and nineteen paint types of heat resistant coatings applicable to plain carbon and low alloy steels are described and evaluated. Relative temperature, corrosion and abrasion resistances are given. Effects on base metal, formability of coated steel, weldability, joining characteristics and costs per square foot of surface coated are shown. A brief description is given of the processes used for applying and the nature of each of the coatings. Available information and sources of supply are given. Project no. 7351. AD 57463. AF WADC TR 54-209. Contract AF 33(616)-406.

Survey of low-alloy aircraft steels heat treated to high-strength levels. Syracuse University, Syracuse, N. Y. Contract AF 33(616) 392. Order separate parts described below from OTS, giving PB number of each part ordered.

Part 4: High-strength steels and their general static properties, by George Sachs. Aug 1954. 145p graphs, tables. $3.75. PB 121504

A general discussion of the factors which determine the selection of high-strength steels and their static-strength and design characteristics. In addition, the information available on the effects of the neumerous variables encountered in making, shaping and heat treating low-alloy steels and their significance for the strength properties of aircraft parts is discussed. The regular strength characteristics of the steels, and especially their tensile strength, yield strength, elongation and reduction of area, reveal no indication of an embrittlement of steels heat treated to strength values in excess of 200 ksi, in general, and of those tempered at temperatures between 500 and 750°F, in particular. However, there is some indication that at very low testing temperatures steels heat treated within this tempering range also may exhibit a comparatively low ductility. AD no. 45578. For Parts 1-3, 5 see PB 123090, 121700, 121667, 121505. AF WADC TR 53-254, Part 4.

Part 6: Recommendations for future research work on high-strength steels, by George Sachs and E. P. Klier. Sep 1954. 9p. 50 cents. PB 121506

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The Appendix presents a number of suggestions for future research work on low-alloy aircraft steels heat treated to high strength levels. AD no. 52663. AF WADC TR 53-254, Part 6.

Technical manual on the machining of Thermenol. Duraloy Co., Scottdale, Pa. Feb 1956. 22p photos. Order from OTS. 75 cents. PB 121660

Thermenol is an alloy composed of 16% aluminum, 3.5% molybdenum and the balance iron and possessing high temperature, non-corrosive, and lightweight (20% lighter than steel) properties as well as superior magnetic properties as regards permeability and high electrical resistivity. Any one or all of the above properties indicates the importance that must be attached to the further development of this alloy. This is particularly true if any real strides are to be made in the effort to relieve the critical shortage of alloying materials commonly in use today, and normally used to produce materials for defense, such as aircraft, guided missiles, airborne equipment and electronic instruments, etc. Contract NOas 55-729.

METEOROLOGY AND CLIMATOLOGY

Frequency of cold-wet climatic conditions in the United States, by Peveril Meigs and Fernand de Percin. U. S. Army. Quartermaster Research and Development Command. Quartermaster Research and Development Center. Environmental Protection Research Division, Natick, Mass. Jul 1956. 22p maps, tables. Order from LC. Mi $2.70, ph $4.80. PB 123468

Cold-wet conditions occur most frequently in the extreme Pacific Northwest, with a second maximum in the Northeast from the Great Lakes to northern New England. The minimum occurrence is in southern Arizona, New Mexico, Texas, and Florida. Unclassified 16 Aug 1956. Project ref. 7-83-03-0088. QMC EP TR 25.

Informal papers in Arctic meteorology. Report on a seminar in Arctic meteorology at Stanstead College, Quebec, Jul 25-Aug 5, 1955. Edited by Pamela Russell and Maurice B. Ballabon. McGill University. Arctic Meteorology Research Group, Montreal, Canada. Dec 1955. 71p fold. map, col. diagr, graphs, table. Order from LC. Mi $4.50, ph $12.30. PB 122363

Scientific report no. 1 under Contract AF 19(604)-1141. For supplement see PB 122363s. Contents: Atmospheric radiation, with applications to polar regions, by W. L. Godson. - Arctic jet streams and high-level turbulence, by W. L. Godson. - Problems of polar analysis, by W. L. Godson. - International Geophysical Year--Canadian meteorological program, by W. L. Godson. - Investigations in Arctic meteorology at McGill, by F. K. Hare. - Method of synthesizing high-level wind climatology, by T. J. Keegan. - On the climatological importance of ice-caps and glaciers, by S. Orvig. AF CRC TN 55-896.

Method for the observation of the ionization profile behind explosive produced shocks in air, by Jacob Savitt. U. S. Naval Ordnance Laboratory, White Oak, Md. Dec 1953. 13p photos, drawings, diagrs, graphs. Order from LC. Mi $2.40, ph $3.30. PB 122000

A method for the observation of the ionization profile behind explosive produced shocks in air is described. Preliminary measurements of a qualitative nature of the shocks produced by the detonation of small quantities of dextrinated lead azide are presented and discussed. It is found that the region of maximum ionization for these shocks is at some distance behind the shock front. Continuation of work reported in NAVORD reports 2132 and 2283 (PB 120849). NAVORD 3589.

On quasi-nondivergent prognostic equations and their integration, by Hsiao-Lan Kuo. Massachusetts Institute of Technology. Dept. of Meteorology, Cambridge, Mass. Aug 1955. 43p graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 122214

A general two-dimensional wind-pressure relationship is obtained as the first integral of the so-called "balance equation" which requires the horizontal divergence to remain small as compared with the vertical component of the relative vorticity for the large-scale motions. This wind-pressure relationship is used in determining the initial conditions and in deriving the governing equations. An influence function is computed for a normal atmosphere. Contract AF 19(604)-1000, Scientific report no. 2. MIT MET SR 2.

Report of the Radio section of the 1932-1933 American Polar Year Expedition, by H. B. Maris. U. S. Naval Research Laboratory. Mar 1934. 35p photos, diagrs, tables. Order from LC. Mi $3, ph $6.30. PB 120637

Apparent heights of the ionosphere were measured by the radio echo reflection method. Signals from distant stations during an active auroral display indicated that auroral activity may give a swinging Doppler shift to the frequency of a signal. Signal absorption was found to be much more important than maximum ion density in the reception of high frequency signals. This was found to be in agreement with the results of all attempts at commercial use of frequencies above 3000 kc in Alaska. Aurora observations of active and quiet auroral displays indicated a systematic regularity in the displays such as to suggest distinctly local changes in the property of the high atmosphere above Fairbanks. Photographs and drawings of several displays are reproduced. A close correlation was observed between auroral activity and local earth current and magnetic activity. Radio meteorgraphs were sent up in free sounding balloons and seven successful

records of stratospheric temperatures and pressures were obtained. Stratospheric temperature radiation was observed with thermometers at ground level. The preliminary conclusion was that such a method in addition to the standard procedure at the Weather Bureau stations, may offer a way to observe conditions in the polar stratosphere which create storm centers and influence weather in temperature latitudes. Unclassified. NRL H-1032.

Sky background studies. Final report covering the period 23 Apr 1954 - 31 Dec 1955 under Contract no. AF 19(604) 1111, by David Z. Robinson and Naomi-Ann Gold. Baird Associates, Inc., Cambridge, Mass. Dec 1955. 101p photos, diagrs (1 fold), graphs (1 fold), table. Order from LC. Mi $5. 70, ph $16.80. PB 122234

This report deals with the measurement of far infrared sky background radiation with the Evaporograph. The emphasis has been on the development of quantitative methods for the determination of the spatial distribution of radiation. During the course of this contract, a method of distinguishing between reflected sunlight and the actual sky radiation was developed. A method was evolved for measuring the radiation differences from every portion of the sky. These studies showed that radiation gradients exist in clouds. The theory of operation of the Evaporograph was shown to be inadequate when used for low temperature measurements. Some studies were made as to methods of automatizing the data collection and means of data reduction are discussed. Finally, the relationship between temperature differences and radiation differences is considered and means of improving the ability to measure temperature described. AF CRC TN 56-154.

Solutions of the coupled wave equations for vertical ionospheric propagation at 75 and 150 kc/s, by S. R. Butler, J. J. Gibbons, G. S. Levy and T. J. May. Pennsylvania State University. Ionosphere Research Laboratory, University Park, Pa. n.d. 137p graphs, tables. Order from LC. Mi $6.90, ph $21.30. PB 122996

In this report three computations are presented in which the properties of radio waves reflected at vertical incidence from various ionospheric models are obtained. In two of these computations, one of which is for 75 kc/s and the other for 150 kc/s, the absorption and polarization are computed. The polarization is obtained, by treating the coupling as a perturbation, by the method of variation of parameters. In the third computation coupling is not considered. In this problem attention is directed toward the mathematical justification of the methods employed by Gibbons and Schrag. Finally, the results are compared with the currently available experimental data and conclusions are drawn concerning the electron density models employed. AF CRC TN 56-463. PSC IRL SR 84. Contract AF 19-(604)-1304.

Winds and temperatures to forty kilometers, by W. C. Conover and C. J. Wentzien. U. S. Signal Corps Engineering Laboratories, Fort Monmouth, N. J. Aug 1953. 26p diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 123000

During the four years from 1948 to 1952 radiosonde flights were made from Belmar, New Jersey up to altitudes of 40 kilometers. Seasonal averages of the temperature and wind data obtained from these flights indicate a definite seasonal trend at all the observed altitudes. On the average the temperatures above 16 kilometers are higher in the summer and lower in the winter, increasing with altitude at a rate of one and one-half to two degrees centigrade per kilometer. The average wind speed above twenty-two kilometers increases with altitude; however, it varies greatly in speed and direction with the change in seasons, being in general strong and westerly during the winter and light and easterly during the summer. Dept. of the Army project no. 3-99-07-021. Signal Corps project no. 172A-2. Unclassified 7 Jun 1956. SCEL TM M-1524.

MINERALS AND MINERAL PRODUCTS

Development of ferroelectric ceramics, by J. D. Wallace and M. F. Pressler. U. S. Naval Air Development Center. Aeronautical Electronic and Electrical Laboratory, Johnsville, Pa. Feb 1953. 59p photos, drawings, diagr, graphs. Order from OTS. $1.50. PB 121418

This report describes, briefly, the preparation of ferroelectric ceramics and shows that most of the ceramic techniques can be applied directly to the ferroelectrics. The system discussed represents only one method, and there is little doubt that other methods might achieve the desired results more expeditiously and with greater certainty. Bureau of Aeronautics TED project no. ADC EL-46001. Bibliography pp. 34-36. NADC EL 52138.

