NASA SP-7039(27)
Section 1
Abstracts

NASA
PATENT
ABSTRACTS
BIBLIOGRAPHY

A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

JULY 1985

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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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 January 1985 and June 1985.
This supplement is available as NASA SP-7039(27) SEC 1 from the National Technical Information Service (NTIS), Springfield, Virginia 22161. For information regarding the purchase price (which is subject to change), please write or call NTIS at (703) 487-4650
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 92 citations published in this issue of the Abstract Section cover the period January 1985 through June 1985. The Index Section references over 4300 citations covering the period May 1969 through June 1985.

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 in the citation of the abstract are depicted in the Typical Citation and Abstract reproduced on the following page and are also used in the indexes.
An aircraft system for increasing the lift drag ratio over a broad range of operating conditions is described. The system positions the engines and nacelles over the wing in such a position that gains in propeller efficiency is achieved simultaneously with increases in wing lift and a reduction in wing drag. Adverse structural and torsional effects on the wings are avoided by fuselage mounted pylons which attach to the upper portion of the fuselage aft of the wings. Similarly, pylon wing interference is eliminated by moving the pylons to the fuselage. Further gains are achieved by locating the pylon surface area aft of the aircraft center of gravity, thereby augmenting both directional and longitudinal stability. This augmentation has the further effect of reducing the size, weight and drag of empennage components. The combination of design changes results in improved cruise performance and increased climb performance while reducing fuel consumption and drag and weight penalties.
INDEX SECTION (SECTION 2)

The Index Section is divided into five indexes which are cross-indexed and are useful in locating a single invention or groups of inventions.

Each of the five indexes utilizes basic data elements: (1) Subject Category Number, (2) NASA Accession Number, and (3) NASA Case Number, in addition to other specific index terms.

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

**Accession Number Index**: Lists all inventions in order of ascending NASA 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 when using 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.
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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.

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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 Assistant General Counsel for Patent Matters, 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.
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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 C. Mannix, Director of Patent Licensing, CP-4, NASA, Washington, D.C. 20546

FOR FURTHER INFORMATION CONTACT: Mr. John C. Mannix, (202) 755-3854

SUPPLEMENTARY INFORMATION:

PART 1245—PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS

Subpart 2—Licensing of NASA Inventions

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

§ 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 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, patent application, or 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 121.3-8, and in subcontracting, contained in 13 C.F.R 121.3-12, will be used.
(e) "Practical application" means to manufacture in the case of a process or method, to practice in the case of a process or method, or to operate in the case of a machine or system, and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are to the extent permitted by law or Government regulations available to the public on reasonable terms.

(f) "United States" means the United States of America, its territories and possessions, the District of Columbia, and the Commonwealth of Puerto Rico.

§ 1245.203 Authority to grant licenses.
NASA inventions shall be made available for licensing as deemed appropriate in the public interest. NASA may grant nonexclusive, partially exclusive, or exclusive licenses thereto under this subpart on inventions in its custody.

Restrictions and Conditions

§ 1245.204 All licenses granted under this subpart:
(a) Restrictions (1) A license may be granted only if the applicant has supplied NASA with a satisfactory plan for development or marketing of the invention, or both, and with information about the applicant's capability to fulfill the plan.
(2) A license granting rights to use or sell under a NASA invention in the United States shall normally be granted only to a licensee who agrees that any products embodying the invention or produced through the use of the invention will be manufactured substantially in the United States.
(b) Conditions Licenses shall contain such terms and conditions as NASA determines are appropriate for the protection of the interests of the Federal Government and the public and are not in conflict with law or this subpart. The following terms and conditions apply to any license:
(1) The duration of the license shall be for a period specified in the license agreement, unless sooner terminated in accordance with this subpart.
(2) The license may be granted for all or less than all fields of use of the invention or in specified geographical areas or both.
(3) The license may extend to subsidiaries of the licensee or other parties if provided for in the license but shall be nonassignable without approval of NASA, except to the successor of that part of the licensee's business to which the invention pertains.
(4) The license may provide the licensee 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
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 licensee.

(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: (i) 3 months after notice of the invention's availability has been announced in the Federal Register, or (ii) without such notice where NASA determines that expeditious granting of such a license will best serve the interests of the Federal Government and the public; and (iii) in either situation, specified in § 1245.204(a)(1) or (ii) of this section only if:
(A) Notice of a prospective license, identifying the invention and the prospective licensee, has been published in the Federal Register, providing opportunity for filing written objections within a 60-day period,
(B) After expiration of the period in § 1245.206(a)(1)(i)(A) and consideration of any written objections received during the period, NASA has determined that:
(J) The interests of the Federal Government and the public will best be served by the proposed license, in view of the applicant's intentions, plans, and ability to bring the invention to practical application or otherwise promote the invention's utilization by the public;
(2) 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;
(3) 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
(4) 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 result in undue concentration in any section of the country in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with the antitrust laws; and

(D) NASA has given first preference to 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, identifying the invention and the prospective licensee, has been published in the Federal Register, providing opportunity for filing written objections...
within a 60-day period and following consideration of such objections;

(ii) NASA has considered whether the interests of the Federal Government or United States industry in foreign commerce will be enhanced, and

(iii) NASA has not determined that the grant of such license will tend substantially to lessen competition or result in undue concentration in any section of the United States in any line of commerce to which the technology to be licensed relates, or to create or maintain other situations inconsistent with antitrust laws.

(2) Conditions. In addition to the provisions of §1245.204, the following terms and conditions apply to foreign 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 be subject to any licenses in force at the time of the grant of the exclusive or partially exclusive license.

(iii) The license may grant the licensee the right to take any suitable and necessary actions to protect the licensed property, on behalf of the Federal Government.

(c) Record of determinations. NASA shall maintain a record of determinations to grant exclusive or partially exclusive licenses.

(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;

(5) Identification of licenses previously granted to applicant under Federally owned inventions;

(6) A statement containing applicant's best knowledge of the extent to which the invention is being practiced by the 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)(iii)(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.

§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 §§1245.208(a)(1)(iii)(A) or...
1245.206(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.
# 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 Aeronautics

### 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 N.A.
Includes passenger and cargo air transport operations, and aircraft accidents
For related information see also 16 Space Transportation and 85 Urban Technology and Transportation

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

### 05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 1
Includes aircraft simulation technology
For related information see also 18 Spacecraft Design, Testing and Performance and 39 Structural Mechanics.

