NASA SP-7063(04)

# NASA Scientific and Technical Publications

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

*1989*

NASA Scientific and Technical Publications Catalog 1989

(NASA-SP-7063(04)) NASA SCIENTIFIC AND TECHNICAL PUBLICATIONS: A CATALOG OF SPECIAL PUBLICATIONS, REFERENCE PUBLICATIONS, CONFERENCE PUBLICATIONS, AND TECHNICAL PAPERS, 1989 (NASA) 61 p CSCL 05B 00/82

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NASA SP-7063(04)

# NASA Scientific and Technical Publications

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

*1989*

National Aeronautics and Space Administration
Office of Management
Scientific and Technical Information Division
Washington, DC 1990

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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.

This catalog provides a list of NASA publications from four report series entered into the NASA scientific and technical information database during accession year 1989. For previous lists, see *Records of Achievement: NASA Special Publications*, NASA SP-470 (accession number N83-33792), *NASA Scientific and Technical Publications: A Catalog of Special Publications, Reference Publications, Conference Publications, and Technical Papers, 1977-1986,* NASA SP-7063(01) (accession number N87-30218). Supplements 02 and 03 of this catalog list NASA publications announced in 1987 and 1988, respectively.

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.

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| NASA SP-7046 | *Technology for Large Space Systems: A Bibliography with Indexes* | Semiannual |
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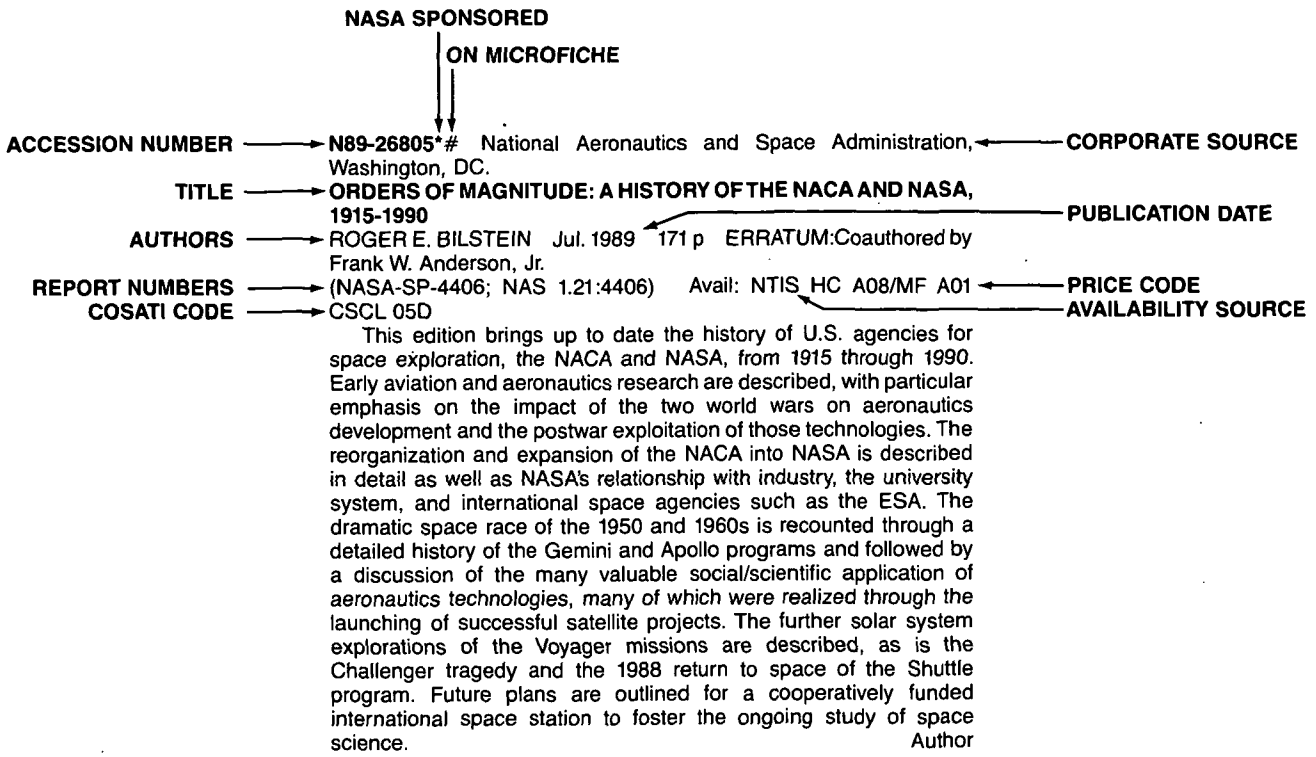


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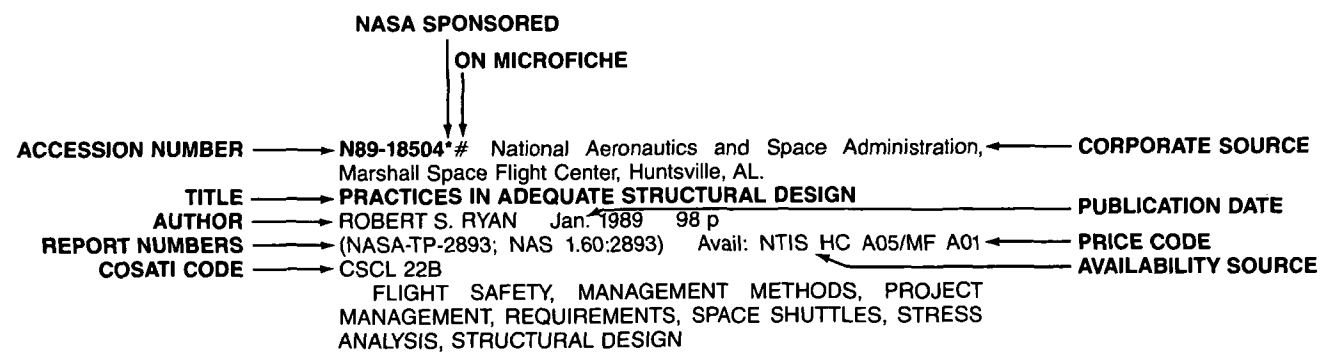

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## AERONAUTICS

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.*



## 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.*

## 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.*



## LIFE SCIENCES

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



## 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.



## 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.*

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

# 01

## AERONAUTICS (GENERAL)

**N89-19230*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**JOINT UNIVERSITY PROGRAM FOR AIR TRANSPORTATION RESEARCH, 1987**
FREDERICK R. MORRELL, comp. Apr. 1989 118 p Presented at a conference held in Atlantic City, NJ, 14-15 Jan. 1988
(NASA-CP-3028; L-16547; NAS 1.55:3028) Avail: NTIS HC A06/MF A01 CSCL 01B
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 01B
AIRCRAFT COMPARTMENTS, AIRCRAFT NOISE, NOISE TOLERANCE, SOUND TRANSMISSION, VIBRATION

**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 A07; NTIS standing order as PB89-914100, $10.50 domestic, $21.00 foreign 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. Author

# 02

## AERODYNAMICS

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

**N89-10020*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**WEAK-WAVE ANALYSIS OF SHOCK INTERACTION WITH A SLIPSTREAM**
RAYMOND L. BARGER Nov. 1988 20 p
(NASA-TP-2848; L-16469; NAS 1.60:2848) Avail: NTIS HC A03/MF A01 CSCL 01A
COUNTERFLOW, SHOCK WAVE INTERACTION, SLIPSTREAMS

**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 HINGED-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**
RICHARD J. MARGASON, ed. Feb. 1988 216 p Workshop held at Moffett Field, Calif., 22-23 Apr. 1987
(NASA-CP-10008; A-88008; NAS 1.55:10008) Avail: NTIS HC A10/MF A01 CSCL 01A
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**
MICHELE G. MACARAEG, CRAIG L. STREETT, and M. YOUSUFF HUSSAINI Washington, D.C. Dec. 1988 42 p
(NASA-TP-2858; L-16470; NAS 1.60:2858) Avail: NTIS HC A03/MF A01 CSCL 01A
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.
**THRUST-REVERSER FLOW INVESTIGATION ON A TWIN-ENGINE TRANSPORT**

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-16385; 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-RP-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**
SAMUEL R. BLAND, comp. Washington, DC Feb. 1989 261 p 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

AEROELASTICITY, 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**
SAMUEL R. BLAND, comp. Washington, DC Feb. 1989 379 p 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

AEROELASTICITY, 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**
JEROME T. FOUGHNER, JR., comp. Mar. 1989 416 p Symposium held in Hampton, VA, 19-21 Apr. 1988; sponsored by NASA, Washington Original contains color illustrations
(NASA-CP-3020-VOL-1-PT-1; L-16501-VOL-1-PT-1; NAS 1.55:3020-VOL-1-PT-1) Avail: NTIS HC A18/MF A01 CSCL 01A

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**
JEROME T. FOUGHNER, JR., comp. Mar. 1989 511 p Symposium held in Hampton, VA, 19-21 Apr.1988; sponsored by NASA, Washington Original contains color illustrations
(NASA-CP-3020-VOL-1-PT-2; L-16501-VOL-1-PT-2; NAS 1.55:3020-VOL-1-PT-2) Avail: NTIS HC A22/MF A01 CSCL 01A

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**
CHRISTINE M. DARDEN, CLEMANS A. POWELL, WALLACE D. HAYES, ALBERT R. GEORGE, and ALLAN D. PIERCE (Pennsylvania State Univ., University Park.) Washington Jun. 1989 32 p 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**
SUSAN L. ALTHOFF (Army Aviation Systems Command, Hampton, VA.) Sep. 1988 35 p
(DA PROJ. 1L1-61102-AH-45-A)
(NASA-TP-2832; L-16407; NAS 1.60:2832;
AVSCOM-TP-88-B-001) Avail: NTIS HC A03/MF A01 CSCL 01A

AIRFOIL PROFILES, FLIGHT TESTS, HOVERING, ROTARY WINGS, ROTORCRAFT AIRCRAFT

**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 A05/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 A05/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 A05/MF A01 CSCL 01A
DEFLECTORS, FLOW DEFLECTION, STATIC TESTS, THRUST REVERSAL, THRUST VECTOR CONTROL, WIND TUNNEL TESTS