Methods of separation of total rare earths in low-alloy constructional steels, by Ann Wennerberg. Armour Research Foundation, Chicago, Ill. Nov 1954. 157p. Order from OTS. $4. PB 121337

A comprehensive survey was made of the technical literature pertaining to the rare earths. Selections for the bibliography were limited to references on chemical methods of separation, fractionation, and determination. Studies of chemical and physical properties of rare earths and rare-earth compounds were also included wherever it appeared that they might suggest a basis for new or improved analytical schemes. Abstracts are included of 388 references from American and foreign technical literature. Contract DAI 11-022-ORD(P)-6. ARF Proj C 064. WAL R-120/73.

Report on synthetic bonded steel molding sands, by R. E. Morey. U. S. Naval Research Laboratory. Sep 1938. 63p diagr, graphs. Order from LC. Mi $3.90, ph $10.80. PB 120463

See also NRL - M - 1435 (PB 123287).
1. Sands, Molding - Properties 2. Bentonite - Uses 3. Bonding - Materials 4. Sands, Molding - Effect of bentonite 5. NRL M-1478.

Research on elevated temperature resistant ceramic structural adhesives, by Richard M. Spriggs, Henry G. Lefort, and Dwight G. Bennett. Illinois. University. Dept. of Ceramic Engineering, Urbana, Ill. Sep 1956. 99p graph, tables. Order from OTS. $2.50. PB 121659

Twenty-three ceramic adhesives of the ceramic-oxide, glassy-bond type, including six commercially available enamel frit compositions, were evaluated during the contract period. Evaluation was based, primarily, on the results of room and elevated temperature shear strength tests. Best results were obtained with ceramic adhesive UI 117-50. When used with 28 mesh stainless steel screen as a carrier, this adhesive gave shear strengths of up to 3680 psi when tested at 800°F. Twelve ceramic adhesives of the cermet type were tested in shear at room and elevated temperatures. Of these, only the adhesive which contained 30% metallic cobalt incorporated in a lead borosilicate glass matrix appeared to offer promise. Thirteen ceramic adhesives of the air-setting, temperature-resistant type were also evaluated. AD 97316. Project 7340, Task no. 73401. Covers period of work Jul 1954 - Nov 1955 under Contract AF 33-(616) 2556. AF WADC TR 55-491.

Synthetic bonded steel molding sands, by R. E. Morey. U. S. Naval Research Laboratory. Mar 1938. 33p graphs, tables. Order from LC. Mi $3, ph $6.30. PB 123287

Parts of this report will not reproduce well. See also NRL M 1478 (PB 120465).
1. Sands, Molding - Properties 2. Bonding - Materials 3. NRL M 1435.

ORDNANCE AND ACCESSORIES

Bruceton test results with non-normal populations, by L. D. Hampton. U. S. Naval Ordnance Laboratory, White Oak, Md. Jun 1951. 9p tables. Order from LC. Mi $1.80, ph $1.80. PB 122437

The analysis of a Bruceton up and down test assumes that the independent variable used in setting up the steps to be used is so chosen that the distribution of the dependent variable closely approximates the normal distribution. This report indicates the extent to which the results of the analysis may be in error due to a failure of this assumption. Unclassified. NAVORD 2129.

Investigation of cold extruded tube for artillery recoil cylinder applications, by A. Ayvazian. U. S. Arsenal, Watertown, Mass. Rodman Laboratory. Feb 1956. 24p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 123466

The investigation was conducted on a SAE 1012 cold extruded thin-walled steel tube. In the study the metallurgical properties of the cylinder were determined, together with response to machining techniques utilized in the manufacture of such cylinders normally produced from alloyed metals. The present program had a limited scope since no attempt was made to procure expensive dies and/or other equipment which would be required to produce a cold extruded tube which has to meet specific dimensional requirements. WAL RPL 31/1.

Method for determining the bomb-aircraft separation interval at fuze arming, by S. E. Wheatley. U. S. Naval Ordnance Laboratory, White Oak, Md. May 1951. 15p photo, drawings. Order from LC. Mi $2.40, ph $3.30. PB 122436

This report describes the preparation and performance of a group of modified service bombs and fuzes, for use in tests to determine the separation interval, at fuze arming, between a bomb and the aircraft from which it is released. Various general purpose bombs and standard fuzes were redesigned to produce a smoke signal upon completion of fuze arming when dropped under operational conditions. Unclassified. NAVORD 1871.

On the existence of a binary reaction zone at a metal-explosive boundary during detonation, by H. Dean Mallory. U. S. Naval Ordnance Laboratory, White Oak, Md. Jul 1954. 30p diagrs, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 122054

This report is a summary of recent progress made in the interpretation of pin point data. The pin technique has been used to measure the initial free surface velocity of aluminum targets struck by a plane detonation wave from crystalline TNT at a loading density of 0.624 g/cc. The data show the existence of an induction zone 0.20 microseconds wide which precedes the chemical reaction zone. NAVORD 3772.

PACKING AND PACKAGING

Development of principles and techniques of integration and packaging of printed circuit assemblies. Part I, final report for the period 1 Jun 1952-30

Sep 1954 under Contract no. DA 36-039-sc-42468, by E. D. Aldred, L. G. Brodrick, C. W. Everhart and M. E. Hinebaugh. Mallory, P. R. and Company, Inc., Indianapolis, Ind. Sep 1954. 74p photos, drawings, diagrs, graphs. Order from OTS. $2. PB 121163

This report contains package analyses for four devised systems of packaging and integrating RF, IF, and AF amplifiers. Systems included plug-in, stacked mechanical, distributed connector, and mechanically cascaded packages. Dept. of the Army project 3-26-00-602. Signal Corps project 32-2006C. For Part II see PB 111714. Contract DA 36-039-sc-42468, Final report, Part I.

Preservation of the exterior surface of wooden shipping containers to retain identification symbols in long-term outdoor storage. Second progress report on field tests, by H. W. Eickner and E. A. Mraz. U. S. Arsenal, Rock Island, Ill. May 1956. 25p photos, diagrs, tables. Order from OTS. 75 cents. PB 121666

This report summarizes the results of inspections of the legibility of stencil markings on wooden containers after one year of outdoor storage at Madison, Wis.; Panama Canal Zone; Fort Churchill, Canada; and Yuma, Ariz. Four marking materials were used with two undercoat and four topcoat treatments on boxes of red oak, southern yellow pine, and Douglas-fir. Approximately one-third of the stencil systems inspected had legibility ratings below fair plus, and there were marked differences in legibility within this group. The remaining systems inspected were rated fair plus to good. It is believed, however, that greater differences in the legibility of these systems will develop as exposures are prolonged. Ordnance Project TB 5-1101 F. D. A. Project 591-07-001. RIAL R 56-1.

PHOTOGRAPHIC AND OPTICAL GOODS

Evaluation of the accuracy of Shoran-controlled photography for mission III, part A, by Carl H. Hammack and LeRoy Lex. Jack Ammann, Photogrammetric Engineers, Inc., San Antonio, Texas. n.d. 40f diagrs, graphs, tables. Order from LC. Mi $3, enl pr $7.80. PB 123681

The primary purpose of this report is a presentation of the results obtained in Mission III, Part A, upon comparing the reduced Shoran distances with corresponding distances between the Shoran ground stations and the photogrammetrically determined nadir point position of the aerial exposures and a statistical analysis of the errors in the Shoran distances with the view toward isolating any constant, systematic or cyclic errors. Also, the position accuracy of the Shoran points was investigated and the errors of displacement analyzed statistically in order to determine what relative accuracy might be expected of the internal positioning of Shoran points within the map and the accuracy of placing a Shoran map with respect to the ground stations. This initial report of the six missions to be analyzed contains an outline on the procedures used on the A-7 for the determination of tilt, tip, azimuth, swing, flying height and nadir point and another outline for the recording and computing of this data obtained from the A-7, Form No. 1. AD 20836. For other reports under this Contract see PB 123675-123680. Project 8-35-05-001.

Microwave stepped-index Luneberg lenses, by G. D. M. Peeler, H. P. Coleman, M. C. Volk and W. R. Cuming. U. S. Naval Research Laboratory. Oct 1956. 21p photos, diagrs, graphs, tables. Order from OTS. 75 cents. PB 121561

Experimental data on two-dimensional, TE_{10} mode, stepped-index Luneberg lenses indicated that 10 shells were sufficient for 18-inch diameter lenses for use at X-band. Expanded polystyrene materials, developed with dielectric constants ranging from 1.1 to 2.0 in increments of 0.1, were used to construct 10-step, 18-inch-diameter, spherical Luneberg lenses. Performance data for these lenses are given at wavelengths of 3.2, 1.8, and 0.8 centimeters. NRL R 4843.

Shadowgraphic investigation of small spherical missiles entering water vertically at 7000 feet per second, by J. H. McMillen and R. L. Kramer. U. S. Naval Ordnance Laboratory, White Oak, Md. Nov 1952. 20p photos, diagrs. Order from LC. Mi $2.40, ph $3.30. PB 122005

Spark shadowgrams were obtained of 1/8-inch spheres entering vertically. By using exploratory beams from the spark it was possible to obtain a qualitative picture of the pressure field between the shock front and the water surface. This pressure field was observed in general to increase downward in the region between the shock front and the water surface and to increase upward near or at the shock front. The shadowgram recorded a pattern of wavelets and lines which were produced by the oscillating spherical missile. One pattern of lines was believed to originate with the wavelets in the pressure field immediately behind the shock front. Shadowgrams recorded on films within several sphere diameters of the missile path revealed that illumination accompanied impact. The average drag coefficient near sonic speeds in water was measured and data between 0.3 and 0.7 were obtained. NAVORD 2646. NOL ARR 130.

PHYSICS

General

Ansätze zur lösung der grundgleichungen der elastizitätstheorie (Preliminary statements for solu-

tion of the basic equations of the theory of elasticity), by K. Marguerre. Translated and edited by F. A. Raven. May 1956. 57p. Order from LC. Mi $3.60, ph $9.30. PB 123003

In recent years, numerous two- and three-dimensional problems in the theory of elasticity have been solved. The preliminary statements used for solution, apparently of very different nature from case to case, prove closely related to one another upon more detailed inspection; in final analysis, it is attempted to build up the solution from combinations of potential functions. The present study consists of the relationships existing between a large number of such statements and complements them by a didactically obvious new one. In an appendix appear the most important rules for vector and tensor calculus. Translated from Zeitschrift für angewandte mathematik und mechanik, vol. 35, no. 6/7, Jun/Jul 1955, pp. 242-263. STS 236. NAVSHIPS T 608.

