NASA PATENT ABSTRACTS BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

JANUARY 1987

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ABSTRACTS BIBLIOGRAPHY: A CONTINUING
BIBLIOGRAPHY, SECTION 1: ABSTRACTS
(SUPPLEMENT 30) (National Aeronautics and
Space Administration) 50 p CSCL 05B 00/82 43479

N87-16654

Unclas
### ACCESSION NUMBER RANGES

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Annotated references to NASA-owned inventions covered by U.S. patents and applications for patent that were announced in Scientific and Technical Aerospace Reports (STAR) between July 1986 and December 1986.
This supplement is available from the National Technical Information Service (NTIS), Springfield, Virginia 22161, price code A03.
INTRODUCTION

Several thousand inventions result each year from the aeronautical and space research supported by the National Aeronautics and Space Administration. The inventions having important use in government programs or significant commercial potential are usually patented by NASA. These inventions cover practically all fields of technology and include many that have useful and valuable commercial application.

NASA inventions best serve the interests of the United States when their benefits are available to the public. In many instances, the granting of nonexclusive or exclusive licenses for the practice of these inventions may assist in the accomplishment of this objective. This bibliography is published as a service to companies, firms, and individuals seeking new, licensable products for the commercial market.

The NASA Patent Abstracts Bibliography (NASA PAB) is a semiannual NASA publication containing comprehensive abstracts and indexes of NASA-owned inventions covered by U.S. patents and applications for patent. The citations included in NASA PAB were originally published in NASA's Scientific and Technical Aerospace Reports (STAR) and cover STAR announcements made since May 1969.

For the convenience of the user, each issue of NASA PAB has a separately bound Abstract Section (Section 1) and Index Section (Section 2). Although each Abstract Section covers only the indicated six-month period, the Index Section is cumulative covering all NASA-owned inventions announced in STAR since 1969. Thus a complete set of NASA PAB would consist of the Abstract Sections of issue 04 (January 1974) and Issue 12 (January 1978) and the Abstract Section for all subsequent issues and the Index Section for the most recent issue.

The 105 citations published in this issue of the Abstract Section cover the period July 1986 through December 1986. The Index Section references over 4500 citations covering the period May 1969 through December 1986.

ABSTRACT SECTION (SECTION 1)

This PAB issue incorporates the 1975 STAR category revisions which include 10 major subdivisions divided into 74 specific categories and one general category/division. (See Table of Contents for the scope note of each category under which are grouped appropriate NASA inventions.) This new scheme was devised in lieu of the 34 category divisions which were utilized in PAB supplements (01) through (06) covering STAR abstracts from May 1969 through January 1974. Each entry in the Abstract Section consists of a STAR citation accompanied by an abstract and a key illustration taken from the patent or application for patent drawing. Entries are arranged in subject category in order of the ascending NASA Accession Number originally assigned in STAR to the invention. The range of NASA Accession Numbers within each issue is printed on the inside front cover.

Abstract Citation Data Elements: Each of the abstract citations has several data elements useful for identification and indexing purposes, as follows:

- NASA Accession Number
- NASA Case Number
- Inventor's Name
- Title of Invention
- U.S. Patent Application Serial Number
- U.S. Patent Number (for issued patents only)
- U.S. Patent Office Classification Number(s)
  (for issued patents only)

These data elements are identified in the Typical Citation and Abstract and in the indexes.
INDEX SECTION (SECTION 2)

The Index Section is divided into five indexes. These indexes are cross-indexed and are used to locate a single invention or groups of inventions.

**Subject Index**: Lists all inventions according to appropriate alphabetized technical term and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

**Inventor Index**: Lists all inventions according to alphabetized names of inventors and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

**Source Index**: Lists all inventions according to alphabetized source of invention (i.e., name of contractor or government installation where invention was made) and indicates the related NASA Case Number, the Subject Category Number, and the Accession Number.

**Number Index**: Lists inventions in order of ascending (1) NASA Case Number, (2) U.S. Patent Application Serial Number, (3) U.S. Patent Classification Number, and (4) U.S. Patent Number and indicates the related Subject Category Number and the Accession Number.

**Accession Number Index**: Lists all inventions in order of ascending Accession Number and indicates the related Subject Category Number, the NASA Case Number, the U.S. Patent Application Serial Number, the U.S. Patent Classification Number, and the U.S. Patent Number.

HOW TO USE THIS PUBLICATION TO IDENTIFY NASA INVENTIONS

To identify one or more NASA inventions within a specific technical field or subject, several techniques are possible with the flexibility incorporated into the NASA PAB.

1. **Using Subject Category**: To identify all NASA inventions in any one of the subject categories in this issue of NASA PAB, select the desired Subject Category in the Abstract Section (Section 1) and find the inventions abstracted thereunder.

2. **Using Subject Index**: To identify all NASA inventions listed under a desired technical subject index term, (A) turn to the cumulative Subject Index in the Index Section and find the invention(s) listed under the desired technical subject term. (B) Note the indicated Accession Number and the Subject Category Number. (C) Using the indicated Accession Number, turn to the inside front cover of the Index Section to determine which issue of the Abstract Section includes the Accession Number desired. (D) To find the abstract of the particular invention in the issue of the Abstract Section selected, (i) use the Subject Category Number to locate the Subject Category and (ii) use the Accession Number to locate the desired invention within the Subject Category listing.

3. **Using Patent Classification Index**: To identify all inventions covered by issued NASA patents (does not include applications for patent) within a desired Patent Classification, (A) turn to the Patent Classification Number in the Number Index of Section 2 and find the associated invention(s), and (B) follow the instructions outlined in (2)(B), and (D) above.
A space station module consisting of a cylindrical can within a can is presented. The outer can, which has one open end, encloses the inner can. The inner can has one tapered end with a hatch and one untapered end with a hatch. The outer can has one tapered end with a hatch. The overall length of the outer can is 25 ft, and its outer diameter is 14 ft. Two such assemblies easily fit end to end in the Shuttle Orbiter payload bay. With a shuttle payload capability of 65,000 pounds and an approximate weight of each twin can assembly of 16,000 pounds, 33,000 pounds of payload are available for instrumenting the cans. Only the inner can can be instrumented prior to launch. Once in orbit, the module is expanded to provide twice the usable space, approximately 48 ft total length.
TABLE OF CONTENTS

Section 1  Abstracts

AERONAUTICS
   Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).
   For related information see also Astronautics.
   01 AERONAUTICS (GENERAL)  N.A.
   02 AERODYNAMICS  N.A.
      Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.
      For related information see also 34 Fluid Mechanics and Heat Transfer.
   03 AIR TRANSPORTATION AND SAFETY  1
      Includes passenger and cargo air transport operations; and aircraft accidents.
      For related information see also 16 Space Transportation and 85 Urban Technology and Transportation.
   04 AIRCRAFT COMMUNICATIONS AND NAVIGATION  1
      Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.
      For related information see also 17 Spacecraft Communications, Command and Tracking and 32 Communications.
   05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE  N.A.
      Includes aircraft simulation technology.
      For related information see also 18 Spacecraft Design, Testing and Performance and 39 Structural Mechanics.
   06 AIRCRAFT INSTRUMENTATION  2
      Includes cockpit and cabin display devices; and flight instruments.
      For related information see also 19 Spacecraft Instrumentation and 35 Instrumentation and Photography.
   07 AIRCRAFT PROPULSION AND POWER  N.A.
      Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.
      For related information see also 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels, and 44 Energy Production and Conversion.
   08 AIRCRAFT STABILITY AND CONTROL  2
      Includes aircraft handling qualities; piloting; flight controls; and autopilots.
   09 RESEARCH AND SUPPORT FACILITIES (AIR)  3
      Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.
      For related information see also 14 Ground Support Systems and Facilities (Space).

ASTRONAUTICS
   Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.
   For related information see also Aeronautics.
   12 ASTRONAUTICS (GENERAL)  N.A.
      For extraterrestrial exploration see 91 Lunar and Planetary Exploration.
   13 ASTRODYNAMICS  N.A.
      Includes powered and free-flight trajectories; and orbit and launching dynamics.
   14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)  N.A.
      Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.
      For related information see also 09 Research and Support Facilities (Air).
   15 LAUNCH VEHICLES AND SPACE VEHICLES  N.A.
      Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.
   16 SPACE TRANSPORTATION  3
      Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.
      For related information see also 03 Air Transportation and Safety and 85 Urban Technology and Transportation.
   17 SPACECRAFT COMMUNICATION, COMMAND AND TRACKING  N.A.
      Includes telemetry; space communications networks; astronavigation; and radio blackout.
      For related information see also 04 Aircraft Communications and Navigation and 32 Communications.
   18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE  4
      Includes spacecraft thermal and environmental control; and attitude control.
      For life support systems see 54 Man-System Technology and Life Support. For related information see also 05 Aircraft Design, Testing and Performance and 39 Structural Mechanics.
   19 SPACECRAFT INSTRUMENTATION  N.A.
      For related information see also 06 Aircraft Instrumentation and 35 Instrumentation and Photography.
   20 SPACECRAFT PROPULSION AND POWER  4
      Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
      For related information see also 07 Aircraft Propulsion and Power, 28 Propellants and Fuels, and 44 Energy Production and Conversion.
CHEMISTRY AND MATERIALS
Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) 5
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS 5
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY 6
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also 77 Thermodynamics and Statistical Physics.

26 METALLIC MATERIALS 7
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS 8
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS 11
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also 07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, and 44 Energy Production and Conversion.

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

31 ENGINEERING (GENERAL) 12
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS 13
Includes land and global communications; communications theory; and optical communications.
For related information see also 04 Aircraft Communications and Navigation and 17 Spacecraft Communications, Command and Tracking.

33 ELECTRONICS AND ELECTRICAL ENGINEERING 15
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; micro miniaturization; and integrated circuitry.
For related information see also 60 Computer Operations and Hardware and 76 Solid-State Physics.

34 FLUID MECHANICS AND HEAT TRANSFER 16
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also 02 Aerodynamics and 77 Thermodynamics and Statistical Physics.

35 INSTRUMENTATION AND PHOTOGRAPHY 17
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see 43 Earth Resources. For related information see also 06 Aircraft Instrumentation and 19 Spacecraft Instrumentation.

36 LASERS AND MASERS 21
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING 22
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

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

39 STRUCTURAL MECHANICS 25
Includes structural element design and weight analysis; fatigue; and thermal stress.

GEOSCIENCES
Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also Space Sciences.

42 GEOSCIENCES (GENERAL) N.A.

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

44 ENERGY PRODUCTION AND CONVERSION 25
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also 07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels, and 85 Urban Technology and Transportation.

