

The NASA Scientific and Technical Information System

...Its Scope and Coverage

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Scientific and Technical Information Division
Office of Management
National Aeronautics and Space Administration
Washington, DC 1988

PREFACE

The NASA scientific and technical information system has been developed to provide NASA and the aerospace community with the information tools to accomplish their missions in the most effective and efficient manner. NASA's mission also includes the responsibility of providing maximum use of acquired knowledge for the benefit of all mankind. The system is a highly automated activity that not only meets the information requirements of NASA and others in the aerospace program, but provides access to the massive flow of this and related information to other government, industrial, and academic groups.

Each month finds thousands of documents added to this information bank for the benefit of its users. Many other documents are reviewed and rejected from inclusion in the system to prevent overlapping and excessive duplication of other large information storage and dissemination systems. This publication lists the subject criteria applied to the various documents to govern the decisions for accepting additions to the NASA information bank. In addition, it establishes subject guidance for those desiring to add documents to the collection of information or to search the collection for documents of interest to meet their needs.

This Scope and Coverage is not intended to be an exhaustive, all-inclusive listing of subjects to be included in the NASA information system. It is, rather, an attempt to provide a broad look at the subjects contained in the system in sufficient depth to assure an understanding of its holdings. The NASA scientific and technical information system is designed with the flexibility to meet the constantly changing information needs of NASA and the aerospace community. In order to incorporate necessary ongoing changes, white space is provided on each page for the user's notes.

Van A. Wentz, Director
Scientific and Technical Information Division

M. Peralta
Associate Administrator for Management



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INTRODUCTION

This publication was originally intended as a working guide for individuals who scan the published and report literature for documents to be added to the National Aeronautics and Space Administration's scientific and technical information system. It has become much more than that, since it now makes you, the user of the NASA information system, knowledgeable about the broad subject coverage included in the system. You can increase the utility of this system to yourself and your peers throughout government, industry, and the academic community by emphasizing the possibility of submitting your own and your organization's published and report literature for inclusion in the system within the overall subject bounds of this Scope and Coverage. Your contributions to the STI database should be sent to the address at the end of the Introduction.

The NASA information system includes the Technical Information Service of the American Institute of Aeronautics and Astronautics and the NASA Scientific and Technical Information Facility. Documents from world-wide sources are included in this system.

This revision of the September 1978 edition reflects NASA's changing interests in both depth and scope in areas such as the environment, energy production and sources, oceanography, and the social sciences. Although the range of Input Subjects of Specific Interest under each subject category is not exhaustive, it is indicative of the subjects of the documents to be included in the NASA information system within the category.

The many-faceted interests of NASA require a broad-based information bank with wide coverage and careful selection of reports, journal articles, books, and conference papers. NASA's wide interests in science include the environment and properties of the Earth, Moon, and planets; the Sun and its relationships to the Earth and the rest of the solar system; the space environment; the physical nature of the universe; and the search for extraterrestrial life. In technology, NASA's interests include spacecraft and launch vehicles; aircraft, including V/STOL, supersonic, hypersonic, and lighter-than-air; propulsion, auxiliary power; human factors; electronics; structures and materials; and materials processing in space. In applications, NASA's interests include astronomical, geophysical, meteorological, and communications systems, Earth resources, air and water pollution, and urban transportation. In the utilization of technology derived from NASA's aerospace activities, information from the database is provided to nonaerospace industries, government at all levels, educational institutions, the medical profession, and nonprofit organizations to benefit their operations.

The rapidly growing volume of documentation resulting from new scientific and technical knowledge in all fields of endeavor is so voluminous that no single collection can be all inclusive. No one can anticipate precisely what the next research project will require from an information viewpoint and the NASA collection is not intended to cover completely all possibilities. The coverage of documents from world-wide sources in aeronautics and astronautics is as complete as possible. Those documents that meet the direct needs of NASA and the aerospace community are definitely included in the STI database as well as those reports and publications having a strong relevance to aerospace science and technology. Other collections of knowledge are available and background and peripheral material will be obtained from these collections as needed.

NASA's interests in scientific and technical information for its database are broadly summarized herein under the same subject categories that are used in the abstract journals Scientific and Technical

Aerospace Reports (STAR) and *International Aerospace Abstracts (IAA)*. The level of interest in each subject category may be "exhaustive," "selective," or "negative."

"Exhaustive" interest in a subject indicates that it lies almost wholly within aerospace science and technology. Most documents on such a subject will be of interest and should be maintained in the NASA collection. "Selective" interest implies that a subject is broader than NASA's direct interest in aerospace sciences and technology, but that a number of reports or published literature items may bear on one or more NASA programs. These documents will be selected carefully to assure that appropriate documents are maintained in the collection. "Negative" interest indicates that the subject is of no interest to NASA's program and will not be included in the NASA collection. Only an occasional document of this nature will be selected because of a specific, direct application to a specific NASA project. A missing interest section indicates that NASA has no interest in that subject at that level.

In determining NASA's interest, the following publications were reviewed: laws, hearings on appropriations, *Research and Technology Objectives and Plans*, latest available *Research and Technology Reports from NASA Centers*, NASA's long-range program plans, *NASA News Releases* and brochures from aerospace companies concerning projects under contract to NASA. A law, legal directive, evidence of money committed, or an announced intent to pursue a particular goal was considered evidence of NASA's interest in any given subject.

The sections entitled Input Subjects of Specific Interest list representative subjects pertinent to NASA's interests. These may be in disciplines, pure science, technology, applications, or in human factors relative to NASA's missions and programs.

Keep in mind that a subject can appear several times because of its application. For example, aerodynamics of launch vehicles appears under Aerodynamics as well as Launch Vehicles and Space Vehicles. A specific launch vehicle's aerodynamics would appear under Launch Vehicles and Space Vehicles, whereas a basic treatment of the aerodynamics of launch vehicles or a broad coverage of aerodynamic configurations would appear under Aerodynamics. A list cross-referencing subject categories to category numbers and page numbers has been included to aid you in determining the subject content of each category. It is located on page 158.

Contributions to the STI database and any suggestions that you may have for improving the usefulness of this publication may be sent to:

Manager, Document Processing
NASA Scientific and Technical Information Facility
P.O. Box 8757
Baltimore/Washington International Airport
Maryland 21240

AERONAUTICS

Includes aeronautics; 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* (pages 23-45).

Aeronautics

Includes research into, and solution of, problems of flight and flight vehicles within the Earth's atmosphere; development, construction, testing, and operation for research purposes of manned and unmanned aircraft. For related information see also *Astronautics* (pages 23-24).

Definition

Aeronautics - The science and art of designing, constructing, and operating aircraft. AGARD Multilingual Aeronautical Dictionary, 1980.

NASA Interest

Exhaustive Interest: Aircraft production and maintenance; problems of flight and of flight vehicles, both manned and unmanned; solutions to these problems; general reports on aeronautics.

Negative Interest: Military operations of aircraft.

Input Subjects of Specific Interest

- Aeronautics
- Aircraft maintenance
- Aircraft manufacturing
- Aircraft production

Aerodynamics

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery. For related information see also *Fluid Mechanics and Heat Transfer* (pages 69-71).

Definition

Aerodynamics - The science that deals with the motion of air and other gaseous fluids and with the forces acting on bodies when the bodies move through such fluids or when such fluids move against or around the bodies. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: All information dealing with the effects of relative motion on the flow of air or other gases and vapors, at any velocity, over aircraft, air cushion vehicles, land transportation vehicles, spacecraft, launch vehicles, missiles, and their components; over geometric shapes of models used in laboratory and wind tunnel tests, e.g., cones, plates, shells, spheres, and cylinders; internal flow in channels, ducts, and turbomachines; forces acting on bodies in aerodynamic flow, including aerodynamic lift and drag.

Selective Interest: Aerodynamics of ground support equipment for aerospace research, results of aerodynamic testing for these effects, or the aerodynamic effects of surface structures on weather or environment.

Negative Interest: Aerodynamics of surface structures, ships, and bridges.

Input Subjects of Specific Interest

- Aerodynamic derivatives
- Aerodynamic flow fields
- Aerodynamic heating
- Aerodynamic noise (airframe generated)
- Aerodynamic studies of skin friction
- Aerodynamic wakes
- Aerodynamics of:
 - Airfoils
 - Bodies
 - Canards
 - Combinations
 - Control surfaces
 - Diffusers
 - Exits
 - Launch vehicles (for specific launch vehicles see *Launch Vehicles and Space Vehicles* (pages 29-30))
 - Propellers
 - Protuberances (antennas, braces, external stores, fairings, landing gear, and struts)
 - Reentry vehicles (for specific reentry vehicles see *Launch Vehicles and Space Vehicles* (pages 29-30))

Rockets (for specific rockets see *Launch Vehicles and Space Vehicles* (pages 29-30))

Rotary wings

Rotors

Spacecraft (for specific spacecraft see *Spacecraft Design, Testing and Performance* (pages 36-39))

Stabilization surfaces

Wings

- Aerothermodynamics
- Air cushion vehicle aerodynamics
- Air flow separation
- Air launched weapons (aerodynamics)
- Aircraft aerodynamics
- Airfoil aerodynamics
- Airship aerodynamics
- Autogyro aerodynamics
- Balloon aerodynamics
- Boundary layer aerodynamics
- Boundary layer flow (aerodynamics)
- Buffeting
- Canard aerodynamics
- Cascade aerodynamics
- Compressible flow (aerodynamics)
- Coriolis forces (aerodynamics)
- Drag reduction (effects and techniques)
- Exit aerodynamics
- Glider aerodynamics
- Ground effect machine aerodynamics
- Helicopter aerodynamics
- High speed aerodynamics
- Hovercraft aerodynamics
- Hypersonic aerodynamics
- Inlet aerodynamics
- Internal flow in ducts (theory)
- Internal flow in turbomachinery (theory)
- Laminar flow (aerodynamics)
- Land transportation vehicles (aerodynamics)
- Launch vehicle aerodynamics (for specific launch vehicles see *Launch Vehicles and Space Vehicles* (pages 29-30))
- Lifting body aerodynamics

- Lighter-than-air craft (balloons, airships) aerodynamics
- Low speed aerodynamics
- Missile aerodynamics
- Nozzle aerodynamics
- Parachute aerodynamics
- Rocket Aerodynamics (for specific rockets see *Launch Vehicles and Space Vehicles* (pages 29-30))
- Rogallo wing aerodynamics
- Rotary wing aircraft aerodynamics
- Sailplane aerodynamics
- Sonic boom (aerodynamically generated)
- Spacecraft aerodynamics (for specific spacecraft see *Spacecraft Design, Testing and Performance* (pages 36-39))
- Stabilization surfaces (aerodynamics)
- STOL aerodynamics
- Subsonic aerodynamics
- Supercritical airfoils
- Supercritical wings
- Supersonic aerodynamics
- Transitional flow (aerodynamics)
- Transonic aerodynamics
- Turbulent flow (aerodynamics)
- Ultralight aircraft (aerodynamics)
- Unsteady flow (aerodynamics)
- VSTOL aerodynamics
- VTOL aerodynamics
- Wakes (effects of turbulent flow behind aircraft)
- Wind tunnel tests (aerodynamics)

Air Transportation and Safety

Includes passenger and cargo air transport operations; and aircraft accidents. For related information see also *Space Transportation* (pages 31-32); and *Urban Technology and Transportation* (page 146).

Definition

Air Transportation - The use of aircraft, usually airplanes, to move passengers and cargo from place to place. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Aircraft Safety - Techniques used to prevent aircraft failures or accidents. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: All information dealing with flight safety, aircraft accidents, and aircraft operating problems. Systems specific to ground operations of aircraft and to airport construction are covered in *Research and Support Facilities (Air)* (pages 20-21). Air traffic control is covered in *Aircraft Communications and Navigation* (pages 7-9).

Selective Interest: Land transportation information that deals with transportation and safety to, from, and at airports.

Input Subjects of Specific Interest

- Accidents and emergencies (aircraft)
- Air piracy (incident or safety aspects)
- Air safety
- Air transportation
- Aircraft accidents
- Aircraft ditching
- Aircraft emergencies
- Aircraft in-flight collision
- Aircraft licensing
- Aircraft near miss
- Aircraft operating problems
- Aircraft safety
- Aircraft search and rescue operations
- Aircrew licensing
- Aircrew training
- Baggage handling (aircraft)
- Bird collision (air transportation and safety)
- Bird ingestion (air transportation and safety)

- Cargo air transport operations
- Cargo handling (aircraft)
- Cargo transportation (aircraft)
- Clear air turbulence (aircraft safety)
- Collision avoidance (aircraft safety)
- Ejection systems and seats (air transportation and safety)
- Emergency locator transmitters
- Escape systems (aircraft)
- Explosions (aircraft)
- Fire (aircraft)
- Flight safety (aircraft)
- Flotation devices
- Foreign object damage (FOD)
- Foreign object ingestion (air transportation and safety)
- Icing
- Lightning discharge on aircraft
- Parachutes (personal and aircraft applications)
- Passenger air transport operations
- Passenger handling (air transportation)
- Passenger transportation (air)
- Public nuisance implications
- Restraint harness (aircraft)
- Safety systems (aircraft)
- Search and rescue operations (air)
- Seat belts (aircraft)
- Severe storms (aircraft safety)
- Shoulder harness (aircraft)
- Survival (aircraft operations)

Aircraft Communications and Navigation

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control. For related information see also *Space Communications, Spacecraft Communications, Command and Tracking* (pages 33-35); and *Communications and Radar* (pages 63-65).

Definition

Aircraft Communication - The conveyance of information to or from aircraft by radio or other signals. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Air Navigation - The art, science, or action of plotting and directing from within an aircraft movement through the air from one place to another. The United States Air Force Dictionary. Woodford Agee Heflin, ed. Princeton, NJ: D. Van Nostrand Co., Inc.

NASA Interest

Exhaustive Interest: Information on development and utilization of communications and navigation systems for airlines, general aviation, and military aviation including air traffic control. Includes all techniques and equipment specifically intended for the transmittal of data to or from aircraft. For detailed equipment and designs, see *Electronics and Electrical Engineering* (pages 66-68).

Selective Interest: Communications and navigation techniques and theory of potential interest to aeronautical research and development.

Negative Interest: Commercial telephone operations; courier and messenger services; and ship navigation, unless related to aeronautics.

Input Subjects of Specific Interest

- Air navigation (ground based and satellite based)
- Air traffic control (ground based and satellite based)
- Air-sea navigation (ground based and satellite based)
- Aircraft command and control
- Aircraft communications
- Aircraft tracking
- All weather global position determination
- Celestial navigation (aircraft)
- Collision avoidance (aircraft control)
- Communications networks (aircraft)
- Communications systems (aircraft)
- Consol/Consolan navigation system
- Decca navigation system
- Digital communications systems (aircraft)
- Doppler navigation systems

- Electromagnetic devices (radiators, sensors and other equipment) for navigation systems
- Global positioning systems (aircraft)
- Ground based and space based radar for air navigation
- Ground control approach (GCA) systems
- Guidance system design (aircraft)
- Inertial navigation systems (aircraft)
- Inertial sensors and measurement units (aircraft)
- Instrument landing systems (ILS)
- Instrument navigation systems
- Ionospheric effects on radio transmission (aircraft)
- Laser communications systems (aircraft)
- Laser tracking systems (aircraft)
- Long range navigation system (LORAN)
- Man-machine communications (aircraft)
- Microwave communications systems (aircraft)
- Microwave Landing System (MLS)
- Microwave receivers (aircraft)
- Microwave transmitters (aircraft)
- Navigation computer systems (aircraft)
- Navigation display devices (aircraft)
- Navigation system design (aircraft)
- Navigation systems (aircraft)
- Omega navigation system
- Omnidirectional radio range system (OMNI)
- Passive sensors, trackers, and references (aircraft)
- Radar communications systems (aircraft)
- Radar detection (aircraft navigation)
- Radar imagery (aircraft navigation)
- Radar tracking systems (aircraft)
- Radio communications systems (aircraft)
- Range and angle measurement (aircraft)
- Sea navigation (aircraft related)
- Speech analysis (aircraft voice communication)
- Speech compression (aircraft voice communication)
- Systems for adverse weather avoidance
- Systems for collision avoidance
- Tactical air navigation system (TACAN)

- Telemetry (aircraft applications)
- Terrain avoidance systems
- Tropospheric scatter (aircraft communications/navigation disruption)
- Very high frequency omnirange (VOR) navigation
- Voice communications systems (aircraft)
- Wave propagation (aircraft communications effects)

Aircraft Design, Testing and Performance

Includes aircraft simulation technology. For related information see also *Spacecraft Design, Testing and Performance* (pages 36-39); and *Structural Mechanics* (pages 82-84). For land transportation vehicles see *Urban Technology and Transportation* (page 146).

Definition

Aircraft Design - Plans for the structure of any apparatus, machine or contrivance, especially a vehicle, intended to be supported by air, being borne up either by dynamic action of the air upon the object's surfaces, or by the object's own buoyancy; also the values of the parameters of the aircraft's systems. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Aircraft Testing - Tests by means of actual or simulated flight of an aircraft to see how the aircraft or any equipment used on an aircraft performs or tests of an aircraft component to determine its suitability or reliability in flight. Adapted from the NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

Aircraft Performance - The manner in which any airborne structure, machine, contrivance, or especially a vehicle, functions while in operation. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Research, development, testing, evaluation, or performance of any complete aircraft, system, or component; operating problems that affect or are affected by design, development, testing, evaluation, or performance.

