NASA
Scientific and Technical
Publications

A Catalog
of
Special Publications,
Reference Publications,
Conference Publications, and
Technical Papers

1989
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PREFACE

The pursuit of human knowledge through scientific research and technical endeavor has vastly expanded understanding of our world and the universe we live in. The contributions of NASA through scientific and technical research and development affect not only our understanding and use of aeronautics and space but also touch our daily lives. Geologists, oceanographers, meteorologists, archaeologists, aircraft engineers, aerospace decision makers, land-use planners, historians, and rescue teams all make use of the results of NASA's research. The findings of this research and development are published in NASA's scientific and technical report series as a part of NASA's mandate to disseminate the results of the agency's far-reaching work.


Two semimonthly abstract journals cover all aspects of aeronautics and space research, NASA and non-NASA, nationally and worldwide. STAR (Scientific and Technical Aerospace Reports), focuses on scientific and technical reports, and IAA (International Aerospace Abstracts), covers the open literature. These are available by subscription from, respectively, the U.S. Government Printing Office and the American Institute of Aeronautics and Astronautics, Inc., (see page vi).

This catalog includes publicly available reports from four NASA report series: Special Publications (SPs), Reference Publications (RPs), Conference Publications (CPs), and Technical Papers (TPs). The scope of each series is defined as follows:

Special Publications are often concerned with subjects of substantial public interest. They report scientific and technical information derived from NASA programs for audiences of diverse technical backgrounds.

Reference Publications contain compilations of scientific and technical data of continuing reference value.

Conference Publications record the proceedings of scientific and technical symposia and other professional meetings sponsored or cosponsored by NASA.

Technical Papers present the results of significant research conducted by NASA scientists and engineers.

Presented here are citations for reports from each of these series. An explanation of the elements in a typical citation follows. Accession numbers (N numbers) at the end of a citation are separate citations to articles within the report. Please use STAR to locate these citations.

Also note that some bibliographies in the NASA SP-7000 series are issued periodically. This catalog lists only the last accessioned report in each bibliography series. The periodicity of each bibliography is as follows:

NASA SP-7011 Aerospace Medicine and Biology: A Continuing Bibliography with Indexes Monthly plus annual cumulative index

NASA SP-7037 Aeronautical Engineering: A Continuing Bibliography with Indexes Monthly plus annual cumulative index

<table>
<thead>
<tr>
<th>Report No.</th>
<th>Title</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>NASA SP-7046</td>
<td>Technology for Large Space Systems: A Bibliography with Indexes</td>
<td>Semiannual</td>
</tr>
<tr>
<td>NASA SP-7056</td>
<td>Space Station Systems: A Bibliography with Indexes</td>
<td>Semiannual</td>
</tr>
<tr>
<td>NASA SP-7500</td>
<td>Management: A Bibliography for NASA Managers</td>
<td>Annual</td>
</tr>
</tbody>
</table>

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This edition brings up to date the history of U.S. agencies for space exploration, the NACA and NASA, from 1915 through 1990. Early aviation and aeronautics research are described, with particular emphasis on the impact of the two world wars on aeronautics development and the postwar exploitation of those technologies. The reorganization and expansion of the NACA into NASA is described in detail as well as NASA's relationship with industry, the university system, and international space agencies such as the ESA. The dramatic space race of the 1950 and 1960s is recounted through a detailed history of the Gemini and Apollo programs and followed by a discussion of the many valuable social/scientific application of aeronautics technologies, many of which were realized through the launching of successful satellite projects. The further solar system explorations of the Voyager missions are described, as is the Challenger tragedy and the 1988 return to space of the Shuttle program. Future plans are outlined for a cooperatively funded international space station to foster the ongoing study of space science.
SOURCES OF NASA PUBLICATIONS

The source from which a publication is available to the public is given in each citation. Addresses for these organizations are given below.

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### Schedule A
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# TABLE OF CONTENTS

## AERONAUTICS
- Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).
  - For related information see also Astronautics.

### 01 AERONAUTICS (GENERAL) 1

### 02 AERODYNAMICS 1
- Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.
  - For related information see also 34 Fluid Mechanics and Heat Transfer.

### 03 AIR TRANSPORTATION AND SAFETY N.A.
- Includes passenger and cargo air transport operations; and aircraft accidents.
  - For related information see also 16 Space Transportation and 85 Urban Technology and Transportation.

### 04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 3
- Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.
  - For related information see also 17 Space Communications, Spacecraft Communications, Command and Tracking and 32 Communications and Radar.

### 05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 3
- Includes aircraft simulation technology.
  - For related information see also 18 Spacecraft Design, Testing and Performance and 39 Structural Mechanics.
  - For land transportation vehicles see 85 Urban Technology and Transportation.

### 06 AIRCRAFT INSTRUMENTATION 4
- Includes cockpit and cabin display devices; and flight instruments.
  - For related information see also 19 Spacecraft Instrumentation and 35 Instrumentation and Photography.

### 07 AIRCRAFT PROPULSION AND POWER 4
- Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.
  - For related information see also 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels, and 44 Energy Production and Conversion.

### 08 AIRCRAFT STABILITY AND CONTROL 4
- Includes aircraft handling qualities; piloting; flight controls; and autopilots.
  - For related information see also 05 Aircraft Design, Testing and Performance.

### 09 RESEARCH AND SUPPORT FACILITIES (AIR) N.A.
- Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.
  - For related information see also 14 Ground Support Systems and Facilities (Space).

## ASTRONAUTICS
- Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; space communications, spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.
  - For related information see also Aeronautics.

### 12 ASTRONAUTICS (GENERAL) 5
- For extraterrestrial exploration see 91 Lunar and Planetary Exploration.

### 13 ASTRODYNAMICS 5
- Includes powered and free-flight trajectories; and orbital and launching dynamics.

### 14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) 6
- Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.
  - For related information see also 09 Research and Support Facilities (Air).

### 15 LAUNCH VEHICLES AND SPACE VEHICLES 6
- Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles.
  - For related information see also 20 Spacecraft Propulsion and Power.

### 16 SPACE TRANSPORTATION N.A.
- Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques.
  - For related information see also 03 Air Transportation and Safety and 18 Spacecraft Design, Testing and Performance.
  - For space suits see 54 Man/System Technology and Life Support.

### 17 SPACE COMMUNICATIONS, SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING N.A.
- Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout.
  - For related information see also 04 Aircraft Communications and Navigation and 32 Communications and Radar.
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 SPACECRAFT DESIGN, TESTING AND</td>
<td>6</td>
</tr>
<tr>
<td>PERFORMANCE</td>
<td></td>
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<tr>
<td>Includes satellites; space platforms;</td>
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<td>space stations; spacecraft systems and</td>
<td></td>
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<tr>
<td>components such as thermal and environmental controls; and attitude controls.</td>
<td></td>
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<tr>
<td>For life support systems see 54 Man/System Technology and Life Support. For related information see also 05 Aircraft Design, Testing and Performance, 39 Structural Mechanics, and 16 Space Transportation.</td>
<td></td>
</tr>
<tr>
<td>19 SPACECRAFT INSTRUMENTATION</td>
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</tr>
<tr>
<td>For related information see also 06 Aircraft Instrumentation and 35 Instrumentation and Photography.</td>
<td></td>
</tr>
<tr>
<td>20 SPACECRAFT PROPULSION AND POWER</td>
<td>6</td>
</tr>
<tr>
<td>Includes main propulsion systems and</td>
<td></td>
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<tr>
<td>components, e.g. rocket engines; and</td>
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<tr>
<td>spacecraft auxiliary power sources.</td>
<td></td>
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<tr>
<td>For related information see also 07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 44 Energy Production and Conversion, and 15 Launch Vehicles and Space Vehicles.</td>
<td></td>
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<tr>
<td>CHEMISTRY AND MATERIALS</td>
<td></td>
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<tr>
<td>Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; propellants and fuels; and materials processing.</td>
<td></td>
</tr>
<tr>
<td>23 CHEMISTRY AND MATERIALS (GENERAL)</td>
<td>7</td>
</tr>
<tr>
<td>24 COMPOSITE MATERIALS</td>
<td>7</td>
</tr>
<tr>
<td>Includes physical, chemical, and</td>
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<tr>
<td>mechanical properties of laminates and</td>
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<td>other composite materials.</td>
<td></td>
</tr>
<tr>
<td>For ceramic materials see 27 Nonmetallic Materials.</td>
<td></td>
</tr>
<tr>
<td>25 INORGANIC AND PHYSICAL CHEMISTRY</td>
<td>N.A.</td>
</tr>
<tr>
<td>Includes chemical analysis, e.g.,</td>
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<td>chromatography; combustion theory;</td>
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<td>electrochemistry; and photochemistry.</td>
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</tr>
<tr>
<td>For related information see also 77 Thermodynamics and Statistical Physics.</td>
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<tr>
<td>26 METALLIC MATERIALS</td>
<td>7</td>
</tr>
<tr>
<td>Includes physical, chemical, and</td>
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<td>corrosion; and metallurgy.</td>
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<tr>
<td>27 NONMETALLIC MATERIALS</td>
<td>8</td>
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<tr>
<td>Includes physical, chemical, and</td>
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<tr>
<td>mechanical properties of plastics,</td>
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<td>textiles, adhesives, and ceramic</td>
<td></td>
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<td>materials. For composite materials see 24 Composite Materials.</td>
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<tr>
<td>28 PROPELLANTS AND FUELS</td>
<td>N.A.</td>
</tr>
<tr>
<td>Includes rocket propellants, igniters</td>
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<td>and oxidizers; their storage and</td>
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<td>handling procedures; and aircraft fuels.</td>
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<tr>
<td>For related information see also 07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, and 44 Energy Production and Conversion.</td>
<td></td>
</tr>
<tr>
<td>29 MATERIALS PROCESSING</td>
<td>8</td>
</tr>
<tr>
<td>Includes space-based development of</td>
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<tr>
<td>products and processes for commercial</td>
<td></td>
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<tr>
<td>application. For biological materials</td>
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<tr>
<td>see 55 Space Biology.</td>
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<tr>
<td>ENGINEERING</td>
<td></td>
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<tr>
<td>Includes engineering (general);</td>
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<td>quality assurance and reliability;</td>
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<td>and structural mechanics.</td>
<td></td>
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<tr>
<td>For related information see also Physics.</td>
<td></td>
</tr>
<tr>
<td>31 ENGINEERING (GENERAL)</td>
<td>8</td>
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<tr>
<td>Includes vacuum technology; control</td>
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<tr>
<td>engineering; cryogenics; and fire</td>
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<td>prevention.</td>
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</tr>
<tr>
<td>32 COMMUNICATIONS AND RADAR</td>
<td>8</td>
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<tr>
<td>Includes radar; land and global</td>
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<td>communications; communications theory;</td>
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<td>and optical communications.</td>
<td></td>
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<td>For related information see also 04 Aircraft Communications and Navigation and 17 Space Communications, Spacecraft Communications, Command and Tracking. For search and rescue see 03 Air Transportation and Safety, and 16 Space Transportation.</td>
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<tr>
<td>33 ELECTRONICS AND ELECTRICAL ENGINEERING</td>
<td>9</td>
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<td>Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.</td>
<td></td>
</tr>
<tr>
<td>For related information see also 60 Computer Operations and Hardware and 76 Solid-State Physics.</td>
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</tr>
<tr>
<td>34 FLUID MECHANICS AND HEAT TRANSFER</td>
<td>9</td>
</tr>
<tr>
<td>Includes boundary layers; hydrodynamics;</td>
<td></td>
</tr>
<tr>
<td>fluidics; mass transfer and ablation</td>
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</tr>
<tr>
<td>cooling. For related information see also 02 Aerodynamics and 77 Thermodynamics and Statistical Physics.</td>
<td></td>
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<tr>
<td>35 INSTRUMENTATION AND PHOTOGRAPHY</td>
<td>10</td>
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<tr>
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<td>cameras and photographic supplies; and</td>
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<td>holography. For related information see also 43 Earth Resources and Remote Sensing. For related information see also 06 Aircraft Instrumentation and 19 Spacecraft Instrumentation.</td>
<td></td>
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<tr>
<td>36 LASERS AND MASERS</td>
<td>10</td>
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<tr>
<td>Includes parametric amplifiers.</td>
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</tr>
<tr>
<td>For related information see also 76 Solid-State Physics.</td>
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<td>37 MECHANICAL ENGINEERING</td>
<td>10</td>
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<tr>
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<td>38 QUALITY ASSURANCE AND RELIABILITY</td>
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<td>techniques; and quality control.</td>
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</tr>
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<td>39 STRUCTURAL MECHANICS</td>
<td>11</td>
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<tr>
<td>Includes structural element design and</td>
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<tr>
<td>weight analysis; fatigue; and thermal</td>
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GEOSCIENCES
Includes geosciences (general); earth resources and remote sensing; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also Space Sciences.

42 GEOSCIENCES (GENERAL)  

43 EARTH RESOURCES AND REMOTE SENSING
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see 35 Instrumentation and Photography.

44 ENERGY PRODUCTION AND CONVERSION
Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.
For related information see also 07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, and 28 Propellants and Fuels.

45 ENVIRONMENT POLLUTION
Includes atmospheric, noise, thermal, and water pollution.

46 GEOPHYSICS
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see 93 Space Radiation.

47 METEOROLOGY AND CLIMATOLOGY
Includes weather forecasting and modification.

48 OCEANOGRAPHY
Includes biological, dynamic, and physical oceanography; and marine resources.
For related information see also 43 Earth Resources and Remote Sensing.

LIFE SCIENCES
Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and space biology.

51 LIFE SCIENCES (GENERAL)

52 AEROSPACE MEDICINE
Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

53 BEHAVIORAL SCIENCES
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT
Includes human engineering; biotechnology; and space suits and protective clothing.
For related information see also 16 Space Transportation.

55 SPACE BIOLOGY
Includes exobiology; planetary biology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES
Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

60 COMPUTER OPERATIONS AND HARDWARE
Includes hardware for computer graphics, firmware, and data processing.
For components see 33 Electronics and Electrical Engineering.

61 COMPUTER PROGRAMMING AND SOFTWARE
Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

62 COMPUTER SYSTEMS
Includes computer networks and special application computer systems.

63 CYBERNETICS
Includes feedback and control theory, artificial intelligence, robotics and expert systems.
For related information see also 54 Man/System Technology and Life Support.

64 NUMERICAL ANALYSIS
Includes iteration, difference equations, and numerical approximation.

65 STATISTICAL AND PROBABILITY
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS
Includes topology and number theory.

PHYSICS
Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also Engineering.

70 PHYSICS (GENERAL)
For precision time and time interval (PTTI) see 35 Instrumentation and Photography; for geophysics, astrophysics or solar physics see 46 Geophysics, 90 Astrophysics, or 92 Solar Physics.
ACOUSTICS
Includes sound generation, transmission, and attenuation.
For noise pollution see 45 Environment Pollution.

ATOMIC AND MOLECULAR PHYSICS
Includes atomic structure, electron properties, and molecular spectra.

NUCLEAR AND HIGH-ENERGY PHYSICS
Includes elementary and nuclear particles; and reactor theory.
For space radiation see 93 Space Radiation.

OPTICS
Includes light phenomena and optical devices.
For lasers see 36 Lasers and Masers.

PLASMA PHYSICS
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see 46 Geophysics. For space plasmas see 90 Astrophysics.

SOLID-STATE PHYSICS
Includes superconductivity.
For related information see also 33 Electronics and Electrical Engineering and 36 Lasers and Masers.

THERMODYNAMICS AND STATISTICAL PHYSICS
Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics.
For related information see also 25 Inorganic and Physical Chemistry and 34 Fluid Mechanics and Heat Transfer.

SOCIAL SCIENCES
Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law, political science; and space policy; and urban technology and transportation.

ECONOMICS AND COST ANALYSIS
Includes cost effectiveness studies.

LAW, POLITICAL SCIENCE AND SPACE POLICY
Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

URBAN TECHNOLOGY AND TRANSPORTATION
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see 03 Air Transportation and Safety, 16 Space Transportation, and 44 Energy Production and Conversion.

SPACE SCIENCES
Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also Geosciences.

