NASA SPECIAL PUBLICATIONS

1965

Foreword

The titles listed in this catalog of Special Publications—an important element in NASA's information program—represent a diverse collection of scientific and technical information, reflecting the manifold activities of the National Aeronautics and Space Administration.

Among the general series of these publications are reports on recent results in space exploration, detailed accounts of significant conferences and symposia, and state-of-the-art reviews in various scientific and technical fields. They include such works as a five-volume set of lunar photographs taken by Rangers VII, VIII, and IX, and a multi-volume summary of significant achievements in the various space science disciplines.

Of particular interest to the technical community not directly involved in the Nation's space program is the Technology Utilization Series, consisting of reports, surveys, and summaries of space technology innovations which hold promise for more general industrial application. Representative titles under this category are *Magnetic Tape Recording Technology*, *A Technique for Joining and Sealing Dissimilar Materials*, and *Plasma Jet Technology*. Bibliographies on industrial utilization of methods born out of NASA's space program are also part of this series, to distinguish them from the continuing and special bibliographies in aerospace science described in the final section of the catalog.

This semiannual listing covers virtually all NASA Special Publications issued through July 1966. (The omissions include a few that are no longer available, and others that have been superseded by more recent editions.) An arrangement by reverse chronological order has been chosen over a numerical one. The initials CFSTI or GPO at the end of each entry indicate that the publication may be purchased from:

Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151

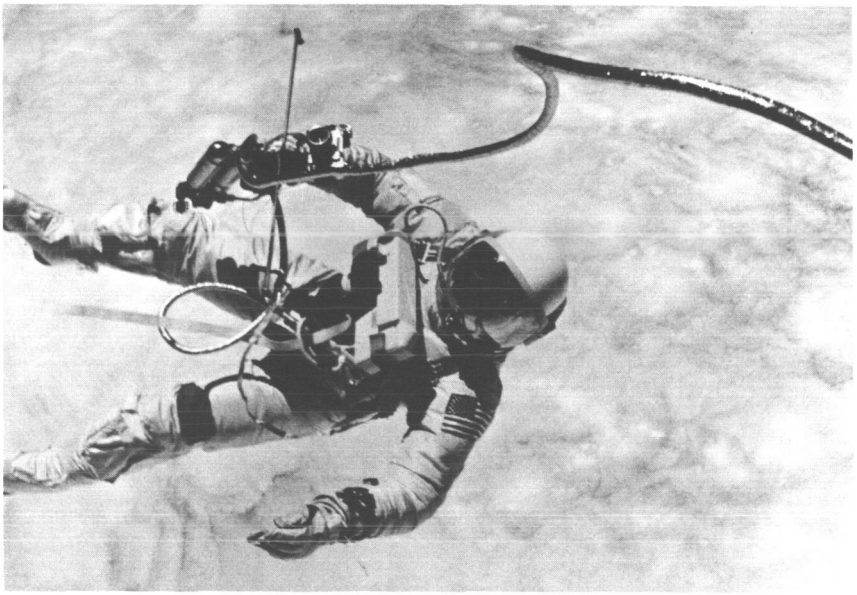
or:

Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

Contents

1966

Gemini Midprogram Conference NASA SP-121



This report contains 46 papers presented at the Gemini Midprogram Conference held at the Manned Spacecraft Center, Houston, Texas, February 23–25, 1966. The first group of 30 papers describes the spacecraft and launch vehicle, flight operations, and mission results, and includes accounts of the Gemini VI–A and VII rendezvous and the astronauts' reactions to the flight; the second group reports on in-flight experiments.

1966 444 pp. GPO $2.75

Orbiting Solar Observatory Satellite OSO I: The Project Summary NASA SP-57

A description of the work performed in connection with the Orbiting Solar Observatory, launched March 7, 1962, including details on spacecraft dynamics, structural design and fabrication, control systems, data acquisition and command systems, power supply, thermal control, testing, and experiments carried out with the OSO I. 1966 306 pp. GPO $2.00

Bioenergetics of Space Suits for Lunar Exploration NASA SP-84

A Literature Review by Emanuel M. Roth

This report discusses the new problems in optimal space-suit system design presented by the potential for severe physical exertion outside the spacecraft and on the surface of the Moon and other celestial bodies. Subjects covered include the metabolic load imposed on humans by exertion, the mechanics of locomotion under varied terrain and gravity conditions, mobility restriction in space suits, and problems of thermal control.

1966 140 pp. GPO $1.00

Human Response to Sustained Acceleration — NASA SP-103

A Literature Review by T. M. Fraser

A critical review of the open literature in the field, this report deals with the natural history and physiological effects of sustained acceleration, and with human tolerance and performance during acceleration stress. 1966 136 pp. GPO $1.00

Philosophy of Simulation in a Man-Machine Space Mission System — NASA SP-102

By T. M. Fraser

An examination of the philosophy of simulation as it pertains to manned space activities, with particular orientation to research in the life sciences. 1966 107 pp. GPO $0.50

Proceedings of the Fifth National Conference on the Peaceful Uses of Space — NASA SP-82

Papers presented at the meeting held May 25–28, 1965, in St. Louis, Mo., to review space accomplishments and their global impact. 1966 200 pp. GPO $1.50

Proceedings of a Conference on Theoretical Biology — NASA SP-104

A series of discussions on de novo cell synthesis and population ecology held at Princeton, N.J., November 22–24, 1963, under the sponsorship of NASA and the American Institute of Biological Sciences. 1966 188 pp. GPO $1.00

Surveyor I, A Preliminary Report — NASA SP-126

A summary of both engineering and scientific aspects of the highly successful Surveyor I spaceflight—the first American soft landing on the Moon. Illustrated with photographs relayed by the spacecraft during its first five days of operation.

1966 40 pp. CFSTI $0.75

Ranger VIII Photographs of the Moon: Cameras "A," "B," and "P" — NASA SP-111

The fourth in a series of five volumes of Ranger lunar photographs, containing 170 selected pictures. 1966 187 pp. GPO $6.50

Ranger IX Photographs of the Moon: Cameras "A," "B," and "P" — NASA SP-112

The last in a series of five volumes of photographs of the Moon taken by Rangers VII, VIII, and IX, presenting 170 selected Ranger IX frames. 1966 187 pp. GPO $6.50

Short Glossary of Space Terms — NASA SP-1

Brief definitions of frequently used space terms, selected from the *Dictionary of Technical Terms for Aerospace Use* (NASA SP-7). Second edition. 1966 52 pp. GPO $0.25

Involuntary Hypohydration in Man and Animals: A Review — NASA SP-110

By John E. Greenleaf

This review summarizes the literature pertaining to delay in rehydration following water loss and associated factors influencing water intake by man and animals.

1966 34 pp. GPO $0.30

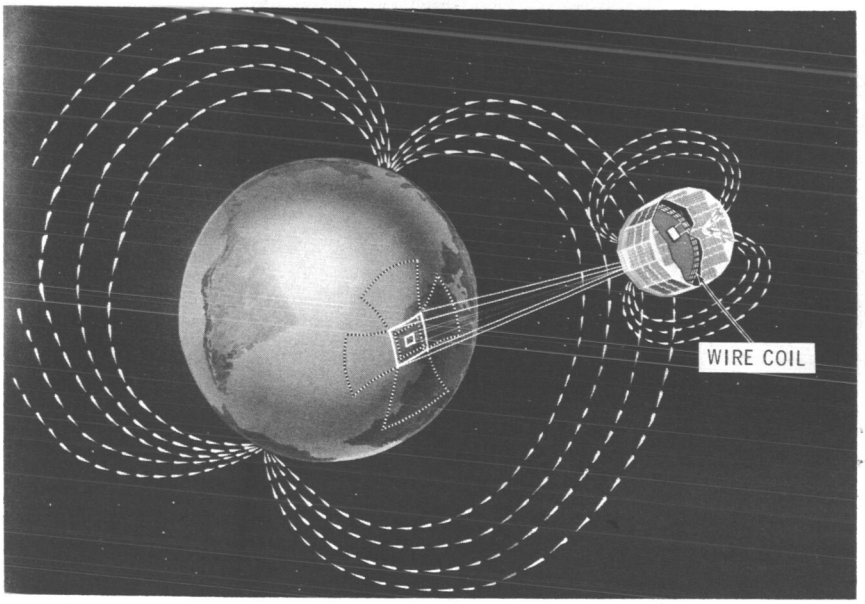
Significant Achievements in Particles and Fields, 1958–1964 — NASA SP–97

Survey of theoretical investigations and space-probe and satellite observations of energetic particle radiations, plasmas, and magnetic fields in space. 1966 94 pp. GPO $0.50

Significant Achievements in Ionospheres and Radio Physics, 1958–1964 — NASA SP–95

A summary of ionospheric research by probes and satellites, dealing primarily with the plasma properties of the ionosphere, with particular emphasis given to the topside of the F–region. 1966 60 pp. GPO $0.45

Significant Achievements in Satellite Meteorology, 1958–1964 — NASA SP–96



A documentation of the application of space technology to the requirements of meteorology and of results achieved with satellites and sounding rockets in a 6-year period. 1966 141 pp. GPO $0.60

Significant Achievements in Planetology, 1958–1964 — NASA SP–99

This report discusses information obtained about extraterrestrial bodies through study of the Earth and describes the results achieved with Mariner II—the Venus probe—and with Ranger VII, which photographed the Moon at close range. Instrumentation developed for the two space probes is also discussed. 1966 71 pp. GPO $0.45

Significant Achievements in Solar Physics, 1958–1964 — NASA SP–100

Survey of knowledge gained concerning the Sun's ultraviolet and X-ray spectrum with the help of rockets, satellites, and space probes. 1966 96 pp. GPO $0.50

Progress in Development of Methods in Bone Densitometry — NASA SP–64

Proceedings of a conference held in Washington, D.C., March 25–27, 1965, under the joint sponsorship of NASA, the National Institute of Arthritis and Metabolic Diseases (NIH), and the American Institute of Biological Sciences. The report covers various methods of studying and measuring bone demineralization, a problem anticipated for astronauts as a result of weightlessness and decreased activity during prolonged space missions. 1966 204 pp. GPO $1.50

Significant Achievements in Planetary Atmospheres, 1958–1964 — NASA SP–98

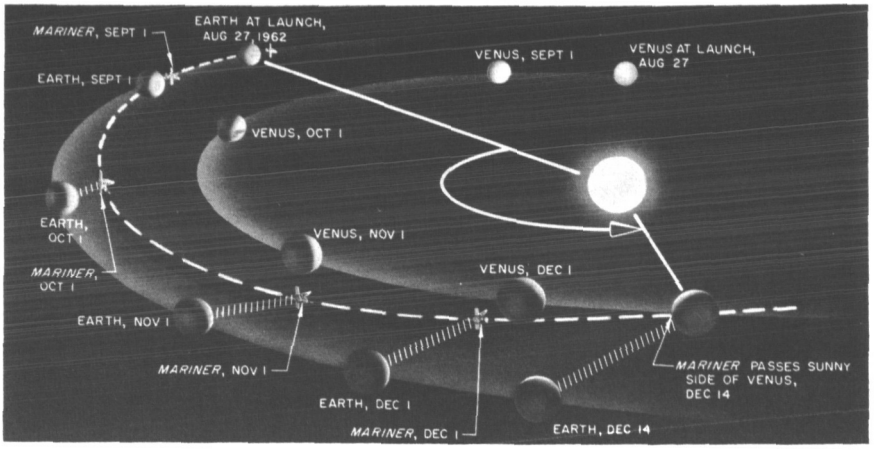
A progress report on status of knowledge and results obtained regarding the Earth's atmosphere above approximately 30 km altitude and the atmospheres of other planets, in particular Mars and Venus. Current problems and the direction of future efforts are also discussed. 1966 59 pp. GPO $0.45