Input Subjects of Specific Interest

- Aeroelasticity (aircraft flexibility)
- Aircraft:
 - Design
 - Development
 - Evaluation
 - Flight simulation
 - Flight tests
 - Hydraulic systems (design)
 - Performance
 - Pneumatic systems (design)
 - Research
 - Simulation
 - Simulation technology
 - Structures
 - Testing
- Aircraft components
- Aircraft descriptions (types/names/designations)
- Aircraft systems
- Airframe structures

- Airship performance
- Bird collision (aircraft design)
- Boattail configurations (aircraft)
- Body-tail combinations (aircraft design)
- Cabin pressurization (aircraft)
- Cruise missiles
- Deicing
- Depressurization systems (aircraft)
- Ejection systems and seats (design)
- Expandable structures (aircraft)
- Fins (aircraft)
- Gliders (sailplanes, hang gliders)
- Helicopter ground resonance
- Helicopter rotor dynamics
- Highly maneuverable aircraft technology (HIMAT)
- Inflatable structures (aircraft)
- Landing gear (aircraft)
- Lifting bodies
- Lighter-than-air craft (balloons, airships) design
- Models (aircraft)
- Pneumatic systems (aircraft)
- Pressurization systems (aircraft)
- Pressurized cabins
- Remotely piloted vehicles (RPV)
- Tail surfaces
- TAV (transatmospheric vehicles) (aircraft)
- Transatmospheric vehicles (TAV) (aircraft)
- Unfoldable structures (aircraft)
- Wind tunnel tests (aircraft and components)
- Wing-body combinations (aircraft design)
- Wing-nacelle combinations (aircraft design)
- Wings

Aircraft Instrumentation

Includes cockpit and cabin display devices; and flight instruments. For related information see also *Spacecraft Instrumentation* (pages 40-42); and *Instrumentation and Photography* (pages 72-74).

Definition

Aircraft Instrumentation - The design, composition, assemblage, arrangement, installation, and use of electronic, gyroscopic, and other instruments for the purpose of controlling flight or detecting, measuring, recording, telemetering, processing, or analyzing different values or quantities as encountered in the flight of an aircraft. Adapted from the Dictionary of Technical Terms for Aerospace Use. Wm. H. Allen, ed., 1965. NASA SP-7.

NASA Interest

Exhaustive Interest: Design, arrangement, installation, and use of devices for detecting, measuring, recording, telemetering, processing, or analyzing values or quantities characterizing an environment, flight, flight vehicle, or other experimental phenomena encountered in aircraft flight.

Selective Interest: Instruments or displays and off-the-shelf equipment from other transportation media that could be transferred to, or modified for, aircraft use.

Negative Interest: Commercial off-the-shelf instruments for general use.

Input Subjects of Specific Interest

- Airborne computers
- Airborne radar displays
- Aircraft control computer systems
- Aircraft instrumentation
- Aircraft systems monitoring instruments
- Airspeed indicators
- Alarm systems (aircraft)
- Altimeters (aircraft)
- Analyzing devices (aircraft)
- Anticollision devices
- Attitude indicators (aircraft)
- Avionics
- Bioelectronic instruments (aircraft)
- Biomedical instruments (aircraft)
- Blind flying instruments
- Cabin display devices (aircraft)
- Cathode ray tubes (aircraft systems)
- Cockpit display devices

- Compasses
- Control position indicators (aircraft)
- Detecting devices (aircraft)
- Display devices (aircraft)
- Engine fuel quantity gages
- Engine oil pressure gages
- Engine oil temperature gages
- Engine propulsion system instruments and gages
- Engine RPM indicators
- Fire control radar
- Fire warning systems
- Flight control computer systems
- Flight instruments (aircraft)
- Flight recorders (aircraft)
- Fluid flow sensors (aircraft)
- Gyroscopes (aircraft)
- Heads-up displays (aircraft)
- Horizon sensors (aircraft)
- Infrared sensors (aircraft)
- Instrument arrangement (aircraft)
- Instrument design (aircraft)
- Instrument displays (aircraft)
- Instrument installation (aircraft)
- Instrument landing systems (ILS) displays
- Landing gear position indicators (aircraft)
- Laser altimeters (aircraft)
- Laser instruments (aircraft)
- Mach meters
- Navigation display devices (design and development)
- Onboard computer systems for aircraft
- Position indicators (aircraft)
- Power plant instruments and gages (aircraft)
- Propulsion system instruments and gages (aircraft)
- Rate of climb indicators
- Recording devices (aircraft)
- Sensors for aircraft equipment and operation
- Skin temperature indicators (aircraft)

- Stall indicators
- Target acquisition
- Target-signature modeling (aircraft)
- Telemetry devices (aircraft)
- Terrain clearance indicators
- Turn and bank indicators
- Warning lights (aircraft)

Aircraft Propulsion and Power

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and onboard auxiliary power plants for aircraft. For related information see also *Spacecraft Propulsion and Power* (pages 43-45); *Propellants and Fuels* (pages 57-59); and *Energy Production and Conversion* (pages 88-89).

Definition

Aircraft Propulsion - The action or process of imparting motion to an aircraft by means of a force such as a thrust of air or energy released by burning fuel. Adapted from the NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Power - The application of energy to do work. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: All air-breathing engines and chemical, electric, hybrid, magnetohydrodynamic, or other types of energy conversion devices suitable for propulsion of aircraft or to provide a source of energy or power for the aircraft or its systems.

Selective Interest: Engines, rockets, and power conversion devices from other applications if readily convertible to aircraft use.

Negative Interest: Conventional, stationary power sources, and propulsion units for land and sea vehicles not modified for aircraft use.

Input Subjects of Specific Interest

- Aerodynamic noise (propulsion systems)
- Afterburner controls
- Airbreathing engines (aircraft)
- Aircraft engine:
 - Afterburners
 - Carburetors
 - Combustors
 - Components
 - Compressors
 - Control systems
 - Cooling systems
 - Design
 - Development
 - Diffusers
 - Evaluation
 - Exhaust systems
 - Injection systems
 - Inlets
 - Maintenance
 - Noise

Performance
Research
Simulation
Superchargers
Testing
Thrust reversers
Turbines

- Aircraft fuel systems
- Aircraft hydraulic systems (power)
- Aircraft pneumatic systems (power)
- Aircraft power systems
- Aircraft propellers
- Aircraft propulsion system components
- Aircraft propulsion systems
- Auxiliary power systems (aircraft)
- Auxiliary power units (APU) (aircraft)
- Bird ingestion (aircraft engines)
- Bypass jet engines
- Centrifugal compressors (aircraft)
- Chemical propulsion engines (aircraft)
- Combustors (aircraft)
- Compression ignition engines (aircraft)
- Diesel engines (aircraft)
- Ejectors (aircraft)
- Electric power systems (aircraft)
- Electric power units (aircraft)
- Electric propulsion systems (aircraft)
- Engine control systems (aircraft)
- Engine ingestion
- Engine noise (aircraft)
- Engine noise suppressors (aircraft)
- Exit controls
- Fan jet engines
- Foreign object ingestion (aircraft engines)
- Fuel distribution pumps (aircraft)
- Fuel distribution systems (aircraft)
- Fuel injection systems (aircraft)
- Fuel system components (aircraft)

- Fuel Systems (aircraft)
- Fuel tanks (aircraft)
- Gas turbine engines (aircraft)
- Gasoline engines (aircraft)
- Inlet controls
- Inlets (aircraft)
- Internal combustion engines (aircraft)
- Jet engines
- Nozzles (aircraft)
- Nuclear engines (aircraft)
- Nuclear propulsion systems (aircraft)
- Piston engines (aircraft)
- Pneumatic systems (aircraft propulsion and power)
- Propellers (tractor, pusher, contrarotating, propfan)
- Propulsion system components (aircraft)
- Propulsion systems (aircraft)
- Pulsejet engines
- Pumps (aircraft)
- Quiet engines (aircraft)
- Ramjet engines (aircraft)
- Reciprocating engines (aircraft)
- Rocket engines (aircraft)
- Rotary engines (aircraft)
- Scramjet engines (aircraft)
- Spark ignition engines (aircraft)
- Stirling cycle engines (aircraft)
- Throttle controls (aircraft)
- Thrust reverser controls
- Turbine blade cooling
- Turbine blade vibration
- Turbofan engines
- Turboprop engines
- Turborocket engines (aircraft)
- Ultra bypass engines
- Wind tunnel tests (propulsion systems)

Aircraft Stability and Control

Includes aircraft handling qualities, piloting, flight controls, and autopilots. For related information see also *Aircraft Design, Testing and Performance* (pages 10-11).

Definition

Aircraft Stability - The property of an aircraft to maintain its attitude or to resist displacement, and if displaced, to develop forces and moments tending to restore the original condition. Adapted from the NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

Aircraft Control - To direct the movements of an aircraft with particular reference to changes in attitude and speed. Adapted from the Dictionary of Technical Terms for Aerospace Use. Wm. H. Allen, ed., 1965. NASA SP-7.

NASA Interest

Exhaustive Interest: Research, development, testing, evaluation, or performance of any complete aircraft or its components, the interaction between the components and the control of the aircraft in flight.

Selective Interest: Piloting as it affects the stability, control, and maneuverability of an aircraft.

Input Subjects of Specific Interest

- Air launched weapons (stability)
- Aircraft control
- Aircraft stability
- Aircraft trim
- Attitude control (aircraft)
- Autopilots (aircraft)
- Body-tail combinations (stability and control)
- Control effectiveness (aircraft)
- Control surface interactions (aircraft)
- Dutch roll
- Dynamic stability (aircraft)
- Flight control (aircraft)
- Flight dynamics (aircraft)
- Flight management systems
- Flight path control (aircraft)
- Flutter (aircraft)
- Fly-by-light
- Fly-by-wire control (FBW)
- Flying qualities (aircraft)

- Handling qualities (aircraft)
- Lateral control (aircraft)
- Lateral stability (aircraft)
- Longitudinal control (aircraft)
- Longitudinal stability (aircraft)
- Maneuvering (aircraft)
- Missiles (performance)
- Operational effects of atmospheric variables (weather, buffeting, turbulence, wind shear)
- Piloting (aircraft)
- Pitch control (aircraft)
- Pitch stability (aircraft)
- Roll control (aircraft)
- Roll stability (aircraft)
- Spin recovery
- Stability (aircraft)
- Stability augmentation (aircraft)
- Stability derivatives (aircraft)
- Stabilization surfaces (aircraft)
- Static stability (aircraft)
- Vibration (aircraft)
- Voice command for aircraft
- Wind tunnel tests (stability and control)
- Wing-body combinations (stability and control)
- Wing-nacelle combinations (stability and control)
- Yaw control (aircraft)
- Yaw stability (aircraft)

Research and Support Facilities (Air)

Includes airports, hangars and runways, aircraft repair and overhaul facilities; wind tunnels, shock tubes; and aircraft engine test stands. For related information see also *Ground Support Systems and Facilities (Space)* (pages 26-28).

Definition

Facility - 1. A physical plant such as real estate and improvements thereto (including buildings and equipment) which provides the means of assisting or making easier the performance of a function. 2. Any part or adjunct of a physical plant, or any item of equipment which is an operating entity and which contributes or can contribute to the execution of a function by providing some specific kind of operating action or operation. A Compendium of Authenticated Logistics Terms and Definitions. Fred Gluck, ed. Department of the Air Force, 1970.

NASA Interest

Exhaustive Interest: All aspects of airports and airways except routine commercial operations; tracking and communications installations; test facilities of direct interest to aeronautical activities, including wind tunnels, shock tubes, and test stands.

Selective Interest: Research, development, and test laboratories having potential interest to aeronautics activities; specialized equipment to generate unusual or extreme conditions of temperature, pressure, stress and strain, etc.

Negative Interest: Administrative and housekeeping functions at supporting facilities, commonly available off-the-shelf instrumentation and equipment systems, and commercial equipment not developed specifically for aeronautical use.

Input Subjects of Specific Interest

- Aircraft ground handling equipment
- Aircraft servicing equipment
- Airport lighting
- Airport planning
- Airports and airways
- Altitude test facilities
- Checkout facilities (air)
- Checkout systems (air)
- Clean rooms (aircraft manufacturing and test facilities)
- Control towers
- Crash test facilities
- Development facilities (air)
- Engine test blocks (air)
- Engine test stands (air)
- Flight simulators (aircrew training and aircraft development)
- Ground support equipment (air)

- Ground support facilities (air)
- Ground support systems (air)
- Ground support vehicles (air)
- Hangar facilities
- High temperature test facilities (air)
- Low temperature test facilities (air)
- Maintenance facilities (air)
- Overhaul facilities (aircraft)
- Pressure test facilities (air)
- Repair facilities (aircraft)
- Research facilities (air)
- Runway approach lighting and markers
- Runway construction
- Runway lighting
- Runway surfaces and grooving
- Runways
- Shock tubes and tunnels
- Simulators (air)
- Structures test facilities (air)
- Support facilities (air)
- Temperature test facilities (air)
- Test facilities (air)
- Tracking and communications installations (aircraft)
- Wind tunnel test facilities (aircraft)

ASTRONAUTICS

Includes astronautics; astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command, and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power. For related information see also *AERONAUTICS* (pages 1-21).

Astronautics

Includes research into, and solution of problems of space flight and manned or unmanned space vehicles or objects intended for launch into, launched into, or assembled in outer space, including related equipment, devices, components/parts; development, construction, testing, and operation of such vehicles or objects for research purposes. For extraterrestrial exploration see *Lunar and Planetary Exploration* (pages 152-153).

Definition

Astronautics - Science and art of designing, constructing, and operating spacecraft. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Spacecraft production, space manufacturing, space flight problems and solutions, space colonization, and space based maintenance.

Selective Interest: Ground-based maintenance of launch vehicles.

Negative Interest: Military or defense applications of launch vehicles on spacecraft.

Input Subjects of Specific Interest

- Astronautics
- In-orbit maintenance, servicing and refueling
- Launch vehicle maintenance
- Launch vehicle manufacturing
- Launch vehicle production
- Mission planning (space)
- Space based maintenance and servicing
- Space colonies
- Space colonization

- Space debris
- Space exploration (mission planning)
- Space manufacturing and assembly
- Space programs
- Space vehicle maintenance
- Space vehicle manufacturing
- Space vehicle production
- Spacecraft maintenance
- Spacecraft manufacturing
- Spacecraft production

Aerodynamics

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

Definition

Aerodynamics - The practical application of celestial mechanics, astrobballistics, propulsion theory, and allied fields to the problem of planning and directing the trajectories of space vehicles. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration. NASA SP-7064.

NASA Interest

Exhaustive Interest: Theoretical analysis and actual orbits and trajectories of launch vehicles and spacecraft.

Input Subjects of Specific Interest

- Astrobballistics
- Aerodynamics
- Atmospheric entry effects
- Gravitational effects (orbital effects on launch vehicles and spacecraft)
- Launching dynamics
- Orbit dynamics of spacecraft
- Powered trajectories
- Propulsion effects on launching, trajectories, and orbits
- Reentry dynamics
- Rendezvous
- Spacecraft orbits
- Trajectories:
 - Ballistic
 - Free-flight
 - Launch vehicle
 - Powered
 - Projectile
 - Reentry
 - Spacecraft
- Trajectory analysis
- Two- and three-body problems (trajectory analysis)

Ground Support Systems and Facilities (Space)

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators. For related information see also *Research and Support Facilities (Air)* (pages 20-21).

Definition

Ground Support Systems and Facilities (Space) - That ground-based equipment, land, and buildings, including all implements, tools, and devices (mobile or fixed), required to inspect, test, adjust, calibrate, appraise, gage, measure, repair, overhaul, assemble, disassemble, transport, safeguard, record, store, or otherwise function in support of a rocket, space vehicle, or the like, either in the research and development, or in an operational phase, or in support of the guidance system used with the missile, vehicle, or the like. Modified from the term Ground-Support Equipment. Dictionary of Technical Terms for Aerospace Use. Wm. H. Allen, ed., 1965. NASA SP-7.

NASA Interest

Exhaustive Interest: All information dealing with spaceports; launch towers; spacecraft and launch vehicle simulators; test facilities for spacecraft, launch vehicles and propulsion systems, and transporters; shuttlecraft landing facilities; ground-support equipment.

Selective Interest: Hangars, maintenance facilities, airports, airways, launch complexes, land transportation information that deals with transportation and safety to, from, and on launch complexes, and aerial navigation and tracking facilities when used in support of astronomical activities.

Negative Interest: Military launch vehicles, military mobile transporters, and missile storage silos.

Input Subjects of Specific Interest

- Accelerators
- Assembly buildings
- Astronaut training facilities
- Automatic picture transmission (APT) ground stations
- Block houses
- Checkout facilities (space)
- Checkout systems (space)
- Clean rooms (space)
- Deep space instrumentation facilities
- Development facilities (space)
- Engine test blocks (space)
- Engine test stands (space)
- Extraterrestrial bases
- Flight simulators (space)
- Gravity simulators

- Ground support equipment (space)
- Ground support facilities (space)
- Ground support systems (space)
- Ground support vehicles (space)
- High temperature test facilities (space)
- Laser range finder facilities
- Laser space communications facilities
- Launch complexes
- Launch facilities
- Launch pads and bases
- Launch towers
- Launch vehicle simulators
- Low temperature test facilities (space)
- Lunar and planetary bases
- Lunar gravity simulators
- Lunar roving vehicles
- Maintenance facilities (space, ground based)
- Mobile lunar laboratories
- Mobile planetary laboratories
- Mobile transporters
- Optical tracking stations
- Overhaul facilities (space)
- Payload operations and support
- Planetary roving vehicles
- Pressure test facilities (space)
- Rail accelerators, railguns, launchers (applications)
- Range safety
- Recovery equipment and vehicles
- Remote launch monitoring facilities
- Repair facilities (spacecraft, ground based)
- Research facilities (space)
- Rocket engine test pads
- Rocket sleds
- Rocket test facilities
- Rover vehicles
- Shuttlecraft landing facilities
- Simulators (space)

- Solar heating simulators
- Solar simulators
- Space facility for cryogenic materials
- Space research facilities
- Space simulators
- Space vacuum simulators
- Spacecraft maintenance facilities
- Spacecraft production facilities
- Spacecraft simulators
- Spaceport planning
- Spaceports
- Special vehicles (land, sea, air) (used as bases and for transportation or rescue of astronauts or astronautic-oriented equipment)
- Storage facilities for propellants and cryogenics
- Structures test facilities (space)
- Support facilities
- Surface exploration vehicles
- Temperature test facilities (space)
- Test facilities (space)
- Test range facilities
- Test ranges
- Transporters
- Umbilical towers
- Vacuum test facilities
- Wind tunnel test facilities (launch and space vehicles)
- Wind tunnel tests (launch and space vehicles)

Launch Vehicles and Space Vehicles

Includes boosters; operating problems of launch/space vehicle systems; and reusable vehicles. For related information see also *Spacecraft Propulsion and Power* (pages 43-45).