Asymptotic expansions. Part II: Elementary methods, by J. G. van der Corput. California. University. Dept. of Mathematics, Berkeley, Calif. n.d. 57p table. Order from LC. Mi $3.60, ph $9.30. PB 122126

AD 70996. Technical report 2 under Contract AF 18(600) 958 (R-354-10-52).
1. Mathematical equations and solutions 2. Maclaurin expansion 3. Asymptotic expansions.

Computational formulae for a distribution-free test of analysis-of-variance hypotheses, by Earl A. Alluisi. Ohio State University. Laboratory of Aviation Psychology, and Ohio State Research Foundation, Columbus, Ohio. Jul 1956. 17p tables. Order from OTS. 50 cents. PB 121698

In this report, computational formulae are presented for use of a statistical method for making distribution-free, or nonparametric, tests of hypotheses concerning both main effects and interactions in multi-factor experimental designs. The test is based upon a segregation of the Chi-square statistic into components in a way similar to the segregation into components of the total sum-of-squares in an analysis of variance. The formulae presented have the computational advantage of resulting in an integer numerator and an integer denominator for each component at the last step in the computational process; this feature reduces the probability of errors accumulating during the computations. A numerical example of the method is presented for the data of a fictitious two-factor experiment. AD 110445. Project 7192, Task no. 71596. AF WADC TR 56-339. Contract AF 33(616) 3612, Task 71596.

Computational theory of linear programming. II: Minimization of non-linear separable convex functionals, by A. Charnes and C. E. Lemke. Carnegie Institute of Technology. Graduate School of Industrial Administration. May 1954. 15f graph, tables. Order from LC. Mi $2.40, enl pr $4.80. PB 123717

This paper shows that for a certain important class of these functionals, "separable convex functionals", a new extended "simplex method", in the announced spirit of this series, can be employed to yield a solution to an arbitrary degree of approximation. The method is developed in the context of a single important example, least squares regression subject to linear inequality restraints, taking care, however, that the procedure is clearly outlined for even its most general instance. For Part I see PB 120207. AD 89507. ONR RM 16.

Geometric and aerodynamic data on ogives, by Victor Halbmillion and Charles J. Kulishek. U. S. Naval Ordnance Laboratory, White Oak, Md. Jan 1952. 35p graphs, table. Order from LC. Mi $3, ph $6.30. PB 120856

This report presents a set of numerical data, mostly in graphical form, on the geometric and aerodynamic properties of ogives, such as the fineness ratio, surface area, volume, center of gravity, pressure distribution, drag, etc. The equations from which these properties can be calculated are presented, and the parameters determining a tangent or secant ogive are defined. Three different approximate methods of determining the pressure distribution around, and the drag of, a tangent ogive, are described and evaluated. NAVORD 2239. NOL ARR 55.

Investigation of the nature of the forces of adhesion, by L. Reed Brantley and John Charnell. Occidental College. Dept. of Chemistry, Los Angeles, Calif. 1955. 89p diagr, graphs, tables. Order from OTS. $2.25. PB 121555

As previously reported, it is advisable to use a statistical treatment of data in the investigation of adherometer adhesion, or "hesion" of lacquers to nonferrous metals. The relationships between stripping force and film thickness are analyzed. A method suggested by Wolf for the elimination of the correction for friction in the stripping force measurements, without the use of a second friction-run, was evaluated and found to be practicable. Bibliography pp. 74-82. Thesis - Occidental College, Los Angeles, Calif. For Report for 1952-1953 see PB 117420. Contract N9 onr-86701, NR 330-015.

Measurements of blockage area ratio, pressure distribution, and boundary layer transition on hollow cylinders, by R. E. Lee. U. S. Naval Ordnance Laboratory, White Oak, Md. Mar 1954. 37p photos, drawings, graphs. Order from LC. Mi $3, ph $6.30. PB 120989

Wind tunnel tests were conducted to determine the feasibility of using hollow cylinder models for boundary layer measurements. In these tests, inserts with smaller openings were placed inside the model to determine the blockage area permitted for the housing of a balance for measuring local skin friction. Both internal and external flows were surveyed by pitot and static pressure probes. Boundary layer transition locations on the inner and outer surfaces were measured with a surface probe. For the case of the outer surface, these data were compared with transition locations measured from schlieren photographs. NAVORD 3650. NOL ARR 226.

Noise statistics after transformations commonly found in circuits, by W. M. Brown. Johns Hopkins University. Radiation Laboratory, Baltimore, Md. Jun 1955. 76p diagrs, graphs. Order from OTS. $2. PB 121515

The object of this report is to survey noise theory and to formulate the statistics of noise ensembles created by transforming other noise ensembles. The transformations discussed are addition, multiplication, differentiation, linear combination of derivatives, integration with respect to a weighting function, and function with a noise argument. AD 70233. Technical report AF-22. Contract AF 33-(616)-68.

Proceedings of the second Symposium in Linear Programming, Washington, D. C., Jan 27-29, 1955. Order separate parts described below from LC, giving PB number of each part ordered.

Vol. 1. 1955. 394p diagrs, graphs. Mi $11.10, ph $60.35. PB 123920

For 1951 Symposium see PB 114067. Sponsored by the Office of Scientific Research of the Air Research and Development Command, and held jointly by the National Bureau of Standards and the Directorate of Management Analysis, DCS/Comptroller, USAF. Contents: Part I. Applications: Military application of linear programming, by Walter Jacobs. - Linear programming in bid evaluations, by Leon Gainen. - Linear programming in the face of uncertainty: Example of a failure, by J. M. Danskin. - Assembly line balancing problem, by M. E. Salveson. - Commercial use of linear programming, by James H. Batchelor. - Model for optimizing production by reference to cost surrogates, by A. Charnes, W. W. Cooper, and B. Mellon. - Production smoothing problem, by George B. Dantzig and Selmer Johnson. - Linear programming and structural design, by J. Foulkes. - Application of linear programming to optical filter design (abstract), by Alex Orden. - Programming under conditions of uncertainty, by D. F. Votaw, Jr. - Stochastic linear programming with applications to agricultural economics, by G. Tintner. - Dynamic programming and multi-stage decision process of stochastic type, by Richard Bellman. - Part II. Economic theory: Linear programming and economic theory, by Paul A. Samuelson. - On a theorem of Wald (abstract), by H. W. Kuhn. - Competitive equilibrium with dependent consumer preferences, by Lionel W. McKenzie. - Limitationality, limitativeness, and economic equilibrium, by Nicholas Georgescu-Roegen. - Activity analysis approach to location theory, by M. Beckmann and T. Marschak. - Linear team: An example of linear programming under uncertainty, by Roy Radner.

Vol. 2. 1955. 293p diagrs, graphs. Mi $11.10, ph $45.35. PB 123921

Contents: Part III. Computation: How to solve a linear programming problem, by A. J. Hoffman. - Projection methods in calculation, by C. Tompkins. - Reduction of systems of linear relations (abstract), by Philip Wolfe. - Optimizing a function of additively separated variables subject to a simple restriction, by Andrew Vazsonyi. - Some results in non-linear programming, by R. M. Thrall. - First feasible solution to the linear programming problem, by Saul I. Gass. - Concepts and computing procedures for certain X_{ij} programming problems, by Harry Markowitz. - Linear programming activities in England (abstract), by S. Vajda. - Part IV. Theory of linear inequalities: Linear inequalities and convex polyhedral sets, by A. W. Tucker. - Consistency conditions for finite and infinite systems of linear inequalities (abstract), by Ky Fan. - Probability of solvability of linear inequalities, by T. S. Motzkin. - Optimal rays for linear programs (abstract), by A. J. Goldman. - Distribution of a product by several properties, by Emil D. Schell. - On the travelling salesman's problem, by I. Heller. - Part V: Development in linear programming, by George B. Dantzig.

Research on the physics of air viscosity, by Markus Reiner. Israel Institute of Technology. Dept. of Aeronautics, Haifa, Israel. Jan 1956. 97p photos, drawings, diagrs, tables. Order from LC. Mi $5.40, ph $15.30. PB 122227

AD 82510. Technical note summarizing research progress for period 15 Jul 1955 - 15 Jan 1956. 1. Weissenberg theory (Viscosity) 2. Viscometers - Design - Israel 3. Pumps, Air - Tests - Israel 4. Viscosity - Theory - Israel 5. Contract AF 61(514)-871 6. Technion Research and Development Foundation, Ltd., Haifa, Israel 7. AF OSR TN 56-114.

Variational method in the theory of harmonic integrals, II, by Charles B. Morrey, Jr. Princeton University. Institute for Advanced Study, Princeton, N. J. Apr 1955. 50p. Order from LC. Mi $3.30, ph $7.80. PB 122232

The variational method introduced in Part I is applied to the study of differential forms and boundary value problems on a compact Riemannian manifold with boundary B. The manifold is not assumed to be orientable and parallel theories are developed for even and odd forms. AD 71319. Presented to the American Mathematical Society, April 16, 1955. AF OSR TN 55-108. Contract AF 18(600)-1114.

Virtual mass of cylinders with radial fins and of polygonal prisms, by G. Kuerti, J. A. McFadden and D. Shanks. U. S. Naval Ordnance Laboratory, White Oak, Md. Jan 1952. 20p diagrs, table. Order from LC. Mi $2.40, ph $3.30. PB 120949

The classical theory of virtual mass of a cylindrical body in two-dimensional translatory motion through a perfect fluid is briefly reviewed and applied to compute the coefficients of induced mass for bodies with the two types of cross sections described in the title. Results are summarized in a chart. Project NR 044-033. NAVORD 2295. NOL ARR 61.

Nuclear

Comparison of the predicted and observed performance of a billion-volt electron accelerator, by Kenneth B. Mallory. Stanford University. W. W. Hansen Laboratory of Physics. High-Energy Physics Laboratory, Stanford, Calif. May 1955. 168p photos, drawings, diagrs, graphs, tables. Order from LC. Mi $7.80, ph $25.80. PB 123103

The measurement of the nominal operating characteristics of the accelerator and the study of discrepancies between the nominal and actual conditions of operation are considered in detail. Considerable attention is devoted to the measurement techniques developed for determining the r-f properties of a heavily loaded waveguide like the accelerator structure and for locating and identifying irregularities in the waveguide. The allowable limits of temperature of operation, frequency drift, frequency modulation and phase modulation are discussed. Methods of measuring and of reducing these phenomena are presented. SU HEPL 46. Contract N6 onr-25116, NR 022-026.