Conference on V/STOL and STOL Aircraft — NASA SP–116

Papers presented at a conference held at Ames Research Center, Moffett Field, Calif., April 4–5, 1966, summarizing recent NASA research results related to the aerodynamic, propulsion, and handling-quality aspects of V/STOL and STOL aircraft. Included are three NASA-supported feasibility studies of concepts for short-haul transports prepared by Boeing, Ling-Temco-Vought, and Lockheed. 1966 467 pp. CFSTI $5.25

1965

Mariner-Venus 1962: Final Project Report — NASA SP–59



Prepared for NASA by the Jet Propulsion Laboratory, this report describes the history-making flight of the Mariner II spacecraft to the vicinity of Venus. The chronology begins with the activation of the project to meet the 1962 Venus launch opportunity. Chapters include historical background on Venus; project organization and management; spacecraft system design and development; operational events describing the Mariner II mission; evaluation of the subsystems, the tracking network, the data-recovery and processing system; and scientific findings. 1965 344 pp. GPO $2.50

The Role of the Vestibular Organs in the Exploration of Space — NASA SP–77

A collection of 34 papers, presented at a conference in Pensacola, Fla., January 20–22, 1965, which comprises a state-of-the-art report on the experiments and observations of the effect space travel may have on the vestibular organs of man. Includes animal studies, oscillation studies, use of drugs, and so forth. 1965 392 pp. GPO $2.25

Dictionary of Technical Terms for Aerospace Use — NASA SP–7

William H. Allen, Ed.

This first edition of a dictionary for space scientists and technologists contains more than 6000 carefully chosen and precisely defined terms. It does not attempt, however, to include every aspect of space terminology. 1965 314 pp. GPO $3.00

Observations From the Nimbus I Meteorological Satellite — NASA SP–89

Six papers presented by personnel of Goddard Space Flight Center at the Western Annual Meeting of the American Geophysical Union, held December 29, 1964, in Seattle, Wash. Early results obtained with the Nimbus I satellite are discussed.

1965 90 pp. CFSTI $1.00

The Meteoroid Environment and Its Effects on Materials and Equipment — NASA SP–78

Summary of a Literature Survey
by William A. Cosby and Robert G. Lyle

A detailed study, prepared by the National Academy of Sciences, of publications appearing since 1960 on the meteoroid environment and its effects on materials and equipment. Divided into the following sections: Environment, Hypervelocity Impact Phenomena, and Design Considerations. 1965 116 pp. GPO $0.50

NASA University Program Review Conference — NASA SP–85

A review conducted at a conference in Kansas City, Mo., March 1–3, 1965, by university professors and administrators of the programs sponsored by NASA through grants and research contracts with universities throughout the country. Included are papers on X-ray and gamma-ray astronomy and biological research, as well as on the effect the grants and contracts have had on research at particular universities. 1965 400 pp. GPO $1.50

Summary Report on the NASA University Program Review Conference — NASA SP–81

Summary of the conference held in Kansas City, Mo., March 1–3, 1965, including a discussion of background objectives and policies of the NASA University Program from the point of view of a university professor. 1965 37 pp. CFSTI $1.00

The Nature and Scope of the NASA University Program — NASA SP–73

By T. L. K. Smull

Description and discussion of university research and training programs sponsored by NASA. Background and philosophy are given. 1965 39 pp. GPO $0.25

Electrical Power Generation Systems for Space Applications — NASA SP–79

State-of-the-art summary of several papers and committee reports on electric-power systems for space use, prepared by the Department of Defense and NASA for the supporting Research and Technical Panel of the Aeronautics and Astronautics Coordinating Board.

1965 40 pp. CFSTI $1.00

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Short-Term Frequency Stability — NASA SP–80

Proceedings of the IEEE–NASA Symposium on the Definition and Measurement of Short-Term Frequency Stability held at the Goddard Space Flight Center, Greenbelt, Md., November 23–24, 1964. Four sessions: Users' Viewpoint and Requirements, Theory, Devices, and Measurement Techniques. 1965 317 pp. GPO $1.75

Space Technology
Vol. I, Spacecraft Systems — NASA SP–65

By L. H. Abraham

Vol. II, Spacecraft Mechanical Engineering — NASA SP–66

By James L. Adams

Basic texts for the upper-level college engineering student. The first volume describes methods and processes of planning spacecraft systems, showing how to establish the relationships of various parts and the utilization of various subsystems before designs are committed. Vol. II presents spacecraft mechanical engineering in terms of structures, temperature control, mechanisms, and electronic packaging. Some basic theory is included, applications of both theory and experiment relative to spacecraft are examined, and actual examples of hardware are given. 1965 Vol. I 85 pp. GPO $0.35
1965 Vol. II 166 pp. GPO $0.60

Symposium on the Analysis of Central Nervous System and Cardiovascular Data Using Computer Methods — NASA SP–72

Lorne D. Proctor and W. Ross Adey, Eds.

Proceedings of a conference held in Washington, D.C., October 29–30, 1964, at which Government and university authorities discussed use of computer techniques in collecting and analyzing data on the central nervous and cardiovascular systems.

1965 600 pp. CFSTI $4.50

Conference on Aircraft Operating Problems — NASA SP–83

Papers presented at a conference held at Langley Research Center, May 10–12, 1965. Contributions were made by representatives of NASA's Ames Research Center, Flight Research Center, and Langley Research Center, as well as by representatives of the Federal Aviation Agency. 1965 327 pp. CFSTI $3.00

An Analysis of the Extraterrestrial Life Detection Problem — NASA SP–75

By Richard S. Young, Robert B. Painter, and Richard D. Johnson

Guidelines and ground rules for a cohesive study of the solar system and beyond for evidences of life—past, present, or future. The study includes a section on "The Attributes of Life" and is mainly concerned with a discussion of conditions on Mars.

1965 33 pp. CFSTI $0.50

NASA 1965 Summer Conference on Lunar Exploration and Science — NASA SP–88

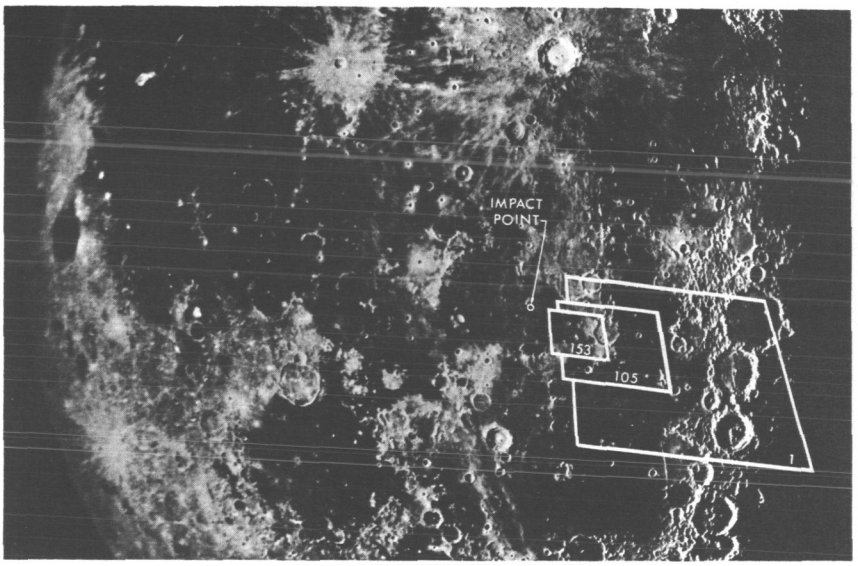
Results of the conference on lunar exploration, held in Falmouth, Mass., July 19–31, 1965, including the conclusions and recommendations drawn from it. An overall lunar-mission summary is given, together with the working-group reports from which the summary was obtained, in the disciplines geodesy/cartography, geology, geophysics, bioscience, geochemistry (mineralogy and petrology), particles and fields, lunar atmosphere measurements, and astronomy. 1965 422 pp. GPO $1.50

Proceedings of the Apollo Unified S-Band Technical Conference — NASA SP–87

Papers presented at the conference held July 14–15, 1965, at Goddard Space Flight Center. The presentations, made by persons directly involved in the Apollo program, describe in some detail the ground systems that GSFC is now implementing for the complex support required for the Apollo Manned Space Flight Network.

1965 302 pp. CFSTI $3.00

Ranger VII Photographs of the Moon Part II: Camera "B" Series — NASA SP–62



Reproductions of the 200 photographs from the "B" camera, taken at altitudes from 1300 miles to 3 miles above the surface of the Moon. Large format. For Part I, published in 1964, see p. 10.

1965 217 pp. GPO $6.50

Ranger VII Photographs of the Moon Part III: Camera "P" Series — NASA SP–63

Third and last volume in the series presenting Ranger VII photographs of the Moon, taken over the same altitude range. Includes 758 of the more than 3900 photographs from the 4 partial-scan "P" cameras. Large format.

1965 200 pp. GPO $6.50

Second Symposium on Protection Against Radiations in Space — NASA SP–71

Papers of a conference held at Gatlinburg, Tenn., October 12–14, 1964, and sponsored by AEC, NASA, and USAF. Four disciplines are represented: The Radiation Environment, Biological Effects, Effects on Materials, and Shielding.

1965 551 pp. GPO $3.25

Final Report on the Relay I Program — NASA SP–76

This report deals with (1) the design, development, and performance of the spacecraft hardware; (2) the various experiments performed (communications and radiation) at the Nutley, N.J., and the Andover, Maine, ground stations; and (3) information received from foreign governments participating in the Relay I project.

1965 767 pp. GPO $1.75

Symposium on Thermal Radiation of Solids — NASA SP–55

S. Katzoff, Ed.

Symposium held in San Francisco, Calif., March 4–6, 1964, sponsored by NASA, the National Bureau of Standards, and the USAF's Aeronautical Systems Division. Papers constitute the sharing of research ideas and experiences by engineers, physicists, and representatives of other disciplines for the advancement of the science of thermal radiation of solids. Discussion sessions included in the book relate to the practical solution of space-age problems involving thermal radiative phenomena. The document also carries Air Force No. ML-TDR-64-159. Author and subject indexes. 1965 620 pp. GPO $3.75

Survey of the Literature on the Solar Constant and the Spectral Distribution of Solar Radiant Flux — NASA SP–74

By M. P. Thekaekara

Survey of currently available data on this subject, including a discussion of relevant theoretical considerations concerning radiation, solar physics, scales of radiometry, and the thermal balance of spacecraft. 1965 43 pp. CFSTI $2.00

Aerodynamic Design of Axial-Flow Compressors — NASA SP–36

Irving A. Johnson and Robert O. Bullock, Eds.