Definition

Launch Vehicles - Machines or vehicles, including catapults, by means of which airplanes, rockets, or the like are directed, hurled, or sent forth. Adapted from the NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

Space Vehicles - Devices, manned and unmanned, which are designed to be placed into orbit about the Earth or into a trajectory to another celestial body. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: Design, research, development, testing, evaluation, and performance of any launch vehicle, space vehicle, combination of launch vehicle and space vehicle, propulsion system, auxiliary system, or component, and all operating procedures and problems related to the peaceful uses of space vehicles.

Negative Interest: Design and performance of military weapons and warheads; military characteristics of weapons and their effects; performance and effectiveness of anti-aircraft missiles, anti-missiles; pyrotechnic rockets used for displays and festivals.

Input Subjects of Specific Interest

- Aerospace vehicles
- Boattail configurations (space vehicles)
- Boosters (launch vehicles)
- Combinations of launch vehicles and spacecraft
- Countdown
- Design of space vehicles, propulsion units, tanks, components, systems
- Effects of space radiation on space vehicles and components
- Landing of space vehicles
- Launch operations
- Launch vehicles
- Lunar landers (unmanned)
- Multistage launch vehicles
- Nose cones
- Orbit-on-demand vehicles
- Orbital transfer vehicles
- Payload and equipment carried on specific space vehicles
- Planetary landers (unmanned)

- Plasma wakes (orbital transfer vehicles)
- Reentry vehicles
- Reusable vehicles
- Rockets
- Satellite launching dynamics
- Separation and staging techniques (for stages of space vehicles)
- Single-stage launch vehicles
- Solar Power System (SPS) (configurations)
- Sounding rockets
- Space vehicle:
 - Configurations
 - Control
 - Design
 - Development
 - Dynamics
 - Evaluation
 - Flight operations
 - Handling and preparation for launching
 - Operations
 - Performance
 - Research
 - Stability
 - Testing
- Space vehicle auxiliary systems
- Spacecraft launch dynamics
- TAV (transatmospheric vehicles) (launch and space vehicles)
- Transatmospheric vehicles (TAV) (launch and space vehicles)

Space Transportation

Includes passenger and cargo space transportation, e.g., shuttle operations; and space rescue techniques. For related information see also *Air Transportation and Safety* (pages 5-6); and *Spacecraft Design, Testing and Performance* (pages 36-39). For space suits see *Man/System Technology and Life Support* (pages 105-106).

Definition

Space Transportation - Means of conveyance or the act of conveying, traveling to, through, or from outer space. NASA Thesaurus Supplement, NASA-SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: All information dealing with passenger and cargo handling; flight safety; rescue operations and techniques. Systems specific to ground operations, maintenance and support, and launch complex construction are covered in *Ground Support Systems and Facilities (Space)* (pages 26-28).

Input Subjects of Specific Interest

- Accidents and emergencies (spacecraft)
- Baggage handling (spacecraft)
- Cargo handling (spacecraft)
- Cargo transportation (spacecraft)
- Escape systems (spacecraft)
- Explosions (spacecraft)
- Extravehicular activity (EVA) (operations)
- Fire (spacecraft)
- Flight safety (spacecraft)
- Orbiting maneuvering vehicles
- Parachutes (spacecraft applications)
- Passenger handling (space transportation)
- Passenger transportation (space)
- Payload assist module (PAM)
- Recovery of spacecraft
- Restraint harness (spacecraft)
- Safety systems (spacecraft)
- Search and rescue operations (space)
- Shoulder harness (spacecraft)
- Shuttle operations
- Space operation emergencies
- Space rescue

- Space shuttles
- Space transportation
- Spacecraft ditching
- Spacecraft retrieval
- Spacelab
- Survival (space operations)

Space Comm., Spacecraft Comm., Command & Tracking

Includes telemetry; space communications networks; astronavigation and guidance; and radio blackout. For related information see also *Aircraft Communications and Navigation* (pages 7-9); and *Communications and Radar* (pages 63-65).

Definition

Space Communications - The act of, or methods for, conveying or receiving intelligible information from beyond the Earth's atmosphere. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Spacecraft Communications - The act of, or methods for, conveying information to, or from, manned or unmanned spacecraft. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Command - A signal which initiates or triggers an action in the device which received the signal. Dictionary of Technical Terms for Aerospace Use. Wm. H. Allen, ed., 1965. NASA SP-7.

Spacecraft Tracking - Following by radio and optical equipment and recording speed, location, and direction of moving spacecraft. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: All techniques, research, development, and application of methods, systems, and equipment intended for the transmittal of data to, or from, launch vehicles, space vehicles, communications and scientific satellites, and lunar and planetary bases; ground and space based tracking and data acquisition stations and systems; launch vehicle and space vehicle navigation and guidance.

Selective Interest: Communication and navigation techniques and theory of potential interest to space flight.

Negative Interest: Telephone, teletype, radio, radar, and microwave equipment and technology not having aerospace communication, command, or tracking applications.

Input Subjects of Specific Interest

- Astronavigation
- Automatic picture transmission (APT)
- Celestial navigation (spacecraft)
- Collision avoidance (spacecraft)
- Command and control of spacecraft
- Communications blackouts (reentry)
- Communications networks (space)
- Communications systems (space)
- Deep space network
- Digital communications systems (spacecraft)

- Global positioning systems (spacecraft)
- Ground based data acquisition stations
- Ground based data acquisition systems
- Ground based tracking stations
- Ground based tracking systems
- Guidance system design (spacecraft)
- Inertial navigation systems (spacecraft)
- Inertial sensors and measurement units (spacecraft)
- Laser communications systems (spacecraft)
- Laser tracking systems (spacecraft)
- Launch vehicle navigation
- Man-machine communications (spacecraft)
- Manned space flight network
- Microwave communications systems (spacecraft)
- Microwave receivers (spacecraft)
- Microwave transmitters (spacecraft)
- Navigation computer systems (spacecraft)
- Navigation display devices (spacecraft)
- Navigation system design (spacecraft)
- Navigation systems (spacecraft)
- Radar communications systems (spacecraft)
- Radar detection (spacecraft navigation)
- Radar imagery (spacecraft navigation)
- Radar tracking systems (spacecraft)
- Radio blackout (loss of communications)
- Radio communications systems (spacecraft)
- Range and angle measurement (spacecraft)
- Rendezvous guidance
- Search and rescue operations (communications)
- Shuttle imaging radar (theory and techniques)
- Space based data acquisition stations
- Space based data acquisition systems
- Space communications
- Space communications networks
- Space flight communication techniques and theory
- Space flight navigation techniques and theory
- Space navigation

- Space tracking and data acquisition network (STADAN)
- Spacecraft command
- Spacecraft communications
- Spacecraft control (communications)
- Spacecraft navigation
- Spacecraft tracking
- Speech analysis (spacecraft voice communications)
- Speech compression (spacecraft voice communications)
- Target-signature modeling (spacecraft)
- Telemetry (spacecraft applications)
- Tracking and communications installations (spacecraft)
- Tracking networks
- Tracking stations
- Voice communications systems (spacecraft)
- Wave propagation (spacecraft communications effects)

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 *Man/System Technology and Life Support* (pages 105-106). For related information see also *Aircraft Design, Testing and Performance* (pages 10-11); *Structural Mechanics* (pages 82-84); and *Space Transportation* (pages 31-32).

Definition

Spacecraft Design - Plans for the structure of any apparatus, machine, or contrivance, especially a device intended to be placed into orbit around the Earth or into a trajectory that escapes the Earth's atmosphere; also the values of the parameters of the spacecraft's systems. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Spacecraft Testing - Tests, by whatever means, of a spacecraft or any equipment, system, or component used in, or on, a spacecraft to determine its suitability for, and reliability in, space flight. Adapted from the NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

Spacecraft Performance - The manner in which any spaceborne structure, machine, contrivance, or vehicle functions while in operation in Earth orbit, in space, or in simulated space or spacecraft test situation. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Research, development, testing, evaluation, or performance of any complete spacecraft, system, or component; operating problems that affect or are affected by design, development, testing, evaluation, or performance.

Input Subjects of Specific Interest

- Active communication satellites
- Active satellite stabilization
- Artificial satellites
- Astronomical observatory satellites
- Attitude control (spacecraft)
- Autopilots (spacecraft)
- Cabin pressurization (spacecraft)
- Capture devices
- Communication satellites
- Control effectiveness (spacecraft)
- Depressurization systems (spacecraft)
- Docking (spacecraft)
- Dynamic stability (spacecraft)
- Expandable structures (spacecraft)

- Fins (spacecraft)
- Flight control (spacecraft)
- Flight dynamics (spacecraft)
- Flight path control (spacecraft)
- Flutter (spacecraft)
- Flying qualities (spacecraft)
- Geophysical satellites
- Handling qualities (spacecraft)
- Inflatable structures (spacecraft)
- Inlets (spacecraft)
- Landing gear (spacecraft)
- LANDSAT (configurations)
- Lateral control (spacecraft)
- Lateral stability (spacecraft)
- Longitudinal control (spacecraft)
- Longitudinal stability (spacecraft)
- Lunar landers (manned)
- Lunar orbiters
- Maneuvering (spacecraft)
- Manned orbital laboratories
- Manned spacecraft
- Meteorite protection
- Meteorological satellites
- Models (spacecraft)
- Navigation satellites
- Observation satellites
- Passive communication satellites
- Passive satellite stabilization
- Piloting (spacecraft)
- Pitch control (spacecraft)
- Pitch stability (spacecraft)
- Planetary landers (manned)
- Planetary orbiters
- Plasma wakes (spacecraft)
- Pneumatic systems (spacecraft)
- Pressurization systems (spacecraft)
- Pressurized cabins (spacecraft)

- Radiation effects on spacecraft and components
- Roll control (spacecraft)
- Roll stability (spacecraft)
- Satellite stabilization
- Satellites for air, land, or sea navigation
- Satellites for air, land, or sea traffic control
- Scientific satellites
- Search and rescue satellites
- SEASAT (configurations)
- Separation and staging techniques (spacecraft)
- Space laboratories
- Space platforms
- Space probes
- Space stations
- Spacecraft:
 - Cabins
 - Descriptions (types/names/designations)
 - Design
 - Development
 - Docking
 - Environmental control
 - Evaluation
 - Flight simulation
 - Flight tests
 - Hydraulic systems (design)
 - Performance
 - Pneumatic systems (design)
 - Research
 - Safety features
 - Separation and staging techniques
 - Simulation
 - Structures
 - Systems
 - Testing
 - Thermal control
- Spacecraft antennas
- Spacecraft charging
- Spacecraft components
- Spacecraft external contamination
- Stability (spacecraft)
- Stability augmentation (spacecraft)
- Stability derivatives (spacecraft)

- Stabilization surfaces (spacecraft)
- Static stability (spacecraft)
- Synchronous satellites
- Tethered satellite systems
- Tracking and data relay satellites
- Unfoldable structures (spacecraft)
- Vibration (spacecraft) (see *Structural Mechanics* (pages 82-84) for effects on structural elements and fatigue)
- Viking space probe
- Weather satellites
- Wind tunnel tests (spacecraft)
- Yaw control (spacecraft)
- Yaw stability (spacecraft)

Spacecraft Instrumentation

Includes the design, manufacture, or use of any device onboard any spacecraft for the purpose of observing, measuring, detecting, controlling, computing, communicating, recording, or processing data. For related information see also *Aircraft Instrumentation* (pages 12-14); and *Instrumentation and Photography* (pages 72-74).

Definition

Spacecraft Instrumentation - The design, composition, assemblage, arrangement, installation, and use of electronic, gyroscopic, and other instruments for the purpose of controlling flight of, detecting, measuring, recording, telemetering, processing, or analyzing different values or quantities as encountered in the flight of a spacecraft. Adapted from the Dictionary of Technical Terms for Aerospace Use. Wm. H. Allen, ed., 1965. NASA SP-7.

NASA Interest

Exhaustive Interest: Design, arrangement, installation, and use of devices for detecting, measuring, recording, telemetering, processing, or analyzing values or quantities characterizing an environment, spaceflight, launch vehicle, spacecraft, or other experimental phenomena encountered in launch vehicle and spacecraft flight.

Selective Interest: Instruments or displays and off-the-shelf equipment from other transportation media that could be transferred or modified for spacecraft or launch vehicle use.

Negative Interest: Commercial off-the-shelf instruments for general use.

Input Subjects of Specific Interest

- Ablation sensors (spacecraft)
- Alarm systems (spacecraft)
- Altimeters (spacecraft)
- Analyzing devices (spacecraft)
- Astrionics
- Astrophysical instruments
- Attitude indicators (spacecraft)
- Bioelectronic instruments (spacecraft)
- Biomedical instruments (spacecraft)
- Cabin display devices (spacecraft)
- Cathode ray tubes (spacecraft systems)
- Control position indicators (spacecraft)
- Detecting devices (spacecraft)
- Display devices (spacecraft)
- Flight instruments (spacecraft)
- Flight recorders (spacecraft)
- Fluid flow sensors (spacecraft)

- Geophysical sensors
- Gyroscopes (spacecraft)
- Heads-up displays (spacecraft)
- Horizon sensors (spacecraft)
- Infrared sensors (spacecraft)
- Instrument arrangement (spacecraft)
- Instrument design (spacecraft)
- Instrument displays (spacecraft)
- Instrument installation (spacecraft)
- Instrument pointing systems (IPS)
- Landing gear position indicators (spacecraft)
- Laser altimeters (spacecraft)
- Laser instruments (spacecraft)
- Measuring sensors for magnetic fields
- Micrometeoroid sensors (spacecraft)
- Navigation display devices (design and development)
- Onboard computer systems for spacecraft
- Onboard instrument systems for spacecraft
- Onboard sensors and recorders for spacecraft
- Passive sensors, trackers, and references (spacecraft)
- Planetary atmosphere sensors
- Pointing systems
- Position indicators (spacecraft)
- Propulsion system instruments and gages (spacecraft)
- Radiation and radiation belt sensors
- Recording devices (spacecraft)
- Sensors for space, stellar, solar, planetary, lunar, and Earth related phenomena
- Sensors for spacecraft equipment
- Skin temperature indicators (spacecraft)
- Solar radiation sensors
- Solar wind sensors
- Space cabin atmosphere sensors
- Spacecraft control computer systems
- Spacecraft instruments
- Spacecraft systems monitoring instruments
- Star trackers (navigation)
- Telemetry devices (spacecraft)

- Thermal protection sensors
- Two-gas sensors (spacecraft)
- Upper atmosphere sensors
- Warning lights (spacecraft)

Spacecraft Propulsion and Power

Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources. For related information see also *Aircraft Propulsion and Power* (pages 15-17); *Propellants and Fuels* (pages 57-59); *Launch Vehicles and Space Vehicles* (pages 29-30); and *Energy Production and Conversion* (pages 88-89).

Definition

Spacecraft Propulsion - The action or process of imparting motion to a spacecraft by means of a force such as a thrust of air or energy released by burning fuel. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Power - The application of energy to do work. NASA Thesaurus Supplement, NASA SP-7064 (Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: All chemical, electric, magnetohydrodynamic, hybrid, or other types of energy conversion suitable for propulsion or stationkeeping of spacecraft, satellites, space probes, planetary probes, space stations, and lunar probes; and for use as auxiliary power sources for spacecraft; including liquid rocket engines, solid rocket engines, ion engines, plasma rocket engines, electric rocket engines, etc., including their components.

Negative Interest: Propulsion and mobile or stationary power sources for earthbound use or transportation, e.g., ship, locomotive, automobile, aircraft, and truck propulsion; mobile or stationary electric power plants, unless directly applicable to spacecraft use.

Input Subjects of Specific Interest

- Attitude thrusters
- Auxiliary power systems (spacecraft)
- Auxiliary power units (APU) (spacecraft)
- Boosters (spacecraft)
- Chemical power sources
- Chemical propulsion engines (spacecraft)
- Clustered rockets
- Combustors (spacecraft)
- Ejectors (spacecraft)
- Electric power systems (spacecraft)
- Electric power units (spacecraft)
- Electric propulsion systems (spacecraft)
- Electric rocket engines
- Electrostatic rocket engines
- Electrothermal rocket engines
- Fuel distribution pumps (spacecraft)
- Fuel distribution systems (spacecraft)

- Fuel injection systems (spacecraft)
- Fuel system components (spacecraft)
- Fuel systems (spacecraft)
- Fuel tanks (spacecraft)
- Hybrid propellant rocket engines
- Igniters (rocket engines)
- Ion rocket engines
- Liquid propellant rocket engines
- Low thrust engines
- Magnetohydrodynamic (MHD) power sources
- Magnetohydrodynamic (MHD) thrusters
- Main propulsion system components
- Main propulsion systems
- Multistage rockets
- Nozzles (spacecraft)
- Nuclear engines (spacecraft)
- Nuclear power sources (spacecraft)
- Nuclear propulsion systems (spacecraft)
- Nuclear rocket engines
- Onboard solar arrays
- Onboard solar generators
- Plasma propulsion (applications)
- Pneumatic systems (spacecraft propulsion and power)
- Propellant flow systems
- Propellant injectors, pumps, and tanks
- Propulsion system components (spacecraft)
- Propulsion systems (spacecraft)
- Pumps (spacecraft)
- Refueling in orbit
- Retrorockets
- Rocket engine exhaust plumes
- Rocket engine noise
- Rocket engines (spacecraft)
- Rocket throttling systems
- Solar sails
- Solid propellant rocket engines
- Space vehicle booster engines

- Spacecraft auxiliary power sources
- Spacecraft hydraulic systems (power)
- Spacecraft pneumatic systems (power)
- Spacecraft power systems
- Spacecraft propulsion
- Systems for energy conversion (spacecraft)
- Thrust vector control devices
- Turbines for propellants
- Turborocket engines (spacecraft)
- Vector control engines
- Vernier engines

CHEMISTRY AND MATERIALS

Includes chemistry and materials; composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; propellants and fuels; and materials processing.