45 ENVIRONMENT POLLUTION N.A.
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

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

47 METEOROLOGY AND CLIMATOLOGY N.A.
Includes weather forecasting and modification.

48 OCEANOGRAPHY N.A.
Includes biological, dynamic and physical oceanography; and marine resources.
<table>
<thead>
<tr>
<th>LIFE SCIENCES</th>
<th>N.A.</th>
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<tbody>
<tr>
<td>Includes sciences (general); aerospace medicine; behavioral sciences; man-system technology and life support; and planetary biology.</td>
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<thead>
<tr>
<th>51 LIFE SCIENCES (GENERAL)</th>
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<tbody>
<tr>
<td>Includes genetics.</td>
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<tr>
<th>52 AEROSPACE MEDICINE</th>
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<td>Includes physiological factors; biological effects of radiation; and weightlessness.</td>
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<th>53 BEHAVIORAL SCIENCES</th>
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<td>Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.</td>
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<th>54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT</th>
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<tr>
<td>Includes human engineering; biotechnology; and space suits and protective clothing.</td>
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<td>Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.</td>
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<th>60 COMPUTER OPERATIONS AND HARDWARE</th>
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<td>Includes computer graphics and data processing. For components see 33 Electronics and Electrical Engineering.</td>
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<tr>
<th>61 COMPUTER PROGRAMMING AND SOFTWARE</th>
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<td>Includes computer programs, routines, and algorithms.</td>
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<td>Includes computer networks.</td>
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<td>Includes feedback and control theory. For related information see also 54 Man/System Technology and Life Support.</td>
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<th>65 STATISTICS AND PROBABILITY</th>
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<td>Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.</td>
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<td>Includes mathematical modeling; network analysis; and operations research.</td>
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<td>Includes topology and number theory.</td>
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<td>Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics. For related information see also Engineering.</td>
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<th>70 PHYSICS (GENERAL)</th>
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<tbody>
<tr>
<td>For geophysics see 46 Geophysics. For astrophysics see 90 Astrophysics. For solar physics see 92 Solar Physics.</td>
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<th>71 ACOUSTICS</th>
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<tbody>
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<td>Includes sound generation, transmission, and attenuation. For noise pollution see 45 Environment Pollution.</td>
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<tr>
<th>72 ATOMIC AND MOLECULAR PHYSICS</th>
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<tr>
<td>Includes atomic structure and molecular spectra.</td>
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<tr>
<th>73 NUCLEAR AND HIGH-ENERGY PHYSICS</th>
<th>N.A.</th>
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<tbody>
<tr>
<td>Includes elementary and nuclear particles; and reactor theory. For space radiation see 93 Space Radiation.</td>
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<th>74 OPTICS</th>
<th>30</th>
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<td>Includes light phenomena.</td>
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<th>75 PLASMA PHYSICS</th>
<th>N.A.</th>
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<tbody>
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<td>Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see 46 Geophysics. For space plasmas see 90 Astrophysics.</td>
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<tr>
<th>76 SOLID-STATE PHYSICS</th>
<th>32</th>
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<tr>
<td>Includes superconductivity. For related information see also 33 Electronics and Electrical Engineering and 36 Lasers and Masers.</td>
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<tr>
<th>77 THERMODYNAMICS AND STATISTICAL PHYSICS</th>
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<tr>
<td>Includes quantum mechanics; and Bose and Fermi statistics. For related information see also 25 Inorganic and Physical Chemistry and 34 Fluid Mechanics and Heat Transfer.</td>
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<th>SOCIAL SCIENCES</th>
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<tr>
<td>Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.</td>
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<td>Includes educational matters.</td>
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<th>81 ADMINISTRATION AND MANAGEMENT</th>
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<tbody>
<tr>
<td>Includes management planning and research.</td>
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82 DOCUMENTATION AND INFORMATION SCIENCE
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see 61 Computer Programming and Software

83 ECONOMICS AND COST ANALYSIS
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE
Includes space law; international law; international cooperation; and patent policy.

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

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

88 SPACE SCIENCES (GENERAL)

89 ASTRONOMY
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION
Includes planetology; and manned and unmanned flights.
For spacecraft design see 18 Spacecraft Design, Testing and Performance. For space stations see 15 Launch Vehicles and Space Vehicles.

92 SOLAR PHYSICS
Includes solar activity, solar flares, solar radiation and sunspots.

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

GENERAL

99 GENERAL

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

A Semiannual Publication of the National Aeronautics and Space Administration

03

AIR TRANSPORTATION AND SAFETY

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

N86-24673* # National Aeronautics and Space Administration.
Langley Research Center, Hampton, Va.

ICE DETECTOR Patent Application
L. M. WEINSTEIN, inventor (to NASA) 31 Mar. 1986 14 p
(NASA-CASE-LAR-13403-1; NAS 1.71: LAR-13403-1;
US-PATENT-APPL-SN-846429) Avail: NTIS HC A02/MF A01
CSCL 01C

An ice detector for aircraft that can accurately determine the presence and thickness of ice and control devices to remove it is proposed. A small depression on the surface of an aircraft structure is filled with a plastic or epoxy material. Two capacitance gauges and a temperature gauge are embedded in this material near the surface. When moisture forms on the surface the capacitance of each of the gauges changes. This signal combined with the signal from a temperature gauge determines whether the moisture is water or ice. If ice is present its thickness may be measured based on the output of the second capacitance gauge. Once the presence of ice is determined, the thickness is easily determined. The output of the device may be used to provide an indication to the pilot or to automatically control heating elements to remove the ice.

N86-26296* # National Aeronautics and Space Administration.
Langley Research Center, Hampton, Va.

LIGHTNING DISCHARGE PROTECTION ROD Patent Application
C. F. BRYAN, JR., inventor (to NASA) 24 Apr. 1986 14 p
Filed 14 Nov. 1983 Supersedes N84-12151 (22-03 p 330) Sponsored by NASA. Pasadena Office
(NASA-CASE-NPO-16171-1; US-PATENT-4,578,678;

This invention is a system for protecting an in-air vehicle from damage due to a lightning strike. It is an extremely simple device consisting of a sacrificial graphite composite rod, approximately the diameter of a pencil with a length of about five inches. The sacrificial rod is constructed with the graphite fibers running axially within the rod in a manner that best provides a path of conduction axially from the trailing edge of an aircraft to the trailing end of the rod. The sacrificial rod is inserted into an attachment hole 32 machined into trailing edges of aircraft flight surfaces, such as vertical fin cap 31, and attached with adhesive in a manner not prohibiting the conduction path between the rod and aircraft. The trailing end of rod may be tapered for aerodynamic and esthetic requirements. This rod is sacrificial but has the capability to sustain several lightning strikes and still provide protection. The novelty of this invention appears to reside in a system for protecting the most vulnerable parts of an in-air vehicle when the craft is hit by lightning with an extremely simple and inexpensive device. The materials are easily procured and the sacrificial rod generally can be constructed from the same composite as the flight or control surface to be protected. The protection extends to several in-air lightning strikes and provides protection to aircraft parts manufactured from all materials including organic composites. NASA

04

AIRCRAFT COMMUNICATIONS AND NAVIGATION

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

N86-27270* # National Aeronautics and Space Administration.
Pasadena Office, Calif.

HIGH DYNAMIC GLOBAL POSITIONING SYSTEM RECEIVER Patent
1983 Supersedes N84-12151 (22 - 03 p 330) Sponsored by NASA. Pasadena Office
(NASA-CASE-NPO-16171-1C); US-PATENT-4,578,678;

A Global Positioning System (GPS) receiver having a number of channels, receives an aggregate of pseudorange code time division modulated signals. The aggregate is converted to baseband and then to digital form for separate processing in the separate channels. A fast fourier transform processor computes the signal energy as a function of Doppler frequency for each correlation lag, and a range and frequency estimator computes estimates of pseudorange, and frequency. Raw estimates from all channels are used to estimate receiver position, velocity, clock offset and
AIRCRAFT INSTRUMENTATION

clock rate offset in a conventional navigation and control unit, and based on the unit that computes smoothed estimates for the next measurement interval.

AIRCRAFT STABILITY AND CONTROL

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

A mechanical system to control the position of a rotating swashplate is developed. This system provides independent lateral cyclic, longitudinal cyclic and collective pitch control of a helicopter rotor attached to the swashplate, without use of a mixer box. The system also provides direct, linear readout of cyclic and collective swashplate positions. A swashplate control system has a first gimbal ring pivotally mounted along a longitudinal axis. A second gimbal ring is pivotally attached to the first gimbal ring along a lateral axis. A longitudinal cyclic actuator pivots the first gimbal ring along a lateral axis. A lateral cyclic actuator pivots the second gimbal ring along the longitudinal axis. A lateral cyclic actuator pivots the second gimbal ring along the lateral axis. The lateral cyclic actuator is mounted on the first gimbal ring. A swashplate is rotatably mounted on the second gimbal ring. Prior swashplate control systems required use of a mixer box to provide true decoupling of lateral and longitudinal cyclic input to the swashplate.
support has a centrally disposed aperture. A light source is mounted on the pivotally movable member above the aperture to direct light through the aperture. The light sensor produces at least one output signal related to a location on the sensor at which the light from the light source strikes the sensor.

RESEARCH AND SUPPORT FACILITIES (AIR)

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

MAGNETIC SPIN REDUCTION SYSTEM FOR FREE SPINNING OBJECTS Patent

A spinning Earth satellite is shown in which it is desired to reduce the rotation or spin to a level that the satellite may be secured or handled remotely from a spacecraft. This is accomplished by the spacecraft having a mast carrying an electrical current coil which encircles the satellite. The magnetic field of the coil is normal to the spin axis of the satellite which causes circular eddy current flow in the housing of the satellite. This generates magnetic force opposing the rotation. In another embodiment the
magnetic field is generated by the use of an electromagnet on a remote manipulation arm.

Official Gazette of the U.S. Patent and Trademark Office

includes spacecraft thermal and environmental control; and attitude control.

National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.

SHUTTLE-LAUNCH TRIANGULAR SPACE STATION Patent
W. C. SCHNEIDER, inventor (to NASA), R. B. BERKA, inventor (to NASA), C. KAVANAUGH, inventor (to NASA), K. NAGY, inventor (to NASA), R. C. PARISH, inventor (to NASA), J. A. SCHLIESING, inventor (to NASA), P. D. SMITH, inventor (to NASA), F. J. STEBBINS, inventor (to NASA), and C. J. WESSELSKI, inventor (to NASA) 1 Apr. 1986 9 p Filed 9 Mar. 1984 Sponsored by NASA
(NASA-CASE-MSC-20676-1; US-PATENT-4.579.302; US-PATENT-CLASS-244-159)
Avail: NASA

A triangular space station deployable in orbit is described. The framework is comprised of three trusses, formed of a pair of generally planar faces consisting of foldable struts. The struts expand and lock into rigid structural engagement forming a repetition of equilateral triangles and nonfolding diagonal struts interconnecting the two faces. The struts are joined together by node fittings. The framework can be packaged into a size and configuration transportable by a space shuttle. When deployed, the framework provides a large work/construction area and ample of modules are secured to the framework and then joined by tunnels to make an interconnected modular display. Thruster units for the space station orientation and altitude maintenance are provided.

NASA

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

National Aeronautics and Space Administration.
Marshall Space Flight Center, Huntsville, Ala.

PROPULSION APPARATUS AND METHOD USING BOIL-OFF GAS FROM A CRYOGENIC LIQUID Patent

A propulsion system and method are disclosed for controlling the attitude and drag of a space vehicle. A helium dewar contains liquid helium which cools an experiment package. The helium is heated or vented to keep the temperature between 1.5 and 1.7 degrees K to maintain adequate helium boil-off gas as a propellant without adversely affecting the experiment package which is contained in the helium dewar for protection from solar heating. The apparatus includes auxiliary heater and temperature sensor for controlling the temperature of the helium. The boil-off gas
propellant is delivered to thruster modules to control vehicle attitude and compensate for drag.

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24 COMPOSITE MATERIALS

Includes laminates.

N86-25416*
National Aeronautics and Space Administration. 
Ames Research Center, Moffett Field, Calif. 

LAMINATE COMPRISING FIBERS EMBEDDED IN CURED AMINE TERMINATED BIS-IMIDE Patent 

Amine terminated bisaspartamides are prepared by a Michael type reaction of an aromatic bismaleimide and an aromatic diamine in an aprotic solvent. These bisaspartamides are thermally polymerized to yield tough, resinous polymers crosslinked through -NH- groups. Such polymers are useful in applications requiring materials with resistance to change at elevated temperatures.