Results of extensive research on the design of axial-flow compressors have been assimilated and correlated in this volume. Attention has been focused primarily on the problems pertinent to the axial-flow compressors of turbojet or turboprop engines, but the results should be applicable to any class of axial-flow compressors. 1965 508 pp. GPO $3.00

Scientific Findings From Explorer VI — NASA SP–54

Selected papers and reports on data collected by Explorer VI, designed to provide a coordinated, comprehensive group of measurements of scientific interest over as large a region of the magnetosphere as possible. Simultaneous studies were made of the trapped radiation in the Van Allen region, galactic cosmic rays, geomagnetism, radio propagation in the upper atmosphere, and the flux of micrometeorites, or cosmic dust.
1965 381 pp. GPO $2.25

X-15 Research Results, with a Selected Bibliography — NASA SP–60

By Wendell H. Stillwell

Semitechnical summary of the X-15 program, directed toward achievements in scientific research rather than the better publicized and spectacular milestones of flight in the near-space environment. Index. 1965 128 pp. GPO $0.55

Conference on Nutrition in Space and Related Waste Problems — NASA SP–70

Proceedings of a conference held at the University of South Florida in Tampa, April 27–30, 1964, at which Government, industry, and university scientists considered the nutrition and waste problems associated with maintaining astronauts in space, especially over extended periods of time. Approximately 60 papers with discussions by conferees.
1965 400 pp. GPO $2.75

1964

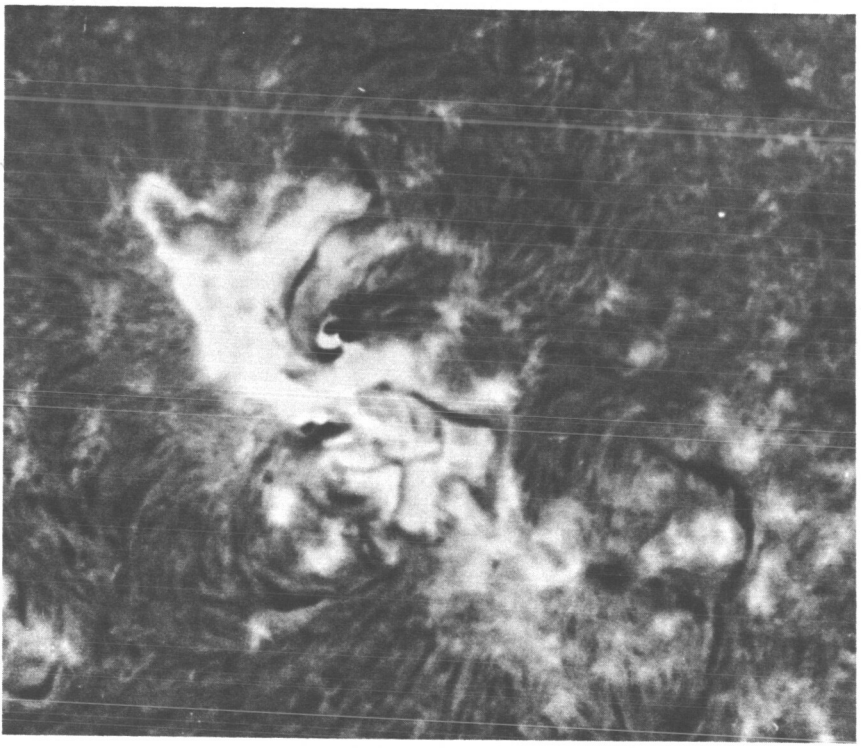
Physics of Nonthermal Radio Sources — NASA SP–46

Proceedings of a conference for an international group of astronomers and physicists, held December 3–4, 1962, at the NASA Goddard Institute for Space Studies, New York, N.Y. The papers cover radio observations, optical observations, and theory of nonthermal radio sources outside the solar system. Index.

1964 171 pp. GPO $0.75

AAS-NASA Symposium on the Physics of Solar Flares — NASA SP–50

Wilmot N. Hess, Ed.



Proceedings of a conference at Goddard Space Flight Center, October 28–30, 1963, of American, European, Asian, and Australian scientists reporting on research progress in the field of solar-flare activity. Papers cover both observations and theory. Among the topics discussed are the origin, structure, motion, and development of flares; spectrographic observations; X-ray, gamma-ray, and radio emission; and energetic particles.

1964 465 pp. GPO $3.25

Meteorological Observations Above 30 Kilometers — NASA SP–49

Three papers on meteorological rockets, network data, and rocket soundings, comprising one session of a conference on Meteorological Support for Aerospace Testing and Operation, held at Colorado State University, Fort Collins, July 11–12, 1963.

1964 57 pp. GPO $0.40

Proceedings of the Conference on the Law of Space and of Satellite Communications — NASA SP-44

Proceedings of a conference organized by Northwestern University School of Law, Evanston, Ill., May 1–2, 1963, as part of the Third National Conference on the Peaceful Uses of Space. The formal papers and comments in the first part of the volume represent an attempt to provide a broad perspective of the legal problems that have arisen and will emerge in the space age, and to indicate to what degree informal legal thought has reached a consensus or formulated tentative conclusions as to their resolution. The second part of the volume is concerned with monopoly, antitrust, administrative, and international aspects of communications satellite operations. 1964 205 pp. GPO $1.50

Concepts for Detection of Extraterrestrial Life — NASA SP-56

Freeman H. Quimby, Ed.

The devices and instruments described in this illustrated booklet are among those planned for inclusion in vehicles designed to land on planets such as Mars. They constitute techniques for detecting growth and metabolism, for determining the presence of biologically significant molecules, and for actual visual observation of microorganisms and the planetary terrain. 1964 53 pp. GPO $0.50

Advanced Bearing Technology — NASA SP-38

By Edmond E. Bisson and William J. Anderson

Exposition of the fundamentals of friction and wear, fluid-film bearings, and rolling element bearings, with demonstrations of how fundamental principles can be applied to the solution of unique and advanced bearing problems. Index. 1964 511 pp. GPO $1.75

Effect of Ionizing Radiation on a Series of Saturated Polyesters — NASA SP-58

By G. F. D'Alelio, Roland Häberli, and George F. Pezdirtz

The polyesters of dihydric alcohols, HO–R_1–OH, and dicarboxylic acids, HOOC–R_2–COOH, were prepared autocatalytically and underwent ionizing radiation. The observed radiation effects were correlated to the molecular weights of the respective polymers. It was shown that the structural features of the polyester segment derived from the polyesterification of specific diols and specific diacids influenced greatly the direction and magnitude of the radiation effects. 1964 63 pp. CFSTI $1.75

A Quasi-Global Presentation of Tiros III Radiation Data — NASA SP-53

By Lewis J. Allison, Thomas I. Gray, Jr., and Guenter Warnecke

Worldwide radiation map in the 8- to 12-micron atmospheric "window," as derived from Tiros III's Channel 2 measurements for July 16, 1961. The map, covering the globe between 55° N and 55° S, is superimposed on various conventional synoptic analyses to study the utility of satellite radiation data for meteorological-analysis purposes. Extra-large format. 1964 23 pp. GPO $2.00

Ranger VII Photographs of the Moon Part I: Camera "A" Series — NASA SP-61

Reproductions of the 199 photographs taken by the "A" camera of Ranger VII at altitudes from 1300 miles to 3 miles above the surface of the Moon. Large format.
1964 226 pp. GPO $6.50

Space Cabin Atmospheres
Part I: Oxygen Toxicity — NASA SP–47
Part II: Fire and Blast Hazards — NASA SP–48

Literature Review by Emanuel M. Roth

The first volume of this review deals with toxicity of oxygen at pressures below 1 atmosphere and the relation of oxygen to other factors of concern in space cabins, such as radiation effects and lung blast. Part II discusses environmental factors in space cabin fire hazards, including flammability of fabrics, gases, liquids, and vapors, electrical fire hazards, and hazards from meteoroid penetration; problems of fire prevention and extinguishing in space cabins are also examined.

1964 Part I 51 pp. GPO $0.40
1964 Part II 119 pp. GPO $1.00

Proceedings of the Fourth National Conference on the Peaceful Uses of Space — NASA SP–51

Thirty papers delivered at a conference held in Boston, Mass., April 29–May 1, 1964. Eight sessions: Space and the Nation, Congress and Science, Men in Space, the Future, Machines in Space, Practical Uses of Satellites, Living in Space, and Working for Space.

1964 225 pp. GPO $1.50

Proceedings of the NASA-AEC Liquid-Metals Corrosion Meetings, Vol. I — NASA SP–41

Proceedings of the unclassified portions of a meeting, held at NASA's Lewis Research Center, October 2–3, 1963, on mechanisms of liquid-metal corrosion, the results of compatibility tests with alkali metals, and the problems related to compatibility testing with alkali metals.

1964 316 pp. CFSTI $5.00

1963

Results of the Project Mercury Ballistic and Orbital Chimpanzee Flights — NASA SP–39

James P. Henry and John D. Mosely, Eds.

This publication presents a full account of the flights of the Project Mercury chimpanzees, from program-planning through launch and recovery operations. It gives a detailed account of training techniques, in-flight measurements, and post-flight evaluation procedures. These flights verified the feasibility of manned space flight. The suborbital ballistic flight of "Ham," on January 31, 1961, was the prelude to Astronaut Alan B. Shepard's suborbital space flight, while the orbital flight of "Enos," on November 29, 1961, preceded the comparable flight of Astronaut John H. Glenn, Jr.

1963 71 pp. GPO $0.45

Conference on Space, Science, and Urban Life — NASA SP–37

Proceedings of a conference held at Oakland, Calif., March 28–30, 1963, on the applicability of the national space program, and the knowledge resulting from aerospace research, to the problems of urban growth. Index.

1963 254 pp. GPO $1.75

Measurement of Thermal Radiation Properties of Solids — NASA SP–31

Joseph C. Richmond, Ed.

Proceedings of a symposium held at Dayton, Ohio, September 5–7, 1962, and sponsored by NASA, the Air Force, and the National Bureau of Standards. Index.

1963 587 pp. GPO $3.50

Telstar I: Vols. 1, 2, and 3 — NASA SP–32

Compilation of papers written by employees of Bell Telephone Laboratories who were involved in the Telstar project. Volume 3 also contains an index to all three volumes.