### 06 AIRCRAFT INSTRUMENTATION N.A.
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) 2
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 3
Includes boosters, manned orbital laboratories, reusable vehicles, and space stations

### 16 SPACE TRANSPORTATION N.A.
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 N.A.
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 3
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

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XIII
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) N.A.
Includes biochemistry and organic chemistry

24 COMPOSITE MATERIALS 4
Includes laminates

25 INORGANIC AND PHYSICAL CHEMISTRY 4
Includes chemical analysis, e.g., chromatography, combustion theory, electrochemistry, and photochemistry
For related information see also 77 Thermodynamics and Statistical Physics

26 METALLIC MATERIALS 5
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion, and metallurgy

27 NONMETALLIC MATERIALS 6
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials

28 PROPELLANTS AND FUELS N.A.
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) 10
Includes vacuum technology, control engineering, display engineering, and cryogenics

32 COMMUNICATIONS 12
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 13
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 15
Includes boundary layers, hydrodynamics, fluidics, mass transfer and ablation cooling
For related information see also 02 Aerodynamics and 77 Thermodynamics and Statistical Physics

35 INSTRUMENTATION AND PHOTOGRAPHY 16
Includes remote sensors, measuring instruments and gages, detectors, cameras and photographic supplies, and holography
For related information see also 06 Aircraft Instrumentation and 19 Spacecraft Instrumentation

36 LASERS AND MASERS 19
Includes parametric amplifiers

37 MECHANICAL ENGINEERING 20
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 N.A.
Includes structural element design and weight analysis, fatigue, and thermal stress
For applications see 05 Aircraft Design, Testing and Performance and 18 Spacecraft Design, Testing and Performance

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 22
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 23
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 24
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

xv
LIFE SCIENCES
Includes sciences (general), aerospace medicine, behavioral sciences, man/system technology and life support, and planetary biology

51 LIFE SCIENCES (GENERAL) N.A.
Includes genetics.

52 AEROSPACE MEDICINE 24
Includes physiological factors, biological effects of radiation, and weightlessness

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

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 25
Includes human engineering, biotechnology, and space suits and protective clothing

55 PLANETARY BIOLOGY N.A.
Includes exobiology, and extraterrestrial life

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

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

60 COMPUTER OPERATIONS AND HARDWARE 26
Includes computer graphics and data processing
For components see 33 Electronics and Electrical Engineering

61 COMPUTER PROGRAMMING AND SOFTWARE N.A.
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS N.A.
Includes computer networks.

63 CYBERNETICS N.A.
Includes feedback and control theory
For related information see also 54 Man/System Technology and Life Support

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

65 STATISTICS AND PROBABILITY N.A.
Includes data sampling and smoothing, Monte Carlo method, and stochastic processes.

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

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

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

70 PHYSICS (GENERAL) N.A.
For geophysics see 46 Geophysics For astrophysics see 90 Astrophysics For solar physics see 92 Solar Physics

71 ACOUSTICS 26
Includes sound generation, transmission, and attenuation
For noise pollution see 45 Environment Pollution

72 ATOMIC AND MOLECULAR PHYSICS N.A.
Includes atomic structure and molecular spectra

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

74 OPTICS 27
Includes light phenomena

75 PLASMA PHYSICS N.A.
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For ionospheric plasmas see 46 Geophysics For space plasmas see 90 Astrophysics

76 SOLID-STATE PHYSICS 28
Includes superconductivity
For related information see also 33 Electronics and Electrical Engineering and 36 Lasers and Masers

77 THERMODYNAMICS AND STATISTICAL PHYSICS N.A.
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

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

80 SOCIAL SCIENCES (GENERAL) N.A.
Includes educational matters

81 ADMINISTRATION AND MANAGEMENT N.A.
Includes management planning and research
82 DOCUMENTATION AND INFORMATION SCIENCE  N.A.
Includes information storage and retrieval technology, micrography, and library science.
For computer documentation see 61 Computer Programming and Software.

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

84 LAW AND POLITICAL SCIENCE  N.A.
Includes space law, international law, international cooperation, and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION  N.A.
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)  N.A.

89 ASTRONOMY  N.A.
Includes radio and gamma-ray astronomy, celestial mechanics, and astrometry.

90 ASTROPHYSICS  N.A.
Includes cosmology, and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION  N.A.
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  N.A.
Includes solar activity, solar flares, solar radiation, and sunspots.

93 SPACE RADIATION  N.A.
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  N.A.

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

Section 2 • Indexes

SUBJECT INDEX
INVENTOR INDEX
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NUMBER INDEX
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JULY 1985 (Supplement 27)

NASA Patent Abstracts Bibliography
A Semiannual Publication of the National Aeronautics and Space Administration

05

AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology

N85-19980*# National Aeronautics and Space Administration
Langley Research Center, Hampton, Va
OVER THE WING PROPELLER Patent Application
J L JOHNSON, JR and E R WHITE, inventors (to NASA)
(Kentron International, Inc., Hampton, Va) 16 Oct 1984 12 p
(NASA-CASE-LAR-13134-1, NAS 1 71 LAR-13134-1,
US-PATENT-APPL-SN-661476) Avail NTIS HC A02/MF A01
CSCL 01C

An aircraft system for increasing the lift drag ratio over a broad range of operating conditions is described. The system positions the engines and nacelles over the wing in such a position that gains in propeller efficiency is achieved simultaneously with increases in wing lift and a reduction in wing drag. Adverse structural and torsional effects on the wings are avoided by fuselage mounted pylons which attach to the upper portion of the fuselage aft of the wings. Similarly, pylon wing interference is eliminated by moving the pylons to the fuselage. Further gains are achieved by locating the pylon surface area aft of the aircraft center of gravity, thereby augmenting both directional and longitudinal stability. This augmentation has the further effect of reducing the size, weight and drag of empennage components. The combination of design changes results in improved cruise performance and increased climb performance while reducing fuel consumption and drag and weight penalties.

N85-21147*# National Aeronautics and Space Administration
Langley Research Center, Hampton, Va
EXTENDED MOMENT ARM ANTI-SPIN DEVICE Patent
R D WHIPPLE, inventor (to NASA) 29 Jan 1985 8 p Filed
27 Jun 1983 Supersedes N83-29173 (21 - 18, p 2867)
(NASA-CASE-LAR-12979-1, NAS 1 71 LAR-12979-1,
US-PATENT-4,496,122, US-PATENT-APPL-SN-508371,
US-PATENT-CLASS-244-75R, US-PATENT-CLASS-244-139,
US-PATENT-CLASS-244-147) Avail US Patent and Trademark Office CSCL 01C

A device which corrects aerodynamic spin is provided in which a collapsible boom extends an aircraft moment arm and an anti-spin parachute force is exerted upon the end of the moment arm to correct intentional or inadvertent aerodynamic spin. This configuration effects spin recovery by means of a parachute whose required diameter decreases as an inverse function of the increasing length of the moment arm. The collapsible boom enables the parachute to avoid the aircraft wake without mechanical assistance, retracts to permit steep takeoff, and permits a parachute to correct spin while minimizing associated aerodynamic, structural and in-flight complications.