Chemistry and Materials

Includes the study of the nature, behavior, use, structure and composition of, and changes in, the structure and composition of, matter related to aircraft, launch vehicles, and spacecraft, and materials processing in space.

Definition

Chemistry - The science that studies the identification, composition, and properties of elements, their combinations, reactions, and applications. NASA Thesaurus Supplement, NASA SP-7064 (Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Materials - In general, the substances of which aircraft, launch vehicles, and space vehicles are composed; specifically, the metals, alloys, ceramics, and plastics used in structural, protective, and electronic functions. Adapted from the Dictionary of Technical Terms for Aerospace Use. Wm. H. Allen, ed., 1965. NASA SP-7.

NASA Interest

Exhaustive Interest: Properties, composition, structures, and manufacture of materials used for aircraft, aerospace, launch and space vehicles, launch site equipment, space structures, protective clothing, propellants, and fuels. The manufacture or processing in space of any material.

Selective Interest: Studies of chemistry or materials having no aerospace applications.

Input Subjects of Specific Interest

- Biochemistry (aerospace applications)
- Chemical manufacturing (aerospace applications)
- Chemistry (aerospace applications)
- Materials (aerospace applications)
- Organic chemistry (aerospace applications)
- Organometallic compounds (aerospace applications)

Composite Materials

Includes physical, chemical, and mechanical properties of laminates and other composite materials. For ceramic materials see *Nonmetallic Materials* (pages 54-56).

Definition

Composite Materials - Structural materials of metals, ceramics, or plastics with built-in strengthening agents which may be in the form of filaments, foils, powders, or flakes of a different compatible material. NASA Thesaurus, Volume 3: Definitions, Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: Physical and mechanical properties, production, handling, testing, and evaluation of composite materials for use in aircraft, rockets, launch vehicles, space vehicles, reentry vehicles, aircraft and spacecraft propulsion systems, and supporting facilities, e.g., cryogenic storage facilities.

Selective Interest: Research and development on composite materials having potential aerospace applications. *Negative Interest:* Routine developments of structural composite materials for use in housing, heavy industry, and earthbound transportation, unless a potential exists for aerospace use.

Input Subjects of Specific Interest

- Ablative materials (composite)
- Boron filament materials
- Carbon filament materials
- Composite materials
- Composition materials
- Fatigue (composite materials)
- Filament materials
- Filament wound structures (composite materials)
- Filament-matrix materials
- Flammability (composite materials)
- Glass fiber-plastic materials
- Honeycomb materials
- Insulation (composite materials)
- Laminates
- Metal filament systems
- Offgassing/outgassing (composite materials)
- Packing (composite materials)
- Reinforcing fibers
- Reinforcing filaments (composite materials)

- Shear strength (composite materials)
- Surface properties (composite materials)
- Tensile strength (composite materials)
- Testing of materials (composite)
- Whiskers (composite materials)

Inorganic and Physical Chemistry

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry. For related information see also *Thermodynamics and Statistical Physics* (page 137).

Definition

Inorganic Chemistry - The study of noncarbon elements, including their identification, composition, properties, combinations, reactions, and applications. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Physical Chemistry - The study of the physical aspects of chemistry such as the structures of compounds or measurements or properties of chemical interactions. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space administration.

NASA Interest

Exhaustive Interest: Chemistry of elements and compounds characteristic of NASA's space, planetary, and astronomical interests; combustion theory and processes of direct relevance to aircraft, launch vehicle, and spacecraft materials and propulsion; and low pressure and vacuum reactions.

Negative Interest: Chemical research of elements, processes, and compounds that do not have possible aerospace applications.

Input Subjects of Specific Interest

- Alkali metal vapors
- Analytical chemistry
- Catalysts (chemical)
- Chemical analysis
- Chemical engineering
- Chemiluminescence
- Chemistry of compounds
- Chemistry of elements
- Chromatography
- Combustion chemistry
- Combustion kinetics
- Combustion physics
- Combustion processes
- Combustion theory
- Electrochemical processes
- Electrochemistry
- Electrophoresis

- Ferromagnetic resonance
- Flame studies
- Flammability
- Gas absorption
- Gas-solid reactions
- Gas-surface interactions
- Gas-surface reactions
- Gaseous reactions
- Ignition studies
- Infrared gas analysis
- Inorganic chemistry
- Low pressure chemistry
- Luminescence (chemistry)
- Mass spectroscopy
- Osmosis (chemistry)
- Photochemistry
- Physical chemistry
- Polarography
- Spectrophotometry
- Spectroscopic analysis
- Spectroscopy (lasers)
- Thermochemistry
- Vacuum chemistry

Metallic Materials

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

Definition

Metallic Materials - Materials that are like metal, having the properties of metal; containing or consisting of metal.

NASA Interest

Exhaustive Interest: Physical, chemical, and mechanical properties; testing, evaluation, and protection of metals, alloys, and related compositions for use in aircraft, rockets, launch vehicles, space vehicles, reentry vehicles, aircraft and spacecraft propulsion systems, and supporting facilities (other than conventional building structural materials).

Selective Interest: Research and development on metallic materials that have potential aerospace applications.

Negative Interest: Routine developments of structural metallic materials for use in housing, heavy industry, and earthbound transportation, unless a potential exists for aerospace use.

Input Subjects of Specific Interest

- Alloys
- Cermets
- Chemical properties of alloys
- Chemical properties of metals
- Compression strength (metallic materials)
- Corrosion
- Creep strength (metallic materials)
- Crystal structure (metallic materials)
- Crystals (metallic)
- Development of alloys
- Eutectics
- Eutectoids
- Evaluation of alloys
- Evaluation of metals
- Fatigue (metallic materials)
- Ferrites
- Fibers (metallic materials)
- Flammability (metallic materials)
- Heat treatment of metals
- Hydrogen embrittlement

- Mechanical properties of alloys
- Mechanical properties of metals
- Metal crystals
- Metallic fibers
- Metallic materials
- Metallography
- Metallurgy
- Metals
- Microstructure of welded joints
- Offgassing/outgassing (metallic materials)
- Packing (metallic materials)
- Phase equilibrium
- Physical properties of alloys
- Physical properties of metals
- Powder metallurgy
- Protection of alloys
- Protection of materials (metallic)
- Protective coatings (metallic)
- Refractory materials
- Reinforcing filaments (metallic materials)
- Research on alloys
- Research on metallic materials
- Shear strength (metallic materials)
- Sintering
- Stress corrosion cracking
- Surface hardening of metals
- Surface properties (metallic materials)
- Tensile strength (metallic materials)
- Testing of alloys
- Testing of materials (metallic)
- Vacuum arc melting
- Welded joints (microstructure)
- Whiskers (metallic materials)

Nonmetallic Materials

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials. For composite materials see *Composite Materials* (pages 48-49).

Definition

Nonmetallic Materials - Materials that do not have the properties of, or do not contain, metal and that are able to combine with hydrogen to form stable compounds, acids, acidic oxides, and anions.

NASA Interest

Exhaustive Interest: Physical, chemical, and mechanical properties; testing, evaluation, and protection of nonmetallic materials (other than conventional building structural materials).

Selective Interest: Research and development on nonmetallic materials that have potential aerospace applications.

Negative Interest: Routine developments of structural nonmetallic materials for use in housing, heavy industry, and earthbound transportation, unless a potential exists for aerospace use.

Input Subjects of Specific Interest

- Ablative materials (nonmetallic)
- Adhesives
- Ceramic materials
- Chemical properties of:
 - Adhesives
 - Ceramics
 - Elastomers
 - Lubricants
 - Plastics
 - Polymers
 - Textiles
- Cleaners
- Compression strength (nonmetallic materials)
- Creep strength (nonmetallic materials)
- Crystal structure (nonmetallic materials)
- Crystals (nonmetallic)
- Development of nonmetallic materials
- Elastomers
- Evaluation of nonmetallic materials
- Fatigue (nonmetallic materials)
- Fibers (nonmetallic materials)
- Film strength

- Flammability (nonmetallic materials)
- Foam materials
- Glass materials
- Graphite
- Greases
- Hydraulic fluids
- Insulation (nonmetallic materials)
- Lubricants
- Lubrication properties of nonmetallic materials
- Mechanical properties of:
 - Adhesives
 - Ceramics
 - Elastomers
 - Lubricants
 - Plastics
 - Polymers
 - Textiles
- Nonmetallic fibers
- Nonmetallic materials
- Offgassing/outgassing (nonmetallic materials)
- Packing (nonmetallic materials)
- Paints
- Patching compounds
- Physical properties of:
 - Adhesives
 - Ceramics
 - Elastomers
 - Lubricants
 - Plastics
 - Polymers
 - Textiles
- Plastics
- Plywoods
- Polymers
- Protection of materials (nonmetallic)
- Protective coatings (nonmetallic)
- Radomes (nonmetallic materials)
- Reinforcing filaments (nonmetallic)
- Research on nonmetallic materials
- Sealants

- Shear strength (nonmetallic materials)
- Silicon materials
- Solvents
- Surface properties (nonmetallic materials)
- Tensile strength (nonmetallic materials)
- Testing of materials (nonmetallic)
- Textiles
- Whiskers (nonmetallic materials)
- Woods

Propellants and Fuels

Includes rocket propellants, igniters, and oxidizers; their storage and handling procedures; and aircraft fuels. For related information see also *Aircraft Propulsion and Power*; *Spacecraft Propulsion and Power* (pages 43-45); and *Energy Production and Conversion* (pages 88-89).

Definition

Propellants - Any agent used for consumption or combustion in rockets and from which the rockets derive their thrust such as fuels, oxidizers, additives, catalysts, or any compounds of these. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

Fuels - Any substance used to produce heat, either by chemical or nuclear reaction, as used, e.g., in a heat engine. NASA Aeronautical Dictionary. Frank Davis Adams, ed., 1959.

NASA Interest

Exhaustive Interest: Physical, chemical, and mechanical properties; testing, evaluation, storage and handling procedures of rocket propellants and aircraft fuels. For facilities to store or handle fuels or propellants see *Research and Support Facilities (Air)* (pages 20-21) and *Ground Support Systems and Facilities (Space)* (pages 26-28).

Selective Interest: Research and development of fuels and propellants for earthbound transportation systems and power production that have potential aerospace applications.

Negative Interest: Routine developments of fuels for marine, automotive, home heating, heavy industry, and other earthbound applications.

Input Subjects of Specific Interest

- Aircraft fuels
- Boiloff
- Boron-based fuels
- Burning rates
- Catalysts (propellants)
- Chemical properties of propellants and fuels
- Combustion characteristics
- Combustion controllability
- Combustion instability
- Combustion kinetics (propellants and fuels)
- Combustion of propellants and fuels
- Combustion products
- Cryogenic propellants
- Decomposition
- Development of propellants and fuels
- Diffusion

- Evaluation of propellants and fuels
- Exotic propellants and fuels
- Explosives
- Flames and flame propagation (propellants and fuels)
- Fluorine/oxygen propellants
- Fuels
- Gelled propellants and fuels
- Handling of propellants and fuels
- High energy propellants and fuels
- Hybrid propellants and fuels
- Hydrazine propellants
- Hydrides
- Hydrogen propellants and fuels
- Hypergolic propellants
- Igniters (propellants)
- Ignition studies (propellants and fuels)
- Jet engine fuels
- Kerosene based fuels
- Liquid fuels
- Liquid hydrogen (propellants and fuels)
- Liquid oxygen (propellants and fuels)
- Liquid petroleum gas (LPG)
- Liquid propellants
- Lithergolic propellants
- Manufacture of propellants
- Mechanical properties of propellants and fuels
- Metal based propellants and fuels
- Monopropellants
- Nitrate based propellants and fuels
- Oxidizers
- Physical properties of propellants and fuels
- Piston engine fuels
- Propellant grains
- Propellants
- Pyrotechnics
- Research on propellants and fuels
- Rocket propellants

- Service life of propellants and fuels
- Solid propellant curing
- Solid propellants
- Space storable propellants
- Storage of propellants and fuels
- Testing of propellants and fuels
- Thermal characteristics
- Thixotropic propellants
- Vaporization of propellants and fuels

Materials Processing

Includes space-based development of products and processes for commercial application. For legal aspects of space commercialization see *Law, Political Science and Space Policy* (pages 144-145).

Definition

Materials Processing - Processing or manufacturing materials in space and the investigation of effects on materials of microgravity.

NASA Interest

Exhaustive Interest: Effects of space environment on behavior of materials as related to manufacturing or processing in space.

Input Subjects of Specific Interest

- Alloy formation (space processing)
- Biological materials (space processing)
- Composite material formation (space processing)
- Containerless processing
- Crystal growth (space processing)
- Electrophoresis operations in space (EOS)
- Fluids experiment apparatus (space processing)
- Glass formation (space processing)
- Macromolecular crystallography
- Materials processing in space
- Materials separation in space
- Microgravity (space processing)
- Multiphase materials processing in space
- Pharmaceutical preparation (space processing)
- Polymers (space processing)
- Reduced gravity effects (materials)
- Space based services for space processing
- Space commercialization (space processing)
- Space processing of materials

ENGINEERING

Includes engineering; 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* (pages 123-137).

Engineering

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

Definition

Engineering - The useful application of the knowledge of scientific principles, properties, and power sources. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Vacuum technology; aerospace safety engineering; control and display technology; cryogenics.

Selective Interest: Computer aided manufacturing; air cushion vehicle technology; applied mechanics; engineering with potential aerospace application.

Negative Interest: Engineering technology with no aerospace applications.

Input Subjects of Specific Interest

- Air cushion vehicles
- Applied mechanics
- CAM (computer aided manufacturing)
- Civil engineering
- Computer aided manufacturing (CAM) (Engineering)
- Control engineering
- Cryogenics
- Display engineering
- Engineering
- Fire prevention

- Hydrofoil vehicles (engineering)
- Industrial process control
- Industrial safety procedures
- Liquefied gases
- Liquid helium
- Liquid hydrogen
- Liquid nitrogen
- Liquid oxygen
- Metrication
- Metrology
- Safety procedures
- Vacuum technology

Communications and Radar

Includes radar; land and global communications; communications theory; and optical communications. For related information see also *Aircraft Communications and Navigation* (pages 7-9); and *Space Communications, Spacecraft Communications, Command and Tracking* (pages 33-35); for search and rescue, see *Air Transportation and Safety* (pages 5-6); and *Space Transportation* (pages 31-32).

Definition

Communications - A field of specialization covering radio and wire transmission and receipt of information, and related electronic devices and their uses. Adapted from The United States Air Force Dictionary. Woodford Agee Heflin, ed. Princeton, NJ: D. Van Nostrand, Co., Inc.

Radar - Radio detection and ranging, i.e., a method, system, or technique of using beamed, reflected, and timed radio waves for detecting, locating, or tracking objects (such as rockets), for measuring altitude, etc., in any of various activities, such as air traffic control or guidance. The apparatus used. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: All equipment, techniques, research, development, and application specifically intended for the transmittal of data, voice communications, code, or other intelligence to, from, or between aircraft, scientific satellites, launch vehicles, space vehicles, communications satellites, manned or unmanned spacecraft, lunar and planetary bases; ground based tracking and communication stations; tracking and data acquisition networks; transmittal of data from aerospace related experiments.

Selective Interest: Earthbased communications techniques and theory of potential interest for aerospace applications.

Negative Interest: Commercial telephone, teletype, television, and radio operations unless directly related to aerospace communications; courier and messenger service.

Input Subjects of Specific Interest

- Antenna design
- Antenna theory
- Code application
- Code development
- Code equipment
- Code research
- Code techniques
- Communications
- Communications blackouts (electromagnetic interference)
- Communications coding
- Communications interference
- Communications networks (theory)

- Communications noise
- Communications satellite operational problems
- Communications systems (theory)
- Communications techniques
- Communications theory
- Data transmission applications
- Data transmission development
- Data transmission equipment
- Data transmission research
- Data transmission techniques
- Digital communications systems (theory)
- Electromagnetic interference
- Electromagnetic radiation (communications)
- Electromagnetic wave propagation
- Electronic countermeasures
- Global communications
- Ionospheric effects on radio transmission (communications)
- Ionospheric propagation
- Ionospheric scatter
- Large deployable space antennas
- Laser communications
- Man-machine communications (theory)
- Microwave communications systems (application and design)
- Microwave radiation (properties)
- Microwave receivers (theory)
- Microwave techniques
- Microwave theory
- Microwave transmitters (theory)
- Modulation
- Networks (communications)
- Optical communications (applications)
- Phase shift keying (PSK)
- Phased array radar
- Radar (theory and techniques)
- Radar absorbing materials
- Radar antenna design
- Radar antennas (theory and techniques)

- Radar clutter
- Radar communications systems (theory and techniques)
- Radar detection (communications)
- Radar imagery (communications)
- Radar scattering
- Radar tracking systems (theory and techniques)
- Radio (theory and techniques)
- Radio antenna design
- Radio antennas (theory and techniques)
- Radio communications systems (theory and techniques)
- Radomes (design)
- Side looking radar (theory and techniques)
- Signal analyzers
- Signal detection
- Signal generators (theory)
- Signal modulators
- Signal processing
- Speech analysis (electromagnetic aspects)
- Speech compression (electromagnetic aspects)
- Speech recognition
- Synthetic aperture radar
- Television systems (aerospace applications)
- Tropospheric scatter (electromagnetic effects)
- Voice communications
- Wave propagation (electromagnetic)
- Whistlers (electromagnetic)

Electronics and Electrical Engineering

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry. For related information see also *Computer Operations and Hardware* (pages 110-112); and *Solid-State Physics* (pages 135-136).

Definition

Electronics - That branch of physics that treats the emission, transmission, behavior, and effects of electrons. Dictionary of Technical Terms for Aerospace Use. Wm. H. Allen, ed., 1965. NASA SP-7.

