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1987
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<table>
<thead>
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<th>NASA SP-7011</th>
<th>Aerospace Medicine and Biology: A Continuing Bibliography with Indexes</th>
<th>Monthly plus annual cumulative index</th>
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</thead>
<tbody>
<tr>
<td>NASA SP-7037</td>
<td>Aeronautical Engineering: A Continuing Bibliography with Indexes</td>
<td>Monthly plus annual cumulative index</td>
</tr>
<tr>
<td>NASA SP-7041</td>
<td>Earth Resources: A Continuing Bibliography with Indexes</td>
<td>Quarterly</td>
</tr>
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</table>

iii
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<tr>
<th>Report Number</th>
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<tr>
<td>NASA SP-7046</td>
<td>Technology for Large Space Systems: A Bibliography with Indexes</td>
<td>Semiannual</td>
</tr>
<tr>
<td>NASA SP-7056</td>
<td>Space Station Systems: A Bibliography with Indexes</td>
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</tr>
<tr>
<td>NASA SP-7500</td>
<td>Management: A Bibliography for NASA Managers</td>
<td>Annual</td>
</tr>
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</table>

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### Schedule E
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</tr>
</tbody>
</table>
TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also Astronautics.

01 AERONAUTICS (GENERAL) 1

02 AERODYNAMICS 1

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

For related information see also 34 Fluid Mechanics and Heat Transfer

03 AIR TRANSPORTATION AND SAFETY 5

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also 16 Space Transportation and 85 Urban Technology and Transportation.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION N.A.

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also 17 Space Communications, Spacecraft Communications, Command and Tracking and 32 Communications and Radar.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 5

Includes aircraft simulation technology.

For related information see also 18 Spacecraft Design, Testing and Performance and 39 Structural Mechanics.

For land transportation vehicles see 85 Urban Technology and Transportation.

06 AIRCRAFT INSTRUMENTATION 7

Includes cockpit and cabin display devices; and flight instruments.

For related information see also 19 Spacecraft Instrumentation and 35 Instrumentation and Photography.

07 AIRCRAFT PROPULSION AND POWER 7

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft.

For related information see also 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels, and 44 Energy Production and Conversion.

08 AIRCRAFT STABILITY AND CONTROL 8

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

For related information see also 05 Aircraft Design, Testing and Performance.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 8

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

For related information see also 14 Ground Support Systems and Facilities (Space).

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; space communications, spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also Astronautics

12 ASTRONAUTICS (GENERAL) 9

For extraterrestrial exploration see 91 Lunar and Planetary Exploration.

13 ASTRODYNAMICS N.A.

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

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) N.A.

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

For related information see also 09 Research and Support Facilities (Air).

15 LAUNCH VEHICLES AND SPACE VEHICLES 9

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

For related information see also 20 Spacecraft Propulsion and Power.

16 SPACE TRANSPORTATION 10

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques.

For related information see also 03 Air Transportation and Safety and 18 Spacecraft Design, Testing and Performance. For space suits see 54 Man/System Technology and Life Support.

17 SPACE COMMUNICATIONS, SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING N.A.

Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout.

For related information see also 04 Aircraft Communications and Navigation and 32 Communications and Radar.
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.
For life support systems see 54 Man/System Technology and Life Support. For related information see also 05 Aircraft Design, Testing and Performance, 39 Structural Mechanics, and 18 Spacecraft Design, Testing and Performance.

19 SPACECRAFT INSTRUMENTATION N.A.
For related information see also 06 Aircraft Instrumentation and 35 Instrumentation and Photography.

20 SPACECRAFT PROPULSION AND POWER
Includes main propulsion systems and components, e.g. rocket engines; and spacecraft auxiliary power sources.
For related information see also 07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 44 Energy Production and Conversion, and 15 Launch Vehicles and Space Vehicles.

CHEMISTRY AND MATERIALS
Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; propellants and fuels; and materials processing.

23 CHEMISTRY AND MATERIALS (GENERAL) 11

24 COMPOSITE MATERIALS 11
Includes physical, chemical, and mechanical properties of laminates and other composite materials.
For ceramic materials see 27 Nonmetallic Materials.

25 INORGANIC AND PHYSICAL CHEMISTRY 12
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also 77 Thermodynamics and Statistical Physics.

26 METALLIC MATERIALS 12
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 12
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.
For composite materials see 24 Composite Materials.

28 PROPELLANTS AND FUELS N.A.
Includes rocket propellants, igniters and oxidizers; their storage and handling procedures; and aircraft fuels.
For related information see also 07 Aircraft Propulsion and Power, 28 Propellants and Fuels, 20 Spacecraft Propulsion and Power, and 44 Energy Production and Conversion.

29 MATERIALS PROCESSING 13
Includes space-based development of products and processes for commercial application.
For biological materials see 55 Space Biology.

ENGINEERING
Includes engineering (general); communications and radar; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also Physics.

31 ENGINEERING (GENERAL) 13
Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

32 COMMUNICATIONS AND RADAR 13
Includes radar; land and global communications; communications theory; and optical communications.
For related information see also 04 Aircraft Communications and Navigation and 17 Space Communications, Spacecraft Communications, Command and Tracking. For search and rescue see 03 Air Transportation and Safety, and 16 Space Transportation.

33 ELECTRONICS AND ELECTRICAL ENGINEERING 14
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; micro miniaturization; and integrated circuitry.
For related information see also 60 Computer Operations and Hardware and 76 Solid-State Physics.

34 FLUID MECHANICS AND HEAT TRANSFER 14
Includes boundary layers; hydrodynamics; fluidics; mass transfer and ablation cooling.
For related information see also 02 Aerodynamics and 77 Thermodynamics and Statistical Physics.

35 INSTRUMENTATION AND PHOTOGRAPHY 16
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see 43 Earth Resources and Remote Sensing. For related information see also 06 Aircraft Instrumentation and 19 Spacecraft Instrumentation.

36 LASERS AND MASERS 16
Includes parametric amplifiers.
For related information see also 76 Solid-State Physics.

37 MECHANICAL ENGINEERING 16
Includes auxiliary systems (nonpower); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY 17
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS 17
Includes structural element design and weight analysis; fatigue; and thermal stress.
GEOSCIENCES
Includes geosciences (general); earth resources and remote sensing; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also Space Sciences.

42 GEOSCIENCES (GENERAL) 18

43 EARTH RESOURCES AND REMOTE SENSING 18
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see 35 Instrumentation and Photography.

44 ENERGY PRODUCTION AND CONVERSION 19
Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower.
For related information see also 07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, and 28 Propellants and Fuels.

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

46 GEOPHYSICS 19
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see 93 Space Radiation.

47 METEOROLOGY AND CLIMATOLOGY 20
Includes weather forecasting and modification.

48 OCEANOGRAPHY 21
Includes biological, dynamic, and physical oceanography; and marine resources.
For related information see also 43 Earth Resources and Remote Sensing.

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

51 LIFE SCIENCES (GENERAL) 21

52 AEROSPACE MEDICINE 21
Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

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

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

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

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

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

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

61 COMPUTER PROGRAMMING AND SOFTWARE 22
Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

62 COMPUTER SYSTEMS 22
Includes computer networks and special application computer systems.

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

64 NUMERICAL ANALYSIS 22
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 23
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

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

67 THEORETICAL MATHEMATICS N.A.
Includes topology and number theory.

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

70 PHYSICS (GENERAL) N.A.
For precision time and time interval (PTTI) see 35 Instrumentation and Photography; for geophysics, astrophysics or solar physics see 46 Geophysics, 90 Astrophysics, or 92 Solar Physics.
ACOUSTICS 23
Includes sound generation, transmission, and attenuation.
For noise pollution see 45 Environment Pollution.

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

NUCLEAR AND HIGH-ENERGY PHYSICS 24
Includes elementary and nuclear particles; and reactor theory.
For space radiation see 93 Space Radiation.

OPTICS 24
Includes light phenomena and optical devices.
For lasers see 36 Lasers and Masers.

PLASMA PHYSICS 24
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see 46 Geophysics. For space plasmas see 90 Astrophysics.

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

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

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

ECONOMICS AND COST ANALYSIS N.A.
Includes cost effectiveness studies.

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

URBAN TECHNOLOGY AND TRANSPORTATION 25
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see 03 Air Transportation and Safety, 16 Space Transportation, and 44 Energy Production and Conversion.

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

ASTRONOMY 25
Includes radio, gamma-ray, and infrared astronomy; and astrometry.

ASTROPHYSICS 26
Includes cosmology; celestial mechanics; space plasmas; and interstellar and interplanetary gases and dust.
For related information see also 75 Plasma Physics.

LUNAR AND PLANETARY EXPLORATION 26
Includes planetology; and manned and unmanned flights.
For spacecraft design or space stations see 18 Spacecraft Design, Testing and Performance.

SOLAR PHYSICS 26
Includes solar activity, solar flares, solar radiation and sunspots.
For related information see 93 Space Radiation.

SPACE RADIATION 27
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see 52 Aerospace Medicine. For theory see 73 Nuclear and High-Energy Physics.

GENERAL
Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs.
01  

AERONAUTICS (GENERAL)

N87-18520*# National Aeronautics and Space Administration.  
Langley Research Center, Hampton, Va. 

JOINT UNIVERSITY PROGRAM FOR AIR TRANSPORTATION RESEARCH, 1983  
held in Atlantic City, N.J., 16 Dec. 1983; sponsored by NASA and FAA  
(NASA-CP-2451; L-16254; NAS 1.55:2451) Avail: NTIS HC  
A05/MF A01 CSCL 01B  
AIR NAVIGATION, AIR TRANSPORTATION, AIRCRAFT GUIDANCE, AVIONICS, CONFERENCES, FLIGHT CONTROL

N87-22504*# National Aeronautics and Space Administration.  
Langley Research Center, Hampton, Va. 

JOINT UNIVERSITY PROGRAM FOR AIR TRANSPORTATION RESEARCH, 1984  
FREDERICK R. MORRELL, comp. May 1987 165 p Meeting  
held in Hampton, Va., 18 Jan. 1985  
(NASA-CP-2452; L-16255; NAS 1.55:2452) Avail: NTIS HC  
A08/MF A01 CSCL 01B  
AIR TRANSPORTATION, AIRCRAFT CONTROL, AIRCRAFT GUIDANCE, AVIONICS, CONTROL THEORY, SURFACE NAVIGATION

N87-25267*# National Aeronautics and Space Administration.  
Langley Research Center, Hampton, Va. 

WIND SHEAR/TURBULENCE INPUTS TO FLIGHT SIMULATION AND SYSTEMS CERTIFICATION  
held in Hampton, Va., 30 May - 1 Jun. 1984  
(NASA-CP-2474; L-16329; NAS 1.55:2474) Avail: NTIS HC  
A12/MF A01 CSCL 01B  
AIRCRAFT PERFORMANCE, AVIONICS, FLIGHT SAFETY, FLIGHT SIMULATION, PILOT PERFORMANCE, WIND SHEAR

N87-27596*# National Aeronautics and Space Administration.  
Langley Research Center, Hampton, Va. 

JOINT UNIVERSITY PROGRAM FOR AIR TRANSPORTATION RESEARCH, 1985  
held in Atlantic City, N.J., 30 Jan. 1986  
(NAS 1.55:2453; NASA-CP-2453) Avail: NTIS HC A05/MF A01  
CSCL 01B  
AIR TRAFFIC CONTROL, AIR TRANSPORTATION, CONFERENCES, FAULT TOLERANCE, FLIGHT CONTROL, GLOBAL POSITIONING SYSTEM, INERTIAL NAVIGATION

N87-27613* National Aeronautics and Space Administration,  
Washington, D.C.  
AERONAUTICAL ENGINEERING: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 217)  
Sep. 1987 124 p  
(NASA-SP-7037(217); NAS 1.21:7037(217)) Avail: NTIS HC A07  
CSCL 01B  
This bibliography lists 450 reports, articles, and other documents introduced into the NASA scientific and technical information system in August, 1987.  

02  

AERODYNAMICS

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

N87-10039*# National Aeronautics and Space Administration.  
Langley Research Center, Hampton, Va. 

WIND-TUNNEL INVESTIGATION OF THE FLIGHT CHARACTERISTICS OF A CANARD GENERAL-AVIATION AIRPLANE CONFIGURATION  
D. R. SATRAN Oct. 1986 60 p  
(NASA-TP-2623; L-15929; NAS 1.60:2623) Avail: NTIS HC  
A04/MF A01 CSCL 01A  
CANARD CONFIGURATIONS, FLIGHT CHARACTERISTICS, GENERAL AVIATION AIRCRAFT, WIND TUNNEL TESTS

N87-10042*# National Aeronautics and Space Administration.  
Langley Research Center, Hampton, Va. 

SUPERSONIC, NONLINEAR, ATTACHED-FLOW WING DESIGN FOR HIGH LIFT WITH EXPERIMENTAL VALIDATION  
(NASA-TP-2336; L-15787; NAS 1.60:2336) Avail: NTIS HC  
A10/MF A01 CSCL 01A  
CAMBERED WINGS, REATTACHED FLOW, SUPERCritical FLOW, SUPERSONIC AIRFOILS, SUPERSONIC FLOW

N87-10838*# National Aeronautics and Space Administration.  
Langley Research Center, Hampton, Va. 

EFFECTS OF TAIL SPAN AND EMPENNAGE ARRANGEMENT ON DRAG OF A TYPICAL SINGLE-ENGINE FIGHTER AFT END  
J. R. BURLEY, II and B. L. BERRIER Sep. 1984 136 p  
(NASA-TP-2352; L-15742; NAS 1.60:2352) Avail: NTIS HC  
A07/MF A01 CSCL 01A  
AERODYNAMIC DRAG, AIRCRAFT CONFIGURATIONS, SKIN FRICTION, TAIL ASSEMBLIES, TRANSONIC SPEED
THREE-DIMENSIONAL, UNSTEADY, FULL-POTENTIAL CALCULATION

STATICAL INTERNAL PERFORMANCE OF SINGLE-EXPANSION-RAMP NOZZLES WITH THRUST-VECTORING CAPABILITY UP TO 60 DEG

B. L. BERRIER and L. D. LEAVITT Oct. 1984 144 p
(NASA-TP-2364; L-15766; NAS 1.60:2364) Avail: NTIS HC
A07/ MF A01 CSCL 01A
AXISYMMETRIC BODIES, NOZZLE FLOW, THRUST VECTOR CONTROL

N87-10841*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

TRANSONIC FLOW ANALYSIS FOR ROTORS. PART 2: THREE-DIMENSIONAL, UNSTEADY, FULL-POTENTIAL CALCULATION

I. C. CHANG Jan. 1985 27 p
(NASA-TP-2375-PT-2; A-9682; NAS 1.60:2375-PT-2) Avail: NTIS HC
AO3/ MF A01 CSCL 01A
AERODYNAMIC STABILITY, HELICOPTER PERFORMANCE, ROTORS, TIP VANES, TRANSONIC FLOW

N87-10843*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PILOTED SIMULATION STUDY OF THE EFFECTS OF AN AUTOMATED TRIM SYSTEM ON FLIGHT CHARACTERISTICS OF A LIGHT TWIN-ENGINE AIRPLANE WITH ONE ENGINE INOPERATIVE

(NASA-TP-2633; L-16147; NAS 1.60:2633) Avail: NTIS HC
AO3/MF A01 CSCL 01A
AERODYNAMIC BALANCE, AUTOMATIC FLIGHT CONTROL, ENGINE FAILURE, LIGHT AIRCRAFT

N87-11702*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

FORWARD-SWEPT WING CONFIGURATION DESIGNED FOR HIGH MANEUVERABILITY BY USE OF A TRANSONIC COMPUTATIONAL METHOD

M. J. MANN and C. E. MERCER Nov. 1986 185 p
(NASA-TP-2628; L-16120; NAS 1.60:2628) Avail: NTIS HC
AO9/ MF A01 CSCL 01A
AERODYNAMIC CONFIGURATIONS, HIGHLY MANEUVERABLE AIRCRAFT, SWEEP FORWARD WINGS, TRANSONIC SPEED

N87-12541*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EFFECT OF PORT CORNER GEOMETRY ON THE INTERNAL PERFORMANCE OF A ROTATING-VANE-TYPE THRUST REVERSER

B. L. BERRIER and F. J. CAPONE Dec. 1986 51 p
(NASA-TP-2624; L-16135; NAS 1.60:2624) Avail: NTIS HC
A04/MF A01 CSCL 01A
CORNER FLOW, NOZZLE GEOMETRY, PORTS (OPENINGS), ROTATING BODIES, THRUST REVERSAL, VANES, WIND TUNNEL TESTS

N87-14284*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PROPAGATION OF SOUND WAVES IN TUBES OF NONCIRCULAR CROSS SECTION

W. B. RICHARDS (Oberlin Coll., Ohio) Aug. 1986 33 p
(NASA-TP-2601; E-2690; NAS 1.60:2601) Avail: NTIS HC
A03/MF A01 CSCL 01A
ELLIPSE CYLINDERS, PIPES (TUBES), SOUND WAVES, WAVE PROPAGATION
A REMOTE CONTROLLED CANARD MISSILE WITH A WIND-TUNNEL INVESTIGATION AT SUPERSONIC SPEEDS OF FREE-ROLLING-TAIL BRAKE TORQUE SYSTEM
A. B. BLAIR, JR. Mar. 1985 38 p
Langley Research Center, Hampton, Va.