N85-19981*# National Aeronautics and Space Administration
Langley Research Center, Hampton, Va
REMOTE PIVOT DECOUPLER PYLON: WING/STORE SUPPRESSION Patent Application
J M HASSLER, JR, inventor (to NASA) 10 Jan 1985 16 p
(NASA-CASE-LAR-13173-1, NAS 1 71 LAR-13173-1,
US-PATENT-APPL-SN-690274) Avail NTIS HC A02/MF A01
CSCL 01C

A device for suspending a store from an aerodynamic support surface, such as an aircraft wing, and more specifically, for improving upon singlet pivot decoupler pylons by reducing both frequency of active store, alignment and alignment system space and power requirements. Two links suspend a lower pylon section, and releasable attached store from an upper pylon section.
AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities, piloting, flight controls, and autopilots

N85-19985* National Aeronautics and Space Administration Langley Research Center, Hampton, Va

LEADING EDGE FLAP SYSTEM FOR AIRCRAFT CONTROL AUGMENTATION Patent

Traditional roll control systems such as ailerons, elevons or spoilers are least effective at high angles of attack due to boundary layer separation over the wing. This invention uses independently deployed leading edge flaps on the upper surfaces of vortex stabilized wings to shift the center of lift outboard. A rolling moment is created that is used to control roll in flight at high angles of attack. The effectiveness of the rolling moment increases linearly with angle of attack. No adverse yaw effects are induced. In an alternate mode of operation, both leading edge flaps are deployed together at cruise speeds to create a very effective airbrake without appreciable modification in pitching moment. Little trim change is required.

Official Gazette of the U S Patent and Trademark Office

INFLIGHT IFR PROCEDURES SIMULATOR Patent

An inflight IFR procedures simulator for generating signals and commands to conventional instruments provided in an airplane is described. The simulator includes a signal synthesizer which generates predetermined simulated signals corresponding to signals normally received from remote sources upon being activated. A computer is connected to the signal synthesizer and causes the signal synthesizer to produce simulated signals responsive to programs fed into the computer. A switching network is connected to the signal synthesizer, the antenna of the aircraft, and navigational instruments and communication devices for selectively connecting instruments and devices to the synthesizer and disconnecting the antenna from the navigational instruments and communication device. Pressure transducers are connected to the altimeter and speed indicator for supplying electrical signals to the computer indicating the altitude and speed of the aircraft. A compass is connected for supply electrical signals for the computer indicating the heading of the airplane. The computer upon receiving signals from the pressure transducer and compass, computes the signals that are fed to the signal synthesizer which, in turn, generates simulated navigational signals.

Official Gazette of the U S Patent and Trademark Office

CONTINUOUS LAMINAR SMOKE GENERATOR Patent

A smoke generator capable of emitting a very thin, laminar stream of smoke for use in high detail flow visualization was invented. The generator is capable of emitting a larger but less stable rope of smoke. The invention consists of a pressure supply and fluid supply which supply smoke generating fluid to feed. The feed tube is directly heated by electrical resistance from current supplied by power supply and regulated by a constant temperature controller. A smoke exit hole is drilled in the wall of feed tube. Because feed tube is heated both before and past exit hole, no condensation of smoke generating occurs at the smoke exit hole, enabling the production of a very stable smoke filament.
generator is small in size which avoids wind turbulence in front of
the test model

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

15

LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters, manned orbital laboratories, reusable vehicles,
and space stations

N85-11122* # National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala

MAGNETIC SPIN REDUCTION SYSTEM FOR FREE SPINNING
OBJECTS Patent Application
G F VONTESSENHAUSEN, inventor (to NASA) 23 Aug 1984
13 p
(NASA-CASE-MFS-25966-1, NAS 171 MFS-25966-1,
US-PATENT-APPL-SN-643522) Avail NTIS HC A02/MF A01
CSCL 22B

A magnetic system and method is described for reducing the
spin rate of a freely rotating or tumbling satellite. Spin reduction
is accomplished by the recovery spacecraft having a mast carrying
an electrical current carrying 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 which 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.

N85-21256* National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio

RING-CUSP ION THRUSTER WITH SHELL ANODE Patent
J S SOVEY, V K RAWLIN, and R F ROMAN, inventors (to
N83-21903 (21-11, p 1783)
(NASA-CASE-LEW-13881-1, NAS 171 LEW-13881-1;
Office CSCL 21C

An improved ion thruster for low specific impulse operation in
the 1500 sec to 6000 sec range has a multicusp boundary field
provided by high strength magnets on an iron anode shell which
lengthens the paths of electrons from a hollow cathode assembly. A downstream anode pole piece in the form of an iron ring supports a ring of magnets to provide a more uniform beam profile. A cylindrical cathode magnet can be moved selectively in an axial direction along a feed tube to produce the desired magnetic field at the cathode tip.

DIAMONDLIKE FLAKES Patent


A carbon coating was vacuum arc deposited on a smooth surface of a target which was simultaneously ion beam sputtered. The bombarding ions have sufficient energy to create diamond bonds. Spalling occurs as the carbon deposit thickens. The resulting diamond-like carbon flakes improve thermal, electrical, mechanical, and tribological properties when used in aerospace structures and components.

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

THERMAL BARRIER COATING SYSTEM Patent


A high temperature oxidation-resistant thermal barrier coating system is disclosed for a nickel cobalt, or iron base alloy substrate. An inner metal bond coating contacts the substrate, and a thermal barrier coating covers the bond coating. NiCrAIR, FeCrAIR, and CoCrAIR alloys are satisfactory as bond coating compositions where R = Y or Yb. These alloys contain, by weight, 24.9-36.7% chromium, 5.4-18.5% aluminum, and 0.05% to 1.55% yttrium or 0.05% to 0.53% ytterbium. The coatings containing ytterbium are preferred over those containing yttrium. An outer thermal barrier coating of partially stabilized zirconium oxide (zirconia) which is between 6% and 8%, by weight, of yttrium oxide (yttria) covers the bond coating. Partial stabilization provides a material with superior durability. Partially stabilized zirconia consists of mixtures of cubic, tetragonal, and monoclinic phases.

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

METHOD AND APPARATUS FOR MAPPING THE DISTRIBUTION OF CHEMICAL ELEMENTS IN AN EXTENDED MEDIUM Patent


Contaminants in an extended medium such as the wall of a building are mapped by locating neutron excitation source on one side of the wall and a gamma ray spectrometer, including a gamma ray detector on the opposite side of the wall facing the excitation source. The source and detector are moved in unison in discrete steps over opposing wall surfaces so as to determine the chemical composition of the elements in a hemispheric region of the wall adjacent the detector with the radius of the region being substantially that of the mean free path distance of gamma rays emitted from elements interacting with neutrons on the detector side of the wall. The source and detector are reversed for relatively thick walls for mapping the distribution of elements on the other side of the wall. The output of the detector is fed to a

Official Gazette of the U.S. Patent and Trademark Office
multichannel pulse height analyzer where the intensity of the various gamma ray spectral lines are indicated relative to a dominant constituent element such as silicon. Resolution of anomalies such as the presence of voids and/or determining the bulk density of the medium is achieved by substituting a gamma ray source technique is also applied to metal alloys, such as iron alloys, in either the solid or molten state

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

A surface of a steel substrate is nitrided 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.

NASA

A method is described for forming thin conductive metal lines on a nonmetallic substrate. A metallizable compound is applied to the substrate in a substantially uniform thin film. Heating radiation is applied to the film along a plurality of separated fine lines, but not to the area between the lines, to heat the film along said lines to a temperature at which the metallizable compound is converted to a metal and gases that drift away. A solvent is then applied to the film to wash away the areas that have not been metallized.