Electrical Engineering - The useful application of the knowledge of electricity and its properties. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Theory, research, development, design, testing, performance, and operations of components, devices, and circuitry that have direct application in aircraft, launch vehicles, space vehicles, and their components and equipment; launch, research, and testing facilities, and the components and equipment used in these.

Selective Interest: Theory, research, development, design, testing, performance, and operation of earthbound equipment, components, devices, and circuitry having potential applications for aerospace use, or for use under extreme or unusual conditions or environments.

Negative Interest: Research, development, design, testing, performance, and operation of components, devices, and circuitry of electronic-electrical equipment for commercial nonaerospace applications.

Input Subjects of Specific Interest

- Amplifiers
- Antenna construction
- Audio amplifiers
- Batteries (electrical properties)
- Bridge circuits
- Capacitors
- Cathode ray tubes (electrical properties)
- Charge-coupled devices
- Chips (integrated circuits)
- Chokes
- Circuit theory
- Converters
- Crystals (electronic applications)
- Dielectrics

- Diodes
- Electric circuits
- Electric power units (electrical properties)
- Electrical components
- Electrical engineering
- Electromechanics
- Electron beam devices
- Electron tubes
- Electronic circuits
- Electronic components
- Electronic packaging
- Electronic test equipment
- Electronics
- Electrostatic charges
- Field effect transistors (FET)
- Filters (electric, electronic)
- Inductors
- Insulation (electric, electronic)
- Integrated circuits
- Inverters
- Klystrons
- Light emitting diodes (LED)
- Magnets (electrical, electronics application)
- Microcircuits
- Microminiaturization
- Modulators
- Network theory
- Networks (circuitry)
- Opto-acoustic electronics
- Optoelectronics (applications)
- Oscillators
- Photoelectric devices
- Photomultipliers
- Power amplifiers
- Power packs
- Power supplies
- Printed circuits

- Radar antenna construction
- Radio antenna construction
- Radomes (electrical properties)
- Rail accelerators, railguns, launchers (theory)
- Resistors
- Semiconductors
- Servomechanisms (electrical aspects)
- Signal generators (applications)
- Silicon cells (electrical properties)
- Sneak circuit analysis
- Solar cells (electrical properties)
- Solid state circuitry
- Solid state devices
- Solid state effects
- Superconductivity (applications)
- Surface wave acoustic devices (electronic properties)
- Switches
- Switching circuits
- Test equipment (electrical properties)
- Thyratrons
- Transducers
- Transformers
- Transistors
- Transmission lines
- Transmitters
- Traveling wave tubes
- Triodes
- Tunnel diodes
- Vacuum tubes
- VHSIC
- Waveguides
- X-ray tubes

Fluid Mechanics and Heat Transfer

Includes boundary layers; hydrodynamics; fluidics; mass transfer and ablation cooling. For related information see also *Aerodynamics* (pages 2-4); and *Thermodynamics and Statistical Physics* (page 137).

Definition

Fluid Mechanics - The study of the characteristics, behavior and applications of liquids and gases under various conditions. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Heat Transfer - The transfer or exchange of heat by radiation, conduction, or convection within a substance and between the substance and its surroundings. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: Theories, research, and studies on the forces, flow, mechanical properties and heat transfer of liquids or gases having specific relevance to aerospace interests or under conditions encountered in aircraft, spacecraft, launch vehicles, space vehicles, propulsion systems, or support facilities. Theory, research, and development on heat transfer of relevance also to the thermodynamic properties of elements, compounds, materials, and substances found in aerospace science and technology. (Those subjects concerned with astronomical, solar, and stellar phenomena and their interactions should be included in *Astronomy* (pages 148-149) or *Astrophysics* (pages 150-151).)

Selective Interest: Research developments, and studies of liquids and gases and heat transfer of potential interest for aerospace applications or under unusual or extreme conditions.

Negative Interest: Heat transfer and flow of liquids and gases over wires, through channels, ducts, and pipes related to normal powerplant, reservoir, irrigation, and residential-business use unless related to remote sensing, earth resources, or for other potential aerospace application.

Input Subjects of Specific Interest

- Ablation
- Ablation cooling
- Atomizers
- Boiling
- Boundary layer flow (gases and liquids)
- Cavitation
- Compressible flow (gases and liquid)
- Computational fluid dynamics
- Convection
- Flow measurement
- Flow (gases and liquids)

- Flow with heat addition
- Fluidics
- Fluid dynamics
- Fluid flow
- Fluid forces
- Fluid heat transfer
- Fluid mechanical properties
- Fluid mechanics
- Fluidics
- Fluids
- Gas dynamics
- Gas flow
- Gas forces
- Gas heat transfer
- Gas mechanical properties
- Gaseous film cooling
- Gases
- Heat exchangers (aerospace applications)
- Heat pipes (aerospace applications)
- Heat pumps (aerospace applications)
- Heat shields (aerospace applications)
- Heat sinks (aerospace applications)
- Heat transfer
- Hydraulics
- Hydrodynamics
- Hydrostatics
- Induction heating
- Internal flow in ducts (applications)
- Internal flow in turbomachinery (applications)
- Laminar flow (gases and liquids)
- Liquid settling
- Liquid sloshing
- Mass transfer
- Mixing of gases
- Mixing of liquids
- Radiators (aerospace applications)
- Shock waves

- Skin friction
- Sprays
- Thermal radiation
- Transitional flow (gases and liquids)
- Transpiration cooling
- Turbulent flow (gases and liquids)
- Unsteady flow (gases and liquids)
- Viscous flow

Instrumentation and Photography

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography. For aerial photography see *Earth Resources and Remote Sensing* (pages 86-87). For related information see also *Aircraft Instrumentation* (pages 12-14); and *Spacecraft Instrumentation* (pages 40-42).

Definition

Instrumentation - The design, composition, assemblage, arrangement, installation, and use of devices for controlling, detecting, measuring, recording, displaying, transmitting, processing, or analyzing data. Adapted from the Dictionary of Technical Terms for Aerospace Use. Wm. H. Allen, ed., 1965. NASA SP-7.

Photography - A process for recording visual images by exposing a light-sensitive substance to radiation such as light, infrared, or X-rays. NASA Thesaurus Supplement, NASA SP-7064 (Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Design, development, installation, and use of devices for detecting, measuring, recording, telemetering, processing, or analyzing values or quantities related to aeronautical or space flight; the environment within or outside the flight vehicle; the physical operation and well being of the flight vehicle and its structure during all phases of flight; the facilities for testing and/or developing the flight vehicle; the observations and experiments performed as a result of the flight of these vehicles.

Selective Interest: Instrument design, development, and theory for other purposes that have potential aerospace applications because of advanced or unusual features, or are developed for extreme environments or unusual test conditions.

Negative Interest: Commercial off-the-shelf photographic equipment and instrument design and development for general use for artistic or commercial applications.

Input Subjects of Specific Interest

- Ablation sensors (theory and techniques)
- Accelerometers
- Alarm systems (theory and techniques)
- Analyzing devices (theory and techniques)
- Anemometers (theory and techniques)
- Atomic clocks (theory and techniques)
- Attitude indicators (theory and techniques)
- Bioelectronic instruments (theory and techniques)
- Bioinstrumentation (theory and techniques)
- Biomedical instruments (theory and techniques)
- Bragg cells (theory and techniques)
- Cameras
- Darkroom equipment

- Detectors
- Earth sensors
- Electro-optical systems (instrumentation)
- Electron microscopes
- Emissivity measurements
- Filters (photographic)
- Flow visualization (instrumentation)
- Fluid flow sensors (theory and techniques)
- Gages
- Gyroscopes (design and operation)
- Holography
- Image enhancement
- Instrument design (theory and techniques)
- Instrumentation
- Interferometers
- Ion mass spectrometers
- Laser Doppler velocimeters
- Laser instruments (design and operation)
- Lenses (photographic)
- Mass spectrometers
- Measuring instruments
- Micrometeoroid sensors (instrumentation)
- Microscopes
- Multimode sensors
- Multispectral sensors
- Nondestructive testing instruments
- Optical imaging devices (theory and techniques)
- Oscilloscopes
- Photographic processing equipment
- Photographic supplies
- Photography
- Photometry
- Phototheodolites
- Physiological monitoring devices (theory and techniques)
- Position sensors
- Precision time and time interval (PTTI)
- Pressure transducers

- Radiation instruments
- Radiography
- Recorders
- Remote sensors
- Scatterometers (theory and techniques)
- Sensors
- Shock tube instruments
- Spectral analysis instruments
- Spectrometers
- Spectrophotometers
- Spectroscopes
- Strain gage instruments
- Tape recorders
- Test equipment (theory and techniques)
- Test facility instruments
- Thermocouples (theory and techniques)
- Time measurement equipment
- Tomography (theory and techniques)
- Transducers (applications)
- Two-gas sensors (theory and techniques)
- Ultrasonic testing equipment
- Vidicon cameras
- Wind tunnel instruments

Lasers and Masers

Includes parametric amplifiers. For related information see also *Solid-State Physics* (pages 135-136).

Definition

Lasers - Amplifiers utilizing the principle of light amplification by stimulated emission of radiation. Dictionary of Technical Terms for Aerospace Use. Wm. H. Allen, ed., 1965. NASA SP-7.

Masers - Amplifiers utilizing the principle of microwave amplification by stimulated emission of radiation. Dictionary of Technical Terms for Aerospace Use. Wm. H. Allen, ed., 1965. NASA SP-7.

NASA Interest

Exhaustive Interest: Fundamental research, theory, and development of lasers and masers with particular or potential aerospace application to drilling and welding of materials, electronic devices, space communications, tracking, navigation, and optical radar.

Negative Interest: Laser medical and surgical use unless related to specific aerospace disorders.

Input Subjects of Specific Interest

- Chemical dye lasers
- Diffraction radiation generators
- Gas lasers
- Laser amplifiers
- Laser communications systems (theory and techniques)
- Laser damage
- Laser drilling
- Laser materials
- Laser navigation
- Laser optical radar
- Laser optics
- Laser radiation
- Laser radiation effects
- Laser radiation hazards
- Laser research
- Laser spectroscopy
- Laser theory
- Laser tracking systems (theory and techniques)
- Laser welding
- Lasers

- Lasertrons
- Lidar
- Liquid lasers
- Masers
- Orotrons
- Parametric amplifiers
- Quantum generators
- Short pulsed lasers
- Solid state lasers

Mechanical Engineering

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

Definition

Mechanical Engineering - The useful application of the knowledge of mechanical devices and their properties. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Selective Interest: Potential aerospace applications of machine elements and processes, manufacturing processes, nonpower auxiliary systems, and equipment.

Input Subjects of Specific Interest

- Airbreathing engines (nonaircraft)
- Auxiliary systems (nonpower)
- Bearings
- Bonding
- Brayton Cycle turbines (mechanical engineering)
- Brazing
- Cams
- Centrifugal compressors (nonaircraft)
- Centrifugal pumps
- Ceramic engines
- Cladding
- Clutches
- Coatings
- Compression ignition engines (nonaircraft)
- Containers
- Dies
- Diesel engines (nonaircraft)
- Drives
- Electrodeposition
- Electron beam welding
- Electroplating
- Fasteners
- Filters (mechanical)
- Fittings
- Fixtures

- Flywheels
- Friction measurement
- Friction phenomena
- Gaskets
- Gasoline engines (nonaircraft)
- Gears
- Hydraulic systems
- Impact phenomena
- Impact testing
- Internal combustion engines (nonaircraft)
- Joining
- Lubrication
- Machine elements
- Machine processes
- Machinery
- Manufacturing processes
- Materials fabrication
- Materials forming
- Materials handling
- Materials manufacturing
- Mechanical engineering
- Mechanical equipment
- Mechanics (practical)
- Metal forming
- Packaging
- Packing (machine elements)
- Piston engines (nonaircraft)
- Plasma spraying
- Plating
- Power trains
- Pressure vessels
- Pumps (nonaircraft)
- Reciprocating engines (nonaircraft)
- Robotics (hardware)
- Rollers
- Rotary engines (nonaircraft)
- Seals

- Servomechanisms (mechanical aspects)
- Shafts
- Spark ignition engines (nonaircraft)
- Stirling cycle engines (nonaircraft)
- Telescope mounts
- Throttle controls (nonaircraft)
- Tools
- Tribology
- Turbine engines (nonaircraft)
- Vacuum forming
- Valves
- Welding techniques

Quality Assurance and Reliability

Includes product sampling procedures and techniques; and quality control.

Definition

Quality Assurance - A system of activities whose purpose is to provide assurance and show evidence that the overall quality control job is in fact being done effectively. The system involves a continuing evaluation of the adequacy and effectiveness of the overall quality control program with a view to having corrective measures initiated where necessary. AGARD Multilingual Aeronautical Dictionary, 1980.

Reliability - Of a piece of equipment or a system, the probability of specified performance for a given period of time when used in the specified manner. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: Quality control, quality assurance, and reliability theories, procedures, and practices specifically applicable to aircraft, space vehicles, launch vehicles, supporting facilities, other aerospace applications, and related equipment.

Selective Interest: Quality control, quality assurance, and reliability theories, procedures, and practices specifically concerned with developments and techniques for nonaerospace oriented activities that may be unusual or of use within the aerospace effort.

Input Subjects of Specific Interest

- Accelerated life testing
- Clean rooms (general)
- Environmental engineering
- Environmental test facilities
- Environmental testing
- Failure rates
- Fault detection (quality control)
- Inspection
- Inspection methods
- Life prediction
- Life testing
- Maintainability (procedures and theory)
- Nondestructive testing
- Quality assurance
- Quality control
- Radiography (quality control)
- Redundancy
- Reliability (procedures and theory)

- Reliability criteria
- Sampling techniques (quality control)
- Service life
- Shock testing (quality control)

Structural Mechanics

Includes structural element design and weight analysis; fatigue; and thermal stress. For applications see *Aircraft Design, Testing and Performance* (pages 10-11); and *Spacecraft Design, Testing and Performance* (pages 36-39).

Definition

Structural Mechanics - The mechanics of structures and the analysis of their behavior under thermal or mechanical loads by means of structural analysis and structural testing. Personal Communication. W. C. Rheinboldt. University of Pittsburgh, May 1985.

NASA Interest

Exhaustive Interest: Theory, design, development and testing of structures and structural elements developed for use in aircraft, space vehicles, and launch vehicles.

Selective Interest: Theory, design, development, and testing of lightweight or unusual structures or structural elements of potential aerospace use.

Negative Interest: Structures of structural elements of conventional types utilized in bridges, buildings, ships, ocean platforms, heavy transportation, radio and microwave towers, and the like unless specifically aimed at aerospace use.

Input Subjects of Specific Interest

- Acoustoelasticity
- Adhesive joints (structural stability)
- Aeroelasticity (structural flexibility)
- Beams
- Bending
- Bolted joints
- Bonded structures
- Buckling
- Columns
- Combined loads
- Compression
- Compression loads
- Compression strength (structural)
- Cones
- Crack propagation
- Cracks
- Cylinders
- Elasticity
- Energy (structural response)

- Energy absorption
- Fatigue (structural)
- Filament wound structures (design and tests)
- Flutter (structural)
- Fracture mechanics
- Honeycomb structures
- Lightweight structural elements
- Lightweight structures
- Panels
- Photoelasticity
- Plasticity
- Plates (structural elements)
- Rings
- Riveted joints
- Shear loads
- Shear strength (structures)
- Shells
- Shock
- Shock testing (structural analysis)
- Stress (structural)
- Stress analysis
- Structural:
 - Analysis
 - Design
 - Elements
 - Fatigue
 - Mechanics
 - Testing
 - Theory
 - Vibration effects
- Tensile strength (structures)
- Tension loads
- Thermal stress
- Thermoelasticity (structural materials)
- Vibration (structures)
- Vibration testing
- Viscoelasticity (structural materials)
- Wave propagation (structural response)
- Weight analysis

- Weld strength
- Welded structures

GEOSCIENCES

Includes geosciences; earth resources and remote sensing; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography. For related information see also *SPACE SCIENCES* (pages 147-155).

Geosciences

Includes the collection and evaluation of data concerning the Earth and its global systems obtained through airborne and spaceborne scientific observations and measurements.

Definition

Geosciences - Sciences that study the Earth, e.g., its structure, behavior, atmosphere, environment, and global systems.

NASA Interest

Exhaustive Interest: Airborne and spaceborne surveys of the Earth and its resources; evaluation of data collected from such surveys; the Earth's structure and its behavior and global systems.

Selective Interest: Earth studies with potential aerospace applications or related to global systems.

Negative Interest: Earth studies having no application to airborne or spaceborne surveys, to the Earth's structure, behavior or global systems, or to any aerospace applications.

Input Subjects of Specific Interest

- Earth sciences
- Geosciences

Earth Resources and Remote Sensing

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography. For instrumentation see *Instrumentation and Photography* (pages 72-74).

Definition

Earth Resources - Power sources and renewable or nonrenewable materials occurring naturally on Earth. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

Remote Sensing - The sensing of remote phenomena by whatever means. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: Ground truth as determined from the air or from space.

Selective Interest: Theory, studies, results, developments, mapping, photographic presentations, and the like resulting from and related to earth resources; the Earth's geothermal reservoirs and its solar energy base.

Negative Interest: Geology and geodesy of a routine, earthbound study unless for ground truth of related purposes.

Input Subjects of Specific Interest

- Aerial photography
- Cartography
- Computer processing of earth resources data
- Crop disease detection
- Crop forecasts
- Desertification
- Earth resources
- Foliage sensing
- Forest fire detection
- Geodesy (earth resources)
- Geological exploration
- Geological survey
- Geothermal resources
- Ground truth
- Hydrology
- Infrared sensors (earth resources)
- Infrared signatures (earth resources)
- LANDSAT (data acquisition)

- Limnology
- Littoral regions
- Mapping
- Mineral deposits
- Multispectral band scanners (data acquisition)
- Orography
- Petrography
- Petroleum deposits
- Petrology
- Photogrammetry
- Radar detection (earth resources)
- Radar imagery (earth resources)
- Remote sensing of earth resources
- Rheology
- Scatterometers (data acquisition)
- SEASAT (data acquisition)
- Shuttle imaging radar (earth resources)
- Side looking radar (earth resources)
- Signature analysis
- Snow and ice observations
- Soil identification
- Tectonic analysis
- Thematic mapping
- Timber inventory
- Water resources

Energy Production and Conversion

Includes specific energy conversion systems, e.g., fuel cells; global sources of energy; geophysical conversion; and windpower. For related information see also *Aircraft Propulsion and Power* (pages 15-17); *Spacecraft Propulsion and Power* (pages 43-45); and *Propellants and Fuels* (pages 57-59).