## 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, FL.) 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 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**
KEISUKE ASAI (National Aerospace Lab., Tokyo, Japan) Washington Jul. 1989 49 p
(NASA-RP-1220; L-16564; NAS 1.61:1220) 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**
JEAN-FRANCOIS M. BARTHELEMY, ed. Washington Apr. 1989 527 p Symposium held in Hampton, VA, 28-30 Sep. 1988; sponsored by NASA, Langley Research Center, NASA, LeResear Center, and Wright Research Development Center
(NASA-CP-3031-PT-1; L-16568-PT-1; NAS 1.55:3031-PT-1)
Avail: NTIS HC A23/MF A01 CSCL 01C
AIRCRAFT DESIGN, COMPUTATIONAL FLUID DYNAMICS, COMPUTER AIDED DESIGN, CONFERENCES, EXPERT SYSTEMS, OPTIMIZATION, STRUCTURAL ENGINEERING

**N89-25173*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**RECENT ADVANCES IN MULTIDISCIPLINARY ANALYSIS AND OPTIMIZATION, PART 2**
JEAN-FRANCOIS M. BARTHELEMY, ed. Washington Apr. 1989 501 p Symposium held in Hampton, VA, 28-30 Sep. 1988; sponsored by NASA, Langley Research Center, NASA, Lewis Research Center, and Wright Research Development Center
(NASA-CP-3031-PT-2; L-16568-PT-2; NAS 1.55:3031-PT-2)
Avail: NTIS HC A22/MF A01 CSCL 01C
AIRCRAFT DESIGN, ARTIFICIAL INTELLIGENCE, COMPUTER AIDED DESIGN, CONFERENCES, DESIGN ANALYSIS, OPTIMIZATION, STRUCTURAL ANALYSIS, STRUCTURAL DESIGN

**N89-25201*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**RECENT ADVANCES IN MULTIDISCIPLINARY ANALYSIS AND OPTIMIZATION, PART 3**
JEAN-FRANCOIS M. BARTHELEMY, ed. Washington Apr. 1989 513 p Symposium held in Hampton, VA, 28-30 Sep. 1988; sponsored by NASA, Langley Research Center, NASA, Lewis Research Center, and Wright Research Development Center
(NASA-CP-3031-PT-3; L-16568-PT-3; NAS 1.55:3031-PT-3)
Avail: NTIS HC A22/MF A01 CSCL 01C
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

**N89-26844*#** National Aeronautics and Space Administration. Ames 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 A89-30801
(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

## 06

## AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

**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.***
DAVID A. HINTON Washington, DC Mar. 1989 57 p Sponsored in part by FAA, Washington, DC
(NASA-TP-2886; L-16498; NAS 1.60:2886; DOT/FAA/DS-89/06)
Avail: NTIS HC A04/MF A01 CSCL 01D
FLIGHT HAZARDS, FLIGHT SIMULATION, MICROBURSTS (METEOROLOGY), PILOT PERFORMANCE, WIND SHEAR

## 07

## 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.

**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; LC88-1690) 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

## 08

## AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

**N89-12569*#** 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

**N89-15123*#** National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, CA.
**DERIVATION AND DEFINITION OF A LINEAR AIRCRAFT MODEL**
EUGENE L. DUKE, ROBERT F. ANTONIEWICZ, and KEITH D. KRAMBEER Aug. 1988 106 p
(NASA-RP-1207; H-1391; NAS 1.61:1207) Avail: NTIS HC A06/MF A01 CSCL 01C

A linear aircraft model for a rigid aircraft of constant mass flying over a flat, nonrotating earth is derived and defined. The derivation makes no assumptions of reference trajectory or vehicle symmetry. The linear system equations are derived and evaluated along a general trajectory and include both aircraft dynamics and observation variables. Author

**N89-15929*#** National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Facility, Edwards, CA.
**FLIGHT CONTROL SYSTEMS DEVELOPMENT AND FLIGHT TEST EXPERIENCE WITH THE HIMAT RESEARCH VEHICLES**
ROBERT W. KEMPEL and MICHAEL R. EARLS Jun. 1988 88 p
(NASA-TP-2822; H-1428; NAS 1.60:2822) Avail: NTIS HC A05/MF A01 CSCL 01C

DIGITAL SYSTEMS, FLIGHT CONTROL, FLIGHT TESTS, HIGHLY MANEUVERABLE AIRCRAFT, REMOTELY PILOTED VEHICLES, RESEARCH AIRCRAFT, SCALE MODELS

**N89-15930*#** National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Facility, Edwards, CA.
**A PILOTED EVALUATION OF AN OBLIQUE-WING RESEARCH AIRCRAFT MOTION SIMULATION WITH DECOUPLING CONTROL LAWS**
ROBERT W. KEMPEL, WALTER E. MCNEILL, GLENN B. GILYARD, and TRINDEL A. MAINE Nov. 1988 52 p
(NASA-TP-2874; H-1430; NAS 1.60:2874) Avail: NTIS HC A04/MF A01 CSCL 01C

DECOUPLING, EVALUATION, FLIGHT SIMULATION, FLIGHT TESTS, OBLIQUE WINGS, PILOT PERFORMANCE

**N89-16845*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
**MODAL CONTROL OF AN OBLIQUE WING AIRCRAFT**
JAMES D. PHILLIPS Jan. 1989 49 p
(NASA-TP-2898; A-88250; NAS 1.60:2898) Avail: NTIS HC A03/MF A01 CSCL 01C

FLIGHT CONTROL, MODAL RESPONSE, OBLIQUE WINGS, RESEARCH AIRCRAFT

**N89-19309*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**INTEGRATED TOOLS FOR CONTROL-SYSTEM ANALYSIS**
AARON J. OSTROFF, MELISSA S. PROFFITT, and DAVID R. CLARK (Planning Research Corp., Hampton, VA.) Washington NASA Mar. 1989 61 p
(NASA-TP-2885; L-16482; NAS 1.60:2885) Avail: NTIS HC A04/MF A01 CSCL 01C

ACTUATORS, COMPUTER PROGRAMS, CONTROL SYSTEMS DESIGN, CONTROLLERS, LINEAR SYSTEMS, SOFTWARE TOOLS, SYSTEMS ANALYSIS

**N89-23468*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**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
(NASA-TP-2907; L-16484; NAS 1.60:2907) Avail: NTIS HC A03/MF A01 CSCL 01C

AERODYNAMIC BALANCE, AIRCRAFT DESIGN, COMPUTATION, LIFT DEVICES, OPTIMIZATION, REDUNDANCY, THRUST VECTOR CONTROL

**N89-23469*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**SIMULATOR EVALUATION OF A DISPLAY FOR A TAKEOFF PERFORMANCE MONITORING SYSTEM**
DAVID B. MIDDLETON, RAGHAVACHARI SRIVATSAN, and LEE H. PERSON, JR. Washington May 1989 29 p
(NASA-TP-2908; L-16510; NAS 1.60:2908) Avail: NTIS HC A03/MF A01 CSCL 01C

ABORTED MISSIONS, DISPLAY DEVICES, MONITORS, RATINGS, SIMULATORS, TAKEOFF

**N89-24327*#** National Aeronautics and Space Administration. Flight Research Center, Edwards, CA.
**DEVELOPMENT AND FLIGHT TEST EXPERIENCES WITH A FLIGHT-CRUCIAL DIGITAL CONTROL SYSTEM**
DALE A. MACKALL Washington Nov. 1988 116 p
(NASA-TP-2857; H-1344; NAS 1.60:2857) Avail: NTIS HC A06/MF A01 CSCL 01C

AIRCRAFT PERFORMANCE, CONTROL SYSTEMS DESIGN, DIGITAL SYSTEMS, F-16 AIRCRAFT, FLIGHT CONTROL, SYSTEMS INTEGRATION

## 12

## ASTRONAUTICS (GENERAL)

**N89-10902*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**THE 1988 GET AWAY SPECIAL EXPERIMENTER'S SYMPOSIUM**
LAWRENCE R. THOMAS, ed. and FRANCES L. MOSIER, ed. (RMS Technologies, Inc., Landover, Md.) Sep. 1988 127 p Symposium 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

CONFERENCES, GET AWAY SPECIALS (STS), SPACE SHUTTLE PAYLOADS, SPACEBORNE EXPERIMENTS

**N89-11760*#** National Aeronautics and Space Administration, Washington, DC.
**TECHNOLOGY FOR FUTURE NASA MISSIONS: CIVIL SPACE TECHNOLOGY INITIATIVE (CSTI) AND PATHFINDER**
Sep. 1988 550 p Conference held in Washington, D.C., 12-13 Sep. 1988; sponsored in part by NASA and AIAA
(NASA-CP-3016; NAS 1.55:3016) Avail: NTIS HC A23/MF A01 CSCL 22A

AEROASSIST, CONFERENCES, NASA PROGRAMS, ORBIT TRANSFER VEHICLES, SPACEBORNE EXPERIMENTS, SPACECRAFT CONSTRUCTION MATERIALS, SPACECRAFT INSTRUMENTS, SPACECRAFT POWER SUPPLIES, SPACECRAFT PROPULSION

## 13

## ASTRODYNAMICS

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

**N89-15934*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**FLIGHT MECHANICS/ESTIMATION THEORY SYMPOSIUM 1988**
THOMAS STENGLE, ed. Washington, DC Sep. 1988 611 p

Symposium held in Greenbelt, MD, 10-11 May 1988
(NASA-CP-3011; REPT-88B0224; NAS 1.55:3011) Avail: NTIS HC A99/MF A01 CSCL 22A

ESTIMATES, FLIGHT MECHANICS, ORBITAL MECHANICS, SPACECRAFT PERFORMANCE

## 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. BUDINGER 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.

**N89-18504*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
**PRACTICES IN ADEQUATE STRUCTURAL DESIGN**
ROBERT S. RYAN Jan. 1989 98 p
(NASA-TP-2893; NAS 1.60:2893) Avail: NTIS HC A05/MF A01 CSCL 22B

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

**N89-12582*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**FIFTEENTH SPACE SIMULATION CONFERENCE: SUPPORT THE HIGHWAY TO SPACE THROUGH TESTING**
JOSEPH STECHER, ed. 1988 492 p Conference held in Williamsburg, Va., 31 Oct. - 3 Nov. 1988; sponsored by NASA, Inst. of Environmental Sciences, AIAA, and the American Society for Testing and Materials
(NASA-CP-3015; REPT-88B0253; NAS 1.55:3015) Avail: NTIS HC A21/MF A01 CSCL 22B

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

**N89-18522*** National Aeronautics and Space Administration, Washington, DC.
**SPACE STATION SYSTEMS: A BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 7)**
Dec. 1988 289 p
(NASA-SP-7056(07); NAS 1.21:7056(07)) Avail: NTIS HC A13 CSCL 22B

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

**N89-26037*** National Aeronautics and Space Administration, Washington, DC.
**TECHNOLOGY FOR LARGE SPACE SYSTEMS: A BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 20)**
Jun. 1989 183 p
(NASA-SP-7046(20); NAS 1.21:7046(20)) Avail: NTIS HC A09 CSCL 22B

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.