ASTRONOMY
Includes radio, gamma-ray, and infrared astronomy; and astrometry.

ASTROPHYSICS
Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.
For related information see also 75 Plasma Physics.

LUNAR AND PLANETARY EXPLORATION
Includes planetology; and manned and unmanned flights.
For spacecraft design or space stations see 18 Spacecraft Design, Testing and Performance.

SOLAR PHYSICS
Includes solar activity, solar flares, solar radiation and sunspots.
For related information see 93 Space Radiation.

SPACE RADIATION
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see 52 Aerospace Medicine. For theory see 73 Nuclear and High-Energy Physics.

GENERAL
Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs.

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX ................................................................. A-1
PERSONAL AUTHOR INDEX .............................................. B-1
REPORT NUMBER INDEX ................................................... C-1
01

AERONAUTICS (GENERAL)

N89-19230*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
JOINT UNIVERSITY PROGRAM FOR AIR TRANSPORTATION RESEARCH, 1987
AVIONICS, COMPUTER TECHNIQUES, CONTROL THEORY, GUIDANCE (MOTION), SURFACE NAVIGATION

N89-22568*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
EVALUATION OF THE RIDE QUALITY OF A LIGHT TWIN ENGINE AIRPLANE USING A RIDE QUALITY METER
ERIC C. STEWART Jun. 1989 27 p (NASA-TP-2913; L-16524; NAS 1.60:2913) Avail: NTIS HC A03/MF A01 CSCL 01A

N89-29304* National Aeronautics and Space Administration, Washington, DC.
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 242)
Aug. 1989 132 p (NASA-SP-7037(242); NAS 1.21:7037(242)) Avail: NTIS HC A03/MF A01 CSCL 01A
This bibliography lists 466 reports, articles, and other documents introduced into the NASA scientific and technical information system in July, 1989. Subject coverage includes: design, construction and testing of aircraft and aircraft engines; aircraft components, equipment and systems; ground support systems; and theoretical and applied aspects of aerodynamics and general fluid dynamics.

02

AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

N89-10024*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
VALIDATION OF A PAIR OF COMPUTER CODES FOR ESTIMATION AND OPTIMIZATION OF SUBSONIC AERODYNAMIC PERFORMANCE OF SIMPLE HINDED-FLAP SYSTEMS FOR THIN SWEPT WINGS
HARRY W. CARLSON (PRC Systems Services Co., Hampton, Va.) and CHRISTINE M. DARDEN Washington Nov. 1988 118 p (NASA-TP-2828; L-16428; NAS 1.60:2828) Avail: NTIS HC A06/MF A01 CSCL 01A
AERODYNAMICS, COMPUTER PROGRAMS, FLAPPING HINGES, OPTIMIZATION, SUBSONIC FLOW, SWEPT WINGS

N89-10844*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
THREE COMPONENT LASER ANEMOMETER MEASUREMENTS IN AN ANNULAR CASCADE OF CORE TURBINE VANES WITH CONTOURED END WALL
LOUIS J. GOLDMAN and RICHARD G. SEASHOLTZ Nov. 1988 44 p (NASA-TP-2846; E-4183; NAS 1.60:2846) Avail: NTIS HC A03/MF A01 CSCL 20D
ANNULAR FLOW, CASCADE FLOW, FABRY-PEROT INTERFEROMETERS, FLOW MEASUREMENT, LASER ANEMOMETERS, STATOR BLADES, VELOCITY MEASUREMENT

N89-10849*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
The 1987 Ground Vortex Workshop
CONFERENCES, EXHAUST GASES, GROUND EFFECT (AERODYNAMICS), SHORT TAKEOFF AIRCRAFT, VATOL AIRCRAFT, VERTICAL TAKEOFF AIRCRAFT, VORTICES

N89-12543*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
A SPECTRAL COLLOCATION SOLUTION TO THE COMPRESSIBLE STABILITY EIGENVALUE PROBLEM
BOUNDARY LAYER FLOW, COMPRESSIBLE FLOW, COMPUTATIONAL GRIDS, FLOW DISTRIBUTION, FLOW STABILITY, SHEAR FLOW

N89-14213*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
THREAT-REVERSER FLOW INVESTIGATION ON A TWIN-ENGINE TRANSPORT
02 AERODYNAMICS

GREGORY M. GATLIN and P. FRANK QUINTO Washington, DC Dec. 1988 156 p
(NASA-TP-2856; L-16426; NAS 1.60:2856) Avail: NTIS HC A08/MF A01 CSCL 01A
ENGINE TESTS, FREE FLOW, GROUND EFFECT (AERODYNAMICS), REVERSED FLOW, THRUST REVERSAL, TRANSPORT AIRCRAFT

N89-15888*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
INTEGRATION EFFECTS OF Pylon GEOMETRY ON A HIGH-WING TRANSPORT AIRPLANE
JOHN R. CARLSON and MILTON LAMB Washington, DC Feb. 1989 78 p
(NASA-TP-2877; L-16489; NAS 1.60:2877) Avail: NTIS HC A05/MF A01 CSCL 01A
INSTALLING, NACELLES, PYLONS, TRANSPORT AIRCRAFT, WINGS

N89-17568*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
NASA SC(2)-0714 AIRFOIL DATA CORRECTED FOR SIDEWALL BOUNDARY-LAYER EFFECTS IN THE LANGLEY 0.3-METER TRANSONIC CRYOGENIC TUNNEL
RENALDO V. JENKINS Washington, DC Mar. 1989 58 p
(NASA-TP-2890; L-16585; NAS 1.60:2890) Avail: NTIS HC A04/MF A01 CSCL 01A
BOUNDARY LAYERS, CRYOGENIC WIND TUNNELS, SUPERCRITICAL AIRFOILS, WIND TUNNEL WALLS

N89-17579*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
TIP AERODYNAMICS AND ACOUSTICS TEST: A REPORT AND DATA SURVEY
JEFFREY L. CROSS and MICHAEL E. WATTS Dec. 1988 463 p
(NASA-RL-1179; A-87128; NAS 1.61:1179) Avail: NTIS HC A20/MF A01 CSCL 01A
In a continuing effort to understand helicopter rotor tip aerodynamics and acoustics, a flight test was conducted by NASA Ames Research Center. The test was performed using the NASA White Cobra and a set of highly instrumented blades. All aspects of the flight test instrumentation and test procedures are explained. Additionally, complete data sets for selected test points are presented and analyzed. Because of the high volume of data acquired, only selected data points are presented. However, access to the entire data set is available to the researcher on request.

Author

N89-19232*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
DRAG MEASUREMENTS ON A LAMINAR-FLOW BODY OF REVOLUTION IN THE 13-INCH MAGNETIC SUSPENSION AND BALANCE SYSTEM
DAVID A. DRESS 1989 37 p
(NASA-TP-2895; L-16483; NAS 1.60:2895) Avail: NTIS HC A03/MF A01 CSCL 01A
AERODYNAMIC BALANCE, BODIES OF REVOLUTION, DRAG MEASUREMENT, LAMINAR FLOW, MAGNETIC SUSPENSION

N89-19234*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
TRANSONIC UNSTEADY AERODYNAMICS AND AEROElasticity 1987, PART 1
Symposium held in Hampton, VA, 20-22 May 1987
(NASA-CP-3022-PT-1; L-16532-PT-1; NAS 1.55:3022-PT-1) Avail: NTIS HC A12/MF A01 CSCL 01A
AERODYNAMICSTRANSORTI AIRCRAFT CONFIGURATIONS, COMPUTATIONAL FLUID DYNAMICS, FLUTTER ANALYSIS, TRANSONIC FLOW, UNSTEADY AERODYNAMICS

N89-19247*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
TRANSONIC UNSTEADY AERODYNAMICS AND AEROElasticity 1987, PART 2
Symposium held in Hampton, VA, 20-22 May 1987
(NASA-CP-3022-PT-2; L-16532-PT-2; NAS 1.55:3022-PT-2) Avail: NTIS HC A17/MF A01 CSCL 01A
AERODYNAMICSTRANSORTI AIRCRAFT STABILITY, FLOW DISTRIBUTION, TRANSONIC FLOW, UNSTEADY AERODYNAMICS, VISCOUS FLOW

N89-20925*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
TRANSONIC SYMPOSIUM: THEORY, APPLICATION, AND EXPERIMENT, VOLUME 1, PART 1
AIRCRAFT DESIGN, COMPUTATIONAL FLUID DYNAMICS, CONFERENCES, FLIGHT TESTS, GRID GENERATION (MATHEMATICS), WIND TUNNEL TESTS

N89-20942*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
TRANSONIC SYMPOSIUM: THEORY, APPLICATION, AND EXPERIMENT, VOLUME 1, PART 2
COMPUTATIONAL FLUID DYNAMICS, COMPUTERIZED SIMULATION, GRID GENERATION (MATHEMATICS), INTERACTIONAL AERODYNAMICS, TRANSONIC FLOW, WIND TUNNEL TESTS

N89-23415*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
STATUS OF SONIC BOOM METHODOLOGY AND UNDERSTANDING
Presented at the Sonic Boom Workshop, Hampton, VA, Jan. 1988
(NASA-CP-3027; L-16567; NAS 1.55:3027) Avail: NTIS HC A03/MF A01 CSCL 01A
NOISE PREDICTION (AIRCRAFT), SONIC BOOMS, SUPERSONIC FLIGHT

N89-24264*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
EFFECT OF ADVANCED ROTORCRAFT AIRFOIL SECTIONS ON THE HOVER PERFORMANCE OF A SMALL-SCALE ROTOR MODEL
(DA PROJ. 1L1-61102-AH-45-A)
(NASA-TP-2832; L-16407; NAS 1.60:2832; AVSCOM-TP-88-B-001) Avail: NTIS HC A04/MF A01 CSCL 01A
AIRCRAFT DESIGN, AUTOMATION AND DATA SURVEY
N89-25117*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.  
**EFFECT OF MILLING MACHINE ROUGHNESS AND WING DIHEDRAL ON THE SUPERSONIC AERODYNAMIC CHARACTERISTICS OF A HIGHLY SWEPT WING**  
CHRISTINE M. DARDEN  Washington Aug. 1989  88 p  
(NASA-TP-2918; L-16546; NAS 1.60:2918)  Avail: NTIS HC  
A03/MF A01 CSCL 01A  
DIHEDRAL ANGLE, LIFT DRAG RATIO, MILLING (MACHINING), SUPERSONIC SPEED, SURFACE ROUGHNESS EFFECTS, SWEPT WINGS

N89-25118*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.  
**INTERACTIONS OF TOLLMIEN-SCHLICHTING WAVES AND DEAN VORTICES. COMPARISON OF DIRECT NUMERICAL SIMULATION AND A WEAKLY NONLINEAR THEORY**  
BART A. SINGER (High Technology Corp., Hampton, VA.) and THOMAS A. ZANG  Washington Aug. 1989  21 p  
(NASA-TP-2919; L-16559; NAS 1.60:2919)  Avail: NTIS HC  
A03/MF A01 CSCL 01A  
CHANNEL FLOW, COMPUTERIZED SIMULATION, NONLINEAR SYSTEMS, TOLLMIEN-SCHLICHTING WAVES, VORTICES, WAVE INTERACTION

N89-25951*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.  
**STEADY-STATE AND TRANSITIONAL AERODYNAMIC CHARACTERISTICS OF A WING IN SIMULATED HEAVY RAIN**  
BRYAN A. CAMPBELL and GAUDY M. BEZOS  Washington Aug. 1989  95 p  
(NASA-TP-2932; L-16576; NAS 1.60:2932)  Avail: NTIS HC  
A03/MF A01 CSCL 01A  
AERODYNAMIC CHARACTERISTICS, AERODYNAMIC STALLING, AIRFOILS, RAIN, STEADY STATE, TRANSIENT RESPONSE, WINGS

N89-26811*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.  
**A PROCEDURE FOR COMPUTING SURFACE WAVE TRAJECTORIES ON AN INHOMOGENEOUS SURFACE**  
RAYMOND L. BARGER  Washington Aug. 1989  14 p  
(NASA-TP-2929; L-16558; NAS 1.60:2929)  Avail: NTIS HC  
A03/MF A01 CSCL 01A  
AERODYNAMIC CHARACTERISTICS, COMPUTATIONAL FLUID DYNAMICS, HYDRODYNAMICS, INHOMOGENEITY, MATHEMATICAL MODELS, SURFACE WAVES

N89-27634*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.  
**STATIC INTERNAL PERFORMANCE OF A NONAXISYMMETRIC VANED THRUST REVERSER WITH FLOW SPLAY CAPABILITY**  
LINDA S. BANGERT and LAURENCE D. LEAVITT  Washington Sep. 1989  89 p  
(NASA-TP-2933; L-16552; NAS 1.60:2933)  Avail: NTIS HC  
A03/MF A01 CSCL 01A  
DEFLECTORS, FLOW DEFLECTION, STATIC TESTS, THRUST REVERSAL, THRUST VECTOR CONTROL, WIND TUNNEL TESTS

**05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE**

**04 AIRCRAFT COMMUNICATIONS AND NAVIGATION**
Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

N89-11726*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.  
**A SIMULATOR INVESTIGATION OF THE USE OF DIGITAL DATA LINK FOR PILOT/ATC COMMUNICATIONS IN A SINGLE PILOT OPERATION**  
DAVID A. HINTON and GARY W. LOHR (Embry-Riddle Aeronautical Univ., Daytona Beach, Fla.) Jun. 1988  41 p  
(NASA-TP-2837; L-16457; NAS 1.60:2837)  Avail: NTIS HC  
A03/MF A01 CSCL 17B  
DATA TRANSMISSION, DIGITAL DATA, PILOT PERFORMANCE, RADIO COMMUNICATION, SIMULATION, VOICE COMMUNICATION

N89-15900*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.  
**A PILOTED SIMULATION STUDY OF DATA LINK ATC MESSAGE EXCHANGE**  
MARVIN C. WALLER and GARY W. LOHR (Embry-Riddle Aeronautical Univ., Daytona Beach, Fla.) Washington, DC Feb. 1989  38 p  
(NASA-TP-2859; L-16450; NAS 1.60:2859)  Avail: NTIS HC  
A03/MF A01 CSCL 17B  
AIR TRAFFIC CONTROL, DATA LINKS, FLIGHT SIMULATION, MESSAGE PROCESSING

N89-15901*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.  
**SIMULATION EVALUATION OF TIMER, A TIME-BASED, TERMINAL AIR TRAFFIC, FLOW-MANAGEMENT CONCEPT**  
LEONARD CREDEUR (National Aerospace Lab., Tokyo, Japan) and WILLIAM R. CAPRON (PRC Kentron Inc., Hampton, VA.) Washington, DC Feb. 1989  69 p  
(NASA-TP-2870; L-16386; NAS 1.60:2870)  Avail: NTIS HC  
A04/MF A01 CSCL 17G  
AIR TRAFFIC CONTROL, AUTOMATIC CONTROL, EVALUATION, MANAGEMENT PLANNING, SCHEDULING, SIMULATION, TERMINAL FACILITIES

**05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE**
Includes aircraft simulation technology.

N89-23448*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.  
**HOT-JET SIMULATION IN CRYOGENIC WIND TUNNELS**  
(NASA-TP-1220; L-16564; NAS 1.60:1220)  Avail: NTIS HC  
A03/MF A01 CSCL 01C  
In order to evaluate hot jet simulation capability in cryogenic wind tunnel testing, simple theoretical calculations were performed. The similarity parameters, isentropic flow properties, and normal shock relations were calculated for a variety of jet simulation techniques. The results were compared with those estimated for a full scale flight condition. It was shown that the cryogenic wind tunnel testing provides an opportunity for the most accurate hot jet simulation technique. By using a compressed nitrogen gas at ambient or moderately elevated temperatures as a jet gas, most all of the relevant similarity parameters including the jet temperature
and velocity ratios and the Reynolds numbers, can be set to the full scale flight values. The only exception is the ratio of specific heats for jet flow. In an attempt to match the ratio of specific heats for the turbojet flow, gases other than pure nitrogen were considered. It was found that a nitrogen/methane mixture at moderately elevated temperature behaves like the real combustion gas. Using this mixture as a jet gas, complete simulation of the full scale turbojet exhaust becomes possible in cryogenic wind tunnels.