Definition

Energy Production - The production of electricity, combustible fuels, nuclear and thermonuclear fuels, and heating and cooling by renewable resources. Personal Communication. Caterine Grissom. Department of Energy, May 1985.

Energy Conversion - The change of a working substance or natural power into a more useable form such as electricity or mechanical motion. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Systems or developments that may provide power or fuel for aircraft, space vehicles, launch vehicles, satellites, or manned spacecraft.

Selective Interest: Earth based energy production and conversion, energy for transportation, and new developments in hydroelectric power (new sources, high efficiency units, etc.); light-weight, low cost power units with potential for aerospace applications.

Negative Interest: Solar, wind, nuclear, and hydroelectric power plants for commercial purposes; coal energy conversion.

Input Subjects of Specific Interest

- Brayton cycle turbines (applications)
- Chemical energy conversion devices
- Electric batteries (applications)
- Electric energy conversion devices
- Energy management technology
- Energy production (aircraft and space applications)
- Energy storage (aircraft and space applications)
- Fuel cells
- Generators
- Geophysical energy conversion devices (aircraft and space applications)
- Hybrid energy conversion devices
- Magnetohydrodynamic (MHD) energy conversion devices
- Microwave energy conversion devices
- Microwave energy transmission
- Photovoltaic energy conversion devices
- Silicon cells (applications)

- Solar cells (energy conversion)
- Solar heating (space applications)
- Solar power (space applications)
- Solar Power System (SPS) (applications)
- Thermionic energy conversion devices
- Thermoelectricity
- Windpower

Environment Pollution

Includes atmospheric, noise, thermal and water pollution.

Definition

Environment Pollution - Undesirable conditions produced in the atmosphere or water by foreign substances, noise, or thermal sources. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Air, noise, thermal, atmospheric pollution, and contamination resulting from air, earthbound, and space transportation.

Selective Interest: Industrial, commercial, and residential air, noise, and thermal atmospheric and water pollution as it impacts air and space transportation, or is monitored by aircraft or spacecraft.

Negative Interest: Air, noise, thermal, water pollution, sewage pollution, and contamination from industrial, commercial, and residential sources with no aerospace applications.

Input Subjects of Specific Interest

- Aerosols (pollution aspects)
- Air pollution
- Atmospheric analysis (terrestrial)
- Atmospheric pollution
- Atmospheric sampling (terrestrial)
- Biosphere (pollution aspects)
- Commercial pollution
- Contamination control
- Ecology
- Electropollution
- Environmental modifications
- Environmental monitoring
- Environmental pollution
- Industrial pollution
- Noise abatement
- Noise pollution
- Pollution control
- Residential pollution
- Sonic boom (noise pollution)
- Stratospheric pollution
- Thermal pollution

- Transportation pollution
- Waste treatment (pollution control)
- Water pollution
- Water treatment (pollution control)

Geophysics

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism. For space radiation see *Space Radiation* (page 155).

Definition

Geophysics - The physics of the Earth and its environment, i.e., earth, air, and (by extension) space. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: Experimental physics of the Earth, including its atmosphere and its hydrosphere, as revealed by aircraft, satellite, and manned spacecraft observations; observation of natural phenomena; upper atmosphere and ionosphere; geomagnetism and Earth gravitational field; paleontology related to development of life; geological investigations having potential relevance to ground truth for remote sensing or Earth evolution and structure.

Selective Interest: Geology of direct interest to aerospace activities.

Negative Interest: Surface surveys; surface or seismic prospecting; assaying processes or records.

Input Subjects of Specific Interest

- Aeronomy
- Aerosols (physical properties)
- Air glow
- Atmospheric density
- Atmospheric physics
- Atmospheric radiation
- Atmospheric radioactivity
- Atmospheric scattering
- Atmospheric studies (physical processes)
- Atmosphericics
- Aurora
- Biosphere (physical processes)
- Continental drift
- Earth gravitational field
- Earth magnetic field
- Earth origins
- Earth structure
- Earth-reflected radiation
- Fault detection (geological)

- Geochemistry
- Geodesy (physics)
- Geology (Earth structure)
- Geomagnetism
- Geomorphology
- Geophysics
- Glaciology
- Gravitational anomalies (terrestrial)
- Gravitational theory (terrestrial)
- Gravitational waves (terrestrial)
- Hydrosphere studies
- Infrared spectrometry (atmosphere)
- Ionosphere
- Ionospheric electron density
- Ionospheric physics
- Ionospheric plasmas
- Ionospheric scintillation
- Lithology
- Lower atmosphere studies
- Magnetism (terrestrial)
- Magnetospheric research
- Noctilucent clouds
- Plate tectonics
- Rocket/balloon geophysical studies
- Seismology
- Soil mechanics
- Space geodesy
- Stratospheric circulation
- Upper atmosphere studies
- Volcanoes
- Whistlers (upper atmosphere)

Meteorology and Climatology

Includes weather forecasting and modification.

Definition

Meteorology - The study dealing with the phenomena of the atmosphere. This includes not only the physics, chemistry, and dynamics of the atmosphere, but is extended to include many of the direct effects of the atmosphere upon the Earth's surface, the oceans, and life in general. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

Climatology - The science that studies climate and its variations. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Earthbound, air, and space observations and measurements of global meteorological conditions and phenomena; atmospheric structure studies; weather forecasting of particular interest to, and use by, the aerospace community; and meteorological satellite studies and remote sensing observatory studies; unusual global weather systems and climate trends.

Selective Interest: Research and observations not related to aerospace activities, but contributing to a better understanding of weather and climatological problems.

Negative Interest: Routine, day-to-day local weather forecasting.

Input Subjects of Specific Interest

- Acoustical atmospheric phenomena
- Anabatic winds
- Anemometers (applications)
- Atmospheric boundary layer
- Atmospheric circulation
- Atmospheric cloud physics
- Atmospheric energy exchanges
- Atmospheric interactions
- Atmospheric optics
- Atmospheric structure
- Atmospheric studies (meteorological)
- Atmospheric turbulence
- Barometric pressure
- Catabatic winds (also katabatic)
- Clear air turbulence (meteorology)
- Climatology
- Cloud cover analysis

- Cloud patterns
- Cloud research
- Cloud seeding
- Coriolis forces (meteorology)
- Cyclones
- Diurnal effects (meteorology)
- Electrical atmospheric phenomena
- Energy exchanges in the atmosphere
- Fog dissipation and formation
- Global meteorology
- Hail
- Hurricanes
- Ice crystals
- Jet streams
- Katabatic winds (also catabatic)
- Lightning
- Long term effects
- Macrometeorology
- Meteorological anomalies
- Meteorological optics
- Meteorological satellite studies
- Meteorological sounding rocket studies
- Meteorology
- Microbursts
- Micrometeorology
- Monsoons
- Optical atmospheric phenomena
- Precipitation (meteorology)
- Seasonal effects
- Seasonal variations
- Short term effects
- Short term variations
- Solar-atmospheric interactions
- Storm cells
- Synoptic scale circulation
- Temperature variations (meteorology)
- Temporal effects

- Temporal variations
- Thermodynamic atmospheric phenomena
- Thunderstorms
- Tornadoes
- Typhoons
- Weather forecasting
- Weather modification
- Wind
- Wind shear

Oceanography

Includes biological, dynamic, and physical oceanography; and marine resources. For related information see also *Earth Resources and Remote Sensing* (pages 86-87).

Definition

Oceanography - The science that studies all aspects of seas and oceans. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Studies by aerospace means of air-sea interactions, marine resources, and the ocean floor; ocean currents and wave phenomena; also marine studies having potential relevance to ground truth for remote sensing and climate modeling.

Selective Interest: Ocean floor core drilling related to age studies, plate movement, and Earth structure.

Negative Interest: Oil and mineral drilling and searching; and fish location.

Input Subjects of Specific Interest

- Air-sea interactions
- Biological oceanography
- Biosphere (oceanography)
- Chlorophyll concentration
- Dynamic oceanography
- Marine biology
- Marine resources
- Ocean circulation
- Ocean currents
- Ocean floor drilling
- Ocean floor studies
- Ocean wave studies
- Oceanography
- Physical oceanography
- Sea ice
- Temperature variations (oceanography)
- Wave phenomena

LIFE SCIENCES

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

Life Sciences

Includes the origin, development, structure, maintenance, and behavior of animals and plants in space, and related biological conditions. For effects of space on human beings see *Aerospace Medicine* (pages 101-102).

Definition

Life Sciences - Scientific disciplines encompassing biology, physiology, psychology, medicine sociology, and other related areas. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: Effects of space environment and Earth simulation on plants, animal biology, microbiology; diurnal effects on animals and plants, all with aerospace applications.

Selective Interest: Genetics, sterilization, biology, botany, and diurnal studies having potential aerospace applications.

Negative Interest: Home gardening, terrestrial farming, and zoology.

Input Subjects of Specific Interest

- Acceleration effects (biological, animal and plant)
- Altitude effects (biological, animal and plant)
- Animal biology
- Atmospheric pressure effects (biological, animal and plant)
- Biochemistry (biological, animal and plant)
- Bioelectronic instruments (animal and plant)
- Bioengineering
- Biology (aerospace oriented)
- Botany
- Chronobiology (biological, animal and plant)
- Circadian rhythm (biological, animal and plant)

- Diurnal effects (biological, animal and plant)
- Earth biology
- Earth simulation
- Environmental effects (biological, animal and plant)
- Estivation
- Farming in space (animal and plant)
- Genetics (animal and plant)
- Gravitational effects (biological, animal and plant)
- Hibernation
- Infrared radiation effects (biological, animal and plant)
- Life sciences
- Magnetic field effects (biological, animal and plant)
- Membranes (osmosis)
- Microbiology
- Microgravity effects (biological, animal and plant)
- Origin of life (terrestrial)
- Osmosis (biological)
- Planetary environment simulation (terrestrial)
- Plants
- Quarantine (animal and plant)
- Radiation effects (biological, animal and plant)
- Reduced gravity effects (biological, animal and plant)
- Space adaptation (biological, animal and plant)
- Space biology
- Space environment effects (biological, animal and plant)
- Temperature effects (biological, animal and plant)
- Theory of evolution
- Weightlessness effects (biological, animal and plant)
- Zero gravity effects (biological, animal and plant)

Aerospace Medicine

Includes physiological factors; biological effects of radiation; and effects of weightlessness on the human being. For the effects of space on animals and plants see *Life Sciences* (pages 99-100).

Definition

Aerospace Medicine - That branch of medicine dealing with the effects of flight through the atmosphere or in space upon the human body and with the prevention or cure of physiological or psychological malfunctions arising from these effects. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: All pharmacological and physiological effects of atmospheric and space flight on the human being.

Selective Interest: Stress, physiological, and radiation effects of conventional medicine on the human being with direct application to aerospace flight.

Negative Interest: Medicine, pharmacology, and radiation effects of conventional medicine and biology with no aerospace applications.

Input Subjects of Specific Interest

- Acceleration effects (physiological, human)
- Aerospace medicine
- Altitude effects (physiological, human)
- Atmospheric pressure effects (physiological, human)
- Bioelectronic instruments (aerospace medicine)
- Biomedical instruments (aerospace medicine)
- Centrifugal motion effects
- Circadian rhythm (physiological, human)
- Clinical chemistry
- Confinement (physiological effects, human)
- Coriolis forces (physiological effects, human)
- Deceleration effects (physiological, human)
- Diurnal effects (physiological, human)
- Effects of atmospheric flight (physiological, human)
- Effects of radiation (physiological, human)
- Effects of space flight (physiological, human)
- Effects of stress (physiological, human)
- Environmental effects (physiological, human)
- Exercise

- Fatigue (physiological, human)
- Genetics (human)
- Gravitational effects (physiological, human)
- High temperature effects (physiological, human)
- Infrared radiation effects (physiological, human)
- Low temperature effects (physiological, human)
- Magnetic field effects (physiological, human)
- Microgravity effects (physiological, human)
- Pathology
- Pharmacological effects of atmospheric flight (physiological, human)
- Pharmacological effects of space flight (physiological, human)
- Pharmacology
- Physiological effects of flight (human)
- Physiological factors (human)
- Physiological monitoring devices (human)
- Physiology (human)
- Physiology of cardiac organs (human)
- Physiology of sensory organs (human)
- Quarantine (human)
- Radiation effects (physiological, human)
- Radiobiology (human)
- Radiography (human)
- Reduced gravity effects (physiological, human)
- Sensory deprivation (physiological effects, human)
- Sleep deprivation (physiological effects, human)
- Space adaptation (physiological, human)
- Space environment effects (physiological, human)
- Stress (physiological effects, human)
- Stress effects of atmospheric flight (physiological, human)
- Stress effects of space flight (physiological, human)
- Temperature effects (physiological, human)
- Tomography (medical applications)
- Toxicology
- Visual acuity
- Visual tracking
- Weightlessness effects (physiological, human)
- Zero gravity effects (physiological, human)

Behavioral Sciences

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

Definition

Behavioral Sciences - Sciences such as psychology, sociology, or anthropology that deal with human action and aim to establish generalizations concerning man's behavior in society.

NASA Interest

Exhaustive Interest: Effects of the aerospace environment on man, alone or in groups, as it affects his mental adaptation to flight in the Earth's atmosphere or in space.

Selective Interest: Mental and emotional effects of small group behavior, isolation, confinement, and the like as they might affect aerospace flight adaptation of man.

Negative Interest: Clinical psychology and psychiatry that would have little or no application to aerospace activities.

Input Subjects of Specific Interest

- Behavioral sciences
- Confinement (psychological effects, human)
- Crew evaluation
- Crew training
- Effects of radiation (psychological, human)
- Effects of stress (psychological, human)
- Flying training
- Group behavior
- Human behavior
- Individual behavior
- Isolation effects
- Mental adaptation to flight
- Perception
- Pilot performance
- Psychiatric research
- Psychological effects of flight
- Psychological factors
- Psychological research
- Sensory deprivation (psychological effects, human)
- Sleep deprivation (psychological effects, human)
- Social interaction

- Sociological research (psychology, human)
- Space adaptation (psychological effects, human)
- Stress (psychological effects, human)
- Weightlessness effects (psychological, human)

Man/System Technology and Life Support

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also *Space Transportation* (pages 31-32).

Definition

Man-Machine System - A system in which the functions of the man and the machine are interrelated and necessary for the operation of the system. AGARD Multilingual Aeronautical Dictionary, 1980.

Life Support System - That complex of equipment which provides for the maintained health, comfort, and security of a vehicle occupant. Usage excludes atmospheric control (environmental control) but includes provision of food and water, waste collection and disposal, escape and survival gear. AGARD Multilingual Aeronautical Dictionary, 1980.

NASA Interest

Exhaustive Interest: Those items and systems specifically concerned with the human aspects of aeronautical and space flight.

Selective Interest: Those items, systems, and life support from other areas of activities (other transportation systems, mining, industry, and the like) that may have an application in the human aspects of aeronautical and space flight.

Negative Interest: Industrial- and transportation-related equipment, systems, etc. with no aerospace applications.

Input Subjects of Specific Interest

- Bioinstrumentation (physiological)
- Bionics
- Biotechnology
- Cabin pressurization (life support)
- Closed ecological systems
- Extravehicular activity (EVA) (equipment)
- Extravehicular activity (EVA) (physiological)
- Farming in space (life support)
- Flight suits
- Food (space missions)
- Food preparation (space missions)
- Food storage (space missions)
- Helmets
- Human engineering
- Human productivity in space
- Life support
- Man-machine interface

- Man-system technology
- Manned maneuvering units
- Pressurized cabins (life support)
- Protective clothing
- Quarantine procedures
- Radiation safety measures (physiological)
- Remote manipulator arms
- Robotics (aerospace vehicles)
- Space cabin atmosphere
- Space cabin oxygen supplies
- Space cabin water supplies
- Space flight feeding
- Space hygiene
- Space sanitation
- Space suits
- Spacecraft sterilization (interior)
- Teleoperators
- Waste products conversion (aerospace vehicles)
- Waste products disposal (aerospace vehicles)
- Waste products storage

Space Biology

Includes exobiology; planetary biology; and extraterrestrial life.

Definition

Space Biology - That field of biology which deals with the effects of extraterrestrial environments on living organisms and with the search for extraterrestrial life. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: All facets of biology concerning outer space (beyond the Earth's atmosphere) and the planets (other than planet Earth); stellar and galactic biology, including extraterrestrial life and the origin of life.

Selective Interest: The biological research concerned with the nature and origin of life; the chemical composition, growth, development, and reproduction of life; the adaptation of life to extremes of altitude, temperature, atmospheric conditions, drought, etc. with possible applications to exobiology and the search for extraterrestrial life.

Negative Interest: Medical, agricultural and botanical, animal, and microbial biology as it relates to and results from existing earthbound life.