NASA

A method of producing tris(N-methylamino)methylsilane is described including the steps of forming and cooling a liquid solution of methylamine in an inert solvent and under an inert atmosphere at a temperature of about -30°C and slowly adding a quantity of methyltrichlorosilane while maintaining said temperature. The reaction mixture is then heated for about 60 minutes at a temperature of about 40°C, followed by filtering the solid portion from the liquid portion. The liquid is distilled to remove the solvent, resulting in a high yield of tris(N-methylamino)methylsilane.

Official Gazette of the U.S. Patent and Trademark Office
N85-20123* National Aeronautics and Space Administration
Langley Research Center, Hampton, Va

THERMOSET-THERMOPLASTIC AROMATIC POLYAMIDE
CONTAINING N-PROPARGYL GROUPS Patent
T L ST CLAIR, J F WOLFE (Virginia Polytechnic Inst and State Univ), and T D GREENWOOD, inventors (to NASA) (Virginia Polytechnic Inst and State Univ) 26 Jul 1983 5 p Filed 23 Oct 1980 Superseded N81-15107 (19 - 06, p 0727)

A composition and method are disclosed for increasing the use temperature of polyamides based on the incorporation of a latent crosslinking agent into the polymer backbone, wherein high temperature performance is achieved without sacrificing solubility or processability

Official Gazette of the U S Patent and Trademark Office

N85-20124* National Aeronautics and Space Administration
Langley Research Center, Hampton, Va

PROCESS FOR PREPARING SOLVENT RESISTANT, THERMOPLASTIC AROMATIC POLY(IMIDESULFONE) Patent

A process for preparing a thermoplastic poly(midesulfone) is disclosed This resulting material has thermoplastic properties which are generally associated with polysulfones but not polyamides, and solvent resistant which is generally associated with polyamides but not polysulfones This system is processable in the 250 to 350 C range for molding, adhesive and laminating applications This unique thermoplastic poly(midesulfone) is obtained by incorporating an aromatic sulfone moiety into the backbone of an aromatic linear polyamide by dissolving a quantity of a 3,3',4,4'-benzophenonetetrazobaclyc diahydnd (BTD) in a solution of 3,3'-diaminodiphenylsulfone and bis(2-methoxethyl)ether, precipitating the reactant product in water, filtering and drying the recovered poly(amide-acid sulfone) and converting it to the poly(midesulfone) by heating

Official Gazette of the U S Patent and Trademark Office

N85-20125* National Aeronautics and Space Administration
Langley Research Center, Hampton, Va

HOT MELT ADHESIVE ATTACHMENT PAD Patent

A hot melt adhesive attachment pad for releasably securing distinct elements together is described which is particularly useful in the construction industry or a spatial vacuum environment The attachment pad consists primarily of a cloth selectively impregnated with a charge of hot melt adhesive, a thermo-foil heater, and a thermo-cooler These components are securely mounted in a mounting assembly In operation, the operator activates the heating cycle transforming the hot melt adhesive to a substantially liquid state, positions the pad against the attachment surface, and activates the cooling cycle solidifying the adhesive and forming a strong, releasable bond

Official Gazette of the U S Patent and Trademark Office

INSULATION BONDING TEST SYSTEM Patent
Superseded N83-19903 (21 - 10, p 1489)

A method and a system for testing the bonding of foam insulation attached to metal is described The system involves the use of an impacter which has a calibrated load cell mounted on a plunger and a hammer head mounted on the end of the plunger When the impacter strikes the insulation at a point to be tested, the load cell measures the force of the impact and the precise time interval during which the hammer head is in contact with the insulation This information is transmitted as an electrical signal to a load cell amplifier where the signal is conditioned and then transmitted to a fast Fourier transform (FFT) analyzer The FFT analyzer produces energy spectral density curves which are displayed on a video screen The termination frequency of the energy spectral density curve may be compared with a
predetermined empirical scale to determine whether a high quality bond, good bond, or debond is present at the point of impact. Official Gazette of the U.S. Patent and Trademark Office.

between reels. The ion beam first cleans the polymer material surface and then sputters the film material from a target onto this surface. NASA.

N85-20128* # National Aeronautics and Space Administration Langley Research Center, Hampton, Va

PROCESS FOR PREPARING ESSENTIALLY COLORLESS POLYIMIDE FILM CONTAINING PHENOXY-LINKED DIAMINES Patent Application

A K STCLAIR and T L STCLAIR, inventors (to NASA) 23 Aug 1984. 12 p

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 dianhydride monomers and introducing phenoxy 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 chromophoric 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 the polyamic acid solutions onto a surface and thermally converting the applied layer to the polyimide. In addition, 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. NASA.

N85-21347* National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif

PHOSPHORUS-CONTAINING IMIDE RESINS Patent

I K VARMA (NAS-NSR, Washington, D.C.), G M FOHLEN, and J A PARKER, inventors (to NASA) 29 Jan 1985. 7 p

Cured polymers of bis and tns-imides derived from tns(m-aminophenyl) phosphine oxides by reaction with maleic anhydride or its derivatives, and addition polymers of such imides, including a variant in which a monoimide is condensed with a dianhydride and the product is treated with a further quantity of maleic anhydride prior to curing are disclosed and claimed. Such polymers are flame resistant. Also disclosed are an improved method of producing tns(m-aminophenyl) phosphine oxides from their nitro analogues by reduction with hydrazine hydrate using palladized charcoal or Raney nickel as the catalyst and fiber reinforced cured resin composites.

Official Gazette of the U.S. Patent and Trademark Office.
A method of forming 4,4',4'',4'''-tetraamino phthalocyanines involves reducing 4,4',4'',4'''-tetranitro phthalocyanines, polymerizing the metal tetraamino phthalocyanines with a tetracarboxylic dianhydride (preferably aromatic) or copolymerizing with a tetracarboxylic dianhydride and a diamine (preferably also aromatic) to produce amic acids which are then dehydrocyclized to imides. Thermally and oxidatively stable polymers result which form tough, flexible films, varnishes, adhesives, and fibers.

A rubber-toughened, addition-type polyimide composition is disclosed which has excellent high temperature bonding characteristics in the fully cured state and improved peel strength and adhesive fracture resistance physical property characteristics. The process for making the improved adhesive involves preparing the rubber-containing amic acid prepolymer by chemically reacting an amine-terminated elastomer and an aromatic diamine with an aromatic dianhydride with which a reactive chain stopper anhydride has been mixed, and utilizing solvent or mixture of solvents for the reaction.

Polyimide resins suitable for use as composite matrix materials are formed by copolymerization of maleic and norbornenyl endcapped monomers and oligomers. The copolymers can be cured at temperatures under about 300°C by controlling the available concentration of the maleic end-capped reactant. This control can be achieved by adding sufficient amounts of said maleic reactant, or by chemical modification of either copolymer, so as to either increase Diels-Alder retrogression of the norbornenyl capped reactant and/or holding initiation and polymerization to a rate compatible with the availability of the maleic-capped reactant.
CHEMICAL APPROACH FOR CONTROLLING NIMALIDE CURE TEMPERATURE AND RATE Patent
Polymide resins suitable for use as composite matrix materials are formed by copolymerization of maleic and norbornenyl endcapped monomers and oligomers. The copolymers can be cured at temperatures under about 300 C by controlling the available concentration of the maleic endcapped reactant. This control is achieved by adding sufficient amounts of said maleic reactant or by chemical modification of either copolymer, to either increase Diels-Alder retrogression of the norbornenyl capped reactant and/or hold initiation and polymerization to a rate compatible with the availability of the maleic capped reactant.