**N89-12626*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
**ADVANCED EARTH-TO-ORBIT PROPULSION TECHNOLOGY 1986, VOLUME 2**
R. J. RICHMOND, ed. and S. T. WU, ed. (Alabama Univ., Huntsville.) Oct. 1986 775 p Conference held in Huntsville, Ala., 13-15 May 1986
(NASA-CP-2437-VOL-2; M-541-VOL-2; NAS 1.55:2437-VOL-2) Avail: NTIS HC A99/MF E03 CSCL 21H

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**
PHILIP A. MASTERS, ELIZABETH S. ARMSTRONG, and HAROLD G. PRICE Dec. 1988 18 p
(NASA-TP-2862; E-2645; NAS 1.60:2862) Avail: NTIS HC A03/MF A01 CSCL 21H
CALORIMETERS, COMBUSTION CHAMBERS, HIGH PRESSURE, KEROSENE, LIQUID OXYGEN, RP-1 ROCKET PROPELLANTS

## 23

## CHEMISTRY AND MATERIALS (GENERAL)

**N89-23528*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**NASA/SDIO SPACE ENVIRONMENTAL EFFECTS ON MATERIALS WORKSHOP, PART 1**
LOUIS A. TEICHMAN, comp. and BLAND A. STEIN, comp. Washington May 1989 356 p Workshop held in Hampton, VA, 28 Jun. - 1 Jul. 1988
(NASA-CP-3035-PT-1; L-16575-PT-1; NAS 1.55:3035-PT-1) Avail: NTIS HC A16/MF A01 CSCL 11G
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/SDIO SPACE ENVIRONMENTAL EFFECTS ON MATERIALS WORKSHOP, PART 2**
LOUIS A. TEICHMAN, comp. and BLAND A. STEIN, comp. Washington May 1989 253 p Workshop held in Hampton, VA, 28 Jun. - 1 Jul. 1988
(NASA-CP-3035-PT-2; L-16575-PT-2; NAS 1.55:3035-PT-2) Avail: NTIS HC A12/MF A01 CSCL 11G
EXTRATERRESTRIAL ENVIRONMENTS, MICROMETEOROIDS, OXYGEN ATOMS, RADIATION EFFECTS, THERMAL RADIATION

## 24

## 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, OH.) 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; NAS 1.60:2820) Avail: NTIS HC A04/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**
PABLO D. TORRES Washington Jul. 1989 32 p
(NASA-TP-2934; NAS 1.60:2934) Avail: NTIS HC A03/MF A01 CSCL 11F
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

**N89-21103*#** 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

**N89-25332*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**ABSORBED DOSE THRESHOLDS AND ABSORBED DOSE RATE LIMITATIONS FOR STUDIES OF ELECTRON RADIATION EFFECTS ON POLYETHERIMIDES**
EDWARD R. LONG, JR., SHEILA ANN T. LONG, STEPHANIE L. GRAY, and WILLIAM D. COLLINS (Old Dominion Univ., Norfolk, VA.) Washington Aug. 1989 22 p
(NASA-TP-2928; L-16585; NAS 1.60:2928) Avail: NTIS HC A03/MF A01 CSCL 11C
ELECTRON RADIATION, POLYETHER RESINS, POLYIMIDE RESINS, RADIATION ABSORPTION, RADIATION DOSAGE, RADIATION EFFECTS

**N89-26091*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
**REACTION OF PERFLUOROALKYLPOLYETHERS (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.

**N89-17682*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
**MICROGRAVITY COMBUSTION DIAGNOSTICS WORKSHOP**
GILBERT J. SANTORO, ed., PAUL S. GREENBERG, ed., and NANCY D. PILTCH, ed. 1988 47 p Workshop held in Cleveland, OH, 28-29 Jul. 1987
(NASA-CP-10017; E-4213; NAS 1.55:10017) Avail: NTIS HC A03/MF A01 CSCL 22A
COMBUSTION PHYSICS, CONFERENCES, DIAGNOSIS, REDUCED GRAVITY

## 31

## ENGINEERING (GENERAL)

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

**N89-24507*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
**FURTHER DEVELOPMENTS IN MODELING DIGITAL CONTROL SYSTEMS WITH MA-PREFILTERED MEASUREMENTS**
MICHAEL E. POLITES Washington Mar. 1989 20 p
(NASA-TP-2909; M-612; NAS 1.60:2909) Avail: NTIS HC A03/MF A01 CSCL 13B
ACCELEROMETERS, CONTROL SYSTEMS DESIGN, DIGITAL FILTERS, DIGITAL SYSTEMS, GYROSCOPES, STAR TRACKERS

**N89-27039*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
**A NEW STATE RECONSTRUCTOR FOR DIGITAL CONTROLS SYSTEMS USING WEIGHTED-AVERAGE MEASUREMENTS**
MICHAEL E. POLITES Washington Aug. 1989 17 p
(NASA-TP-2936; M-615; NAS 1.60:2936) Avail: NTIS HC A03/MF A01 CSCL 09B
CONTROL SYSTEMS DESIGN, DIGITAL TECHNIQUES, RECONSTRUCTION, STATE ESTIMATION

## 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-1082(04); NAS 1.61:1082(04)) Avail: NTIS HC A23/MF A01 CSCL 20N
The NASA Propagation Effects Handbook for Satellite Systems Design provides a systematic compilation of the major propagation effects experienced on space-Earth paths in the 10 to 100 GHz

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**
ROBERT R. ROMANOFSKY and KURT A. SHALKHAUSER Mar. 1989 42 p Presented at the 13th International Conference on Infrared and mm-Waves, Honolulu, Hawaii, 5-9 Dec. 1988
(NASA-TP-2875; E-3983; NAS 1.60:2875) Avail: NTIS HC A03/MF A01 CSCL 09C
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. ROMANOFSKY 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**
RAND DECKER, ed. and CHARLES F. SCHAFER, ed. Jul. 1988 191 p Workshop was held in Huntsville, Ala., 25-26 Feb. 1988; sponsored by NASA, Marshall Space Flight Center, Huntsville, Ala. and USRA, Huntsville, Ala. Sponsored by NASA, Washington, D.C.
(NASA-CP-3006; M-591; NAS 1.55:3006) Avail: NTIS HC A09/MF A01 CSCL 20D
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**
L. ROANE HUNT Washington, D.C. Dec. 1988 85 p
(NASA-TP-2855; L-16460; NAS 1.60:2855) Avail: NTIS HC A05/MF A01 CSCL 20D
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-2867; L-16477; NAS 1.60:2867) Avail: NTIS HC A04/MF A01 CSCL 20D
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**
ALLAN J. ZUCKERWAR, TRACY K. KING, and KIM CHI NGO (Old Dominion Univ., Norfolk, VA.) Apr. 1989 26 p
(NASA-TP-2894; L-16526; NAS 1.60:2894) Avail: NTIS HC A03/MF A01 CSCL 20D
FUEL CONTAMINATION, GAS-GAS INTERACTIONS, GASEOUS DIFFUSION, HYPERSONIC WIND TUNNELS, LIQUID NITROGEN, LIQUID OXYGEN, PRESSURE EFFECTS

**N89-25409*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
**DETERMINATION OF COMBUSTION GAS TEMPERATURES BY INFRARED RADIOMETRY IN SOOTING AND NONSOOTING FLAMES**
VALERIE J. LYONS and CARMEN M. GRACIA-SALCEDO (Army Aviation Systems Command, Cleveland, OH.) Feb. 1989 13 p (DA PROJ. 1L1-61102-AH-45)
(NASA-TP-2900; E-4446; NAS 1.60:2900; AVSCOM-TR-88-C-008; AD-A205373) Avail: NTIS HC A03/MF A01 CSCL 21/2
COMBUSTION TEMPERATURE, FLAME TEMPERATURE, GAS TEMPERATURE, INFRARED RADIOMETERS, PREMIXED

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. 1988
(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**
MICHAEL E. TAUBER Washington Jul. 1989 38 p
(NASA-TP-2914; A-89042; NAS 1.60:2914) Avail: NTIS HC A03/MF A01 CSCL 20D
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 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**
C. L. PARSONS, ed. Jul. 1989 88 p
(NASA-RP-1226; REPT-89-143; NAS 1.61:1226) Avail: NTIS HC A05/MF A01 CSCL 14B
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.
Author

## 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-POWR LASER SYSTEMS**
L. E. ZAPATA and M. D. WILLIAMS Feb. 1989 13 p
(NASA-TP-2905; L-16085; NAS 1.60:2905) Avail: NTIS HC A03/MF A01 CSCL 20E
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 13I
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 13I
BEARINGS, COMPRESSORS, CONFERENCES, DAMPERS,

DYNAMIC STABILITY, IMPELLERS, MATHEMATICAL MODELS, ROTOR AERODYNAMICS, SEALS (STOPPERS), TURBOMACHINERY

**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-C-010) Avail: NTIS HC A03/MF A01 CSCL 13I
COMPUTERIZED SIMULATION, HELICOPTER PROPELLER DRIVE, OPERATING TEMPERATURE, PERFORMANCE TESTS, ROLLER BEARINGS, THERMAL ANALYSIS, TRANSMISSIONS (MACHINE ELEMENTS), UH-60A HELICOPTER

## 39

## STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

**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 CONTROL COATINGS

**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**
AHMED K. NOOR and JEANNE M. PETERS (Joint Inst. for Advancement of Flight Sciences, Hampton, VA.) Washington, DC Jan. 1989 38 p Original contains color illustrations
(NAG1-730; AF-AFOSR-0136-88)
(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. Lewis 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, CONTROL SURFACES, FLUTTER ANALYSIS

**N89-17298*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
**TURBINE ENGINE HOT SECTION TECHNOLOGY, 1987**
Oct. 1987 464 p Workshop held in Cleveland, OH, 20-21 Oct. 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

**N89-17892*#** 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**
AHMED K. NOOR, JEANNE M. PETERS, and BYUNG-JIN MIN Feb. 1989 28 p Prepared in cooperation with Joint Inst. for Advancement of Flight Sciences, Hampton, VA
(NASA-TP-2868; L-16506; NAS 1.60:2868) Avail: NTIS HC A03/MF A01 CSCL 20K
BEAMS (SUPPORTS), FINITE ELEMENT METHOD, FREE VIBRATION, THIN WALLS

**N89-19580*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**MIXED FORMULATION FOR FRICTIONLESS CONTACT PROBLEMS**
AHMED K. NOOR and KYUN O. KIM 1989 26 p Prepared in cooperation with George Washington Univ., Hampton, VA and Joint Inst. for Advancement of Flight Sciences, Hampton, VA
(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**