Input Subjects of Specific Interest

- Abiogenesis (cosmic and galactic evolution)
- Altitude effects (exobiology)
- Amino acid analysis
- Atmospheric analysis (extraterrestrial)
- Atmospheric pressure effects (exobiology)
- Atmospheric sampling (extraterrestrial)
- Biochemical detection of life
- Bioinstrumentation (extraterrestrial life)
- Biology (extraterrestrial)
- Chemical evolution
- Culturing
- Enzyme analysis
- Exobiology
- Extraterrestrial biochemistry
- Extraterrestrial biology
- Extraterrestrial life
- Extreme temperature effects
- Galactic biology
- Gravitational effects (planetary biology)

- Infrared radiation effects (planetary biology)
- Life detection
- Magnetic field effects (planetary biology)
- Nature of life
- Origin of life (extraterrestrial)
- Planetary atmospheres
- Planetary biology
- Protobiological evolution
- Reproduction of extraterrestrial life
- Soil sampling and analysis (extraterrestrial life)
- Spontaneous generation of life

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences; computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

Mathematical and Computer Sciences

Includes general reports on the science of numbers and their uses in studies of shapes, quantities, arrangements, and relationships, and their uses in making generalizations or dealing with abstract concepts; also, studies of information processing including representative structures, procedures, and processing systems.

Definition

Mathematical - Of or concerning mathematics.

Mathematics - The study of the logical relationships among abstract entities. These relationships are expressed in numbers, symbols, and signs and may also be applied to concrete data such as measures and properties of shapes. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Computer Sciences - The study of the development and use of electronic devices that store, process, and retrieve information, and of theoretical and applied disciplines that are related to these devices and have contributed to their capabilities.

NASA Interest

Exhaustive Interest: Mathematics and computer theory and technology applicable to aerospace problems.

Selective Interest: Mathematics and computer science technology having potential aerospace applications.

Negative Interest: Computer science and advanced theoretical mathematics having no application or potential application to aerospace problems.

Input Subjects of Specific Interest

- Computer sciences
- Mathematical sciences

Computer Operations and Hardware

Includes hardware for computer graphics, firmware and data processing. For components see *Electronics and Electrical Engineering* (pages 66-68).

Definition

Computer Operations - The physical and procedural control of computers; also the electronic responses of a computer to instructions. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Hardware - Electronic and electromechanical devices that make up a computer. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: All computer hardware operations and specific hardware in use, under development, or in theory for use in aerospace flight; as test equipment for aerospace hardware, research, or development; for aerospace launch, takeoff, landing, flight control, or navigation.

Selective Interest: Computer hardware operations and specific hardware for land or sea navigation; for transportation control systems; for industrial applications and testing or study purposes with a potential for aerospace application; and for machine tool control.

Negative Interest: Pocket calculators, desk calculators, and computer hardware operations and hardware developed for routine operations such as banking, inventory control, production line control, and the like.

Input Subjects of Specific Interest

- Acoustical couplers
- Adaptive computers
- Analog computers
- Automatic data processors (ADP)
- Automatic film digitizers
- Calculators
- Compilers (design)
- Computer buffers
- Computer display devices
- Computer graphics (hardware)
- Computer hardware
- Computer imagery (hardware)
- Computer interfacing equipment
- Computer manufacturing
- Computer memory devices

- Computer operations
- Computer peripheral equipment
- Computer printers
- Computer production
- Computer readers
- Computer storage devices
- Computer storage techniques
- Computer vision (hardware)
- Computerized information systems
- Computers
- Data input devices
- Data input techniques
- Data processing
- Digital computers
- Digital storage devices
- Digital storage techniques
- Electronic computer architecture
- Electronic computers
- Electronic data processing
- Firmware
- Hybrid computers
- Input devices
- Interpreters (design)
- List processors
- Mainframes
- Mechanical computers
- Microcomputers
- Minicomputers
- Modems
- Output devices
- Personal computers
- Plotters
- Processors (hardware)
- Random access memories
- Read-only memories
- Remote input equipment
- Remote input techniques

- Remote readout equipment
- Remote terminals
- Robust computers
- Spaceborne computers
- Supercomputers
- Tape drives
- Word processors

Computer Programming and Software

Includes computer programs, routines, algorithms, and specific applications, e.g., CAD/CAM.

Definition

Computer Programming - The writing of a sequence of tasks to be performed by a computer; the scheduling, or the actual performance of these tasks. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Software - Computer programs, computer systems programs, and related documentation.

NASA Interest

Exhaustive Interest: All computer programming and software concerned with aerospace activities including those for flight computers, test facilities, navigation, control, manufacturing, data processing from the results of these activities, and for the purpose of advancing the state-of-the-art of aerospace research and development.

Selective Interest: Computer programming and software from all sources, e.g., transportation, industry, university, etc. that would have possible aerospace application.

Negative Interest: Computer programming and software for routine medical, banking, ship operation, production line control, and the like, not having application to aerospace activities.

Input Subjects of Specific Interest

- Algorithms (computer operations)
- CAD (computer aided design)
- CAM (computer aided manufacturing)
- Coding techniques (software)
- Compilers (software)
- Computer aided design (CAD)
- Computer aided manufacturing (CAM)
- Computer algorithms
- Computer editing techniques
- Computer graphics (software)
- Computer imagery (software)
- Computer programming
- Computer routines
- Computer simulation
- Computer software
- Data acquisition programs
- Debugging procedures
- Debugging programs
- Diagnostic procedures

- Diagnostic programs
- Fault tolerant software
- Flight computer programs
- Flight computer software
- Formatters
- Interpreters (software)
- Linear programming
- Mathematical programming
- Navigation computer programs
- Navigation computer software
- Processors (software)
- Programming
- Programming languages
- Signal cleanup
- Software technology
- Test facility computer programs
- Test facility computer software
- Testing programs

Computer Systems

Includes computer networks and special application computer systems.

Definition

Computer Systems - Defined configurations of hardware, software and processes used to fulfill data and information processing requirements.

NASA Interest

Exhaustive Interest: Computer systems used for aerospace applications, e.g., launch control, tracking, navigation, communications, weather forecasting, aerospace data compilation and processing, test data calculation, aeronautical and space vehicle control, etc.

Selective Interest: Computer systems used for data compilation and processing in such fields as navigation, mathematics, manufacturing, earth resources, transportation information handling, etc., that may have possible aerospace application.

Negative Interest: Computer systems for routine business and commercial operations; manufacturing and industrial operations and control; conventional data compilation and processing for academic purposes unless applicable to aerospace activities.

Input Subjects of Specific Interest

- Communications computer systems
- Computer hardware - software combinations
- Computer logic systems
- Computer networks
- Computer systems
- Computer systems engineering
- Computer time sharing
- Data compilation systems
- Data management systems
- Data processing systems
- Launch control computer systems
- Local area networks (LAN)
- Navigation computer systems (hardware and software)
- Nonlinear computer systems
- Parallel processing
- Self-repairing computer systems
- Special application computer systems
- Tracking computer systems
- Weather forecasting computer systems

Cybernetics

Includes feedback and control theory, artificial intelligence, robotics, and expert systems. For related information see also *Man/System Technology and Life Support* (pages 105-106).

Definition

Cybernetics - The study of methods of control and communication which are common to living organisms and machines. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: All aspects of cybernetics that relate to aerospace activities.

Selective Interest: Cybernetics of interest to nonaerospace activities that have potential aerospace application.

Input Subjects of Specific Interest

- Adaptive control theory
- Artificial intelligence
- Automata theory
- Automation
- Computer machine theory
- Computer vision (theory)
- Control theory
- Cybernetics
- Decision theory
- Expert systems
- Feedback theory
- Filter theory
- Information coding
- Information theory
- Multivariable controls
- Neural net simulation
- Pattern recognition
- Robotics (theory)
- Scene detection theory
- Scene matching theory
- Sequential machine theory
- Switching theory

Numerical Analysis

Includes iteration, difference equations, and numerical approximation.

Definition

Numerical Analysis - Study of approximation methods using arithmetic techniques. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: All facets of numerical analysis.

Input Subjects of Specific Interest

- Abelian groups
- Algorithms (mathematics)
- Approximations
- Boundary problems
- Calculus
- Difference equations
- Differential equations
- Dispersion analysis
- Eigenvalues/Eigenvectors
- Finite element methods
- Fourier methods
- Functional analysis
- Harmonic analysis
- Iteration
- Mathematical analysis
- Mathematics
- Matrices
- Numerical analysis
- Numerical approximation
- Numerical integration
- Parameter estimation
- Second order equations
- Spline functions
- Variational methods

Statistics and Probability

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

Definition

Statistic - A quantity calculated from a sample of observations, usually as an estimate of some population parameter such as mean or standard deviation. AGARD Multilingual Aeronautical Dictionary, 1980.

Probability - A real number in the scale 0-1 attached to a random event. It can be related to a long run relative frequency of occurrence or degrees of belief that an event will occur. AGARD Multilingual Aeronautical Dictionary, 1980.

NASA Interest

Exhaustive Interest: All statistical and probability theory, sampling techniques, reliability theory and techniques related to aerospace activities, aircraft and spacecraft control, facilities, development, and manufacturing.

Selective Interest: Statistics and probability related to transportation, agriculture, water pollution, and air pollution of possible aerospace interest or application.

Negative Interest: Statistics and probability concerned with banking, housing, home furnishing, and general manufacturing of a nonaerospace nature.

Input Subjects of Specific Interest

- Analysis of variance
- Bayesian statistics
- Data sampling
- Data smoothing
- Error estimation
- Error theory
- Markov processes
- Monte Carlo method
- Prediction analysis
- Probability
- Probability theory
- Random sampling
- Sampling techniques (numerical analysis)
- Statistical techniques
- Statistical theory
- Statistics
- Stochastic processes

- Time series analysis
- Weibull distributions

Systems Analysis

Includes mathematical modeling; network analysis; and operations research.

Definition

Systems Analysis - The examination of an activity, procedure, method, technique, or a business to determine what must be accomplished and how the necessary operations may best be accomplished. AGARD Glossary of Documentation Terms, Third Revision. H. A. Stolk, ed., 1968.

NASA Interest

Exhaustive Interest: All systems analysis theory and all aerospace related practice, procedures, and applications.

Selective Interest: Systems analysis practice, procedures, and applications from transportation, manufacturing, communications, and scientific fields having potential interest for aerospace activities.

Negative Interest: Business, banking, and management with no aerospace applications.

Input Subjects of Specific Interest

- Convergence criteria
- Experimental design
- Game theory
- Mathematical modeling
- Network analysis
- Operations research
- Queueing theory
- Systems analysis
- Systems analysis applications
- Systems analysis practice
- Systems analysis procedures
- Systems analysis theory

Theoretical Mathematics

Includes topology and number theory.

Definition

Theoretical Mathematics - The study of hypothetical relationships among abstract entities. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Mathematical theories developed for, and of use in, aerospace programs.

Selective Interest: Mathematical theories with applications that may be of potential use for aerospace activities.

Input Subjects of Specific Interest

- Banach spaces
- Boolean algebra
- Fuzzy sets
- Group theory
- Hilbert spaces
- Mathematical theories
- Number theory
- Riemann surfaces
- Set theory
- Stability theory
- Theoretical mathematics
- Topology

PHYSICS

Includes physics; 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* (pages 61-84).

Physics

Includes properties, elementary principles, and laws that relate to the physical world; fundamentals of acoustic, optic, electric, magnetic, mechanic, thermal, radiative, atomic structure, or nuclear phenomena; interactions of matter and energy states. For precision time and time interval (PTTI) see *Instrumentation and Photography* (pages 72-74); for geophysics, astrophysics, or solar physics see *Geophysics* (pages 92-93), *Astrophysics* (pages 150-151), or *Solar Physics* (page 154).

Definition

Physics - The science that studies the elementary principles and laws of nature. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: The elements of physics as they relate to aeronautics, astronautics, and the aerospace sciences.

Selective Interest: The elements of physics from all fields that might have potential aerospace applications.

Negative Interest: Nuclear physics for weaponry, large-scale commercial electricity generation, and other applications not having aerospace potential.

Input Subjects of Specific Interest

- Antigravity
- Chaos
- Electromagnetic radiation (theory)
- Field energy
- Field theory
- Infrared radiation theory
- Kinetics

- Magnetism (theory)
- Many-body problems
- Mechanics (theory and analysis)
- Microwave radiation (theory)
- Physics
- Solitary waves
- Stability of motion
- Time measurement
- Wave propagation (theory)

Acoustics

Includes sound generation, transmission, and attenuation. For noise pollution see *Environment Pollution* (pages 90-91).

Definition

Acoustics - The study of sound, including its production, transmission, and effects. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: Acoustic theory, noise generation, sound attenuation, and related phenomena as they apply to aerospace equipment and vehicles and their operating environment. For specific applications see *Aerodynamics* (pages 2-4); *Aircraft Design, Testing and Performance* (pages 10-11); *Aircraft Propulsion and Power* (pages 15-17); *Launch Vehicles and Space Vehicles* (pages 29-30); *Spacecraft Design, Testing, and Performance* (pages 36-39); and *Spacecraft Propulsion and Power* (pages 43-45).

Selective Interest: Noise generation and sound attenuation related to other means of transportation, manufacturing, and construction with potential aerospace applications.

Negative Interest: Home and commercial noise generation and sound attenuation.

Input Subjects of Specific Interest

- Acoustic scattering
- Acoustic theory
- Acoustics
- Aeroacoustics
- Aerodynamic noise (theory and measurement)
- Doppler effect
- Noise attenuation
- Noise generation
- Noise measurement
- Noise propagation
- Noise reduction
- SODAR (sound detection and ranging)
- Sonic boom (theory)
- Sound absorption
- Sound attenuation
- Sound generation
- Sound generation in ducts
- Sound propagation
- Sound reduction

- Sound transmission
- Surface wave acoustic devices (theory)
- Ultrasonic applications
- Ultrasonic theory

Atomic and Molecular Physics

Includes atomic structure, electron properties, and molecular spectra.

Definition

Atomic Physics - The study of the structure and characteristics of atoms. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Molecular Physics - The study of the structure and characteristics of molecules. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Selective Interest: The basic theories and formulas of atomic and molecular physics as they relate to aeronautics, astronautics, and aerospace sciences. Those elements of atomic and molecular physics that have actual or potential application to the aerospace program.

Negative Interest: Large, heavy nuclear reactor applications; ship propulsion reactors.

Input Subjects of Specific Interest

- Absorption of radiation by atoms
- Activation analysis
- Atomic beam measurements
- Atomic collisions
- Atomic electron properties
- Atomic energy levels
- Atomic frequency standards
- Atomic physics
- Atomic reactions
- Atomic structure
- Chemical binding
- Electron collisions
- Electron density (measurement)
- Emissivity of radiation by atoms
- Fluorescence
- Intermolecular forces
- Ion beams (theory)
- Ion dynamics
- Ion exchange
- Luminescence (atomic structure)
- Molecular beams

- Molecular collision theory
- Molecular energy
- Molecular physics
- Molecular properties
- Molecular spectra
- Molecular spectroscopy
- Molecular structure
- Radiation absorption by atoms
- Radiation chemistry
- Theories of atomic physics
- Theories of molecular physics
- X-ray radiation (physics)

Nuclear and High-Energy Physics

Includes elementary and nuclear particles; and reactor theory. For space radiation see *Space Radiation* (page 155).

Definition

Nuclear Physics - The study of the structure and characteristics of atomic nuclei. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

High-Energy Physics - The study of interaction of atomic particles with application to nuclear power sources.

NASA Interest

Exhaustive Interest: The basic theories and formulas of nuclear and high-energy physics and testing and research equipment to support these developments as they relate to aeronautics, astronautics, and aerospace sciences.

Selective Interest: Those applications that may be of use to the aerospace program, i.e., propulsion systems and power sources, suitable for aerospace use.

Negative Interest: Large, heavy nuclear reactor applications; ship propulsion reactors.

Input Subjects of Specific Interest

- Alpha rays (theory)
- Atomic fuels (space applications)
- Beta rays (theory)
- Cyclotrons (space applications)
- Electron beams
- Elementary particles
- Fission spectra
- Gamma rays (theory)
- High energy accelerators (space applications)
- High energy particles
- High energy physics
- High energy research equipment (space applications)
- High energy test equipment (space applications)
- Ion beam particle generators (space applications)
- Ion beams (high-energy physics)
- Linear accelerators (space applications)
- Neutron properties
- Neutron spectra
- Nuclear engines (space applications)

- Nuclear fission (space applications)
- Nuclear fuels (space applications)
- Nuclear magnetic resonance
- Nuclear particles
- Nuclear physics
- Nuclear power sources (theory)
- Nuclear propulsion systems (theory)
- Nuclear reactor operations (space applications)
- Nuclear reactor theory (space applications)
- Nuclear reactors (space applications)
- Nuclear research equipment (space applications)
- Nuclear test equipment
- Particle physics
- Particle scattering
- Proton beams
- Quarks
- Radioisotopes
- Reactor radiation safety measures (space applications)
- Reactor theory

Optics

Includes light phenomena and optical devices. For lasers see *Lasers and Masers* (pages 75-76).

Definition

Optics - The study of the transmission and polarization properties of visible radiation. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Theories of light transmission and lenses, light absorption, reflection, and scattering as they relate to aeronautics, astronautics, and space sciences.

Selective Interest: Applications of optics and light phenomena to aerospace use.

Negative Interest: Industrial, commercial, and household applications of optics and light phenomena, lenses, and eyeglasses.

Input Subjects of Specific Interest

- Bragg cells (optical applications)
- Cassegrain optics
- Coherent light
- Electron optics theory
- Fiber optics
- Infrared optics
- Infrared radiation effects (optical applications)
- Infrared signatures (optical applications)
- Infrared spectra
- Lens theory
- Lenses (optical properties)
- Light absorption
- Light phenomena
- Light reflection
- Light scattering
- Light transmission
- Liquid optics
- Luminescence (optics)
- Modulation (optics)
- Optical bistability
- Optical coatings

- Optical communications (theory)
- Optical fibers
- Optical imaging devices (optics)
- Optical imaging systems
- Optical materials
- Optical properties
- Optical waveguides
- Optics
- Optoelectronics (optics)
- Photon beams
- Photonics
- Telescopes (optical properties)
- Tomography (optics)
- Ultraviolet radiation (optics)

Plasma Physics

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *Geophysics* (pages 92-93). For space plasmas see *Astrophysics* (pages 150-151).

Definition

Plasma Physics - The study of the nature and properties of highly ionized gases (comprised of free elements and charged nuclei) with application to fusion energy devices. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Theoretical magnetohydrodynamics and plasma fusion; research and test equipment for studies in plasma physics.