Author

N89-25146*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

RECENT ADVANCES IN MULTIDISCIPLINARY ANALYSIS AND OPTIMIZATION, PART 1
AIRCRAFT DESIGN, COMPUTATIONAL FLUID DYNAMICS, COMPUTER AIDED DESIGN, CONFERENCES, EXPERT SYSTEMS, OPTIMIZATION, STRUCTURAL ENGINEERING

Author

N89-25173*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

RECENT ADVANCES IN MULTIDISCIPLINARY ANALYSIS AND OPTIMIZATION, PART 2
AIRCRAFT DESIGN, ARTIFICIAL INTELLIGENCE, COMPUTER AIDED DESIGN, CONFERENCES, DESIGN ANALYSIS, OPTIMIZATION, STRUCTURAL ANALYSIS, STRUCTURAL DESIGN

Author

N89-25201*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

RECENT ADVANCES IN MULTIDISCIPLINARY ANALYSIS AND OPTIMIZATION, PART 3
AIRCRAFT DESIGN, COMPUTER AIDED DESIGN, COMPUTERIZED SIMULATION, CONFERENCES, CONTROL THEORY, DESIGN ANALYSIS, FLEXIBLE SPACECRAFT, LARGE SPACE STRUCTURES, OPTIMIZATION, SPACECRAFT DESIGN, STRUCTURAL DESIGN, STRUCTURAL ENGINEERING, SYSTEMS ENGINEERING

Author

N89-26844*# National Aeronautics and Space Administration. Langley Research Center, Moffett Field, CA.

METHOD FOR EXPERIMENTAL DETERMINATION OF FLUTTER SPEED BY PARAMETER IDENTIFICATION
E. NISSIM (Technion - Israel Inst. of Tech., Haifa,) and GLENN B. GILYARD Washington Jun. 1989 44 p; Previously announced in IAA as A89-30601 (NASA-TP-2923: H-1510; NAS 1.60:2923) Avail: NTIS HC A03/MF A01 CSCL 01C
AEROElasticity, Dynamic Pressure, Flight Tests, Flutter, Parameter Identification

Author

N89-16820*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

PILOTED-SIMULATION EVALUATION OF ESCAPE GUIDANCE FOR MICROBURST WIND SHEAR ENCOUNTERS M.S. Thesis - George Washington Univ.
FLIGHT PERFORMANCE, WIND SHEAR

Author

N89-12565*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

ADVANCED TURBOPROP PROJECT
ROY D. HAGER and DEBORAH VRABEL (Sverdrup Technology, Inc., Cleveland, Ohio.) 1988 130 p Original contains color illustrations (NASA-SP-495; NAS 1.21:495; LCR-1690) Avail: NTIS HC A07/MF A01 CSCL 21E

At the direction of Congress, a task force headed by NASA was organized in 1975 to identify potential fuel saving concepts for aviation. The result was the Aircraft Energy Efficiency (ACEE) Program implemented in 1976. An important part of the program was the development of advanced turboprop technology for Mach 0.65 to 0.85 applications having the potential fuel saving of 30 to 50 percent relative to existing turbofan engines. A historical perspective is presented of the development and the accomplishments that brought the turboprop to successful flight tests in 1986 and 1987.

Author

N89-12589*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

SINGULAR PERTURBATIONS AND TIME SCALES IN THE DESIGN OF DIGITAL FLIGHT CONTROL SYSTEMS
DESINENI S. NAIDU (Old Dominion Univ., Norfolk, Va.) and DOUGLAS B. PRICE Washington, D.C. Dec. 1988 30 p (NASA-TP-2844; L-16440; NAS 1.60:2844) Avail: NTIS HC A03/MF A01 CSCL 01C
DIGITAL SYSTEMS, FLIGHT CONTROL, OPTIMAL CONTROL, PERTURBATION THEORY

Author

N89-12569*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.
A CLOSED-FORM TRIM SOLUTION YIELDING MINIMUM TRIM DRAG FOR AIRPLANES WITH MULTIPLE LONGITUDINAL-CONTROL EFFECTORS
KENNETH H. GOODRICH, STEVEN M. SLIWA, and FREDERICK J. LALLMAN Washington May 1989 30 p
(ANASA-TP-2907; L-16510; NAS 1.60:2907) Avail: NTIS HC
A03/MFA01 CSCL 01C
AERODYNAMIC BALANCE, AIRCRAFT DESIGN, COMPUTATION, LIFT DEVICES, OPTIMIZATION, REDUNDANCY, THRUST VECTOR CONTROL

A03/MFA01 CSCL 01C
FLIGHT MECHANICS/ESTIMATION THEORY SYMPOSIUM 1988
THOMAS STENGLE, ed. Washington, DC Sep. 1988 611 p
Conference held in Cocoa Beach, Fla., 27-30 Sep. 1988
Sponsored by NASA, Washington
(NASA-CP-3008; REPT-88-158; NAS 1.55:3008) Avail: NTIS HC
A07/MF A01 CSCL 22A
AERODYNAMICS

Includes powered and free-flight trajectories; and orbital and launching dynamics.

A03/MFA01 CSCL 01C
FLIGHT MECHANICS/ESTIMATION THEORY SYMPOSIUM 1988
THOMAS STENGLE, ed. Washington, DC Sep. 1988 611 p
Conference held in Cocoa Beach, Fla., 27-30 Sep. 1988
Sponsored by NASA, Washington
(NASA-CP-3008; REPT-88-158; NAS 1.55:3008) Avail: NTIS HC
A07/MF A01 CSCL 22A
AERODYNAMICS
14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

N89-28545* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH. DIGITALLY MODULATED BIT ERROR RATE MEASUREMENT SYSTEM FOR MICROWAVE COMPONENT EVALUATION MARY JO W. SHALKHAUSER and JAMES M. BUINGER Washington Jul. 1989 20 p (NASA-TP-2912; E-4456; NAS 1.60:2912) Avail: NTIS HC A03/MF A01 CSCL 14B

BIT ERROR RATE, COMMUNICATION SATELLITES, DATA TRANSMISSION, DIGITAL DATA, MICROWAVE EQUIPMENT, MODULATION, TIME DIVISION MULTIPLE ACCESS

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles.


FLIGHT SAFETY, MANAGEMENT METHODS, PROJECT MANAGEMENT, REQUIREMENTS, SPACE SHUTTLES, STRESS ANALYSIS, STRUCTURAL DESIGN

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes satellites; space platforms; space stations; spacecraft systems and components such as thermal and environmental controls; and attitude controls.

N89-12580* National Aeronautics and Space Administration. Langley Research Center, Hampton, VA. LIGHTWEIGHT STRUCTURAL DESIGN OF A BOLTED CASE JOINT FOR THE SPACE SHUTTLE SOLID ROCKET MOTOR JOHN T. DORSEY, PETER A. STEIN (Coast Guard, Yorktown, Va.), and HAROLD G. BUSH Washington, D.C. Nov. 1988 24 p (NASA-TP-2851; L-16496; NAS 1.60:2851) Avail: NTIS HC A03/MF A01 CSCL 22B

BOLTED JOINTS, ROCKET ENGINE CASES, SPACE SHUTTLE MAIN ENGINE, STRUCTURAL ANALYSIS


COMMUNICATION SATELLITES, CONFERENCES, HEAT TRANSFER, RADIATION DAMAGE, SOLAR SIMULATORS, SPACE ENVIRONMENT SIMULATION, SPACE SIMULATORS, SPACE STATIONS, SPACECRAFT CONTAMINATION, THERMAL CONTROL COATINGS


This bibliography lists 1,158 reports, articles, and other documents introduced into the NASA scientific and technical information system between January 1, 1988 and June 30, 1988. Its purpose is to provide helpful information to researchers, designers, and managers engaged in Space Station technology development and mission design. Coverage includes documents that define major systems and subsystems related to structures and dynamic control, electronics and power supplies, propulsion, and payload integration. In addition, orbital construction methods, servicing and support requirements, procedures and operations, and missions for the current and future Space Station are included. Author


This bibliography lists 694 reports, articles, and other documents introduced into the NASA Scientific and Technical Information System between July, 1988 and December, 1988. Its purpose is to provide helpful information to the researcher or manager engaged in the development of technologies related to large space systems. Subject areas include mission and program definition, design techniques, structural and thermal analysis, structural dynamics and control systems, electronics, advanced materials, assembly concepts, and propulsion. Author

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.


BEARINGS, BOOSTER ROCKET ENGINES, CONFERENCES,
FRACTURE MECHANICS, FUEL COMBUSTION, HYDROGEN EMBRITTLEMENT, HYDROGEN OXYGEN ENGINES, METAL FATIGUE, PROPULSION SYSTEM CONFIGURATIONS, ROCKET ENGINE DESIGN, SPACE SHUTTLE MAIN ENGINE, SPACECRAFT PROPULSION

N89-15979* # National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
HIGH-PRESSURE CALORIMETER CHAMBER TESTS FOR LIQUID OXYGEN/KEROSENE (LOX/RP-1) ROCKET COMBUSTION
CALORIMETERS, COMBUSTION CHAMBERS, HIGH PRESSURE, KEROSENE, LIQUID OXYGEN, RP-1 ROCKET PROPELLANTS

CHEMISTRY AND MATERIALS (GENERAL)

N89-23528* # National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
NASA/SIDO SPACE ENVIRONMENTAL EFFECTS ON MATERIALS WORKSHOP, PART 1
CONFERENCES, EARTH ORBITAL ENVIRONMENTS, MICROMETEOROIDS, OXYGEN ATOMS, RADIATION EFFECTS, SPACE DEBRIS, SPACECRAFT CHARGING, SPACECRAFT CONTAMINATION

N89-23547* # National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
NASA/SIDO SPACE ENVIRONMENTAL EFFECTS ON MATERIALS WORKSHOP, PART 2
EXTRATERRESTRIAL ENVIRONMENTS, MICROMETEOROIDS, OXYGEN ATOMS, RADIATION EFFECTS, THERMAL RADIATION

COMPOSITE MATERIALS

Includes physical, chemical, and mechanical properties of laminates and other composite materials.

N89-19385* # National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
The Effects of Simulated Space Environmental Parameters on Six Commercially Available Composite Materials
JOAN G. FUNK and GEORGE F. SYKES, JR. Apr. 1989 34 p (NASA-TP-2906; L-16549; NAS 1.60:2906) Avail: NTIS HC A03/MF A01 CSCL 11D
COMPOSITE MATERIALS, EARTH ORBITAL ENVIRONMENTS, FIBER COMPOSITES, RADIATION EFFECTS, SPACE ENVIRONMENT SIMULATION

N89-27796* # National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
TUNGSTEN FIBER REINFORCED COPPER MATRIX COMPOSITES: A REVIEW
DAVID L. MCDANELS Sep. 1989 24 p (NASA-TP-2924; E-4318; NAS 1.60:2924) Avail: NTIS HC A03/MF A01 CSCL 11D
COPPER, FIBER COMPOSITES, METAL MATRIX COMPOSITES, STRESS-STRAIN RELATIONSHIPS, TUNGSTEN

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N89-10996* # National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
INDENTATION PLASTICITY AND FRACTURE IN SILICON
GEORGE C. RYBICKI and P. PIROUZ (Case Western Reserve Univ., Cleveland, Ohio.) Nov. 1988 30 p (NASA-TP-2863; E-4184; NAS 1.60:2863) Avail: NTIS HC A03/MF A01 CSCL 11B
CRYSTAL DISLOCATIONS, DOPED CRYSTALS, FRACTURE STRENGTH, HARDNESS, PLASTIC PROPERTIES, SILICON, SINGLE CRYSTALS, TRANSITION TEMPERATURE

N89-17650* # National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
SECONDARY ELECTRON EMISSION CHARACTERISTICS OF UNTREATED AND ION-TEXTURED TITANIUM
ARTHUR N. CURREN, KENNETH A. JENSEN, and GARY A. BLACKFORD (Case Western Reserve Univ., Cleveland, Ohio.) Mar. 1989 16 p (NASA-TP-2902; E-4495; NAS 1.60:2902) Avail: NTIS HC A03/MF A01 CSCL 11F
ELECTRON EMISSION, ION PLATING, MACHINING, SECONDARY EMISSION, SURFACE FINISHING, TITANIUM

N89-19406* # National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
AN ELECTROCHEMICAL STUDY OF CORROSION PROTECTION BY PRIMER-TOPCOAT SYSTEMS ON 4130 STEEL WITH AC IMPEDANCE AND DC METHODS
M. J. MENDREK, R. H. HIGGINS, and M. D. DANFORD May 1988 56 p (NASA-TP-2820; E-4271; NAS 1.60:2820) Avail: NTIS HC A03/MF A01 CSCL 11F
ALTERNATING CURRENT, DIRECT CURRENT, ELECTROCHEMICAL CORROSION, IMPEDANCE, METAL SURFACES, PRIMERS (COATINGS), PROTECTIVE COATINGS, STAINLESS STEELS

N89-26976* # National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
STRESS CORROSION STUDY OF PH13-8MO STAINLESS STEEL USING THE SLOW STRAIN RATE TECHNIQUE
AGING (METALLURGY), SALT SPRAY TESTS, STAINLESS STEELS, STRAIN RATE, STRESS CORROSION CRACKING
27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N89-13642*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH. THERMAL BARRIER COATINGS. ABSTRACTS AND FIGURES 1985 220 p Workshop held in Cleveland, Ohio, 21-22 May 1985 (NASA-CP-10019; E-4425; NAS 1.55:10019) Avail: NTIS HC A10/MF A01 CSCL 11C BARRIER LAYERS, CONFERENCES, FAILURE ANALYSIS, GAS TURBINES, LIFE (DURABILITY), MATHEMATICAL MODELS, NONDESTRUCTIVE TESTS, PLASMA SPRAYING, THERMAL CONTROL COATINGS

N89-21032*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH. DEGRADATION AND CROSSLINKING OF PERFLUOROALKYL POLYETHERS UNDER X-RAY IRRADIATION IN ULTRAHIGH VACUUM SHIGEYUKI MORI (National Academy of Sciences - National Research Council, Washington, DC. ) and WILFREDO MORALES Mar. 1989 15 p Prepared in cooperation with Iwate Univ., Morioka (Japan) (NASA-TP-2910; E-4500; NAS 1.60:2910) Avail: NTIS HC A03/MF A01 CSCL 11B CROSSLINKING, PHOTOELECTRON SPECTROSCOPY, POLYETHER RESINS, RADIATION EFFECTS


N89-26091*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH. REACTION OF PERFLUOROALKYL POLYETHERS (PFPE) WITH 440C STEEL IN VACUUM UNDER SLIDING CONDITIONS AT ROOM TEMPERATURE SHIGEYUKI MORI (Iwate Univ., Morioka, Japan ) and WILFREDO MORALES Jan. 1989 12 p (NASA-TP-2883; E-4209; NAS 1.60:2883) Avail: NTIS HC A03/MF A01 CSCL 07D ALKYL COMPOUNDS, PERFLUORO COMPOUNDS, POLYETHER RESINS, SLIDING FRICTION, STAINLESS STEELS, VACUUM EFFECTS

29 MATERIALS PROCESSING

Includes space-based development of products and processes for commercial applications.


31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.


32 COMMUNICATIONS AND RADAR

Includes radar; land and global communications; communications theory; and optical communications.