Electrons from muon capture, by J. Steinberger and Harry B. Wolfe. Columbia University. Physics Dept. Nevis Cyclotron Laboratories, Irvington-on-Hudson, N. Y. Aug 1955. 20p diagr, graphs, table. Order from LC. Mi $2.40, ph $3.30. PB 123129

Joint ONR-AEC program.
1. Muons - Decay spectrum 2. Atomic power - Research 3. Electrons - Detection 4. Electron theory 5. Contract N6 ori-110-Task no. 1 6. Nevis 13 7. R 109 8. CU 89.

Excess kinetic energies for ions formed by electron impact from acetylenes, by Fred H. Coats and Robbin C. Anderson. Texas. University. Dept. of Chemistry, Austin, Texas. Apr 1956. 8p graph. Order from OTS. 50 cents. PB 121422

Attempts have been made by two methods to determine whether ions such as C_2H^+ from acetylene, CH_3^+ from propyne, and $C_2H_5^+$ from 1-butyne are formed with excess kinetic energy. Instrumental limitations proved to be such that the range of experimental error is rather large. AD 86591. AF OSR TN 56-169. Contract AF 18(600)-430.

Molecular engineering, by A. von Hippel. Massachusetts Institute of Technology. Laboratory for Insulation Research, Cambridge, Msss. Oct 1955. 24p. Order from LC. Mi $2.70, ph $4.80. PB 123428

1. Engineering, Molecular 2. Engineering - Education 3. Contract N5 ori-07801 4. MIT LIR TR 101.

Proton resonances in Na^{23}, by J. W. Teener and L. A. Beach. U. S. Naval Research Laboratory. Oct 1956. 10p diagr, graphs, table. Order from OTS. 50 cents. PB 121407

Some of the previously observed resonances in the gamma-ray yield from proton bombardment of Na^{23} have been re-examined using a technique by which it is possible to differentiate between the various competing processes. It has been found that at least two of the resonance structures are more complex than had been reported. Cascade gamma-ray energies were measured at some of the more prominent resonances and the observed lines fit well into the known energy level diagram for Mg^{24}. NRL R 4821.

PHYSIOLOGY

Oxygen cost of hyperventilation, by Arthur B. Otis and Colin B. McKerrow. U. S. Air Force. School of Aviation Medicine, Randolph Field, Texas. May 1956. 11p diagrs, graphs, tables. Order from OTS. 50 cents. PB 121674

A method is described for measuring the oxygen cost of hyperventilation. The results on 5 normal subjects show that the oxygen cost of maximum voluntary ventilation is variable, ranging from 2.13 to 0.71 liters per minute. Repeated observations at different rates on 1 subject indicated that the oxygen consumption increased disproportionately to the ventilation as the latter approached its maximum. Observations on 2 subjects with pulmonary tuberculosis and diffuse obstructive emphysema showed that their oxygen cost per unit of ventilation was much higher than that of the normal subjects. AF SAM R 56-28.

Physiology of load-carrying, IX: Energy cost of sled pulling by one man, by John A. Vaughan and Farrington Daniels, Jr. U. S. Army. Quartermaster Research and Development Command. Environmental Protection Division, Quartermaster Research and Development Center, Natick, Mass. Jan 1956. 29p photo, graphs, tables. Order from LC. Mi $2.70, ph $4.80. PB 122899

The energy cost of sled pulling and the drag imposed by the sled has been measured with net loads ranging from 53 to 196 pounds on the 200-pound-capacity plastic boat-type sled. The relationship between load and drag under the conditions of level snow in treeless areas at air temperatures from about 0° to -40°F, is approximately linear and a prediction formula has been calculated. Another formula has been derived to estimate energy expenditure from drag. Data on two ranges of speed indicate that the energy expenditure per unit distance depends mainly upon the drag and not on the walking pace. The pulse rate rises moderately with increase in drag at a slow walking rate, but climbs sharply as the speed is increased. For Parts 1 and 8 see PB 113460 and 122896. QMC EP TR 26.

PSYCHOLOGY

Effect of mental hygiene films on normal and abnormal individuals, by Charles J. McIntyre. Pennsylvania State University, University Park, Pa. May 1955. 44p tables. Order from LC. Mi $3.30, ph $7.80. PB 122209

In this study it was desired to learn whether the sex of the main character in the film was important and how normal and hospitalized patients differ in their acceptance and learning from mental health films. Instructional film research program. SDC project 20-E-4. Based on thesis "Influence of the sex variable in the perception of two mental health motion pictures" and "Exploratory investigation of the use of motion pictures in the treatment of hospitalized psychiatric patients". SDC TR 269-7-46. Contract N6onr-269.

Effectiveness of several methods of repetition of films, by Charles J. McIntyre and H. Dennis Sherk. Pennsylvania State University, University Park, Pa. May 1955. 27p tables. Order from LC. Mi $2.70, ph $4.80. PB 122210

The purpose of this study was to investigate certain problems related to the effective employment of repetition in instructional films. Specifically, the study was concerned with the effects in repetition of the following variables: 1. Constant and varied task-presentation, 2. Intervening and concurrent practice, 3. Camera angle and level of verbalization. Instructional film research program. SDC Human Engineering Project 20-E-4. SDC TR 269-7-45. Contract N6onr-269.

Recognition and identification of complex visual forms as a function of the labeling system employed, by Harold W. Hake and Charles W. Eriksen. Johns Hopkins University. Institute for Cooperative Research, Baltimore, Md. Sep 1955. 28p diagr, graph, table. Order from OTS. 75 cents. PB 121358

This report describes two experiments conducted to explore variables affecting the ability of human observers to learn to recognize and identify previously unfamiliar complex visual forms. In both experiments the effect upon subsequent recognition skill of giving subjects practice in the use of irrelevant labels as discriminating responses before they learned to associate them with a set of unfamiliar stimulus forms was systematically studied. The results suggested that labeling practice can have a double function. It can have the function first of forcing subjects to differentiate a set of stimulus forms, and can provide also a denotative process whereby subjects organize and identify the stimulus aspects differentiated by practice. Project no. 7192, Task no. 71598. AF WADC TR 55-367. Contract AF 33(038)-22642.

Selected annotated bibliography on leadership and executive development, by Harland G. Fox, Walton D. Scott, Wayne K. Kirchner and Thomas A. Mahoney. Minnesota. University. Industrial Relations Center. Dec 1955. 74p. Order from LC. Mi $4.50, ph $12.30. PB 123459

This bibliography brings together in convenient form 421 selected items dealing with the following aspects of leadership and executive development: summaries of the literature, criteria of leadership, characteristics of leaders, executive jobs, selection of executives, and training and development of executives. Annotations of 296 of the items containing particularly valuable objective research material are provided. Project 7730, Task no. 77356. AF PTRC TN 55-67. Contract AF 18(600)-320, T. O. 77356.

RUBBER AND RUBBER PRODUCTS

Effect of impact speed on the brittle temperature of elastomers, by R. E. Ofner. U. S. Arsenal, Rock Island, Ill. Feb 1956. 20p photos, graphs, tables. Order from OTS. 50 cents. PB 121502

The brittle temperatures of four rubber compounds prepared from GR-I, polychloroprene, GR-S and nitrile polymers were determined at impact speeds ranging from 0.7 to 33.1 feet per second, using a motor driven tester conforming to the dimensional requirements of ASTM D746-54T. Impact speed versus brittle temperature relationships were compared with stiffness data obtained with the Gehman (ASTM D1053-54T) apparatus. Dept. of the Army project no. 593-15-008. Ordnance project no. TB4-521E, Report no. 5. RIAL 56-370.

List of copolymer reports, no. 3571-3934. Federal Facilities Corporation. Oct 1956. 23p. Order from OTS. 25 cents. PB 118310s

List of reports included in PB 118310s2.
1. Rubber - Copolymers.

TEXTILES AND TEXTILE PRODUCTS

Development of high tenacity-heat stable dacron yarns, by Robert J. Coskren and Thomas T. Constantine. Fabric Research Laboratories, Inc., Dedham, Mass. Sep 1956. 57p photos, graphs, tables. Order from OTS. $1.50. PB 121566

Preliminary experimentation showed that cyclical yarn stressing and relaxing processes at elevated temperatures would produce a yarn of the desired high tenacity, nominal rupture elongation and low shrinkage, provided that the yarn was allowed to relax completly after the last stressing cycle. In an attempt to develop Dacron yarn of optimum properties, those factors which were found to have an influence on ultimate properties were thoroughly investigated. These included stretching temperatures, times, and amounts and sequences of stretching-relaxing systems. AD 97242. Project no. 7320. Covers period of work from June 1954 to July 1955 under Contract AF 33(600)-24087. AF WADC TR 55-297.

Study of the effects of chemicals on the properties of parachute fabrics, by J. Glenn Templeton. North Carolina State College. School of Textiles, Raleigh, N. C. Sep 1956. 216p diagrs, graphs, tables. Order from OTS. $4. PB 121679

During routine inspection of parachutes, several badly degraded nylon parachutes were discovered. Preliminary evaluation by chemical analysis indicated the presence of mineral acids. To provide background data, nylon and Dacron fabrics were exposed to sulfuric, hydrochloric, nitric, phosphoric, sulfurous, hydrosulfuric, and nitrous acids. The exposures were conducted under various concentrations for periods of time up to six months. The evaluation was conducted by establishing the breaking strength of the exposed fabrics and comparing them to the original breaking strength. Additional phases of the work consisted of studying the effect of light in combination with the acids, studying the effect of sulfur dioxide, hydrogen sulfide, and oxides of nitrogen, and examinations of procedures for detecting, by visual means, degradation by acids. Dacron was found to be quite resistant to attack by mineral acids in comparison with nylon. Acid-treated nylon was more sensitive to light than acid-treated Dacron. AD 97243. Project 7320. Covers period of work Jun 1954 - Sep 1955 under Contract AF 33(616) 2530. AF WADC TR 55-340.

TRANSPORTATION EQUIPMENT

Aeronautics

Aircraft

Experimental study of applied ground loads in landing, by Benjamin Milwitzky, Dean C. Lindquist and Dexter M. Potter. U. S. National Advisory Committee for Aeronautics. 1955. 36p photos, diagrs, graphs, tables. Order as NACA 1248 from Superintendent of Documents, Government Printing Office, Washington 25, D. C. 30 cents. PB 123538

Supersedes and extends TN 3246 (PB 115222).
1. Loads, Landing - Impact 2. Landing gear - Impact loads 3. Landing gear - Wheels - Spin 4. Loads, Structural - Dynamic tests 5. NACA 1248 6. NACA TN 3246 Revised.