Official Gazette of the U.S. Patent and Trademark Office

N86-28131*
National Aeronautics and Space Administration. 
Ames Research Center, Moffett Field, Calif. 

LIGHT WEIGHT FIRE RESISTANT GRAPHITE COMPOSITES Patent 

Composite structures with a honeycomb core and characterized by lightweight and excellent fire resistance are provided. These sandwich structures employ facesheets made up of bismaleimide-vinyl styrlypyridine copolymers with fiber reinforcement such as carbon fiber reinforcement. In preferred embodiments the facesheets are over layered with a decorative
25 INORGANIC AND PHYSICAL CHEMISTRY

The properties of these composites make them attractive materials of construction for aircraft and spacecraft. The Official Gazette of the U.S. Patent and Trademark Office

25 INORGANIC AND PHYSICAL CHEMISTRY

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

N86-25428* National Aeronautics and Space Administration. Pasadena Office, Calif.

SOLAR HEATED OIL SHALE PYROLYSIS PROCESS Patent


An improved system for recovery of a liquid hydrocarbon fuel from oil shale is presented. The oil shale pyrolysis system is composed of a retort reactor for receiving a bed of oil shale particiles which are heated to pyrolysis temperature by means of a recycled solar heated gas stream. The gas stream is separated from the recovered shale oil and a portion of the gas stream is rapidly heated to pyrolysis temperature by passing it through an efficient solar heater. Steam, oxygen, air or other oxidizing gases can be injected into the recycle gas stream after it enters the retort reactor. The use of solar thermal heat to preheat the recycle gas and optionally the steam before introducing it into the bed of shale, increases the yield of shale oil.

Official Gazette of the U.S. Patent and Trademark Office

N86-27431* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

SPILLAGE DETECTOR FOR LIQUID CHROMATOGRAPHY SYSTEMS Patent


A spillage detector device for use in conjunction with fractionation of liquid chromatography systems which includes a spillage receiving enclosure beneath the fractionation area is described. A sensing device having a plurality of electrodes of alternating polarity is mounted within the spillage receiving enclosure. Detection circuitry, responsive to conductivity between electrodes, is operatively connected to the sensing device. The detection circuitry feeds into the output circuitry. The output circuit has relaying and switching circuitry directed to a solenoid, an alarm system and a pump. The solenoid is connected to the pliable conduit of the chromatography system. The alarm system comprises an audio alarm and a visual signal. A 115-volt power system interconnected with the pump, the solenoid, the sensing device, and the detection and output circuitry.

Official Gazette of the U.S. Patent and Trademark Office

N86-32540* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ISOTOPE EXCHANGE IN OXIDE-CONTAINING CATALYST Patent Application


A method of exchanging rare-isotope oxygen for common-isotope oxygen in the top several layers of an oxide-containing catalyst is disclosed. A sample of an oxide-containing catalyst is exposed to a flowing stream of reducing gas in an inert carrier gas at a temperature suitable for the removal of the reactive common-isotope oxygen atoms from the surface layer or layers of the catalyst without damaging the catalyst structure. The reduction temperature must be higher than any at which the catalyst will subsequently operate. Sufficient reducing gas is used to allow removal of all of the reactive common-isotope oxygen atoms in the top several layers of the catalyst. The catalyst is then reoxidized with the desired rare-isotope oxygen in sufficient quantity to replace all of the common-isotope oxygen that was removed.

NASA
26 METALLIC MATERIALS

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


A pretreatment and reactivation process for enhancing the recombination activity of an oxide-containing catalyst is disclosed. Pretreatment is achieved by first exposing the catalyst to a flowing stream of a reducing agent in an inert carrier gas while the catalyst is heated to a temperature greater than its operating temperature. The catalyst is then exposed to a flowing stream of the inert carrier gas in pure form at the same temperature. Finally, the catalyst is cooled to its operating temperature in a flowing stream of the inert carrier gas in pure form. Reactivation is achieved by merely reheating the catalyst, in the presence of CO-containing recombining gases, to a temperature greater than its operating temperature and then recoiling the catalyst to its operating temperature.


A method for coating a substrate with rapidly solidified metal is described which comprises spraying a mixture of rapidly solidified metal powder and small peening particles at high velocity against a substrate. The velocity is sufficient for the rapidly solidified metal powder to impact the substrate and simultaneously bond the metal powder to the substrate. If the substrate is metallic, the method may provide the simultaneous mechanical working of the substrate surface. Official Gazette of the U.S. Patent and Trademark Office


A cobalt-free nickel-base superalloy composed of in weight % 15 Cr - 5 Mo - 3.5 Ti - 4 Al - 0.07 (max) C - remainder Ni is given a modified heat treatment. With this heat treatment the cobalt-free alloy achieves certain of the mechanical properties of the corresponding cobalt-containing nickel-base superalloy at 1220 F (650 C). Thus, strategic cobalt can be replaced with nickel in the superalloy.

Amorphous metals are produced by forming a molten unit of metal and deploying the unit into a bidirectional acoustical levitating field or by dropping the unit through a spheroidizing zone, a slow quenching zone, and a fast quenching zone in which the sphere is rapidly cooled by a cryogenic liquid jet stream created in the standing acoustic wave field produced between a half cylindrical acoustic driver and a focal reflector or a curved driver and a reflector. The cooling rate can be further augmented first by a cryogenic liquid collar and secondly by a cryogenic liquid jacket surrounding a drop tower. The molten unit is quenched to an amorphous solid which can survive impact in a unit collector or is retrieved by a vacuum chuck.

Official Gazette of the U.S. Patent and Trademark Office

ION-BEAM NITRIDING OF STEELS Patent Application
J. SALIK, inventor (to NASA) and T. E. HUBBELL, JR., inventor (to NASA) 29 Jan. 1986 11 p

A surface of a steel substrate is nitrided without external heating by exposing it to a beam of nitrogen ions under a low pressure. The pressure is much lower than that employed for ion-nitriding, and an ion source is used instead of a glow discharge. Both of these features reduce the introduction of impurities into the substrate surface.

POLY(CARBONATE-MIDE) POLYMER Patent Application
T. L. ST.CLAIR, inventor (to NASA), S. MAUDGAL, inventor (to NASA), and J. R. PRATT, inventor (to NASA) (Mississippi Univ. For Women, Columbus) 27 Feb. 1986 25 p

A novel series of polymers and copolymers based on a polyamide backbone with the incorporation of carbonate moieties along the backbone is presented. The preparation process for the polymers and copolymers is disclosed together with a novel series of dinitrophenyl carbonates and dinitrophenyl carbonates. The novel polymers and copolymers exhibit high temperature capability and because of the carbonate unit, many exhibit a high degree of order and/or crystallinity.
with a cross-linkable oligomer which has the same repeating unit improved properties over prior networks because the polymer and as the linear polymer. The resulting interpenetrating network has characteristics which is constructed by combining a linear polymer formed using polymers having different repeating units. This method oligomer having identical repeating units is developed. Polymers problems common to other networks. NASA

A process using a Diels-Adler reaction which increases the molecular weight and/or crosslinks polymers by reacting the polymers with bisunsaturated dienophiles is developed. The polymer comprises at least 75% by weight based on the reaction product, has a molecular weight of at least 5000 and a plurality of conjugated 1,3-diene systems incorporated into the molecular structure. A dienophile reaction with the conjugated 1,3-diene of the polymer is at least 1% by weight based on the reaction product. Examples of the polymer include polyesters, polyamides, polyanhydrides, polyisocyanates and copolymers. The bisunsaturated dienophiles may include bismaleimides, bisadipimides, bis maleic and bis terephthalic esters and amides. This method for expanding the molecular weight chains of the polymers, preferably thermoplastics, is advantageous for processing or fabricating thermoplastics. A low molecular weight thermoplastic is converted to a high molecular weight plastic having improved strength and toughness for use in the completed end use article. NASA

A semi-2-interpenetrating network of improved qualities which is prepared by combining a linear polymer and a cross-linkable oligomer having identical repeating units is developed. Polymers have been combined in the past into interpenetrating networks in order to gain useful properties from the combination of materials. However, previous semi-interpenetrating networks have only been formed using polymers having different repeating units. This method provides a semi-2-interpenetrating network of improved characteristics which is constructed by combining a linear polymer with a cross-linkable oligomer which has the same repeating unit as the linear polymer. The resulting interpenetrating network has improved properties over prior networks because the polymer and oligomer with identical functionalities are mutually soluble and form one homogeneous phase. This eliminates the phase separation problems common to other networks. NASA

A polymeric substrate is coated with a metal oxide film to provide oxidation protection in low Earth orbital environments. The film contains about four volume percent polymer to provide flexibility. NASA

This invention relates to a polyether graft copolymer having improved solvent resistance and crystalline thermally reversible crosslinks. The copolymer is prepared by a novel process of anionic copolymerization. The polymers of this invention exhibit good solvent resistance and are well suited for commercial aircraft parts. Previous aromatic polymers, also well known as polyphenylene oxides, have certain deficiencies which detract from their usefulness. These well known commercial polymers are often soluble in common solvents including the halocarbon and aromatic hydrocarbon types of paint thinners and removers. This limitation prevents the use of these polyethers in structural articles that require frequent painting. In addition, the most popular commercially available polyether is a very high melting plastic. This makes it considerably more difficult to fabricate finished parts from this material. The present invention solves these problems by providing an aromatic polyether graft copolymer with improved solvent resistance and crystalline thermally reversible crosslinks. The graft copolymer is formed by converting the carboxyl groups of a carboxylated polyphenylene oxide polymer to ionic carbonyl groups in a suitable solvent, reacting pivalolactone with the dissolved...
polymer, and adding acid to the solution to produce the graft copolymer. NASA

The process involves the conversion of a pendant bromo group to a hydroxy group in the polymer, and adding acid to the solution to produce the graft copolymer. NASA

The 5(4-ethynyl phenoxy)isophthaloyl chloride synthesis procedures are also disclosed. Ames Research Center, Moffett Field, Calif.

N86-27450* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

SULFONE-ESTER POLYMERS CONTAINING PENDENT ETHYL GROUPS Patent
P. M. HERGENROTHER and B. J. JENSEN, inventors (to NASA) 6 May 1986 8 p Filed 23 May 1984 Supersedes N84-28987 (22 - 19, p 2996) Sponsored by NASA. Langley Research Center

Ames Research Center, Moffett Field, Calif.

N86-27451* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

TOUGHENING REINFORCED EPOXY COMPOSITES WITH BROMINATED POLYMERIC ADDITIVES Patent

Cured multifunctional epoxy resins including tris(hydroxyphenyl)methane triglycidyl ether are toughened by addition of polybrominated polymeric additives having an EE below 1500 to the pre-cure composition. Carboxy-terminated butadiene-acrylonitrile rubber is optionally present in the pre-cure mixture as such or as a pre-formed copolymer with other reactants. Reinforced composites, particularly carbon-reinforced composites of these resins are disclosed and shown to have improved toughness.

Official Gazette of the U.S. Patent and Trademark Office

N86-29039* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PROCESS FOR PREPARING HIGHLY OPTICALLY TRANSPARENT/COLORLESS AROMATIC POLYIMIDE FILM Patent

A polyimide film that is approximately 90% transparent at 500 nm, useful for thermal protective coatings and solar cells, and the processes for preparing the same by thermal and chemical conversion are disclosed. An essential feature for achieving maximum optical transparency films requires utilizing recrystallized and/or sublimated specific aromatic diamines and dihydride monomers and introducing phenoxo or thiophenyl separator groups and isomeric m,m' or o,p'-oriented diamines into the polymer molecular structure. The incorporation of these groups in the polymer structure serves to separate the chromaphoric centers and reduce the formation of inter-chain and intra-chain charge transfer complexes which normally cause absorptions in the UV-visible range. The films may be obtained by hand, brushing, casting, or spraying a layer of polyamic acid solutions onto a surface and thermally converting the applied layer to the polyimide, or the polyamic acid solution can be chemically converted to the polyimide, subsequently dissolved in an organic solvent, and applied as a polyimide film layer with the solvent therein thermally removed.