Official Gazette of the US Patent and Trademark Office

N85-21352* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio.

FIRE RESISTANT PHOSPHORUS CONTAINING COMPOUNDS, POLYIMIDES AND COPOLYIMIDES Patent Application
Phosphorus containing polyimides and copolyimides are synthesized in a two step polycondensation reaction from 1-(diorgano oxyphosphonyl)methyl-2,4 and -2,6-diamino benzenes are reacted with polyacrylates and optionally, comonomers to produce polyamides which have desirable heat and fire resistance properties. These polymers are used to form fibers and fabrics where fire and flame resistance properties are important, like aircraft equipment and structures.
A novel class of fire and heat resistant bisimide resins prepared by thermal polymerization of maleimido or citraconimido substituted 1-(dialkox phosphonyl)methyl-2,4 and -2,6-diamino benzene was presented. The polymer precursors are prepared by reacting 1-(diorgano oxyphosphonyl)methyl-2,4- and -2,6-diamino benzenes with maleic anhydride or citraconic anhydride in a mole ratio 1:2. Chain extension of the monomers is achieved by reacting the mono-N-maleimido derivatives of 1-(diorgano oxyphosphonyl)methyl-2,4- and -2,6-diamino benzenes with aryl tetracarboxylic dianhydrides, such as benzophenone tetracarboxylic dianhydride, or aryl diisocyanates, such as methylenebis (4-phenyloisocyanate), in a mole ratio 2:1. The polymerization of the monomers is studied by differential scanning calorimetry (DSC) and the thermal stability of the polymers is ascertained by thermogravimetric analysis (TGA).

This addition of energy to the system increases mobility of the condensing atoms and serves to remove lesser bound atoms. The polymerization is monitored by differential scanning calorimetry (DSC) and the thermal stability of the polymers is ascertained by thermogravimetric analysis (TGA).
TEXTURED CARBON SURFACES ON COPPER Patent
Application
A N CURREN, K A. JENSEN, and R F ROMAN, inventors (to NASA) 10 Oct 1984 12 p
CSCL 13H

A very thin layer of highly textured carbon is applied to a copper surface by a tnode 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 spines or peaks which extend perpendicularly from the copper surface. The coated copper is especially useful for electrode plates in multistage depressed collectors.

MAGNETICALLY ACTUATED COMPRESSOR Patent
J EVANS and P A STUDER, inventors (to NASA) 19 Feb 1985 9 p Filed 28 Jan 1983 Supersedes N83-20153 (21 - 10, p 1526)
CSCL 13H

A vibration free fluid compressor particularly adapted for Stirling cycle cryogenic refrigeration apparatus comprises a pair of identical opposing ferromagnetic pistons located in a housing and between a gas spring including a sealed volume of a working fluid such as gas under pressure. The gas compresses and expands in accordance with movement of the pistons to generate a compression wave which can be vented to other apparatus, for example, a displacer unit in a Stirling cycle engine. The pistons are urged outwardly due to the pressure of the gas, however, a fixed electromagnetic coil assembly located in the housing adjacent the pistons, is periodically energized to produce a magnetic field which interlinks the pistons in such a fashion that the pistons are mutually attracted to one another. The mass of the pistons, in conjunction with the compressed gas between them, form a naturally resonant system which, when the pistons are electromagnetically energized, produces an oscillating compression wave in the entrapped fluid medium.

IMPROVED SILICON GRINDING METHOD AND APPARATUS Patent Application
E R COLLINS, JR, inventor (to NASA) (JPL, California Inst of Tech, Pasadena) 29 Nov 1984 9 p Sponsored by NASA
(NASA-CASE-NPO-16336-1-CU, NAS 1 71 NPO-16336-1-CU,
US-PATENT-APPL-SN-676163) Avail NTIS HC A02/MF A01
CSCL 13H

Opposing streams of silicon particles collide to form a collision product, which is repeatedly graded, refined by a series of jet mills and recycled to provide an output containing an improved yield of useful particles.
32 COMMUNICATIONS

Includes land and global communications, communications theory, and optical communications

N85-20226*# National Aeronautics and Space Administration
Goddard Space Flight Center, Greenbelt, Md

IMPROVED LEGISLATED EMERGENCY LOCATING TRANSmitters AND EMERGENCY POSITION INDICATING RADIO BEACONS Patent Application

An emergency locating transmitting (ELT) system is disclosed which comprises a legislated ELT modified with an interface unit and connected by a multiwire cable to a remote control monitor (RCM), typically located at the pilot position. The RCM can remotely test the ELT by disabling the legislated swept tone and allowing transmission of a single tone, turn the ELT on for legislated ELT transmission, and reset the ELT to an armed condition. The RCM also provides visual and audio indications of transmitter operating condition as well as ELT battery condition. Removing the RCM or shorting or opening the interface input connections are not to affect traditional ELT operation.

N85-21427* National Aeronautics and Space Administration
Lyndon B Johnson Space Center, Houston, Tex

TELEVISION CAMERA VIDEO LEVEL CONTROL SYSTEM Patent

A video level control system is provided which generates a normalized video signal for a camera processing circuit. The video level control system includes a lens iris which provides a controlled light signal to a camera tube. The camera tube converts the light signal provided by the lens iris into electrical signals. A feedback circuit in response to the electrical signals generated by the camera tube, provides feedback signals to the lens iris and the camera tube. This assures that a normalized video signal is provided in a first illumination range. An automatic gain control loop, which is also responsive to the electrical signals generated by the camera tube, operates in tandem with the feedback circuit. This assures that the normalized video signal is maintained in a second illumination range.

N85-21428* National Aeronautics and Space Administration
Pasadena Office, Calif

MULTICOMPUTER COMMUNICATION SYSTEM Patent

A local area network is provided for a plurality of autonomous computers which operate at different rates and under different protocols coupled by network bus adapters to a global bus. A host computer (HC) divides a message file to be transmitted into blocks, each with a header that includes a data type identifier and a trailer. The associated network bus adapter (NBA) then divides the data into packets, each with a header to which a transport header and trailer is added with frame type code which specifies one of three modes of addressing in the transmission of data, namely a physical address mode for computer to computer transmission using two bytes for source and destination addresses, a logical address mode and a data type mode. In the logical address mode, one of the two addressing bytes contains a logical channel number (LCN) established between the transmitting and one or more receiving computers. In the data type mode, one of the addressing bytes contains a code identifying the type of data.
A double reference pulse phase locked loop is described which measures the phase shift between tone burst signals initially derived from the same periodic signal source (voltage controlled oscillator) and delayed by different amounts because of two different paths. A first path is from the transducer to the surface of a sample and back, and a second path is from the transducer to the opposite surface and back. A first pulse phase locked loop including a phase detector and a phase shifter forces the tone burst signals delayed by the second path in phase quadrature with the periodic signal source. A second pulse phase locked loop including a second phase detector forces the tone burst signals delayed by the first path into phase quadrature with the phase shifted periodic signal source.