1963 1940 pp. CFSTI $10.00 for set of 3; volumes not sold individually

Ariel I: The First International Satellite, The Project Summary — NASA SP–43

A short history of the satellite launched April 26, 1962, in a cooperative effort by the United Kingdom and the United States. 1963 76 pp. GPO $0.70

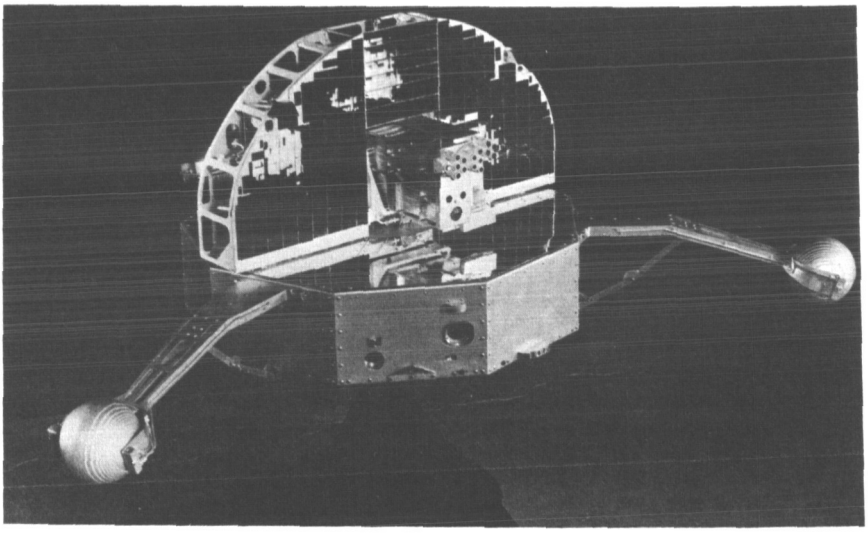
Mercury Project Summary, Including Results of the Fourth Manned Orbital Flight, May 15–16, 1963 — NASA SP–45

Review of the planning, preparation, experiences, and results of Project Mercury, including the results of the fourth U.S. manned orbital space flight—the final 34-hour mission of Astronaut L. Gordon Cooper. 1963 444 pp. GPO $2.75

Proceedings of the Conference on Space-Age Planning — NASA SP–40

Proceedings of the general sessions of the Third National Conference on the Peaceful Uses of Space, held in Chicago, Ill., May 6–9, 1963. Participants included representatives of NASA, industry, and universities. Twenty-nine papers grouped under these broad headings: National Space Program, University-Industry Partnership in Space Projects, How Space Activities Are Changing the Economy, Consumer Goods Opportunities From Space Research, Placement and Management of Research and Development Projects, and Opportunities and Challenges in Space Procurement. 1963 301 pp. GPO $2.00

The Observatory Generation of Satellites — NASA SP–30



Discussion of the missions and engineering designs of the Orbiting Geophysical Observatories, the Advanced Orbiting Solar Observatory, and the Orbiting Astronomical Observatory held at the second session of a Special Astronautics Symposium at Franklin Institute, Philadelphia, December 27, 1962. 1963 62 pp. GPO $0.50

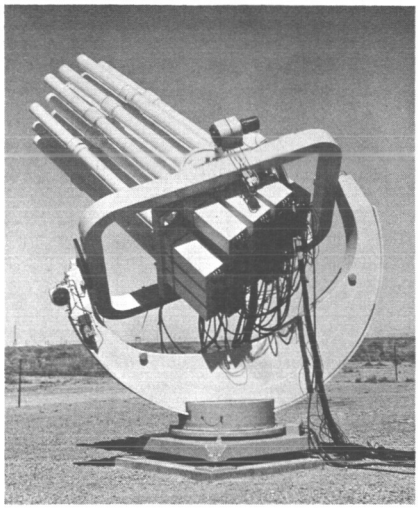
Proceedings of the Second NASA-Industry Program Plans Conference — NASA SP-29

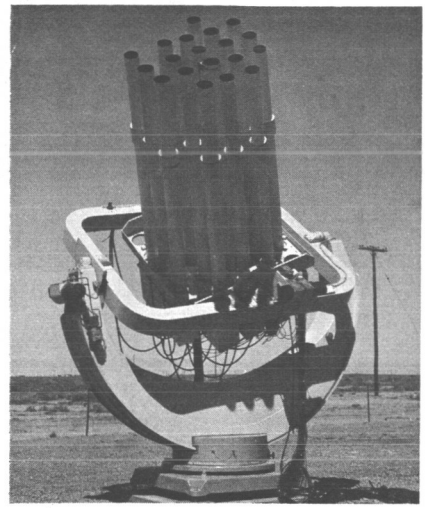
Speeches and statements describing NASA's organization, present plans, and possible future projects, presented at a conference in Washington, D.C., February 11–12, 1963, for the information of industrial management as a partner in the national space program.

1963 231 pp. GPO $1.25

1962

Proceedings of the Image Intensifier Symposium — NASA SP-2





Proceedings of the symposium held at Fort Belvoir, Va., October 24–26, 1961, under the joint sponsorship of NASA and the U.S. Army Engineer Research and Development Laboratories.

1962 252 pp. GPO $1.50

Results of the First U.S. Manned Orbital Space Flight, February 20, 1962 — (NO NUMBER)

Results of the MA–6 flight by Astronaut John H. Glenn, Jr.

1962 204 pp. GPO $1.25

Results of the Second U.S. Manned Orbital Space Flight, May 24, 1962 — NASA SP–6

Results of the MA–7 flight by Astronaut M. Scott Carpenter.

1962 107 pp. GPO $0.65

Results of the Third U.S. Manned Orbital Space Flight, October 3, 1962 — NASA SP–12

Results of the MA–8 flight by Astronaut Walter Schirra, October 1962, including spacecraft and launch-vehicle performance, mission operations, aeromedical analysis of pilot performance, and pilot's flight report.

1962 120 pp. GPO $0.70

List of Selected References on NASA Programs — NASA SP–3

List of the selected NASA publications and releases issued during the 3 years following the agency's establishment in October 1958.

1962 236 pp. GPO $1.25

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NASA Day, April 27, 1962: Western Space Age Industries and Engineering Exposition and Conference — NASA SP-4

Published record of NASA participation in a conference held in Washington, D.C., April 1962, at which NASA speakers provided industrial management with information on NASA's programs and procedures. 1962 66 pp. GPO $0.45

Proceedings of the International Meteorological Satellite Workshop — (NO NUMBER)

Report of the workshop held in Washington, D.C., November 13–22, 1961, on the results of the meteorological-satellite program of the United States and the possibilities for the future. The workshop was sponsored by NASA and the Weather Bureau.
1962 226 pp. GPO $1.75

Proceedings of the Second National Conference on the Peaceful Uses of Space — NASA SP-8

Principal addresses, scientific papers, and panel discussions of a conference held May 8–10, 1962, in Seattle, Wash. 1962 282 pp. GPO $1.50

U.S. Standard Atmosphere, 1962 — (NO NUMBER)

Tables of atmospheric parameters to 700 kilometers, incorporating results of rocket and satellite research through mid-1962. 1962 278 pp. GPO $3.50

Proceedings of the NASA-University Conference on the Science and Technology of Space Exploration, Vols. 1 and 2 — NASA SP-11

State-of-the-art papers on NASA programs presented to the scientific and technical community at a conference held in Chicago, Ill., November 1–3, 1962.
1962 Vol. 1 429 pp. GPO $2.50; Vol. 2 532 pp. GPO $3.00

These papers have also been published individually as follows: "Geophysics and Astronomy in Space Exploration," NASA SP-13 (43 pp. GPO $0.35); "Lunar and Planetary Sciences in Space Exploration," NASA SP-14 (85 pp. GPO $0.55); "Celestial Mechanics and Space Flight Analysis," NASA SP-15 (41 pp. GPO $0.35); "Data Acquisition From Spacecraft," NASA SP-16 (59 pp. GPO $0.40); "Control, Guidance, and Navigation of Spacecraft," NASA SP-17 (54 pp. GPO $0.40); "Bioastronautics," NASA SP-18 (35 pp. GPO $0.30); "Chemical Rocket Propulsion," NASA SP-19 (55 pp. GPO $0.40); "Nuclear Rocket Propulsion," NASA SP-20 (62 pp. GPO $0.45); " Power for Spacecraft," NASA SP-21 (26 pp. GPO $0.25); "Electric Propulsion for Spacecraft," NASA SP-22 (37 pp. GPO $0.35); "Aerodynamics of Space Vehicles," NASA SP-23 (56 pp. GPO $0.40); "Gas Dynamics in Space Exploration," NASA SP-24 (51 pp. GPO $0.40); "Plasma Physics and Magnetohydrodynamics in Space Exploration," NASA SP-25 (77 pp. GPO $0.50); "Laboratory Techniques in Space Environment Research," NASA SP-26 (51 pp. GPO $0.40); "Materials for Space Operations," NASA SP-27 (46 pp. GPO $0.35); and "Structures for Space Operations," NASA SP-28 (46 pp. GPO $0.35)

1961

Results of the Second U.S. Manned Suborbital Space Flight, July 21, 1961 — (NO NUMBER)

Report of the second (MR-4) manned suborbital space flight, on July 21, 1961, in which Astronaut Virgil I. Grissom was the pilot. 1961 58 pp. GPO $0.45

Proceedings of a Conference on Results of the First U.S. Manned Suborbital Space Flight (NO NUMBER)

Report of the early results from the MR–3 flight, on May 5, 1961, of Astronaut Alan B. Shepard, Jr., with primary emphasis on the medical results. The conference, held in Washington, D.C., June 6, 1961, was sponsored by NASA in cooperation with the National Institutes of Health and the National Academy of Sciences. 1961 76 pp. GPO $0.50

Proceedings of the First National Conference on the Peaceful Uses of Space (NO NUMBER)

Proceedings of the conference held at Tulsa, Okla., May 26–27, 1961, describing the NASA program and its potential applications. 1961 184 pp. GPO $1.25

1960

NASA-Industry Program Plans Conference (NO NUMBER)

Proceedings of a conference held in Washington, D.C., July 28–29, 1960, for the purpose of providing industrial management with an overall picture of the NASA program and establish an adequate basis for subsequent conferences at various NASA Centers.
1960 124 pp. GPO $0.75

Handbooks, Data Compilations, Charts, and Tables

1966

Electron Densities and Scale Heights in the Topside Ionosphere: Alouette I Observations in Midlatitudes — NASA SP-3026

By John O. Thomas, M. Rycroft, and L. Colin

Contains data on electron density and plasma scale height at a series of heights and times. The tabulated data were computed from ionograms recorded at Stanford University in the summer and winter of 1963–64. The calculations were programed for an electronic digital computer at Ames Research Center. 1966 614 pp. CFSTI $6.50

Electron Densities and Scale Heights in the Topside Ionosphere: Alouette I Observations Over the American Continents. Vol. I: November, December 1962, and January 1963 — NASA SP-3027

By Kwok-Long Chan, Lawrence Colin, and John O. Thomas

One of a series, this volume presents data tabulated from Alouette I topside sounder ionograms made available by the World Data Center. The ionograms selected for analysis were chosen for nearly complete latitudinal coverage over the American continents during winter, summer, and equinox months at sunspot minimum epoch of the solar cycle. 1966 504 pp. CFSTI $5.50

Calculations of Thermal Field Emission for a Terminated Image Potential — NASA SP-3023

By James F. Morris

Computed properties are presented that characterize electron emission with a terminated image potential for fields from 10^6 to 10^8 volts per centimeter, temperatures from 0° to 3000° K, work functions from 1 to 8 volts, and Fermi levels from 1 to 15 electron volts. 1966 610 pp. CFSTI $6.00

Space Materials Handbook: Supplement 1 to the Second Edition, Space Materials Experience — NASA SP-3025

By John B. Rittenhouse and John B. Singletary

A survey of materials used in the construction of successfully orbited spacecraft for which information has become available since the completion of the second edition of the *Space Materials Handbook* (ML-TDR-64-40, available from the Defense Documentation Center). Selection of materials for optimum performance is discussed in terms of the effects of the space environment. Glossary and indexes, including a cumulative index which also covers information contained in the Handbook. 1966 263 pp. CFSTI $3.00

Models of the Trapped Radiation Environment. Vol. I: Inner Zone Protons and Electrons — NASA SP-3024

By James I. Vette

A description of a model environment developed for the inner radiation belt through collation and comparison of results from various individual measurements of fluxes and energy spectra. Card-deck formats for storage of radiation data and codes for integrating the flux along satellite orbits are discussed. 1966 55 pp. CFSTI $1.00