Official Gazette of the U.S. Patent and Trademark Office

N86-31726* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AMINE TERMINATED BISASPARTIMIDE POLYMER Patent

Novel amine terminated bisaspartimides are prepared by a Michael-type reaction of an aromatic bismaleimide and an aromatic diamine in an aprotic solvent. These bisaspartimides are thermally polymerized to yield tough, resinsous polymers cross-linked through the chromaphoric centers. The incorporation of these groups in the polymer structure serves to separate the chromaphoric centers and reduce the formation of inter-chain and intra-chain charge transfer complexes which normally cause absorptions in the UV-visible range. The films may be obtained by hand, brushing, casting, or spraying a layer of polyamic acid solutions onto a surface and thermally converting the applied layer to the polyimide, or the polyamic acid solution can be chemically converted to the polyimide, subsequently dissolved in an organic solvent, and applied as a polyimide film layer with the solvent therein thermally removed.

Official Gazette of the U.S. Patent and Trademark Office

N86-31727* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

PROCESS FOR PREPARING HIGHLY OPTICALLY TRANSPARENT/COLORLESS AROMATIC POLYIMIDE FILM Patent

An aromatic condensation polyimide film that is approximately 90% transparent at 500 nm, useful for thermal protective coatings and the process for preparing same are disclosed. A feature to achieve maximum optical transparency films requires the utilization of recrystallized and/or sublimated specific aromatic diamines and dianhydride monomers and the introduction of bulky electron withdrawing groups and separator groups into the polymer molecular structure.

Official Gazette of the U.S. Patent and Trademark Office

N86-32568* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.


1-(Diorganooxophosphonyl)methyl2,4- and 2,6diamino benzenes are reacted with polyacrylates and optionally comonomers to produce polyamides which have desirable heat and fire resistance properties. These polymers are useful to form fibers and fabrics where fire resistance properties are important, e.g., aircraft equipment and structures.

Official Gazette of the U.S. Patent and Trademark Office

N86-32570* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.


Thermosetting fluoropolymer foams are made by mixing fluid form thermosetting fluoropolymer components having a substantial fluorine content, placing the mixture in a pressure tight chamber, filling the chamber with a gas, at relatively low pressure, that is unreactive with the fluoropolymer components, allowing the mixture to gel, removing the gelled fluoropolymer from the chamber and thereafter heating the fluoropolymer at a relatively low temperature to simultaneously cure and foam the fluoropolymer. The resulting fluoropolymer product is closed celled with the cells storing the gas employed for foaming. The fluoropolymer resins employed may be any thermosetting fluoropolymer including fluoroepoxies, fluoropolyurethanes and fluorocaraylates.

N86-23744* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.

N86-23744** National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.


An integrated polygeneration system and process is disclosed for generating liquid hydrogen as a main energy product for use as a propellant for space vehicles. Secondary energy products and commodities for supporting a space center complex and launching of the space vehicle includes the production of electrical and thermal energy and gaseous nitrogen. The integrated process includes a coal gasification and gas cleanup system, a combined cycle power generation system, a hydrogen production and liquefaction system and a air separation system. A medium BTU gas is produced by the coal gasification system. Steam also
produced in the coal gasification process is delivered to a steam turbine in the combined cycle power generation system.

A deployable geodesic truss structure which can be deployed from a stowed state to an erected state is described. The truss structure includes a series of bays, each bay having sets of battens connected by longitudinal cross members which give the bay its axial and torsional stiffness. The cross members are hinged at their mid point by a joint so that the cross members are foldable for deployment or collapsing. The bays are deployed and stabilized by actuator means connected between the mid point joints of the cross members. Hinged longerons may be provided to also connect the sets of battens and to collapse for stowing with the rest of the truss structure. The truss structure has the capability of serving a structural function even when only partly deployed.

A method for boring well defined holes in a composite material such as graphite/epoxy is discussed. A slurry of silicon carbide powder and water is projected onto a work area of the composite material in which a hole is to be bored with a conventional drill bit. The silicon carbide powder and water slurry allow the drill bit, while experiencing only normal wear, to bore smooth, cylindrical holes in the composite material.

The present invention relates to a chemisorption compressor cryogenic refrigerator which employs oxygen to provide cooling at 60 K to 100 K. The invention includes dual vessels containing an oxygen absorbent material, alternately heated and cooled to provide a continuous flow of high pressure oxygen, multiple heat exchangers for cooldown of the oxygen, a Joule-Thomson expansion valve system for expanding the oxygen to partially liquify it and a liquid oxygen collection vessel. The primary novelty of the present invention lies in the provision of a refrigeration system which makes
use of reversible chemical reactions with oxygen to provide cooling at 60 K to 100 K.

A very thin layer of highly textured carbon is applied to a copper surface by a triode sputtering process. A carbon target and a copper substrate are simultaneously exposed to an argon plasma in a vacuum chamber. The resulting carbon surface is characterized by a dense, random array of needle like spires or peaks which extend perpendicularly from the copper surface. The coated copper is especially useful for electrode plates in multistage depressed collectors.

A system for the measurement of shaft angles is disclosed wherein a synchro resolver is sequentially pulsed, and alternately, a sine and then a cosine representative voltage output of it are sampled. Two like type, sine or cosine, succeeding outputs (V_{sub S1}, V_{sub S2}) are averaged and algebraically related to the opposite type output pulse (V_{sub c}) occurring between the averaged pulses to provide a precise indication of the angle of a shaft coupled to the resolver at the instant of the occurrence of the intermittently occurring pulse (V_{sub c}).

A system for the measurement of shaft angles is disclosed wherein a synchro resolver is sequentially pulsed, and alternately, a sine and then a cosine representative voltage output of it are sampled. Two like type, sine or cosine, succeeding outputs (V_{sub S1}, V_{sub S2}) are averaged and algebraically related to the opposite type output pulse (V_{sub c}) occurring between the averaged pulses to provide a precise indication of the angle of a shaft coupled to the resolver at the instant of the occurrence of the intermittently occurring pulse (V_{sub c}).

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Official Gazette of the U.S. Patent and Trademark Office

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Official Gazette of the U.S. Patent and Trademark Office
Patent Application
C. L. LICHTENBERG, inventor (to NASA), P. W. SHORES, inventor (to NASA), and H. S. KOBAYASHI, inventor (to NASA) 20 Feb. 1986 34 p

The invention employs a continuous wave radar technique and apparatus which can be used as a distance measuring system in the presence of background clutter, by utilizing small passive transponders. A first continuous electromagnetic wave signal $S_1$ at a first frequency $f_1$ is transmitted from a first location. A transponder carried by a target object positioned at a second (remote) location receives the transmitted signal, phase-coherently divides the $f_1$ frequency and phase therefore, and re-transmits the transmitted signal as a second continuous electromagnetic wave signal $S_2$ at a lower second frequency $f_2$ which is a subharmonic of $f_1$. The re-transmitted signal is received at the first location where a measurement of the phase difference is made between the signals $S_1$ and $S_2$, such measurement being indicative of the distance between the first and second locations. In a preferred embodiment, the transponder is a passive divide-by-two parametric oscillator employing the energy from the transmitted signal $S_1$ incident thereon to generate the re-transmitted signal $S_2$.

METHOD AND APPARATUS FOR OPERATING ON COMPANDED PCM VOICE DATA Patent

The method and apparatus constructed in accordance with this invention permits a plurality of parties to speak to each other on a conference line with a minimum of interference. The apparatus digitizes audio signals. Each of the parties has an audio transmitter and receiver provided for transmitting and receiving audio signals. The audio signals are converted to a PCM companded eight-bit parallel signal followed by a conversion to a serial signal for transmitting to a remote location and then reconverting each of the companded signals to a first-eight-bit parallel signal. The eight-bit parallel signal is fed to one input of a pre-programmed ROM. This eight-bit signal provides one-half of a sixteen-bit address of a lookup ROM. The other half of the sixteen-bit ROM address is supplied by another subscriber over an identical circuit.

MEASUREMENT APPARATUS AND PROCEDURE FOR THE DETERMINATION OF SURFACE EMISSIVITIES Patent Application
H. J. C. BLUME, inventor (to NASA) 3 Dec. 1985 27 p

A method and apparatus for independently determining the electromagnetic surface emissivity of a material is developed, which is particularly useful in the design of large deployable space antennas employing mesh membrane surfaces. The system is a closed one with respect to unwanted or uncorrelated radiation outside the system. The present embodiment comprises a radiometer connected to a horn antenna, a test section sealed to the horn antenna and a cryogenically cooled matched load (cryoload) exposed to the interior of the system. The material is enclosed in a convection test chamber within the test section, heated by convection within a test chamber and allowed to radiate within the system such that a component of the radiation energy of the material is measured by the radiometer in terms of brightness temperature. A matched load serves as the stabilized source of uncorrelated radiation within the system. The actual physical temperature of the material is also measured during the heating process with a thermometer. The difference in brightness temperature over a selected period of time when divided by the physical temperature over the same period of time is the emissivity of the material according to a derivation of the Raleigh - Jeans approximation for an ideal system free from all uncorrelated radiation.

N86-24880* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

N86-27513* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.

MEASUREMENT APPARATUS AND PROCEDURE FOR THE DETERMINATION OF SURFACE EMISSIVITIES Patent Application
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33 ELECTRONICS AND ELECTRICAL ENGINEERING

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

33 ELECTRONICS AND ELECTRICAL ENGINEERING

which has a better combination of resolution, brightness, contrast ratio and fabrication simplicity than any of the prior designs.


A front surface contact floating emitter solar cell transistor is provided in a semiconductor body (n-type), in which floating emitter sections (p-type) are diffused or implanted in the front surface. Between the emitter sections, a further section is diffused or implanted in the front surface, but isolated from the floating emitter sections, for use either as a base contact to the n-type semiconductor body, in which case the section is doped n+, or as a collector for the adjacent emitter sections, in which case the section is doped p+. In the first case, the structure is diffused or implanted p+ on the back in a section that serves as a collector, and in the second case the structure is diffused or implanted n+ all across the back to serve as a base contact. In either case, the semiconductor material on the back may be a starting substrate of suitably doped semiconductor material. A major advantage is that no wafer edge groove is necessary since the floating emitter solar cell transistors are isolated from saw damage, so long as a cut is not made through the well.


An oscillator circuit for sensing and indicating temperature by changing oscillator frequency with temperature comprises a programmable operational amplifier which is operated on the roll-off portion of its gain versus frequency curve and has its output directly connected to the inverting input to place the amplifier in a follower configuration. Its output is also connected to the non-inverting input by a capacitor with a crystal or other tuned circuit also being connected to the non-inverting input. A resistor is connected to the program input of the amplifier to produce a given set current at a given temperature, the set current varying with temperature. As the set current changes, the gain-bandwidth of the amplifier changes and, in turn, the reflected capacitance across the crystal changes, thereby providing the desired change in oscillator frequency by pulling the crystal. There is no requirement that a crystal employed with this circuit display either a linear frequency change with temperature or a substantial frequency change with temperature.