An apparatus for generating a single pulse the first time only that a noisy cyclic signal exceeds a reference level during a half-cycle is disclosed. For the positive half of a cycle of the noisy cyclic signal, a comparator and a multivibrator produce a fixed voltage output when the noisy cyclic signal first exceeds the reference level. A multivibrator stops the production of the fixed voltage output when the noisy cyclic signal next passes the zero voltage level in the negative direction. Consequently, a single pulse is generated indicating that the signal exceeded the reference level during that half-cycle.

A tunable microwave cavity containing ionizable metallic vapor or gases and an apparatus for precisely positioning a microwave coupling tip in the cavity and for precisely adjusting at least one dimension of the cavity are disclosed. With this combined structure, resonance may be achieved with various types of ionizable gases. A coaxial probe extends into a microwave cavity through a tube. One end of the tube is retained in a spherical joint attached in the cavity wall. This allows the coaxial probe to be pivotally rotated. The coaxial probe is slidable within the tube thus allowing the probe to be extended toward or retracted from the center of the cavity. A tunable wall in the cavity is precisely positioned by a plurality of threaded rods extending through threaded bushings which are geared together. Thus, rotation of one of the bushings caused rotation of the other bushings simultaneously whereby the tuning wall is accurately positioned. Means are provided for moving the tube through which the coaxial probe extends in both a side-to-side and back and forth motion.
A processing circuit is provided for correcting for input parameter variations, such as data and clock signal asymmetry, phase offset and jitter, noise and signal amplitude, in incoming data signals. An asymmetry corrector circuit performs the correcting function and furnishes the corrected data signals to a convolutional encoder circuit. The corrector circuit further forms a regenerated clock signal from clock pulses in the incoming data signals and another clock signal at a multiple of the incoming clock signal. These clock signals are furnished to the encoder circuit so that encoded data may be furnished to a modulator at a high data rate for transmission.

Examination of microstructures of LSI and VLSI devices is facilitated by employing a method in which the device is photographed through a darkfield illumination optical microscope and the resulting negative subjected to inverse processing to form a positive on a photographic film. The film is then developed to form photographic prints or transparencies which clearly illustrate the structure of the device. The entire structure of a device may be examined by alternately photographing the device and selectively etching layers of the device in order to expose underlying layers.
Power is extracted from plasmons, photons, or other guided electromagnetic waves at infrared to mid-ultraviolet frequencies by inelastic tunneling in metal-insulator-semiconductor-metal diodes. Inelastic tunneling produces power by absorbing plasmons to pump electrons to higher potential. Specifically, an electron from a semiconductor layer absorbs a plasmon and simultaneously tunnels across an insulator into metal layer which is at higher potential. The diode voltage determines the fraction of energy extracted from the plasmons, any excess is lost to heat.

N85-21492* National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio

INELASTIC TUNNEL DIODES Patent
L. M. ANDERSON, inventor (to NASA) 13 Nov 1984 7 p
Filed 19 Apr 1983 Supersedes N83-25883 (21 - 15, p 2390)
(NASA-CASE-LEW-13833-1; NAS 1 71 LEW-13833-1;

A technique for self-calibrating and phasing a lens-feed array antenna, while normal operation is stopped, utilizes reflected energy of a continuous and coherent wave broadcast by a transmitter through a central feed while a phase controller advances the phase angles of reciprocal phase shifters in radiation electronics of the array elements at different rates to provide a distinct frequency modulation of electromagnetic wave energy returned by reflection in one mode and leakage in another mode from the radiation electronics of each array element. The composite return signal received by a synchronous receiver goes through a Fourier transform processing system and produces a response function for each antenna element. Compensation of the phase angles for the antenna elements required to conform the antenna response to a precomputed array pattern is derived from the reciprocal square root of the response functions for the antenna elements which, for a rectangular array of NXM elements, is a response function $T(n,m)$. A third mode of calibration uses an external pilot tone from a separate antenna element. Respective responses are thus obtained from the three modes of calibration.

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

N85-21568* National Aeronautics and Space Administration
Langley Research Center, Hampton, Va

HEAT PIPE COOLED PROBE Patent
C. J. CAMARDA, inventor (to NASA) and L. M. COUCH 4 Dec 1984 6 p
Filed 13 Feb 1981 Supersedes N81-24525 (19 - 15, p 2075)
(NASA-CASE-LAR-12588-1, NAS 1 71 LAR-12588-1,
US-PATENT-CLASS-165-104 26) Avail US Patent and
Trademark Office

The basic heat pipe principle is employed to provide a self-contained passively cooled probe that may be placed into a high temperature environment. The probe consists of an evaporator region of a heat pipe and a sensing instrument. Heat is absorbed as the working fluid evaporates in the probe. The vapor is transported to the vapor space of the condenser region. Heat is dissipated from the condenser region and fins causing condensation of the working fluid, which returns to the probe by gravity and the capillary action of the wick. Working fluid, wick and condenser configurations and structure materials can be selected to maintain the probe within an acceptable temperature range.

Official Gazette of the U.S. Patent and Trademark Office
INSTRUMENTATION AND PHOTOGRAPHY

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

**N85-20294**
National Aeronautics and Space Administration
Goddard Space Flight Center, Greenbelt, Md
PORTABLE PALLET WEIGHING APPARATUS Patent
(NASA-CASE-GSC-12789-1, NAS 1 71 GSC-12789-1,
US-PATENT-CLASS-177-147, US-PATENT-CLASS-177-260,

An assembly for use with several like units in weighing the mass of a loaded cargo pallet supported by its trunnions has a bridge frame for positioning the assembly on a transportation frame carrying the pallet while straddling one trunnion of the pallet and its trunnion lock, and a cradle assembly for incrementally raising the trunnion. The mass at the trunnion is carried as a static load by a slidable bracket mounted upon the bridge frame for supporting the cradle assembly. The bracket applies the static loading to an electrical load cell symmetrically positioned between the bridge frame and the bracket. The static loading compresses the load cell, causing a slight deformation and a potential difference at the load cell terminals which is proportional in amplitude to the mass of the pallet at the trunnion.

**N85-20297**
National Aeronautics and Space Administration
Langley Research Center, Hampton, Va
LIQUID THICKNESS GAGE Patent Application
L M Weinstein, inventor (to NASA) 20 Dec 1984 11 p
(NASA-CASE-LAR-13342-1, NAS 1 71 LAR-13342-1,
US-PATENT-APPL-SN-684186) Avail NTIS HC A02/MF A01 CSCL 14B

A method and apparatus to measure the thickness of liquid independent of liquid conductivity are disclosed. Two pairs of round, corrosion resistant wire are mounted in an insulating material such that the cross-sectional area of each wire is flush with and normal to the surface. The resistance between each pair of wires are measured using two AC resistance measuring circuits. The ratio of the outputs of the two resistance measuring circuits is indicative of the thickness of the liquid on the surface.