Models of the Trapped Radiation Environment. Vol. II: Inner and Outer Zone Electrons — NASA SP-3024

By James I. Vette, Antonio B. Lucero, and Jon A. Wright

An updating of the model environment presented in Vol. I, this report describes the electron environment AE2, which covers both the inner and outer zone out to L=6.0 for the time period around August 1964, giving a detailed listing of both the flux distribution and energy spectrum. Orbital integration results for circular orbits up to 18 000 nautical miles are also presented for 29 energies and energy bands. Similar results are projected to the end of 1968 as a possible guide in estimating radiation damage for future space missions. 1966 88 pp. CFSTI $1.00

1965

Magnetic Fields Due to Solid and Hollow Conical Conductors — NASA SP-3022

By James C. Stoll, Peggy L. Yohner, and James C. Laurence

The axial and radial components of the magnetic field produced by a solid, finite-length conical conductor with a constant azimuthal current density were derived, and numerical results were computed for several values of the half-cone angle. The triple integrals giving the field values were integrated twice analytically; the third integration was done numerically on electronic computers using Gaussian integration. Axial and radial magnetic fields due to hollow conical coils or hollow frustum coils of finite thickness can be obtained from these solid-cone fields by superposition. 1965 132 pp. CFSTI $1.00

Equilibrium Thermodynamic Properties of Three Engineering Models of the Martian Atmosphere — NASA SP-3021

By Harry E. Bailey

Entropy, enthalpy, pressure, and sound speed of three carbon dioxide–nitrogen mixtures are presented graphically for wide ranges of temperature and density. The temperature range is $250° \text{ K} \leq T \leq 25\,000° \text{ K}$ ($\Delta T = 250° \text{ K}$). The density range is $-7.0 \leq \log \rho/\rho_o \leq 3.0$ ($\Delta \log \rho/\rho_o = 0.2$). The chemical compositions of the three mixtures correspond to those selected as engineering models of the Mars atmosphere in NASA TN D-2525. 1965 162 pp. CFSTI $2.50

Charts of Isentropic Exponent as a Function of Enthalpy for Various Gases in Equilibrium — NASA SP-3020

By Leland H. Jorgensen

For enthalpies to 28 000 Btu/lb and pressures from 10^{-3} to 10^2 atmospheres, curves of isentropic exponent as a function of enthalpy and speed are presented for equilibrium air, nitrogen, carbon dioxide, and a composition of 20 percent CO_2 and 80 percent N_2 (by volume). For a pressure of 1 atmosphere, curves are also presented for compositions of 10 percent CO_2—90 percent N_2 and for 50 percent CO_2—50 percent N_2. 1965 10 pp. CFSTI $0.50

Charts for Equilibrium and Frozen Nozzle Flows of Carbon Dioxide — NASA SP-3019

By George G. Mateer and Victor L. Peterson

Results are presented for total pressures ranging to 1000 atmospheres and total enthalpies ranging to 55 kilojoules per gram. The properties of temperature, pressure, density, velocity, dynamic pressure, Mach number, Reynolds number, molecular-weight ratio, and species concentrations are presented in charts. Temperature, pressure ratio, and density ratio across normal shock waves in a nozzle are also included. 1965 78 pp. CFSTI $0.75

Charts for Equilibrium and Frozen Flows Across Plane Shock Waves in Carbon Dioxide — NASA SP-3018

By Craig D. Simcox and Victor L. Peterson

In this work, the flow was assumed to be in equilibrium and the chemisty to be frozen with molecular vibrations either not excited or fully excited. Results are presented in graphical form at ambient pressures ranging from 10^{-7} to 10 atmospheres, and for speeds ranging from 1 to 16 km/sec. 1965 129 pp. CFSTI $1.00

Charts for Approximate Thermodynamic Properties of Nitrogen-Oxygen Mixtures — NASA SP-3017

By Bruce Fowler and Ronald D. Brown

The purpose of this publication is to present data, determined by one consistent approach, on the thermodynamic properties of nitrogen and three nitrogen-oxygen compositions and the dimensionless speed-of-sound parameter for each. These properties have been calculated over a temperature range from 200° to 15 000° K for a pressure range from 10^{-4} to 10^{2} atmospheres. The data are presented in a combination of Mollier charts and tables, so that aerodynamic expansions can be performed. The results, which agree closely with more rigorous calculations, are considered suitable for engineering purposes.

1965 116 pp. CFSTI $1.25

Venus and Mars Nominal Natural Environment for Advanced Manned Planetary Mission Programs — NASA SP-3016

By Dallas E. Evans, David E. Pitts, and Gary L. Kraus

Numerical values for a nominal natural environment for application in studies of advanced planetary missions to Venus and Mars. The data compiled here provide a standard environment so that various mission and preliminary design studies will all be based on realistic data and have a common basis for comparison of end results. 1965 46 pp. CFSTI $2.00

Charts for Equilibrium Flow Properties of Carbon Dioxide in Hypervelocity Nozzles — NASA SP-3015

By Leland H. Jorgensen and Robert J. Redmond

Conjecture on the composition of the Venusian and Martian atmospheres, as well as interest in the problems of flight within these atmospheres, has prompted this investigation. For initial stagnation pressures from 1 to 1000 atmospheres and stagnation enthalpies from 400 to 20 000 Btu/lb, nozzle-flow properties for equilibrium carbon dioxide have been computed and plotted. Properties charted as a function of Mach number are as follows: temperature, pressure, density, speed, area ratio, dynamic pressure, stagnation-point pressure coefficient, Reynolds number, isentropic exponent, and molecular-weight ratio. Temperatures, pressures, and densities across normal shock waves are also charted, and weight-flow rate is plotted as a function of stagnation enthalpy.

1965 71 pp. CFSTI $3.00

Equilibrium Thermodynamic Properties of Carbon Dioxide — NASA SP-3014

By Harry E. Bailey

Entropy, enthalpy, pressure, and speed of sound of carbon dioxide computed for wide ranges of temperature and density are presented graphically. The temperature range is $250° \text{ K} \leq T < 25\,000° \text{ K}$ ($\Delta T = 250° \text{ K}$). The density range is $-7.0 \leq \log \rho/\rho_o \leq +3.0$ ($\Delta \log \rho/\rho_o = 0.2$). 1965 66 pp. CFSTI $3.00

Bioastronautics Data Book — NASA SP-3006

Paul Webb, Ed.

This publication is for designers of aerospace vehicles and equipment. It contains carefully selected applied research data from the life sciences in consistent engineering units, accompanied by metric scales. Index. 1964 400 pp. GPO $2.25

Tables of Energy Losses and Ranges of Electrons and Positrons — NASA SP-3012

By Martin J. Berger and Stephen M. Seltzer

Tables giving the mean energy loss of electrons by collisions with atomic electrons and by bremsstrahlung, the mean range, and the radiation yield (conversion of electron kinetic energy into bremsstrahlung energy) are presented for approximately 40 materials and 80 energies between 10 keV and 1000 MeV. Some comparisons are made between calculated and experimental values of the mean energy loss. 1964 127 pp. CFSTI $4.00

Tables of Energy Losses and Ranges of Heavy Charged Particles — NASA SP-3013

By Walter H. Barkas and Martin J. Berger

Two-variable proton stopping-power and range tables are given as functions of the particle energy τ and of the mean excitation energy I_{adj} of the medium for 160 values of τ between 1 and 5000 MeV, and for 36 values of I_{adj}. These tables can be applied to any medium with specified mean excitation energy. Stopping-power and range tables that include the density-effect correction are given for protons, haons, pions, and muons for 36 elements and compounds. 1964 131 pp. CFSTI $4.00

Thermodynamic and Transport Properties for the Hydrogen-Oxygen System — NASA SP-3011

By Roger A. Svehla

The properties calculated include enthalpy, entropy, molecular weight, heat capacity, isentropic exponent, composition, viscosity, thermal conductivity, and Prandtl number and Lewis number for chemical-equilibrium conditions. Also included are frozen heat capacity, frozen thermal conductivity, and frozen Prandtl number, all calculated with the equilibrium composition. Results are presented in tabular form and, in some cases, in graphical form. 1964 419 pp. CFSTI $6.00

Tables of the Complex Fresnel Integral — NASA SP-3010

By C. William Martz

The complex Fresnel integral defined by

$$\int_0^{x+iy} \exp \frac{i\pi u^2}{2}\, du$$

is evaluated by means of Taylor's series expansions. The real and imaginary parts, accurate to five significant figures, are tabulated essentially throughout the complex plane, except in the regions $xy < -6.8$. Tabulation intervals in the x-direction are 0.02 for $0 \leq X \leq 10$, and 0.01 for $10 \leq X \leq 20$. Similar intervals apply in the y and $-y$ directions. An error analysis is presented of the methods used to evaluate the integrals.

1964 298 pp. CFSTI $4.00

Tables for Supersonic Flow Around Right Circular Cones at Small Angle of Attack — NASA SP-3007

Results are presented for cone angles from 2.5° to 30° in regular increments of 2.5°. The calculations were performed using the theory of Stone, which yields results in a wind-fixed coordinate system. However, all results have been transformed into a body-fixed coordinate system. 1964 422 pp. GPO $2.25

Tables of Flow Properties of Thermally Perfect Carbon Dioxide and Nitrogen Mixtures — NASA SP-3009

By William Patrick Peterson

Equations, tables, and figures for use in the analysis of flow of carbon dioxide and mixtures of carbon dioxide and nitrogen. Tables of gas properties as functions of temperature and one-dimensional, normal, and oblique-shock parameters as functions of Mach number are presented for Mach numbers up to 12.7. The parameters dependent on Mach number are tabulated for stagnation temperatures from 1000° to 3000° R. Condensation Mach numbers are also given. 1964 113 pp. CFSTI $2.50

Thermodynamic Properties and Mollier Chart for Hydrogen From 300° K to 20 000° K — NASA SP-3002

By Robert F. Kubin and Leroy L. Presley

The calculated properties for pressures from 10^4 to 10^8 atmospheres include energy, enthalpy, entropy, specific heats, and equilibrium constants for dissociation and ionization, chemical composition, density, compressibility, and speed of sound. Results are presented in tabular form and in the form of a Mollier diagram, and are considered to be suitable for engineering purposes. 1964 63 pp. CFSTI $1.75

Energy Spectra and Angular Distributions of Electrons Transmitted Through Sapphire (Al_2O_3) Foils — NASA SP-3008

By Martin J. Berger and Stephen M. Seltzer

Monte Carlo results are presented, in the form of 72 tables, for the transmission of electrons with energies between 1 and 8 MeV through sapphire foils. Two types of beam geometry are treated for all source energies: (*a*) perpendicular incidence and (*b*) beams with an initial cosine-law angular distribution. For a source energy of 2 MeV, various incident beam obliquities are also treated. The physical factors taken into account include the energy losses due to collisions with atomic electrons, the mean energy loss due to bremsstrahlung, and the angular deflections and path detours due to multiple Coulomb scattering by atoms. 1964 107 pp. CFSTI $2.50

Tables for Supersonic Flow Around Right Circular Cones at Zero Angle of Attack — NASA SP-3004

By Joseph L. Sims

Results are presented for cone angles from 2.5° to 30° in regular increments of 2.5°. The calculations were performed using the Taylor and Maccoll theory. Numerical integrations were performed using the Runge-Kutta method for second-order differential equations. The desired free-stream Mach number was obtained to six or more significant figures in all calculations. The data listed in this report are essentially the same as those of Zdenk Kopal's Tables of Supersonic Flow Around Cones. 1964 421 pp. GPO $2.25

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Tables of the Composition, Opacity, and Thermodynamic Properties of Hydrogen at High Temperatures

NASA SP-3005

By N. L. Krascella

All data are tabulated for 14 total pressures between 1 and 1000 atmospheres and for 21 temperatures between 3000° and 200 000° R. Spectral-absorption coefficients are tabulated for 33 wave numbers between 1000 and 400 000 cm^{-1} at each pressure and temperature. The equations employed in making the theoretical calculations are listed, and typical examples of the tabulated data are presented in graphical form.