Mar. 1989 400 p Colloquium held in San Antonio, TX, 24-28 Apr. 1989
(NASA-CP-3029; NAS 1.55:3029) Avail: NTIS HC A17/MF A01; also available from COSMIC, Athens, GA 30602 CSCL 20K
CONFERENCES, FINITE ELEMENT METHOD, NASTRAN, STRAIN ENERGY METHODS, STRUCTURAL ANALYSIS

**N89-23892*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
**THE 23RD AEROSPACE MECHANISMS SYMPOSIUM**
Washington Mar. 1989 342 p Symposium held in Huntsville, AL, 3-5 May 1989; sponsored by NASA, Washington, California Inst. of Tech., Pasadena, and LMSC, Sunnyvale, CA
(NASA-CP-3032; M-611; NAS 1.55:3032) Avail: NTIS HC A15/MF A01 CSCL 20K
AEROSPACE SYSTEMS, CONFERENCES, DEPLOYMENT, LUBRICANTS, MANIPULATORS, SPACE STATIONS, SPACECRAFT DOCKING, TELEOPERATORS

**N89-24626*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**RESEARCH IN STRUCTURES, STRUCTURAL DYNAMICS AND MATERIALS, 1989**
WILLIAM F. HUNTER, comp. and AHMED K. NOOR, comp. (George Washington Univ., Hampton, VA.) Apr. 1989 88 p Proceedings of the AIAA/ASME/ASCE/AHS/ASC 30th Structures, Structural Dynamics and Materials Conference, Mobile, AL, 3-5 Apr. 1989
(NASA-CP-10024; NAS 1.55:10024) Avail: NTIS HC A05/MF A01 CSCL 20K
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**
W. JEFFERSON STROUD, ed., JERROLD M. HOUSNER, ed., JOHN A. TANNER, ed., and ROBERT J. HAYDUK, ed. Washington May 1989 329 p Workshop held in Hampton, VA, 19-21 Jun. 1985
(NASA-CP-3034-PT-1; L-16560-PT-1; NAS 1.55:3034-PT-1)
Avail: NTIS HC A15/MF A01 CSCL 20K
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**
W. JEFFERSON STROUD, ed., JERROLD M. HOUSNER, ed., JOHN A. TANNER, ed., and ROBERT J. HAYDUK, ed. Washington May 1989 256 p Workshop held in Hampton, VA, 19-21 Jun. 1985
(NASA-CP-3034-PT-2; L-16560-PT-2; NAS 1.55:3034-PT-2)
Avail: NTIS HC A12/MF A01 CSCL 20K
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**
HOWARD E. HINNANT (Army Aviation Systems Command, Hampton, VA.) Aug. 1989 45 p
(DA PROJ. 1L1-62211-A-47-AB)
(NASA-TP-2931; L-16577; NAS 1.60:2931; AVSCOM-TR-B-002)
Avail: NTIS HC A03/MF A01 CSCL 20K
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**
V. VERDERAIME Washington Aug. 1989 28 p
(NASA-TP-2935; NAS 1.60:2935) Avail: NTIS HC A03/MF A01 CSCL 20L
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**
LAWRENCE F. REARDON Jun. 1989 39 p
(NASA-TP-2921; H-1331; NAS 1.60:2921) Avail: NTIS HC A03/MF A01 CSCL 20K
AIRCRAFT CONFIGURATIONS, AIRCRAFT STRUCTURES, CALIBRATING, HIGH TEMPERATURE ENVIRONMENTS, LOAD TESTS, LOW ASPECT RATIO WINGS, STRAIN GAGES, WING LOADING

**N89-29773*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**NASA WORKSHOP ON COMPUTATIONAL STRUCTURAL MECHANICS 1987, PART 1**
NANCY P. SYKES, ed. (Analytical Services and Materials, Inc., Hampton, VA.) Feb. 1989 383 p Workshop held in Hampton, VA, 18-20 Nov. 1987; sponsored by NASA, Langley Research Center, Hampton, VA, and NASA, Lewis Research Center, Cleveland, OH
(NASA-CP-10012-PT-1; NAS 1.55:10012-PT-1) Avail: NTIS HC A17/MF A01 CSCL 20K
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**
NANCY P. SYKES, ed. (Analytical Services and Materials, Inc., Hampton, VA.) Feb. 1989 374 p Workshop held in Hampton, VA, 18-20 Nov. 1987; sponsored by NASA, Langley Research Center, Hampton, VA, and NASA, Lewis Research Center, Cleveland, OH
(NASA-CP-10012-PT-2; NAS 1.55:10012-PT-2) Avail: NTIS HC A16/MF A01 CSCL 20K
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**
NANCY P. SYKES, ed. (Analytical Services and Materials, Inc., Hampton, VA.) Feb. 1989 419 p Workshop held in Hampton, VA, 18-20 Nov. 1987; sponsored by NASA, Langley Research Center, Hampton, VA, and NASA, Lewis Research Center, Cleveland, OH
(NASA-CP-10012-PT-3; NAS 1.55:10012-PT-3) Avail: NTIS HC A18/MF A01 CSCL 20K
COMPUTER TECHNIQUES, CONFERENCES, FINITE ELEMENT METHOD, LARGE SPACE STRUCTURES, SOFTWARE ENGINEERING, STRUCTURAL ANALYSIS

**N89-29811*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**APPLICATION 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 A03/MF A01 CSCL 20K

BUCKLING, CYLINDRICAL SHELLS, DEFORMATION, LOADS (FORCES), NEWTON METHODS, RING STRUCTURES, STRUCTURAL FAILURE

# 42

# GEOSCIENCES (GENERAL)

**N89-22152*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**NIMBUS-7 DATA PRODUCT SUMMARY**
ARNOLD G. OAKES, DAESOO HAN, H. LEE KYLE, GENE CARL FELDMAN, ALBERT J. FLEIG, EDWARD J. HURLEY, and BARBARA A. KAUFMAN (General Sciences Corp., Laurel, MD.) Feb. 1989 103 p
(NAS5-29386)
(NASA-RP-1215; REPT-89B00074; NAS 1.61:1215) Avail: NTIS HC A06/MF A01 CSCL 04A

Data sets resulting from the first nine years of operations of the Nimbus-7 Satellite are briefly described. After a brief description of the Nimbus-7 Mission, each of the eight experiments on-board the satellite (Coastal Zone Color Scanner (CZCS), Earth Radiation Budget (ERB), Limb Infrared Monitor of the Stratosphere (MIMS), Stratospheric Aerosol Measurement II (SAM II), Stratospheric and Mesospheric Sounder (SAMS), Solar Backscatter Ultraviolet/Total Ozone Mapping Spectrometer (SBUV/TOMS), Scanning Multichannel Microwave Radiometer (SMMR) and the Temperature Humidity Infrared Radiometer (THIR) are introduced and their respective data products are described in terms of media, general format, and suggested applications. Extensive references are provided. Instructions for obtaining further information, and for ordering data products are given. Author

**N89-26274*#** National Aeronautics and Space Administration, Washington, DC.
**PLANETARY GEOSCIENCES, 1988**
MARIA T. ZUBER, ed., JEFF L. PLESCIA, ed., ODETTE B. JAMES, ed., and GLENN MACPHERSON, ed. (Smithsonian Institution, Washington, DC.) Aug. 1989 113 p Original contains color illustrations
(NASA-SP-498; NAS 1.21:498; LC-88-600456) Avail: NTIS HC A06/MF A01 CSCL 08G

Research topics within the NASA Planetary Geosciences Program are presented. Activity in the fields of planetary geology, geophysics, materials, and geochemistry is covered. The investigator's current research efforts, the importance of that work in understanding a particular planetary geoscience problem, the context of that research, and the broader planetary geoscience effort is described. As an example, theoretical modelling of the stability of water ice within the Martian regolith, the applicability of that work to understanding Martian volatiles in general, and the geologic history of Mars is discussed. Author

**N89-26275*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**POLAR MICROWAVE BRIGHTNESS TEMPERATURES FROM NIMBUS-7 SMMR: TIME SERIES OF DAILY AND MONTHLY MAPS FROM 1978 TO 1987**
JOSEFINO C. COMISO and H. JAY ZWALLY Jul. 1989 89 p
(NAS5-29386)
(NASA-RP-1223; REPT-89B00167; NAS 1.61:1223) Avail: NTIS HC A05/MF A01 CSCL 04A

A time series of daily brightness temperature gridded maps (October 25, 1978 through August 15, 1987) were generated from all ten channels of the Nimbus-7 Scanning Multichannel Microwave Radiometer orbital data. This unique data set can be utilized in a wide range of applications including heat flux, ocean circulation, ice edge productivity, and climate studies. Two sets of data in polar stereographic format are created for the Arctic region: one with a grid size of about 30 km on a 293 by 293 array similar to that previously utilized for the Nimbus-5 Electrically Scanning Microwave Radiometer, while the other has a grid size of about 25 km on a 448 by 304 array identical to what is now being used for the DMSP Scanning Multichannel Microwave Imager. Data generated for the Antaractic region are mapped using the 293 by 293 grid only. The general technique for mapping, and a quality assessment of the data set are presented. Monthly and yearly averages are also generated from the daily data and sample geophysical ice images and products derived from the data are given. Contour plots of monthly ice concentrations derived from the data for October 1978 through August 1987 are presented to demonstrate spatial and temporal detail which this data set can offer, and to show potential research applications. Author

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# 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**
ALAN D. HOWARD, ed., R. CRAIG KOCHEL, ed., and HENRY E. HOLT, ed. (Geological Survey, Flagstaff, Ariz.) 1987 115 p Original contains color illustrations
(NSG-7572)
(NASA-SP-491; NAS 1.21:491; LC-87-15305) Avail: NTIS HC A06/MF A01; also available SOD HC $6.00 as 003-000-01027-3 CSCL 08H

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

**N89-12114*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**LANDSAT-4 AND LANDSAT-5 MULTISPECTRAL SCANNER COHERENT NOISE CHARACTERIZATION AND REMOVAL**
JAMES C. TILTON and WILLIAM L. ALFORD (Defense Mapping Agency, Washington, D.C.) Feb. 1988 46 p
(NASA-TP-2595-REV; NAS 1.60:2595-REV; REPT-86B0040)
Avail: NTIS HC A03/MF A01 CSCL 08B

COHERENT ELECTROMAGNETIC RADIATION, ELECTROMAGNETIC NOISE, LANDSAT 4, LANDSAT 5, MULTISPECTRAL BAND SCANNERS, NOISE REDUCTION

**N89-29825*** National Aeronautics and Space Administration, Washington, DC.
**EARTH RESOURCES: A CONTINUING BIBLIOGRAPHY WITH INDEXES (ISSUE 62)**
Nov. 1988 146 p

(NASA-SP-7041(62); NAS 1.21:7041(62)) Avail: NTIS HC A07; NTIS standing order as PB89-903800, $15.50 domestic, $31.00 foreign CSCL 08B

This bibliography lists 544 reports, articles, and other documents introduced into the NASA scientific and technical information system between April 1 and June 30, 1989. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, hydrology and water management, data processing and distribution systems, instrumentation and sensors, and economic analysis. Author

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## ENERGY PRODUCTION AND CONVERSION

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

**N89-22982*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
**SPACE ELECTROCHEMICAL RESEARCH AND TECHNOLOGY CONFERENCE: ABSTRACTS Abstracts Only**
Washington 1989 49 p Conference held in Cleveland, OH, 11-13 Apr. 1989
(NASA-CP-10029; E-4708; NAS 1.55:10029) Avail: NTIS HC A03/MF A01 CSCL 10A

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

**N89-24704*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
**SPACE PHOTOVOLTAIC RESEARCH AND TECHNOLOGY, 1988. HIGH EFFICIENCY, SPACE ENVIRONMENT, AND ARRAY TECHNOLOGY**
Washington Apr. 1989 362 p Conference held in Cleveland, OH, 19-21 Apr. 1988
(NASA-CP-3030; E-4587; NAS 1.55:3030) Avail: NTIS HC A16/MF A01 CSCL 10A

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

## 45

## ENVIRONMENT POLLUTION

Includes atmospheric, noise, thermal, and water pollution.