**N85-20298**
National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala
ANGULAR MEASUREMENT SYSTEM Patent Application
J R Currie and R Kisvel, inventors (to NASA) 3 Oct 1984 13 p
(NASA-CASE-MFS-25825-1, NAS 1 71 MFS-25825-1,
US-PATENT-APPL-SN-657309) Avail NTIS HC A02/MF A01 CSCL 14B

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 intermediately occurring pulse (V sub c) NASA

N85-20299*# National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala
EMITTED VIBRATION MEASUREMENT DEVICE AND METHOD Patent Application
G L GISLER, inventor (to NASA) (Sperry Corp., Phoenix, Ariz) 3 Oct 1984 17 p

This invention is directed to a method and apparatus for measuring emitted vibrational forces produced by a reaction wheel assembly due to imbalances, misalignment, bearing defects and the like. The apparatus includes a low mass carriage supported on a large mass base. The carriage is in the form of an octagonal frame having an opening which is adapted for receiving the reaction wheel assembly supported thereon by means of a mounting ring. The carriage is supported on the base by means of air bearings which support the carriage in a generally frictionless manner when supplied with compressed air from source A plurality of carriage brackets and a plurality of base blocks provide for physical coupling of the base and carriage. The sensing axes of the load cells are arranged generally parallel to the base and connected between the base and carriage NASA

N85-20300*# National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala
ADJUSTABLE INDICATING DEVICE FOR LOAD POSITION Patent Application
C HELLEW, inventor (to NASA) 20 Dec 1984 10 p

An indicating device designed to provide an electrical signal relative to the position of a load is described. The device has a central housing with two wing structures on each side which support conventional switch means having cantilevered arms. Extending through the housing is a movable shaft that is spring biased to a forward extended position and adapted to respond against a load being positioned. The rear end of the movable shaft has an adjustable cam means which acts upon the cantilevered arms to cause a switching action upon shifting of the movable shaft by a load NASA

N85-20301*# National Aeronautics and Space Administration Lyndon B Johnson Space Center, Houston, Tex
SOLID SORBENT AIR SAMPLER Patent Application
T J GALEN, inventor (to NASA) (Northrop Services, Inc, Los Angeles) 10 Oct 1984 19 p

A fluid sampler for collecting a plurality of discreet samples over separate time intervals is presented. The sampler comprises a sample assembly with an inlet and a plurality of discreet sample tubes each of which has an inlet and outlet ends. A multiport dual acting valve is provided in the sampler to sequentially pass air from the sample inlet into the selected sample tubes. The sample tubes extend longitudinally from the housing and are located at its outer periphery so that upon removal of an enclosure cover, they are readily accessible for analytical operation of the sampler NASA
A self-metering and dispensing device for fluids obtained from a pressurized fluid supply is discussed. Tubing and valving means permit the introduction of fluid into and discharge from a closed cylindrical reservoir. The reservoir contains a slideably disposed piston co-acting with a coil compression spring, with piston travel determining the amount of fluid in the reservoir. Once the determined amount of fluid is introduced into the reservoir, the fluid is discharged by the force of the coil compression spring acting upon the piston.

Official Gazette of the U.S. Patent and Trademark Office
THIN FILM STRAIN TRANSDUCER Patent


A strain transducer system and process for making same is disclosed wherein a beryllium-copper ring having four strain gages disposed thereon is electrically connected in Wheatstone bridge fashion to output instrumentation. Tabs are bonded to a balloon or like surface with strain on the surface causing bending of the ring and providing an electrical signal through the gages proportional to the surface strain. A figure is provided which illustrates a pattern of a one-half ring segment as placed on a sheet of beryllium-copper for chem-mill etch formation, prior to bending and welding of a pair of the segments to form a ring structure.

LASERS AND MASERS

Includes parametric amplifiers.

LASERS AND MASERS

N85-21598* National Aeronautics and Space Administration
Wallops Flight Center, Wallops Island, Va.

36 LASERS AND MASERS

36

PORTABLE REMOTE LASER SENSOR FOR METHANE LEAK DETECTION Patent


A portable laser system for remote detection of methane gas leaks and concentrations is disclosed. The system transmitter includes first and second lasers, tuned respectively to a wavelength coincident with a strong absorption line of methane and a reference wavelength which is weakly absorbed by methane gas. The system receiver includes a spherical mirror for collecting the reflected laser radiation and focusing the collected radiation through a narrowband optical filter onto an optical detector. The filter is tuned to the wavelength of the two lasers, and rejects background noise. The output of the optical detector is processed by a lock-in detector.
synchronized to the chopper, and which measures the difference between the first wavelength signal and the reference wavelength signal. 

Laser beams are transmitted through gas to a reflecting target, which may be either a solid surface or particulate matter in gas or the gas molecules. The return beams are measured to determine the amount of energy absorbed by the gas. For temperature measurements, the laser beam has a wavelength at which the gas exhibits a relatively temperature-sensitive and pressure-insensitive absorption characteristic. For pressure measurements, the laser beam has a wavelength at which the gas has a relatively pressure-sensitive and temperature-insensitive absorption characteristic. To reduce the effects of scattering on the absorption measurements, a reference laser beam with a weak absorption characteristic is transmitted colinearly with the data beam having a strong absorption characteristic. The two signals are processed as a ratio to eliminate back scattering. Embodiments of transmitters and receivers described include a sequential laser pulse transmitter and receiver, a simultaneous laser pulse transmitter and receiver, and a self-regulating, nonmoving, active magnetic bearing disclosed which has an elongated cylindrical housing for containing a shaft type armature with quadrature positioned shaft position sensors and equidistantly positioned electromagnets located at one end of the housing. Each set of sensors is responsive to orthogonal displacement of the armature and is used to generate control signals to energize the electromagnets to center the armature. A bumper magnet assembly is located at one end of the housing for dampening any undesired axial movement of the armature or to axially move the armature either continuously or fixedly.

A valve control is described having a valve body with an actuator stem and a rotating handle connected to the actuator stem by a differential drive mechanism which, during uniform movement of the handle in one direction, initially opens the valve at a relatively slow rate and, thereafter, complete the valve movement at a substantially faster rate. A series of stop rings are received about the valve stem to control the rate of valve opening.
the body in frictional abutting relationship and serially rotated by
the handle to uniformly resist handle movement independently of
the extent of handle movement.