N89-17060*# Westinghouse Electric Corp., Baltimore, MD. PROPAGATION EFFECTS HANDBOOK FOR SATELLITE SYSTEMS DESIGN. A SUMMARY OF PROPAGATION IMPAIRMENTS ON 10 TO 100 GHz SATELLITE LINKS WITH TECHNIQUES FOR SYSTEM DESIGN LOUIS J. IPPOLITO Washington, DC Feb. 1989 531 p (NAS7-100; JPL-958178) (NASA-RP-f082(04); NAS 1.61:1082(04)) Avail: NTIS HC A23/MF A01 CSCL 20N
frequency band region. It provides both a detailed description of the propagation phenomenon and a summary of the impact of the effect on the communications system design and performance. Chapter 2 through 5 describe the propagation effects, prediction models, and available experimental data bases. In Chapter 6, design techniques and prediction methods available for evaluating propagation effects on space-Earth communication systems are presented. Chapter 7 addresses the system design process and how the effects of propagation on system design and performance should be considered and how that can be mitigated. Examples of operational and planned Ku, Ka, and EHF satellite communications systems are given. Author

N89-17767*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

UNIVERSAL TEST FIXTURE FOR MONOLITHIC MM-WAVE INTEGRATED CIRCUITS CALIBRATED WITH AN AUGMENTED TRD ALGORITHM


ALGORITHMS, CALIBRATING, INTEGRATED CIRCUITS, MICROWAVE CIRCUITS, MILLIMETER WAVES, SOLID STATE DEVICES

33

ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

N89-15337*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

PERFORMANCE OF A MULTISTAGE DEPRESSED COLLECTOR WITH MACHINED TITANIUM ELECTRODES

PETER RAMINS and BEN T. EBIHARA Jan. 1989 10 p (NASA-TP-2891; E-4400; NAS 1.60:2891) Avail: NTIS HC A02/MF A01 CSCL 09A

ACCUMULATORS, ELECTRODES, MACHINING, PERFORMANCE TESTS, TITANIUM

N89-21169*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

ANALYTICAL AND EXPERIMENTAL PROCEDURES FOR DETERMINING PROPAGATION CHARACTERISTICS OF MILLIMETER-WAVE GALLIUM ARSENIDE MICROSTRIP LINES

ROBERT R. ROMANOVSKY Mar. 1989 21 p (NASA-TP-2899; E-4273; NAS 1.60:2899) Avail: NTIS HC A03/MF A01 CSCL 20N

ELECTROMAGNETIC RADIATION, MICROSTRIP TRANSMISSION LINES, MICROWAVE TRANSMISSION, REFLECTANCE

N89-21171*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.

DESIGN, FABRICATION, AND PERFORMANCE OF BRAZED, GRAPHITE ELECTRODE, MULTISTAGE DEPRESSED COLLECTORS WITH 500-W, CONTINUOUS WAVE, 4.8-TO 9.6-GHZ TRAVELING-WAVE TUBES

PETER RAMINS and BEN EBIHARA Mar. 1989 18 p (NASA-TP-2904; E-4361; NAS 1.60:2904) Avail: NTIS HC A03/MF A01 CSCL 09A

BRAZING, CONTINUOUS RADIATION, ELECTRODE MATERIALS, ELECTRON EMISSION, SOLID ELECTRODES, TRAVELING WAVE TUBES

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

N89-11153*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

MIXING AND DEMIXING PROCESSES IN MULTIPHASE FLOWS WITH APPLICATION TO PROPULSION SYSTEMS


COMBUSTION PHYSICS, CONFERENCES, FLUID DYNAMICS, FUEL COMBUSTION, LAMINAR FLOW, MIXING, MULTIPHASE FLOW, PROPULSION, TURBULENT FLOW

N89-12822*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

AERODYNAMIC Pressures and Heating Rates on Surfaces Between Split Elevons at Mach 6.6


AERODYNAMIC HEATING, DYNAMIC PRESSURE, ELEVONS, HYPERSONIC FLIGHT, SPLIT FLAPS

N89-16115*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

CONSERVATION EQUATIONS AND PHYSICAL MODELS FOR HYPERSONIC AIR FLOWS IN THERMAL AND CHEMICAL NONEQUILIBRIUM

PETER A. GNOFFO, ROOP N. GUPTA (Scientific Research and Technology, Inc., Hampton, VA.), and JUDY L. SHINN Washington, DC Feb. 1989 62 p (NASA-TP-2667; L-16477; NAS 1.60:2867) Avail: NTIS HC A04/MF A01 CSCL 20D

AERODYNAMIC Pressures and Heat Rates on Surfaces Between Split Elevons at Mach 6.6


AIR FLOW, CHEMICAL EQUILIBRIUM, CONSERVATION EQUATIONS, HYPERSONIC FLOW, MATHEMATICAL MODELS, NONEQUILIBRIUM FLOW, NONEQUILIBRIUM THERMODYNAMICS

N89-19499*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

CONTAMINATION OF LIQUID OXYGEN BY PRESSURIZED GASEOUS NITROGEN


FUEL Contamination, Gas-Gas Interactions, Gaseous Diffusion, Hypersonic Wind Tunnels, Liquid Nitrogen, Liquid Oxygen, Pressure Effects

N89-25409*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

COMBUSTION GAS TEMPERATURES BY FLAME TEMPERATURE, INFRARED RADIOMETRY IN SOOTING AND NONSOOTING FLAMES


FUEL ConBUSTION Temperatures, FLAME Temperature, GAS TEMPERATURE, INFRARED RADIOMETERS, PREMIXED
34 FLUID MECHANICS AND HEAT TRANSFER

- FLAMES, RADIATION PYROMETERS, Soot, TEMPERATURE MEASUREMENT

N89-26184*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
WORKSHOP ON TWO-PHASE FLUID BEHAVIOR IN A SPACE ENVIRONMENT
THEODORE D. SWANSON, ed., AL JUHASZ, ed., W. RUSS LONG, ed. (National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX), and LAURA OTTENSTEIN, ed. 1989 45 p Workshop held in Ocean City, MD, 13-14 Jun. 1986 (NASA-CP-3043; REPT-89B00114; NAS 1.55:3043) Avail: NTIS HC A03/MF A01 CSCL 20D
AEROSPACE ENVIRONMENTS, FLUID MANAGEMENT, HEAT TRANSFER, LIQUID-VAPOR INTERFACES, TWO PHASE FLOW

N89-27116*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
A REVIEW OF HIGH-SPEED, CONVECTIVE, HEAT-TRANSFER COMPUTATION METHODS
AERODYNAMIC HEATING, COMPUTATION, CONVECTIVE HEAT TRANSFER, LAMINAR BOUNDARY LAYER, SEPARATED FLOW, SHOCK HEATING, TURBULENT BOUNDARY LAYER

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

N89-13762*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
SPATIAL VISION PROCESSES: FROM THE OPTICAL IMAGE TO THE SYMBOLIC STRUCTURES OF CONTOUR INFORMATION
DANIEL J. JOBSON Nov. 1988 31 p Original contains color illustrations (NASA-TP-2838; L-16479; NAS 1.60:2838) Avail: NTIS HC A03/MF A01 CSCL 14B
COMPUTER VISION, CONTOURS, EDGES, IMAGE PROCESSING, SPATIAL FILTERING, SYMBOLS, TEXTURES

N89-15380*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
TECHNIQUE FOR TEMPERATURE COMPENSATION OF EDDY-CURRENT PROXIMITY PROBES
ROBERT M. MASTERS Jan. 1989 10 p (NASA-TP-2880; E-4316; NAS 1.60:2880) Avail: NTIS HC A02/MF A01 CSCL 14B
EDDY CURRENTS, EVALUATION, PERFORMANCE TESTS, PROBES, PROXIMITY, TEMPERATURE COMPENSATION, TEMPERATURE MEASUREMENT, TURBOMACHINERY

N89-16139*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
RAMAN INTENSITY AS A PROBE OF CONCENTRATION NEAR A CRYSTAL GROWING IN SOLUTION
R. ALLEN WILKINSON Feb. 1989 12 p (NASA-TP-2865; E-4397; NAS 1.60:2865) Avail: NTIS HC A03/MF A01 CSCL 14B.
CRYSTAL GROWTH, RAMAN SPECTROSCOPY, RAMAN SPECTRA, RAMAN SPECTROSCOPY, SOLUTIONS

N89-26209*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, VA.
MARA (MULTIMODE AIRBORNE RADAR ALTIMETER) SYSTEM DOCUMENTATION. VOLUME 1: MARA SYSTEM REQUIREMENTS DOCUMENT
The Multimode Airborne Radar Altimeter (MARA), a flexible airborne radar remote sensing facility developed by NASA's Goddard Space Flight Center, is discussed. This volume describes the scientific justification for the development of the instrument and the translation of these scientific requirements into instrument design goals. Values for key instrument parameters are derived to accommodate these goals, and simulations and analytical models are used to estimate the developed system's performance.

36 LASERS AND MASERS

Includes parametric amplifiers.

N89-17855*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
ANALYSIS OF ND3+:GLASS, SOLAR-PUMPED, HIGH-POWER LASER SYSTEMS
GLASS LASERS, HIGH POWER LASERS, NEODYMIUM LASERS, SOLAR COLLECTORS

37 MECHANICAL ENGINEERING

Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

N89-21243*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
COMPARISON STUDY OF GEAR DYNAMIC COMPUTER PROGRAMS AT NASA LEWIS RESEARCH CENTER
JAMES J. ZAKRAJESEK Mar. 1989 31 p Prepared in cooperation with Army Aviation Research and Development Command, Cleveland, OH (DA PROJ. 1L1-62209-AH-76) (NASA-TP-2901; E-4144; NAS 1.60:2901; AVSCOM-TR-88-C-010) Avail: NTIS HC A03/MF A01 CSCL 131
COMPUTER AIDED DESIGN, COMPUTER PROGRAMS, GEARS, MECHANICAL DRIVES

N89-22891*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
ROTORDYNAMIC INSTABILITY PROBLEMS IN HIGH-PERFORMANCE TURBOMACHINERY, 1988
Washington, DC Feb. 1989 454 p Workshop held in College Station, TX, 16-18 May 1988; sponsored by NASA, Lewis Research Center, Cleveland, OH, Texas A and M Univ., College Station, ARO, Durham, NC, and Aeropropulsion Lab., Wright-Patterson AFB, OH (NASA-CP-3026; E-4227; NAS 1.55:3026) Avail: NTIS HC A20/MF A01 CSCL 131
BEARINGS, COMPRESSORS, CONFERENCES, DAMPERS,
DYNAMIC STABILITY, IMPELLERS, MATHEMATICAL MODELS, ROTOR AERODYNAMICS, SEALS (STOPPERS), TURBO-MACHINERY

N89-24607*# National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, OH.
COMPARISON OF PREDICTED AND MEASURED TEMPERATURES OF UH-60A HELICOPTER TRANSMISSION
HAROLD H. COE Washington Apr. 1989 15 p
(NASA-TP-2911; NAS 1.60:2911; E-4588; AVSCOM-TR-89-C010)
Avail: NTIS HC A03/MF A01 CSCL 13
COMPUTERIZED SIMULATION, HELICOPTER PROPELLER DRIVE, OPERATING TEMPERATURE, PERFORMANCE TESTS, ROLLER BEARINGS, THERMAL ANALYSIS, TRANSMISSIONS (MACHINE ELEMENTS), UH-60A HELICOPTER

N89-12876*# National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, OH.
TURBINE ENGINE HOT SECTION TECHNOLOGY 1986
Oct. 1986 488 p Workshop held in Cleveland, Ohio, 21-22 Oct. 1986
(NASA-CP-2444; E-3205; NAS 1.55:2444) Avail: NTIS HC A21/MF A01 CSCL 20K
CONFERENCES, FATIGUE (MATERIALS), FRACTURE MECHANICS, GAS TURBINE ENGINES, HEAT TRANSFER, MEASURING INSTRUMENTS, PROPELLANT COMBUSTION, STRUCTURAL ANALYSIS, THERMAL COATING, MATERIALS

N89-13814*# National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, AL.
EFFECTS OF VARIABLES UPON PYROTECHNICALLY INDUCED SHOCK RESPONSE SPECTRA, PART 2
JAMES LEE SMITH Nov. 1988 106 p
(NASA-TP-2872; NAS 1.60:2872) Avail: NTIS HC A06/MF A01 CSCL 20K
COMPONENT RELIABILITY, JOINTS (JUNCTIONS), PYROTECHNICS, SHAPED CHARGES, SPACECRAFT STRUCTURES

N89-16170*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, VA.
PARTITIONING STRATEGY FOR EFFICIENT NONLINEAR FINITE ELEMENT DYNAMIC ANALYSIS ON MULTIPROCESSOR COMPUTERS
(NASA-TP-2850; L-16476; NAS 1.60:2850) Avail: NTIS HC A03/MF A01 CSCL 20K
DYNAMIC STRUCTURAL ANALYSIS, FINITE ELEMENT METHOD, MULTIPROCESSING (COMPUTERS), PARALLEL PROCESSING (COMPUTERS), PARTITIONS (MATHEMATICS)

N89-16183*# National Aeronautics and Space Administration.
Langley Research Center, Cleveland, OH.
THERMOVISCOPLASTIC MODEL WITH APPLICATION TO COPPER
ALAN D. FREED Dec. 1988 18 p
(NASA-TP-2845; E-4280; NAS 1.60:2845) Avail: NTIS HC A03/MF A01 CSCL 20K
COPPER, MODELS, THERMOVISCOELASTICITY, VISCOPLASTICITY

N89-16192*# National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, AL.
CYCLIC LOADS TESTS OF CARBON INVOLUTE SOLID ROCKET MOTOR OUTER BOOT RING SEGMENTS
RAFIQ AHMED Dec. 1988 28 p
(NASA-TP-2884; M-605; NAS 1.60:2884) Avail: NTIS HC A03/MF A01 CSCL 20K
CYCLIC LOADS, FIBER COMPOSITES, LOAD TESTS, MODULUS OF ELASTICITY, PLASTIC PROPERTIES, RESIN MATRIX COMPOSITES, SPACE SHUTTLE BOOSTERS, STRESS-STRAIN RELATIONSHIPS

N89-16196*# National Aeronautics and Space Administration.
Hugh L. Dryden Flight Research Facility, Edwards, CA.
CONTROL SURFACE SPANWISE PLACEMENT IN ACTIVE FLUTTER SUPPRESSION SYSTEMS
E. NISSIM and JOHN J. BURKEN Nov. 1988 19 p Prepared in cooperation with Technion - Israel Inst. of Tech., Haifa
(NASA-TP-2873; H-1492; NAS 1.60:2873) Avail: NTIS HC A03/MF A01 CSCL 20K
ACTIVE CONTROL, CONTROLLER SURFACES, FLUTTER ANALYSIS

N89-17298*# National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, OH.
TURBINE ENGINE HOT SECTION TECHNOLOGY, 1987
(NASA-CP-2493; E-3745; NAS 1.55:2493) Avail: NTIS HC A20/MF A01 CSCL 20K
AIRCRAFT ENGINES, COMBUSTION, CONFERENCES, FINITE ELEMENT METHOD, FRACTURE MECHANICS, GAS TURBINE ENGINES, HEAT TRANSFER, STRUCTURAL ANALYSIS, THERMAL CONTROL COATINGS, THERMAL FATIGUE, TURBINE BLADES

N89-17929*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, VA.
MEASURED AND PREDICTED ROOT-MEAN-SQUARE ERRORS IN SQUARE AND TRIANGULAR ANTENNA MESH FACETS
W. B. FICHTER Washington, DC Mar. 1989 17 p
(NASA-TP-2896; L-16525; NAS 1.60:2896) Avail: NTIS HC A03/MF A01 CSCL 20K
ANTENNA DESIGN, ANTENNA RADIATION PATTERNS, FABRICS, REFLECTORS, ROOT-MEAN-SQUARE ERRORS, STRUCTURAL ANALYSIS

N89-19579*# National Aeronautics and Space Administration.
Washington, DC.
MIXED FINITE ELEMENT MODELS FOR FREE VIBRATIONS OF THIN-WALLED BEAMS
(NASA-TP-2868; L-16506; NAS 1.60:2868) Avail: NTIS HC A03/MF A01 CSCL 20K
BEAMS (SUPPORTS), FINITE ELEMENT METHOD, FREE VIBRATION, SHAPED CHARGES, SPACECRAFT STRUCTURES

N89-19580*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, VA.
MIXED FORMULATION FOR FRICITIONLESS CONTACT PROBLEMS
(NASA-TP-2897; L-16513; NAS 1.60:2897) Avail: NTIS HC A03/MF A01 CSCL 20K
CONTACT LOADS, CURVED BEAMS, DEFORMATION, FINITE ELEMENT METHOD, FRICTION FACTOR, STRESS ANALYSIS

N89-22940*# Computer Software Management and Information Center, Athens, GA.
SEVENTEENTH NASTRAN (R) USERS' COLLOQUIUM
N89-23892*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

THE 23RD AEROSPACE MECHANISMS SYMPOSIUM

AEROSPACE SYSTEMS, CONFERENCES, DEPLOYMENT, LUBRICANTS, MANIPULATORS, SPACE STATIONS, SPACE-CRAFT DOCKING, TELEOPERATORS

N89-24636*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

RESEARCH IN STRUCTURES, STRUCTURAL DYNAMICS AND MATERIALS, 1989

ACOUSTIC EMISSION, BUCKLING, COMPOSITE STRUCTURES, CONFERENCES, CONTROL SYSTEMS DESIGN, DISPLACEMENT, DYNAMIC STRUCTURAL ANALYSIS, MATHEMATICAL MODELS

N89-24638*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

COMPUTATIONAL METHODS FOR STRUCTURAL MECHANICS AND DYNAMICS, PART 1

COMPUTATION, COMPUTERIZED SIMULATION, CONFERENCES, SHELLS (STRUCTURAL FORMS), STRESS ANALYSIS, STRUCTURAL ANALYSIS, TIRES

N89-24654*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

COMPUTATIONAL METHODS FOR STRUCTURAL MECHANICS AND DYNAMICS

AIRCRAFT DESIGN, COMPUTERIZED SIMULATION, CONFERENCES, DYNAMIC STRUCTURAL ANALYSIS, MANY BODY PROBLEM, STRESS ANALYSIS

N89-26255*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

DERIVATION OF A TAPPERED P-VERSION BEAM FINITE ELEMENT

BEAMS, FINITE ELEMENT METHOD, MATHEMATICAL MODELS, TAPERING

N89-27214*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.