**N89-14503*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**POLAR OZONE WORKSHOP. ABSTRACTS**
ARTHUR C. AIKIN May 1988 306 p Workshop held in Snowmass, CO, 9-13 May 1988; sponsored by NASA, NOAA, NSF, Chemical Mfgrs. Association, WMO, and the United Nations Environment Program Sponsored by NASA, Washington, DC
(NASA-CP-10014; REPT-88B0234; NAS 1.55:10014) Avail: NTIS HC A14/MF A01 CSCL 13B

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.
**COMPILATION OF METHODS IN ORBITAL MECHANICS AND SOLAR GEOMETRY**
JAMES J. BUGLIA Washington Oct. 1988 81 p
(NASA-RP-1204; L-16451; 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

**N89-25540*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**COMPARISON OF SATELLITE-DERIVED DYNAMICAL QUANTITIES FOR THE STRATOSPHERE OF THE SOUTHERN HEMISPHERE**
THOMAS MILES, ed. and ALAN ONEILL, ed. Washington Jul. 1989 39 p Presented at the Workshop on the Middle Atmosphere in the Southern Hemisphere, Williamsburg, VA, 14-17 Apr. 1986; sponsored by NASA, Washington, DC
(NASA-CP-3044; L-16593; NAS 1.55:3044) Avail: NTIS HC A03/MF A01 CSCL 04A

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

**N89-26304*#** Oxford Univ. (England). Dept. of Atmospheric Physics.
**NIMBUS-7 STRATOSPHERIC AND MESOSPHERIC SOUNDER (SAMS) EXPERIMENT DATA USER'S GUIDE**
F. W. TAYLOR, C. D. RODGERS, S. T. NUTTER, and N. OSLIK (ST Systems Corp., Lanham, MD.) Washington May 1989 149 p
(NAS5-28063)
(NASA-RP-1221; NAS 1.61:1221; REPT-89B00074) Avail: NTIS HC A07/MF A01 CSCL 08G

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 grid extending from 67.5 degrees N to 50 degrees S. The zonal mean methane and nitrous oxide composition tape (ZMT-G) contains zonal mean day and night average CH4 and N2O mixing ratios at 31 pressure levels for 2.5 degrees latitude zones extending from 67.5 degrees N to 50 degrees S. Author

**N89-28969*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**A HIGH-RESOLUTION ATLAS OF THE INFRARED SPECTRUM OF THE SUN AND THE EARTH ATMOSPHERE FROM SPACE. A COMPILATION OF ATMOS SPECTRA OF THE REGION FROM 650 TO 4800 CM-1 (2.3 TO 16 MICRONS). VOLUME 2: STRATOSPHERE AND MESOSPHERE, 650 TO 3350 CM-1**
CROFTON B. FARMER and ROBERT H. NORTON Washington 1989 688 p
(NAS7-918)
(NASA-RP-1224-VOL-2; JPL-400-370-VOL-2; NAS 1.61:1224-VOL-2; LC-89-600203) Avail: NTIS HC A99/MF E03 CSCL 04A

During the period April 29 to May 2, 1985, the Atmospheric Trace Molecule Spectroscopy (ATMOS) experiment was operated for the first time, as part of the Spacelab-3 payload of the shuttle Challenger. The principal purpose of this experiment was to study the distributions of the atmosphere's minor and trace molecular constituents. The instrument, a modified Michelson interferometer covering the frequency range from 600 to 5000/cm-1 at a spectral resolution of 0.01/cm-1, recorded infrared absorption spectra of the sun and of the earth's atmosphere at times close to entry into and exit from occultation by the earth's limb. Spectra were obtained that are free from absorptions due to constituents of the atmosphere (i.e., they are pure solar spectra), as well as spectra of the atmosphere itself, covering line-of-sight tangent altitudes that span the range from the lower thermosphere to the bottom of the troposphere. This atlas presents a compilation of these spectra arranged in a hardcopy format suitable for quick-look reference purposes. Volume 2 covers the stratosphere and mesosphere (i.e., tangent altitudes from 20 to 80 km) for frequencies from 650 to 3350/cm-1. Author

# 47

# METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

**N89-14634*#** National Aeronautics and Space Administration, Washington, DC.
**SUMMARY OF ALONG-TRACK DATA FROM THE EARTH RADIATION BUDGET SATELLITE FOR SEVERAL REPRESENTATIVE OCEAN REGIONS**
DAVID R. BROOKS and MARTA A. FENN (Planning Research Corp., Hampton, Va.) Nov. 1988 216 p
(NASA-RP-1206; L-16449; NAS 1.61:1206) Avail: NTIS HC A10/MF A01 CSCL 04B

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 overflight 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 radiance in each scene classification as a function of viewing zenity angle during each overflight 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. Author

**N89-14648*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**USER'S GUIDE FOR THE NIMBUS 7 SCANNING MULTICHANNEL MICROWAVE RADIOMETER (SMMR) CELL-ALL TAPE**
C. C. CU, D. HAN, S. T. KIM (ST Systems Corp., Lanham, Md.), and P. GLOERSEN Oct. 1988 152 p
(NAS5-29386)
(NASA-RP-1210; REPT-88-181; NAS 1.61:1210) Avail: NTIS HC A08/MF A01 CSCL 04B

The SMMR instrument onboard the Nimbus-7 satellite has been in operation since October 1978. It provided global coverage of passive microwave observations at 6.6, 10.7, 18, 21, and 37 GHz. The oberved 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. Author

**N89-17374*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**LIMB-DARKENING FUNCTIONS AS DERIVED FROM ALONG-TRACK OPERATION OF THE ERBE SCANNING RADIOMETER FOR JANUARY 1985**
G. LOUIS SMITH, NATIVIDAD MANALO, JOHN T. SUTTLES, and IRA WALKER (Planning Research Corp., Hampton, VA.) Washington, DC Mar. 1989 26 p
(NASA-RP-1214; L-16487; NAS 1.61:1214) Avail: NTIS HC A03/MF A01 CSCL 04B

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 exitance. 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. Author

**N89-20587*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**ANGULAR RADIATION MODELS FOR EARTH-ATMOSPHERE SYSTEM. VOLUME 2: LONGWAVE RADIATION**
J. T. SUTTLES, R. N. GREEN, G. L. SMITH, B. A. WIELICKI, I. J. WALKER, V. R. TAYLOR, and L. L. STOWE (National Oceanic and Atmospheric Administration, Washington, DC.) Apr. 1989 88 p
(NASA-RP-1184-VOL-2; L-16503; NAS 1.61:1184-VOL-2) Avail: NTIS HC A05/MF A01 CSCL 04B

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. Author

**N89-20588*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**AN ASSESSMENT MODEL FOR ATMOSPHERIC COMPOSITION**
MICHAEL J. PRATHER, ed. Jan. 1988 56 p Proceedings of a workshop held at NASA Goddard Inst. for Space Studies, New York, NY, 10-13 Jan. 1988
(NASA-CP-3023; REPT-89-31; NAS 1.55:3023) Avail: NTIS HC A04/MF A01 CSCL 04B
AIR QUALITY, ATMOSPHERIC COMPOSITION, EARTH ATMOSPHERE, ENVIRONMENTAL MONITORING, PHOTOCHEMICAL OXIDANTS

**N89-27302*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**THE 1989 AIRBORNE ARCTIC STRATOSPHERIC EXPEDITION NIMBUS-7 TOMS DATA ATLAS**
ARLIN J. KRUEGER, LANNING M. PENN, DAVID E. LARKO, SCOTT D. DOIRON, and PATRICIA T. GUIMARAES (ST Systems Corp., Vienna, VA.) Washington Jul. 1989 154 p
(NAS5-29373)
(NASA-RP-1227; REPT-89B00188; NAS 1.61:1227) Avail: NTIS HC A08/MF A01 CSCL 04B
Over the past several years, world scientific attention was focused on the rapid and unanticipated decrease in the abundance of ozone over Antarctica during the Austral spring. A major aircraft campaign was conducted from December 1988 to February 1989 in response to the recently published Ozone Trends Panel Report which found that the largest decreases in Arctic ozone occurred during January to February at latitudes near the edge of the Arctic vortex. This atlas provides a complete set of TOMS ozone measurements over Europe and the North Atlantic for the duration of the experiment. These were the orbital TOMS measurements provided to the experimenters in near-real-time. In addition, a set of Northern Hemisphere TOMS ozone measurements for the period December 26, 1988 to March 20, 1989 is presented. A comparison of January and February 1989 mean ozone values to prior years is also presented. Author

**N89-28983*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**THE 1988 ANTARCTIC OZONE MONITORING NIMBUS-7 TOMS DATA ATLAS**
ARLIN J. KRUEGER, LANNING M. PENN, DAVID E. LARKO, SCOTT D. DOIRON, and PATRICIA T. GUIMARAES (ST Systems Corp., Vienna, VA.) Aug. 1989 153 p
(NAS5-29375)
(NASA-RP-1225; REPT-89B00176; NAS 1.61:1225) Avail: NTIS HC A08/MF A01 CSCL 04B
Because of the great environmental significance of ozone and to support continuing research at McMurdo, Syowa, and other Southern Hemisphere stations, the development of the 1988 ozone hole was monitored using data from the Nimbus-7 Total Ozone Mapping Spectrometer (TOMS) instrument, produced in near-real-time. This Atlas provides a complete set of daily polar orthographic projections of the TOMS total ozone measurements over the Southern Hemisphere for the period August 1 through November 17, 1988. Although total ozone in mini-holes briefly dropped below 150 DU in late August, the main ozone hole is seen to be much less pronounced than in 1987. Minimum values, observed in late September and early October 1988, were seldom 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 is displaced from the South Pole, opposing a persistent maximum with values consistently above 500 DU. Daily ozone values above selected Southern Hemisphere stations are presented, along with comparisons of the 1988 ozone distribution to that of other years. Author