Summary of research by Forest Products Laboratory on sandwich construction for aircraft, by Donald G. Coleman. U. S. Forest Products Laboratory, Madison, Wis. Sep 1956. 14p. Order from OTS. 50 cents. PB 121152s

Developments in the program of research in sandwich construction for aircraft conducted by the U. S. Forest Products Laboratory during fiscal year 1956 are summarized. The approach has been in general to derive design criteria mathematically and then to check by test. Nine technical reports issued during the fiscal year are abstracted. AD 97328. Project 7340. Covers work from Aug 1955 to Aug 1956 under Contract AF 33(616)-56-9. For Supplement 3 see PB 121152. AF WADC TR 52-184, Suppl. 4.

Landing gear stresses (Sur les sollicitations des atterrisseurs), by A. Gentric. Translated by Mary L. Mahler. Jul 1956. 45p photos, diagrs, graphs. Order as NACA TM 1422 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123708

This paper presents the French viewpoint on ground loads problems and discusses their current efforts and new research equipment. Some data are presented on tangential forces due to wheel spin-up effects and on longitudinal oscillations of landing gears. The subject of fatigue failures resulting from longitudinal oscillations is discussed and several case histories are presented. Overall suggestions for improvement in landing-gear design techniques are given and the areas where additional research is needed are indicated. Translated from Docaero, no. 25, Jan 1954, pp. 17-38. NACA TM 1422.

Theoretical investigation of optimum pressures in aircraft hydraulic systems, by Conrad H. Cooke, Eugene Gessner and Robert L. Smith. Glenn L. Martin Co., Baltimore, Md. Jan 1954. 128p drawings, graphs, tables. Order from LC. Mi $6.30, ph $19.80. PB 123645

An investigation to determine the optimum pressure of aircraft hydraulic systems has been made. A survey of the status of present and future designs of hydraulic systems was conducted to be used as a basis of the analysis. A detail analysis of weight, space, performance, and heat throughout the system was conducted taking into consideration the factors of cost and reliability. A range of system pressures from 1500 to 10,000 psi was found sufficient to define the optimum. AD 33061. Project 53-610A-10. Covers period of work from Feb 1953 to Jan 1954 under Contract AF 33(616)-344. AF WADC TR 54-189, Vol. I.

Instruments

Band-pass shock and vibration absorbers for application to aircraft landing gear, by Emanuel Schnitzer. U. S. National Advisory Committee for Aeronautics. Oct 1956. 27p diagrs. Order as NACA TN 3803 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123637

1. Wings - Rotating - Loads 2. Loads, Landing - Impact - Theory 3. Loads, Structural - Dynamic - Theory 4. Landing gear - Impact loads 5. NACA TN 3803.

Evaluation of airport surface detection equipment model AN/MPN-7 (XW-1). U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Md. Order separate parts described below from LC, giving PB number of each part ordered.

Part I: Technical evaluation, by Edward M. Blount, Samuel L. Kades, Hugh A. Kay and Raymond E. McCormick. Nov 1952. 26p photos, diagrs, graph, tables. Mi $2.70, ph $4.80. PB 123574

1. Airports - Surface detection equipment 2. Radar, Airborne - Evaluation 3. CAA TDR 175.

Part II: Operational evaluation, by Clair M. Anderson and Marvin H. Yost. Nov 1952. 25p photos, diagrs, tables. Mi $2.70, ph $4.80. PB 123575

Importance of certain dial design variables in quantitative instrument reading, by Julien M. Christensen. U. S. Air Force. Air Research and Development Command. Wright Air Development Center. Aeromedical Laboratory, Wright-Patterson Air Force Base, Dayton, Ohio. Oct 1955. 69p photo, diagrs, graphs, tables. Order from OTS. $1.75. PB 121119

The present experiment is the second of a series intended to investigate the nature of certain variables involved in the design and use of instrument dials. Six variables were considered in this experiment, viz., subjects, exposure time, practice, moving pointer-moving scale, clockwise-counterclockwise scale and point of fixation (prior to exposure). One essential difference exists between this and a previous experiment (reported in WADC TR 52-116) (PB 108436). The subjects of the present experiment knew prior to exposure the type of dial that would be presented; in the first experiment this information was withheld. A comparison of the results of the two experiments indicates that this change in subject set produced fewer errors, a different effect on one of the primary variables and a widespread effect on the nature of the interaction terms. Project no. 7186. AF WADC TR 55-376.

Engines and Propellers

Protective shot peening of propellers. Part II: Fatigue tests, by Ronald F. Brodrick. Lessells and Associates, Inc., Boston, Mass. Aug 1955. 56p photos, diagr, graphs, tables. Order from OTS. $1.50. PB 121464

The object of the investigation was to determine any benefits of shot peening as a means of protecting aircraft propeller blades against the reduction of fatigue strength arising from surface damage. The report covers Prot fatigue tests on SAE 4340 steel specimens which had been shot peened and subjected to simulated propeller blade damage. The results indicate that shot peening acts as a barrier to the detrimental effects of surface damage. Project no. 3346, Task no. 33048. Covers the period from 1 Feb 1954 to 31 Aug 1955. For Part I see PB 111802. AF WADC TR 55-56, Part 2. Contract AF 33(616)-2324.

Airports and Airways

Correlation of aircraft take-off and landing characteristics with airport size, by A. L. Morse. U. S. Civil Aeronautics Administration. Technical Development and Evaluation Center, Indianapolis, Ind. Apr 1944. 140p map, diagrs, graphs, tables. Order from LC. Mi $6.90, ph $21.30. PB 123562

The purpose of this study is to establish a fundamental basis for the determination of airport dimensions that will accomodate safely the operation of aircraft. The study involves the obtaining of adequate and pertinent factual data and the interpretation of these data in the form of recommended dimensional requirements for airports. These requirements should remain within reasonable topographic and economic limits, and should

be determined so that no increase in dimensions will be necessary for many years to come. It is believed important that these dimensions be founded, as far as possible, upon data that indicate how airplanes actually perform under ordinary conditions rather than upon an assumed standard of performance. Accordingly, this study is based mainly upon photographic records of day-in and day-out operations of a number of representative airplanes, obtained at various altitudes and at various airports. In addition to these performance data, this study includes a large number of accident records and meteorological observations through which the photographic records are translated into airport dimensions. CAA TDR 40.

Proposed airport development plan for the territory of Alaska, by Fred H. Grieme. U. S. Civil Aeronautics Administration, Technical Development and Evaluation Center, Indianapolis, Ind. Jul 1940. 38p maps, fold. tables. Order from LC. Mi $3, ph $6.30. PB 122268

1. Airports - Sites - Alaska 2. CAA TDN 23.

Aerodynamics

Aerodynamic mixing downstream from line source of heat in high-intensity sound field, by William R. Mickelsen and Lionel V. Baldwin. U. S. National Advisory Committee for Aeronautics. Aug 1956. 77p photos, diagrs, graphs. Order as NACA TN 3760 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123518

Theory and measurement showed that the heat wake downstream from a line source is displaced by a transverse standing sound wave in a manner similar to a flag waving in a harmonic mode. With a 147 db, 104 cps standing wave, time-mean temperatures were reduced by an order of magnitude except near the displacement-pattern nodal points. The theory showed that a 161 db, 520 cps standing wave considerably increased the mixing in both the time-mean and instantaneous senses. NACA TN 3760.

Calculation of the forces and moments on a slender fuselage and vertical fin penetrating lateral gusts, by John M. Eggleston. U. S. National Advisory Committee for Aeronautics. Oct 1956. 20p diagrs, graphs, table. Order as NACA TN 3805 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123638

1. Bodies of revolution - Aerodynamics 2. Stability, Directional - Effect of tail 3. Stability, Lateral - Effect of tail 4. Stability, Lateral - Yaw effect 5. Tail surfaces - Loads 6. Gust loads - Mathematical analysis 7. NACA TN 3805.

Comparison of flight and wind-tunnel measurements of high-speed-airplane stability and control characteristics, by Walter C. Williams, Hubert M. Drake, and Jack Fischel. U. S. National Advisory Committee for Aeronautics. Aug 1956. 16p diagr, graphs. Order as NACA TN 3859 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123532

The information in this report was also contained in a paper by the same authors which was presented to Wind Tunnel and Model Testing Panel of Advisory Group for Aeronautical Research and Development, Brussels, Belgium, Aug 27-31, 1956. 1. Stability, Longitudinal - Static tests 2. Stability, Directional - Static tests 3. Controls, Lateral - Tests 4. Controls, Longitudinal - Operation - Tests 5. Fuselages - Stability - Wind tunnel tests 6. NACA TN 3859.

Comparison of several methods for obtaining the time response of linear systems to either a unit impulse or arbitrary input from frequency-response data, by James J. Donegan and Carl R. Huss. U. S. National Advisory Committee for Aeronautics. Jul 1956. 39p drawings, graphs, tables. Order as NACA TN 3701 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123684

Several methods of obtaining the time response of linear systems to either a unit impulse or an arbitrary input from frequency-response data are described and compared. Some discussion is given of the use of the methods as flight-data-analysis techniques in predicting loads and motions for a flexible aircraft when the aircraft frequency response is known. NACA TN 3701.

Flight techniques for determining airplane drag at high Mach numbers, by De E. Beeler, Donald R. Bellman, and Edwin J. Saltzman. U. S. National Advisory Committee for Aeronautics. Aug 1956. 40p photos, diagrs, graphs. Order as NACA TN 3821 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123530

Presented to Flight Test Panel of Advisory Group for Aeronautical Research and Development, Brussels, Belgium, Aug 27-31, 1956.
1. Airplanes - Performance 2. Instruments, Aeronautical - Research 3. NACA TN 3821.

Generalized trajectory curves for bodies moving in air, by R. J. Templin and M. M. Callan. Canada. National Aeronautical Establishment. Mar 1956. 14p graphs, (1 fold). Order from LC. Mi $2.40, ph $3.30. PB 122588

A chart has been constructed which enables rapid development, using a step method, of trajectory curves having any initial values of the ratio initial velocity to terminal velocity, and the angle of the trajectory to the horizontal. The ratio V/V_t is

used as a variable to extend the usefulness of any one trajectory which is developed. NAEC LR-159.

Incompressible non-meridional boundary layer flow on bodies of revolution, by Artur Mager. U. S. Naval Ordnance Test Station, Inyokern, Calif. Sep 1954. 55p diagrs, graphs. Order from LC. Mi $3.60, ph $9.30. PB 122615

A method is presented for computing incompressible, steady, and slightly non-meridional boundary-layer flow on bodies of revolution. This method is applicable to laminar and turbulent boundary-layer computations over slightly yawed bodies of revolution, which may or may not rotate about some axis (not necessarily their axis of symmetry) in space. AD 70892. Unclassified 19 Mar 1955. NOTS 942. NAVORD 3366.