WELD STRESSES BEYOND ELASTIC LIMIT: MATERIALS DISCONTINUITY

ELASTIC PROPERTIES, STRAIN HARDENING, STRESS CONCENTRATION, STRESSES, WELDING

N89-28034*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

EVALUATION OF A STRAIN-GAGE LOAD CALIBRATION ON A LOW-ASPECT-RATIO WING STRUCTURE AT ELEVATED TEMPERATURE

AIRCRAFT CONFIGURATIONS, AIRCRAFT STRUCTURES, CALIBRATING, HIGH TEMPERATURE ENVIRONMENTS, LOAD TESTS, LOW ASPECT RATIO WINGS, STRAIN GAGES, WING LOADING

N89-29772*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

NASA WORKSHOP ON COMPUTATIONAL STRUCTURAL MECHANICS 1987, PART 1

ARCHITECTURE (COMPUTERS), CONFERENCES, FINITE ELEMENT METHOD, MULTIPROCESSING (COMPUTERS), PARALLEL PROCESSING (COMPUTERS), SOFTWARE ENGINEERING, STRUCTURAL ANALYSIS

N89-29789*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

NASA WORKSHOP ON COMPUTATIONAL STRUCTURAL MECHANICS 1987, PART 2

ARCHITECTURE (COMPUTERS), COMPUTER AIDED DESIGN, COMPUTER SYSTEMS PROGRAMS, COMPUTERIZED SIMULATION, CONFERENCES, FINITE ELEMENT METHOD, STRUCTURAL ANALYSIS, STRUCTURAL ENGINEERING

N89-29799*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

NASA WORKSHOP ON COMPUTATIONAL STRUCTURAL MECHANICS 1987, PART 3

COMPUTER TECHNIQUES, CONFERENCES, FINITE ELEMENT METHOD, LARGE SPACE STRUCTURES, SOFTWARE ENGINEERING, STRUCTURAL ANALYSIS
Applications of Newton's method to the postbuckling of rings under pressure loadings
Gaylen A. Thurston Oct. 1989 26 p
(NASA-TP-2941; L-16578; NAS 1.60:2941) Avail: NTIS HC A09/MF A01 CSCL 20K

Buckling, Cylindrical Shells, Deformation, Loads (Forces), Newton Methods, Ring Structures, Structural Failure

Geosciences (General)

Earth Resources and Remote Sensing

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

N89-10401*# National Aeronautics and Space Administration, Washington, DC.
Sapping features of the Colorado plateau: A comparative planetary geology field guide
Original contains color illustrations (NSG-7572)
(NASA-SP-481; NAS 1.21:491; LC-87-15305) Avail: NTIS HC A06/MF A01; also available SCD HC $6.00 as 003-000-01027-3 CSCL 08K

This book is an attempt to determine geomorphic criteria to be used to distinguish between channels formed predominantly by sapping and seepage erosion and those formed principally by surface runoff processes. The geologic nature of the Colorado Plateau has resulted in geomorphic features that show similarities to some areas on Mars, especially certain valley networks within thick sandstone formations. Where spring sapping is an effective process, the valleys that develop are unique in terms of their morphology and network pattern.

Author

Earth Resources and Remote Sensing

Indexes (Issue 62)

Earth Resources: A continuing bibliography with indexes (Issue 62) Nov. 1988 146 p

Author
44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.


AEROSPACE SYSTEMS, CONFERENCES, ELECTROCATALYSTS, ELECTROCHEMISTRY, ELECTRODES, ENERGY STORAGE, HYDROGEN OXYGEN FUEL CELLS, STORAGE BATTERIES


CONFERENCES, PHOTOVOLTAIC EFFECT, SOLAR ARRAYS, SOLAR CELLS, SPACECRAFT POWER SUPPLIES

45 ENVIRONMENT POLLUTION

Includes atmospheric, noise, thermal, and water pollution.


ANTARCTIC REGIONS, ATMOSPHERIC CHEMISTRY, ATMOSPHERIC COMPOSITION, CONFERENCES, EARTH OBSERVATIONS (FROM SPACE), OZONE, OZONE DEPLETION, OZONOMETRY, POLAR METEOROLOGY, STRATOSPHERE

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

N89-10420*# National Aeronautics and Space Administration. Langley Research Center, Hampton, VA. COMPILE OF METHODS IN ORBITAL MECHANICS AND SOLAR GEOMETRY JAMES J. BUGLIA Washington Oct. 1988 81 p (NASA-SP-1204; L-18451; NAS 1.61:1204) Avail: NTIS HC A05/MF A01 CSCL 04A

This paper contains a collection of computational algorithms for determining geocentric ephemerides of Earth satellites, useful for both mission planning and data reduction applications. Special emphasis is placed on the computation of sidereal time, and on the determination of the geocentric coordinate of the center of the Sun, all to the accuracy found in the Astronomical Almanac. The report is completely self-contained in that no requirement is placed on any external source of information, and hence, these methods are ideal for computer application. Author


ATMOSPHERIC CIRCULATION, GEOPOTENTIAL HEIGHT, SATELLITE OBSERVATION, STRATOSPHERE, ZONAL FLOW (METEOROLOGY)


The Stratospheric and Mesospheric Sounder (SAMS) aboard Nimbus-7 observes infrared radiation from the atmospheric limb. Global upper atmosphere temperature profiles and vertical concentrations of H2O, NO, N2O, CH4 and CO2 are derived from these measurements. The status of all channels was carefully monitored. Temperature and composition were retrieved from the measurements by linearizing the direct equation about an a priori profile and using an optimum statistical estimator to find the most likely solution. The derived temperature and composition profiles are archived on two tape products whose file structure and record formats are described in detail. The gridded retrieved temperature tape (GRID-T) contains daily day and night average temperatures at 62 pressure levels in a 2.5 degree latitude by 10 degree longitude profile and using an optimum statistical estimator to find the most likely solution. The derived temperature and composition profiles are archived on two tape products whose file structure and record formats are described in detail. The gridded retrieved temperature tape (GRID-T) contains daily day and night average temperatures at 62 pressure levels in a 2.5 degree latitude by 10 degree longitude profile and using an optimum statistical estimator to find the most likely solution. The derived temperature and composition profiles are archived on two tape products whose file structure and record formats are described in detail. The gridded retrieved temperature tape (GRID-T) contains daily day and night average temperatures at 62 pressure levels in a 2.5 degree latitude by 10 degree longitude pro...
47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.


For several days in January and August 1985, the Earth Radiation Budget Satellite, a component of the Earth Radiation Budget Experiment (ERBE), was operated in an along-track scanning mode. A survey of radiance measurements taken in this mode is given for five ocean regions: the north and south Atlantic, the Arabian Sea, the western Pacific north of the Equator, and part of the Intertropical Convergence Zone. Each orbit contains information about the clear scene and three cloud categories: partly cloudy, mostly cloudy, and overcast. The data presented include the variation of longwave and shortwave radiances in each scene classification as a function of viewing zenith angle during each orbit of one of the five target regions. Several features of interest in the development of anisotropic models are evident, including the azimuthal dependence of shortwave radiance that is an essential feature of shortwave bidirectional models. The data also demonstrate that the scene classification algorithm employed by the ERBE results in scene classifications that are a function of viewing geometry.


The SMMR instrument onboard the Nimbus-7 satellite has been in operation since October 1978. It has provided global coverage of passive microwave observations at 6.6, 10.7, 18, 21, and 37 GHz. The observed brightness temperature can be used to retrieve geophysical parameters, principally sea surface temperature, atmospheric water vapor and liquid water content over oceans, sea ice concentration, and snow cover over land. The SMME CELL-ALL Tape contains earth-located calibrated brightness temperature data which have been appropriately binned into cells of various grid sizes, allowing intercomparisons of observations made at different frequencies (with corresponding different footprint sizes). This user's guide describes the operation of the instrument, the flow of the data processing the calibration procedure, and the characteristics of the calibrated brightness temperatures and how they are binned. Detailed tape specifications and lists of available data are also provided.


During January 1985, the scanning radiometer aboard the Earth Radiation Budget Satellite was operated to scan along-track. These data have been analyzed to produce limb-darkening functions for Earth emitted radiation, which relate the radiance in any given direction to the radiant exittance. Limb-darkening functions are presented in tabular form and shown as figures for 10 day cases and 12 night cases, corresponding to various scene types and latitude zones. The scene types were computed using measurements within 10 deg of zenith. The limb-darkening functions have values of 1.03 to 1.09 at zenith, with 1.06 being typical. It is found that latitude causes a variation on the order of 1 percent, except for zenith angles greater than 70 deg. These limb-darkening models are about 2 percent higher at zenith than the models derived from Nimbus 7 data.


The longwave angular radiation models that are required for analysis of satellite measurements of Earth radiation, such as those from the Earth Radiation Budget Experiment (ERBE) are presented. The models contain limb-darkening characteristics and mean fluxes. Limb-darkening characteristics are the longwave anisotropic factor and the standard deviation of the longwave radiance. Derivation of these models from the Nimbus 7 ERB (Earth Radiation Budget) data set is described. Tabulated values and computer-generated plots are included for the limb-darkening and mean-flux models.
Values above selected Southern Hemisphere stations are compared to that of other years. The ozone hole is displaced from the South Pole, opposing a persistent decrease in ozone levels. A pronounced ozone hole was observed in late September and early October 1988, with minimum values of 109 Dobson units. These values were seldom seen and were compared to the 1987 ozone distribution, showing it was less pronounced than in 1987. Minimum values, observed over the Southern Hemisphere for the period August 1 through November 17, 1988, were less than 175 DU. Compared with the same period in 1987, when a pronounced ozone hole whose minimum value of 109 Dobson Units (DU) was the lowest total ozone ever observed, the 1988 ozone hole was displaced from the South Pole, opposing a persistent decrease in ozone levels. Daily ozone values above selected Southern Hemisphere stations are presented, along with comparisons of the 1988 ozone distribution to that of other years.

Author
AEROSPACE MEDICINE
Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 327)
Feb. 1989 53 p
(NASA-SP-7011(327); NAS 1.21:7011(327)) Avail: NTIS HC A03; NTIS standing order as PB89-912300, $10.50 domestic, $21.00 foreign

This bibliography lists 127 reports, articles and other documents introduced into the NASA Scientific and Technical Information System during August, 1989. Subject coverage includes: aerospace medicine and psychology, life support systems and controlled environments, safety equipment, exobiology and extraterrestrial life, and flight crew behavior and performance.

MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT
Includes human engineering; biotechnology; and space suits and protective clothing.

REPORT OF THE 1ST PLANNING WORKSHOP FOR CELSS FLIGHT EXPERIMENTATION
JOHN W. TREMOR and ROBERT D. MACELROY 1988 28 p
Workshop held at Moffett Field, Calif., 23-24 Mar. 1987
(NASA-CP-10020; A-88265; NAS 1.55:10020) Avail: NTIS HC A03/MF A01 CSCL 05H

BIOASTRONAUTICS, CLOSED ECOLOGICAL SYSTEMS, CONFERENCES, PLANTS (BOTANY), SPACECRAFT ENVIRONMENTS

INTERACTIVE ORBITAL PROXIMITY OPERATIONS PLANNING SYSTEM
ARTHUR J. GRUNWALD and STEPHEN R. ELLIS Nov. 1988 48 p
(NASA-TP-2839; A-88091; NAS 1.60:2839) Avail: NTIS HC A03/MF A01 CSCL 05H

COMPUTER GRAPHICS, ORBITAL MANEUVERS, PROXIMITY, SPACE STATIONS, SPACECRAFT TRAJECTORIES

MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

SECOND ANNUAL WORKSHOP ON SPACE OPERATIONS AUTOMATION AND ROBOTICS (SOAR 1988)
SANDY GRIFFIN, ed./comp. Washington, DC Nov. 1988

COMPUTER PROGRAMMING AND SOFTWARE
Includes computer programs, routines, and algorithms, and specific applications, e.g., CAD/CAM.

OEXP ANALYSIS TOOLS WORKSHOP
(NASA-CP-10013; NAS 1.55:10013) Avail: NTIS HC A04/MF A01 CSCL 09B

COMPUTER PROGRAMS, LUNAR EXPLORATION, MARS LANDING, MISSION PLANNING, SOFTWARE TOOLS

ANALYSIS OF POSITRON LIFETIME SPECTRA IN POLYMERS
(NASA-TP-2853; L-16468; NAS 1.60:2853) Avail: NTIS HC A04/MF A01 CSCL 09B

COMPUTER PROGRAMS, EPOXY COMPOUNDS, HALF LIFE, POSITRONS, RADIATION SPECTRA

THE ESTIMATION ERROR COVARIANCE MATRIX FOR THE IDEAL STATE RECONSTRUCTOR WITH MEASUREMENT NOISE
MICHAEL E. POLITES Dec. 1988 19 p
(NASA-TP-2881; NAS 1.60:2881) Avail: NTIS HC A03/MF A01 CSCL 09B

COVARIANCE, ERROR ANALYSIS, MATRICES (MATHEMATICS), RECONSTRUCTION, STATE ESTIMATION

FOURTH CONFERENCE ON ARTIFICIAL INTELLIGENCE FOR SPACE APPLICATIONS
(NASA-CP-3013; M-599; NAS 1.55:3013) Avail: NTIS HC A21/MF A01 CSCL 09B

AEROSPACE SCIENCES, ARTIFICIAL INTELLIGENCE, EXPERT SYSTEMS, ROBOTICS

PROCEEDINGS OF THE SCIENTIFIC DATA COMPRESSION WORKSHOP

61 COMPUTER PROGRAMMING AND SOFTWARE
(NASA-CP-3019; S-585; NAS 1.55:3019) Avail: NTIS HC A22/MF A01 CSCL 12A

COMPUTER ASSISTED INSTRUCTION, COMPUTER TECHNIQUES, EXPERT SYSTEMS, HUMAN FACTORS ENGINEERING, INFORMATION SYSTEMS, KNOWLEDGE BASES (ARTIFICIAL INTELLIGENCE), ROBOTICS, SYSTEMS INTEGRATION, TELEOPERATORS
61 COMPUTER PROGRAMMING AND SOFTWARE
Includes computer programs, routines, and algorithms, and specific applications, e.g., CAD/CAM.