This invention relates to a flat-panel, electroluminescent display capable of achieving full color and is particularly useful in achieving a bright display with high resolution. The invention uses red, green and blue phosphors in two layers separated by layers of insulating material and layers of electrodes that are used to excite the electrodes. In operation, the display is addressed by supplying sufficient voltage between selected electrodes. This places an electric field across the phosphor at each picture element located between the overlap of the selected electrodes, causing the phosphor to emit light at this location. The display can be addressed in line-at-a-time fashion in rapid enough sequence to display information at standard TV frame rates. The novelty of this invention resides in the combining of a partial side-by-side design with a partially stacked layer design to produce a flat-panel, full-color display...
A power supply is provided for an arc discharge lamp which includes a relatively low voltage high current power supply section and a high voltage starter circuit. The low voltage section includes a transformer, rectifier, variable resistor and a bank of capacitors, while the starter circuit comprises a plurality of diodes and capacitors connected as a Cockcroft-Walton multiplier. The starting circuit is effectively bypassed when the lamp arc is established and serves to automatically provide a high starting voltage to re-strike the lamp arc if the arc is extinguished by a power interruption.

FLUID MECHANICS AND HEAT TRANSFER

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

A multileg heat pipe evaporator facilitates the use and application of a monogroove heat pipe by providing an evaporation section which is compact in area and structurally more compatible with certain heat exchangers or heat input apparatus. The evaporation section of a monogroove heat pipe is formed by a series of parallel legs having a liquid and a vapor channel and a communicating capillary slot therebetween. The liquid and vapor channels and interconnecting capillary slots of the evaporating section are connected to the condensing section of the heat pipe by a manifold connecting liquid and vapor channels of the parallel
Evaporation section legs with the corresponding liquid and vapor channels of the condensing section.

The coolant fluid evaporated in a compact heat absorbing panel utilizing monogroove heat pipes in a pumped two-phase system is replenished through a liquid inlet control valve under the control of an ultrasonic liquid presence detector which is connected to the panel. The detector maintains the desired liquid quantity in the panel’s liquid coolant channels, thereby dynamically responding to varying heat loads.

A new method of bonding strain gauges to base structures was found. Induction heating is used to concentrate high temperature levels in the bonding of a strain gauge to a substrate. By using new method embodiments, the adhesive curing schedules of the prior art were reduced from a matter of hours to a matter of minutes. A method is provided for installing a strain gauge device on a base. According to another aspect of the present method invention, the layer of ferric material is a thin plate of ferric material which is placed substantially adjacent to the upper surface of the strain gauge device prior to the heating of the layer of ferric material by induction heating. By utilizing the separate plate of ferric material, the present invention may be utilized to
bond strain gauges to low reluctance bases such as aluminum or to no reluctance bases such as fiberglass.

**FLUID FLOW METER FOR MEASURING THE RATE OF FLUID FLOW IN A CONDUIT Patent**


A tube fluid flow rate meter consists of a reservoir divided by flexible diaphragm into two separate isolated compartments. The incoming and outgoing tubes open into the compartments. The orifice is sized to allow maximum tube fluid flow. Opposing compression springs are secured within the two compartments on opposite sides of the orifice to maintain orifice position when the tube fluid pressure is zero. A tapered element is centered in, and extends through the orifice into the compartment, leaving an annular opening between the element and the perimeter of the orifice. The size varies as the diaphragm flexes with changes in the tube fluid pressure to change the fluid flow through the opening. The light source directs light upon the element which in turn scatters the light through the opening into the compartment. The light detector in the compartment senses the scattered light to generate a signal indicating the amount of fluid.

**SOLID SORBENT AIR SAMPLER Patent**


A fluid sampler for collecting a plurality of discrete samples over separate time intervals is described. The sampler comprises a sample assembly having an inlet and a plurality of discreet sample tubes each of which has inlet and outlet sides. A multiport dual acting valve is provided in the sampler in order to sequentially pass air from the sample inlet into the selected sample tubes. The sample tubes extend longitudinally of the housing and are located about the outer periphery thereof so that upon removal of an enclosure cover, they are readily accessible for operation of
35 INSTRUMENTATION AND PHOTOGRAPHY


PLANAR OSCILLATORY STIRRING APPARATUS Patent Application
M. F. WOLF, inventor (to NASA) (Stanford Univ., Calif.) 15 Aug. 1985 15 p
(Contract NAS8-34872)

The present invention is directed to an apparatus for stirring materials using planar orthogonal axes oscillations. The apparatus has a movable slide plate sandwiched between two fixed parallel support plates. Pressurized air is supplied to the movable slide plate which employs a tri-arm air bearing vent structure which allows the slide plate to float and to translate between the parallel support plates. The container having a material to be stirred is secured to the upper surface of the slide plate through an aperture in the upper support plate. A motor driven eccentric shaft loosely extends into a center hole bearing of the slide plate to cause the horizontal oscillations. Novelty lies in the combination of elements which exploits the discovery that low frequency, orthogonal oscillations applied horizontally to a Bridgman crucible provides a very rigorous stirring action, comparable with and more effective by an order of magnitude than the accelerated crucible rotation technique.

NASA

N86-32695*# National Aeronautics and Space Administration. Pasadenan Office, Calif.

FLUIDIC ANGULAR VELOCITY SENSOR Patent

A fluidic sensor providing a differential pressure signal proportional to the angular velocity of a rotary input is described. In one embodiment the sensor includes a fluid pump having an impeller coupled to a rotary input. A housing forming a constricting fluid flow chamber is connected to the fluid input of the pump. The housing is provided with a fluid flow restrictive input to the flow chamber and a port communicating with the interior of the flow chamber. The differential pressure signal measured across the fluid restrictive input is relatively noise free and proportional to the square of the angular velocity of the impeller. In an alternative embodiment, the flow chamber has a generally cylindrical configuration and plates having flow restrictive apertures are disposed within the chamber downstream from the housing port.
In this embodiment, the differential pressure signal is found to be approximately linear with the angular velocity of the impeller.

N86-32696* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TWO-AXIS, SELF-NULLING SKIN FRICTION BALANCE Patent
T. PING, inventor (to NASA) and F. H. SUPPLEE, JR., inventor (to NASA) 12 Aug. 1986 5 p Filed 28 Feb. 1985 Supersedes N85-21610 (23 - 12, p 1851)
Avail: US Patent and Trademark Office CSCL 14B
A skin friction force measuring device is described which is comprised of a first pivoted L shaped arm, a second arm pivoted on one end of the L shaped arm with a sensing element attached to an end of the second arm. In response to skin friction forces on the sensing element the arms are pivoted about the two pivots and two nulling means force the pivots back to their zero position. The outputs of the two nulling means are indicative of the skin friction forces along two perpendicular axes in the plane of the sensing element.

APPARATUS AND METHOD FOR INSPECTING A BEARING BALL Patent
B. F. BANKSTON, inventor (to NASA) 5 Nov. 1985 7 p Filed 09 Mar. 1983 Supersedes N83-21316 (21 - 11, p 1699)
Avail: US Patent and Trademark Office CSCL 14B
A method and apparatus for inspecting the surface of a ball bearing is disclosed which includes a base having a high friction non-abrasive base scanning surface. A holding device includes a cone-shaped cup recess in which a ball element is received. Air is introduced through a passage to relieve friction between the wall of the recess and the ball element and facilitate rolling of the ball over the high friction base surface. The holding device is moved over the base scanning surface in a predetermined pattern such that the entire surface of the ball element is inspected by an eddy current probe which detects any surface defects.

N86-32697* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SPINNING DISK CALIBRATION METHOD AND APPARATUS FOR LASER DOPPLER VELOCIMETER Patent
Avail: US Patent and Trademark Office CSCL 14B
A method and apparatus for calibrating laser Doppler velocimeters having one or more intersecting beam pairs are described. These velocimeters measure fluid velocity by observing the light scattered by particles in the fluid stream. Moving fluid particulates are simulated by fine taut wires that are radially mounted on a disk that is rotated at a known velocity. The laser beam intersection locus is first aimed at the very center of the disk and then the disk is translated so that the locus is swept by the rotating wires. The radial distance traversed is precisely measured so that the velocity of the wires (pseudo particles) may be calculated.

N86-32697* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SPINNING DISK CALIBRATION METHOD AND APPARATUS FOR LASER DOPPLER VELOCIMETER Patent
Avail: US Patent and Trademark Office CSCL 14B
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N86-32698* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TWO-AXIS, SELF-NULLING SKIN FRICTION BALANCE Patent
T. PING, inventor (to NASA) and F. H. SUPPLEE, JR., inventor (to NASA) 12 Aug. 1986 5 p Filed 28 Feb. 1985 Supersedes N85-21610 (23 - 12, p 1851)
Avail: US Patent and Trademark Office CSCL 14B
A skin friction force measuring device is described which is comprised of a first pivoted L shaped arm, a second arm pivoted on one end of the L shaped arm with a sensing element attached to an end of the second arm. In response to skin friction forces on the sensing element the arms are pivoted about the two pivots and two nulling means force the pivots back to their zero position. The outputs of the two nulling means are indicative of the skin friction forces along two perpendicular axes in the plane of the sensing element.

APPARATUS AND METHOD FOR INSPECTING A BEARING BALL Patent
B. F. BANKSTON, inventor (to NASA) 5 Nov. 1985 7 p Filed 09 Mar. 1983 Supersedes N83-21316 (21 - 11, p 1699)
Avail: US Patent and Trademark Office CSCL 14B
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N86-32699* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
SPINNING DISK CALIBRATION METHOD AND APPARATUS FOR LASER DOPPLER VELOCIMETER Patent
Avail: US Patent and Trademark Office CSCL 14B
A method and apparatus for calibrating laser Doppler velocimeters having one or more intersecting beam pairs are described. These velocimeters measure fluid velocity by observing the light scattered by particles in the fluid stream. Moving fluid particulates are simulated by fine taut wires that are radially mounted on a disk that is rotated at a known velocity. The laser beam intersection locus is first aimed at the very center of the disk and then the disk is translated so that the locus is swept by the rotating wires. The radial distance traversed is precisely measured so that the velocity of the wires (pseudo particles) may be calculated.
ULTRASONIC DEPTH GAUGE FOR LIQUIDS UNDER HIGH PRESSURE Patent Application
US-PATENT-APPL-SN-829042) Avail: NTIS HC A02/MF A01 CSCL 14B

The invention relates to an ultrasonic depth gauge for liquids under high pressure and is particularly useful in the space industry where it is necessary to use a pressurized gas to transfer a liquid from one location to another. Conventional liquid depth gauges do not have the capability to operate under extreme high pressures (i.e., exceeding 300 p.s.i.). An ultrasonic depth gauge capable of withstanding high pressure according to the present invention is comprised of a transducer assembly and a supporting electronics unit. The transducer assembly is mounted into the bottom wall of a storage vessel with its resonating surface directly exposed to the highly pressurized liquid in the vessel. In operation, the ultrasonic pulse propagates upward through the liquid to the liquid-gas interface in the storage vessel. When the ultrasonic echo returns from the liquid-gas interface, it re-excites the composite resonator into vibration. The supporting electronics unit measures the round-trip transmit time for the ultrasonic pulse and its return echo to traverse the depth of the highly pressurized liquid. The novelty of this invention resides in the use of a conventional transducer rigidly bonded to the inside wall of a bored-out conventional high-pressure plug to form a composite resonator capable of withstanding extremely high pressure.

IMPROVED FLUXGATE MAGNETOMETER Patent Application
Avail: NTIS HC A02/MF A01 CSCL 171

The invention relates to a fluxgate magnetometer type device in which the directions and relative magnitudes of the components of the Earth’s magnetic field, lying parallel to the longitudinal and to the transverse axes of the vehicle in which the device is mounted, are measured and used to calculate the heading of the vehicle with respect to magnetic north. The manner in which the components of the Earth’s magnetic field are measured and the computing process used makes the device simple, inexpensive to manufacture and easy to calibrate.
This invention relates to a laser Doppler velocimeter (LDV) that is capable of operating with a small focus diameter for analyzing fluid flows at low velocity with high spatial resolution, or with a larger focus diameter to measure fluid flows at higher velocities accurately. More particularly, it relates to such an LDV in which a simple reversal of a lens pair will allow the LDV to operate in the two focus diameter modes.