1963 185 pp. CFSTI $3.00

Handbook of Space-Radiation Effects on Solar-Cell Power Systems

NASA SP-3003

By William C. Cooley and Robert J. Janda

Areas of space-radiation effects covered in this handbook are: (1) radiation damage to solar cells, (2) correlation of satellite test data on solar-cell performance, (3) design methods for solar-cell power systems, (4) radiation effects on solar-cell cover slide materials and adhesives, (5) space-radiation effects on transistors and diodes, and (6) summary of the space-radiation environment. 1963 120 pp. CFSTI $2.50

Thermodynamic Properties to 6000° K for 210 Substances Involving the First 18 Elements

NASA SP-3001

By Bonnie J. McBride, Sheldon Heimel, Janet G. Ehlers, and Sanford Gordon

Consistent tables for gaseous and condensed species give the following functions for the standard state: heat capacity at constant pressure, sensible enthalpy, entropy, sensible free energy, and the sum of sensible enthalpy and chemical energy at 0° K, as well as values of enthalpy changes and logarithms of equilibrium constants.

1963 328 pp. CFSTI $5.00

Histories and Chronologies

1966

An Administrative History of NASA, 1958–1963 NASA SP–4101

By Robert L. Rosholt, with a Foreword by James E. Webb

The first five chapters of this study cover the antecedents and first years of the National Aeronautics and Space Administration; the remaining four deal with the change in political administration and the acceleration of the space program in 1961, and with the organizational consequences through 1963. Emphasis is on organizational structure and administrative procedures, including intra-agency procedures, personnel, finance, and procurement.

1966 381 pp. GPO $4.00

1965

Space Medicine in Project Mercury NASA SP–4003

By Mae Mills Link

This volume examines the development of NASA's fund of space-medicine information and experience. It also shows how NASA was able to draw upon the vast and rich resources of the Air Force, the Navy, other Government agencies, industry, and academic and private research institutions to develop life-support systems to protect man against the stresses of launch, orbit, reentry, and impact throughout the Mercury program. Index.

1965 198 pp. GPO $1.00

Astronautics and Aeronautics, 1964 NASA SP–4005
Chronology on Science, Technology, and Policy

A chronology of events and statements of the seventh year of the space age, compiled from open public sources as ready reference for current use by space technologists, scholars, students, and writers, as well as for future analysts and historians. Index.

1965 527 pp. GPO $1.75

1964

Astronautics and Aeronautics, 1963 NASA SP–4004
Chronology on Science, Technology, and Policy

A chronology of events and statements of the sixth year of the space age, compiled from open public sources as ready reference for current use by space technologists, scholars, students, and writers, as well as for future analysts and historians. Index.

1964 610 pp. GPO $2.00

1963

Project Mercury: A Chronology NASA SP–4001

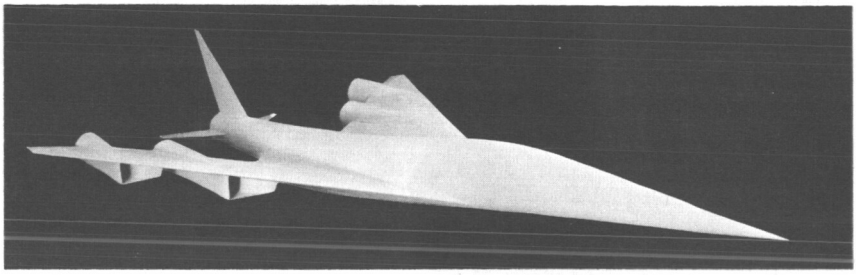
By James M. Grimwood

A listing of major events in the first U.S. manned space-flight program, from preliminary discussions of Earth satellite vehicles through Astronaut Cooper's 22-orbit flight in May 1963. Index.

1963 238 pp. GPO $1.50

1966

Selected Casting Techniques — NASA SP-5044



Outlines a construction method by which wind-tunnel models of both simple and complex configuration can be produced rapidly at reduced cost. An interesting casting and plasticizing technique developed by Langley Research Center that may be applied to items not necessarily related to the aircraft industry. 1966 21 pp. CFSTI $1.00

Suggested Method for Plating Copper on Aluminum — NASA SP-5025

Describes the successful application of the phosphate anodizing process in copperplating commercially pure aluminum and several aluminum alloys. Lists the advantages, as well as one disadvantage, of this procedure compared with the zincate process in current industrial use. 1966 9 pp. GPO $0.20

Cumulative Index to NASA Tech Briefs, 1963–1965 — NASA SP-5021(02)

A guide to technological innovations derived from the NASA space program, containing citations and abstracts of all *NASA Tech Briefs* published through 1965. Subject index and two indexes relating *Tech Brief* numbers to originating sources.

1966 41 pp. CFSTI $1.00

Symposium on Technology Status and Trends — NASA SP-5030

Proceedings of a conference at Huntsville, Ala., April 21–23, 1965, sponsored by the Technology Utilization Office of Marshall Space Flight Center for the purpose of acquainting representatives of nonaerospace industry with space innovations that may have general industrial application. 1966 248 pp. GPO $1.50

Bibliography on Electromechanical Transducers — NASA SP-5036

Annotated bibliography of current literature on the applications and uses of electromechanical transducers, with subject and author indexes. Material selected by ASTRA, Midwest Research Institute. 1966 20 pp. CFSTI $1.00

Bibliography on Solid Lubricants — NASA SP-5037

Material for this annotated bibliography of current literature on the applications and uses of solid lubricants was selected by the Aerospace Research Applications Center at the University of Indiana. Includes subject and author indexes.

1966 14 pp. CFSTI $1.00

Bibliography on Welding Methods — NASA SP-5024

A list of annotated references to current literature on various welding techniques. Selection by the Knowledge Availability Systems Center, University of Pittsburgh. Subject and author indexes.

1966 28 pp. CFSTI $1.00

Magnetic Tape Recording Technology — NASA SP-5038

By Skipwith W. Athey

A survey of the entire range of recorder technology, with emphasis on two aspects of development in which NASA has played an important part. One is the area of miniature severe-environment tape recorders, for use in satellites and space probes. The other area particularly explored in this publication is that of commercial, ground-based tape recorders for acquiring telemetry data and for related purposes. Index.

1966 326 pp. GPO $1.25

1965

The Electromagnetic Hammer — NASA SP-5034

This report describes a method, under investigation at Marshall Space Flight Center and by NASA contractors, of using electrodynamic forces for removing the distortion from welded components. The method consists of using a pancake electromagnetic coil driven by electric-discharge equipment to smooth out nonferrous metal components such as welded rocket fuel tanks, gore segments, and bulkheads. The process is unusual in that no tooling other than the magnetic coil is required. In a typical application, the magnetic hammer has been used to remove distortions in fuel-tank domes for the giant Saturn V launch vehicle.

1965 22 pp. GPO $0.25

Microelectronics in Space Research — NASA SP-5031

Provides information on the contributions to the microelectronics field that have originated in NASA research programs. Also includes a review of the status of microelectronics, in which the limitations of the various technologies are highlighted. Considerable emphasis has been placed on silicon integrated-device technology, because of its importance. Microminiaturization aimed solely at reducing the size of components and circuits is not considered.

1965 130 pp. GPO $0.60

Tungsten Powder Metallurgy — NASA SP-5035

By V. D. Barth and H. O. McIntire

Prepared for NASA under contract by Battelle Memorial Institute, this report summarizes recent developments in tungsten-powder metallurgy technology as related to space vehicles and the less traditional applications. The customary use of tungsten as a carbide or as a minor alloying element is not considered.

1965 40 pp. GPO $0.35

Metal-Forming Techniques — NASA SP-5017

By Ilia I. Islamoff

Outlines recent metal-forming methods for sheet and plate materials used by the aircraft and aerospace industries, and describes particularly the techniques employed at present, some of which, like magnetic forming and hot-drape forming, are in experimental stages.

1965 52 pp. GPO $0.40

Elastic Orifices for Gas Bearings — NASA SP-5029

Report describing an elastic orifice for the control of fluid flow in a pressurized gas bearing. Test data indicate superiority of such a system over pressurized liquid and rolling-contact bearing systems.

1965 11 pp. GPO $0.20

Handling Hazardous Materials — NASA SP-5032

By D. R. Cloyd and W. J. Murphy

A report on highly reactive materials (such as liquid hydrogen, pentaborane, fluorine, and hydrazine) studied in the search for fuels and oxidizers for spacework. Methods for safe handling of these and similar materials are discussed in relation to their hazardous properties. References are given to work done by NASA and other investigators.

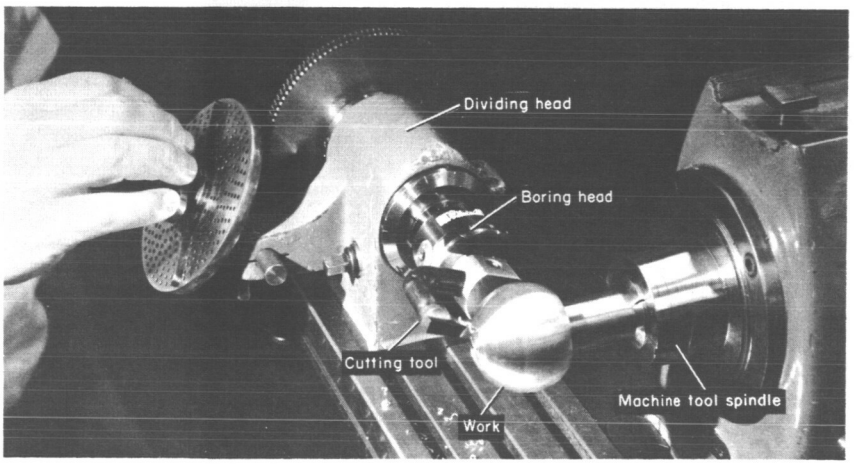
1965 96 pp. GPO $0.45

Plasma Jet Technology — NASA SP-5033

Compiled and edited by P. R. Dennis, C. R. Smith, D. W. Gates and J. B. Bond

This survey of some of the present industrial applications of plasma-arc devices and of NASA work in this field was undertaken to stimulate the interest and imagination of readers concerned with technological progress. The publication emphasizes the industrial potential of plasma generators in the testing, coating, and spraying of materials, in chemical synthesis, and in other industrial operations. It includes accounts of NASA contributions to such technology and the instrumentation involved, and lists NASA plasma-arc facilities. Both arc-heater and propulsion work are noted, because both are of industrial interest. The volume also includes a bibliography with selected abstracts for readers who may wish further information. Author index. 1965 200 pp. GPO $1.00

Selected Shop Techniques — NASA SP-5010



A handbook prepared especially for machinists, mechanics, and those working in related crafts, on the premise that "although no two problems are identical, they may certainly be similar." It describes how fabrication obstacles were overcome by improvisation, by creating new tools, and sometimes by applying an old and maybe all-but-forgotten technique to a new field. 1965 105 pp. GPO $0.60

Medical and Biological Applications of Space Telemetry — NASA SP-5023

A description of the biotelemetry systems developed for or employed in the space effort and in civilian biomedical applications. It is directed toward expediting more widespread use of such devices and toward accumulation of information useful in further design and applications. Glossary. 1965 66 pp. GPO $0.45

Technical and Economic Status of Magnesium-Lithium Alloys

NASA SP-5028

By Paul D. Frost

Magnesium-lithium alloys, their general characteristics, current applications, and economic considerations for their future use. One objective is to report on the progress being made in the application of the new ultralight magnesium-lithium alloys in the space industry and to disseminate this information to those organizations not acquainted with the alloys and their applications. The second objective is to speculate on possible future usefulness of the alloys in applications not oriented to space flight and to define technical and economic requirements for establishing such commercial use.