SUPERSONIC SPEED, TAIL ASSEMBLIES, TORQUE, WIND CONFIGURATIONS, REMOTE CONTROL, ROLLING MOMENTS, AERODYNAMICS, COMPUTERIZED SIMULATION, DYNAMIC STRUCTURAL ANALYSIS

N87-17686* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND-TUNNEL INVESTIGATION AT SUPERSONIC SPEEDS OF A REMOTE-CONTROLLED CANARD MISSILE WITH A FREE-ROLLING-TAIL BRAKE TORQUE SYSTEM
A. B. BLAIR, JR. Mar. 1985 38 p
(NASA-TP-2401; L-15882; NAS 1.60:2401) Avail: NTIS HC A03/MF A01 CSCL 01A
BRAKING, CANARD CONFIGURATIONS, FINS, MISSILE CONFIGURATIONS, REMOTE CONTROL, ROLLING MOMENTS, SUPERSONIC SPEED, TAIL ASSEMBLIES, TORQUE, WIND TUNNEL TESTS

N87-17689* # National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMBINED AERODYNAMIC AND STRUCTURAL DYNAMIC PROBLEM EMULATING ROUTINES (CASPER): THEORY AND IMPLEMENTATION
WILLIAM H. JONES Feb. 1985 75 p
(NASA-TP-2418; E-2278; NAS 1.60:2418) Avail: NTIS HC A04/MF A01 CSCL 01A
AERODYNAMIC COEFFICIENTS, COMPUTATIONAL FLUID DYNAMICS, COMPUTERIZED SIMULATION, DYNAMIC STRUCTURAL ANALYSIS

N87-18537* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
HELICOPTER BLADE-VORTEX INTERACTION LOCATIONS: SCALe-MODEL ACOUSTICS AND FREE-WAKE ANALYSIS RESULTS
DANNY R. HOAD Apr. 1987 106 p
(DA PROJ. 1L-62209-AH-76-A)
(NASA-TP-2658; L-16214; AVSCOM-87-B-1; NAS 1.60:2658) Avail: NTIS HC A04/MF A01 CSCL 01A
ACOUSTICS, BLADE-VORTEX INTERACTION, FREE FLOW, HELICOPTERS, ROTORS, VORTICES, WAKES

N87-19351* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NUMERICAL SIMULATION OF CHANNEL FLOW TRANSITION, RESOLUTION REQUIREMENTS AND STRUCTURE OF THE HAIRPIN VORTEX
STEVEN E. KRIST (Joint Inst. for Advancement of Flight Sciences, Hampton, Va.) and THOMAS A. ZANG Apr. 1987 71 p
(NASA-TP-2667; L-16204; NAS 1.60:2667) Avail: NTIS HC A04/MF A01 CSCL 01A
BOUNDARY LAYER STABILITY, BOUNDARY LAYER TRANSITION, BOUNDARY VALUE PROBLEMS, CHANNEL FLOW, COMPUTATIONAL FLUID DYNAMICS, SPECTRAL METHODS

N87-20233* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INVESTIGATION OF LEADING-EDGE FLAP PERFORMANCE ON DELTA AND DOUBLE-DELTA WINGS AT SUPERSONIC SPEEDS
PETER F. COVELL, RICHARD M. WOOD, and DAVID S. MILLER Apr. 1987 125 p
(NASA-TP-2658; L-16143; NAS 1.60:2656) Avail: NTIS HC A06/MF A01 CSCL 01A
DELTA WINGS, EXPERIMENT DESIGN, LEADING EDGE FLAPS, SUPERSONIC SPEED

N87-22265* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EXPERIMENTAL CAVITY PRESSURE DISTRIBUTIONS AT SUPERSONIC SPEEDS
ROBERT L. STALLINGS, JR. and FLOYD J. WILCOX, JR. Jun. 1987 79 p
(NASA-TP-2683; L-16215; NAS 1.60:2683) Avail: NTIS HC A05/MF A01 CSCL 01A
CAVITIES, FLUID FLOW, PRESSURE DISTRIBUTION, SUPERSONIC SPEED

N87-23586* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ON MINIMIZING THE NUMBER OF CALCULATIONS IN DESIGN-BY-ANALYSIS CODES
RAYMOND L. BARGER and ANUTOSH MOITRA Jun. 1987 16 p
(NASA-TP-2706; L-16226; NAS 1.60:2706) Avail: NTIS HC A02/MF A01 CSCL 01A
AERODYNAMIC CONFIGURATIONS, APPROXIMATION, DESIGN ANALYSIS, NUMERICAL ANALYSIS, PRESSURE DISTRIBUTION

N87-21855* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
WIND-TUNNEL FREE-FLIGHT INVESTIGATION OF A 0.15-SCALE MODEL OF THE F-106B AIRPLANE WITH VORTEX FLAPS
LONG P. YIP May 1987 46 p
(NASA-TP-2700; L-16202; NAS 1.60:2700) Avail: NTIS HC A03/MF A01 CSCL 01A
F-106 AIRCRAFT, FREE FLIGHT, VORTEX FLAPS, WIND TUNNEL MODELS, WIND TUNNEL TESTS

N87-21871* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
NEW METHODS AND RESULTS FOR QUANTIFICATION OF LIGHTNING-AIRCRAFT ELECTRODYNAMICS
(NASA-TP-2737; L-16281; NAS 1.60:2737) Avail: NTIS HC A04/MF A01 CSCL 01A
ELECTRODYNAMICS, F-106 AIRCRAFT, FLIGHT TESTS, LIGHTNING, RESEARCH AIRCRAFT

N87-21873* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF AFTERBODY BOATTAIL DESIGN AND EMPENNAGE ARRANGEMENT ON AEROPROPELLIVE characterizeSTICS OF A TWIN-ENGINE FIGHTER MODEL AT TRANS-SONIC SPEEDS
LINDA S. BANGERT, LAURENCE D. LEAVITT, and DAVID E. REUBUSH Jun. 1987 134 p
(NASA-TP-2704; L-16227; NAS 1.60:2704) Avail: NTIS HC A07/MF A01 CSCL 01A
AFTERBODIES, AXISYMMETRIC FLOW, BOATTAILS, DRAG, FIGHTER AIRCRAFT, NOZZLES, PROPULSIVE EFFICIENCY, TAIL ASSEMBLIES

IN-FLIGHT SURFACE OIL-FLOW PHOTOGRAPHS WITH COMPARISONS TO PRESSURE DISTRIBUTION AND BOUNDARY-LAYER DATA
ROBERT R. MEYER, JR. and LISA A. JENNETT Apr. 1985 27 p
(NASA-TP-2395; H-1184; NAS 1.60:2395) Avail: NTIS HC A03/MF A01 CSCL 01A
BOUNDARY LAYER FLOW, FLOW VISUALIZATION, IN-FLIGHT MONITORING, OILS, PHOTOGRAPHY, PRESSURE DISTRIBUTION

N87-20238* # National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LEWIS INVERSE DESIGN CODE (LINDES): USERS MANUAL
JOSE M. SANZ Mar. 1987 67 p
(NASA-TP-2678; E-3221; NAS 1.60:2676) Avail: NTIS HC A04/MF A01 CSCL 01A
AEREOILS, CODING, DESIGN ANALYSIS, HODOGRAPH, INVERSIONS, TURBINE BLADES, USER MANUALS (COMPUTER PROGRAMS)
CALCULATION OF VISCOS EFFECTS ON TRANSONIC FLOW FOR OSCILLATING AIRFOILS AND COMPARISONS WITH EXPERIMENT

JAMES T. HOWLETT and SAMUEL R. BLAND Sep. 1987
77 p (NASA-TP-2731; L-16289; NAS 1.60:2731) Avail: NTIS HC A05/MF A01 CSCL 01A
AIRFOILS, COMPARISON, INVISCID FLOW, OSCILLATIONS, TRANSONIC FLOW, VISCOS FLow

DRAG MEASUREMENTS OF BLUNT STORES TANGENTIALLY MOUNTED ON A FLAT PLATE AT SUPERSONIC SPEEDS

FLOYD J. WILCOX, JR. Sep. 1987 68 p (NASA-TP-2742; L-16284; NAS 1.60:2742) Avail: NTIS HC A04/MF A01 CSCL 01A
AERODYNAMIC DRAG, BLUNT BODIES, EXTERNAL STORES, FLAT PLATES, MOUNTING, SUPERSONIC SPEED, TANGENTS

PRESSURE MEASUREMENTS ON A THICK CAMBERED AND TWISTED 58 DEG DELTA WING AT HIGH SUBSONIC SPEEDS

JULIO CHU and JOHN E. LAMAR Sep. 1987 233 p (NASA-TP-2713; L-16224; NAS 1.60:2713) Avail: NTIS HC A11/MF A01 CSCL 01A
CAMBER, DELTA WINGS, PRESSURE MEASUREMENT, SUBSONIC SPEED, THICKNESS, TWISTED WINGS

LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A TWIN-ENGINE GENERAL AVIATION CONFIGURATION WITH AFT-FUSELAGE-MOUNTED PUSHER PROPELLERS

DANA MORRIS DUNHAM, GARL L. GENTRY, JR., GREGORY S. MANUEL, ZACHARY T. APPLIN, and P. FRANK QUINTO Oct. 1987 116 p (NASA-TP-2763; L-16331; NAS 1.60:2763) Avail: NTIS HC A06/MF A01 CSCL 01A
AERODYNAMIC CHARACTERISTICS, GENERAL AVIATION AIRCRAFT, LOW SPEED, PROPELLERS, PROPULSION SYSTEM CONFIGURATIONS, PYLON MOUNTING, TURBOPROP ENGINES

Includes aircraft simulation technology.

AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

FLAT PLATES, MOUNTING, SUPERSONIC SPEED, TANGENTS

JET TRANSPORT FLIGHT OPERATIONS USING COCKPIT DISPLAY OF TRAFFIC INFORMATION DURING INSTRUMENT METEOROLOGICAL CONDITIONS: SIMULATION EVALUATION

DAVID H. WILLIAMS and DOUGLAS C. WELLS May 1986 50 p (NASA-CP-2567; L-16091; NAS 1.55:2567) Avail: NTIS HC A03/MF A01 CSCL 01C
AIR TRAFFIC CONTROL, COCKPIT SIMULATORS, DISPLAY DEVICES, INSTRUMENT APPROACH, JET AIRCRAFT, TRANSPORT AIRCRAFT, VIDEO COMMUNICATION, WORKLOADS (PSYCHOPHYSIOLOGY)
05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE


N87-20990*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif. SUMMARY OF STUDIES TO REDUCE WING-MOUNTED PROPFAN INSTALLATION DRAG ON AN M = 0.8 TRANSPORT RONALD C. SMITH, ALAN D. LEVIN, and RICHARD D. WOOD May 1987 29 p (NASA-TP-2678; A-86242; NAS 1.60:2678) Available: NTL HS A03/MF A01 CSCL 01C DRAG REDUCTION, HIGH SPEED, PROPFAN TECHNOLOGY, TRANSPORT AIRCRAFT, WIND TUNNEL TESTS


N87-24458*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. MEASUREMENTS OF FLOW RATE AND TRAJECTORY OF AIRCRAFT TIRE-GENERATED WATER SPRAY ROBERT H. DAUGHERTY and SANDY M. STUBBS Jul. 1987 118 p (NASA-TP-2718; L-16195; NAS 1.60:2718) Available: NTL HS A06/MF A01 CSCL 01C AIRCRAFT TIRES, ENGINE INLETS, FLOW VELOCITY, INGESTION (ENGINES), SPLASHING, SPRAYING

N87-26041*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. EVALUATION OF INSTALLED PERFORMANCE OF A WING-TIP-MOUNTED PUSHER TURBOPROP ON A SEMISPAN WING JAMES C. PATTERSON, Jr. and GLYNN R. BARTLETT Aug. 1987 60 p (NASA-TP-2739; L-16252; NAS 1.60:2739) Available: NTL HS A03/MF A01 CSCL 01C INSTALLING, PROPELLERS, SEMISPAN MODELS, TURBOFAN ENGINES, TURBOPROP ENGINES, WING TIP VORTICES


N87-29499*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. APPLICATION OF PARAMETER ESTIMATION METHODOLOGY TO AIRCRAFT STABILITY AND CONTROL: THE OUTPUT-ERROR APPROACH RICHARD E. MAINE and KENNETH W. ILIFF Jun. 1986 175 p Submitted for publication (NASA-RP-1188; H-1299; NAS 1.61:1188) Available: NTL HS A06/MF A01 CSCL 01C The practical application of parameter estimation methodology to the problem of estimating aircraft stability and control derivatives from flight test data is examined. The primary purpose of the
The document is to present a comprehensive and unified picture of the entire parameter estimation process and its integration into a flight test program. The document concentrates on the output-error method to provide a focus for detailed examination and to allow us to give specific examples of situations that have arisen. The document first derives the aircraft equations of motion in a form suitable for application to estimation of stability and control derivatives. It then discusses the issues that arise in adapting the equations to the limitations of analysis programs, using a specific application to estimation of stability and control derivatives. It then discusses the issues that arise in adapting the equations to the limitations of analysis programs, using a specific example. The roles and issues related to mass distribution data, preflight predictions, maneuver design, flight scheduling, instrumentation sensors, data acquisition systems, and data processing are then addressed. Finally, the document discusses evaluation and the use of the analysis results. Author applications of signal conditioning for the most common flight-test data-acquisition systems. A limited amount of theoretical discussion is included to assist the reader in a more complete understanding of the subject matter. Nonspecific signal conditioning, such as amplification, filtering, and multiplexing, is discussed. Signal conditioning for various specific transducers and data terminal devices is also discussed to illustrate signal conditioning that is unique to particular types of transducers. The purpose is to delineate for the reader the various signal-conditioning technique options, together with tradeoff considerations, for commonly encountered flight-test situations. Author applications of signal conditioning for the most common flight-test data-acquisition systems. A limited amount of theoretical discussion is included to assist the reader in a more complete understanding of the subject matter. Nonspecific signal conditioning, such as amplification, filtering, and multiplexing, is discussed. Signal conditioning for various specific transducers and data terminal devices is also discussed to illustrate signal conditioning that is unique to particular types of transducers. The purpose is to delineate for the reader the various signal-conditioning technique options, together with tradeoff considerations, for commonly encountered flight-test situations. Author
AEROELASTIC CHARACTERISTICS OF AN OBLIQUE-WING

Ames Research Center, Moffett Field, Calif.

AIRCRAFT STABILITY AND CONTROL

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

N87-10103* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
IN-FLIGHT TOTAL FORCES, MOMENTS AND STATIC AEROELASTIC CHARACTERISTICS OF AN OBLIQUE-WING RESEARCH AIRPLANE
(NASA-TP-2224; H-1181; NAS 1.60:2224) Avail: NTIS HC
A03/MF A01 CSCL 01C
AEROELASTIC RESEARCH WINGS, AIRCRAFT DESIGN, FLIGHT TESTS, OBLIQUE WINGS, RESEARCH AIRCRAFT, STRUCTURAL DESIGN, WIND TUNNEL TESTS

N87-10870** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
INTERFERENCE EFFECTS OF THRUST REVERSING ON HORIZONTAL TAIL EFFECTIVENESS OF TWIN-ENGINE FIGHTER AIRCRAFT AT MACH NUMBERS FROM 0.15 TO 0.90
(NASA-TP-2350; L-15811; NAS 1.60:2350) Avail: NTIS HC
A06/MF A01 CSCL 01C
AERODYNAMIC INTERFERENCE, FIGHTER AIRCRAFT, TAIL ASSEMBLIES, THRUST REVERSAL, WIND TUNNEL TESTS

N87-10871** National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLIGHT-DETERMINED AERO_DYNAMIC DERIVATIVES OF THE AD-1 OBLIQUE-WING RESEARCH AIRPLANE
(NASA-TP-2222; H-1179; NAS 1.60:2222) Avail: NTIS HC
A03/MF A01 CSCL 01C
AERODYNAMIC COEFFICIENTS, OBLIQUE WINGS, RESEARCH AIRCRAFT, VARIABLE SWEEP WINGS

N87-16849* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PILOTED SIMULATOR STUDY OF ALLOWABLE TIME DELAYS IN LARGE-AIRPLANE RESPONSE
(NASA-TP-2652; L-16149; NAS 1.60:2652) Avail: NTIS HC
A04/MF A01 CSCL 01C
CONTROL SYSTEMS DESIGN, FLIGHT CHARACTERISTICS, FLIGHT SIMULATORS, LOW SPEED, TIME LAG, TRANSPORT AIRCRAFT

N87-18570* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FLIGHT CHARACTERISTICS OF THE AD-1 OBLIQUE-WING RESEARCH AIRCRAFT
ALEX G. SIM and ROBERT E. CURRY Mar. 1985 29 p
(NASA-TP-2223; H-1180; NAS 1.60:2223) Avail: NTIS HC
A03/MF A01 CSCL 01C
AERODYNAMIC CONFIGURATIONS, FLIGHT CHARACTERISTICS, LOW SPEED, OBLIQUE WINGS, RESEARCH AIRCRAFT

N87-25331* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ADVANCED DETECTION, ISOLATION AND ACCOMMODATION OF SENSOR FAILURES: REAL-TIME EVALUATION
WALTER C. MERRILL, JOHN C. DELAAT, and WILLIAM M. BRUTON Jul. 1987 30 p
(NASA-TP-2740; E-3479; NAS 1.60:2740) Avail: US Patent and Trademark Office, CSCL 01C
ENGINE CONTROL, ENGINE FAILURE, FAULT TOLERANCE, REDUNDANCY ENCODING, REMOTE SENSORS, TURBINE ENGINES

N87-26922* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
PILOTED SIMULATION STUDY OF EFFECTS OF VORTEX FLAPS ON LOW-SPEED HANDLING QUALITIES OF A DELTA-WING AIRPLANE
JAY M. BRANDON, PHILIP W. BROWN, and ALFRED J. WUNSCHSEL Sep. 1987 38 p
(NASA-TP-2747; L-16307; NAS 1.60:2747) Avail: NTIS HC
A03/MF A01 CSCL 01C
CONTROLLABILITY, DELTA WINGS, FLIGHT SIMULATION, LOW SPEED, PILOTS (PERSONNEL), VORTEX FLAPS

RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tubes; and aircraft engine test stands.

N87-10876* National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICAL FACILITIES ASSESSMENT
F. E. PENARANDA, comp. Nov. 1985 204 p
(NASA-TP-1146; NAS 1.61:1146) Avail: NTIS HC A10/MF A01 CSCL 14B
A survey of the free world's aeronautical facilities was undertaken and an evaluation made on where the relative strengths and weaknesses exist. Special emphasis is given to NASA's own capabilities and needs. The types of facilities surveyed are: Wind Tunnels; Airbreathing Propulsion Facilities; and Flight Simulators. Author

N87-17717* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL EVALUATION OF WALL MACH NUMBER DISTRIBUTIONS OF THE OCTAGONAL TEST SECTION PROPOSED FOR NASA LEWIS RESEARCH CENTER'S ALTITUDE WIND TUNNEL
DOUGLAS E. HARRINGTON, RICHARD R. BURLEY, and ROBERT R. CORBAN Nov. 1986 35 p
(NASA-TP-2666; L-3145; NAS 1.60:2666) Avail: NTIS HC
A03/MF A01 CSCL 14B
FLOW VELOCITY, MACH NUMBER, WIND TUNNEL APPARATUS, WIND TUNNEL WALLS

N87-18575* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL EVALUATION OF TWO TURNING VANE DESIGNS FOR FAN DRIVE CORNER OF 0.1-SCALE MODEL OF NASA LEWIS RESEARCH CENTER'S PROPOSED ALTITUDE WIND TUNNEL
DONALD R. BOLDMAN, ROYCE D. MOORE, and RICKEY J. SHYNE Mar. 1987 148 p
(NASA-TP-2664; E-3175; NAS 1.60:2664) Avail: NTIS HC
A07/MF A01 CSCL 14B
CORNER FLOW, VANES, WIND TUNNEL APPARATUS, WIND TUNNEL DRIVES
15 LAUNCH VEHICLES AND SPACE VEHICLES

12 ASTRONAUTICS (GENERAL)

N87-20302* # National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE 1986 GET AWAY SPECIAL EXPERIMENTER'S SYMPOSIUM
CONFERENCES, GETAWAY SPECIALS (STS), GOVERNMENT/INDUSTRY RELATIONS, SPACE SHUTTLE PAYLOADS, UNIVERSITIES

N87-29576* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TECHNOLOGY FOR LARGE SPACE SYSTEMS. A BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 17)
Oct. 1987 140 p (NASA-SP-7046(17); NAS 1.21:7046(17)) Avail: NTIS HC A03 MF A01 CSCL 22A
This bibliography lists 512 reports, articles, and other documents introduced into the NASA scientific and technical information system between January 1, 1987 and June 30, 1987. Its purpose is to provide helpful information to the researcher, manager, and designer in technology development and mission design according to system, interactive analysis and design, structural and thermal analysis and design, structural concepts and control systems, electronics, advanced materials, assembly concepts, propulsion, and solar power satellite systems. Author

15 LAUNCH VEHICLES AND SPACE VEHICLES

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

N87-12581* # National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SOLAR ARRAY FLIGHT DYNAMIC EXPERIMENT
R. W. SCHOCK Washington May 1986 27 p (NASA-TP-2598; NAS 1.60:2598) Avail: NTIS HC A03/MF A01 CSCL 10A
LARGE SPACE STRUCTURES, LASER APPLICATIONS, SOLAR ARRAYS, SPACE SHUTTLE PAYLOADS, TRACKING (POSITION)

N87-18588* # National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SYSTEM STUDY OF THE CARBON DIOXIDE OBSERVATIONAL PLATFORM SYSTEM (CO-OPS): PROJECT OVERVIEW
ATMOSPHERIC COMPOSITION, CARBON DIOXIDE, REMOTE SENSING, SPACE PLATFORMS
15 LAUNCH VEHICLES AND SPACE VEHICLES


16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques.


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.