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## LIFE SCIENCES (GENERAL)

**N89-17997*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
**PROCEEDINGS OF A CONFERENCE ON CARDIOVASCULAR BIOINSTRUMENTATION**
RODNEY W. BALLARD, CHARLES A. FULLER, RICHARD MAINS, and HERBERT J. FINGER Dec. 1988 71 p Conference held at Moffett Field, CA, 21-22 Jul. 1987
(NASA-CP-10022; A-88120; NAS 1.55:10022) Avail: NTIS HC A04/MF A01 CSCL 06C
BIOINSTRUMENTATION, CARDIOVASCULAR SYSTEM, CONFERENCES, GROUND SUPPORT SYSTEMS, MANNED SPACE FLIGHT

**N89-24022*#** General Electric Co., Moffett Field, CA.
**GAS-GRAIN SIMULATION FACILITY: FUNDAMENTAL STUDIES OF PARTICLE FORMATION AND INTERACTIONS. VOLUME 1: EXECUTIVE SUMMARY AND OVERVIEW**
GUY FOGLEMAN, ed., JUDITH L. HUNTINGTON, ed. (Search for Extraterrestrial Intelligence Inst., Los Altos, CA.), DEBORAH E. SCHWARTZ, ed., and MARK L. FONDA, ed. Mar. 1989 38 p Presented at the Gas-Grain Simulation Facility Experiments Workshop, Sunnyvale, CA, 31 Aug. - 1 Sep. 1987; sponsored by the Exobiology Flight Program
(NASA-CP-10026-VOL-1; A-88256-VOL-1; NAS 1.55:10026-VOL-1) Avail: NTIS HC A03/MF A01 CSCL 06C
AEROSOLS, CLOUDS, COSMIC DUST, GRAINS, GRAVITATIONAL EFFECTS, NUCLEATION, PARTICLE INTERACTIONS, PARTICLES, PARTICULATES, REDUCED GRAVITY, SPACE LABORATORIES, SPACE STATION PAYLOADS, SPACEBORNE EXPERIMENTS

**N89-24023*#** General Electric Co., Moffett Field, CA.
**GAS-GRAIN SIMULATION FACILITY: FUNDAMENTAL STUDIES OF PARTICLE FORMATION AND INTERACTIONS. VOLUME 2: ABSTRACTS, CANDIDATE EXPERIMENTS AND FEASIBILITY STUDY**
GUY FOGLEMAN, ed., JUDITH L. HUNTINGTON, ed. (Search for Extraterrestrial Intelligence Inst., Los Altos, CA.), DEBORAH E. SCHWARTZ, ed., and MARK L. FONDA, ed. Mar. 1989 199 p Presented at the Gas-Grain Simulation Facility Experiments Workshop, Sunnyvale, CA, 31 Aug. - 1 Sep. 1987; sponsored by the Exobiology Flight Program
(NASA-CP-10026-VOL-2; A-88256-VOL-2; NAS 1.55:10026-VOL-2) Avail: NTIS HC A09/MF A01 CSCL 06C
AEROSOLS, CLOUDS, COSMIC DUST, GRAINS, PARTICLE INTERACTIONS, PARTICLES, PARTICULATES, REDUCED GRAVITY, SPACEBORNE EXPERIMENTS

**N89-26334*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
**EXOBIOLOGY AND FUTURE MARS MISSIONS**
CHRISTOPHER P. MCKAY, ed. and WANDA DAVIS, L., ed. Washington Mar. 1989 73 p Workshop held in Sunnyvale, CA, Mar. 1988
(NASA-CP-10027; A-89098; NAS 1.55:10027) Avail: NTIS HC A04/MF A01 CSCL 03B
BIOLOGICAL EVOLUTION, CHEMICAL EVOLUTION, CONFERENCES, ECOLOGY, EXOBIOLOGY, FOSSILS, MARS SAMPLE RETURN MISSIONS, SOILS

## 52

## AEROSPACE MEDICINE

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

**N89-29951*** National Aeronautics and Space Administration, Washington, DC.
**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 CSCL 06E

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. Author

## 54

## MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

**N89-13898*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
**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

**N89-18039*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
**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

## 59

## MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

**N89-19817*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
**SECOND ANNUAL WORKSHOP ON SPACE OPERATIONS AUTOMATION AND ROBOTICS (SOAR 1988)**
SANDY GRIFFIN, ed./comp. Washington, DC Nov. 1988 517 p Workshop held in Dayton, OH, 20-23 Jul. 1988; sponsored by NASA, Johnson Space Flight Center, USAF, Washington, DC, and Wright State Univ., Dayton, OH
(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**
L. BERNARD GARRETT, ROBERT L. WRIGHT, DEBORAH BADI, and JOHN T. FINDLAY (Flight Mechanics and Control, Inc., Hampton, Va.) Aug. 1988 146 p Workshop held in Hampton, Va., 21-22 Jun. 1988 Sponsored by NASA, Washington, D.C.
(NASA-CP-10013; NAS 1.55:10013) Avail: NTIS HC A07/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**
JAG J. SINGH, GERALD H. MALL (Computer Sciences Corp., Hampton, Va.), and DANNY R. SPRINKLE Dec. 1988 61 p
(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**
STEPHEN L. ODELL, comp., JUDITH S. DENTON, comp., and MARY VEREEN, comp. Oct. 1988 485 p Conference held in Huntsville, AL, 15-16 Nov. 1988; sponsored by NASA and Alabama Univ., Huntsville
(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**
H. K. RAMAPRIYAN, ed. Washington, DC Feb. 1989 448 p Workshop held in Snowbird, UT, 3-5 May 1988; sponsored by

NASA, Washington
(NASA-CP-3025; REPT-89B0038; 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, Inc., Hampton, VA.) Washington Jul. 1989 40 p
(NASA-TP-2915; L-16529; NAS 1.60:2915) Avail: NTIS HC A03/MF A01 CSCL 09B
COMPUTER PROGRAMS, COMPUTER TECHNIQUES, 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-89B00099; NAS 1.55:3033) Avail: NTIS HC A17/MF A01 CSCL 09B
ARTIFICIAL INTELLIGENCE, COMPUTER VISION, COMPUTERIZED SIMULATION, CONFERENCES, DATA MANAGEMENT, EXPERT SYSTEMS, FAILURE ANALYSIS, IMAGE PROCESSING, MISSION PLANNING

## 64

## NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

**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

**N89-16415*#** 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-16485; 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.

**N89-16437*#** National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Facility, Edwards, CA.
**USER'S MANUAL FOR INTERACTIVE LINEAR: 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 MANUALS (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**
R. A. GORDON Washington, D.C. Mar. 1988 46 p
(NASA-TP-2811; REPT-86B0451; NAS 1.60:2811) Avail: NTIS HC A03/MF A01 CSCL 12A
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**
JOHN W. NORBURY, PHILIP A. DEUTCHMAN, LAWRENCE W. TOWNSEND, and FRANCIS A. CUCINOTTA (Old Dominion Univ., Norfolk, Va.) Nov. 1988 23 p
(NSF PHY-84-11009)
(NASA-TP-2843; L-16463; NAS 1.60:2843) Avail: NTIS HC A03/MF A01 CSCL 20C
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**
THOMAS F. BROOKS, D. STUART POPE (PRC Kentron, Inc., Hampton, VA.), and MICHAEL A. MARCOLINI Jul. 1989 145 p
(NASA-RP-1218; L-16528; NAS 1.61:1218) Avail: NTIS HC A07/MF A01 CSCL 20A
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

## 72

## ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure, electron properties, and molecular spectra.

**N89-30022*#** National Aeronautics and Space Administration. Langley Research Center, Hampton, VA.
**AUGER ELECTRON INTENSITY VARIATIONS IN OXYGEN-EXPOSED LARGE GRAIN POLYCRYSTALLINE SILVER**
W. S. LEE, R. A. OUTLAW, G. B. HOFLUND, and M. R. DAVIDSON (Florida Univ., Gainesville.) 1989 18 p
(NASA-TP-2930; L-16579; NAS 1.60:2930) Avail: NTIS HC A03/MF A01 CSCL 20H
AUGER SPECTROSCOPY, CRYSTALLOGRAPHY, ELECTRON FLUX DENSITY, OXYGEN RECOMBINATION, POLYCRYSTALS, SILVER

## 75

## PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

**N89-14842*#** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, OH.
**LUNAR HELIUM-3 AND FUSION POWER**
Washington, DC Sep. 1988 234 p Workshop held in Cleveland, Ohio, 25-26 Apr. 1988
(NASA-CP-10018; E-4254; NAS 1.55:10018) Avail: NTIS HC A11/MF A01 CSCL 20I
HELIUM ISOTOPES, LUNAR SOIL, MINING, NUCLEAR FUSION, REGOLITH

## 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**
FRANCIS T. HOBAN, ed. Oct. 1988 51 p
(NASA-SP-6101; NAS 1.21:6101) Avail: NTIS HC A04/MF A01 CSCL 05A
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 viewpoints 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.
**NASA THESAURUS. VOLUME 3: DEFINITIONS**
Jul. 1988 148 p
(NASA-SP-7064-VOL-3; NAS 1.21:7064-VOL-3) Avail: NTIS HC A07 CSCL 05B

Publication of NASA Thesaurus definitions began with Supplement 1 to the 1985 NASA Thesaurus. The definitions given here represent the complete file of over 3,200 definitions, complimented by nearly 1,000 use references. Definitions of more common or general scientific terms are given a NASA slant if one exists. Certain terms are not defined as a matter of policy: common names, chemical elements, specific models of computers, and nontechnical terms. The NASA Thesaurus predates by a number of years the systematic effort to define terms, therefore not all Thesaurus terms have been defined. Nevertheless, definitions of older terms are continually being added. The following data are provided for each entry: term in uppercase/lowercase form, definition, source, and year the term (not the definition) was added to the NASA Thesaurus. The NASA History Office is the authority for capitalization in satellite and spacecraft names. Definitions with no source given were constructed by lexicographers at the NASA Scientific and Technical Information (STI) Facility who rely on the following sources for their information: experts in the field, literature searches from the NASA STI database, and specialized references. Author