1965 45 pp. GPO $0.25

A Technique for Joining and Sealing Dissimilar Materials

NASA SP-5016

Describes a boltless attachment-and-sealing method used in cryogenic research at NASA's Lewis Research Center. The method features configured male and female members with a third material in the resulting cavity. Under the NASA Technology Utilization Program, this fastening method has been studied for potential use in industrial products and processes. The study suggests that the concept can provide the basis for a family of fastening and sealing methods. Representative areas of design use are presented.

1965 8 pp. CFSTI $0.25

Micropower Logic Circuits

NASA SP-5022

By John C. Sturman

Illustrated descriptions of a number of digital logic circuits that were developed primarily to fill a need for very-low-power logic systems in space vehicles but which can easily be adapted for specific applications in nonspace computer systems. With relatively simple engineering modifications, applications of these circuits, as well as of three ancillary circuits described in this report, will be apparent for such equipment and products as automated production systems, numerically controlled machine tools, measuring instrumentation, remote controls and alarm systems, high-fidelity radio and recording systems, and television receivers.

1965 15 pp. CFSTI $0.75

Advanced Valve Technology

NASA SP-5019

By Kenneth D. May

Objectives of this survey are threefold: (1) to identify present limitations of commercially available valves; (2) to recognize current technological advancements beyond the general state of the art; and (3) to disseminate this advanced valve technology throughout industry. To fulfill these objectives present valve problem areas are recognized, research and development activities in these areas discussed, and the latest trends and techniques reported. Glossary.

1965 182 pp. CFSTI $1.50

1964

Transforming and Using Space-Research Knowledge (Ten Diversified Views)

NASA SP-5018

Ten papers selected from a symposium and workshop sponsored by NASA and the University of California, Los Angeles, June 2, 1964, to acquaint engineers, executives, and marketers in nonaerospace industries with new approaches, knowledge, and technology generated by Government-sponsored aerospace research.

1964 110 pp. GPO $0.70

NASA Contributions to the Technology of Inorganic Coatings — NASA SP-5014

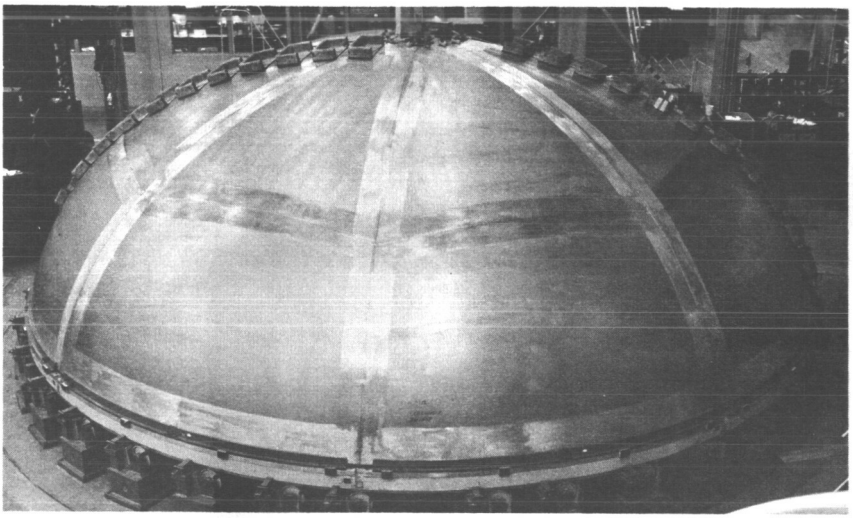
By Jerry D. Plunkett

A survey of NASA's contributions in the areas of thermophototropic coatings, thermal control for space vehicles, solid-lubrication coatings, thermal-insulation coatings, application of coatings to substrates, measurement of coating optical properties, and refractory metal oxidation-resistant coatings. 1964 268 pp. GPO $1.00

Conference on New Technology — NASA SP-5015

Proceedings of a conference on technology utilization held at Lewis Research Center, June 4–5, 1964, to discuss ways of transferring applicable space-research knowledge to the industrial community. 1964 156 pp. GPO $1.00

Selected Welding Techniques, Parts I and II — NASA SP-5003 NASA SP-5009



Descriptions and illustrations of tools and techniques selected from those used in welding aluminum sheet and plate at NASA's Marshall Space Flight Center.

1964 Part I 25 pp. GPO $0.30; 1964 Part II 34 pp. GPO $0.30

Welding for Electronic Assemblies — NASA SP-5011

This handbook covers the theory requirements and fundamental techniques of interconnecting electronic components by resistance spot welding. A thorough understanding of the theory of resistance spot welding along with good workmanship and process control are the factors necessary to attain the required reliability. Glossary.

1964 81 pp. GPO $0.40

Space Batteries — NASA SP-5004

By Howard T. Francis

Handbook containing descriptions of three sealed battery systems for spacecraft, and a discussion of how test-data information may be shared among space contractors.

1964 53 pp. GPO $0.25

Effects of Low Temperatures on Structural Metals — NASA SP-5012

Testing procedures are described and test data are tabulated in this report. Cryogenic properties are presented in graphic form and discussed for alloy steels and alloys of aluminum, nickel, titanium, and magnesium. 1964 55 pp. GPO $0.40

Precision Tooling Techniques — NASA SP-5013

Describes novel tooling techniques and devices, with possible industrial applications, developed at NASA's Marshall Space Flight Center.

1964 25 pp. GPO $0.25

The Retrometer: A Light-Beam Communications System — NASA SP-5005

By Numa E. Thomas

A new system of voice communications transmitted on a beam of light is described, which differs from prior systems in that the originating station requires no power other than that of the human voice. The advantages and limitations of the retrometer are briefly discussed, and some potential applications are analyzed. A detailed description of an experimental model is given. 1964 19 pp. CFSTI $0.50

The Measurement of Blood Pressure in the Human Body — NASA SP-5006

By C. R. Smith and W. H. Bickley

Survey presenting a state-of-the-art summary prepared from the open literature for nonmedical scientists and engineers. 1964 34 pp. GPO $0.30

Measurement of the Heartbeat of Bird Embryos With a Micrometeorite Transducer — NASA SP-5007

By Vernon L. Rogallo

This report describes a new ultrasensitive momentum transducer that has been successfully adapted as a ballistocardiograph to measure the heartbeat of avian embryos. Experiments have demonstrated that life can be detected as early as 4 days in the incubation period. The technique appears to open new avenues of investigation in such areas as vaccine production and drug research. 1964 10 pp. CFSTI $0.50

1963

Reliable Electrical Connections, Third Edition — NASA SP-5002

Prepared under the direction of James A. Gay, Jr.

Diagrams, photographs, and detailed instructions covering dependable techniques of different kinds of electrical connections. 1963 67 pp. CFSTI $0.70

An Improved Precision Height Gage — NASA SP-5001

By Lester B. Vale

Design and construction of this accurate, easy-to-use gage are described. Possible variations and attachments to increase its utility are also suggested.

1963 13 pp. CFSTI $0.50

Publications for Office of Manned Space Flight

1966

Structural Systems and Program Decisions, Vols. 1 and 2 — **NASA SP–6008, NASA SP–6008(01)**

Written for decision-makers who assimilate, validate, and interpret changes in baseline requirements on space vehicle programs, this study presents a computer program designed to provide management with a means of rapidly assessing the impact of design criteria changes on launch vehicle structural weight. The program is kept as flexible as possible, with necessary specialization of techniques or usage aimed at the Saturn V launch vehicle.

1966 Vol. 1 214 pp. CFSTI $4.50
1966 Vol. 2 386 pp. CFSTI $3.75

Forecasts and Appraisals for Management Evaluation, Vols. 1 and 2 — **NASA SP–6009, NASA SP–6009(01)**

Intended primarily for those responsible for the administration, design, development, manufacture, and test of the Apollo System, this text emphasizes the use of forecasting devices as applied to space vehicle weight and performance. Mathematical models, performance relationships, and user's guide are presented in appendixes contained in the second volume.

1966 Vol. 1 220 pp. CFSTI $3.75
1966 Vol. 2 370 pp. CFSTI $4.50

1965

Weight/Performance Management Survey Manual — **NASA SP–6006**

An Apollo Program Office Manual providing procedures for a management assessment of Apollo contractor activities, performance, and effectiveness of the management system. It also provides a tool for determining corrective action. 1965 31 pp. CFSTI $2.00

Electrical Power Management Survey Manual — **NASA SP–6007**

Procedures for a management audit of NASA Apollo Program contractor activities. It assesses performance toward objectives, evaluates effectiveness of the management system, and, where weaknesses exist, provides a tool for determining corrective action. This amplifies Electrical Power Management Standard CMO19–000–1, June 15, 1965.

1965 31 pp. CFSTI $2.00

Electrical Power Management Standard — **NASA SP–6005**

This document is a standard for all Apollo procurement actions. It establishes a system for the management and reporting of electrical power source, load, and distribution properties of space vehicles. Its demand will probably be limited to OMSF centers and Headquarters offices. Its use is similar to that of SP–6004 noted below. 1965 31 pp. CFSTI $2.00

Mass Properties Standard — NASA SP-6004

This publication establishes a system for the management of mass properties during procurement and use of space vehicles, or portions thereof. It is designed to permit the acquisition of systematized, verifiable, and controllable mass properties of vehicle systems; to facilitate rapid establishment and reporting of inputs for the weight/performance relationship; and to enable parametric extrapolation from the reported systems to newly evolving systems. 1965 88 pp. CFSTI $3.00

1963

Reliability Program Evaluation Procedures — NASA SP-6002

The objectives of this document are threefold: (1) to establish uniform standards for evaluating the degree and effectiveness of reliability practices and controls; (2) to identify reliability problems for evaluation and correction; (3) to permit evaluation of the various methods of controlling a specific area leading to improved reliability and safety levels. These standards may be used to survey contractual compliance to all reliability publications. They are designed to identify problem and improvement areas consistent with the severe reliability and safety requirements of manned space-flight systems.