Initial results of a flight investigation of the wing and tail loads on an airplane equipped with a vane-controlled gust alleviation system, by T. V. Cooney and Russell L. Schott. U. S. National Advisory Committee for Aeronautics. Sep 1956. 31p photos, diagrs, graphs, tables. Order as NACA TN 3746 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123511

1. Loads, Structural - Analysis - Methods 2. Loads, Structural - Dynamic - Theory 3. Tail surfaces - Loads - Mathematical analysis 4. Wings - Span load distribution 5. Gust loads - Alleviation systems 6. NACA TN 3746.

Investigation of the laminar aerodynamic heat-transfer characteristics of a hemisphere-cylinder in the Langley 11-inch hypersonic tunnel at a Mach number of 6.8, by Davis H. Crawford and William D. McCauley. U. S. National Advisory Committee for Aeronautics. Jul 1956. 38p photos, drawing, graphs. Order as NACA TN 3706 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123685

1. Flow, Laminar - Heat transfer 2. Heat - Transference - Aerodynamics 3. NACA TN 3706.

On a method for optimization of time-varying linear systems with nonstationary inputs, by Marvin Shinbrot. U. S. National Advisory Committee for Aeronautics. Sep 1956. 39p. Order as NACA TN 3791 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D.C. PB 123529

1. Time interval methods 2. Correlation functions - Calculation 3. Equations, Integral 4. NACA TN 3791.

On supersonic rotational flow behind strong shock waves. I: Flow past airfoils, by Abraham Kogan Israel Institute of Technology. Dept. of Aeronautics, Haifa, Israel. Jan 1956. 59p diagrs, graphs, table. Order from LC. Mi $3.60, ph $9.30. PB 122224

A method of successive approximations to the ideal flow past airfoils at high supersonic Mach numbers is developed, based on the concept of Crocco's steam function. Part of a thesis. Technical note summarizing the research progress for period 15 Jul 1955 - 15 Jan 1956 under Contract AF 61(514)-870. AF OSR TN 56-165. AD 86586.

Precautions a prendre pour eviter les vibrations aerodynamiques des avions. I-Voilure. II-Empennages. (Safeguards against flutter of airplanes), by Gerhard De Vries. Translated by Mary L. Mahler. Aug 1956. 94p diagrs, graphs. Order as NACA TM 1423 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123537

Translated from La Recherche Aeronautique, no. 12, 1949, pp. 15-30, and no. 13, 1950, pp. 27-43.
1. Aeroelasticity - France 2. Ailerons - Flutter - France 3. Ailerons - Vibration - France 4. Tabs, Control - Flutter - France 5. Rudders, Aircraft - Flutter - France 6. Elevators, Aircraft - Vibration - France 7. Tail surfaces - Flutter - France 8. Wings - Flutter - Calculations - France 9. NACA TM 1423.

Preliminary wind-tunnel tests of triangular and rectangular wings in steady roll at Mach numbers of 1.62 and 1.92, by Clinton E. Brown and Harry S. Heinke, Jr. U. S. National Advisory Committee for Aeronautics. Jun 1956. 36p drawings, diagr, graphs, tables. Order as NACA TN 3740 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123506

Supersedes RM L8L30.
1. Damping derivatives - Stability 2. Mach number - Effect 3. Wings, Rectangular - Wind tunnel tests 4. Wings, Triangular - Wind tunnel tests 5. NACA TN 3740.

Results of wind-tunnel tests to a Mach number of 0.90 of a four-engine propeller-driven airplane configuration having a wing with 40° of sweepback and an aspect ratio of 10, by George G. Edwards, Jerald K. Dickson, Fred B. Sutton and Fred A. Demele. U. S. National Advisory Committee for Aeronautics. Sep 1956. 171p photo, diagrs, graphs, tables. Order as NACA TN 3789 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123527

Supersedes RM A53I28. For analysis of tests see PB 123528.
1. Airplanes - Models - Wind tunnel tests 2. Wing-flaps - Wind tunnel tests 3. Stability, Longitudinal - Effect of propellers 4. Airplanes - Stability - Effect of propellers 5. NACA TN 3789.

Rockets and Jet Propulsion

Further measurements of intensity, scale, and spectra of turbulence in a subsonic jet, by James C. Laurence and Truman M. Stickney. U. S. National Advisory Committee for Aeronautics. Oct 1956. 24p graphs. Order as NACA TN 3576 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123682

1. Flow, Subsonic - Measurements 2. Flow, Turbulent - Measurements 3. Flow, Jet mixing - Measurements 4. Spectra, Acoustic - Measurements 5. Instruments, Measuring - Noise 4. NACA TN 3576.

Flight investigation of the performance of a two-stage solid-propellant Nike-Deacon (DAN) meteorological sounding rocket, by Robert H. Heitkotter. U. S. National Advisory Committee for Aeronautics. Jul 1956. 21p photos, drawing, graphs. Order as NACA TN 3739 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123691

1. Rocket motors - Performance 2. Rocket propulsion 3. Rockets, Upper air - Performance 4. Instruments, Meteorological - Tests 5. NACA TN 3739.

Investigation of the loads on the vertical tail of a jet-bomber airplane resulting from flight through rough air, by Jack Funk and Richard H. Rhyne. U. S. National Advisory Committee for Aeronautics. Oct 1956. 36p drawings, diagrs, graphs, tables. Order as NACA TN 3741 from National Advisory Committee for Aeronautics, 1512 "H" St., N. W., Washington 25, D. C. PB 123692

1. Stabilizers, Vertical - Load distribution 2. Gust loads 3. Tail surfaces - Loads 4. Stability, Lateral - Effect of tail 5. Stability, Directional - Effect of tail 6. NACA TN 3741.

Marine Transportation

Analysis of the anti-submarine warfare problem from the standpoint of underwater acoustics, by H. C. Hayes. U. S. Naval Research Laboratory. Jul 1942. 17p. Order from LC. Mi $2.40, ph $3.30. PB 120679

1. Acoustics, Underwater - Research 2. Anti-submarine warfare 3. NRL S 1908.

Heat transport in the north Atlantic Ocean, by Glenn H. Jung. Texas. Agricultural and Mechanical College. Dept. of Oceanography, College Station, Texas. Aug 1955. 49p diagrs, graphs, tables. Order from LC. Mi $3.30, ph $7.80. PB 122937

This report presents a detailed description and analysis of certain aspects of the behavior of the North Atlantic Ocean, especially as it is related to heat transport. It is the first time a description of this type has been based on an extensive body of oceanographic data. In particular, the flows of mass, salt content, and heat have been ascertained for many ocean levels; the summarized results are shown in diagrams. A new technique is derived for estimating the net heat transport across a section. Ref. 55-34T. A & M Proj 24: Oceanographic survey of the Gulf of Mexico. Submitted as part of thesis. Contract N7onr-48702, T. O. II, NR 083-836.

Influence of the proximity of tank walls on the water-entry behavior of models, by Albert May. U. S. Naval Ordnance Laboratory, White Oak, Md. Oct 1951. 14p photos, graphs. Order from LC. Mi $2.40, ph $3.30. PB 120855

To investigate the effect of the proximity of walls on the validity of model tests of weapons entering water, shots were made into two tanks of square cross section, 8 inches and 36 inches wide. Steel balls 1/2 and 3/4 inches in diameter, were shot vertically into the tanks with entry speeds of 19 to 143 ft/sec, and with air pressures of one atmosphere to 1/8 atmosphere above the water. Usually wall effects due to the smaller cross section were not observed for 1/2-inch spheres at pressures of one half atmosphere or more, nor for 3/4-inch spheres at one atmosphere. Within the range of the investigation it appears that wall effects will be avoided if the tank width is at least five times the maximum width of the cavity formed on entry. NAVORD 2240.

Response of air-backed plates to high-amplitude underwater shockwaves, by Hans G. Snay and Ermine A. Christian. U. S. Naval Ordnance Laboratory, White Oak, Md. May 1952. 41p graphs, table. Order from LC. Mi $3.30, ph $7.80. PB 120826

The response of a free plate to a plane high-amplitude underwater shockwave has been calculated by use of the method of characteristics. The method employed is described in some detail. The pressure, velocity and energy distribution at and near the plate are shown for incident waves of zero to 40 kilobars peak pressure. NAVORD 2462.

Response of simple floating targets to underbottom explosion attack, by Erich Buchmann. U. S. David W. Taylor Model Basin, Washington, D. C. Jun 1951. 34p photos, diagrs, graphs, tables. Order from LC. Mi $3, ph $6.30. PB 122879

Underwater explosion tests have been conducted against simple cube-shaped floating wooden blocks, 10 x 11 x 10 inches and 20 x 20 x 20 inches. Charges were fired below the center of the blocks at distances from contact up to 10 feet. The charge weights varied from 1 gram to 90 grams. The response of the targets was measured by recording the displacement, velocity, and in some cases the acceleration.

High-speed motion pictures of the pulsation and migration of the gas bubble under water were taken simultaneously; these pictures also showed the occurrence of cavitation. The response of the targets could be correlated with the different phenomena of the underwater explosions such as the shock wave, bubble pulses, cavitation, bubble expansion and contraction, and migration. The results are compared with theory and show that the response of the target resembles that of the water displaced by the target. A few tests were made with a submerged target having the weight of the displaced water. The response also resembled that of the displaced water. DWTMB 749.

Wave gage installed at Cape Henry, Virginia, by A. D. Ehnes. U. S. Naval Ordnance Laboratory, White Oak, Md. Jan 1951. 30p photos, map, drawings, diagrs, graphs. Order from LC. Mi $2.70, ph $4.80. PB 122430

Unclassified.
1. Gages, Water level 2. Waves, Ocean - Measuring equipment 3. NAVORD 1727.

MISCELLANEOUS

Allocating motor-vehicle-tax responsibility by the incremental method. Symposium presented at the thirty-fourth annual meeting, Jan 11-14, 1955. Highway Research Board. 1956. 40p table. Order from NAS-NRC Publications Office, 2101 Constitution Ave., N. W., Washington 25, D. C. 75 cents. PB 122542

1. Roads - Construction - Costs - Allocation
2. Motor vehicles - Taxation 3. HRB Bul 121
4. NRC 408.

Candles, by Carl H. Moulton. Revised. U. S. Office of Technical Services. Sep 1956. 16p. Order from OTS. 50 cents. PB 105347r

1. Candles 2. TAS 95R.

Land forms of the southeast Bahamas, by Edwin Doran, Jr. Texas. University. Dept. of Geography, Austin, Texas. May 1955. 48f photos, drawings, maps, tables. Order from LC. Mi $3.30, enl pr $9.30. PB 123642

The name Southeast Bahamas is used to describe all islands in the Bahama Archipelago from Crooked Island to Grand Turk. Air photos covering almost the entire area were valuable in the field, where they were constantly at hand. In making the maps the photos were assembled, after stereographic interpretation based on field recognition of forms, into uncontrolled mosaics. The maps are carefully drawn sketches from which accurate locations and bearings can not be determined, but their main function, that of showing the general relationship and distribution of land forms, is not impaired by this lack of precision. Publication No. 5509. AD 62554. Contract Nonr-375(03), NR 388-014.