N87-26073*# National Aeronautics and Space Administration, Washington, D.C. SPACE STATION SYSTEMS: A BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 4) May 1987 220 p (NASA-SP-7056(04); NAS 1.21:7056(04)) Avail: NTIS HC A10 CSCL 22B This bibliography lists 832 reports, articles, and other documents introduced into the NASA scientific and technical information system between July 1, 1986 and December 31, 1986. Its purpose is to provide helpful information to the researcher, manager, and designer in technology development and mission design according to system, interactive analysis and design, structural and thermal analysis and design, structural concepts and control systems, electronics, advanced materials, assembly concepts, propulsion, and solar power satellite systems. The coverage includes documents that define major systems and subsystems, servicing and support requirements, procedures and operations, and missions for the current and future space station. Author

20 SPACECRAFT PROPULSION AND POWER

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


24 COMPOSITE MATERIALS

National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

STRUCTURAL INTEGRITY AND DURABILITY OF REUSABLE SPACE PROPULSION SYSTEMS
1987 205 p Conference held in Cleveland, Ohio, 12-13 May 1987
(NASA-CP-2471; E-3512; NAS 1.55:2471) Avail: NTIS HC A10/MF A01 CSCL 21H
AEROTHERMODYNAMICS, CONFERENCES, DURABILITY, DYNAMIC STRUCTURAL ANALYSIS, FATIGUE (MATERIALS), FRACTURE MECHANICS, SPACE SHUTTLE MAIN ENGINE, SPACECRAFT PROPULSION, STRUCTURAL RELIABILITY

CHEMISTRY AND MATERIALS (GENERAL)

National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

SPECTROSCOPIC COMPARISON OF EFFECTS OF ELECTRON RADIATION ON MECHANICAL PROPERTIES OF TWO POLYIMIDES
EDWARD R. LONG, JR. and SHEILA ANN T. LONG Apr. 1987 21 p
(NASA-TP-2663; L-16200; NAS 1.60:2663) Avail: NTIS HC A02/MF A01 CSCL 11C
DURABILITY, ELECTRON RADIATION, KAPTON (TRADE-MARK), RADIATION DAMAGE, TENSILE PROPERTIES

COMPOSITE MATERIALS

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

National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EFFECTS OF THERMAL CYCLING ON GRAPHITE-FIBER-REINFORCED 6061 ALUMINUM
(NASA-TP-2612; L-16139; NAS 1.60:2612) Avail: NTIS HC A03/MF A01 CSCL 11D
ALUMINUM GRAPHITE COMPOSITES, CARBON FIBERS, METAL MATRIX COMPOSITES, REINFORCING FIBERS, SPACECRAFT STRUCTURES, THERMAL CYCLING TESTS

PRELIMINARY STRUCTURAL DESIGN OF COMPOSITE MAIN ROTOR BLADES FOR MINIMUM WEIGHT
(DA PROJ. 1L1-62209-AH-76) (NASA-TP-2730; L-16310; NAS 1.60:2730; AVSCOM-TM-87-B-6) Avail: NTIS HC A03/MF A01 CSCL 11D
BLADES, COMPOSITE MATERIALS, DYNAMIC STRUCTURAL ANALYSIS, HELICOPTERS, ROTORS, WEIGHT REDUCTION

THE ACEE PROGRAM AND BASIC COMPOSITES RESEARCH AT LANGLEY RESEARCH CENTER (1975 TO 1986): SUMMARY AND BIBLIOGRAPHY
MARVIN B. DOW Oct. 1987 147 p
(NASA-RP-1178; L-16290; NAS 1.61:1177) Avail: NTIS HC A07/MF A01 CSCL 11D
Composites research conducted at the Langley Research Center during the period from 1975 to 1986 is described, and an annotated bibliography of over 600 documents (with their abstracts) is presented. The research includes Langley basic technology and the composite primary structures element of the NASA Aircraft Energy Efficiency (ACEE) Program. The basic technology documents cited in the bibliography are grouped according to the research activity such as design and analysis, fatigue and fracture, and damage tolerance. The ACEE documents cover development of composite structures for transport aircraft.
INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

N87-18629*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ELECTRON STIMULATED DESORPTION OF ATOMIC OXYGEN FROM SILVER
R. A. OULAW, W. K. PEREGOY, GAR B. HOFLUND (Florida Univ., Gainesville), and GREGORY R. CORALLO Apr. 1987 25 p
(NASA-TP-2668; L-16225; NAS 1.60:2668) Avail: NTIS HC A02/MF A01 CSCL 07D
ATOMIC BEAMS, DESORPTION, ELECTRON EMISSION, OXYGEN, SILVER, STIMULATED EMISSION

METALLIC MATERIALS

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

N87-16902*# National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.
CONVENTIONALLY CAST AND FORGED COPPER ALLOY FOR HIGH-HEAT-FLUX THRUST CHAMBERS
JOHN M. KAZAROFF and GEORGE A. REPAS Feb. 1987 12 p
(NASA-TP-2694; E-3304; NAS 1.60:2694) Avail: NTIS HC A02/MF A01 CSCL 11F
COMBUSTION CHAMBERS, COPPER ALLOYS, HEAT FLUX, HIGH TEMPERATURE, LININGS, SPACE SHUTTLE MAIN ENGINE

N87-18644*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, Va.
EFFECT OF LID (REGISTERED) PROCESSING ON THE MICROSTRUCTURE AND MECHANICAL PROPERTIES OF Ti-6Al-4V AND Ti-6Al-2Sn-4Zr-2Mo TITANIUM FOIL-GAUGE MATERIALS
LINDA B. BALCKBURN Apr. 1987 27 p
(NASA-TP-2677; L-16098; NAS 1.60:2677) Avail: NTIS HC A03/MF A01 CSCL 11F
BONDING, DIFFUSION, INTERFACES, LIQUIDS, MECHANICAL PROPERTIES, MICROSTRUCTURE, PROTECTIVE COATINGS, TITANIUM ALLOYS

N87-20407*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, Va.
MATERIAL CHARACTERIZATION OF SUPERPLASTICALLY FORMED TITANIUM (Ti-6Al-25Sn-4Zr-2Mo) SHEET
WILLIAM A. OSSA (PRC Kentron, Inc., Hampton, Va.) and DICK M. ROYSTER 1987 38 p
(NASA-TP-2674; L-16115; NAS 1.60:2674) Avail: NTIS HC A03/MF A01 CSCL 11F
AEROSPACE INDUSTRY, SUPERPLASTICITY, TENSILE CREEP, TITANIUM ALLOYS

THE CORROSION MECHANISMS FOR PRIMER COATED 2219-T87 ALUMINUM
MERLIN D. DANFORD and WARD W. KNOCKEMUS (Huntingdon Coll., Montgomery, Ala.) Apr. 1987 25 p
(NASA-TP-2715; M-558; NAS 1.60:2715) Avail: NTIS HC A02/MF A01 CSCL 11F
ALUMINUM ALLOYS, CORROSION RESISTANCE, PRIMERS (COATINGS), PROTECTIVE COATINGS

HYDROGEN TRAPPING AND THE INTERACTION OF HYDROGEN WITH METALS
MERLIN D. DANFORD Jul. 1987 36 p
(NASA-TP-2744; NAS 1.60:2744) Avail: NTIS HC A03/MF A01 CSCL 11F
CRYSTAL LATTICES, GAS-METAL INTERACTIONS, HYDROGEN, TRAPPING

N87-27024*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, Va.
PERMEATION OF OXYGEN THROUGH HIGH PURITY, LARGE GRAIN SILVER
(NASA-TP-2755; L-16305; NAS 1.60:2755) Avail: NTIS HC A02/MF A01 CSCL 11F
GRAIN BOUNDARIES, OXYGEN, PERMEATING, PURITY, SILVER

NONMETALLIC MATERIALS

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

N87-12680*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, Va.
INVESTIGATION OF THE EFFECTS OF COBALT IONS ON EPOXY PROPERTIES
J. J. SINGH and D. M. STOAKLEY Dec. 1986 16 p
(NASA-TP-2639; L-16196; NAS 1.60:2639) Avail: NTIS HC A02/MF A01 CSCL 11G
COBALT, EPOXY RESINS, INVESTIGATION, IONS, MECHANICAL PROPERTIES

N87-18666*# National Aeronautics and Space Administration.
Lewis Research Center, Cleveland, Ohio.
ESTER OXIDATION ON AN ALUMINUM SURFACE USING CHEMILUMINESCENCE
WILLIAM R. JONES, JR., MICHAEL A. MEADOR, and WILFREDO MORALES Jul. 1986 16 p
(NASA-TP-2611; E-2647; NAS 1.60:2611) Avail: NTIS HC A02/MF A01 CSCL 11B
ALUMINUM ALLOYS, CHEMILUMINESCENCE, ESTERS, METAL SURFACES, OXIDATION

12
MICROGRAVITY CRYSTALLIZATION OF MACROMOLECULES: AN INTERIM REPORT AND PROPOSAL FOR CONTINUED RESEARCH 
MOLECULES, POLYMER CHEMISTRY, RECRYSTALLIZATION, REDUCED GRAVITY

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

N87-21141* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio. 
MICROGRAVITY FLUID MANAGEMENT SYMPOSIUM 
MANAGEMENT, WEIGHTLESSNESS, AEROSPACE ENVIRONMENTS, CONFERENCES, FLUID ENGINEERING (GENERAL) 
Includes vacuum technology; control engineering; display engineering; cryogenics; and fire prevention.

MODELING DIGITAL CONTROL SYSTEMS WITH MA-PREFILTERED MEASUREMENTS 
CONTROL SYSTEMS DESIGN, DIGITAL FILTERS, DIGITAL SYSTEMS, STATE VECTORS, SYSTEMS ENGINEERING

A NEW APPROACH TO STATE ESTIMATION IN DETERMINISTIC DIGITAL CONTROL SYSTEMS 
MICHAEL E. POLITES Jul. 1987 16 p (NASA-TP-2745; NAS 1.60:2745) Avail: NTIS HC A02/MF A01 CSCL 09B 
CONTROL SYSTEMS DESIGN, DIGITAL FILTERS, DIGITAL SYSTEMS, STATE VECTORS

N87-27067* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala. 
EXACT STATE RECONSTRUCTION IN DETERMINISTIC DIGITAL CONTROL SYSTEMS 
MICHAEL E. POLITES Aug. 1987 19 p (NASA-TP-2757; NAS 1.60:2757) Avail: NTIS HC A02/MF A01 CSCL 13H 
DIGITAL COMMAND SYSTEMS, STATE ESTIMATION, STATE VECTORS

32 COMMUNICATIONS AND RADAR

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

PULSE CODE MODULATION (PCM) DATA STORAGE AND ANALYSIS USING A MICROCOMPUTER 
D. E. MASSEY Aug. 1986 8 p (NASA-TP-2629; REPT-822.3; NAS 1.60:2629) Avail: NTIS HC A02/MF A01 CSCL 17B 
DATA PROCESSING, DATA REDUCTION, DATA STORAGE, MICROCOMPUTERS, PULSE CODE MODULATION

N87-17971* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio. 
UNIQUE BIT-ERROR-RATE MEASUREMENT SYSTEM FOR SATELLITE COMMUNICATION SYSTEMS 
MARY JO WINDMILLER Mar. 1987 13 p (NASA-TP-2699; E-3322; NAS 1.60:2699) Avail: NTIS HC A02/MF A01 CSCL 17B 
BIT ERROR RATE, COMMUNICATION NETWORKS, SATELLITE COMMUNICATION, SYSTEMS ANALYSIS

N87-20448* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio. 
UNIQUE BIT-ERROR-RATE MEASUREMENT SYSTEM FOR SATELLITE COMMUNICATION SYSTEMS 
MARY JO WINDMILLER Mar. 1987 13 p (NASA-TP-2699; E-3322; NAS 1.60:2699) Avail: NTIS HC A02/MF A01 CSCL 17B 
BIT ERROR RATE, COMMUNICATION NETWORKS, SATELLITE COMMUNICATION, SYSTEMS ANALYSIS

A SYNCHRONOUS DATA ANALYZER FOR THE MINIMUM DELAY DATA FORMAT (MDDF) AND LAUNCH TRAJECTORY ACQUISITION SYSTEM (LTAS) 
ANDREW J. GREEN Jul. 1987 10 p (NASA-TP-2743; REPT-822.1; NAS 1.60:2743) Avail: NTIS HC A02/MF A01 CSCL 17B 
DATA REDUCTION, LAUNCHING, SAMPLING, SYNCHRONISM, TRAJECTORY ANALYSIS

32 COMMUNICATIONS AND RADAR
ELECTRONICS AND ELECTRICAL ENGINEERING

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

**N87-11072** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
**THE 1985 GODDARD SPACE FLIGHT CENTER BATTERY WORKSHOP**

CONFERENCES, ENERGY STORAGE, LITHIUM SULFUR BATTERIES, NICKEL CADMIUM BATTERIES, NICKEL-HYDROGEN BATTERIES

**N87-17990** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**PERFORMANCE OF TEXTURED CARBON ON COPPER ELECTRODE MULTISTAGE DEPRESSED COLLECTORS WITH MEDIUM-POWER TRAVELING WAVE TUBES**
PETER RAMINS and ARTHUR N. CURREN Nov. 1986 12 p (NASA-TP-2665; E-3143; NAS 1.60:2665) Avail: NTIS HC A02/MF A01 CSCL 09A

ACCUMULATORS, CURRENT DENSITY, ELECTRODES, ELECTRON EMISSION, TRAVELING WAVE TUBES

**N87-17991** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**CALCULATION OF SECONDARY ELECTRON TRAJECTORIES IN MULTISTAGE DEPRESSED COLLECTORS FOR MICROWAVE AMP Li Mc Guire lifier s**
DALE A. FORCE Nov. 1986 7 p (NASA-TP-2664; E-3196; NAS 1.60:2664) Avail: NTIS HC A02/MF A01 CSCL 09A

ACCUMULATORS, ELECTRON EMISSION, MICROWAVE AMPLIFIERS, PARTICLE TRAJECTORIES, TRAVELING WAVE TUBES

**N87-20474** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**DESIGN, FABRICATION AND PERFORMANCE OF SMALL GRAPHITE ELECTRODE, MULTISTAGE DEPRESSED COLLECTORS WITH 200-W, CW, 8-TO 18-GHZ TRAVELING-WAVE TUBES**
BEN T. EBIBHARA and PETER RAMINS Feb. 1987 22 p (NASA-TP-2693; E-3099; NAS 1.60:2693) Avail: NTIS HC A02/MF A01 CSCL 09A

ACCUMULATORS, DESIGN ANALYSIS, ELECTRODES, FABRICATION, PYROLYTIC GRAPHITE, TRAVELING WAVE TUBES

**N87-21239** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**TRAVELING-WAVE-TUBE EFFICIENCY IMPROVEMENT BY A LOW-COST TECHNIQUE FOR DEPOSITION OF CARBON ON MULTISTAGE DEPRESSED COLLECTOR**
BEN T. EBIBHARA, PETER RAMINS, and SHELLY PEET May 1987 14 p (NASA-TP-2719; E-3416; NAS 1.60:2719) Avail: NTIS HC A02/MF A01 CSCL 09A

CARBON, COPPER, DEPOSITION, ELECTRODES, THIN FILMS, TRAVELING WAVE TUBES

**N87-22923** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**REVISED NASA AXIALLY SYMMETRIC RING MODEL FOR COUPLED-CAVITY TRAVELING-WAVE TUBES**
JEFFREY D. WILSON Jan. 1987 17 p (NASA-TP-2675; E-3220; NAS 1.60:2675) Avail: NTIS HC A02/MF A01 CSCL 09A
AXISYMMETRIC BODIES, CA VITIES, COUPLED MODES, MODELS, RINGS, TRAVELING WAVE TUBES

**N87-25532** National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
**ANALYTICAL AND EXPERIMENTAL PERFORMANCE OF A DUAL-MODE TRAVELING WAVE TUBE AND MULTISTAGE DEPRESSED COLLECTOR**
PETER RAMINS, DALE A. FORCE, and HENRY G. KOSMAHUAL Aug. 1987 29 p (NASA-TP-2752; E-3470; NAS 1.60:2752) Avail: NTIS HC A03/MF A01 CSCL 09A

ACCUMULATORS, ELECTRON BEAMS, TRAVELING WAVE TUBES

**FLUID MECHANICS AND HEAT TRANSFER**
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

**N87-11963** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**ON THE MAXWELLIAN DISTRIBUTION, SYMMETRIC FORM, AND ENTROPY CONSERVATION FOR THE EULER EQUATIONS**
S. M. DESHPANDE Nov. 1986 30 p (NASA-TP-2583; L-16036; NAS 1.60:2583) Avail: NTIS HC A03/MF A01 CSCL 20D

ENTROPY, EULER EQUATIONS OF MOTION, MAXWELL-BOLTZMANN DENSITY FUNCTION

**N87-13664** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
**AERO THERMAL TESTS OF SPHERICAL DOME PROTUBERANCES ON A FLAT PLATE AT A MACH NUMBER OF 6.5**

AEROTHERMODYNAMICS, HYPERSONIC VEHICLES, LAMINAR BOUNDARY LAYER, PREDICTION ANALYSIS TECHNIQUES, PROTUBERANCES, THERMAL PROTECTION, TILES, TURBULENT BOUNDARY LAYER

**N87-17000** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
**SPACE SHUTTLE MAIN ENGINE HIGH PRESSURE FUEL PUMP AFT PLATFORM SEAL CAVITY FLOW ANALYSIS**

CA VITIES, FUEL PUMPS, HIGH PRESSURE, SEALS (STOPPERS), SPACE SHUTTLE MAIN ENGINE, TURBINE PUMPS
N87-18034*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
JET MODEL FOR SLOT FILM COOLING WITH EFFECT OF FREE-STREAM AND COOLANT TURBULENCE
FREDERICK F. SIMON Oct. 1986 21 p
(NASA-TP-2655; E-2961; NAS 1.60:2955) Avail: NTIS HC
A02/MF A01 CSCL 20D
FILM COOLING, FLOW VELOCITY, JET ENGINES, NUMERICAL ANALYSIS, TURBULENCE EFFECTS, WALL JETS

N87-18035*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
VELOCITY PROFILES IN LAMINAR DIFFUSION FLAMES
Presented at the Combustion Inst. Meeting, Cleveland, Ohio, 5-8 May 1986
(NASA-TP-2596; E-2879; NAS 1.60:2596) Avail: NTIS HC
A02/MF A01 CSCL 20D
HEPTANES, DIFFUSION FLAMES, ETHYL ALCOHOL, HEXANES, LAMINAR FLOW, OCTANES, TEMPERATURE PROFILES, VELOCITY MEASUREMENT

N87-18782*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AERO THERMAL EVALUATION OF A SPHERICALLY BLUNTED BODY WITH A TRAPEZOIDAL CROSS SECTION IN THE LANGLEY 8-FOOT HIGH-TEMPERATURE TUNNEL
CINDY W. ALBERTSON Apr. 1986 83 p
(NASA-TP-2641; L-16096; NAS 1.60:2641) Avail: NTIS HC
A05/MF A01 CSCL 20D
BOUNDARY LAYERS, FLOW DISTRIBUTION, HEAT TRANSFER, PREDICTIONS, PRESSURE MEASUREMENT, THERMAL PROTECTION

N87-18783*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A SECOND-ORDER ACCURATE KINETIC-THEORY-BASED METHOD FOR INVISCID COMPRESSIBLE FLOWS
SURESH M. DESHPANDE Dec. 1986 42 p
(NASA-TP-2613; L-16050; NAS 1.60:2613) Avail: NTIS HC
A03/MF A01 CSCL 20D
BOLTZMANN TRANSPORT EQUATION, EULER EQUATIONS OF MOTION, KINETIC THEORY, NUMERICAL ANALYSIS, SHOCK WAVE PROPAGATION