**N89-15779*#** National Aeronautics and Space Administration, Washington, DC.
**THE NASA SCIENTIFIC AND TECHNICAL INFORMATION SYSTEM: ITS SCOPE AND COVERAGE**
Dec. 1988 216 p
(NASA-SP-7065; NAS 1.21:7065) Avail: NTIS HC A10/MF A01 CSCL 05B

A general description of the subject areas covered in the NASA scientific and technical information system is presented. In addition, it establishes subject-based selection criteria for guiding decisions related to the addition of new documents to the NASA collection. Author

**N89-25775*** National Aeronautics and Space Administration, Washington, DC.
**NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY. SECTION 1: ABSTRACTS (SUPPLEMENT 35)**
Jun. 1989 38 p
(NASA-SP-7039(35)-SECT-1; NAS 1.21:7039(35)-SECT-1) Avail: NTIS HC A03; NTIS standing order as PB89-911100, $13.75 domestic, $27.50 foreign CSCL 05B

Abstracts are provided for 58 patents and patent applications entered into the NASA scientific and technical information systems during the period January 1989 through June 1989. Each entry consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or patent application. Author

**N89-29264*** National Aeronautics and Space Administration, Washington, DC.
**PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY. SECTION 2: INDEXES (SUPPLEMENT 35)**
Jan. 1989 512 p
(NASA-SP-7039(35)-SECT-2; NAS 1.21:7039(35)-SECT-2) Avail: NTIS HC A22; NTIS standing order as PB89-911100, $29.00 domestic, $58.00 foreign CSCL 05B

A subject index is provided for over 4600 patents and patent applications for the period May 1969 through June 1989. Additional indexes list personal authors, corporate authors, contract numbers, NASA case numbers, U.S. patent class numbers, U.S. patent numbers, and NASA accession numbers. Author

## 88

## SPACE SCIENCES (GENERAL)

**N89-14188*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
**REPORT OF THE IN SITU RESOURCES UTILIZATION WORKSHOP**
KYLE FAIRCHILD, ed. and WENDELL W. MENDELL, ed. Nov. 1988 85 p Workshop held in Lake Buena Vista, Fla., 28-30 Jan. 1987; sponsored by NASA, DOE, Large Scale Programs Inst., United Technologies Corp., Kraft Foods and Disney Imagineering
(NASA-CP-3017; S-581; NAS 1.55:3017) Avail: NTIS HC A05/MF A01 CSCL 03B

LUNAR EXPLORATION, SPACE COMMERCIALIZATION, SPACE HABITATS, TECHNOLOGY ASSESSMENT

**N89-14189*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
**REMOTE SENSING IN POLARIZED LIGHT**
VICTOR S. WHITEHEAD and KINSELL L. COULSON (California Univ., Davis.) Oct. 1988 40 p Proceedings of Workshop held in Houston, Tex., 3-5 Nov. 1987
(NASA-CP-3014; S-577; NAS 1.55:3014) Avail: NTIS HC A03/MF A01 CSCL 05B

CAMERAS, EARTH OBSERVATIONS (FROM SPACE), IMAGING TECHNIQUES, POLARIZATION (WAVES), RADIATIVE TRANSFER, SPACE SHUTTLE PAYLOADS

**N89-14998*#** National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.
**EXPERIMENTS IN PLANETARY AND RELATED SCIENCES AND THE SPACE STATION**
RONALD GREELEY, ed. (Arizona State Univ., Tempe.) and RICHARD J. WILLIAMS, ed. Washington, DC Nov. 1987 188 p Workshop held in Tempe, AZ, 15-16 Sep. 1986
(NCC9-14; NAS9-17023)
(NASA-CP-2494; S-566; NAS 1.55:2494) Avail: NTIS HC A09/MF A01 CSCL 03B

ASTROPHYSICS, CONFERENCES, INTERSTELLAR CHEMISTRY, PARTICLE INTERACTIONS, ROBOTICS, SPACE STATION PAYLOADS, SPACEBORNE EXPERIMENTS

**N89-15790*#** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, AL.
**SPACE STATION INDUCED MONITORING**
JAMES F. SPANN, ed. and MARSHA R. TORR, ed. Washington, DC Nov. 1988 85 p Conference held in Huntsville, AL, 10-11 May 1988 Sponsored by NASA, Washington
(NASA-CP-3021; M-602; NAS 1.55:3021) Avail: NTIS HC A05/MF A01 CSCL 22B

AEROSPACE ENVIRONMENTS, ENVIRONMENTAL MONITORING, SPACE STATIONS, SPACECRAFT CHARGING

# 89

## ASTRONOMY

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

**N89-11657*#** National Aeronautics and Space Administration, Washington, DC.
**O STARS AND WOLF-RAYET STARS**
PETER S. CONTI, ANNE B. UNDERHILL, STUART JORDAN, ed., and RICHARD THOMAS, 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 efforts of stellar radiation and wind on the immediate interstellar environment are presented. B.G.

**N89-12513*** National Aeronautics and Space Administration, Washington, DC.
**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 surface brightness, the choice of field position is crucial for programs involving resolution of particular galaxies into stars. The purpose of this atlas is to facilitate this choice. Enough information is given herein (coordinates of the galaxy centers and the scale of the photography) to allow optimum placement of the HST wide-field planetary camera format of approximately 150 arc-seconds on a side. Author

**N89-13310*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
**SECOND WORKSHOP ON IMPROVEMENTS TO PHOTOMETRY**
WILLIAM J. BORUCKI, ed. Sep. 1988 314 p Workshop held in Gaithersburg, Md., 5-6 Oct. 1987; sponsored by NASA, Ames Research Center, Moffett Field, Calif. and NBS, Gaithersburg, Md.
(NASA-CP-10015; A-88125; NAS 1.55:10015) Avail: NTIS HC A14/MF A01 CSCL 03A

ASTRONOMICAL PHOTOMETRY, CONFERENCES, FIBER OPTICS, PHOTOMETERS

**N89-13330*#** National Aeronautics and Space Administration, Washington, DC.
**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 Workshop held at Ithaca, N.Y., 10-12 Aug. 1987
(NASA-CP-3004; NAS 1.55:3004) 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 Center, Houston, TX.
**FUTURE ASTRONOMICAL OBSERVATORIES ON THE MOON**
JACK O. BURNS, ed. (New Mexico Univ., Albuquerque.) and WENDELL W. MENDELL, ed. Washington, DC Mar. 1988 129 p Workshop held in Houston, TX, 10 Jan. 1986; sponsored by NASA, Johnson Space Flight Center, Houston, TX and American Astronomical Society, Washington, DC
(NASA-CP-2489; S-569; NAS 1.55:2489) Avail: NTIS HC A07/MF A01 CSCL 03A

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

# 90

## ASTROPHYSICS

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

**N89-14194*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**INFRARED ASTRONOMICAL SATELLITE (IRAS) CATALOGS AND ATLASES. VOLUME 1: EXPLANATORY SUPPLEMENT**
C. A. BEICHMAN, ed., G. NEUGEBAUER, ed., H. J. HABING, ed., P. E. CLEGG, ed., and THOMAS J. CHESTER, ed. (California Inst. of Tech., Pasadena.) Washington, D.C. 1988 455 p Prepared in cooperation with Netherlands Agency for Aerospace Programs, Delft, and Science Research Council, London, United Kingdom Sponsored by NASA, Washington
(NASA-RP-1190-VOL-1; NAS 1.61:1190-VOL-1) Avail: NTIS HC A20/MF A01; also available SOD CSCL 03B

The Infrared Astronomical Satellite (IRAS) was launched on January 26, 1983. During its 300-day mission, IRAS surveyed over 96 pct 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 data reduction. Author

**N89-14195*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**INFRARED ASTRONOMICAL SATELLITE (IRAS) CATALOGS AND ATLASES. VOLUME 5: THE POINT SOURCE CATALOG DECLINATION RANGE -30 DEG GREATER THAN DELTA GREATER THAN -50 DEG**
Washington, D.C. 1988 410 p Prepared in cooperation with Netherlands Agency for Aerospace Programs, Delft, and Science Research Council, London, United Kingdom Sponsored by NASA, Washington
(NASA-RP-1190-VOL-5; NAS 1.61:1190-VOL-5) Avail: NTIS HC A18/MF A01; also available SOD CSCL 03B

The Infrared Astronomical Satellite (IRAS) was launched January 26, 1983. During its 300-day mission, IRAS surveyed over 96 pct of the celestial sphere at four infrared wavelengths, centered approximately at 12, 25, 60, and 100 microns. This is Volume 5, The Point Source Catalog Declination Range -30 deg greater than delta greater than -50 deg. Author

**N89-14196*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**INFRARED ASTRONOMICAL SATELLITE (IRAS) CATALOGS AND ATLASES. VOLUME 4: THE POINT SOURCE CATALOG DECLINATION RANGE 0 DEG GREATER THAN DELTA GREATER THAN -30 DEG**
Washington, D.C. 1988 596 p Prepared in cooperation with Netherlands Agency for Aerospace Programs, Delft, and Science Research Council, London, United Kingdom Sponsored by NASA, Washington
(NASA-RP-1190-VOL-4; NAS 1.61:1190-VOL-4) Avail: NTIS HC A25/MF A01; also available SOD CSCL 03B

The Infrared Astronomical Satellite (IRAS) was launched 26 January 1983. During its 300-day mission, it surveyed over 96 pct of the celestial sphere at four infrared wavelengths, centered approximately at 12, 25, 60, and 100 microns. This is Volume 4, The Point Source Catalog Declination Range 0 deg greater than delta greater than -30 deg. Author

**N89-14197*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**INFRARED ASTRONOMICAL SATELLITE (IRAS) CATALOGS AND ATLASES. VOLUME 2: THE POINT SOURCE CATALOG DECLINATION RANGE 90 DEG GREATER THAN DELTA GREATER THAN 30 DEG**
Washington, D.C. 1988 555 p Prepared in cooperation with Netherlands Agency for Aerospace Programs, Delft, and Science Research Council, London, United Kingdom Sponsored by NASA, Washington
(NASA-RP-1190-VOL-2; NAS 1.61:1190-VOL-2) Avail: NTIS HC A24/MF A01; also available SOD CSCL 03B

The Infrared Astronomical Satellite (IRAS) was launched January 26, 1983. During its 300-day mission, IRAS surveyed 96 pct of the celestial sphere at four infrared wavelengths, centered approximately at 12, 25, 60, and 100 microns. This is Volume 2, The Point Source Catalog Declination Range 90 deg greater than delta greater than 30 deg. Author