A solar pumped laser has its lasing path lengthened by forming a square loop in the lasing path by means of bending mirrors. Solar radiation is collected and concentrated into a donut shaped intensity pattern. This intensity pattern is directed onto the lasing path such that there is a maximum fit of the solar intensity pattern to the square loop laser cavity.

The invention is a five-degree of freedom adjustable mounting device for positioning an electro-optic transducer in an evacuated, cryogenic chamber. Electro-optic transducers are used in this manner as high sensitivity detectors of gas emission lines in spectroscopic analysis. The mount is made up of an adjusting mechanism and a transducer mount. This combination avoids many difficulties with prior devices by permitting the use of an internal lens and allowing independent adjustment of each degree of freedom. The transducer mount, although attached to the adjusting mechanism, is isolated thermally such that a cryogenic environment can be maintained at the transducer while the adjusting mechanism remains at room temperature. Radiation shields also are incorporated to further reduce heat flow to the transducer location. Features of this invention include the use of an internal lens and mechanizing of an adjustment device which allows for independent adjustments. An adjustment of one parameter will not affect the setting of any other parameter. This result is achieved by locating the centers of rotation of the angular adjustment at the focal point of the internal lens.

A collapsible-expandable truss structure, including first and second spaced surface truss layers having an attached core layer.
is described. The surface truss layers are composed of a plurality of linear struts arranged in multiple triangular configurations. Each linear strut is hinged at the center and hinge connected at each end to a nodular joint. A passive spring serves as the expansion force to move the folded struts from a stowed collapsed position to a deployed operative final truss configuration. A damper controls the rate of spring expansion for the synchronized deployment of the truss as the folded configuration is released for deployment by the restrain belts. The truss is synchronously extended under the control of motor driven spools.

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as weightless under both static and dynamic conditions. Positioning acceleration and velocity performance are therefore symmetrical.

OFFICIAL GAZETTE OF THE U.S. PATENT AND TRADEMARK OFFICE

Welded or brazed to both the insert and the tube. The result is a permanent repair having great structural integrity.

OFFICIAL GAZETTE OF THE U.S. PATENT AND TRADEMARK OFFICE

A method is disclosed for joining segments of the skin of an aircraft. The ends of the skin are positioned in close proximity or abutt each other. The skin is of constant thickness throughout the joint and is sandwiched between splice plates, which taper in thickness from the last to the first bolt rows in order to reduce the stiffness of the splice plate and thereby reduce the load transfer at the location where bypass loads are the highest.

OFFICIAL GAZETTE OF THE U.S. PATENT AND TRADEMARK OFFICE

A deployable M-braced truss structure, efficiently packaged into a compact stowed position and expandable to an operative position at the use site is described. The M-braced configuration effectively separates tension compression and shear in the structure and permits efficient structural design. Both diagonals and longerons telescope from an M-braced base unit and deploy either pneumatically, mechanically by springs or cables, or by powered reciprocating mechanisms. Upon full deployment, the diagonals and longerons lock into place with a simple latch mechanism.

OFFICIAL GAZETTE OF THE U.S. PATENT AND TRADEMARK OFFICE

A method of repairing a tubular assembly in which access to a defect in the tube is limited includes the steps of cutting an opening in the tube on the side opposite the defect so as to expose the defect from the inside of the tube. A tubular insert is inserted into the tube to cover the defect and is secured in place by means of brazing or welding. The remaining space between the opening and insert is closed by means of close-out patches which are welded or brazed to both the insert and the tube. The result is a permanent repair having great structural integrity.

OFFICIAL GAZETTE OF THE U.S. PATENT AND TRADEMARK OFFICE
rotation by means of a stationary ring gear and pump roller gears. An upper pressure shoe plate and a lower pressure shoe plate are positioned above sets of flexible tubing. The tubing is sandwiched between the pressure shoe plates and the pump rollers. A highly compact pump is provided having twice as many fluid channel lines as is conventional. The peristaltic pump device may be remotely operated by means of a rotary actuator which rotates a driving hub to move the shoe plates by means of eccentrically mounted links. The pressure shoe plates may be moved by the rotary actuator to a loaded position in which the fluid lines are pinched by the pump rollers and fluid is pumped to an unloaded position in which the fluid lines are maintained in an undeformed, uncrimped configuration so that no creases or crimps are set into the fluid lines during periods of prolonged nonuse.

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44 ENERGY PRODUCTION AND CONVERSION

39 STRUCTURAL MECHANICS

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


This invention relates to a fatigue testing apparatus for simultaneously subjecting a plurality of material test specimens to cyclical tension loading to determine the fatigue strength of the material. The fatigue testing apparatus includes a pulling head having cylinders defined therein which carry reciprocating pistons. The reciprocation of the pistons is determined by cyclical supplies of pressurized fluid to the cylinders. Piston rods extend from the pistons through the pulling head and are attachable to one end of test specimens, the other end of the test specimens being attachable to a fixed base, causing test specimens attached between the piston rods and the base to be subjected to cyclical tension loading. Because all of the cylinders share a common pressurized fluid supply, the breaking of a test specimen does not substantially effect the pressure of the fluid supplied to the other cylinders nor the tension applied to the other test specimens.


In a turbine machine, a two component shroud seal which maximizes insulation and sealing around the rotating turbine blades and made by independently fabricating each of the two components then joining them together is disclosed. The two components may be joined together at room temperature. The resulting shroud seal provides greater engine efficiency and thrust.
chemical recombination of oxygen and hydrogen in areas or sites remote from the hydrogen electrodes. In the metal-hydrogen cell, a plurality of electrical cell units are placed in a back to back relationship. The cells may be lined with a wick, having one or more catalyzed sites on the inner surface of the cell. Separators disposed between the respective metal and hydrogen electrodes of each cell unit are provided with gas directing notches around their peripheries to facilitate the desired movement of gasses within the metal-hydrogen cell. Any two metal electrodes separated by a gas screen are provided with gas tight sealing means between the electrodes at each aperture. The sealing means may be a ring of rubber or elastomeric material which is somewhat compressible but nonreactive with other materials in the cell.

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LITHIUM COUNTERDOPED SILICON SOLAR CELL Patent

The resistance to radiation damage of an n(+)p boron doped silicon solar cell is improved by lithium counterdoping. Even though lithium is an n-dopant in silicon, the lithium is introduced in small enough quantities so that the cell base remains p-type. The lithium is introduced into the solar cell wafer by implantation of lithium ions whose energy is about 50 keV. After this lithium implantation, the wafer is annealed in a nitrogen atmosphere at 375 C for two hours. Official Gazette of the U.S. Patent and Trademark Office
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

N86-28618
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

TORSO SIZING RING CONSTRUCTION FOR HARD SPACE SUIT Patent


Official Gazette of the U.S. Patent and Trademark Office

A hard suit for use in space or diving applications having an adjustable length torso covering that will fit a large variety of wearers is described. The torso covering comprises an upper section and a lower section which interconnect so that the covering will fit wearers with short torsos. One or more sizing rings may be inserted between the upper and lower sections to accommodate larger torso sizes as required. Since access of the astronaut to the torso covering is preferably through an opening in the back of the upper section (which is closed off by the backpack), the rings slant upward-forward from the lower edge of the opening. The lower edge of the upper covering section has a coupler which slants upward-forward from the lower edge of the back opening. The lower torso section has a similarly slanted coupler which may interfit with the upper section coupler to accommodate the smallest torso size. One or more sizing rings may be inserted between the coupler sections of the upper and lower torso sections to accommodate larger torsos. Each ring has an upper coupler which may interfit with the upper section coupler and a lower coupler which may interfit with the lower section coupler.

N86-28620
National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

SHOULDER AND HIP JOINT FOR HARD SPACE SUITS Patent


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Shoulder and hip joints for hard space suits are disclosed which are comprised of three serially connected truncated spherical sections, the ends of which converge. Ball bearings between the sections permit relative rotation. The proximal end of the first section is connected to the torso covering by a ball bearing and the distal end of the outermost section is connected to the elbow or thigh covering by a ball bearing. The sections are equi-angular and this alleviates lockup, the condition where the distal end of the joint leaves the plane in which the user is attempting to flex. The axes of rotation of the ball bearings and the bearing mid planes are arranged to intersect in a particular manner that provides the joint with a minimum envelope. In one embodiment, the races of the bearing between the innermost section and the second section are...
is partially within the inner race of the bearing between the torso and the innermost spherical section further to reduce bulk.

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SHOULDER AND HIP JOINTS FOR HARD SPACE SUITS AND THE LIKE Patent


For use in hard space suits and the like, a joint between the torso covering and the upper arm covering (i.e., shoulder) or between the torso covering and upper leg covering (i.e., hip) is disclosed. Each joint has an outer covering and an inner covering. The outer covering has plural preferably truncated toroidal sections decreasing in size proceeding outwardly. In one embodiment at each joint there are two bearings, the first larger than the second. The outer race of the larger bearing is attached to the outer edge of the smaller end of each section and the inner race of the larger bearing is attached to the end wall. The inner race of the smaller bearing is attached to the end wall. The outer race of the smaller bearing is attached to the larger end of the next section. Each bearing has appropriate seals. Between each section is a rubber ring for the comfort of the wearer. Such rubber rings have radial flanges attached to the inner races of adjacent bearings. Matching semicircular grooves are formed in the abutting overlapping surfaces. Bellows-like inner walls are also provided for each section fixed at one end to an inner cylindrical flange and, at the opposite end, to an end wall. Each outer section may rotate 360 deg relative to the next outer section, whereas the bellows sections do not rotate, but rather expand or contract locally as the rigid sections rotate relative to each other.

Official Gazette of the U.S. Patent and Trademark Office

A pipelined image processor selectively interconnects modules in a column of a two dimensional array to modules of the next column of the array of modules, 1, through M, where M is the number of modules in one dimension and N is the number of modules in the other direction. Each module includes two input selectors for A and B inputs, two convolvers, a binary function operator, a neighborhood comparison operator which produces an A output and an output selector which may select as a B output the output of any one of the components in the module, including the A output of the neighborhood comparison operator. Each module may be connected to as many as eight modules in the next column, preferably with the majority always in a different row that is up (or down) in the array for a generally spiral data path around the torus thus formed. The binary function operator is implemented as a look-up table addressed by the most significant 8 bits of each 12-bit argument. The table output includes a function value and the slopes for interpolation of the two arguments by multiplying the 4 least significant bits in multipliers and adding the products to the function value through adders.

NASA
Digital values in a moving window are compared by an operator having nine comparators connected to line buffers for receiving a succession of central pixels together with eight neighborhood pixels. A single bit of program control determines whether the neighborhood pixels are to be compared with the central pixel or a threshold value. The central pixel is always compared with the threshold. The comparator output plus 2 bits indicating odd-even pixel/line information about the central pixel addresses a lookup table to provide 14 bits of information, including 2 bits which control a selector to pass either the central pixel value, the other 12 bits of table information, or the bit-wise logical OR of all nine pixels through circuit that implements a very wide OR gate.
its ground state via a pressurized cylinder and an adjustable leak valve into a cryogenically cooled detection area. The ground state of xenon is double photon excited to a particularized level of the Rydberg series by a resonance lamp and a laser. The doubly excited gas is then further excited by the radiation to be measured. A field ionization and an ion measurement indicative of the radiation intensity is achieved.