N87-22103*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SPACELAB 3 MISSION SCIENCE REVIEW
(NASA-CP-2429; M-547; NAS 1.55:2429) Avail: NTIS HC
A05/MF A01 CSCL 22A
AEROSPACE ENVIRONMENTS, POSTFLIGHT ANALYSIS, REDUCED GRAVITY, SPACE COMMERCIALIZATION, SPACE SHUTTLES, SPACEBORNE EXPERIMENTS, SPACELAB

N87-23921*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THREE-STEP LABYRINTH SEAL FOR HIGH-PERFORMANCE TURBOMACHINES
ROBERT C. HENDRICKS Jun. 1987 75 p
(NASA-TP-1848; E-3186; NAS 1.60:1848) Avail: NTIS HC
A04/MF A01 CSCL 20D
FUEL PUMPS, LABYRINTH SEALS, SPACE SHUTTLE MAIN ENGINE, STATIC TESTS, TURBOMACHINERY

N87-23936*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STRAIGHT CYLINDRICAL SEAL FOR HIGH-PERFORMANCE TURBOMACHINES
ROBERT C. HENDRICKS Jun. 1987 76 p
(NASA-TP-1850; E-3185; NAS 1.60:1850) Avail: NTIS HC
A05/MF A01 CSCL 20D
CYLINDRICAL BODIES, FUEL PUMPS, SEALS (STOPPERS), SPACE SHUTTLE MAIN ENGINE, TURBINE PUMPS, TURBOMACHINERY

N87-24639*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THREE-STEP CYLINDRICAL SEAL FOR HIGH-PERFORMANCE TURBOMACHINES
ROBERT C. HENDRICKS Jun. 1987 79 p
(NASA-TP-1849; E-3185; NAS 1.60:1849) Avail: NTIS HC
A05/MF A01 CSCL 20D
DYNAMIC STABILITY, FUEL PUMPS, LEAKAGE, PUMP SEALS, SPACE SHUTTLE MAIN ENGINE, TURBINE PUMPS

N87-24672*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MULTISCALE TURBULENCE EFFECTS IN SUPERSONIC JETS EXHAUSTING INTO STILL AIR
(NASA-TP-2707; L-16256; NAS 1.60:2707) Avail: NTIS HC
A03/MF A01 CSCL 20D
JET EXHAUST, NAVIER-STOKES EQUATION, SUPERSONIC AIRCRAFT, TURBULENCE

N87-26309*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SIMPLIFIED CURVE FITS FOR THE THERMODYNAMIC PROPERTIES OF EQUILIBRIUM AIR
S. SRINIVASAN, J. C. TANNEHILL (Iowa State Univ. of Science and Technology, Ames.), and K. J. WEILMUESTER Aug. 1987 48 p
(NASA-RP-1181) (NASA-CP-2429; M-547; NAS 1.60:2429) Avail: NTIS HC
A03/MF A01 CSCL 20D
New, improved curve fits for the thermodynamic properties of equilibrium air have been developed. The curve fits are for pressure, speed of sound, temperature, entropy, enthalpy, density, and internal energy. These curve fits can be readily incorporated into new or existing computational fluid dynamics codes if real gas effects are desired. The curve fits are constructed from Grabau-type transition functions to model the thermodynamic surfaces in a piecewise manner. The accuracies and continuity of these curve fits are substantially improved over those of previous curve fits. These improvements are due to the incorporation of a small number of additional terms in the approximating polynomials and careful choices of the transition functions. The ranges of validity of these new curve fits are temperatures up to 25 000 K and densities from 10 to the -7 to 10 to the 3d power amagats. Author

N87-27161*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPLICATION OF TURBULENCE MODELING TO PREDICT SURFACE HEAT TRANSFER IN STAGNATION FLOW REGION OF CIRCULAR CYLINDER
CHI R. WANG and FREDERICK C. YEH Sep. 1987 25 p
(NASA-TP-1846; E-3186; NAS 1.60:1846) Avail: NTIS HC
A04/MF A01 CSCL 20D
CIRCULAR CYLINDERS, HEAT TRANSFER, MODELS, STAGNATION FLOW, SURFACE PROPERTIES, TURBULENCE

N87-27161*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPLICATION OF TURBULENCE MODELING TO PREDICT SURFACE HEAT TRANSFER IN STAGNATION FLOW REGION OF CIRCULAR CYLINDER
CHI R. WANG and FREDERICK C. YEH Sep. 1987 25 p
(NASA-TP-2758; E-3418; NAS 1.60:2758) Avail: NTIS HC
A02/MF A01 CSCL 20D
CIRCULAR CYLINDERS, HEAT TRANSFER, MODELS, STAGNATION FLOW, SURFACE PROPERTIES, TURBULENCE
34 FLUID MECHANICS AND HEAT TRANSFER

N87-29778* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DESCRIPTION AND CALIBRATION OF THE LANGLEY HYPERSONIC CF4 TUNNEL: A FACILITY FOR SIMULATING LOW GAMMA FLOW AS OCCURS FOR A REAL GAS
RAYMOND E. MIDDEN and CHARLES G. MILLER, III Mar. 1985 78 p
(NASA-TP-2384; L-15798; NAS 1.60:2384) Avail: NTIS HC A05/MF A01 CSCL 300
CALIBRATING, CARBON TETRAFLUORIDE, HYPERSONIC WIND TUNNELS, MACH NUMBER, REAL GASES, TEST FACILITIES

N87-29795* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FINITE-ELEMENT REENTRY HEAT-TRANSFER ANALYSIS OF SPACE SHUTTLE ORBITER
WILLIAM L. KO, ROBERT D. QUINN, and LESLIE GONG Dec. 1986 59 p
(NASA-TP-2657; H-1236; NAS 1.60:2657) Avail: NTIS HC A04/MF A01 CSCL 20E
AERODYNAMIC HEATING, FINITE ELEMENT METHOD, HEAT TRANSFER COEFFICIENTS, REENTRY SHIELDING, SPACE SHUTTLE ORBITERS, THERMAL ANALYSIS

35 INSTRUMENTATION AND PHOTOGRAPHY

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

N87-10263* National Aeronautics and Space Administration.
THIRTEENTH INTERNATIONAL LASER RADAR CONFERENCE
(NASA-CP-2431; L-16201; NAS 1.55:2431) Avail: NTIS HC A15/MF A01 CSCL 131
WORKSHOPS, LASERS, METEOROLOGICAL PARAMETERS, MIDDLE ATMOSPHERE, OPTICAL RADAR, RADAR EQUIPMENT

N87-13731* National Aeronautics and Space Administration.
EVALUATION OF DIFFUSE-ILLUMINATION HOLOGRAPHIC CINEMATOGRAPHY IN A FLUTTER CASCADE
A. J. DECKER Jul. 1986 33 p
(NASA-TP-2593; E-2937; NAS 1.60:2593) Avail: NTIS HC A03/MF A01 CSCL 14E
CINEMATOGRAPHY, FLOW VISUALIZATION, HOLOGRAPHIC INTERFEROMETRY, HOLOGRAPHY, LASER OUTPUTS, THREE DIMENSIONAL FLOW

N87-20514* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A SIMPLIFIED METHOD FOR DETERMINING HEAT OF COMBUSTION OF NATURAL GAS
JAG J. SINGH, HOSHANG CHEGINI (Old Dominion Univ., Norfolk, Va.), and GERALD H. MALL (Computer Sciences Corp., Hampton, Va.) Apr. 1987 15 p
(NASA-TP-2592; L-16281; NAS 1.60:2592) Avail: NTIS HC A02/MF A01 CSCL 14B
GAS DETECTORS, HEAT OF COMBUSTION, NATURAL GAS, OXYGEN SUPPLY EQUIPMENT

36 LASERS AND MASERS

Includes parametric amplifiers.

N87-20522* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CLOSED-CYCLE, FREQUENCY-STABLE CO2 LASER TECHNOLOGY
Workshop held in Hampton, Va., 10-12 Jun. 1986
(NASA-CP-2456; L-16271; NAS 1.55:2456) Avail: NTIS HC A13/MF A01 CSCL 20E
CARBON DIOXIDE LASERS, CLOSED CYCLES, FREQUENCY STABILITY, RESEARCH MANAGEMENT

N87-27994* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FREQUENCY DOMAIN LASER VELOCIMETER SIGNAL PROCESSOR: A NEW SIGNAL PROCESSING SCHEME
JAMES F. MEYERS and JAMES I. CLEMMONS, JR. Sep. 1987 38 p
(NASA-TP-2735; L-16209; NAS 1.60:2735) Avail: NTIS HC A03/MF A01 CSCL 20E
DOMAINS, FREQUENCIES, LASER DOPPLER VELOCIMETERS, SIGNAL PROCESSING

37 MECHANICAL ENGINEERING

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

N87-10391* National Aeronautics and Space Administration.
TESTING OF UH-GOA HELICOPTER TRANSMISSION IN NASA LEWIS 2240-KW (3000-HP) FACILITY
A. M. MITCHELL, F. B. OSWALD, and H. H. COE Aug. 1986 30 p
(NASA-TP-2626; E-2941; NAS 1.60:2626) Avail: NTIS HC A03/MF A01 CSCL 131
HELICOPTERS, TRANSMISSIONS (MACHINE ELEMENTS), VIBRATION MEASUREMENT

N87-18821* National Aeronautics and Space Administration.
TETHER DYNAMICS SIMULATION
(NASA-CP-2458; NAS 1.55:2458) Avail: NTIS HC A15/MF A01 CSCL 22B
COMPUTERIZED SIMULATION, ELECTRODYNAMICS, TETHERED SATELLITES, TETHER LINES
39 STRUCTURAL MECHANICS

N87-20555*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio. VIBRATION CHARACTERISTICS OF OH-58A HELICOPTER MAIN ROTOR TRANSMISSION DAVID G. LEWICKI and JOHN J. COY Apr. 1987 18 p (NASA-TP-2705; E-3368; NAS 1.60:2705; AVSCOM-TR-86-C-42; AD-A180364) Avail: NTIS HC A01/MF A01 CSCL 01C HELICOPTERS, ROTOR AERODYNAMICS, TRANSMISSIONS (MACHINE ELEMENTS), VIBRATION MEASUREMENT


N87-22235*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio. GEAR TOOTH STRESS MEASUREMENTS ON THE UH-60A HELICOPTER TRANSMISSION FRED B. OSWALD Mar. 1987 17 p (NASA-TP-2698; E-3357; NAS 1.60:2698) Avail: NTIS HC A02/MF A01 CSCL 131 GEAR TEETH, STRESS MEASUREMENT, TRANSMISSIONS (MACHINE ELEMENTS), UH-60A HELICOPTER

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.


39 STRUCTURAL MECHANICS

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


N87-16321*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio. THE 20TH AEROSPACE MECHANICS SYMPOSIUM May 1986 316 p Symposium held in Cleveland, Ohio, 7-9 May 1986; sponsored by NASA, the California Inst. of Tech. and LMSC (NASA-CP-2423-REV; E-2904; NAS 1.55:2423-REV) Avail: NTIS HC A14/MF A01 CSCL 20K ACTUATORS, CONFERENCES, FLEXIBLE SPACECRAFT, HYDRAULIC EQUIPMENT, JOINTS (JUNCTIONS), MANIPULATORS, SPACE STATIONS, SPACECRAFT INSTRUMENTS, SPATTERING, TRIBOLOGY

39 STRUCTURAL MECHANICS

N87-20566*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio. SHOT PEENING FOR TI-6AL-4V ALLOY COMPRESSOR BLADES GERALD A. CAREK Apr. 1987 9 p (NASA-TP-2711; E-3430; NAS 1.60:2711) Avail: NTIS HC A01/MF A01 CSCL 20K ALUMINUM, COMPRESSOR BLADES, SHOT PEENING, TITANIUM ALLOYS, VANADIUM

N87-20567*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. MODELING OF JOINTS FOR THE DYNAMIC ANALYSIS OF TRUSS STRUCTURES W. KEITH BELVIN May 1987 43 p (NASA-TP-2661; L-16163; NAS 1.60:2661) Avail: NTIS HC A03/MF A01 CSCL 20K DYNAMIC STRUCTURAL ANALYSIS, JOINTS (JUNCTIONS), LARGE SPACE STRUCTURES, MODELS, TRUSSES


42 GEOSCIENCES (GENERAL)

N87-18139*# National Aeronautics and Space Administration. NASA Goddard Space Flight Center, Greenbelt, Md. GEOMORPHOLOGY FROM SPACE: A GLOBAL OVERVIEW OF REGIONAL LANDFORMS NICHOLAS M. SHORT, ed. and ROBERT W. BLAIR, JR., ed. (Fort Lewis A&M Coll., Durango, Colo.) 1986 737 p Original contains color illustrations (NASA-SP-486; NAS 1.21:486; LC-86-17974) Avail: SOD HC $41.00 as 033-000-00994-1; NTIS MF E03 CSCL 08E This book, Geomorphology from Space: A Global Overview of Regional Landforms, was published by NASA STIF as a successor to the two earlier works on the same subject: Mission to Earth: LANDSAT views the Earth, and ERTS-1: A New Window on Our Planet. The purpose of the book is threefold: first, to serve as a stimulant in rekindling interest in descriptive geomorphology and landforms analysis at the regional scale; second, to introduce the community of geologists, geographers, and others who analyze the Earth's surficial forms to the practical value of space-acquired remotely sensed data in carrying out their research and applications; and third, to foster more scientific collaboration between geomorphologists who are studying the Earth's landforms and astrogeologists who analyze landforms on other planets and moons in the solar system, thereby strengthening the growing field of comparative planetology. F.M.R.

43 EARTH RESOURCES AND REMOTE SENSING

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

N87-22281*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. SURFACE BIDIRECTIONAL REFLECTANCE PROPERTIES OF TWO SOUTHWESTERN ARIZONA DESERTS FOR WAVELENGTHS BETWEEN 0.4 AND 2.2 MICROMETERS CHARLES H. WHITLOCK, G. CARLTON PURGOLD, and STUART R. LECROY (PRC Kentron, Inc., Hampton, Va.) May 1987 48 p (NASA-TP-2643; L-16159; NAS 1.60:2643) Avail: NTIS HC A03/MF A01 CSCL 20F ALBEDO, BIDIRECTIONAL REFLECTANCE, DESERTS, DIRECTIVITY, SOLAR POSITION, ZENITH

N87-27315*# National Aeronautics and Space Administration, Washington, D.C. EARTH RESOURCES: A CONTINUING BIBLIOGRAPHY WITH INDEXES (ISSUE 54) Aug. 1987 164 p (NASA-SP-7041(54); NAS 1.21:7041(54)) Avail: NTIS HC A08 CSCL 058B This bibliography lists 562 reports, articles, and other documents introduced into the NASA scientific and technical information system between April 1 and June 30, 1987. 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, hydology and water management, data processing and distribution
systems, instrumentation and sensors, and economic analysis.

Author

N87-28162# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EFFECTS OF AEROSOLS AND SURFACE SHADOWING ON BIDIRECTIONAL REFLECTANCE MEASUREMENTS OF DESERTS

DAVID E. BOWKER and RICHARD E. DAVIS Sep. 1987 26 p (NASA-TP-2756; L-16327; NAS 1.60:2756) Avail: NTIS HC A03/MF A01 CSCL 04A

AEROSOLS, BIDIRECTIONAL REFLECTANCE, DESERTS, DUST, REMOTE SENSING, SHADOWS, SURFACE PROPERTIES

N87-28955# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ATLAS OF ABSORPTION LINES FROM 0 TO 17900 CM^{-1}


Plots of logarithm (base 10) of absorption line strength versus wavenumber from 0 to 17900/cm(sup)-1 are shown for the 28 atmospheric gases (H2O, CO2, O3, N2O, CO, CH4, O2, NO, SO2, NO2, NH3, HNO3, CH3O, HF, HCl, HBr, HI, CO2, OCS, H2CO, NO2, HCN, CH3CN, H2O2, C2H2, C2H6, PH3), which appear in the 1986 Air Force Geophysics Laboratory high-resolution transmission molecular absorption data base (HI grenades) and for O(P-3), O-18 isotopic ozone, and HO2 from the 1984 JPL compilation in the 0- to 200/cm(sup)-1 region, and infrared solar CO lines at 4500 K. Also shown are plots of logarithm (base 10) of approximate infrared absorption cross sections of 11 heavy molecules versus wavenumber. The cross-section data cover 700 to 1800/cm(sup)-1 and are included as a separate data file in the 1986 HITRAN database.

Author

44

ENERGY PRODUCTION AND CONVERSION

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

N87-26413# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio

SPACE PHOTOVOLTAIC RESEARCH AND TECHNOLOGY 1986.

HIGH EFFICIENCY, SPACE ENVIRONMENT, AND ARRAY TECHNOLOGY


CONFERENCES, ENERGY CONVERSION EFFICIENCY, PHOTOVOLTAIC CONVERSION, SOLAR CELLS, SPACECRAFT POWER SUPPLIES

N87-29914# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio

SPACE ELECTROCHEMICAL RESEARCH AND TECHNOLOGY (SERT)

Sep. 1987 364 p Conference held in Cleveland, Ohio, 14-16 Apr. 1987 (NASA-CP-2484; E-3506; NAS 1.55:2484) Avail: NTIS HC A16/MF A01 CSCL 10C

ELECTRIC BATTERIES, ELECTROCATALYSTS, ELECTROCHEMISTRY, MATHEMATICAL MODELS, REGENERATIVE FUEL CELLS

N87-11195# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

AIRBORNE LIDAR MEASUREMENTS OF EL CHICHON STRATOSPHERIC AEROSOLS, MAY 1983


An experimental survey flight to determine the spatial distribution and aerosol characteristics of the El Chichon-produced stratospheric aerosol was conducted in May 1983. The mission included several different sensors flown aboard the NASA Convair 990 at latitudes between 72 deg. and 56 deg. s. This report presents the lidar data from that flight mission. Representative profiles of lidar backscatter ratio, plots of integrated backscattering function versus latitude, and contours of backscatter mixing ratio versus altitude and latitude are given. In addition, tables containing numerical values of the backscatter ratio and backscattering function versus altitude are supplied for each profile. By May 1983, material produced by the El Chichon eruptions of late March-early April 1982 had spread throughout the latitudes covered by this mission. However, the most massive portion of the material resided north of 33 deg. N and was concentrated below 21 km. In this latitude region (33 deg. N to 72 deg. S), peak backscatter ratios at a wavelength of 0.5943 microns varied between 3.5 and 4.5, and the peak integrated backscattering function was about 18 X 10^-10 to the -4 power/cm² corresponding to a peak optical depth calculated to be approximately 0.08. This report presents the results of this mission in a ready-to-use format for atmospheric and climatic studies.