**N89-14198*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**INFRARED ASTRONOMICAL SATELLITE (IRAS) CATALOGS AND ATLASES. VOLUME 6: THE POINT SOURCE CATALOG DECLINATION RANGE -50 DEG GREATER THAN DELTA GREATER THAN -90 DEG**
Washington, D.C. 1988 473 p Prepared in cooperation with Netherlands Agency for Aerospace Programs, Delft, and Science Research Council, London, United Kingdom Sponsored by NASA, Washington
(NASA-RP-1190-VOL-6; NAS 1.61:1190-VOL-6) Avail: NTIS HC A20/MF A01; also available SOD CSCL 03B

The Infrared Astronomical Satellite (IRAS) was launched January 26, 1983. During its 300-day mission, it surveyed over 96 pct of the celestial sphere at four infrared wavelengths, centered approximately at 12, 25, 60, and 100 microns. This is Volume 6, The Point Source Catalog Declination Range -50 deg greater than delta greater than -90 deg. Author

**N89-14199*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**INFRARED ASTRONOMICAL SATELLITE (IRAS) CATALOGS AND ATLASES. VOLUME 7: THE SMALL SCALE STRUCTURE CATALOG**
GEORGE HELOU, ed. and D. W. WALKER, ed. Washington, D.C. 1988 348 p Prepared in cooperation with Netherlands Agency for Aerospace Programs, Delft, and Science Research Council, London, United Kingdom Sponsored by NASA, Washington
(NASA-RP-1190-VOL-7; NAS 1.61:1190-VOL-7) Avail: NTIS HC A15/MF A01; also available SOD CSCL 03B

The Infrared Astronomical Satellite (IRAS) was launched January 26, 1983. During its 300-day mission, it surveyed over 96 pct 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. Author

**N89-14201*#** Jet Propulsion Lab., California Inst. of Tech., Pasadena.
**INFRARED ASTRONOMICAL SATELLITE (IRAS) CATALOGS AND ATLASES. VOLUME 3: THE POINT SOURCE CATALOG DECLINATION RANGE 30 DEG GREATER THAN DELTA GREATER THAN 0 DEG**
Washington, D.C. 1988 493 p Prepared in cooperation with Netherlands Agency for Aerospace Programs, Delft, and Science Research Council, London, United Kingdom Sponsored by NASA, Washington
(NASA-RP-1190-VOL-3; NAS 1.61:1190-VOL-3) Avail: NTIS HC A21/MF A01; also available SOD CSCL 03B

The Infrared Astronomical Satellite (IRAS) was launched January 26, 1983. During its 300-day mission, IRAS surveyed over 96 pct of the celestial sphere at four infrared wavelengths, centered approximately at 12, 25, 60, and 100 microns. This is Volume 3, The Point Source Catalog Declination Range 30 deg greater than delta greater than 0 deg. Author

**N89-27612*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**COMMENTARY ON INTERSTELLAR MATTER ASSOCIATED WITH 18 OPEN CLUSTERS**
DAVID LEISAWITZ Washington Sep. 1989 20 p Sponsored by National Research Council
(R033-87; NSF AST-81-6403; NSF AST-83-12332)
(NASA-RP-1229; REPT-89B00238; NAS 1.61:1229) Avail: NTIS HC A03/MF A01 CSCL 03B

Information supplementary to that contained in Section 4 of an article entitled, A CO Survey of Regions Around 34 Open Clusters, (Leisawitz, Bash, and Thaddeus) published in the Astrophysical Journal Supplement Series, Volume 70, Number 4, August 1989 is summarized. The information presented here, which describes the interstellar environments of young clusters and some cluster physical characteristics, comes from observations published in the astronomical literature and the author's carbon monoxide (CO) emission line survey, and may help clarify our understanding of the interaction of massive stars with the interstellar medium. Author

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## LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

**N89-16709*#** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, MD.
**THE CASSINI MISSION: INFRARED AND MICROWAVE SPECTROSCOPIC MEASUREMENTS**
V. G. KUNDE Jan. 1989 127 p
(NASA-RP-1213; NAS 1.61:1213; REPT-89B0006) Avail: NTIS HC A07/MF A01 CSCL 03B

The Cassini Orbiter and Titan Probe model payloads include a number of infrared and microwave instruments. This document describes: (1) the fundamental scientific objectives for Saturn and Titan which can be addressed by infrared and microwave instrumentation, (2) the instrument requirements and the accompanying instruments, and (3) the synergism resulting from the comprehensive coverage of the total infrared and microwave spectrum by the complement of individual instruments. The baseline consists of four instruments on the orbiter and two on the Titan

probe. The orbiter infrared instruments are: (1) a microwave spectrometer and radiometer; (2) a far to mid-infrared spectrometer; (3) a pressure modulation gas correlation spectrometer, and (4) a near-infrared grating spectrometer. The two Titan probe infrared instruments are: (1) a near-infrared instrument, and (2) a tunable diode laser infrared absorption spectrometer and nephelometer.
Author

**N89-18373*#** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.
**PROCEEDINGS OF THE POLAR PROCESSES ON MARS WORKSHOP**
ROBERT M. HABERLE Dec. 1988 59 p Workshop held in Sunnyvale, CA, 12-13 May 1988
(NASA-CP-10021; A-89001; NAS 1.55:10021) Avail: NTIS HC A04/MF A01 CSCL 03B
CONFERENCES, MARS (PLANET), MARS ATMOSPHERE, POLAR REGIONS

**N89-28474*#** National Aeronautics and Space Administration, Washington, DC.
**TIME-VARIABLE PHENOMENA IN THE JOVIAN SYSTEM**
MICHAEL J. S. BELTON, ed., ROBERT A. WEST, ed. (Jet Propulsion Lab., California Inst. of Tech., Pasadena.), JURGEN RAHE, ed., and MARGARITA PEREYDA 1989 406 p Workshop held in Flagstaff, AZ, 25-27 Aug. 1987 Original contains color illustrations
(NASA-SP-494; NAS 1.21:494; LC-88-25450) 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, Io'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

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## 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**
EUGENE MAJOR, JOHN R. HICKEY, H. LEE KYLE, BRADLEY M. ALTON, and BRENDA J. VALLETTE (Research and Data Systems, Inc., Lanham, MD.) Nov. 1988 92 p
(NASA-RP-1211; REPT-88-204; NAS 1.61:1211) Avail: NTIS HC A05/MF A01 CSCL 03B
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

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## 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**
JOHN E. NEALY, JOHN W. WILSON, and LAWRENCE W. TOWNSEND Dec. 1988 21 p
(NASA-TP-2869; L-16488; NAS 1.60:2869) Avail: NTIS HC A03/MF A01 CSCL 03B
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**
BARRY D. GANAPOL (Arizona Univ., Tucson.), LAWRENCE W. TOWNSEND, and JOHN W. WILSON Washington, DC Mar. 1989 31 p
(NASA-TP-2878; L-16519; NAS 1.60:2878) Avail: NTIS HC A03/MF A01 CSCL 03B
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**
JOHN W. WILSON, LAWRENCE W. TOWNSEND, JOHN E. NEALY, SANG Y. CHUN, B. S. HONG, WARREN W. BUCK, S. L. LAMKIN, BARRY D. GANAPOL, FERDOUS KHAN, and FRANCIS A. CUCINOTTA (Old Dominion Univ., Norfolk, VA.) Washington, DC Mar. 1989 84 p
(NASA-TP-2887; L-16512; NAS 1.60:2887) Avail: NTIS HC A05/MF A01 CSCL 03B
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-16583; 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

# 99

## GENERAL

**N89-25946*#** National Aeronautics and Space Administration, Washington, DC.
**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

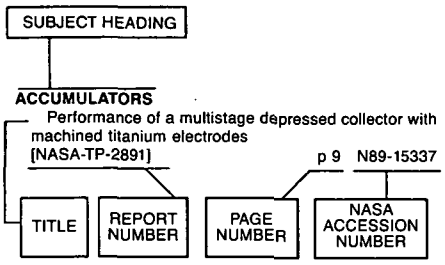
**N89-26803*#** National Aeronautics and Space Administration, Washington, DC.
**ASTRONAUTICS AND AERONAUTICS, 1985: A CHRONOLOGY**
BETTE R. JANSON Mar. 1988 545 p
(NASA-SP-4025; NAS 1.21:4025; LC-65-60308) Avail: NTIS HC A23/MFA01; also available SOD HC $22.00 as 033-000-01022-2 CSCL 05B

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

**N89-26805*#** National Aeronautics and Space Administration, Washington, DC.
**ORDERS OF MAGNITUDE: A HISTORY OF THE NACA AND NASA, 1915-1990**
ROGER E. BILSTEIN Jul. 1989 171 p ERRATUM: Coauthored by Frank W. Anderson, Jr.
(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 histroy 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 it 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

## Typical Subject Index Listing




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 number and the page number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number 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.

## A

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## K



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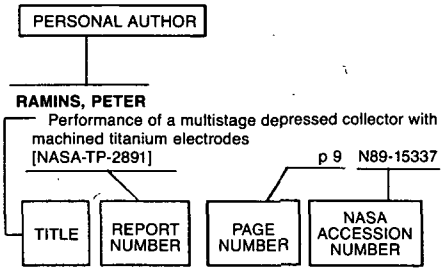
## Typical Personal Author Index Listing




Listings in this index are arranged alphabetically by personal author. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document listed (e.g., NASA report, translation, NASA contractor report). The page and accession numbers are located beneath and to the right of the title. Under any one author's name the accession numbers are arranged in sequence with the AIAA accession numbers appearing first.

## A

**AHMED, RAFIQ**
Cyclic loads tests of carbon involute solid rocket motor outer boot ring segments
[NASA-TP-2884] p 11 N89-16192

**AIKIN, ARTHUR C.**
Polar Ozone Workshop. Abstracts
[NASA-CP-10014] p 14 N89-14503

**ALFORD, WILLIAM L.**
LANDSAT-4 and LANDSAT-5 multispectral scanner coherent noise characterization and removal
[NASA-TP-2595-REV] p 13 N89-12114

**ALTHOFF, SUSAN L.**
Effect of advanced rotorcraft airfoil sections on the hover performance of a small-scale rotor model
[NASA-TP-2832] p 2 N89-24264

**ALTON, BRADLEY M.**
Nimbus-7 ERB Solar Analysis Tape (ESAT) user's guide
[NASA-RP-1211] p 23 N89-30151

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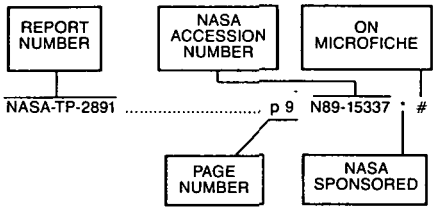


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