N89-11407*# National Aeronautics and Space Administration, Langley Research Center, Hampton, VA.
OEXP ANALYSIS TOOLS WORKSHOP
(NASA-CP-10013; NAS 1.55:10013) Avail: NTIS HC A04/MF A01 CSCL 09B

COMPUTER PROGRAMS, LUNAR EXPLORATION, MARS LANDING, MISSION PLANNING, SOFTWARE TOOLS

N89-12237*# National Aeronautics and Space Administration, Langley Research Center, Hampton, VA.
ANALYSIS OF POSITRON LIFETIME SPECTRA IN POLYMERS
(NASA-TP-2853; L-16468; NAS 1.60:2853) Avail: NTIS HC A04/MF A01 CSCL 09B

COMPUTER PROGRAMS, EPOXY COMPOUNDS, HALF LIFE, POSITRONS, RADIATION SPECTRA

N89-13994*# National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, AL.
THE ESTIMATION ERROR COVARIANCE MATRIX FOR THE IDEAL STATE RECONSTRUCTOR WITH MEASUREMENT NOISE
MICHAEL E. POLITES Dec. 1988 19 p
(NASA-TP-2881; NAS 1.60:2881) Avail: NTIS HC A03/MF A01 CSCL 09B

COVARIANCE, ERROR ANALYSIS, MATRICES (MATHEMATICS), RECONSTRUCTION, STATE ESTIMATION

N89-15549*# National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, AL.
FOURTH CONFERENCE ON ARTIFICIAL INTELLIGENCE FOR SPACE APPLICATIONS
(NASA-CP-3013; M-599; NAS 1.55:3013) Avail: NTIS HC A21/MF A01 CSCL 09B

AEROSPACE SCIENCES, ARTIFICIAL INTELLIGENCE, EXPERT SYSTEMS, ROBOTICS

N89-22332*# National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, MD.
PROCEEDINGS OF THE SCIENTIFIC DATA COMPRESSION WORKSHOP
61 COMPUTER PROGRAMMING AND SOFTWARE

NASA, Washington
(NASA-CP-3025; REPT-8980038; NAS 1.55:3025) Avail: NTIS
HC A19/MF A01 CSCL 09B

CONFERENCES, DATA COMPRESSION, DATA
MANAGEMENT, DATA TRANSMISSION, IMAGE PROCESSING,
IMAGING TECHNIQUES, SIGNAL PROCESSING, TELEMETRY,
VECTORS (MATHEMATICS)

N89-23181*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, VA.
A KNOWLEDGE-BASED TOOL FOR MULTILEVEL
DECOMPOSITION OF A COMPLEX DESIGN PROBLEM
JAMES L. ROGERS Washington May 1989 23 p
(NASA-TP-2903; L-16557; NAS 1.60:2903) Avail: NTIS HC
A03/MF A01 CSCL 09B
COMPUTER AIDED DESIGN, KNOWLEDGE BASES
(ARTIFICIAL INTELLIGENCE), SCHEDULING, SOFTWARE
TOOLS, SYSTEMS ENGINEERING

62 COMPUTER SYSTEMS

Includes computer networks and special application computer
systems.

N89-17422*# National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, OH.
PARALLEL GAUSSIAN ELIMINATION OF A BLOCK
TRIDIAGONAL MATRIX USING MULTIPLE
MICROCOMPUTERS
RICHARD A. BLECH Washington, DC Feb. 1989 35 p
(NASA-TP-2892; E-4199; NAS 1.60:2892) Avail: NTIS HC
A03/MF A01 CSCL 09B
GAUSSIAN ELIMINATION, MATRICES (MATHEMATICS),
MICROCOMPUTERS, MULTIPROCESSING (COMPUTERS),
PARALLEL PROGRAMMING

N89-24815*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, VA.
THE FAULT TREE COMPILER (FTC): PROGRAM AND
MATHEMATICS
RICKY W. BUTLER and ANNA L. MARTENSEN (PRC Kentron,
(NASA-TP-2915; L-16529; NAS 1.60:2915) Avail: NTIS HC
A03/MF A01 CSCL 09B
COMPUTER PROGRAMS, COMPUTER TOOLS, FAULT
TOLERANCE, FAULT TREES, PROBABILITY THEORY,
RELIABILITY ANALYSIS

63 CYBERNETICS

Includes feedback and control theory, artificial intelligence, robotics
and expert systems.

N89-26578*# National Aeronautics and Space Administration.
Goddard Space Flight Center, Greenbelt, MD.
THE 1989 GODDARD CONFERENCE ON SPACE
APPLICATIONS OF ARTIFICIAL INTELLIGENCE
JAMES RASH, ed. Washington Apr. 1989 385 p Conference
held in Greenbelt, MD, 16-17 May 1989
(NASA-CP-3033; REPT-89800099; NAS 1.55:3033) Avail: NTIS
HC A17/MF A01 CSCL 09B
ARTIFICIAL INTELLIGENCE, COMPUTER VISION,

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical
approximation.

N89-16415*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, VA.
EFFECT OF EPHEMERIS ERRORS ON THE ACCURACY OF
THE COMPUTATION OF THE TANGENT POINT ALTITUDE OF
A SOLAR SCANNING RAY AS MEASURED BY THE SAGE 1
AND 2 INSTRUMENTS
JAMES J. BUGLIA Washington, DC Feb. 1989 29 p
(NASA-TP-2866; L-16465; NAS 1.60:2866) Avail: NTIS HC
A03/MF A01 CSCL 12A
ALTITUDE, APPROXIMATION, EPHEMERIDES, POSITION
ERRORS, SAGE SATELLITE, SCANNING, SPACECRAFT ORBITS,
SUN, TANGENTS

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations
research.

N89-12316*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, VA.
THREE-DIMENSIONAL MULTIGRID ALGORITHMS FOR THE
FLUX-SPLIT EULER EQUATIONS
W. KYLE ANDERSON, JAMES L. THOMAS, and DAVID L.
WHITFIELD (Mississippi State Univ., Mississippi State.) Nov.
1988 41 p
(NASA-TP-2829; L-16416; NAS 1.60:2829) Avail: NTIS HC
A03/MF A01 CSCL 12A
APPROXIMATION, COMPUTATIONAL FLUID DYNAMICS,
EULER EQUATIONS OF MOTION, FLUX VECTOR SPLITTING,
THREE DIMENSIONAL FLOW

N89-16437*# National Aeronautics and Space Administration.
Hugh L. Dryden Flight Research Facility, Edwards, CA.
USER'S MANUAL FOR INTERACTIVE LINCOLN: A FORTRAN
PROGRAM TO DERIVE LINEAR AIRCRAFT MODELS
ROBERT F. ANTONIEWICZ, EUGENE L. DUKE, and BRIAN P.
PATTERSON Sep. 1988 126 p
(NASA-TP-2835; H-1443; NAS 1.60:2835) Avail: NTIS HC
A07/MF A01 CSCL 12B
AIRCRAFT DESIGN, FORTRAN, INTERACTIVE CONTROL,
LINEAR SYSTEMS, USER GUIDES (COMPUTER PROGRAMS)
67
THEORETICAL MATHEMATICS
Includes topology and number theory.

N89-14052* # National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
AN ECONOMICAL SEMI-ANALYTICAL ORBIT THEORY FOR MICRO-COMPUTER APPLICATIONS
AERODYNAMIC DRAG, COMPUTER TECHNIQUES, ORBIT CALCULATION, ORBIT PERTURBATION, ZONAL HARMONICS

70
PHYSICS (GENERAL)

N89-14053* # National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
A GENERAL FORMALISM FOR PHASE SPACE CALCULATIONS
GALACTIC COSMIC RAYS, NORMALITY, PHASE-SPACE INTEGRAL

71
ACOUSTICS
Includes sound generation, transmission, and attenuation.

N89-25673* # National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
AIRFOIL SELF-NOISE AND PREDICTION
A prediction method is developed for the self-generated noise of an airfoil blade encountering smooth flow. The prediction methods for the individual self-noise mechanisms are semiempirical and are based on previous theoretical studies and data obtained from tests of two- and three-dimensional airfoil blade sections. The self-noise mechanisms are due to specific boundary-layer phenomena, that is, the boundary-layer turbulence passing the trailing edge, separated-boundary-layer and stalled flow over an airfoil, vortex shedding due to laminar boundary layer instabilities, vortex shedding from blunt trailing edges, and the turbulent vortex flow existing near the tip of lifting blades. The predictions are compared successfully with published data from three self-noise studies of different airfoil shapes. An application of the prediction method is reported for a large scale-model helicopter rotor, and the predictions compared well with experimental broadband noise measurements. A computer code of the method is given. Author

81
ADMINISTRATION AND MANAGEMENT
Includes management planning and research.

N89-12479* # National Aeronautics and Space Administration, Washington, DC.
ISSUES IN NASA PROGRAM AND PROJECT MANAGEMENT
This collection of papers and resources on aerospace management issues is inspired by a desire to benefit from the lessons learned from past projects and programs. Inherent in the NASA culture is a respect for divergent viewpoint's and innovative ways of doing things. This publication presents a wide variety of views and opinions. Good management is enhanced when program and project managers examine the methods of veteran managers, considering the lessons they have learned and reflected on their own guiding principles. Author

N89-26766* National Aeronautics and Space Administration, Washington, DC.
MANAGEMENT: A BIBLIOGRAPHY FOR NASA MANAGERS Apr. 1989 198 p (NASA-SP-7500(23); NAS 1.21:7500(23)) Avail: NTIS HC A09 CSCL 05A
This bibliography lists 822 reports, articles and other documents introduced into the NASA Scientific and Technical Information
System in 1988. Items are selected and grouped according to their usefulness to the manager as manager. Citations are grouped into ten subject categories: human factors and personnel issues; management theory and techniques; industrial management and manufacturing; robotics and expert systems; computers and information management; research and development; economics, costs and markets; logistics and operations management; reliability and quality control; and legality, legislation, and policy. Author

82

DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.

N89-13301*# National Aeronautics and Space Administration, Washington, DC.

N89-14188*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

N89-14998*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

N89-15779*# National Aeronautics and Space Administration, Washington, DC.

N89-29264* National Aeronautics and Space Administration, Washington, DC.

N88

SPACE SCIENCES (GENERAL)

N89-13301*# National Aeronautics and Space Administration, Washington, DC.

N89-14188*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

N89-15779*# National Aeronautics and Space Administration, Washington, DC.

N89-29264* National Aeronautics and Space Administration, Washington, DC.

N88

DOCUMENTATION AND INFORMATION SCIENCE

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography.
90 ASTROPHYSICS

Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.

N89-13330*# National Aeronautics and Space Administration, Washington, D.C.

INFRARED OBSERVATIONS OF COMETS HALLEY AND WILSON AND PROPERTIES OF THE GRAINS

MARTHA S. HANNER, ed. (Jet Propulsion Lab., California Inst. of Tech., Pasadena.) Sep. 1988 200 p Prepared in cooperation with the following organizations: NASA, Johnson Space Flight Center, Houston, TX; American Astronomical Society, Washington, DC; Lyndon B. Johnson Space Center, Houston, TX; Science Research Council, London, United Kingdom; Netherlands Agency for Aerospace Programs, Delft, The Netherlands; and Centre National de la Recherche Scientifique, Paris, France.

Avail: NTIS HC A09/MF A01 CSCL 03A

COMETARY ATMOSPHERES, COSMIC DUST, HALLEY'S COMET, INFRARED SPECTRA

N89-15810*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Flight Center, Houston, TX.

FUTURE ASTRONOMICAL OBSERVATORIES ON THE MOON


Avail: NTIS HC A07/MF A01 CSCL 03A

ASTRONOMICAL OBSERVATORIES, LUNAR BASES, LUNAR OBSERVATORIES, RADIO ASTRONOMY, RADIO TELESCOPES

90 ASTROPHYSICS

Includes radio, gamma-ray, and infrared astronomy; and astrometry.

N89-11657*# National Aeronautics and Space Administration, Washington, D.C.

O STARS AND WOLF-RAYET STARS

PETER H. CONTI, ANNE B. UNDERHILL, STUART JORDAN, ed. 1988 508 p Prepared in cooperation with Centre National de la Recherche Scientifique, Paris (France) (NASA-SP-497; NAS 1.21:497) Avail: SOD HC $24.00 as 033-000-01021-4; NTIS A01 CSCL 03A

Basic information is given about O and Wolf-Rayet stars indicating how these stars are defined and what their chief observable properties are. Part 2 of the volume discussed four related themes pertaining to the hottest and most luminous stars. Presented are: an observational overview of the spectroscopic classification and extrinsic properties of O and Wolf-Rayet stars; the intrinsic parameters of luminosity, effective temperature, mass, and composition of the stars, and a discussion of their viability; stellar wind properties; and the related issues concerning the effects of stellar radiation and wind on the immediate interstellar environment are presented.

B.G.

N89-12513*# National Aeronautics and Space Administration, Washington, D.C.

ATLAS OF GALAXIES USEFUL FOR MEASURING THE COSMOLOGICAL DISTANCE SCALE

ALLAN SANDAGE and JOHN BEDKE (Space Telescope Science Inst., Baltimore, Md.) 1988 462 p Prepared for Computer Sciences Corp., Baltimore, Md. Prepared in cooperation with Johns Hopkins Univ., Baltimore, Md. (NASA-SP-496; NAS 1.21:496; LC-88-600056) Avail: NTIS HC A20; also available SOD HC $80.00 as 033-000-01020-6 CSCL 03A

A critical first step in determining distances to galaxies is to measure some property of primary objects such as stars of specific types, H II regions, and supernovae remnants that are resolved out of the general galactic star content. With the completion of the Mount Wilson/Palomar/Las Campanas survey of bright galaxies in 1985, excellent large-scale photographs of the complete Shapley-Ames sample were on hand. Most of the galaxies useful for distance scale calibration are in this collection. This atlas contains photographs of 322 galaxies including the majority of all Shapley-Ames bright galaxies, plus cluster members in the Virgo Cluster core that might be usefully resolved by the Hubble Space Telescope (HST). Because of crowding and high background-disk fluctuations and high background disks, this atlas should not be used for distance scale calibration.

N89-12910*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, CA.

SECOND WORKSHOP ON IMPROVEMENTS TO PHOTOMETRY


ASTRONOMICAL PHOTOMETRY, CONFERENCES, FIBER OPTICS, PHOTOMETERS
The Infrared Astronomical Satellite (IRAS) was launched January 26, 1983. During its 300-day mission, it surveyed over 96 percent of the celestial sphere at four infrared wavelengths, centered approximately at 12, 25, 60, and 100 microns. Volume 1 describes the instrument, the mission, and the data reduction process. Volumes 2 through 6 present the observations of the approximately 245,000 individual point sources detected by IRAS; each volume gives sources within a specified range of declination. Volume 7 gives the observations of the approximately 16,000 sources spatially resolved by IRAS and smaller than 8'. This is Volume 7, The Small Scale Structure Catalog.
The current state of knowledge of dynamic processes in the jovian system is evaluated and summaries are provided of both theoretical and observational foundations upon which future research might be based. There are three sections: satellite phenomena and rings; magnetospheric phenomena, loft's torus, and aurorae; and atmospheric phenomena. Each chapter discusses time dependent theoretical framework for understanding and interpreting what is observed; others describe the evidence and nature of observed changes or their absence. A few chapters provide historical perspective and attempt to present a comprehensive synthesis of the current state of knowledge.

**TIME-VARIABLE PHENOMENA IN THE JOVIAN SYSTEM**


(NASA SP-494; NAS 1.21:494; LC-68-25450) Avail: NTIS HC A18/MF A01 CSCL 03B

The current state of knowledge of dynamic processes in the jovian system is assessed and summaries are provided of both theoretical and observational foundations upon which future research might be based. There are three sections: satellite phenomena and rings; magnetospheric phenomena, loft's torus, and aurorae; and atmospheric phenomena. Each chapter discusses time dependent theoretical framework for understanding and interpreting what is observed; others describe the evidence and nature of observed changes or their absence. A few chapters provide historical perspective and attempt to present a comprehensive synthesis of the current state of knowledge. **Author**

**SOLAR PHYSICS**

Includes solar activity, solar flares, solar radiation and sunspots.