Selective Interest: Applications of magnetohydrodynamics and plasma fusion that may be of interest for propulsion, power sources, and other uses in the aerospace program.

Negative Interest: Heavy industrial and commercial applications; large power reactors.

Input Subjects of Specific Interest

- Collision effects
- Electrogasdynamics
- Electrohydrodynamics
- Electron density (plasma physics)
- Fusion devices
- Hydromagnetics (plasma physics)
- Ion beams (plasma physics)
- Laser interaction with plasmas
- Magnetogasdynamics
- Magnetohydrodynamics
- Magnetoplasmas
- MHD generators
- Microwave interaction with plasmas
- Nuclear fusion
- Plasma conductivity
- Plasma diagnostics
- Plasma dynamics
- Plasma flow
- Plasma fusion
- Plasma oscillations
- Plasma physics

- Plasma physics research equipment
- Plasma physics test equipment
- Plasma pinch
- Plasma propulsion (theory)
- Plasma seeding
- Plasma sheath
- Plasma theory
- Plasma waves
- Stellarators
- Tokamak generators
- Whistlers (plasma physics)

Solid-State Physics

Includes superconductivity. For related information see also *Electronics and Electrical Engineering* (pages 66-68); and *Lasers and Masers* (pages 75-76).

Definition

Solid-State Physics - The study of the physical structure of solid matter, including crystallography and band structure, and magnetic, electric, and dielectric properties. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: All facets of solid-state physics and the solid-state effects in electrical and electronic devices as they relate to aeronautics, astronautics, and aerospace sciences.

Selective Interest: Commercial applications of solid-state physics that might have a potential for use in aerospace applications.

Negative Interest: Automotive and household applications of solid-state physics.

Input Subjects of Specific Interest

- Acceptors in semiconductors
- Band structure of solids
- Conductivity in semiconductors
- Critical field curves of superconducting materials
- Critical temperatures of superconducting materials
- Crystal defects
- Crystal growth
- Crystal structure (semiconductors)
- Crystallography
- Dielectric materials properties
- Donors in semiconductors
- Electrical transport properties in solids
- Electron energy bands
- Electron motion in conductors
- Electron paramagnetic resonance in semiconductors
- Energy gaps in semiconductors
- Holes in semiconductors (electron deficiencies)
- Lattice vibrations
- Liquid crystals
- Mossbauer effect
- Piezoelectricity

- Radiation effects in semiconductors
- Semiconductors
- Solid state physics
- Superconducting materials
- Superconductivity (theory)
- Thermoelectric materials
- Thin films (theory and applications)
- Transition of superconducting materials

Thermodynamics and Statistical Physics

Includes quantum mechanics; theoretical physics; and Bose and Fermi statistics. For related information see also *Inorganic and Physical Chemistry* (pages 50-51); and *Fluid Mechanics and Heat Transfer* (pages 69-71).

Definition

Thermodynamics - The study of the flow of heat. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

Statistical Physics (Statistical Mechanics) - The application of statistical methods to the study of classical- and quantum-mechanical phenomena. NASA Thesaurus Supplement, NASA SP-7064 (Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Selective Interest: The basic theories and formulas of thermodynamics and statistical physics for those applications that may be of use to the aerospace program.

Input Subjects of Specific Interest

- Boltzmann equations
- Boltzmann transport theory
- Bose and Fermi statistics
- Enthalpy
- Entropy
- Quantum mechanics
- Radiative transfer
- Statistical physics
- Temperature-pressure phenomena
- Theoretical physics
- Theory of relativity
- Thermodynamic properties
- Thermodynamics
- Unified field theory
- Volume relationships

SOCIAL SCIENCES

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

Social Sciences

Includes educational matters.

Definition

Social Sciences - A group of sciences dealing with special phases of human society such as economics, sociology, political science, ethics, and education.

NASA Interest

Exhaustive Interest: Aerospace research opportunities at NASA Centers.

Selective Interest: Aerospace research as it relates to opportunities, professional groups, and scientific education; socioeconomic impact of aerospace and aerospace related subjects.

Negative Interest: Social studies having no application to aerospace programs.

Input Subjects of Specific Interest

- Educational matters
- Social sciences
- Sociological research (humanities)

Administration and Management

Includes management planning and research.

Definition

Administration - The act of performing, or people who perform, executive functions for an entity such as an institution or a business. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Management - Act or art of conducting, directing, supervising, or controlling the operation of a business, enterprise, or similar endeavor. NASA Thesaurus Supplement, NASA SP-7064 (Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Administration and management of NASA and the aerospace industry.

Selective Interest: Administration and management techniques and assessment of technology applicable to the aerospace program; transfer of aerospace technology to the private sector.

Negative Interest: Routine industrial and transportation administration or management.

Input Subjects of Specific Interest

- Administration
- Administrative decisionmaking
- Administrative planning
- Analysis of alternatives and tradeoffs
- Contract supervision
- Critical path method
- Decisionmaking
- Management
- Management information systems
- Management planning
- Management research
- Management tools
- PERT (Program Evaluation and Review Technique)
- Project management
- Research management
- Research planning
- Space commercialization (management)
- Tradeoffs and options

Documentation and Information Science

Includes information management; information storage and retrieval technology; technical writing; graphic arts; and micrography. For computer documentation see *Computer Programming and Software* (pages 113-114).

Definition

Documentation - The creating, collecting, organizing, storing, citing, and disseminating of documents, or the information recorded in documents. Compilation of Terms in Information Sciences Technology. Florence Casey, ed. Federal Coordinating Council for Science and Technology, April 1970.

Information Science - The study of generating, acquiring, processing, storing, retrieving, disseminating, and using information; and the development of methods for the useful organization of data and dissemination of information. Compilation of Terms in Information Sciences Technology. Florence Casey, ed. Federal Council for Science and Technology, April 1970.

NASA Interest

Exhaustive Interest: All facets of documentation and information science theory applicable to the processing, retrieval, and dissemination of aerospace information.

Selective Interest: Documentation and information science methods and procedures of possible application to the processing, retrieval, and dissemination of aerospace information.

Negative Interest: Public or community library procedures and techniques.

Input Subjects of Specific Interest

- Catalogs (refer to appropriate category for catalogs on specific subjects)
- Databases
- Dictionaries (refer to appropriate category for dictionaries on specific subjects)
- Document miniaturization
- Document processing
- Documentation
- Graphic arts
- Information retrieval
- Information science
- Information storage
- Library science
- Manuals (refer to appropriate category for manuals on specific subjects)
- Mechanical drawing
- Microfiche techniques
- Micrography
- Project documentation
- Reprography

- Space Station Information System
- Technical writing

Economics and Cost Analysis

Includes cost effectiveness studies.

Definition

Economics - Study of the production, distribution, and consumption of goods and services. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Cost Analysis - Examination of the effects on expenses and profits of various procedures that might be used by a business or enterprise in creating or supplying its goods or services. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Those elements of economics and cost analysis theory, law, and other developments that would directly impact the aerospace program.

Selective Interest: Those elements of economics and cost analysis that would have possible application to the aerospace program, e.g., contract procurement, production forecasts, marketing predictions, or aerospace transportation funding forecasts.

Negative Interest: The economics and cost analysis of household, routine business and marketing, manufacturing, and local, state, and Federal government procedures that have no impact on aerospace activities.

Input Subjects of Specific Interest

- Aircraft economics
- Airline economics
- Contract procurement
- Cost analysis
- Cost effectiveness studies
- Economics
- Insurance (aerospace)
- Marketing predictions
- Marketing research
- Production costs
- Production forecasts
- Space flight economics
- Space shuttle economics
- Transportation funding forecasts (aerospace)

Law, Political Science and Space Policy

Includes NASA appropriation hearings; aviation law; space law and policy; international law; international cooperation; and patent policy.

Definition

Law (Jurisprudence) - A written rule or collection of rules for action or conduct binding upon the population of a community. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: All aspects of law and political science, both domestic and international, that are concerned with or directly affect the aerospace programs.

Negative Interest: Domestic and international civil law, shipping and other transportation law, and political science.

Input Subjects of Specific Interest

- Aerospace agreements
- Air piracy (legal aspects)
- Air transport regulations
- Civil aeronautical law
- Congressional legislation
- Federal aviation decisions
- Federal aviation laws
- Government/industry cooperation
- International cooperation
- International law
- Law
- Legal liability of commercial aviation
- Legal liability of general aviation
- Legal liability of manned space flight
- Legal liability of unmanned space flight
- NASA appropriation hearings
- Patent policy
- Patents
- Political science
- Space commercialization (legal aspects)
- Space law
- Space policy

- Transfer of responsibility (space applications)
- Treaties

Urban Technology and Transportation

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation. For related information see *Air Transportation and Safety* (pages 5-6); *Space Transportation* (pages 31-32); and *Energy Production and Conversion* (pages 88-89).

Definition

Urban Technology - The application of aerospace development to city problems. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Urban Transportation - The conveyance of, or means for conveying, people and goods in and around cities. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Selective Interest: NASA program spin-offs applicable to urban problems; surface and mass transportation that might serve NASA or provide improved transportation as a result of the NASA aerospace effort.

Negative Interest: Routine ship, railroad, bus, trucking, or automotive transportation unless of an unusual nature or utilized in an unusual manner in the aerospace program.

Input Subjects of Specific Interest

- Electric vehicles
- Fresh water sources
- Hybrid vehicles
- Land transportation vehicles (development and technology)
- Mass transportation
- Rapid transit systems
- Sewage disposal
- Space technology applications to urban problems
- Surface transportation
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SPACE SCIENCES

Includes space sciences; astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation. For related information see also *GEOSCIENCES* (pages 85-97).

Space Sciences

Includes extraterrestrial intelligence, movement, and communication; and general scientific studies of galaxies and the universe.

Definition

Space Sciences - The specific discipline associated with the development of knowledge about the universe. Apollo Terminology, August 1963. NASA SP-6001.

NASA Interest

Exhaustive Interest: All facets of extraterrestrial activity and properties of extraterrestrial matter; scientific studies of the regions within the solar system and beyond the Earth's atmosphere and the solar system.

Negative Interest: Pseudoscientific reports on the universe, unidentified flying objects, black holes, and space.

Input Subjects of Specific Interest

- Extraterrestrial communication
- Extraterrestrial intelligence
- Gravitational wave detectors
- Space sciences

Astronomy

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

Definition

Astronomy - The scientific study of all aspects of the heavens: compositions, distances, evolution, magnitudes, masses and motions of celestial bodies. The science now includes a number of specialized branches such as radio astronomy, X-ray astronomy, astrometry, astrophysics, celestial mechanics, and cosmology. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: Except for astrophysics, all facets of astronomy including radio and gamma-ray astronomy, observations of celestial mechanics, and planets, their structure, motions, and locations.

Input Subjects of Specific Interest

- Asteroid belt
- Asteroids (observation)
- Astrometry
- Astronomy
- Binaries (observation)
- Black holes (observation)
- Celestial bodies (observation)
- Celestial mechanics (observation)
- Comets (observation)
- Discovery of celestial bodies
- Ephemerides of celestial bodies
- Galaxies (observation)
- Gamma-ray astronomy
- Hubble telescope
- Identification of celestial bodies
- Infrared astronomy
- Infrared telescopes
- Large space telescope
- Meteorites (observation)
- Meteoroids (observation)
- Meteors (observation)
- Moons
- Natural satellites

- Nebulae (observation)
- Novae (observation)
- Observation of celestial bodies
- Observatories
- Optical telescope facilities
- Optical telescopes
- Planet location
- Planet motion
- Planet structure (observation)
- Planetary satellites (observation)
- Planets (observation)
- Pulsars (observation)
- Quasars (observation)
- Radar telescope and range finder facilities
- Radar telescopes
- Radio astronomy
- Radio telescope facilities
- Radio telescopes
- Spaceborne astronomy
- Spectroscopy (astronomy)
- Star trackers (observation)
- Stars (observation)
- Stellar spectroscopy
- Sun (observation)
- Supernovae (observation)
- Tektites (observation)
- Telescopes (operation)
- X-ray telescopes
- Zodiacal light

Astrophysics

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

Definition

Astrophysics - A branch of astronomy that treats the physical properties of celestial bodies such as luminosity, size, mass, density, temperature, and chemical composition. NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: All facets of the physical properties of celestial bodies, interplanetary, interstellar, and intergalactic properties; data analysis and calculations of celestial mechanics. For planetary structure see *Lunar and Planetary Exploration* (pages 152-153).

Input Subjects of Specific Interest

- Astrochemistry
- Astrophysics
- Binaries (data analysis and calculations)
- Black holes (data analysis and calculations)
- Calculations of chemical composition
- Calculations of density
- Calculations of luminosity
- Calculations of mass
- Calculations of physical properties
- Calculations of size
- Calculations of temperature
- Celestial body orbits
- Celestial body physical properties
- Celestial body trajectories
- Celestial mechanics (data analysis and calculations)
- Celestial trajectories
- Comets (astrophysics)
- Cosmic dust
- Cosmic noise
- Cosmology
- Data analysis and calculations (astrophysics)
- Galactic structure
- Galaxies (data analysis and calculations)

- Gravitational collapse
- Gravitational radiation (space)
- Gravitational theory (space)
- Gravitational waves (space)
- Hydromagnetics (astrophysics)
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- Intergalactic gases
- Intergalactic matter
- Intergalactic properties
- Interplanetary dust
- Interplanetary gases
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- Interplanetary properties
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- Interstellar dust
- Interstellar gases
- Interstellar matter
- Interstellar properties
- Magellanic clouds
- Magnetism (extraterrestrial)
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- Novae (data analysis and calculations)
- Physical properties of celestial bodies
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- Quasars (data analysis and calculations)
- Solar system
- Space plasmas
- Stars (data analysis and calculations)
- Stellar luminosity
- Stellar magnetic fields
- Stellar physics
- Supergravity
- Supernovae (data analysis and calculations)

Lunar and Planetary Exploration

Includes planetology; and manned and unmanned flights. For spacecraft design or space stations see *Spacecraft Design, Testing and Performance* (pages 36-39).

Definition

Lunar Exploration - Scientific investigation of the moon by means of probes or manned or unmanned missions. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

Planetary Exploration - Scientific investigation of planets and their satellites, asteroids and bodies of meteoric origin.

NASA Interest

Exhaustive Interest: All facets of manned, unmanned, or remote exploration of planets and their structure, including planets within the solar system or elsewhere within the universe.

Input Subjects of Specific Interest

- Asteroids (characteristics and composition)
- Flyby missions
- Lunar exploration
- Lunar mapping
- Lunar photography
- Lunar samples
- Lunar structure
- Manned flights (space exploration)
- Manned lunar exploration
- Manned planetary exploration
- Meteorites (characteristics and composition)
- Meteoroids (characteristics and composition)
- Meteors (characteristics and composition)
- Planet structure (characteristics and composition)
- Planetary exploration
- Planetary mapping
- Planetary photography
- Planetary samples
- Planetary satellites (characteristics and composition)
- Planetology
- Remote exploration of planets
- Selenography
- Selenology

- Space exploration (manned and unmanned)
- Tektites
- Unmanned flights (space exploration)
- Unmanned lunar exploration
- Unmanned planetary exploration

Solar Physics

Includes solar activity, solar flares, solar radiation and sunspots. For related information see *Space Radiation* (page 155).

Definition

Solar Physics - The study of the structure and activities of the Sun. NASA Thesaurus Supplement, NASA SP-7064(Suppl. 1). Washington, DC: National Aeronautics and Space Administration.

NASA Interest

Exhaustive Interest: All facets of solar physics.

Input Subjects of Specific Interest

- Alpha rays (solar)
- Beta rays (solar)
- Chromosphere
- Lunar eclipses
- Photosphere
- Solar activity
- Solar constants
- Solar corona
- Solar cycles
- Solar density
- Solar eclipses
- Solar flares
- Solar magnetic field
- Solar mass
- Solar physics
- Solar radiation
- Solar radio emissions
- Solar ratio
- Solar spectra
- Solar structure
- Solar wind
- Sunspots

Space Radiation

Includes cosmic radiation; and inner and outer Earth's radiation belts. For biological effects of radiation on plants and animals see *Life Sciences* (pages 99-100); on human beings see *Aerospace Medicine* (pages 101-102). For theory see *Nuclear and High-Energy Physics* (pages 129-130).

Definition

Space Radiation - The process by which energy is emitted by objects in space in the form of photons or electromagnetic waves. Adapted from the NASA Thesaurus, Volume 3: Definitions. Washington, DC: National Aeronautics and Space Administration, 1988. NASA SP-7064.

NASA Interest

Exhaustive Interest: All facets of space radiation.

Input Subjects of Specific Interest

- Alpha rays (space)
- Beta rays (space)
- Cosmic radiation
- Galactic radiation
- Gamma rays (space)
- Inner Earth radiation belts
- Intergalactic radiation
- Interstellar radiation
- Outer Earth radiation belts
- Radiation belts
- Space radiation
- Stellar radiation
- Ultraviolet radiation (space)
- Van Allen belts
- X-ray radiation (space)

GENERAL

Includes aerospace related reports of a general or broad nature; histories, biographies, or overviews of aerospace programs.

General

Includes aeronautical, astronautical, and space science related histories, biographies, and pertinent reports too broad for categorization; histories or broad overviews of NASA programs such as Apollo, Gemini, and Mercury spacecraft, Earth Resources Technology Satellite (ERTS), and Skylab.

Definition

General - Not specific in nature and not restricted to identifiable parameters.

NASA Interest

Exhaustive Interest: Histories of NASA programs and missions; biographies of NASA astronauts.

Selective Interest: Histories of aeronautics and astronautics; biographies of astronauts, aviation pioneers, pilots and aerospace related scientists; reports on aerospace subjects of such wide coverage and of such broad nature that no predominate or suitable subject category can be found.

Negative Interest: Histories, biographies, or reports that are unrelated to aerospace.

Input Subjects of Specific Interest

- Aeronautical history
- Astronautical history
- Biographies of astronauts, aviation pioneers, pilots, and scientists
- Histories of aeronautics and space programs

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