Methods of urban analysis: Summary report, by Philip M. Hauser, Otis Dudley Duncan and Beverly Davis Duncan. U. S. Air Force. Air Research and Development Command, Personnel and Training Research Center. Officer Education Research Laboratory, Maxwell Air Force Base, Ala. Jan 1956. 87p maps, drawings, graphs, tables. Order from LC. Mi $4.80, ph $13.80. PB 123457

This project was designed to develop a method for describing and analyzing distributive patterns of human, institutional, and material resources within an urban area, which would meet the criteria indicated and which could be tested with data relating to the distribution of population, of services, of relatively homogeneous population groupings, of economic institutions, particularly business and industry, and of relationships between place of work and place of residence. Project 7732: Chicago Urban Analysis. AF PTRC TN 56-1. Contract AF 33-(038)-25630.

Report of NRL progress. U. S. Naval Research Laboratory. Dec 1956. 55p. Order from OTS. $1.25. Also available at annual subscription rate of $10 a year in U.S.A., foreign subscription rate $13 a year. PB 121755

Contents: Articles: Field reader for small-volume dosimeters, by P. A. Caldwell. - Brittle fracture of ship steels in terms of flow properties at high strain rates, by J. M. Krafft and A. M. Sullivan. - Cosmic noise background with high-gain antennas, by Nancy G. Roman. - Scientific program: Problem notes: Applications research: Linear and nonlinear error magnification in target tracking display systems.... Effects of course frequency and aided time constant on pursuit and compensatory tracking..... Human operator performance under stressful conditions in a man-machine system....Human monitoring behavior as influenced by signal detections. - Astronomy and astrophysics: Parachute-deliverable, drifting, buoy-type automatic weather stations. - Chemistry: Characteristics of the anode in the silver oxide-zinc alkaline primary cell. - Mathematics: Effect of a gradual change of the modulus of elasticity on the pattern of the longitudinal displacement of a bar. - Mechanics: Ultrasonic vibrations applied in the measurement of elastic constants. - Metallurgy and ceramics: Isothermal and continuous cooling transformation behavior of substitute special-treatment steels.... Electron transport properties of dilute binary magnesium alloys.... Mechanism of pit formation in boiler tubing....Current distribution in cathodic protection. - Radio: Instrumentation for measurement of electromagnetic propagation through flames....Performance of radio equipment in the transosonde system for gathering meteorological data over large ocean areas. - Solid-state physics: Emission and excitation spectra of KCl:Tl. - Sound: Recognition of a linear pattern of dots viewed against a simulated sonar noise (random) field. - Published reports. - Papers by NRL staff members. - Patents. - Index of articles.

ATOMIC ENERGY REPORTS OF INTEREST TO INDUSTRY

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

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

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

Biology and Medicine

Biological effects of external X and gamma radiation. Part 2, edited by Raymond E. Zirkle. Technical Information Service Extension, Oak Ridge, Tenn. Aug 1956. 477p. Order from OTS. $2.10. TID-5220

The release of Sr90 and Cs137 from Vina loam upon prolonged cropping, by H. Nishita, A. J. Steen, and K. H. Larson. Univ. of Calif. School of Medicine, West Los Angeles, Calif. Nov 1956. Contract AT-04-1-gen-12. 30p. Order from OTS. 40 cents. UCLA-380

Chemistry and Chemical Engineering

Solvent extraction separation of uranium from acid leach liquors and pulps, by J. R. Ross, J. B. Rosenbaum, and J. B. Clemmer. Intermountain Experiment Station. Bureau of Mines, Salt Lake City, Utah. Apr 1956. Apr 1956. 18p. Order from OTS. 20 cents. AECU-3181

Research on the combustion and explosion hazards of hydrogen—water vapor—air mixtures. Progress report no. 1 for March—June 1956, by Michael G. Zabetakis. Division of Explosives Technology. Bureau of Mines, Pittsburgh, Pa. Nov 1956. 13p. Order from OTS. 20 cents. AECU-3326

Research on the combustion and explosion hazards of hydrogen—water vapor—air mixtures. Final report, by Michael G. Zabetakis. Division of Explosives Technology. Bureau of Mines, Pittsburgh, Pa. Sep 1956. 11p. Order from OTS. 20 cents. AECU-3327

Absorption spectra of lanthanide and actinide rare earths. III. The heavier lanthanide elements in aqueous perchloric acid solution, by D. C. Stewart. Argonne National Lab., Lemont, Ill. Oct 1956. Contract W-31-109-eng-38. 16p. Order from OTS. 20 cents. ANL-5624

The X-ray spectrometric determination of uranium in solution, by D. S. Flikkema, R. P. Larsen, and R. V. Schablaske. Argonne National Lab., Lemont, Ill. Nov 1956. Contract W-31-109-eng-38. 9p. Order from OTS. 15 cents. ANL-5641

Ignition reactions in the hydrogen-oxygen-water system at elevated temperatures, by Elmer F. Stephan, Nathan S. Hatfield, Robert S. Peoples, and H. A. Pray. Battelle Memorial Inst., Columbus, Ohio. Oct 1956. Contract W-7405-eng-92. 64p. Order from OTS. 40 cents. BMI-1138

Recovery of uranium from shales. Volumes I and II. Final report, by R. A. Ewing, G. A. Lutz, and A. E. Bearse. Battelle Memorial Inst., Columbus, Ohio. Sep 1949. Decl. Mar 1956 (Volume I) and Mar 1956 (Volume II). 373p. Order from OTS. $1.75. BMI-JDS-210

Progress report on fission products utilization. IX. Studies on radiation-induced graft copolymerization and solid state polymerization, by D. S. Ballantine, P. Colombo, A. Glines, B. Manowitz, and D. J. Metz. Brookhaven National Lab., Upton, N. Y. Oct 1956. 14p. Order from OTS. 20 cents. BNL-414(T-81)

An evaluation of the zirconium hazard, by W. R. DeHollander. Hanford Atomic Products Operation, Richland, Wash. Aug 1956. Contract W-31-109-eng-52. 21p. Order from OTS. 20 cents. HW-44989

Separations of yttrium and some rare earths by liquid-liquid extraction, by Raymond A. Foos and H. A. Wilhelm. Ames Lab. Iowa State College, Ames, Iowa. Jul 1954. Contract W-7405-eng-82. 77p. Order from OTS. 50 cents. ISC-695

Stability of Freon-113 with fluorine, by A. V. Faloon and J. D. Gibson. K 25 Plant. Carbide and Carbon Chemicals Corp., Oak Ridge, Tenn. Dec 1949. Contract W-7405-eng-26. 4p. Order from OTS. 10 cents. K-532

The palladium-tritium system at low temperature, R. M. Haag and F. J. Shipko. Knolls Atomic Power Lab., Schenectady, N. Y. Jun 1956. Contract W-31-109-eng-52. 40p. Order from OTS. 30 cents. KAPL-1097

Spectrophotometric and solvent extraction studies of uranyl phosphate complexes, by Burton J. Thamer. Los Alamos Scientific Lab. Univ. of Calif., Los Alamos, N. Mex. Feb 1956. Contract W-7405-eng-36. 85p. Order from OTS. 50 cents. LA-1996

The gravimetric determination of tantalum in uranium-tantalum alloys, Owen H. Kriege and Ross D. Gardner. Los Alamos Scientific Lab. Univ. of Calif., Los Alamos, N. Mex. Apr 1956. Contract W-7405-eng-36. 17p. Order from OTS. 20 cents. LA-2032

The properties of phosphoric acid solutions of uranium as fuels for homogeneous reactors, by B. J. Thamer and others. Los Alamos Scientific Lab. Univ. of Calif., Los Alamos, N. Mex. Mar 1956. Contract W-7405-eng-36. 59p. Order from OTS. 40 cents. LA-2043

The gravimetric determination of niobium in uranium-niobium alloys, by Owen H. Kriege. Los Alamos Scientific Lab. Univ. of Calif., Los Alamos, N. Mex. May 1956. Contract W-7405-eng-36. 14p. Order from OTS. 20 cents. LA-2049

Analysis of massive amounts of platinum for tracer amounts of radioactivity, by M. L. Curtis and R. A. Staniforth. Mound Lab., Monsanto Chemical Co., Miamisburg, Ohio. Jun 1954. Contract AT-33-1-gen-53. 5p. Order from OTS. 10 cents. MLM-986

Experimental estimate of free energy of formation of plutonium trifluoride, by A. G. Buyers. Atomics International. Division of North American Aviation, Inc., Canoga Park, Calif. Sep 1956. Contract AT-11-1-gen-8. 16p. Order from OTS. 15 cents. NAA-SR-1649

Semiannual progress report for the period January 1956 through June 1956, by C. J. Rodden. New Brunswick Lab. Oct 1956. 28p. Order from OTS. 25 cents. NBL-133

A review of the reaction kinetics of deuterium and tritium compounds. VI. Solvolysis reactions, by Lawrence M. Brown. National Bureau of Standards, Washington, D. C. Jul 1956. 20p. Order from OTS. 20 cents. NBS-4712

Separation of isotopes. Annual progress report for July 1, 1954 to July 1, 1955. Department of Chemistry, by T. I. Taylor. Columbia Univ., New York, N. Y. Jul 1955. Contract AT(30-1)-755. 135p. Order from OTS. 65 cents. NYO-6242

The extraction and recovery of uranium (and vanadium) from acid liquors with di(2-ethylhexyl) phosphoric acid and some other organophosphorus acids, by C. A. Blake, K. B. Brown, and C. F. Coleman. Oak Ridge National Lab., Oak Ridge, Tenn. May 1955. Contract W-7405-eng-26. 124p. Order from OTS. 75 cents. ORNL-1903

Amine extraction processes for uranium recovery from sulfate liquors. Vol. I, by D. J. Crouse and K. B. Brown. Oak Ridge National Lab., Oak Ridge, Tenn. Sep 1955. Contract W-7405-eng-26. 79p. Order from OTS. 50 cents. ORNL-1959

Chemical and isotopic studies of the closed-cycle carbonate system for N^{15} enrichment, by A. A. Palko, L. L. Brown, G. M. Begun, and E. F. Joseph. Oak Ridge National Lab., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 20p. Order from OTS. 25 cents. ORNL-2138

Gamma radiation damage studies of organic protective coatings and gaskets, by J. C. Bresee, C. D. Watson, and J. S. Watson. Oak Ridge National Lab., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 30p. Order from OTS. 30 cents. ORNL-2174

Determination of free acid in solutions of uranyl sulfate, by O. Menis, D. L. Manning, and G. Goldstein. Oak Ridge National Lab., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 13p. Order from OTS. 20 cents. ORNL-2178

Optical properties and X-ray diffraction data for some inorganic fluoride and chloride compounds, by H. Insley, T. N. McVay, R. E. Thoma, and G. D. White. Oak Ridge National Lab., Oak Ridge, Tenn. n.d. Contract W-7405-eng-26. 65p. Order from OTS. 45 cents. ORNL-2192

The determination of uranium in ores: Separation by ethyl acetate extraction and spectrophotometric determination by the thiocyanate method in acetone-water medium, by H. I. Feinstein. Geological Survey, Washington, D. C. Sep 1955. 16p. Order from OTS. 20 cents. TEI-555

Decontamination of bismuth phosphate process first cycle waste supernatants, by R. E. Burns, H. S.