1963 52 pp. CFSTI $1.50

Quality Program Evaluation Procedures — NASA SP-6003

Procedures and related survey checklists to be used in evaluating quality procedures and controls being applied to manned space-flight programs. The program has three objectives: (1) to establish uniform standards for evaluating the degree and effectiveness of quality practices and controls; (2) to identify quality problems for evaluation and correction; and (3) to permit evaluation of various methods of controlling a specific quality area, leading to improved reliability and safety levels. The program is designed to identify problem and improvement areas consistent with the severe reliability and safety requirements of manned space-flight systems. 1963 69 pp. CFSTI $1.75

Bibliographies and Other Reference Works

1966

Particles and Fields Research, A Bibliography With Author Index — NASA SP-7026

An extensive list of references to journal articles, books, conference proceedings, and English translations of foreign journals published between January 1958 and May 1966. Particularly comprehensive with regard to rocket and satellite research on energetic particles and on magnetic and electric fields. 1966 164 pp. CFSTI $2.50

Lunar Surface Studies, A Continuing Bibliography With Indexes — NASA SP-7003(02)

A selection of annotated references to reports and journal articles introduced into the NASA information system during the period February 1965–January 1966. Subjects include the theory of the lunar origin, the lunar atmosphere, and physical characteristics of the Moon. Techniques and instrumentation for lunar observation, measurement and analysis are also covered. Subject and author indexes. 1966 36 pp. CFSTI $1.00

Previously issued under the same title: NASA SP-7003(01), reflecting NASA acquisitions April 1964–January 1965 (54 pp. CFSTI $1.00), and NASA SP-7003, January 1962–March 1964 (98 pp. CFSTI $2.25).

High Energy Propellants, A Continuing Bibliography With Indexes — NASA SP-7002(02)

Annotated references to report and journal literature on the subject introduced into the NASA information system January–December 1965. Emphasis is given to research and development studies on solid, liquid, and hybrid propellants and oxidizers, but the bibliography also covers such related topics as propellant handling and storage, combustion characteristics, toxicity, and hazards and safety measures. Subject and author indexes. 1966 48 pp. CFSTI $1.00

Previously issued under the same title: NASA SP-7002(01), containing references to NASA acquisitions April–December 1964 (98 pp. CFSTI $1.75), and NASA SP-7002, January 1962–March 1964 (65 pp. CFSTI $1.75).

Bibliographies on Aerospace Science, A Continuing Bibliography With Indexes — NASA SP-7006(02)

Annotated references to unclassified bibliographies in the field of aerospace science introduced into the NASA information system in the period February 1965–April 1966. Subject and author indexes. 1966 44 pp. CFSTI $1.00

Previously issued under the same title: NASA SP-7006(01), containing references acquired June 1964–February 1965 (68 pp. CFSTI $0.75), and NASA SP-7006, January 1962–May 1964 (52 pp. CFSTI $1.00).

Guide to the Subject Indexes for Scientific and Technical Aerospace Reports — NASA SP-7016

Third revised edition. 1966 440 pp. CFSTI $3.75

Communications Satellites, A Continuing Bibliography With Indexes — NASA SP-7004(02)

Annotated listing of report and journal literature on the subject introduced into the NASA information system during the period February 1965–January 1966. Subject and author indexes. 1966 39 pp. CFSTI $1.00

Previously issued under the same title: NASA SP-7004(01), containing references acquired May 1964–January 1965 (56 pp. CFSTI $1.00), and NASA SP-7004, January 1962–April 1964 (90 pp. CFSTI $1.00).

Aerospace Medicine and Biology, A Continuing Bibliography — NASA SP-7011(24)

Monthly annotated bibliography concentrating on the biological, physiological, psychological, and environmental effects on man during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Among related topics covered are sanitary problems, pharmacology, toxicology, safety and survival, life-support systems, exobiology, and personnel factors. This most recent supplement contains references to NASA acquisitions during April 1966. Subject, corporate source, and author indexes. 1966 76 pp. CFSTI $1.00

Previous 1966 issues under the same title: SP-7011(23), containing selected references acquired in March 1966, (68 pp. CFSTI $1.00); SP-7011(22), February 1966, (80 pp. CFSTI $1.00); and SP-7011(21), January 1966, (52 pp. CFSTI $1.00).

For the 1965 and 1964 issues, two cumulative indexes are available: "A Cumulative Index to the 1965 Issues of a Continuing Bibliography on Aerospace Medicine and Biology," NASA SP-7011(20), 721 pp. CFSTI $7.00; and "A Cumulative Index to the 1964 Issues of a Continuing Bibliography on Aerospace Medicine and Biology," NASA SP-7011(07), 554 pp. CFSTI $5.00. Monthly issues may also be purchased individually from CFSTI for $1.00 per copy.

A Selected Listing of NASA Scientific and Technical Reports for 1965 — NASA SP-7024

Annotated listing of NASA reports and journal articles announced during 1965 in *Scientific and Technical Aerospace Reports* (*STAR*). Included are Special Publications, Technical Reports, Technical Notes, Technical Memorandums, Technical Translations, and Contractor Reports. 1966 1400 pp. GPO $7.00

Similar listings available for 1964 and 1963: NASA SP-7018 (1132 pp. GPO $5.25), and NASA SP-7005 (236 pp. CFSTI $3.50).

1965

Extraterrestrial Life: A Bibliography — NASA SP-7015
Part I, Report Literature
Part II, Published Literature

A comprehensive collection of annotated references on the general subjects of extraterrestrial life and exobiology, including such related topics as the origin of life on Earth and terrestrial contamination of spacecraft. Part I consists of references to selected domestic and foreign reports prepared during the period 1962 through July 1964; Part II lists journal articles and books published in the period 1900–1964. A limited selection of 1965 sources is also included. The first volume is indexed by subject, author, corporate source, and contract number. The subject and author indexes of the second volume also cover information contained in Part I. 1965 Part I 76 pp. GPO $0.45; 1965 Part II 335 pp. GPO $2.00

Planetary Atmospheres, A Continuing Bibliography — NASA SP-7017

Selection of annotated references to unclassified reports and journal articles announced in Technical Publications Announcements (TPA, Vol. 2), Scientific and Technical Aerospace Reports (STAR), and International Aerospace Abstracts (IAA). The majority of the references pertain to studies, measurements, and discussions concerning the atmospheres of Mars, Venus, and Jupiter, but a limited number of references to the atmospheres of Mercury and Saturn are also included. Subject and author indexes.

1965 142 pp. CFSTI $1.50

Lasers and Masers, A Continuing Bibliography — NASA SP-7009

Bibliography of annotated references to the characteristics and applications of lasers and masers that were introduced into the NASA information system between January 1962 and February 1965. 1965 280 pp. CFSTI $2.50

Space Communications: Theory and Applications, A Bibliography

Vol. 1: Modulation and Channels — NASA SP-7022(01)
Vol. 2: Coding and Detection Theory — NASA SP-7022(02)
Vol. 3: Information Processing and Advanced Techniques — NASA SP-7022(03)
Vol. 4: Satellite and Deep Space Applications — NASA SP-7022(04)

A four-volume bibliography containing an extensive listing of references to reports, articles, and books on several subjects directly pertinent to the field of space communications. The compilers have endeavored to provide maximum coverage of the literature for the period 1958 through 1963. References to publications of unusual significance that appeared before 1958, as well as a limited number of 1964 sources, have also been included. Subject index.

1965 Vol. 1 474 pp. GPO $2.50
1965 Vol. 2 412 pp. GPO $2.25
1965 Vol. 3 448 pp. GPO $2.50
1965 Vol. 4 290 pp. GPO $1.75

The International System of Units—Physical Constants and Conversion Factors — NASA SP-7012

Compiled by E. A. Mechtly

This document defines the basic units of the Système International, adopted officially by the 1960 Eleventh General Conference on Weights and Measures, and tables for converting from U.S. customary units. 1965 20 pp. GPO $0.20

Lubrication, Corrosion, and Wear: A Continuing Bibliography — NASA SP-7020

Annotated bibliography of all references on this general subject that were stored in the NASA information system from January 1962 through March 1965. References pertaining to lubricating systems, lubricants, bearing design, machinery design, and heat transfer and lubricants for the special applications relating to space travel are included. Subject and author indexes. 1965 162 pp. CFSTI $1.75

Ballistocardiography: A Bibliography — NASA SP-7021

Selected bibliography of reports and journal articles, of both domestic and foreign origin, published during the period 1877–1964. Prepared by staff members of the Federal Aviation Agency and published jointly by FAA and NASA. The document also carries the number FAA AM 65-15. 1965 46 pp. GPO $0.35

1964

Preparing Contractor Reports for NASA: Repro Typing and Layout — NASA SP-7007

By Proctor P. Taylor, Jr.

Ground rules for the production of suitable reproducible copy with a minimum of effort. Topics discussed are: (1) the typewriter; (2) the reproducible layout sheet; (3) section headings; (4) spacing; (5) hyphenation; (6) error correction; (7) typing tables and figures; (8) the reproducible layout; (9) figuring reductions; and (10) typing equations.

1964 19 pp. GPO $0.15

Preparing Contractor Reports for NASA: Technical Illustrating — NASA SP-7008

Guidelines to insure the proper selection of size, shape, and style of illustrations for use in printed technical publications for NASA. The following areas are covered in detail: (1) materials; (2) graphs; (3) line drawings; (4) perspective drawings; (5) typography and lettering; (6) photographs; (7) layouts; and (8) figuring reductions.

1964 27 pp. GPO $0.15

Clarity in Technical Reporting — NASA SP-7010

By S. Katzoff

Commonsense suggestions for improving written technical reports. In particular, the booklet discusses basic attitudes, some elements of composition, the organization and contents of the report, and the editorial review. Since technical information is transmitted not only in written reports but also in talks and lectures, a section is devoted to the technical talk—the orally delivered technical report. In both written and oral reports, stress is placed on striving for clarity. 1964 25 pp. GPO $0.15

Bibliography Related to Human Factors System Program (July 1962–February 1964) — NASA SP-7014

By Richard J. Potocko

Bibliography divided into 18 categories covering the areas of human research and performance, man-systems integration, and life-support and protective systems. Also relevant listings under the categories of biology, physiology, and psychology. Each listing includes information for locating an abstract in either Scientific and Technical Aerospace Reports (STAR) or International Aerospace Abstracts (IAA). 1964 242 pp. CFSTI $3.50

Subject Index

Title Index

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U.S. GOVERNMENT PRINTING OFFICE : 1966—O-236-327

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—NATIONAL AERONAUTICS AND SPACE ACT OF 1958

NASA SCIENTIFIC AND TECHNICAL PUBLICATIONS

TECHNICAL REPORTS: Scientific and technical information considered important, complete, and a lasting contribution to existing knowledge.

TECHNICAL NOTES: Information less broad in scope but nevertheless of importance as a contribution to existing knowledge.

TECHNICAL MEMORANDUMS: Information receiving limited distribution because of preliminary data, security classification, or other reasons.

CONTRACTOR REPORTS: Scientific and technical information generated under a NASA contract or grant and considered an important contribution to existing knowledge.

TECHNICAL TRANSLATIONS: Information published in a foreign language considered to merit NASA distribution in English.

SPECIAL PUBLICATIONS: Information derived from or of value to NASA activities. Publications include conference proceedings, monographs, data compilations, handbooks, sourcebooks, and special bibliographies.

TECHNOLOGY UTILIZATION PUBLICATIONS: Information on technology used by NASA that may be of particular interest in commercial and other non-aerospace applications. Publications include Tech Briefs, Technology Utilization Reports and Notes, and Technology Surveys.

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