**N89-30151/#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.

**NIMBUS-7 ERB SOLAR ANALYSIS TAPE (ESAT) USER'S GUIDE**


Seven years and five months of Nimbus-7 Earth Radiation Budget (ERB) solar data are available on a single ERB Solar Analysis Tape (ESAT). The period covered is November 16, 1978 through March 31, 1986. The Nimbus-7 satellite performs approximately 14 orbits per day and the ERB solar telescope observes the sun once per orbit as the satellite crosses the southern terminator. The solar data were carefully calibrated and screened. Orbital and daily mean values are given for the total solar irradiance plus other spectral intervals (10 solar channels in all). In addition, selected solar activity indicators are included on the ESAT. The ESAT User's Guide is an update of the previous ESAT User's Guide (NASA TM 86143) and includes more detailed information on the solar data calibration, screening procedures, updated solar data plots, and applications to solar variability. Details of the tape format, including source code to access ESAT, are included. **Author**

**SPACE RADIATION**

Includes cosmic radiation; and inner and outer earth's radiation belts.

**N89-14210/#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

**SOLAR-FLARE SHIELDING WITH REGOLITH AT A LUNAR-BASE SITE**


LUNAR BASES, LUNAR SURFACE, RADIATION DOSAGE, RADIATION SHIELDING, SOLAR FLARES

**N89-16714/#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

**BENCHMARK SOLUTIONS FOR THE GALACTIC ION TRANSPORT EQUATIONS: ENERGY AND SPATIALLY DEPENDENT PROBLEMS**


EQUATIONS OF MOTION, GALACTIC RADIATION, HEAVY IONS, ION BEAMS, IONIC MOBILITY, RADIATION HAZARDS, TRANSPORT THEORY

**N89-17562/#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

**BRYNTRN: A BARYON TRANSPORT MODEL**


BARYONS, COMPUTER PROGRAMS, DATA BASES, ENERGY TRANSFER, TRANSPORT PROPERTIES

**N89-25103/#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.

**KAON-NUCLEUS SCATTERING**

Byungsik Hong, Khin Maung Maung, John W. Wilson, and Warren W. Buck (Hampton Inst., Va.) 1989 30 p (NASA-TP-2920; L-16569; NAS 1.60:2920) Avail: NTIS HC A03/MF A01 CSCL 03A

ABSORPTION CROSS SECTIONS, EIKONAL EQUATION, KAONS, MESON-NUCLEON INTERACTIONS, NUCLEAR SCATTERING, NUCLEONS, PARTICLE COLLISIONS, PARTICLE INTERACTIONS, PROTON SCATTERING, SCATTERING CROSS SECTIONS, SCHROEDINGER EQUATION

23
WHERE NO MAN HAS GONE BEFORE: A HISTORY OF APOLLO LUNAR EXPLORATION MISSIONS
WILLIAM DAVID COMPTON 1988 420 p Original contains color illustrations
(NASA-SP-4214; NAS 1.21:4214) Avail: NTIS HC A18/MF A01
CSCL 05D

This book is a narrative account of the development of the science program for the Apollo lunar landing missions. It focuses on the interaction between scientific interests and operational considerations in such matters as landing site selection and training of crews, quarantine and back contamination control, and presentation of results from scientific investigations. Scientific exploration of the moon on later flights, Apollo 12 through Apollo 17 is emphasized. Author

ASTRONAUTICS AND AERONAUTICS, 1985: A CHRONOLOGY
CSCL 05B

This book is part of a series of annual chronologies of significant events in the fields of astronautics and aeronautics. Events covered are international as well as national, in political as well as scientific and technical areas. This series is an important reference work used by historians, NASA personnel, government agencies, and congressional staffs, as well as the media. Author

(NASA-SP-4406; NAS 1.21:4406) Avail: NTIS HC A08/MF A01
CSCL 05D

This edition brings up to date the history of U.S. agencies for space exploration, the NACA and NASA, from 1915 through 1990. Early aviation and aeronautics research are described, with particular emphasis on the impact of the two world wars on aeronautics development and the postwar exploitation of those technologies. The reorganization and expansion of the NACA into NASA is described in detail as well as NASA's relationship with industry, the university system, and international space agencies such as the ESA. The dramatic space race of the 1950 and 1960s is recounted through a detailed history of the Gemini and Apollo programs and followed by a discussion of the many valuable social/scientific application of aeronautics technologies, many of which were realized through the launching of successful satellite projects. The further solar system explorations of the Voyager missions are described, as is the Challenger tragedy and the 1988 return to space of the Shuttle program. Future plans are outlined for a cooperatively funded international space station to foster the ongoing study of space science. Author
### SUBJECT INDEX

**Typical Subject Index Listing**

<table>
<thead>
<tr>
<th>SUBJECT HEADING</th>
<th>REPORT NUMBER</th>
<th>PAGE NUMBER</th>
<th>TITLES</th>
<th>NASA ACCESSION NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A STARS</td>
<td>p 21</td>
<td>N89-11657</td>
<td>O stars and Wolf-Rayet stars [NASA-SP-497]</td>
<td>NASA-SP-497</td>
</tr>
<tr>
<td>ABROTED MISSIONS</td>
<td>p 5</td>
<td>N89-23469</td>
<td>Simulator evaluation of a display for a Takeoff Performance Monitoring System [NASA-TP-2908]</td>
<td>NASA-TP-2908</td>
</tr>
<tr>
<td>ABSORPTION CROSS SECTIONS</td>
<td>p 23</td>
<td>N89-25103</td>
<td>Krypton nucleus scattering [NASA-TP-2902]</td>
<td>NASA-TP-2902</td>
</tr>
<tr>
<td>ACCELEROMETERS</td>
<td>p 8</td>
<td>N89-24507</td>
<td>Further developments in modeling digital control systems with MA-prefiltered measurements [NASA-TP-2909]</td>
<td>NASA-TP-2909</td>
</tr>
<tr>
<td>ACCUMULATORS</td>
<td>p 9</td>
<td>N89-15337</td>
<td>Performance of a multistage depressed collector with machined titanium electrodes [NASA-TP-2891]</td>
<td>NASA-TP-2891</td>
</tr>
<tr>
<td>ACTIVE CONTROL</td>
<td>p 11</td>
<td>N89-16196</td>
<td>Control surface spanwise placement in active flutter suppression systems [NASA-TP-2873]</td>
<td>NASA-TP-2873</td>
</tr>
<tr>
<td>ACTUATORS</td>
<td>p 5</td>
<td>N89-19309</td>
<td>Integrated tools for control-system analysis [NASA-TP-2885]</td>
<td>NASA-TP-2885</td>
</tr>
<tr>
<td>AERODYNAMIC HEATING</td>
<td>p 9</td>
<td>N89-12822</td>
<td>Aerodynamic pressures and heating rates on surfaces between split elevons at Mach 6.6 [NASA-TP-2895]</td>
<td>NASA-TP-2895</td>
</tr>
<tr>
<td>AERODYNAMIC STALLING</td>
<td>p 23</td>
<td>N89-25951</td>
<td>Steady-state and translational aerodynamic characteristics of a wing in simulated heavy rain [NASA-TP-2932]</td>
<td>NASA-TP-2932</td>
</tr>
<tr>
<td>AERODYNAMICS</td>
<td>p 1</td>
<td>N89-29304</td>
<td>Validated of a pair of computer codes for estimation and optimization of supersonic aerodynamic performance of simple hinged-flap systems for thin swept wings [NASA-TP-2825]</td>
<td>NASA-TP-2825</td>
</tr>
<tr>
<td>AERODYNAMIC DRAG</td>
<td>p 1</td>
<td>N89-26944</td>
<td>Aerodynamical engineering: A continuing bibliography with indexes [supplement 242]</td>
<td>NASA-SP-7037(242)</td>
</tr>
<tr>
<td>AERODYNAMICS</td>
<td>p 1</td>
<td>N89-29304</td>
<td>Aerodynamical engineering: A continuing bibliography with indexes [supplement 242]</td>
<td>NASA-SP-7037(242)</td>
</tr>
<tr>
<td>AEROSPACE</td>
<td>p 20</td>
<td>N89-15790</td>
<td>Workshop on Two-Phase Fluid Behavior in a Space Environment [NASA-CP-3043]</td>
<td>NASA-CP-3043</td>
</tr>
<tr>
<td>AGING</td>
<td>p 7</td>
<td>N89-26976</td>
<td>Stress corrosion study of PH13-8Mo stainless steel using the Slow Strain Rate Technique [NASA-TP-2934]</td>
<td>NASA-TP-2934</td>
</tr>
<tr>
<td>AIR FLOW</td>
<td>p 9</td>
<td>N89-16115</td>
<td>Conservation equations and physical models for hypersonic air flows in thermal and chemical nonequilibrium [NASA-TP-2895]</td>
<td>NASA-TP-2895</td>
</tr>
<tr>
<td>AIR TRAFFIC CONTROL</td>
<td>p 3</td>
<td>N89-15000</td>
<td>A piloted simulation study of data link ATC message exchange [NASA-TP-2895]</td>
<td>NASA-TP-2895</td>
</tr>
<tr>
<td>AIRCRAFT</td>
<td>p 18</td>
<td>N89-26209</td>
<td>AIRCRAFT COMPONENTS [NASA-TP-2835]</td>
<td>NASA-TP-2835</td>
</tr>
<tr>
<td>AIRCRAFT</td>
<td>p 1</td>
<td>N89-25668</td>
<td>AIRCRAFT CONFIGURATIONS [NASA-TP-2835]</td>
<td>NASA-TP-2835</td>
</tr>
<tr>
<td>AIRCRAFT</td>
<td>p 5</td>
<td>N89-24668</td>
<td>AIRCRAFT CONFIGURATIONS [NASA-TP-2835]</td>
<td>NASA-TP-2835</td>
</tr>
<tr>
<td>AIRCRAFT</td>
<td>p 12</td>
<td>N89-24654</td>
<td>AIRCRAFT CONFIGURATIONS [NASA-TP-2835]</td>
<td>NASA-TP-2835</td>
</tr>
</tbody>
</table>

**A-1**

**NASA Scientific and Technical Publications 1989**

The subject heading is a key to the subject content of the document. The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of document content, a title extension is added, separated from the title by three hyphens. The (NASA or AIAA) accession numbers appearing first.

The subject heading is also included as an aid in identifying the document. Under any one subject heading, the accession numbers are arranged in sequence with the AIAA accession numbers appearing first.
ANTENNA DESIGN

ANTENNA RADIATION PATTERNS
Measured and predicted root-mean-square errors in square and triangular antenna mesh facets
[NASA-TP-28986] p 11 N89-17892

ANTENNA DESIGN
Measured and predicted root-mean-square errors in square and triangular antenna mesh facets
[NASA-TP-28986] p 11 N89-17892

ANTENNA RADIATION PATTERNS
Measured and predicted root-mean-square errors in square and triangular antenna mesh facets
[NASA-TP-28986] p 11 N89-17892

APOLLO FLIGHTS
Where no man has gone before: a history of Apollo lunar landing missions
[NASA-SP-4214] p 24 N89-25946

APOLLO PROJECT
Where no man has gone before: a history of Apollo lunar landing missions
[NASA-SP-4214] p 24 N89-25946

APOLLO SPACECRAFT
Where no man has gone before: a history of Apollo lunar landing missions
[NASA-SP-4214] p 24 N89-25946

APPROXIMATION
Three-dimensional multigrid algorithms for the flux-split Euler equations
[NASA-TP-2828] p 18 N89-12316

Effect of eigenphases on the accuracy of the computation of the tangent point altitude of a solar scanning ray as measured by the SAGE 1 and 2 instruments
[NASA-TP-28986] p 18 N89-16415

ARCHITECTURE (COMPUTERS)
NASA Workshop on Computational Structural Mechanics 1987, part 1
[NASA-CP-10012-PT-1] p 12 N89-29773

NASA Workshop on Computational Structural Mechanics 1987, part 2

ARCTIC REGIONS

Arctic regions -50 deg greater than delta greater than -90 deg

Arctic regions 90 deg greater than delta greater than 30 deg

Arctic regions 0 deg greater than delta greater than -30 deg

Arctic regions -30 deg greater than delta greater than -50 deg

Atlantic Ocean: Explanatory supplement

Atlantic Ocean: Explanatory supplement

atlases. Volume 7: The small-scale structure catalog
[NASA-TP-2839] p 22 N89-25964

atlases. Volume 6: The point-source catalog declination range 0 deg greater than delta greater than -30 deg

atlases. Volume 5: The point-source catalog declination range -30 deg greater than delta greater than -50 deg

atlases. Volume 4: The point-source catalog declination range 0 deg greater than delta greater than -30 deg

atlases. Volume 3: The point-source catalog declination range 30 deg greater than delta greater than 0 deg

atlases. Volume 2: The point-source catalog declination range 90 deg greater than delta greater than 30 deg

atlases. Volume 1: Explanatory supplement

AIRFOIL PROFILES

Effect of advanced retrocarft airfoils sections on the hover performance of a small-scale rotor model
[NASA-TP-2833] p 2 N89-24264

Airfoil self-noise and prediction
[NASA-TP-2833] p 19 N89-25673

AIRFOILS

Airfoil self-noise and prediction
[NASA-SB-1218] p 19 N89-25673

Steady-state and transitional aerodynamic characteristics of a 4-wing in simulated heavy rain
[NASA-TP-2932] p 2 N89-25951

ALGORITHMS

Universal test fixture for monolithic mm-wave integrated circuits calibrated with an augmented TRD algorithm
[NASA-TP-2839] p 18 N89-12316

An assessment model for atmospheric composition: Comparison of satellite-derived dynamical quantities for the southern hemisphere
[NASA-TP-3031-PT-2] p 4 N89-25173

ASR satellite data product summary

ASR satellite data product summary

ATMOSPHERIC SOUNDING

Nimbus-7 data product summary
[NASA-SP-4215] p 13 N89-22152

ATTENUATION

Propagation effects handbook for satellite systems design. A summary of propagation impairments on 10 to 100 GHz satellite links with techniques for system design
[NASA-TP-10820] p 6 N89-17060

AUGER SPECTROSCOPY

Auger electron intensity variations in oxygen-exposed large grain polycrystalline silver
[NASA-TP-2903] p 19 N89-30022

AUTOMATIC CONTROL

Simulation evaluation of TIME, a time-based, terminal air traffic flow-management concept
[NASA-TP-2870] p 3 N89-15901

AVIONICS

Joint University Program for Air Transportation Research, 1987
[NASA-CP-3028] p 19 N89-12190
A-3
Subject Index

Data Compression

Data Links
A pilot simulation study of data link ATC message exchange [NASA-TP-2651] p 3 N89-15900

Data Management
The 1985 Goddard Conference on Space Applications of Artificial Intelligence [NASA-CP-3035] p 18 N89-26578

Data Processing

Data Transmission
A simulator investigation of the use of digital data link for pilot/ATC communications in a single pilot operation [NASA-TP-2657] p 3 N89-11726
Digitally modulated bit error rate measurement system for microwave component evaluation [NASA-TP-2912] p 6 N89-28545

Declination
Infrared astronomical satellite (IRAS) catalogs and atlases. Volume 6: The point source catalog declination [NASA-TP-2912] p 6 N89-28545

Decoupling
Motion simulation with decoupling control laws [NASA-CP-10017] p 8 N89-17682

Design Analysis
A new state reconstructor for digital controls systems using weighted-average measurements [NASA-TP-2908] p 8 N89-27039

Dihedral Angle
Effect of milling machine roughness and wing dihedral on the supersonic aerodynamic characteristics of a highly swept wing [NASA-TP-2918] p 3 N89-25117

Direct Current
An electrochemical study of corrosion protection by primer-topcoat systems on 4130 steel with ac impedance and dc methods [NASA-TP-2650] p 7 N89-19406

Displacement

Displacement Devices
Simulator evaluation of a display for a Takeoff Performance Monitoring System [NASA-TP-2908] p 5 N89-23469

Distance
Atlas of galaxies useful for measuring the cosmological distance scale [NASA-SP-496] p 21 N89-12513

Documents
The NASA scientific and technical information system: Its scope and coverage [NASA-SP-3006] p 20 N89-15779

Doped Crystals
Indentation plasticity and fracture in silicon [NASA-TP-2905] p 7 N89-10996