Author

N87-13022# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

DESCRIPTION OF DATA ON THE NIMBUS 7 LIMS MAP ARCHIVE TAPE: OZONE AND NITRIC ACID


INFRARED DETECTORS, KALMAN FILTERS, NIMBUS 7 SATELLITE, NITRIC ACID, OZONE, STRATOSPHERE

N87-15528# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

FUTURE DIRECTIONS FOR H SUB X 0 SUB Y DETECTION


ATMOSPHERIC COMPOSITION, HYDROGEN PEROXIDE, HYDROXYL RADICALS, TROPOSPHERE, WATER

N87-17417# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

SAGE AEROSOL MEASUREMENTS. VOLUME 3: JANUARY 1, 1981 TO NOVEMBER 18, 1981

M. PATRICK MCCORMICK Feb. 1987 274 p (NASA-CP-1137; L-16177; NAS 1.61:1173) Avail: NTIS HC A12/MF A01 CSCL 04A

The Stratospheric Aerosol and Gas Experiment (SAGE) satellite system, launched February 18, 1979, obtained profiles of aerosol extinction at 1.00 micron and 0.45 micron ozone concentration, and nitrogen dioxide concentration. Data taken during sunset events are presented in the form of zonal and seasonal averages of
aerosol extinction of 1.00 micron and 0.45 micron, ratios of aerosol extinction to molecular extinction at 1.00 micron and ratios of aerosol extinction at 0.45 micron to aerosol extinction at 1.00 micron. Averages for 1981 are shown in tables, and in profile and contour plots (as a function of altitude and latitude). In addition, temperature data provided by NOAA for the time and location of each SAGE measurement are averaged and shown in a similar format. The stratospheric aerosol distribution for 1981 shows effects of volcanically injected material from eruptions of Ulawun, Alaid, and Pagan. Peak values of aerosol extinction at 0.45 micron and 1.00 micron were 2 to 4 times higher than typical peak values observed during near background conditions. Stratospheric aerosol optical depth values at 1.00 microns increased by a factor of about 2 from near background levels in regions of volcanic activity. During the year, these values ranged from between 0.001 and 0.006. The largest were near the location of a recent eruption. The distribution of the ratio of aerosol to molecular extinction at 1.00 microns also showed that maximum values are found in the vicinity of an eruption. These maximum varied in altitude, but remained below a height of about 25 km. No attempt has been made to give detailed explanations or interpretations of these data. The report is intended to provide, in a ready-to-use visual format, representative zonal and seasonal averages of aerosol extinction data for the third calendar year of the SAGE data set to facilitate atmospheric and climatic studies.

Author


N87-20663*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. AIRBORNE LIDAR MEASUREMENTS OF EL CHICHON STRATOSPHERIC AEROSOLS, JANUARY 1984 M. PATRICK MCCORMICK and M. T. OSBORN (ST Systems Corp., Hampton, Va.) Apr. 1987 49 p (NASA-RP-1175; L-16234; NAS 1.61:1175) Avail: NTIS HC A03/MF A01 CSCL 04A A lidar-equipped NASA Electra aircraft was flown in January 1984 between the latitude of 38 and 90 deg N. One of the primary purposes of this mission was to determine the spatial distribution and aerosol characteristics of El Chichon produced stratospheric material. Lidar data from that portion of the flight mission between 38 deg N and 77 deg N is presented. Representative profiles of lidar backscatter ratio, a plot of the integral backscattering function versus latitude, and contours of backscatter mixing ratio versus altitude and latitude are given. In addition, tables containing numerical values of the backscatter ratio and backscattering function versus altitude are applied for each profile. These data clearly show that material produced by the El Chichon eruptions of late March-early April 1982 had spread throughout the latitudes covered by this mission, and that the most massive portion of the material resided north of 55 deg N and was concentrated below 17 km in a layer that peaked at 13 to 15 km. In this latitude region, peak backscatter ratios at a wavelength of 0.6943 microns were approximately 3 and the peak integrated backscattering function was about 15 X 10 to the -10 power corresponding to a peak optical depth of approximately 0.07. This report presents the results of this mission in a ready-to-use format for atmospheric and climatic studies.

Author


47

METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.


N87-20701*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. ON REQUIREMENTS FOR A SATELLITE MISSION TO MEASURE TROPICAL RAINFALL OTTO W. THIELE, ed. Apr. 1987 67 p (NASA-RP-1183; NAS 1.61:1183) Avail: NTIS HC A04/MF A01 CSCL 04B Tropical rainfall data are crucial in determining the role of tropical latent heating in driving the circulation of the global atmosphere. Also, the data are particularly important for testing the realism of climate models, and their ability to simulate and predict climate accurately on the seasonal time scale. Other scientific issues such as the effects of El Nin~ on climate could be addressed with a reliable, extended time series of tropical rainfall observations. A passive microwave sensor is planned to provide information on the integrated column precipitation content, its areal distribution, and its intensity. An active microwave sensor (radar) will define the layer depth of the precipitation and provide information about the intensity of rain reaching the surface, the key to determining the latent heat input to the atmosphere. A visible/infrared sensor will provide very high resolution information on cloud coverage, type, and top temperatures and also serve as the link between these data and the long and virtually continuous coverage by the geosynchronous meteorological satellites. The unique combination of sensor wavelengths, coverages, and resolving capabilities
together with the low-altitude, non-Sun synchronous orbit provide
a sampling capability that should yield monthly precipitation
amounts to a reasonable accuracy over a 500- by 500-km grid.

Author

N87-22341*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, Va.
ATMOSPHERIC TURBULENCE RELATIVE TO AVIATION,
MISSILE, AND SPACE PROGRAMS
DENNIS W. CAMP, ed. and WALTER FROST, ed. (FWG
held in Hampton, Va., 2-4 Apr. 1986 (NASA-CP-2488; L-16296; NAS 1.55:2468) Avail: NTIS HC
A12/MF A01 CSCL 04B
AIRCRAFT SAFETY, ATMOSPHERIC MODELS, ATMOSPHERIC
TURBULENCE, CONFERENCES, MISSILES, SPACE PROGRAMS,
WEATHER FORECASTING

N87-26489*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, Va.
ATLAS OF WIDE-FIELD-OF-VIEW OUTGOING LONGWAVE
RADIATION DERIVED FROM NIMBUS 6 EARTH RADIATION
BUDGET DATA SET, JULY 1975 TO JUNE 1978
T. DALE BESS and G. LOUIS SMITH Aug. 1987 80 p
(NASA-RI-1185; L-16325; NAS 1.61:1185) Avail: NTIS HC
A05/MF A01 CSCL 04B
An atlas of monthly mean outgoing longwave radiation global
contour maps and associated spherical harmonic coefficients is
presented. The atlas contains 36 months of continuous data from
July 1975 to June 1978. The data were derived from the first
Earth radiation budget experiment, which was flown on the
Nimbus-6 Sun-synchronous satellite in 1975. Only the
wide-field-of-view longwave measurements are cataloged in this
atlas. The contour maps along with the associated sets of spherical
harmonic coefficients form a valuable data set for studying different
aspects of our changing climate over monthly, annual, and
interannual scales in the time domain, and over regional, zonal,
and global scales in the spatial domain.

Author

N87-26491*# National Aeronautics and Space Administration.
Langley Research Center, Hampton, Va.
CALIBRATION OF THE SPIN-SCAN OZONE IMAGER ABOARD
THE DYNAMICS EXPLORER 1 SATELLITE
WALTER E. BRESSETTE, GERALD M. KEATING, and DAVID F.
YOUNG (ST Systems Corp., Hampton, Va.) Aug. 1987 44 p
(NASA-TP-2723; L-16109; NAS 1.60:2723) Avail: NTIS HC
A03/MF A01 CSCL 04B
ALGORITHMS, CALIBRATING, DYNAMICS EXPLORER 1
SATELLITE, OZONE, REGRESSION ANALYSIS, ULTRAVIOLET
SPECTROMETERS

N87-29996**# National Aeronautics and Space Administration.
Goddard Space Flight Center, Greenbelt, Md.
FIVE YEAR GLOBAL DATASET: NMC OPERATIONAL
ANALYSES (1978 TO 1982)
DAVID STRAUS and JOSEPH ARIZZONE Sep. 1987 50 p
Prepared in cooperation with Sigma Data Services Corp., Rockville,
Md. (NASA-RI-1194; REPT-87B0273; NAS 1.61:1194) Avail: NTIS HC
A03/MF A01 CSCL 04B
This document describes procedures used in assembling a five
year dataset (1978 to 1982) using NMC Operational Analysis data.
These procedures entailed replacing missing and unacceptable
data in order to arrive at a complete dataset that is continuous in
time. In addition, a subjective assessment on the integrity of all
data (both preliminary and final) is presented. Documentation on
tapes comprising the Five Year Global Dataset is also included.

Author

52 AEROSPACE MEDICINE

Includes biological, dynamic, and physical oceanography; and
marine resources.

N87-24870* National Aeronautics and Space Administration.
Goddard Space Flight Center, Greenbelt, Md.
ARCTIC SEA ICE, 1973-1976: SATELLITE PASSIVE-MICROWAVE
OBSERVATIONS
CLAIRE L. PARKINSON, JOSEFINO C. COMISO, H. JAY ZWALLY,
DONALD J. CAVALIERI, PER GLOERSEN, and WILLIAM J.
CAMPBELL (Puget Sound Univ., Tacoma, Wash.) Jan. 1987
301 p Original contains color illustrations
(NASA-SP-489; NAS 1.21:489; LC-86-23876) Avail: NTIS HC
A14 CSCL 06B
The Arctic region plays a key role in the climate of the earth.
The sea ice cover affects the radiative balance of the earth and
radically changes the fluxes of heat between the atmosphere and
the ocean. The observations of the Arctic made by the Electrically
Scanning Microwave Radiometer (ESMR) on board the Nimbus 5
research satellite are summarized for the period 1973 through
1976.

Author

51 LIFE SCIENCES (GENERAL)

N87-20727*# National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.
LIQUID DROP STABILITY FOR PROTEIN CRYSTAL GROWTH
IN MICROGRAVITY
ROBERT B. OWEN, BETH H. BROOM, ROBERT S. SNYDER,
and RON DANIEL Apr. 1987 17 p
(NASA-TP-2724; NAS 1.60:2724) Avail: NTIS HC A02/MF A01
CSCL 06B
CRYSTAL GROWTH, DROPS (LIQUIDS), MICROGRAVITY
APPLICATIONS, PROTEIN SYNTHESIS, STABILITY

52 AEROSPACE MEDICINE

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

N87-18976' National Aeronautics and Space Administration.
Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CUMULATIVE INDEX
TO THE 1986 ISSUES (SUPPLEMENT 293)
Jan. 1987 251 p
(NASA-SP-7011(293); NAS 1.21:7011(293)) Avail: NTIS HC A12
CSCL 06E
This publication is a cumulative index to the abstracts contained
in the Supplements 281 through 292 of Aerospace Medicine and
Biology: A Continuing Bibliography. It includes seven indexes
subject, personal author, corporate source, foreign technology,
contract number, report number, and accession number.

Author
N87-30041# National Aeronautics and Space Administration, Washington, D.C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 302)
Oct. 1987 55 p (NASA-SP-7011(302); NAS 1.21:7011(302)) Avail: HC A04 CSCL 06E
This bibliography lists 131 reports, articles, and other documents introduced into the NASA scientific and technical information system in September, 1987. Author

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

N87-10720# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ACCESS CONTROL, COMPUTER NETWORKS, FORMAT, IMAGE PROCESSING, ORBITAL SPACE STATIONS, SOFTWARE ENGINEERING, SOFTWARE TOOLS

N87-19931# National Aeronautics and Space Administration, Washington, D.C.
ARCHITECTURE (COMPUTERS), CONCURRENT PROCESSING, CONFERENCES, DATA MANAGEMENT, DISTRIBUTED PROCESSING, EXPERT SYSTEMS, SOFTWARE ENGINEERING

N87-19932# National Aeronautics and Space Administration, Washington, D.C.
CONFERENCES, DATA STORAGE, DISTRIBUTED PROCESSING, FIBER OPTICS, OPTICAL DATA PROCESSING, PARALLEL PROCESSING (COMPUTERS), VHSIC (CIRCUITS)

N87-23156# National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.
APPLICATIONS PROGRAMS (COMPUTERS), COMPUTER SYSTEMS PROGRAMS, CONFERENCES, IMAGE PROCESSING, INFORMATION SYSTEMS, MAN-COMPUTER INTERFACE, OPERATING SYSTEMS (COMPUTERS)

N87-26531# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ALGORITHMS, COMPUTER GRAPHICS, COMPUTER SYSTEMS PERFORMANCE, COMPUTERIZED SIMULATION, PARALLEL COMPUTERS, PARALLEL PROCESSING (COMPUTERS)

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

N87-23202# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPLICATIONS AND REQUIREMENTS FOR REAL-TIME SIMULATORS IN GROUND-TEST FACILITIES DALE J. ARPAASI and RICHARD A. BLECH Dec. 1986 26 p (NASA-TP-2672; E-3189; NAS 1.60:2672) Avail: NTIS HC A03/MF A01 CSCL 09B
GROUND TESTS, REAL TIME OPERATION, SIMULATORS, TEST FACILITIES

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

N87-14054# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SOME PATH-FOLLOWING TECHNIQUES FOR SOLUTION OF NONLINEAR EQUATIONS AND COMPARISON WITH PARAMETRIC DIFFERENTIATION R. L. BARGER and R. W. WALTERS (Virginia Polytechnic Inst. and State Univ., Blacksburg.) 1986 16 p (NASA-TP-2654; L-16199; NAS 1.60:2654) Avail: NTIS HC A02/MF A01 CSCL 12A
COMPUTER PROGRAMMING, CRITICAL PATH METHOD, DIFFERENTIAL EQUATIONS, NONLINEAR EQUATIONS, PARAMETER IDENTIFICATION

N87-14918# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SOLUTION OF ELLIPTIC PARTIAL DIFFERENTIAL EQUATIONS BY FAST POISSON SOLVERS USING A LOCAL RELAXATION FACTOR 2: TWO-STEP METHOD S. C. CHANG May 1986 17 p (NASA-TP-2530; E-2528-1; NAS 1.60:2530) Avail: NTIS HC A02/MF A01 CSCL 12A
ELLIPITC DIFFERENTIAL EQUATIONS, ELLIPTIC FUNCTIONS, PARTIAL DIFFERENTIAL EQUATIONS, PROBLEM SOLVING
71 ACOUSTICS

Includes sound generation, transmission, and attenuation.

N87-14120* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. EFFECTS OF BACKGROUND NOISE ON TOTAL NOISE ANNOYANCE
K. F. WILLSHIRE Jan. 1987 59 p (NASA-TP-2630; L-16153; NAS 1.60:2630) Avail: NTIS HC A04/MF A01 CSCL 46A
BACKGROUND NOISE, EFFECTIVE PERCEIVED NOISE LEVELS, NOISE INTENSITY, NOISE POLLUTION, NOISE TOLERANCE

N87-23397* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. POWER CEPSTRUM TECHNIQUE WITH APPLICATION TO MODEL HELICOPTER ACOUSTIC DATA
ACOUSTIC MEASUREMENT, CEPSTRAL ANALYSIS, HELICOPTERS, MODELS, SIGNAL REFLECTION

N87-18399* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. EXPERIMENTAL VALIDATION OF A TWO-DIMENSIONAL SHEAR-FLOW MODEL FOR DETERMINING ACOUSTIC IMPEDANCE
TONY L. PARROTT, WILLIE R. WATSON, and MICHAEL G. JONES (PRC Kentron, Inc., Hampton, Va.) May 1987 50 p (NASA-TP-2679; L-16203; NAS 1.60:2679) Avail: NTIS HC A03/MF A01 CSCL 20A
ACOUSTIC IMPEDANCE, MODELS, SHEAR FLOW, TWO DIMENSIONAL FLOW

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N87-23244* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. DEVELOPMENT OF CONFIDENCE LIMITS BY PIVOTAL FUNCTIONS FOR ESTIMATING SOFTWARE RELIABILITY
KELLY J. DOTSON Jun. 1987 12 p (NASA-TP-2709; L-16254; NAS 1.60:2709) Avail: NTIS HC A02/MF A01 CSCL 12A
CONFIDENCE LIMITS, FAILURE ANALYSIS, PREDICTIONS, RELIABILITY ANALYSIS, SOFTWARE ENGINEERING

N87-24161* # National Aeronautics and Space Administration. Langley Research Center, Hampton, Va. ANNOYANCE RESPONSE TO SIMULATED ADVANCED TURBOPROP AIRCRAFT INTERIOR NOISE CONTAINING TONAL BEATS
JACK D. LEATHERWOOD Jul. 1987 28 p (NASA-TP-2669; L-16164; NAS 1.60:2669) Avail: NTIS HC A03/MF A01 CSCL 20A
AIRCRAFT COMPARTMENTS, AIRCRAFT NOISE, HUMAN TOLERANCES, PSYCHOLOGICAL EFFECTS, RESPONSES
NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

DOUBLY DIFFERENTIAL CROSS SECTIONS FOR GALACTIC HEAVY-ION FRAGMENTATION
FRANCIS A. CUCINOTTA (Old Dominion Univ., Norfolk, Va.), JOHN W. NORBURY, GOVIND S. KHANDELWAL, and LAWRENCE W. TOWNSEND
Feb. 1987 23 p
(NASA-TP-2659; L-16187; NAS 1.60:2659) Avail: NTIS HC A02/MF A01 CSCL 20H

PARTICLE COLLISIONS, SCATTERING CROSS SECTIONS
COLLISION PARAMETERS, GALAXIES, HEAVY IONS, PARTICLE COLLISIONS, SCattering CROSS SECTIONS

NUCLEI AND ANTINUCLEI
WARREN W. BUCK, JOHN W. WILSON, LAWRENCE W. TOWNSEND, and JOHN W. NORBURY (Idaho Univ., Moscow.)
Jul. 1987 47 p
(NASA-TP-2741; L-16275; NAS 1.60:2741) Avail: NTIS HC A03/MF A01 CSCL 20H

ANTIMATTER, ANTIPARTICLES, GALACTIC COSMIC RAYS, HEAVY IONS, NUCLEI (NUCLEAR PHYSICS)

OPTICS

Includes light phenomena; and optical devices.

THEORY FOR COMPUTING THE FIELD SCattered FROM A SMOOTH INFLECTED SURFACE
R. L. BARGER and A. K. DOMINEK 1986 23 p
(NASA-TP-2632; L-16157; NAS 1.60:2632) Avail: NTIS HC A01/MF A01 CSCL 20H

BODIES OF REVOLUTION, ELECTROMAGNETIC RADIATION, MICROWAVES, REFLECTANCE, SURFACE PROPERTIES, WAVE SCATTERING

PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.

LASER-POWERED MHD GENERATORS FOR SPACE APPLICATION
N. W. JALUFKA Oct. 1986 15 p
(NASA-TP-2621; NAS 1.60:2621) Avail: NTIS HC A02/MF A01 CSCL 20H

ENERGY CONVERSION EFFICIENCY, LASER PLASMA INTERACTIONS, MAGNETOHYDRODYNAMIC GENERATORS

81

ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

MANAGEMENT: A BIBLIOGRAPHY FOR NASA MANAGERS (SUPPLEMENT 21)
Apr. 1987 70 p
(NASA-SP-7500(21); NAS 1.21:7500(21)) Avail: NTIS HC A04 CSCL 05A

This bibliography lists 664 reports, articles and other documents introduced into the NASA scientific and technical information system in 1986. 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
N87-27557* National Aeronautics and Space Administration, Washington, D.C.

NASA THESAURUS SUPPLEMENT (SUPPLEMENT 3)
Jul. 1987 325 p
(NASA-SP-7053(SUPP-3); NAS 1.21:7053(SUPP-3)) Avail: NTIS HC A14 CSCL 05B


Author

N87-30218# National Aeronautics and Space Administration, Washington, D.C.

NASA SCIENTIFIC AND TECHNICAL PUBLICATIONS: A CATALOG OF SPECIAL PUBLICATIONS, REFERENCE PUBLICATIONS, CONFERENCE PUBLICATIONS, AND TECHNICAL PAPERS, 1977-1986
Sep. 1987 390 p
(NASA-SP-7063; NAS 1.21:7063) Avail: NTIS HC free as PR-6558; NASA Scientific and Technical Information Facility, P.O. Box 8757, BWI Airport, Md. 21240 HC free CSCL 05B

This catalog lists 2311 citations of all NASA Special Publications, NASA Reference Publications, NASA Conference Publications, and NASA Technical Papers that were entered into the NASA scientific and technical database during the decade 1977 through 1986. The entries are grouped by subject category. Indexes of subject terms, personal authors, and NASA report numbers are provided.

Author

85

URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

N87-70425* National Aeronautics and Space Administration, Washington, D.C.