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An integrating sphere comprised of a uniform difusely reflecting spherical cavity, having mutually transverse input and output ports, and a linear sample transport mechanism is described. The sample transport mechanism is secured so that the multiple samples can be brought into registration with the input port, one at a time, without having to open or disassemble the apparatus when a change of sample is desired. A vacuum tight seal is provided between the cavity and the transport mechanism. This maintains the integrity of a vacuum generated with the sphere when attached to the source of optical energy. The device is utilized to test emissive characteristics such as the relative fluorescence quantum efficiency of a dye sample placed in the path of a monochromatic optical energy source coupled to the input port while having a light detector coupled to the output port.

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An apparatus for detecting multiple spectral bands, individually or concurrently, using linear detector arrays is described. The system employs a beamsplitter to divide the optical source into two or more optical beams which are directed at the linear detector arrays. Filter trays are positioned in the focal planes of the optical beams so that the beams pass through the filter trays prior to impinging upon the detector arrays. Multiple filters are placed on the filter trays. Linear actuators positioned adjacent the filter trays translate the trays across the focal planes of the optical beams so that individual filters are positioned in the path of beams such that those frequencies of the beams that fall within the spectral ranges of the individual bandpass filter through which it passes
may be detected by the detector arrays for further examination
and analysis.

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OPTICAL DISTANCE MEASURING INSTRUMENT

J. E. ABSHIRE, inventor (to NASA) 15 Jul. 1986 10 p Filed
10 Aug. 1982 Supersedes N83-13982 (21 - 04, p 600)
(NASA-CASE-GSC-12781-1; US-PATENT-4,600,299;
US-PATENT-APPL-SN-406820; US-PATENT-CLASS-356-5,
Office CSCL 20F

An optical instrument, such as a stability monitor or a target
range finder, uses an unstabilized laser to project a composite
optical signal of coherent light having two naturally occurring
longitudinal mode components. A beamsplitter divides the signal
into a reference beam which is directed toward one photodetector
and a transmitted beam which illuminates and is reflected from a
distant target onto a second photodetector optically isolated from
the first Photodetector. Both photodetectors are operated on the
square law principle to provide electrical signals modulated at a
frequency equal to the separation between the frequencies of the
two longitudinal mode components of the optical signal projected
by the laser. Slight movement of the target may be detected and
measured by electrically monitoring the phase difference between
the two signals provided by the photodetectors and the range of
the target measured with the aid of a microprocessor by changing
the separation between the longitudinal modes by shifting the length
of the resonator cavity in an iterative series of increments.

Official Gazette of the U.S. Patent and Trademark Office

PHOTODETECTOR ARRAY WITH IMAGE PLANE PROCESSING

Patent Application

D. J. JOBSON, inventor (to NASA) 16 Jul. 1986 11 p
(NASA-CASE-LAR-13391-1; US-PATENT-APPL-SN-886133;
NAS 1.71:LAR-13391-1) Avail: NTIS HC A02/MF A01 CSCL 20F

An apparatus is provided for merging image detection provided
by an array of photodetector elements and local neighborhood
processing of the outputs of photodetector elements which is useful
in applications requiring high speed extraction of meaningful
information from raw detector signals. The apparatus combines
relatively large photodetector elements with small electronic
processing elements located between the photodetector elements
on the same chip. The close proximity of the photodetector and
signal processing elements increases the speed of information
acquisition and minimizes undesirable signal noise.

NASA

COMPENSATION FOR PRIMARY REFLECTOR WAVEFRONT
ERROR Patent Application

A. B. MEINEL, inventor (to NASA), M. P. MEINEL, inventor (to
NASA), and J. E. STACY, inventor (to NASA) 29 May 1986 16
P (Contract NAS7-918)
(NASA-CASE-NPO-16869-1CU; US-PATENT-APPL-SN-867986;
NAS 1.71:NPO-16869) Avail: NTIS HC A02/MF A01 CSCL
20F

The object of the invention is to compensate for errors in a
large telescope primary reflector by making certain compensating
deviations in a smaller, auxiliary reflector of the telescope. At
least one intermediate element forms an image of the primary
surface onto the secondary surface, so each point on the secondary
surface corresponds to a point on the primary surface. The
secondary surface is formed with a deviation from an ideal
secondary surface, with the piston distance of each point on the
actual secondary surface equal to the piston distance of a
corresponding piston on the actual primary surface from the ideal
primary surface. It is found that this results in electromagnetic
(e.g., light) rays which strike a deviating area of the actual primary
surface being brought to the same focus as if the actual primary
surface did not have a deviation from an ideal primary surface.

NASA
Includes superconductivity.

METHOD OF MEASURING FIELD FUNNELING AND RANGE STRAGGLING IN SEMICONDUCTOR CHARGE-COLLECTING JUNCTIONS Patent Application
J. A. ZOUTENDYK, inventor (to NASA) 27 Nov. 1985 19 p
(Contract NAS7-918)
(NASA-CASE-NPO-16584-1-CU; NAS 1.71:NPO-16584-1-CU;
US-PATENT-APPL-SN-802769) Avail: NTIS HC A02/MF A01
CSCl 20L

Electric-field funneling length is measured while irradiating a semiconductor charge-collecting junction with electron-hole-pair generating charged particles at a first junction bias voltage. The bias voltage is then reduced to a second level in order to reduce the depth of the depletion region such that the total charge can no longer be collected by drift and measured in the energy band previously displayed in the multichannel analyzer. This is representative of the maximum electric field funneling length which may be calculated by measuring the difference at the second bias voltage level of the depletion width and the ion penetration range. The bias voltage is further lowered to a third level at which the particles are collected over a spread of energy levels while at least some of the particles are still collected at the selected energy level. From this the different depths of penetration of the particles are determined while additional effects due to diffusion are minimized.

METHOD OF MAKING MACROCRYSTALLINE OR SINGLE CRYSTAL SEMICONDUCTOR MATERIAL Patent
P. J. SHLICHTA, inventor (to NASA) and R. J. HOLLIDAY, inventor (to NASA) 24 Jun. 1986 4 p
Filed 10 Feb. 1983 Supersedes N83-21993 (21 - 11, p 1796)
Avail: US Patent and Trademark Office CSCl 058

A macrocrystalline or single crystal semiconductive material is formed from a primary substrate including a single crystal or several very large crystals of a relatively low melting material. This primary substrate is deposited on a base such as steel or ceramic, and it may be formed from such metals as zinc, cadmium, germanium, aluminum, tin, lead, copper, brass, magnesium silicide, or magnesium stannide. These materials generally have a melting point below about 1000 C and form on the base crystals the size of fingernails or greater. The primary substrate has an epitaxial relationship with a subsequently applied layer of material, and because of this epitaxial relationship, the material deposited on the primary substrate will have essentially the same crystal size as the crystals in the primary substrate. If required, successive layers are formed, each of a material which has an epitaxial relationship with the previously deposited layer, until a layer is formed which has an epitaxial relationship with the semiconductive material. This layer is referred to as the epitaxial substrate, and it serves as a site for the growth of large crystals of semiconductive material. The primary substrate is passivated to remove or otherwise convert it into a stable or nonreactive state prior to deposition of the secondcrude material.

A Braille reading system wherein the display of characters is controlled by moving a position sensor is developed. A text recorded on a cassette tape is removed by a cassette player under the control of loading logic. The logic controls the cassette player to remove one or two pages of the text at a time. The removed text is stored in buffer memory. One character at a time is retrieved from memory and received by solenoid drivers. These drivers control a series of solenoids and pins to present a standard Braille representation of the character selected. The Braille display is mounted on a mouse which may be manually moved by the operator. When the mouse is moved, an optical pickoff determines the amount of movement of the mouse and forwards signals to an up down counter to record its position. When the mouse is moved a predetermined distance, the character to be displayed is changed to the next character in the text.
PUBLIC AVAILABILITY OF COPIES OF PATENTS AND PATENT APPLICATIONS

Copies of U.S. patents may be purchased directly from the U.S. Patent and Trademark Office, Washington, D.C. 20231 at $1.50 per copy. When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the Patent and Trademark Office.

NASA patent application specifications are sold in paper copy by the National Technical Information Service at price code A02. Microfiche are sold at price code A01. The US-Patent-Appl-SN-number should be used in ordering either paper copy or microfiche from NTIS.

LICENSES FOR COMMERCIAL USE:
INQUIRIES AND APPLICATIONS FOR LICENSE

NASA inventions, abstracted in NASA PAB, are available for nonexclusive or exclusive licensing in accordance with the NASA Patent Licensing Regulations. It is significant that all licenses for NASA inventions shall be by express written instruments and that no license will be granted or implied in a NASA invention except as provided in the NASA Patent Licensing Regulations.

Inquiries concerning the NASA Patent Licensing Program or the availability of licenses for the commercial use of NASA-owned inventions covered by U.S. patents or pending applications for patent should be forwarded to the NASA Patent Counsel of the NASA installation having cognizance of the specific invention, or the Associate General Counsel for Intellectual Property, Code GP, National Aeronautics and Space Administration, Washington, D.C. 20546. Inquiries should refer to the NASA Case Number, the Title of the Invention, and the U.S. Patent Number or the U.S. Application Serial Number assigned to the invention as shown in NASA PAB.

The NASA Patent Counsel having cognizance of the invention is determined by the first three letters or prefix of the NASA Case Number assigned to the invention. The addresses of NASA Patent Counsels are listed alongside the NASA Case Number prefix letters in the following table.

STANDING ORDER SUBSCRIPTIONS

NASA SP-7039, Section 1 and its supplements are available from the National Technical Information Service (NTIS) on standing order subscription as PB 86-911100 at the price of $11.50 domestic and $23.00 foreign. Standing order subscriptions do not terminate at the end of a year, as do regular subscriptions, but continue indefinitely unless specifically terminated by the subscriber.
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**PATENT LICENSING REGULATIONS**

**NATIONAL AERONAUTICS AND SPACE ADMINISTRATION**

14 CFR Part 1245

**Licensing of NASA Inventions**

**AGENCY:** National Aeronautics and Space Administration.

**ACTION:** Interim regulation with comments requested.

**SUMMARY:** The National Aeronautics and Space Administration (NASA) is revising its patent licensing regulations to conform with Pub. L. 96-517. This interim regulation provides policies and procedures applicable to the licensing of federally owned inventions in the custody of the National Aeronautics and Space Administration, and implements Pub. L. 96-517. The object of this subpart is to use the patent system to promote the utilization of inventions arising from NASA supported research and development.

**EFFECTIVE DATE:** July 1, 1981. Comments must be received in writing by December 2, 1981. Unless a notice is published in the Federal Register after the comment period indicating changes to be made, this interim regulation shall become a final regulation.

**ADDRESS:** Mr. John G. Mannix, Director of Patent Licensing, GP-4, NASA, Washington, D.C. 20546.

**FOR FURTHER INFORMATION CONTACT:** Mr. John G. Mannix, (202) 755-3954.

**SUPPLEMENTARY INFORMATION:**

**PART 1245—PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS**

Subpart 2 of Part 1245 is revised to read as follows:

- - - - -

Subpart 2—Licensing of NASA Inventions

Sec. 1245.200 Scope of subpart.