DRAG MEASUREMENT
Drag measurements on a laminar-flow body of revolution in the 13-inch magnetic suspension and balance system [NASA-TP-2895] p 2 N89-19232

Drainage Patterns

Dynamic Characteristics
Time-Variable phenomena in the Jovian System [NASA-SP-494] p 23 N89-28474

Dynamic models
Aircraft with variable geometry and definition of a linear aircraft model [NASA-TP-1207] p 5 N89-15123

Dynamic Pressure
Aerodynamic pressures and heating rates on surfaces between split elevons at Mach 6.6 [NASA-TP-2855] p 9 N89-12522
Method for experimental determination of flutter speed by parameter identification [NASA-TP-2923] p 4 N89-26844

Dynamic Stability

Dynamic Structural Analysis
Partitioning strategy for efficient nonlinear finite element dynamic analysis on multiprocessor computers [NASA-TP-2850] p 11 N89-16170

DyG NaC
Volume 6: The point source catalog declination

DyG NaC

Design
Recent Advances in Multidisciplinary Analysis and Optimization, part 2 [NASA-CP-3001-PT-2] p 4 N89-25173
Recent Advances in Multidisciplinary Analysis and Optimization, part 3 [NASA-CP-3001-PT-3] p 4 N89-25201

Diagnosis
Microgravity Combustion Diagnostics Workshop [NASA-CP-10017] p 8 N89-17682

Dictionaries

Digital Data
A simulator investigation of the use of digital data link for pilot/ATC communications in a single pilot operation [NASA-TP-2657] p 3 N89-11726
Digitally modulated bit error rate measurement system for microwave component evaluation [NASA-TP-2912] p 6 N89-28545

Digital Filters
Further developments in modeling digital control systems with MA-prefiltered measurements [NASA-TP-2909] p 8 N89-24507

Digital Systems
Significant perturbations and time scales in the design of digital flight control systems [NASA-TP-2854] p 8 N89-24507

Digital Techniques
Further developments in modeling digital control systems with MA-prefiltered measurements [NASA-TP-2909] p 8 N89-24507

A new state reconstructor for digital controls systems using weighted-average measurements [NASA-TP-2906] p 8 N89-27039

Differential Pressure
Effect of milling machine roughness and wing dihedral on the supersonic aerodynamic characteristics of a highly swept wing [NASA-TP-2918] p 3 N89-25117

Digital Radiation
Earth Radiation Budget Experiment

Digital Systems
Aerostructural model for corrosion protection by primer-topcoat systems on 4130 steel with ac impedance and dc methods [NASA-TP-2650] p 7 N89-19406

Earth Observations (from Space)

Earth Orbital Environment
The effects of simulated space environmental parameters on six commercially available composite materials [NASA-TP-2906] p 7 N89-10985

Earth Radiation Budget
Nimbus-7 data product summary [NASA-TP-1215] p 13 N89-22152

Earth Resources
The NASA Goddard Conference on Space Applications of Artificial Intelligence [NASA-CP-3035] p 18 N89-26578

Electronics
Experience with the HiMAT research vehicles for microwave component evaluation [NASA-TP-28221] p 5 N89-15929
NASA-CP-30231 - p 16 N89-20588

Electric Currents
Technique for temperature compensation of eddy-current proximity probes [NASA-TP-2980] p 10 N89-15380

Elastic Properties
Skin and blood pressure measurement system with MA-prefiltered measurements [NASA-TP-2907] p 6 N89-28545

Electrode Materials
Design, fabrication, and performance of brazed, graphite electrode, multistage depressed collectors with 500-W, continuous wave, 4.8- to 9.6-GHz traveling-wave tubes [NASA-TP-2904] p 9 N9-21171

Electrochemistry
Performance of a multistage depressed collector with machined titanium electrodes [NASA-TP-2891] p 9 N9-15337

Electromagnetic Noise
LANDSAT-4 and LANDSAT-5 multiplexer scan coherence noise characterization and removal [NASA-TP-2959-REV] p 13 N89-12114

Electromagnetic Radiation
Analytical and experimental procedures for determining propagation characteristics of millimeter-wave gallium arsenide microstrip lines [NASA-TP-2999] p 9 N9-21169

Electrodes
Secondary electron emission characteristics of untreated and oxidized graphite [NASA-TP-2902] p 7 N9-17650
Design, fabrication, and performance of brazed, graphite electrode, multistage depressed collectors with 500-W, continuous wave, 4.8- to 9.6-GHz traveling-wave tubes [NASA-TP-2904] p 9 N9-21171

Electron Flux Density
Auger electron intensity variations in oxygen-exposed large grain polycrystalline silver [NASA-TP-2930] p 19 N89-30222

Electron Radiation
Absorbed dose thresholds and absorbed dose rate limitations for studies of electron radiation effects on polynyemidens [NASA-TP-2928] p 8 N89-25332

Elevations
Aerodynamic pressures and heating rates on surfaces between split elevons at Mach 6.6 [NASA-TP-2855] p 9 N9-12822

Emission Spectra

Energy Conservation
Advanced turbine project [NASA-SP-495] p 4 N9-12665

Nimbus-7 ERB Solar Analysis Tape (ESAT) user's guide [NASA-TP-1211] p 23 N89-30151

Earth Radiation Budget Experiment
Summary of along-track data from the earth radiation budget satellite for several representative ocean regions [NASA-TP-1206] p 15 N89-16434
NEODYMIUM LASERS

Analysis of Nd3+ glass, solar-pumped, high-power laser systems [NASA-TP-2905]  p 10  N89-17555

NEWTON METHODS

Application of Newton's method to the postbuckling of rings under pressure loadings [NASA-TP-2941]  p 13  N89-29811

NIMBUS 7 SATELLITE

User's guide for the Nimbus 7 Multichannel Microwave Radiometer (SMMR) CELL-ALL tape [NASA-RP-2301]  p 15  N89-14648


NOISE (AIRCRAFT)

Status of sonic boom methodology and understanding [NASA-CP-3027]  p 2  N89-23415

Aircraft signature and prediction [NASA-RP-1216]  p 19  N89-25673

NOISE REDUCTION

LANDSAT-4 and LANDSAT-5 multispectral scanner coherent noise characterization and removal [NASA-TP-2555-REV]  p 13  N89-12114

NOISE TOLERANCE

Evaluation of the ride quality of a light twin engine airplane using a ride quality meter [NASA-TP-2913]  p 1  N89-22568

NONDESTRUCTIVE TESTS


NONEQUILIBRIUM FLOW

Conservation equations and physical models for hypersonic air flows in thermal and chemical nonequilibrium [NASA-TP-2867]  p 9  N89-16115

NONEQUILIBRIUM THERMODYNAMICS

Conservation equations and physical models for hypersonic air flows in thermal and chemical nonequilibrium [NASA-TP-2867]  p 9  N89-16115

NONLINEAR SYSTEMS

Interactions of Tellmich-Schlichting waves and Dean vortices. Comparison of direct numerical simulation and a weakly nonlinear theory [NASA-TP-2910]  p 3  N89-25118

NORMALITY

A general formalism for phase space calculations [NASA-TP-2843]  p 19  N89-14053

NUCLEAR FUSION


NUCLEAR SCATTERING

Kaur-nuclear scattering [NASA-TP-2920]  p 23  N89-25103

NUCLEATION


NUCLEONS

Kaur-nuclear scattering [NASA-TP-2920]  p 23  N89-25103

PARALLEL PROCESSING (COMPUTERS)

Partitioning strategy for efficient nonlinear finite element dynamic analysis on multiprocessor computers [NASA-TP-2850]  p 11  N89-15170


PARALLEL PROGRAMMING

Parallel Gaussian elimination of a block triadiagonal matrix using multiple microcomputers [NASA-TP-2892]  p 18  N89-17422

PARAMETER IDENTIFICATION

Method for experimental determination of flutter speed by parameter identification [NASA-TP-2923]  p 4  N88-25844

PARTICLE COLLISIONS

Kaur-nuclear scattering [NASA-TP-2920]  p 23  N89-25103

PARTICLE INTERACTIONS

Experiments in Planetary and Related Sciences and the Space Station [NASA-CP-2944]  p 20  N89-14998


PARTICULATES


PARTITIONS (MATHEMATICS)

Partitioning strategy for efficient nonlinear finite element dynamic analysis on multiprocessor computers [NASA-TP-2850]  p 11  N89-16170

PATENT POLICY

NASA abstracts bibliography: A continuing bibliography. Section 1: Abstracts (supplement 35) [NASA-SP-7039(35)-SECT-1]  p 20  N89-23775


PERFLUORO COMPOUNDS

Reaction of perfluoroalkylpolyethers (PFPE) with 440C steel in vacuum under sliding conditions at room temperature [NASA-TP-2863]  p 8  N89-26091

PERFORMANCE TESTS

Performance of a multiaxial depressed collector with machined titanium electrodes [NASA-TP-2891]  p 9  N89-15327

Performance of a multiaxial depressed collector with machined titanium electrodes [NASA-TP-2891]  p 9  N89-15327

Technique for temperature compensation of eddy-current proximity probes [NASA-TP-2880]  p 10  N89-15380

Comparison of predicted and measured temperatures of UH-60A helicopter transmission [NASA-TP-2891]  p 11  N89-24607

PERSISTION THEORY

Singlar perturbations and time scales in the design of digital flight control systems [NASA-TP-2844]  p 4  N89-12569

PHASE-SPACE INTEGRAL


PHOTOCONDUCTIVE EFFECT


PHOTOLUMINESCENCE

A general formalism for phase space calculations [NASA-TP-2843]  p 19  N89-14053

PHOTOCHEMICAL OXIDANTS


PHOTOELECTRON SPECTROSCOPY

Degradation of perfluoroalkylpolyethers under X-ray irradiation in ultra-high vacuum [NASA-TP-2910]  p 8  N89-21103

PHOTOMETERS

Second Workshop on Improvements to Photometry [NASA-CP-10015]  p 21  N89-13310

PHOTOLUMINOUS PHENOMENA


PILOT PERFORMANCE

A pilot's evaluation of the use of digital data link for pilot/ATC communications in a single pilot operation [NASA-TP-2893]  p 3  N89-11126

A pilot's evaluation of the use of digital data link for pilot/ATC communications in a single pilot operation [NASA-TP-2893]  p 3  N89-11126

A simulated evaluation of escape guidance for microburst wind shear encounters [NASA-TP-2893]  p 4  N89-16820

PLANETARY ATMOSPHERES

The Cassini mission: Infrared and microwave spectroscopic measurements [NASA-TP-2912]  p 22  N89-16703

PLANETARY SURFACES


PLANETOLOGY


PLANTS (BOTANY)


PLASMA SPRAYING


PLASTIC PROPERTIES

Indentation plasticity and fracture in silicon [NASA-TP-2863]  p 7  N89-10996

SUBJECT INDEX

A10
OORSEY, JOHN T.
DOIRON, SCOTT D.
EARLS, MICHAEL R.
DENTON, JUDITH S.
DECKER, RAND
DAVIS, WANDA, L.
EBIHARA, BEN
FAIRCHILD, KYLE
FARMER, CROFTON B.
FINGER, HERBERT J.
FLEGAL, ALBERT J.
FOGLEMAN, GUY
FONDA, MARK L.
FREED, ALAN D.
FULTER, CHARLES A.
FUINK, JOAN G.
GANEAL, BARRY D.
HAN, D.
HAGEN, H. J.
HABERLE, ROBERT M.
HABERLE, ROBERT M.
DAVIS, WANDA, L.
DAVIS, WANDA, L.
DANFORD, M. D.
DARREN, CHRISTINE M.
DARWIN, M. R.
DAVIS, WANDA, L.
DECKER, RAND
DEUTCHMAN, PHILIP A.
DOIRON, SCOTT D.
DORSEY, JOHN T.
EARLS, MICHAEL R.
EBIHARA, BEN
EARS, MICHAEL R.
EIBHARA, BEN
FAIRCHILD, KYLE
FAIRCHILD, KYLE
FAIRCHILD, KYLE
FARMER, CROFTON B.
FINGER, HERBERT J.
FLEGAL, ALBERT J.
FOGLEMAN, GUY
FONDA, MARK L.
FREED, ALAN D.
FULTER, CHARLES A.
FUINK, JOAN G.
GANEAL, BARRY D.
HAN, D.
HAGEN, H. J.
HABERLE, ROBERT M.
HABERLE, ROBERT M.
EBIGHARA, BEN.
EIBHARA, BEN.
FAIRCHILD, KYLE.
FAIRCHILD, KYLE.
FAIRCHILD, KYLE.
FAIRCHILD, KYLE.
FAIRCHILD, KYLE.
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FAIRCHILD, KYLE.
FAIRCHILD, KYLE.
FAIRCHILD, KYLE.
FAIRCHILD, KYLE.
FAIRCHILD, KYLE.
FAIRCHILD, KYLE.
WHITFIELD, DAVID L.
Three-dimensional multigrid algorithms for the flux-split Euler equations
[NASA-TP-2929] p 18 N89-12016

WIELICKI, B. A.
Angular radiation models for earth-atmosphere system.
Volume 2: Longwave radiation

WILKINSON, R. ALLEN
Raman intensity as a probe of concentration near a crystal growing in solution
[NASA-TP-2955] p 10 N89-16139

WILLIAMS, M. D.
Analysis of Nd3+-glass, solar-pumped, high-power laser systems
[NASA-TP-2905] p 10 N89-17855

WILLIAMS, RICHARD J.
Experiments in Planetary and Related Sciences and the Space Station
[NASA-CP-2494] p 20 N89-14998

WILSON, JOHN W.
Solar-flare shielding with Regolith at a lunar-base site
[NASA-TP-2869] p 23 N89-14210

BRYNTRIN: A baryon transport model
[NASA-TP-2871] p 23 N89-16714

Kaon-nucleus scattering
[NASA-TP-2920] p 23 N89-25103

WRIGHT, ROBERT L.
GXP Analysis Tools Workshop
[NASA-CP-100131] p 17 N89-11407

WU, S. T.
Advanced Earth-to-Orbit Propulsion Technology 1986, volume 2
[NASA-CP-2437-VOL-2] p 6 N89-12626

Z

ZAKRAJESEK, JAMES J.
Comparison study of gear dynamic computer programs at NASA Lewis Research Center
[NASA-TP-2001] p 10 N89-21243

ZANG, THOMAS A.
Interactions of Tollmien-Schlichting waves and Dean vortices. Comparison of direct numerical simulation and a weakly nonlinear theory
[NASA-TP-2919] p 3 N89-25118

ZAPATA, L. E.
Analysis of Nd3+-glass, solar-pumped, high-power laser systems
[NASA-TP-2905] p 10 N89-17855

ZUBER, MARIA T.
Planetary geosciences. 1988
[NASA-SP-498] p 13 N89-26274

ZUCKERWAR, ALLAN J.
Contamination of liquid oxygen by pressurized gaseous nitrogen
[NASA-TP-2854] p 9 N89-19499

ZWALLY, H. JAY
Polar microwave brightness temperatures from Nimbus-7 SMMR: Time series of daily and monthly maps from 1978 to 1987
[NASA-RP-1223] p 13 N89-26275
Typical Report Number
Index Listing

REPORT
NUMBER
NASA TP-2891
N89-15337
#

NASA
ACCESSION
NUMBER

ON
MICROFICHE

PAGE
NUMBER

NASA
SPONSORED

LISTINGS IN THIS INDEX ARE ARRANGED ALPHABETICALLY BY REPORT NUMBER. THE PAGE NUMBER INDICATES THE PAGE ON WHICH THE CITATION IS LOCATED. THE AC- CESSION NUMBER DENOTES THE NUMBER BY WHICH THE CITATION IS IDENTIFIED. AN ASTERISK (*) INDICATES THAT THE ITEM IS AVAILABLE ON MICROFICHE.
<table>
<thead>
<tr>
<th>1. Report No.</th>
<th>NASA SP-7063(04)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Government Accession No.</td>
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<tr>
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<td></td>
</tr>
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<td>National Aeronautics and Space Administration Washington, DC 20546</td>
</tr>
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<td></td>
</tr>
<tr>
<td>15. Supplementary Notes</td>
<td></td>
</tr>
</tbody>
</table>

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