SIGNIFICANT NASA INVENTIONS. AVAILABLE FOR LICENSING IN FOREIGN COUNTRIES
1977 103 p
(NASA-SP-7038(04); NAS 1.21:7038(04)) Avail: SOD HC $5.00 as 003-000-00966-1; NTIS MF A01

88

SPACE SCIENCES (GENERAL)

N87-23313*# National Aeronautics and Space Administration.

Marshall Space Flight Center, Huntsville, Ala.

DOUBLE LAYERS IN ASTROPHYSICS

CONFERENCES, ELECTRIC FIELDS, ENERGY TRANSFER, MATHEMATICAL MODELS, PLASMA LAYERS, PLASMA PHYSICS, SPACE PLASMAS

N87-24247*# National Aeronautics and Space Administration.

Goddard Space Flight Center, Greenbelt, Md.

ESSAYS IN SPACE SCIENCE

ASTROPHYSICS, CONFERENCES, COSMIC RAYS, GAMMA RAY ASTRONOMY, INFRARED ASTRONOMY, X RAY ASTRONOMY

N87-28471* National Aeronautics and Space Administration.

Langley Research Center, Hampton, Va.

CALCULATION AND ACCURACY OF ERBE SCANNER MEASUREMENT LOCATIONS
LAWRENCE H. HOFFMAN, WILLIAM L. WEAVER, and JAMES F. KIBLER Sep. 1987 34 p (NASA-TP-2670; L-16216; NAS 1.60:2670) Avail: NTIS HC A03/MF A01 CSCL 03B

COMPUTATION, EARTH ATMOSPHERE, EARTH RADIATION BUDGET EXPERIMENT, POSITION (LOCATION), REMOTE SENSING, SCANNING

89

ASTRONOMY

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

N87-14219*# National Aeronautics and Space Administration.

Goddard Space Flight Center, Greenbelt, Md.

TEN YEAR PLANETARY EPHEMERIS: 1986-1995

Accurate geocentric positions are tabulated at five day intervals for the Sun, Mercury, Venus, Mars, Jupiter, Saturn, Uranus and Neptune during the ten year period 1986 through 1995. The apparent angular diameters, radial velocities, declinations and mean times of meridian transit of the seven planets and the Sun are graphically depicted for each year in the interval. Appendices are included which discuss the theory of planetary orbits and a FORTRAN program for calculating planetary ephemerides.

Author

N87-22573*# National Aeronautics and Space Administration.

Goddard Space Flight Center, Greenbelt, Md.

INFRARED SOURCE CROSS-INDEX, FIRST EDITION
MARION SCHMIDTZ (Computer Sciences Corp., Beltsville, Md.), JAYLEE M. MEAD, and DANIEL Y. GEZARI Apr. 1987 323 p (NASA-RP-1182; REPT-87B0058; NAS 1.61:1182) Avail: NTIS HC A14/MF A01 CSCL 03A

The Infrared Source Cross-Index is a listing of correlated infrared source names (and positions) for astronomical objects observed at 1-1000 microns. The source names have been obtained from the database of the first edition of the Catalog of Infrared Observations (CIOC: NASA RP 1118), covering observations published through 1982. Additional identifications were located by correlating these names with identifications contained in other machine-readable astronomical catalogs in the NASA National Space Science Data Center (NSSDC). There are some 80,000 different source names in the Cross-Index, corresponding to over 27,000 unique infrared sources.

Author

25
N87-24266*# National Aeronautics and Space Administration, Washington, D.C.

STAR FORMATION IN GALAXIES
(NASA-CP-2466; NAS 1.55:2466) Avail: NTIS HC A99/MF E03 CSCL 03A

CONFERENCES, GALACTIC STRUCTURE, GALAXIES, INFRARED ASTRONOMY, MOLECULAR CLOUDS, RADIO ASTRONOMY, STAR FORMATION, STELLAR LUMINOSITY

N87-25906*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

FIFTY YEAR CANON OF SOLAR ECLIPSES: 1986 - 2035
FRED ESPENAK Jul. 1987 272 p
(NASA-IP-1178-REV; REPT-87B0252; NAS 1.61:1178-REV)
Avail: NTIS HC A12/MF A01 CSCL 03A

A complete catalog is presented, listing the general characteristics of every solar eclipse from 1981 through 2100. To complement this catalog, a detailed set of cylindrical projection world maps shows the umbral paths of every solar eclipse over the 200 year interval. Focusing in on the next 50 years, accurate geodetic path coordinates and local circumstances for the 71 central eclipses from 1987 through 2035 are tabulated. Finally, the geodetic paths of the umbral and penumbral shadows of all 109 solar eclipses in this period are plotted on orthographic projection maps of the Earth. Appendices are included which discuss eclipse geometry, eclipse frequency and occurrence, modern eclipse prediction and time determination. Finally, code for a simple Fortran program is given to predict the occurrence and characteristics of solar eclipses. Author

90

ASTROPHYSICS

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

N87-30235*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ATLAS OF COMET HALLEY 1910 II
BERTRAM DONN, JUERGEN RAHE, and JOHN C. BRANDT
1986 597 p
(NASA-SP-488; NAS 1.21:488; LC-86-16341) Avail: SOD HC $46.00 as 033-000-00991-7; NTIS MF A01 CSCL 03B

With the impending return of Halley's Comet in 1986, a major effort began to collect the material obtained at its last appearance in 1910. This material displays the evolving coma and tail phenomena, and is useful for comparison with the present quantitative studies of spectroscopic and structural phenomena. Images in the atlas are arranged in chronological order by day. Days that have multiple images with varying scale are arranged in two sequences. Photographs showing tail phenomena are first, followed by photographs obtained with longer focus instruments showing the head or near-nuclear region. Drawings of Comet Halley, made from visual observations in 1835 and 1910, also are included. Author

91

LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

N87-17598*# National Aeronautics and Space Administration. Goddard Inst. for Space Studies, New York, N.Y.

THE JOVIAN ATMOSPHERES
Submitted for publication
(NASA-CP-2441; NAS 1.55:2441) Copyright Avail: NTIS HC A07/MF A01 CSCL 84B

ATMOSPHERIC CHEMISTRY, CLOUDS (METEOROLOGY), GAS DYNAMICS, GAS GIANT PLANETS, HYDROGEN, JUPITER ATMOSPHERE, NEPTUNE ATMOSPHERE, SATURN ATMOSPHERE, SPACE EXPLORATION, SYNOPTIC METEOROLOGY, THERMODYNAMICS, URANUS ATMOSPHERE

N87-19322*# National Aeronautics and Space Administration, Washington, D.C.

STATUS AND FUTURE OF LUNAR GEOSCIENCE
1986 63 p
(NASA-SP-484; NAS 1.21:484) Avail: SOD HC $4.25 as 033-000-00997-6; NTIS MF A01 CSCL 03B

The Moon is of special interest among the many and diverse bodies of the solar system because it serves as a scientific baseline for understanding the terrestrial planets, its origin is closely tied to the early history of the Earth, and its proximity permits a variety of space applications such as mining and establishment of bases and colonies. Data acquisition and analysis have enabled advances to be made and the remaining questions in many fields of lunar geoscience to be identified. The status and unresolved problems of lunar science are discussed. Immediate needs, new unmanned missions, and a return to the Moon (a lunar base) are examined. Author

92

SOLAR PHYSICS

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

N87-19328*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ENERGETIC PHENOMENA ON THE SUN: THE SOLAR MAXIMUM MISSION FLARE WORKSHOP, PROCEEDINGS
(NASA-CP-2439; NAS 1.55:2439) Avail: NTIS HC A18/MF A01 CSCL 03B

CONFERENCES, MAGNETOHYDRODYNAMIC STABILITY, SOLAR CORONA, SOLAR FLARES, SOLAR MAGNETIC FIELD, SOLAR MAXIMUM MISSION, SOLAR PHYSICS, SOLAR PROMINENCES, SUN, SUNSPOTS

N87-20871*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

CORONAL AND PROMINENCE PLASMAS
(NASA-CP-2442; REPT-86B0536; NAS 1.55:2442) Avail: NTIS HC A19/MF A01 CSCL 03B

CONFERENCES, MAGNETIC FIELD CONFIGURATIONS, MAGNETOHYDRODYNAMIC STABILITY, MAGNETOSTATICS, PLASMAS (PHYSICS), RADIO ASTRONOMY, SOLAR
99 GENERAL

ATMOSPHERE, SOLAR CORONA, SOLAR MAGNETIC FIELD, SOLAR PHYSICS, SOLAR PROMINENCES, SUN

N87-20947** National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

STATISTICAL ASPECTS OF SOLAR FLARES
ROBERT M. WILSON Apr. 1987 41 p (NASA-TP-2714; NAS 1.60:2714) Avail: NTIS HC A03/MF A01 CSCL 03B

SOLAR FLARES, SOLAR PROMINENCES, STATISTICAL ANALYSIS

N87-21785** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

RAPID FLUCTUATIONS IN SOLAR FLARES

CONFERENCES, MICROWAVES, OSCILLATIONS, PLASMA PHYSICS, RADIO WAVES, SOLAR FLARES, X RAYS

93

SPACE RADIATION

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

N87-25984** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

COSMIC RAY HEAVY ION LET MAPPING FOR ALUMINUM, SILICON, AND TISSUE TARGETS

Linear energy transfer (LET) values in aluminum, silicon, and tissue targets have been calculated for 31 galactic cosmic ray ion species in eight different units. The values are described for single event upset (SEU) effect assessments or radiobiological evaluations. The data are presented in graphical and tabular form. Author

99

GENERAL

N87-24390** National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ENGINEER IN CHARGE: A HISTORY OF THE Langley AERONAUTICAL LABORATORY, 1917-1958
JAMES R. HANSEN (Maine Univ., Orono.) Washington, D.C. 1986 643 p NASA History Series (NASW-3502) (NASA-SP-4305; NAS 1.21:4305) Avail: SOD HC $30.00 as 033-000-00999-2; NTIS MF A01 CSCL 05B

A history is presented by using the most technologically significant research programs associated with the Langley Aeronautical Laboratory from 1917 to 1958 and those programs that, after preliminary research, seemed best to illustrate how the laboratory was organized, how it works, and how it cooperated with industry and the military. B.G.
AFTERBODIES

Effects of empennage surface location on aerodynamic characteristics of a twin-engine afterbody model with nacelle-mounted nacelles
[NASA-TP-2392] p 6 N87-17693

Effects of afterbody boattail design and empennage arrangement on aeropropulsive characteristics of a twin-engine fighter model at transonic speeds
[NASA-TP-2704] p 3 N87-21873

AIR

Simplified curved fits for the thermodynamic properties of equilibrium air
[NASA-TP-2618] p 15 N87-26309

AIR DATA SYSTEMS

Qualitative evaluation of a flush air data system at transonic speeds and high angle of attack
[NASA-TP-2716] p 6 N87-29497

AIR NAVIGATION

Joint University Program for Air Transportation Research, 1983
[NASA-CP-2451] p 1 N87-18520

AIR POLLUTION

[NASA-TP-1173] p 21 N87-17417

Space Opportunities for Tropospheric Chemistry Research
[NASA-CP-2450] p 20 N87-18248

Airborne lidar measurements of El Chichon stratospheric aerosols, January 1984
[NASA-TP-1175] p 20 N87-20663

Atmospheric turbulences Relative to Aviation, Missiles, and Space Programs
[NASA-CP-2468] p 21 N87-22341

Air data system

Flight test investigation of the effect of tail configuration on stall, spin, and recovery characteristics of a low-wing general aviation research airplane
[NASA-TP-2644] p 6 N87-16815

Air data systems

Application of parameter estimation to aircraft stability and control: The output-error approach
[NASA-TP-1166] p 6 N87-29499

AIRCRAFT STRUCTURES

The ACEO program and basic composites research at Langley Research Center (1975 to 1986): Summary and bibliography
[NASA-TP-1177] p 21 N87-29612

AIRCRAFT TIRES

Measurements of flow rate and trajectory of aircraft tire-generated water spray
[NASA-TP-2718] p 6 N87-24458

AIRFOILS

Turbo Engine Hot Section Technology, 1984
[NASA-CP-2239] p 17 N87-11180

AIRCRAFT GUIDANCE

Joint University Program for Air Transportation Research, 1983
[NASA-CP-2451] p 1 N87-18520

Joint University Program for Air Transportation Research, 1984
[NASA-CP-2239] p 1 N87-22604

AIRCRAFT HAZARDS

Doppler Radar Detection of Wind Shear
[NASA-CP-2450] p 5 N87-10654

AIRCRAFT LANDING

Langley Aircraft Landing Dynamics Facility
[NASA-TP-1189] p 9 N87-29544

AIRCRAFT NOISE

Annoyance response to simulated advanced turboprop aircraft interior noise containing tonal beats
[NASA-TP-2689] p 23 N87-24161

AIRCRAFT PERFORMANCE

Wind Shear/Turbulence Inputs to Flight Simulation and System Certification
[NASA-CP-2474] p 1 N87-25267

AIRCRAFT SAFETY

Atmospheric Turbulence Relative to Aviation, Missiles, and Space Programs
[NASA-CP-2468] p 21 N87-22341

AIRCRAFT SPIN

Flight test of the effect of tail configuration on stall, spin, and recovery characteristics of a low-wing general aviation research airplane
[NASA-TP-2644] p 6 N87-16815

AIRCRAFT STABILITY

Application of parameter estimation to aircraft stability and control: The output-error approach
[NASA-TP-1166] p 6 N87-29499

AIRCRAFT SYSTEMS

Measurements of flow rate and trajectory of aircraft tire-generated water spray
[NASA-TP-2718] p 6 N87-24458

AIRCRAFT ENGINE

Turbine Engine Hot Section Technology, 1984
[NASA-CP-2239] p 17 N87-11180

AIRCRAFT ENGINE

Turbine Engine Hot Section Technology, 1984
[NASA-CP-2239] p 17 N87-11180

AIRCRAFT ENGINE

Turbine Engine Hot Section Technology, 1984
[NASA-CP-2239] p 17 N87-11180

AIRCRAFT ENGINE

Turbine Engine Hot Section Technology, 1984
[NASA-CP-2239] p 17 N87-11180

ALUMINUM GRAPHITE COMPOSITES

Effects of thermal cycling on graphite-fiber-reinforced 6061 aluminum
[NASA-TP-2612] p 11 N87-10614

ANALOG DATA

Analog signal conditioning for flight-test instrumentation
[NASA-RP-1156] p 7 N87-29553

ANGLE OF ATTACK

Mach 6 experimental and theoretical stability and performance of a cruciform missale at angles of attack up to 65 degrees
[NASA-TP-2733] p 4 N87-23582

Simplified longitudinal and lateral-directional characteristics of a forward-swept-wing fighter configuration at angles of attack up to 70 deg
[NASA-TP-2672] p 7 N87-29874

Qualitative evaluation of a flush air data system at transonic speeds and high angle of attack
[NASA-TP-2716] p 6 N87-29497

ANNUAL VARIATIONS

Arctic Sea Ice, 1973-1976: Satellite passive-microwave observations
[NASA-SP-489] p 21 N87-24870

ANTERIORS

NASA/DOO Control/Structures Interaction Technology, 1986
[NASA-CP-2447-PT-1] p 10 N87-19014

Technology for Large Space Systems. A bibliography with indexes (supplement 17)
[NASA-SP-4064] p 9 N87-29578

ANTIMATTER

Possible complementary cosmic-ray systems: Nulei and antineutrinon
[NASA-TP-2741] p 24 N87-29477

ANTIPARTICLES

Possible complementary cosmic-ray systems: Nulei and antineutrinon
[NASA-TP-2741] p 24 N87-29477

APPLICATIONS PROGRAMS (COMPUTERS)

Predicted effect of dynamic load on pitting fatigue life for low-contact-ratio spur gears
[NASA-CP-2461] p 16 N87-19095

Sixth Annual Users' Conference: Transportable Applications Executives (TAE)
[NASA-CP-2463] p 22 N87-23156

APPROACH CONTROL

A simulation education of a pilot interface with an automatic terminal approach system
[NASA-TP-2668] p 7 N87-19393

APPROXIMATION

On minimizing the number of calculations in design-analysis codes
[NASA-TP-2706] p 3 N87-23586

ARCHITECTURE (COMPUTERS)

Computer Sciences and Data Systems, volume 1
[NASA-CP-2459-VOI-1] p 22 N87-19931

ARCTIC REGIONS

Arctic Sea ice, 1973-1976: Satellite passive-microwave observations
[NASA-SP-489] p 21 N87-24870

AREA

Experimental thrust performance of a high-area-ratio rocket nozzle
[NASA-CP-2720] p 10 N87-20381

ASTRONOMICAL CATALOGS

Inferred source cross-index, first edition
[AIR-CP-1182] p 25 N87-22573

Fifty year canon of solar eclipses: 1846-2055
[NASA-TP-1178-REV] p 26 N87-29506

ASTRONOMY

Atlas of Comet Halley 1910 II
[NASA-SP-488] p 26 N87-30235

ASTROPHYSICS

Essays in Space Science
[NASA-CP-2464] p 25 N87-24247

ASYMPTOTIC METHODS

Asymptotic analysis of corona discharge from thin electrodes
[NASA-TP-2645] p 24 N87-14998

ATMOSPHERIC CHEMISTRY

The Jovan Atmospheres
[NASA-CP-2441] p 26 N87-17598

Space Opportunities for Tropospheric Chemistry Research
[NASA-CP-2450] p 20 N87-18248

ATMOSPHERIC COMPOSITION

Future directions for H sub x 0 sub y detection
[NASA-TP-2648] p 19 N87-15528

[NASA-TP-1173] p 19 N87-17417

Space Opportunities for Tropospheric Chemistry Research
[NASA-CP-2450] p 20 N87-18248

System study of the carbon dioxide observational platform system (CO-OPS): Project overview
[NASA-TP-2696] p 9 N87-18588
SUBJECT INDEX

ATOMIC BEAMS
Electron stimulated desorption of atomic oxygen from silver
[NASA-TP-2566] p 12 N87-18629

AUTOMATIC CONTROL
A simulation study of a pilot interface with an automatic terminal approach system
[NASA-TP-2669] p 7 N87-19393

AUTOMATIC FLIGHT
Pilot study simulation of the effects of an automated trim system on flight characteristics of a light twin-engine airplane with one engine inoperative
[NASA-TP-2633] p 2 N87-10843

AUTOMATIC PILOTS
A simulation evaluation of a pilot interface with an automatic terminal approach system
[NASA-TP-2669] p 7 N87-19393

AVIONICS
Joint University Program for Air Transportation Research, 1983
[NASA-CP-2451] p 1 N87-18520

Joint University Program for Air Transportation Research, 1984
[NASA-CP-2452] p 1 N87-22904

AVIONICS
Wire-Show/Turbulence inputs to Flight Simulation and Systems Certification
[NASA-CP-2474] p 1 N87-25267

ASYMMETRIC BODIES
Static internal performance of single-expansion-ramp nozzles with thrust-rectifying capability up to 60 deg
[NASA-TP-2364] p 2 N87-10839

Effects of empennage surface location on aerodynamic characteristics of a twin-engine afterbody model with nonaxisymmetric nozzles
[NASA-TP-2932] p 6 N87-17893

Research of NASA axially symmetric ring model for coupled-cavity traveling-wave tubes
[NASA-TP-2675] p 4 N87-22923

Effects of trade between boattail angle and wedge size on the performance of an axisymmetric wedge nozzle
[NASA-TP-2717] p 4 N87-23593

AEROTURBULENCE FLOW
Effects of afterbody boattail design and empannage arrangement on aeropropulsive characteristics of a twin-engine afterbody model at transonic speeds
[NASA-TP-2704] p 3 N87-21873