Gile and C. R. McMullen. Hanford Atomic Products Operation, Richland, Wash. Sep 1953. Contract W 31-109-eng-52. 19p. Order from OTS. 30 cents. Contract AT(10-1) 770. TID-10142

Ethylenediaminetetraacetate separation of calcium from uranium for flame photometric analysis, by J. H. Stewart, Jr. and R. C. McIlhenny. Union Carbide Nuclear Co. Division of Union Carbide and Carbon Corp., Oak Ridge, Tenn. Aug 1956. Contract W-7405-eng-26. 14p. Order from OTS. 20 cents. Y-1140

Engineering

Load capacity and dry friction tests of a water-lubricated thrust bearing. Final report for February 19, 1954 to August 31, 1954, by Stanley Abramovitz. Franklin Inst. Laboratories for Research and Development, Philadelphia, Pa. Oct 1956. Bearing Development Subcontract 57-(14-371). 21p. Order from OTS. 25 cents. AECU-3150

The effect of chemical nature of heating surfaces on the heat transfer coefficients of pool boiling liquids. Final report for February 1, 1952—June 15, 1955, by George W. Preckshot. Inst. of Tech. Univ. of Minnesota, Minneapolis, Minn. Dec 1955. Contract AT(11-1)-219. 61p. Order from OTS. 40 cents. AECU-3183

Studies of flow distribution in the core of a quarter-scale flow model of the PWR reactor, by Herbert R. Hazard and John M. Allen. Battelle Memorial Inst., Columbus, Ohio. Oct 1956. Contract W-7405-eng-92. 48p. Order from OTS. 35 cents. BMI-1141

A study of heat transfer effects on aluminum corrosion. Part I, by D. R. DeHalas. Hanford Atomic Products Operation, Richland, Wash. Apr 1956. Contract W 31-109-eng-52. 24p. Order from OTS. 25 cents. HW 42585(Rev.)

Engineering test reactor engineering design and safeguards report. Idaho Operations Office, Idaho Falls, Idaho. Jul 1956. 349p. Order from OTS. $1.75. IDO-24020

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Fourth Atomic Energy Commission air cleaning conference held at Argonne National Laboratory, November 1955. Division of Reactor Development, Washington, D. C. Jun 1956. 315p. Order from OTS. $1.50. TID-7513(Pt. 1)

Sanitary engineering aspects of the Atomic Energy Industry. A seminar sponsored by the AEC and the Public Health Service, held at the Robert A. Taft Engineering Center, Cincinnati, Ohio, December 6-9, 1955. Division of Reactor Development, Washington, D. C., and Public Health Service, Washington, D. C. Oct 1956. (2 Vols.). Order from OTS. $3.10. (TID-7517(Pt. I)

Shock testing instrumentation, by F. Card. Bettis Plant, Pittsburgh, Pa. Jul 1956. Contract AT-11-1-gen-14. 20p. Order from OTS. 20 cents. WAPD-TM-16

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Location of uranium deposits in Southwestern North Dakota and the Cave Hills and Slim Buttes areas, Harding County, South Dakota. Denver Area Office, Denver, Colo. Jul 1956. 12p. Order from OTS. 15 cents. RME-1076

Petrographical investigations of the salt wash sediments. Annual technical report for April 1, 1954 to April 1, 1955, by J. C. Griffiths, J. A. Cochran, J. J. Hutta, and R. Steinmetz. College of Mineral Industries. Pennsylvania State University, University Park, Pa. Sep 1956. Contract AT(30-1)-1362. 84p. Order from OTS. 75 cents. RME-3122(Pts. I and II)

Health and Safety

Effectiveness of various solutions for decontaminating stainless steel, lead and glass, by John B. Huff. Phillips Petroleum Co. Idaho Operations Office. May 1956. Contract AT(10-1)-205. 21p. Order from OTS. 35 cents. IDO-14379

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Active cation transport in submerged aquatic plants II. Effect of aeration upon the equilibrium content of calcium in Potamogeton crispus (L) leaves, by Benjamin Lowenhaupt. University of California. Radiation Laboratory, Berkeley, Calif. Oct 1956. Contract W-7405-eng-48. 13p. Order from OTS. 20 cents. UCRL-3532

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Particle accelerator division summary report April through September 1956, by John J. Livingood. Argonne National Lab., Lemont, Ill. Oct 1956. Contract W-31-109-eng-38. 47p. Order from OTS. 35 cents. ANL-5630

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Electronic devices for nuclear physics. Quarterly report no. 22 for November 1, 1955—January 31, 1956, by R. H. Anderson, G. O. Fowler, M. H. Greenblatt, and A. H. Sommer. David Sarnoff Research Center, Princeton, N. J. Feb 1956. Contract W-7405-eng-26. 14p. Order from OTS. 20 cents. RIB-12

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Electronic devices for nuclear physics; a report on photomultiplier tube development. Quarterly report no. 24 for May 1, 1956—July 31, 1956, by M. H. Greenblatt, R. M. Matheson, A. H. Sommer, and G. O. Fowler. David Sarnoff Research Center, Princeton, N. J. Nov 1956. Contract W-7405-eng-26. 13p. Order from OTS. 20 cents. RIB-17

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Millimicrosecond coincidence instrumentation and its limitations, by Melvin Brown. University of California. Radiation Laboratory, Berkeley, Calif. Oct 1956. Contract W-7405-eng-48. 8p. Order from OTS. 15 cents. UCRL-3539

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Metallurgy and Ceramics

Special heat of austenitic stainless steel used in the experimental breeder reactor (EBR-I), by Robert A. Noland and David E. Walker. Argonne National Lab., Lemont, Ill. Oct 1956. Contract W-31-109-eng-38. 16p. Order from OTS. 20 cents. ANL-5548

Investigation of some niobium-base alloys, by Stan J. Paprocki and John T. Stacy. Battelle Memorial Inst., Columbus, Ohio. Oct 1956. Contract W-7405-eng-92. 16p. Order from OTS. 20 cents. BMI-1143

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Aviation, Inc., Canoga Park, Calif. Nov 1956. Contract AT-11-1-gen-8. 16p. Order from OTS. 20 cents. NAA SR-1688

A continuous electrolytic process for the production of beryllium metal, by M. C. Kells, R. B. Holden, and C. Whitman. Atomic Energy Division. Sylvania Electric Products, Inc., Bayside, N. Y. Apr 1956. Decl. May 1956. Contract AT 30-1-gen-366. 43p. Order from OTS. 30 cents. SEP-207

Production of thorium metal. A bibliography of unclassified report literature. Technical Information Service Extension, Oak Ridge, Tenn. Oct 1956. 7p. Order from OTS. 15 cents. TID 3310

Development of U_3Si epsilon phase alloys for use in pressurized water reactors, by R. A. Wolfe, W. E. Bond, W. A. Bostrom, L Cohen, and R. B. Roof, Jr. Bettis Plant, Pittsburgh, Pa. Jul 1956. Contract AT-11-1-gen-14. 73p. Order from OTS. 45 cents. WAPD-155

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Search for new radioactive nuclides in the region of 126 neutrons (thesis), by George William Warren. University of Arkansas, Fayetteville, Arkansas. 1956. Contract Nos. AT-(40-1)-277 and NSF-G-1877. 52p. Order from OTS. 35 cents. AECU-3165

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Critical geometries for bare cylinders, by J. A. Pond. Goodyear Atomic Corp., Portsmouth, Ohio. Jul 1956. Contract AT(33-2)-1. 23p. Order from OTS. 25 cents. GAT-189

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Trixy - a computer program for multigroup nuclear reactor calculations in three-space dimensions, by Paul Greebler. Knolls Atomic Power Lab., Schenectady, N. Y. Aug 1956. Contract W-31-109-eng-52. 75p. Order from OTS. 45 cents. KAPL-1549

An analysis of Li^6 neutron cross sections, by Joseph J. Devaney. Los Alamos Scientific Lab., Los Alamos, N. Mex. 1955. Decl. Nov 1955. Contract W-7405-eng-36. 25p. Order from OTS. 25 cents. LA-1960

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Some characteristics of plastic fluor, by M. M. Hoffman, R. W. Peterson, and M. Janco. Los Alamos Scientific Lab., Los Alamos, N. Mex. Sep 1956. Contract W-7405-eng-36. 16p. Order from OTS. 20 cents. LA-2069

Electronic properties of thorium, uranium and plutonium. I. Atomic energy levels, by Guy W. Lehman. Atomics International, Division of North American Aviation, Inc., Canoga Park, Calif. Nov 1956. Contract AT-11-1-gen-8. 19p. Order from OTS. 20 cents. NAA-SR 1659

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Size distribution in aerosols determined by settling of charged particles. Progress report for September 1, 1954—August 31, 1955, by Vadim G. Drozin and Dante De Deo. Columbia Univ., New York, N. Y. Aug 1955. Contract AT(30-1) 1434. 61p. Order from OTS. 40 cents. NYO-4657

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Detection of azimuthal symmetry in quasi-elastic double-scattering experiments, by Robert E. Donaldson. University of California. Radiation Laboratory, Berkeley, Calif. Nov 1955. Contract W-7405-eng-48. 33p. Order from OTS. 25 cents. UCRL-3185

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