1245.201 Policy and objective.

1245.202 Definitions.

1245.203 Authority to license.

Restrictions and Conditions

1245.204 All licenses granted under this subpart.

Types of Licenses

1245.205 Nonexclusive licenses.

1245.206 Exclusive and partially exclusive licenses.

Procedures

1245.207 Application for a license.

1245.208 Processing applications.

1245.209 Notice to Attorney General.

1245.210 Modification and termination of licenses.

1245.211 Appeals.

1245.212 Protection and administration of inventions.

1245.213 Transfer of custody.

1245.214 Confidentiality of information.

**Authority:** 35 U.S.C. Section 207 and 208, 9 Stat. 3023 and 3024.

**Subpart 2—Licensing of NASA Inventions**

§ 1245.200 Scope of subpart.

This subpart prescribes the terms, conditions, and procedures upon which a NASA invention may be licensed. It does not affect licenses which (a) were in effect prior to July 1, 1981; (b) may exist at the time of the Government's acquisition of title to the invention, including those resulting from the allocation of rights to inventions made under Government research and development contracts; (c) are the result of an authorized exchange of rights in the settlement of patent disputes; or (d) are otherwise authorized by law or treaty.

§ 1245.201 Policy and objective.

It is the policy and objective of this subpart to use the patent system to promote the utilization of inventions arising from NASA supported research and development.

§ 1245.202 Definitions.

(a) "Federally owned invention" means an invention, plant, or design which is covered by a patent, or patent application in the United States, or a patent, patent application, plant variety protection, or other form of protection, in a foreign country, title to which has been assigned to or otherwise vested in the United States Government.

(b) "Federal agency" means an executive department, military department, Government corporation, or independent establishment, except the Tennessee Valley Authority, which has custody of a Federally owned invention.

(c) "NASA Invention" means a Federally owned invention with respect to which NASA maintains custody and administration, in whole or in part, of the right, title, or interest in such invention on behalf of the United States Government.

(d) "Small business firm" means a small business concern as defined at section 2 of Pub. L. 85-536 (15 U.S.C. 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of these regulations, the size standard for small business concerns involved in Government procurement, contained in 13 C.F.R. 121.3 and in subcontracting, contained in 13 C.F.R. 121.3-12, will be used.

[...]

[...]
PATENT LICENSING REGULATIONS

(4) The license may provide the licensor the right to grant sublicenses under the license subject to the approval of NASA. Each sublicense shall make reference to the license, including the rights retained by the Government, and a copy of such sublicense shall be furnished to NASA.

(5) The license shall require the licensor to carry out the plan for development or marketing of the invention, or both, to bring the invention to practical application within a period specified in the license, and to continue to make the benefits of the invention reasonably accessible to the public.

(6) The license shall require the licensee to report periodically on the utilization or efforts at obtaining utilization that are being made by the licensee, with particular reference to the plan submitted.

(7) All licenses shall normally require royalties or other consideration.

(8) Where an agreement is obtained pursuant to § 1245.204(a)(5) that any products embodying the invention or produced through use of the invention will be manufactured substantially in the United States, the license shall recite such agreement.

(9) The license shall provide for the right of NASA to terminate the license, in whole or in part, if:

(i) NASA determines that the licensee is not executing the plan submitted with its request for a license and the licensee cannot otherwise demonstrate to the satisfaction of NASA that it has taken or can be expected to take within a reasonable time effective steps to achieve practical application of the invention:

(ii) NASA determines that such action is necessary to meet requirements for public use specified by Federal regulations issued after the date of the license and such requirements are not reasonably satisfied by the licensee;

(iii) The licensee has willfully made a false statement of or willfully omitted a material fact in the license application or in any report required by the license agreement:

(iv) The licensee commits a substantial breach of a covenant or agreement contained in the license.

(10) The license may be modified or terminated, consistent with this subpart, upon mutual agreement of NASA and the licensee.

(11) Nothing relating to the grant of a license, nor the grant itself, shall be construed to confer upon any person any immunity from or defenses under the antitrust laws or from a charge of patent misuse, and the acquisition and use of rights pursuant to this subpart shall not be immunized from the operation of state or Federal law by reason of the source of the grant.

Types of Licenses

§ 1245.205 Nonexclusive licenses.

(a) Availability of licenses. Nonexclusive licenses may be granted under NASA inventions without publication of availability or notice of a prospective license.

(b) Conditions. In addition to the provisions of § 1245.204, the nonexclusive license may also provide that, after termination of a period specified in the license agreement, NASA may restrict the license to the fields of use or geographic areas, or both, in which the licensee has brought the invention to practical application and continues to make the benefits of the invention reasonably accessible to the public. However, such restriction shall be made only in order to grant an exclusive or partially exclusive license in accordance with this subpart.

§ 1245.206 Exclusive and partially exclusive licenses.

(a) Domestic licenses. (1) Availability of licenses. Exclusive or partially exclusive licenses may be granted on NASA inventions if the desired practical application will tend substantially to lessen competition or otherwise promote the invention's utilization by the public; and

(ii) The desired practical application has not been achieved, or is not likely expeditiously to be achieved, under any nonexclusive license which has been granted, or which may be granted, on the invention;

(2) Exclusive or partially exclusive licensing is a reasonable and necessary incentive to call forth the investment of risk capital and expenditures to bring the invention to practical application or otherwise promote the invention's utilization by the public; and

(3) The proposed terms and scope of exclusivity are not greater than reasonably necessary to provide the incentive for bringing the invention to practical application or otherwise promote the invention's utilization by the public;

(C) NASA has not determined that the grant of such license will tend substantially to lessen competition or otherwise promote the invention's utilization by the public;

(D) NASA has given first preference to any small business firms submitting plans that are determined by the agency to be within the capabilities of the firms and as equally likely, if executed, to bring the invention to practical application as any plans submitted by applicants that are not small business firms.

(2) Conditions. In addition to the provisions of § 1245.204, the following terms and conditions apply to domestic exclusive and partially exclusive licenses:

(i) The license shall be subject to the irrevocable, royalty-free right of the Government of the United States to practice and have practiced the invention on behalf of the United States and on behalf of any foreign government or international organization pursuant to any existing or future treaty or agreement with the United States.

(ii) The license shall reserve to NASA the right to require the licensee to grant sublicenses to responsible applicants, on reasonable terms, when necessary to fulfill health or safety needs.

(iii) The license shall be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iv) The license may grant the licensee the right of enforcement of the licensed patent pursuant to the provisions of Chapter 29 of Title 35, United States Code, or other statutes, as determined appropriate in the public interest.

(b) Foreign licenses.

(1) Availability of licenses. Exclusive or partially exclusive licenses may be granted on a NASA invention covered by a foreign patent, patent application, or other form of protection, provided that:

(i) Notice of a prospective license,
PATENT LICENSING REGULATIONS

identifying the invention and business, identifying products or services which the applicant has successfully commercialized, and approximate number of applicant's employees;
(f) Source of information concerning the availability of a license on the invention;
(g) A statement indicating whether applicant is a small business firm as defined in § 1245.202(c);
(h) A detailed description of applicant's plan for development or marketing of the invention, or both, which should include:
(1) A statement of the time, nature and amount of anticipated investment of capital and other resources which applicant believes will be required to bring the invention to practical application;
(2) A statement as to applicant's capability and intention to fulfill the plan, including information regarding manufacturing, marketing, financial, and technical resources;
(3) A statement of the fields of use for which applicant intends to practice the invention; and
(4) A statement of the geographic areas in which applicant intends to manufacture any products embodying the invention and geographic areas where applicant intends to use or sell the invention, or both;
(i) Identification of licenses previously granted to applicant under Federally owned inventions;
(j) A statement containing applicant's best knowledge of the extent to which the invention is being practiced by private industry or Government, or both, or is otherwise available commercially; and
(k) Any other information which applicant believes will support a determination to grant the license to applicant.

§ 1245.206 Processing applications.
(a) Applications for licenses will be initially reviewed by the Patent Counsel of the NASA installation having responsibility for the invention. The Patent Counsel shall make a preliminary recommendation to the Director of Licensing, NASA Headquarters, whether to: (1) grant the license as requested, (2) grant the license with modification after negotiation with the licensee, or (3) deny the license. The Director of Licensing shall review the preliminary recommendation of the Patent Counsel and make a final recommendation to the NASA Assistant General Counsel for Patent Matters. Such review and final recommendation may include, and be based on, any additional information obtained from applicant and other sources that the Patent Counsel and the Director of Licensing deem relevant to the license requested. The determination to grant or deny the license shall be made by the Assistant General Counsel for Patent Matters based on the final recommendation of the Director of Licensing.
(b) When notice of a prospective exclusive or partially exclusive license is published in the Federal Register in accordance with § 1245.206(a)(1)(ii)(A) or § 1245.206(b)(1)(i), any written objections received in response thereto will be considered by the Director of Licensing in making the final recommendation to the Assistant General Counsel for Patent Matters.
(c) If the requested license, including any negotiated modifications, is denied by the Assistant General Counsel for Patent Matters, the applicant may request reconsideration by filing a written request for reconsideration within 30 days after receiving notice of denial. This 30-day period may be extended for good cause.
(d) In addition to, or in lieu of, requesting reconsideration, the applicant may also appeal the denial of the license in accordance with § 1245.211.
§ 1245.209 Notice to Attorney General.
A copy of the notice provided for in §§ 1245.206(a)(1)(ii)(A) and 1245.206(b)(1)(i) will be sent to the Attorney General.
§ 1245.210 Modification and termination of licenses.
Before modifying or terminating a license, other than by mutual agreement, NASA shall furnish the licensee and any sublicenses of record a written notice of intention to modify or terminate the license, and the licensee and any sublicensee shall be allowed 30 days after such notice to remedy any breach of the license or show cause why the license should not be modified or terminated.
§ 1245.211 Appeals.
(a) The following parties may appeal to the NASA Administrator or designee any decision or determination concerning the grant, denial, interpretation, modification, or termination of a license:
(1) A person whose application for a license has been denied;
(2) A licensee whose license has been modified or terminated, in whole or in part; or
(3) A person who timely filed a written objection in response to the notice required by (a) or (b) of
§ 1245.206(a)(1)(ii)(A) or
PATENT LICENSING REGULATIONS

1245.209(b)(1)(i) and who can demonstrate to the satisfaction of NASA that such person may be damaged by the Agency action.

(b) Written notice of appeal must be filed within 30 days (or such other time as may be authorized for good cause shown) after receiving notice of the adverse decision or determination; including, an adverse decision following the request for reconsideration under § 1245.208(c). The notice of appeal, along with all supporting documentation should be addressed to the Administrator, National Aeronautics and Space Administration, Washington, DC 20546. Should the appeal raise a genuine dispute over material facts, fact-finding will be conducted by the NASA Inventions and Contributions Board. The person filing the appeal shall be afforded an opportunity to be heard and to offer evidence in support of the appeal. The Chairperson of the Inventions and Contributions Board shall prepare written findings of fact and transmit them to the Administrator or designee. The decision on the appeal shall be made by the NASA Administrator or designee. There is no further right of administrative appeal from the decision of the Administrator or designee.

§ 1245.212 Protection and administration of inventions.

NASA may take any suitable and necessary steps to protect and administer rights to NASA inventions, either directly or through contract.

§ 1245.213 Transfer of custody.

NASA having custody of certain Federally owned inventions may transfer custody and administration in whole or in part, to another Federal agency, of the right, title, or interest in any such invention.

§ 1245.214 Confidentiality of information.

Title 35, United States Code, section 209, provides that any plan submitted pursuant to § 1245.207(h) and any report required by § 1245.204(b)(6) may be treated by NASA as commercial and financial information obtained from a person and privileged and confidential and not subject to disclosure under section 552 of Title 5 of the United States Code.

James M. Beggs,
Administrator.
October 15, 1981.
Abstracts are provided for 105 patents and patent applications entered into the NASA scientific and technical information system during the period July 1986 through December 1986. Each entry consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or patent application.