AEROSPACE MECHANICS
Aerodynamic engineering: A continuing bibliography with indexes (supplement 217)
[NASA-SP-7037(217)] p 1 N87-27613

Technology for Large Space Systems. A bibliography with indexes (supplement 17)
[NASA-SP-7041(17)] p 1 N87-29576

Aerospacemedicine and biology: A continuing bibliography with indexes (supplement 302)
[NASA-SP-7011(302)] p 22 N87-30041

AERODIREC TIONAL REFLECTANCE
Surface bidirectional reflectance properties of two southwestern Arizona deserts for wavelengths between 0.4 and 2.2 micrometers
[NASA-TP-2643] p 18 N87-22281

Effects of aerosols and surface shadowing on bidirectional reflectance measurements of deserts
[NASA-TP-2756] p 19 N87-28162

BIODERIAL EFFECTS
Aerospace medicine and biology: A cumulative index to the 1986 issues (supplement 293)
[NASA-SP-7011(293)] p 21 N87-19576

Aerospace medicine and biology: A continuing bibliography with indexes (supplement 302)
[NASA-TP-2756] p 22 N87-30041

BIT ERROR RATE
Bit-error-rate testing of high-power 30-GHz traveling wave tubes for ground-terminal applications
[NASA-TP-2635] p 13 N87-17971

Unique bit-error-rate measurement system for satellite communication systems
[NASA-TP-2699] p 13 N87-20448

BLADE SLAP NOISE
Correction of helicopter impulse noise from blade-vortex interaction with rotor mean inflow
[NASA-TP-2550] p 23 N87-18399

BLADE TIPS
Low-cost FM oscillators for capacitance type of blade tip clearance measurement system
[NASA-TP-2746] p 7 N87-24481

BLADE-VORTEX INTERACTION
Correlation of helicopter impulse noise from blade-vortex interaction with rotor mean inflow
[NASA-TP-2650] p 23 N87-18399

Helicopter blade-vortex interaction locations: Scale-model acoustics and free-wake analysis results
[NASA-TP-2658] p 3 N87-18537

BLADES
Preliminary structural design of composite main rotor blades for minimum weight
[NASA-TP-2730] p 11 N87-25435

BLUNT BODIES
Drag measurements of blunt storesp tangentially mounted on a flat plate at supersonic speeds
[NASA-TP-2742] p 5 N87-27626

BOATTAILS
Effects of afterbody boattail design and empennage arrangement on aeropropulsive characteristics of a twin-engine afterbody model at transonic speeds
[NASA-TP-2704] p 3 N87-21873

BOLTMAN TRANSPORT EQUATION
A second-order accurate kinetic-theory-based method for inviscid compressible flows
[NASA-TP-2613] p 15 N87-18763

BONING
Effect of LID (Registered) processing on the effect of a trade between boattail angle and wedge size on the performance of a nonaxisymmetric wedge nozzle
[NASA-TP-2717] p 4 N87-23593

BOUNDRY LAYER FLOW
In-flight surface-of-view photographs with comparisons to pressure distribution and boundary-layer data
[NASA-TP-2395] p 3 N87-20966

BOUNDARY LAYER STABILITY
Numerical simulation of channel flow transition, resolution requirements and structure of the harpin vortex
[NASA-TP-2667] p 3 N87-19351

BOUNDARY LAYER TRANSITION
Numerical simulation of channel flow transition, resolution requirements and structure of the harpin vortex
[NASA-TP-2667] p 3 N87-19351

BOUNDARY LAYERS
Aerothermal evaluation of a spherically blunted body with a trapezoidal cross section in the Langley 8-foot high-temperature tunnel
[NASA-TP-2641] p 15 N87-18782

BOUNDARY VALUE PROBLEMS
Numerical simulation of channel flow transition, resolution requirements and structure of the harpin vortex
[NASA-TP-2667] p 3 N87-19351

BRAKING
Wind-tunnel investigation at supersonic speeds of a remote-controlled canard missile with a free-rolling-tail brake torque system
[NASA-TP-2341] p 3 N87-17668

CALIBRATING
Calibration of the spin-scan cosine imager aboard the dynamics explorer 1 satellite
[NASA-TP-2720] p 21 N87-26401

Description and calibration of the Langley Hypersonic CF4 tunnel: A facility for simulating low gamma flow as occurs for a real gas
[NASA-TP-2384] p 16 N87-27978

CAMBER
Pressure measurements on a thick cambered and twisted 58 deg delta wing at high subsonic speeds
[NASA-TP-2711] p 5 N87-27643

CARBON DIOXIDE
Supersonic, nonlinear, attached-flow wing design for high lift with experimental validation
[NASA-TP-2384] p 1 N87-10042

CARH AD Configurations
Wind-tunnel investigation of the flight characteristics of a delta geometry configuration airplane configuration
[NASA-TP-2623] p 1 N87-10039

Wind-tunnel investigation at supersonic speeds of a remotely controlled canard missile with a free-rolling-tail brake torque system
[NASA-TP-2401] p 3 N87-17668

CATION
Traveling-wave-tube efficiency improvement by a low-cost technique for deposition of carbon on multistage traveling-wave tubes
[NASA-TP-2719] p 14 N87-21239

CARBON DIOXIDE
System study of the carbon dioxide observational platform system (CO-OPS): Project overview
[NASA-TP-2696] p 9 N87-18568

CARBON DIOXIDE LASERS
Closed-Cycle, Frequency-Stable CO2 Laser
[NASA-CP-2456] p 16 N87-20522

CARBON FIBERS
Effects of thermal cYcling on graphite-fiber reinforced 6051 aluminum
[NASA-TP-2512] p 11 N87-10184

CARBON TETRAFLUORIDE
Description and calibration of the Langley Hypersonic CF4 tunnel: A facility for simulating low gamma flow as occurs for a real gas
[NASA-TP-2384] p 16 N87-29778

CATALOGS (PUBLICATIONS)
[NASA-SP-7063] p 35 N87-30218

CAVITIES
Space shuttle main engine high pressure fuel pump aft platform seal cavity flow analysis
[NASA-TP-2685] p 14 N87-17000

Experimental cavity pressure distributions at supersonic speeds
[NASA-TP-2683] p 3 N87-22626

Research of NASA axially symmetric ring model for coupled-cavity traveling-wave tubes
[NASA-TP-2675] p 14 N87-22393

CELESTIAL MECHANICS
Fifty year canyon of solar eclipses: 1986-2035

CEPTRAL ANALYSIS
Power cepstrum technique with application to model helicopter acoustic data
[NASA-TP-2566] p 23 N87-17479

CHANNEL FLOW
Numerical simulation of channel flow transition, resolution requirements and structure of the harpin vortex
[NASA-TP-2667] p 3 N87-19351

CHEMILUMINESCENCE
Ester oxidation on an aluminum surface using chemiluminescence
[NASA-TP-2511] p 12 N87-18666

CINEMATOGRAPHY
Evaluation of diffuse-illumination holographic cinematography in a flutter cascade
[NASA-TP-2593] p 16 N87-13731
MOLECULES
Microscopy crystalization of macromolecules: An interim report and proposal for continued research [NASA-TP-2671] p 13 N87-20423

MOON
Status and future of lunar geoscience [NASA-SP-484] p 26 N87-19322

MOUNTING
Drag measurements of blunt stores tangentially mounted on a flat plate at supersonic speeds [NASA-TP-2742] p 5 N87-27626

NASA Programs
Management: A bibliography for NASA managers (supplement 21) [NASA-SP-7053(21)] p 24 N87-20803
NASA project abstracts bibliography: A continuing bibliography. Section 1: Abstracts (supplement 31) [NASA-SP-7039(31)] p 24 N87-25023
NASA project abstracts bibliography: A continuing bibliography. Section 3: Supplement (supplement 31) [NASA-SP-7053(SUPP-3)] p 25 N87-27557

NASNASTRA
Fifteenth NASTRAN Users' Colloquium [NASA-CP-2481] p 18 N87-27231

NATURAL GAS

NEUTRON-DEER EQUATION
Multiscale turbulence effects in supersonic jets exhausting into still air [NASA-TP-2620] p 15 N87-24672
Supercomputing in Aerospace [NASA-CP-2454] p 4 N87-25998

NEPTUNE ATMOSPHERE
The Jovian Atmospheres [NASA-TP-2165] p 26 N87-17506

NICKEL CADMIUM BATTERIES

NICKEL HYDROGEN BATTERIES

NIMBUS SATELLITE

NIMBUS Y SATELLITE
Description of data on the Nimbus 7 LIMS map archive tape: Ozone and nitric acid [NASA-TP-2625] p 19 N87-13022

NITRIC ACID
Description of data on the Nimbus 7 LIMS map archive tape: Ozone and nitric acid [NASA-TP-2625] p 19 N87-13022

NOISE INTENSITY
Effects of background noise on total noise annoyance [NASA-TP-2620] p 23 N87-14120

NOISE POLLUTION
Effects of background noise on total noise annoyance [NASA-TP-2620] p 23 N87-14120

NOISE TOLERANCE
Effects of background noise on total noise annoyance [NASA-TP-2620] p 23 N87-14120

NONDESTRUCTIVE TESTS
Low-cost FM oscillator for capacitance type of blade tip clearance measurement system [NASA-TP-2746] p 7 N87-24481
Electrical stability and measurement technology [NASA-CP-2472] p 17 N87-27204

NONLINEAR EQUATIONS
Some path-following techniques for solution of nonlinear equations and comparison with parametric differentiation [NASA-TP-2644] p 22 N87-14054

NOZZLE FLOW
Static internal performance of single-expansion-ramp nozzles with thrust-vectoring capacity up to 60 deg [NASA-TP-2644] p 22 N87-10839
Experimental evaluation of heat transfer on a 1000:1 area ratio rocket nozzle [NASA-CP-2271] p 11 N87-25424

NOZZLE GEOMETRY
Effect of prop corner geometry on the internal performance of rotating-vane-type thrust reverser [NASA-TP-2624] p 2 N87-12541

Oscillations
Calculation of viscous effects on transonic flow for oscillating surfs and partial differential equations [NASA-TP-2721] p 5 N87-27622
Low-cost FM oscillator for capacitance type of blade tip clearance measurement system [NASA-TP-2746] p 7 N87-24481
Oxidation
Ester oxidation on an aluminum surface using chemiluminescence [NASA-TP-2811] p 12 N87-18666

OXYGEN
Electron stimulated desorption of atomic oxygen from sintered NiO-5% Al2O3 [NASA-TP-2668] p 12 N87-18629
Permeation of oxygen through high purity, large grain silver [NASA-TP-2755] p 12 N87-20724

OXYGEN SUPPLY EQUIPMENT
Calibration of the spin-scan ozone imager aboard the dynamics Explorer 1 satellite [NASA-TP-2723] p 21 N87-26491

PANEL METHOD (FLUID DYNAMICS)
Steady and unsteady aerodynamic forces from the SCOUR surface-polar finite element method for a fighter velocity with tip missile and comparison with experiment and PANAIR [NASA-TP-2738] p 4 N87-28032

PARTIAL DIFFERENTIAL EQUATIONS

PARTICLE COLLISIONS
Doubly differential cross sections for galactic heavy-ion fragmentation [NASA-TP-2669] p 24 N87-17487

PARTICLE SIZE DISTRIBUTION
Automated Reduction of Data from Images and Holograms [NASA-CP-2477] p 5 N87-29432

PARTICLE TRAJECTORIES
Calculation of secondary electron trajectories in multistage depressed collectors for microwave amplifiers [NASA-TP-2644] p 14 N87-17891

PATENT POLICY
NASA patent abstracts bibliography: A continuing bibliography, Section 1: Abstracts (supplement 31) [NASA-SP-7039(31)] p 24 N87-25023
NASA patent abstracts bibliography: A continuing bibliography, Section 2: Indexes (supplement 31) [NASA-SP-7039(31)-SECT-2] p 24 N87-26689

PATHFINDER
Significant NASA inventions. Available for licensing in foreign countries [NASA-SP-7039(02)] p 25 N87-70425

PERFORMANCE TESTS
Development and evaluation of an airborne electronic display format aligned with the inherent velocity vector [NASA-TP-2648] p 7 N87-13438
Design of 8.271-pressure ratio 5-stage core compressor and overall performance for first 3 stages [NASA-TP-2597] p 7 N87-17899
Bias-error-rate testing of high-power 30-GHz traveling wave tubes for ground terminal applications [NASA-TP-2635] p 13 N87-17891
### PERSONAL AUTHOR INDEX

#### NASA Scientific and Technical Publications

1987

<table>
<thead>
<tr>
<th>PERSONAL AUTHOR</th>
<th>TITLE</th>
<th>REPORT NUMBER</th>
<th>PAGE NUMBER</th>
<th>NASA ACCESSION NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ABDOUL-HAMID, KHALED S.</strong></td>
<td>Multiscale turbulence effects in supersonic jets exhausting into still air</td>
<td>NASA-TP-2707</td>
<td>p 15</td>
<td>N87-24672</td>
</tr>
<tr>
<td><strong>ADELMAN, HOWARD M.</strong></td>
<td>Sensitivity Analysis in Engineering</td>
<td>NASA-CP-2457</td>
<td>p 17</td>
<td>N87-18655</td>
</tr>
<tr>
<td><strong>ALBERTSON, CINDY W.</strong></td>
<td>Aerothermal evaluation of a spherically blunted body with a trapezoidal cross section in the Langley 8000 foot-high-temperature tunnel</td>
<td>NASA-TP-2641</td>
<td>p 15</td>
<td>N87-17822</td>
</tr>
<tr>
<td><strong>ALUSSON, MICHAEL</strong></td>
<td>The Jovian Atmospheres</td>
<td>NASA-CP-2441</td>
<td>p 26</td>
<td>N87-17598</td>
</tr>
<tr>
<td><strong>ANDERSEN, CARL M.</strong></td>
<td>Exploiting symmetries in the modeling and analysis of trees</td>
<td>NASA-TP-2648</td>
<td>p 6</td>
<td>N87-17690</td>
</tr>
<tr>
<td><strong>ANDERSON, B. J.</strong></td>
<td>Development testing of large volume water sprays for warm log dispersal</td>
<td>NASA-TP-2607</td>
<td>p 10</td>
<td>N87-12585</td>
</tr>
<tr>
<td><strong>APPLIN, ZACHARY T.</strong></td>
<td>Low-speed aerodynamic characteristics of a twin-engine general aviation configuration with aft-fuselage-mounted pusher propellers</td>
<td>NASA-TP-2793</td>
<td>p 5</td>
<td>N87-29083</td>
</tr>
<tr>
<td><strong>ARZACCHIONE, JOSEPH</strong></td>
<td>Five year global dataset: NMC operational analyses (1978 to 1982)</td>
<td>NASA-RP-1194</td>
<td>p 21</td>
<td>N87-29008</td>
</tr>
<tr>
<td><strong>ARPASI, DALE J.</strong></td>
<td>Applications and requirements for real-time simulators in ground-test facilities</td>
<td>NASA-TP-2672</td>
<td>p 22</td>
<td>N87-23202</td>
</tr>
<tr>
<td><strong>BALKDUR, LINDA B.</strong></td>
<td>Effect of LID (Localized 1attenuating) processing on the microstructure and mechanical properties of TiAl44V and TiAl625Sn4-2Zr-2Mo titanium foil-gauge materials</td>
<td>NASA-TP-2677</td>
<td>p 12</td>
<td>N87-16844</td>
</tr>
<tr>
<td><strong>BANGERT, LINDA S.</strong></td>
<td>Effects of afterbody boattail design and empennage arrangement on aerodynamic characteristics of a twin-engine fighter model at transonic speeds</td>
<td>NASA-TP-2704</td>
<td>p 3</td>
<td>N87-21873</td>
</tr>
<tr>
<td><strong>BARE, E. ANN</strong></td>
<td>Effect of a trade between boattail angle and wedge size on the performance of a nonaxisymmetric wedge nozzle</td>
<td>NASA-TP-2717</td>
<td>p 4</td>
<td>N87-23593</td>
</tr>
<tr>
<td><strong>BARRANGER, JOHN P.</strong></td>
<td>Static internal performance of a two-dimensional convergent-divergent nozzle with thrust vectoring</td>
<td>NASA-TP-2721</td>
<td>p 4</td>
<td>N87-24432</td>
</tr>
<tr>
<td><strong>BARGER, R. L.</strong></td>
<td>Multiaspect control power from thrust vectoring for a supersonic fighter aircraft model at Mach 0.2 to 2.47</td>
<td>NASA-TP-2712</td>
<td>p 4</td>
<td>N87-24433</td>
</tr>
<tr>
<td><strong>BARNES, PAUL G.</strong></td>
<td>Theory for computing the field scattered from a smooth infinite surface</td>
<td>NASA-TP-2632</td>
<td>p 24</td>
<td>N87-13264</td>
</tr>
<tr>
<td><strong>BARTHEL, B. L.</strong></td>
<td>Theoretical evaluation of a spherically blunted body with a trapezoidal cross section in the Langley 8000 foot-high-temperature tunnel</td>
<td>NASA-TP-2641</td>
<td>p 15</td>
<td>N87-17822</td>
</tr>
<tr>
<td><strong>BARTLEY, RICHARD R.</strong></td>
<td>Low-cost PRT fluids for capacitance type of blade tip clearance measurement system</td>
<td>NASA-TP-2746</td>
<td>p 7</td>
<td>N87-24461</td>
</tr>
<tr>
<td><strong>BARTLY, J. M.</strong></td>
<td>Cosmic ray heavy ion LET mapping for aluminum, silicon, and iron targets</td>
<td>NASA-TP-1190</td>
<td>p 27</td>
<td>N87-25964</td>
</tr>
<tr>
<td><strong>BARTLETT, CLYNNE R.</strong></td>
<td>Evaluation of installed performance of a wing-tip-mounted pulser turboprop on a semispan wing</td>
<td>NASA-TP-2739</td>
<td>p 6</td>
<td>N87-20401</td>
</tr>
<tr>
<td><strong>BATTEN, CARMEN E.</strong></td>
<td>Closed-Cycle, Frequency-Stable CO2 Laser Technology</td>
<td>NASA CP-2456</td>
<td>p 16</td>
<td>N87-20522</td>
</tr>
<tr>
<td><strong>BEARD, J. R. II</strong></td>
<td>Development testing of large volume water sprays for warm log dispersal</td>
<td>NASA-TP-2607</td>
<td>p 10</td>
<td>N87-12585</td>
</tr>
<tr>
<td><strong>BEATIK, W. KEITH</strong></td>
<td>Modeling of joints for the dynamic analysis of truss structures</td>
<td>NASA-TP-2681</td>
<td>p 18</td>
<td>N87-20567</td>
</tr>
<tr>
<td><strong>BERREIR, B. L.</strong></td>
<td>Effects of tail span and empennage arrangement on drag of a typical single-engine fighter aircraft</td>
<td>NASA-TP-2677</td>
<td>p 1</td>
<td>N87-16038</td>
</tr>
<tr>
<td><strong>BISHOP, D. E.</strong></td>
<td>Static internal performance of a single-expansion-ramp nozzle with thrust-vectoring capability up to 60 deg</td>
<td>NASA-TP-2636</td>
<td>p 2.</td>
<td>N87-10639</td>
</tr>
<tr>
<td><strong>BLAIR, A. B. JR.</strong></td>
<td>Effect of port corner geometry on the internal performance of a rotating-vane-type thrust reverser</td>
<td>NASA-TP-2624</td>
<td>p 2.</td>
<td>N87-25451</td>
</tr>
<tr>
<td><strong>BHAVAT, K. G.</strong></td>
<td>Effects of winglet on transonic flutter characteristics of a cantilevered twin-engine transport wing model</td>
<td>NASA-TP-2627</td>
<td>p 17</td>
<td>N87-13788</td>
</tr>
<tr>
<td><strong>BILLY, A. L. JR.</strong></td>
<td>Wind-tunnel investigation at supersonic speeds of a remote-controlled canard missile with a free-rolling-tail brake torque system</td>
<td>NASA-TP-2401</td>
<td>p 3</td>
<td>N87-17868</td>
</tr>
<tr>
<td><strong>BLAIR, ROBERT W. JR.</strong></td>
<td>Aerodynamics from space: A global overview of regional landforms</td>
<td>NASA-SP-4033</td>
<td>p 18</td>
<td>N87-16199</td>
</tr>
<tr>
<td><strong>BLAY, JACQUES.</strong></td>
<td>Geomorphology from space: A global overview of regional landforms</td>
<td>NASA-SP-4033</td>
<td>p 18</td>
<td>N87-16199</td>
</tr>
<tr>
<td><strong>BLOOM, B. R.</strong></td>
<td>Experimental evaluation of two turning vane designs for fan drive corner of 0.1-scale model of NASA Lewis Research Center's proposed altitude wind tunnel</td>
<td>NASA-TP-2746</td>
<td>p 8</td>
<td>N87-18576</td>
</tr>
<tr>
<td><strong>BOLLE, B. R.</strong></td>
<td>Detailed flow surveys of turning vanes designed for a 0.1-scale model of NASA Lewis Research Center's proposed altitude wind tunnel</td>
<td>NASA-TP-2800</td>
<td>p 9</td>
<td>N87-20295</td>
</tr>
<tr>
<td><strong>BOWES, ROLAND L.</strong></td>
<td>Wind Shear/Turbulence Inputs to Flight Simulation and Systems Certification</td>
<td>NASA-CP-2474</td>
<td>p 1</td>
<td>N87-25267</td>
</tr>
<tr>
<td><strong>BRANDON, JAY M.</strong></td>
<td>Pilot-in-the-loop simulation of effects of vortex flaps on low-speed handling qualities of a Delta-wing airplane</td>
<td>NASA-TP-2747</td>
<td>p 8</td>
<td>N87-26922</td>
</tr>
<tr>
<td><strong>BRANDT, JOHN C.</strong></td>
<td>Calmation of the spin-scan oxygen imager aboard the dynamics Explorer 1 satellite</td>
<td>NASA-TP-2723</td>
<td>p 21</td>
<td>N87-26491</td>
</tr>
<tr>
<td><strong>BROWN, PAUL W.</strong></td>
<td>Liquid drop stability for protein crystal growth in microgravity</td>
<td>NASA-TP-2724</td>
<td>p 21</td>
<td>N87-20727</td>
</tr>
<tr>
<td><strong>BROWN, RICHARD R.</strong></td>
<td>Pilot-in-the-loop simulation of effects of an automated trim system on flight characteristics of a light twin-engine airplane with one engine inoperative</td>
<td>NASA-TP-2632</td>
<td>p 2</td>
<td>N87-10643</td>
</tr>
<tr>
<td><strong>BROWN, ROBERT W.</strong></td>
<td>Pilot-in-the-loop simulation of effects of vortex flaps on low-speed handling qualities of a Delta-wing airplane</td>
<td>NASA-TP-2747</td>
<td>p 8</td>
<td>N87-26922</td>
</tr>
<tr>
<td><strong>BRUTON, WILLIAM M.</strong></td>
<td>Advanced detection, isolation and accommodation of sensor failures: Real-time evaluation</td>
<td>NASA-TP-2740</td>
<td>p 8</td>
<td>N87-25331</td>
</tr>
<tr>
<td><strong>BUCK, WARREN W.</strong></td>
<td>Possible complementary cosmic-ray systems: Nuclei and antinuclei</td>
<td>NASA-TP-2741</td>
<td>p 24</td>
<td>N87-24977</td>
</tr>
<tr>
<td><strong>BURLINGTON, C. L.</strong></td>
<td>Power crossfeed technique with application to model helicopter acoustic data</td>
<td>NASA-TP-2556</td>
<td>p 23</td>
<td>N87-17479</td>
</tr>
<tr>
<td><strong>BURLEY, J. R., JR.</strong></td>
<td>Effects of tail span and empennage arrangement on drag of a typical single-engine fighter aircraft</td>
<td>NASA-TP-2552</td>
<td>p 1</td>
<td>N87-10638</td>
</tr>
<tr>
<td><strong>BURLEY, JAMES R., II</strong></td>
<td>Effects of tail span and empennage arrangement on drag of a typical single-engine fighter aircraft</td>
<td>NASA-TP-2552</td>
<td>p 1</td>
<td>N87-10638</td>
</tr>
<tr>
<td><strong>BURLEY, ROBERT W., JR.</strong></td>
<td>Experimental evaluation of wall Mach number distributions of the octagonal test section proposed for NASA Lewis Research Center's altitude wind tunnel</td>
<td>NASA-TP-2666</td>
<td>p 8</td>
<td>N87-17717</td>
</tr>
<tr>
<td><strong>BURLEY, ROBERT W., JR.</strong></td>
<td>Experimental evaluation of wakeblockage ratio and planar evaporated system flow effects on pressure distribution for bodies of revolution in 0.1 scale model test section of NASA Lewis Research Center's proposed altitude wind tunnel</td>
<td>NASA-TP-2702</td>
<td>p 9</td>
<td>N87-22694</td>
</tr>
</tbody>
</table>
KIPLINGER, ALAN L.

KIPRINGER, ALAN L.

KIPRINGER, ALAN L.

KIPLINGER, ALAN L.

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KIPLINGER, ALAN L.

KIPLINGER, ALAN L.

KIPLINGER, ALAN L.

KIPLINGER, ALAN L.
### PERSONAL AUTHOR INDEX

<table>
<thead>
<tr>
<th>Author</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nixon, Mark W.</td>
<td></td>
</tr>
<tr>
<td>Oryes, Jonathan F.</td>
<td></td>
</tr>
<tr>
<td>Owen, Robert B.</td>
<td></td>
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<td>Oswald, Fred B.</td>
<td></td>
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<td>Ossa, William A.</td>
<td></td>
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<tr>
<td>Outlaw, R. A.</td>
<td></td>
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<tr>
<td>Pack, Homer C., Jr.</td>
<td></td>
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<tr>
<td>Palumbo, Daniel L.</td>
<td></td>
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<td>Patterson, James C., Jr.</td>
<td></td>
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<td>Patton, James M.</td>
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<tr>
<td>Pavli, Albert J.</td>
<td></td>
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<td>Peet, Shelly</td>
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<tr>
<td>Orlady, Harry W.</td>
<td></td>
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<tr>
<td>Ormes, Jonathan F.</td>
<td></td>
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<tr>
<td>Orrin, Larry E.</td>
<td></td>
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<tr>
<td>Ogbin, M. T.</td>
<td></td>
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<tr>
<td>Oss, Michel A.</td>
<td></td>
</tr>
<tr>
<td>Povil, W.</td>
<td>Pulse Code Modulation (PCM) encoder handbook for AyniX Vector MVP-600 series system (NASA-ARP-1171) p 13 N87-11916</td>
</tr>
<tr>
<td>Purcell, G. Carlton</td>
<td>Surface bidirectional reflectance properties of two southwestern Arizona deserts for wavelengths between 0.4 and 2.2 micrometers (NASA-TP-2643) p 18 N87-22281</td>
</tr>
<tr>
<td>Quinto, F. Frank</td>
<td>Low-speed aerodynamic characteristics of a twin-engine general aviation configuration with aft-flue-mounted pusher propellers (NASA-TP-2763) p 5 N87-29462</td>
</tr>
<tr>
<td>Rahn, Jürgen</td>
<td>Alas of Count Halley 1910 II (NASA-SP-488) p 26 N87-30235</td>
</tr>
<tr>
<td>Ramis, Peter</td>
<td>Performance of textured carbon on copper electrode multistage depressed collectors with medium-power traveling wave tubes (NASA-TP-2665) p 14 N87-17980</td>
</tr>
<tr>
<td>Rapp, Douglas C.</td>
<td>Analysis of quasi-hybrid solid rocket booster concepts for advanced earth-to-orbit vehicles (NASA-TP-2751) p 11 N87-25425</td>
</tr>
<tr>
<td>Rauh, Edward J.</td>
<td>Evolution, calibration, and operational characteristics of the two-dimensional test section of the Langley 0.3-meter transonic cryogenic tunnel (NASA-TP-2479) p 28 N87-28570</td>
</tr>
<tr>
<td>Remburger, David S.</td>
<td>Effects of afterbody boattail design and empennage arrangement on aeropropulsive characteristics of a twin-engine fighter model at transonic speeds (NASA-TP-2704) p 3 N87-21873</td>
</tr>
<tr>
<td>Richardson, D. J.</td>
<td>Atlas of absorption lines from 0 to 17900 cm (sup-1) (NASA-RP-1188) p 10 N87-28055</td>
</tr>
<tr>
<td>Rietmeijer, Gregory D.</td>
<td>Subsonic maneuver capability of a supersonic cruise fighter wing concept (NASA-TP-2642) p 2 N87-15184</td>
</tr>
<tr>
<td>Rinaldi, C. P.</td>
<td>Atlas of absorption lines from 0 to 17900 cm (sup-1) (NASA-TP-2665) p 18 N87-20955</td>
</tr>
<tr>
<td>Rothman, L. S.</td>
<td>Atlas of absorption lines from 0 to 17900 cm (sup-1) (NASA-TP-2665) p 19 N87-28955</td>
</tr>
<tr>
<td>Rothen, L. S.</td>
<td>Atlas of absorption lines from 0 to 17900 cm (sup-1) (NASA-TP-2665) p 18 N87-22281</td>
</tr>
<tr>
<td>Rose, George A.</td>
<td>Conventional cast and forged copper alloy for high-heat-flux thrust chambers (NASA-TP-2664) p 12 N87-16902</td>
</tr>
<tr>
<td>Rose, George A.</td>
<td>Conventional cast and forged copper alloy for high-heat-flux thrust chambers (NASA-TP-2664) p 12 N87-16902</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
<tr>
<td>Rott, Robert D.</td>
<td>Finite-element reentry heat-transfer analysis of space shuttle Orbiter (NASA-TP-2567) p 16 N87-27995</td>
</tr>
</tbody>
</table>
PERSONAL AUTHOR INDEX

W

WALTERS, R. W.
Some path-following techniques for solution of nonlinear equations and comparison with parametric differentiation [NASA-TP-2654] p 22 N87-14054

WALTERS, ROBERT W.
Efficient solutions to the Euler equations for supersonic flow with embedded subsonic regions [NASA-TP-2523] p 2 N87-15183

WANG, CHI R.
Application of turbulence modeling to predict surface heat transfer in stagnation flow region of circular cylinder [NASA-TP-2758] p 15 N87-27161

WATSON, CAROLYN B.
Study of lee-side flows over conically cambered delta wings at supersonic speeds, part 1 [NASA-TP-2650-PT-1] p 4 N87-23557

WATSON, WILLIE R.
Study of lee-side flows over conically cambered Delta wings at supersonic speeds, part 2 [NASA-TP-2650-PT-2] p 4 N87-25301

WEaver, William L.
Experimental validation of a two-dimensional shear-flow model for determining acoustic impedance [NASA-TP-2679] p 23 N87-20798

WILDMANSTER, K. J.
Simplified curve fits for the thermodynamic properties of equilibrium air [NASA-1P-1181] p 15 N87-26309

Wells, Douglas C.
Jet transport flight operations using cockpit display of traffic information during instrument meteorological conditions: Simulation evaluation [NASA-TP-2567] p 5 N87-29469

WHITLOCK, CHARLES H.
Surface bidirectional reflectance properties of two southwestern Arizona deserts for wavelengths between 0.4 and 2.2 micrometers [NASA-TP-2463] p 18 N87-22281

WHITMORE, STEPHEN A.
Qualitative evaluation of a flush air data system at transonic speeds and high angles of attack [NASA-TP-2716] p 6 N87-29497

WILCOX, FLOYD J., JR.
Experimental cavity pressure distributions at supersonic speeds [NASA-TP-2663] p 3 N87-29226

WILLETTS, DAVID V.
Cone measurements of blunt noses tangentially mounted on a flat plate at supersonic speeds [NASA-TP-2742] p 5 N87-27826

WILLETTS, DAVID V.
Closed-Cycle, Frequency-Stable CO2 Laser Technolgy [NASA-CP-2456] p 16 N87-20522

WILLIAMS, ALTON C.

WILLIAMS, DAVID H.
Jet transport flight operations using cockpit display of traffic information during instrument meteorological conditions: Simulation evaluation [NASA-TP-2567] p 23 N87-14120

WILLIS, K. F.
Effects of background noise on total noise annoyance [NASA-TP-2650] p 23 N87-29469

WILMOTH, RICHARD D.
Multiscale turbulence effects in supersonic jets exhausting into still air [NASA-TP-2707] p 15 N87-24872

WILSON, JEFFREY D.
Revised NASA axially symmetric ring model for coupled-cavity traveling-wave tubes [NASA-TP-2675] p 14 N87-22923

WILSON, JOHN W.
Possible complementary cosmic-ray systems: Neutron and antinucleon [NASA-TP-2741] p 24 N87-24977

WILSON, ROBERT M.
Statistical aspects of solar flares [NASA-TP-2714] p 27 N87-20947

WINDMILLER, MARY JO.
Unique bit-error-rate measurement system for satellite communication systems [NASA-TP-2699] p 13 N87-20448

WILCZEK, GEORGE F.
Preliminary design of turbopumps and related machinery [NASA-1P-1170] p 2 N87-17665

WOOD, GEORGE M., JR.
Closed-Cycle, Frequency-Stable CO2 Laser Technology [NASA-CP-2466] p 16 N87-20522

WOOD, RICHARD D.
Summary of studies to reduce wing-mounted proplfan installation drag on an M = 0.8 transport [NASA-TP-2678] p 6 N87-20990

WOOD, RICHARD M.
Investigation of leading-edge flap performance on delta and double-delta wings at supersonic speeds [NASA-TP-2656] p 3 N87-20223

Study of lee-side flows over conically cambered delta wings at supersonic speeds, part 1 [NASA-TP-2650-PT-1] p 4 N87-23557

Study of lee-side flows over conically cambered Delta wings at supersonic speeds, part 2 [NASA-TP-2650-PT-2] p 4 N87-25301

WOODGATE, BRUCE

WRIGHT, ROBERT L.

WRIGHT, ROBERT L.

WUNSCHEL, ALFRED J.
Piloted-simulation study of effects of vortex flaps on low-speed handling qualities of a Delta-wing airplane [NASA-TP-2747] p 8 N87-26922

Y

YEE, HELEN
Supercomputing in Aerospace [NASA-CP-2454] p 4 N87-25998

YEH, FREDERICK C.
Application of turbulence modeling to predict surface heat transfer in stagnation flow region of circular cylinder [NASA-TP-2758] p 15 N87-27161

YENNI, K. R.
Piloted simulation study of the effects of an automated trim system on flight characteristics of a light twin-engine airplane with one engine inoperative [NASA-TP-2463] p 2 N87-10843

YIP, LONG P.
Wind-tunnel free-flight investigation of a 0.15-scale model of the F-1065 airplane with vortex flaps [NASA-TP-2700] p 3 N87-21855

YOUNG, DAVID F.
Calibration of the spin-scan ozone imager aboard the dynamics Explorer 1 satellite [NASA-TP-2723] p 21 N87-26491

YOUNG, LEIGHTON E.
Solar array flight experiment/dynamic augmentation experiment [NASA-TP-2690] p 10 N87-20380

YU, Y. H.
Automated Reduction of Data from images and Holograms [NASA-CP-2477] p 5 N87-29432

Z

ZANG, THOMAS A.
Numerical simulation of channel flow transition, resolution requirements and structure of the harpin vortex [NASA-TP-2667] p 3 N87-19351

ZURAWSKI, ROBERT L.

ZWALLY, H. JAY
<table>
<thead>
<tr>
<th>REPORT NUMBER</th>
<th>PAGE NUMBER</th>
<th>ACCESSION NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>NASA-CP-2327-PT-1</td>
<td>p 5</td>
<td>N87-1171</td>
</tr>
<tr>
<td>NASA-CP-2327-PT-2</td>
<td>p 6</td>
<td>N87-1175</td>
</tr>
<tr>
<td>NASA-CP-2339</td>
<td>p 17</td>
<td>N87-1180</td>
</tr>
<tr>
<td>NASA-CP-2399</td>
<td>p 22</td>
<td>N87-10720</td>
</tr>
<tr>
<td>NASA-CP-2402</td>
<td>p 20</td>
<td>N87-13043</td>
</tr>
<tr>
<td>NASA-CP-2402-REV</td>
<td>p 24</td>
<td>N87-16221</td>
</tr>
<tr>
<td>NASA-CP-2429</td>
<td>p 15</td>
<td>N87-22103</td>
</tr>
<tr>
<td>NASA-CP-2431</td>
<td>p 16</td>
<td>N87-10263</td>
</tr>
<tr>
<td>NASA-CP-2433</td>
<td>p 7</td>
<td>N87-20267</td>
</tr>
<tr>
<td>NASA-CP-2434</td>
<td>p 14</td>
<td>N87-11072</td>
</tr>
<tr>
<td>NASA-CP-2435</td>
<td>p 5</td>
<td>N87-10054</td>
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<td>NASA-CP-2438</td>
<td>p 9</td>
<td>N87-20302</td>
</tr>
<tr>
<td>NASA-CP-2439</td>
<td>p 26</td>
<td>N87-18328</td>
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<tr>
<td>NASA-CP-2441</td>
<td>p 26</td>
<td>N87-17998</td>
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<tr>
<td>NASA-CP-2442</td>
<td>p 26</td>
<td>N87-20871</td>
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<td>NASA-CP-2443</td>
<td>p 17</td>
<td>N87-22199</td>
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<td>NASA-CP-2447-PT-1</td>
<td>p 10</td>
<td>N87-18014</td>
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<tr>
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<td>p 9</td>
<td>N87-24805</td>
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<td>p 18</td>
<td>N87-15528</td>
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<td>p 7</td>
<td>N87-21785</td>
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<td>p 20</td>
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<td>p 1</td>
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<td>p 3</td>
<td>N87-22904</td>
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<td>p 1</td>
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<td>p 4</td>
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<td>p 5</td>
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<td>p 16</td>
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<td>p 17</td>
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<td>p 16</td>
<td>N87-13461</td>
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<td>NASA-CP-2459-VOL-1</td>
<td>p 22</td>
<td>N87-19631</td>
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<td>p 22</td>
<td>N87-19632</td>
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<td>p 20</td>
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<td>p 22</td>
<td>N87-23136</td>
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<td>p 25</td>
<td>N87-24247</td>
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<td>p 13</td>
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<td>p 21</td>
<td>N87-22341</td>
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<td>p 10</td>
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<td>NASA-CP-2467-PT-2</td>
<td>p 10</td>
<td>N87-22729</td>
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<td>p 21</td>
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<td>p 25</td>
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<td>p 18</td>
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<td>p 11</td>
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<td>p 17</td>
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<td>p 22</td>
<td>N87-26631</td>
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<td>NASA-CP-2481</td>
<td>p 18</td>
<td>N87-27231</td>
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<tr>
<td>NASA-CP-2484</td>
<td>p 19</td>
<td>N87-29614</td>
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<tr>
<td>NASA-RP-1146</td>
<td>p 8</td>
<td>N87-10876</td>
</tr>
<tr>
<td>NASA-RP-1159</td>
<td>p 7</td>
<td>N87-29503</td>
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<td>NASA-RP-1168</td>
<td>p 6</td>
<td>N87-29949</td>
</tr>
<tr>
<td>NASA-RP-1170</td>
<td>p 2</td>
<td>N87-17865</td>
</tr>
</tbody>
</table>
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