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37 MECHANICAL ENGINEERING

opening in the bulkhead. This pin is sized to fit within one of the
notches in the ring thereby preventing rotation of this ring with
respect to the bulkhead. NASA

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N85-20377*# National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio.
VARIABLE FRICTION SECONDARY SEAL FOR FACE SEALS
Patent Application
E. D'IRUSSO, inventor (to NASA) 16 Nov 1984 8 p
(NASA-CASE-LEW-14170-1, NAS 171 LEW-14170-1,
US-PATENT-APPL-SN-672224) Avail NTIS HC A02/MF A01
CSCL 11A

Vibration and stability of a primary seal ring are controlled by
a secondary seal system. An inflatable bladder which forms a
portion of secondary seal varies the damping applied to this seal
ring. The amplitude of vibration of the primary seal ring is sensed
with a proximity probe that is connected to a microprocessor in a
control system. The bladder pressure is changed by the control
system to mitigate any sensed instability or vibration. NASA

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N85-21649* National Aeronautics and Space Administration
Lyndon B. Johnson Space Center, Houston, Tex
CONNECTION SYSTEM Patent
B. MCCANDLESS, II, inventor (to NASA) 20 Nov 1984 9 p
Filed 30 Jun 1982 Supersedes N82-31689 (20 - 22, p 3137)
(NASA-CASE-MSC-20319-1, NAS 171 MSC-20319-1,
US-PATENT-4,483,639, US-PATENT-APPL-SN-393582,
Office CSCL 131

A mechanical connection system comprises a first body defining
a receptacle and a second body defining a pin matingly receivable
in the receptacle by relative movement in a first directional mode.
A primary latch is engageable between the two bodies to retain
the pin in the receptacle. The primary latch is reciprocable in a
second directional mode transverse to the first directional mode.
A lock member carried by one of the bodies is operatively
associated with the primary latch and movable, transverse to the
second directional mode, between a locking position maintaining
eengagement of the primary latch and a releasing position
permitting release of the primary latch. The lock includes an operator portion
engageable to move the lock member from its locking position to
its releasing position. The operator is located internally of the first
body. An actuator is selectivity insertable into and disengageable
from the first body. The actuator is movable relative to the first
body when it is inserted for engagement with and operation of
the operator. NASA

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N85-20378*# National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala
TUBE COUPLING DEVICE Patent Application
W. N. MEYERS and L. A. HEIN, inventors (to NASA) 18 Jan
1985 12 p
(NASA-CASE-MFS-25964-1, NAS 171 MFS-25964-1,
US-PATENT-APPL-SN-692801) Avail NTIS HC A02/MF A01
CSCL 13K

A first annular ring has a keyed opening sized to fit around
the nut region of a male coupling and a second annular ring has
a keyed opening sized to fit around the nut of a female coupling.
Each ring has mating ratchet teeth and these rings are biased
together, thereby engaging these teeth and preventing rotation of
these rings. This in turn prevents the rotation of the male nut
region with respect to the female nut. For tube-to-bulkhead locking,
one facet of one ring is notched, and a pin is pressed into an
INGOT SLICING MACHINE AND METHOD Patent


An improved method for simultaneously slicing one or a multiplicity of boules of silicon into silicon wafers is described. A plurality of vertical stacks of horizontal saw blades of circular configuration are arranged in juxtaposed coaxial alignment. Each blade is characterized by having a cutting diameter slightly greater than the cutting diameter of the blade arranged immediately above, imparting a simultaneous rotation to the blades.

REUSABLE THERMAL CYCLING CLAMP Patent

W J Debnam, Jr, A L Fripp, and R K Crouch, inventors (to NASA) 1 Jan 1985 6 p Filed 17 Nov 1981 Supersedes N82-18390 (20-09, p 1208)

A reusable metal clamp for retaining a fused quartz ampoule during temperature cycling in the range of 20 deg C to 1000 deg C is described. A compressible graphite foil having a high radial coefficient of thermal expansion is interposed between the fused quartz ampoule and metal clamp to maintain a snug fit between these components at all temperature levels in the cycle.

METHOD OF MEASURING SEA SURFACE WATER TEMPERATURE WITH A SATELLITE INCLUDING WIDEBAND PASSIVE SYNTHETIC-APERTURE MULTICHANNEL RECEIVER Patent

J M Stagey, inventor (to NASA) (JPL, California Inst of Tech, Pasadena) 12 Feb 1985 11 p Filed 6 May 1982 Supersedes N82-26523 (20-17, p 2390)

A wideband passive synthetic-aperture multichannel receiver with a satellite is mounted on a satellite which travels in an orbit above the Earth passing over large bodies of water, e.g., the Atlantic Ocean. The antenna is scanned to receive signals over a wide frequency band from each incremental surface area (pixel) of the water which are related to the pixel's sea temperature.
received signals are fed to several channels which are tuned to separate selected frequencies. Their outputs are fed to a processor with a memory for storage. As the antenna points to pixels within a calibration area around a buoy of known coordinates, signals are likewise received and stored. Exactly measured sea temperature is received from the buoy. After passing over several calibration areas, a forward stepwise regression analysis is performed to produce an expression which selects the significant from the insignificant channels and assigns weights (coefficients) to them. The expression is used to determine the sea temperature at each pixel based on the signals received therefrom. Wind temperature, pressure, and wind speed at each pixel can also be calculated.

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ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batters, global sources of energy, fossil fuels, geophysical conversion, hydroelectric power, and wind power

N85-20530* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
SCREEN PRINTED INTERDIGITATED BACK CONTACT SOLAR CELL Patent
C R BAROA, G A MAZARIS, and A T CHAI, inventors (to NASA) 23 Oct 1984 6 p Filed 10 Feb 1983 Supersedes N83-20374 (21 - 10, p 1557)

Interdigitated back contact solar cells are made by screen printing dopant materials onto the back surface of a semiconductor substrate in a pair of interdigitated patterns. These dopant materials are then diffused into the substrate to form junctions having configurations corresponding to these patterns. Contacts having configurations which match the patterns are then applied over the junctions.

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N85-21769* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
SOLAR POWERED ACTUATOR WITH CONTINUOUSLY VARIABLE AUXILIARY POWER CONTROL Patent
F J NOLA, inventor (to NASA) 18 Dec 1984 6 p Filed 6 May 1982 Supersedes N82-26780 (20 - 17, p 2426)

Sunlight is dispersed over a diffraction grating formed on the surface of a conducting film on a substrate. The angular dispersion controls the effective grating period so that a matching spectrum of surface plasmons is excited for parallel processing on the conducting film. The resulting surface plasmons carry energy to an array of inelastic tunnel diodes. This solar energy converter does not require different materials for each frequency band, and sunlight is directly converted to electricity in an efficient manner by extracting more energy from the more energetic photons.

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SOLAR ENERGY CONVERTER USING SURFACE PLASMA WAVES Patent

Sunlight is dispersed over a diffraction grating formed on the surface of a conducting film on a substrate. The angular dispersion controls the effective grating period so that a matching spectrum of surface plasmons is excited for parallel processing on the conducting film. The resulting surface plasmons carry energy to an array of inelastic tunnel diodes. This solar energy converter does not require different materials for each frequency band, and sunlight is directly converted to electricity in an efficient manner by extracting more energy from the more energetic photons.

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A solar powered system is disclosed in which a load such as a compressor is driven by a main induction motor powered by a solar array. An auxiliary motor shares the load with the solar powered motor in proportion to the amount of sunlight available, and is provided with a power factor controller for controlling voltage applied to the auxiliary motor in accordance with the loading on that motor. In one embodiment, when sufficient power is available from the solar cell, the auxiliary motor is driven as a generator by excess power from the main motor so as to return electrical energy to the power company utility lines.

- **Title:** CROSS CORRELATOR
  - **Abstract:** The time difference of arrival of the modulated signals is proportional to electron content of the ionosphere. A variable delay is adjusted relative to a fixed delay in the respective channels (L1,L2) to produce a maximum at the cross correlator output. The difference in delay required to produce this maximum is a measure of the columnar electron content of the ionosphere. A plurality of monitoring stations and spacecraft (Global Positioning System satellites) are employed to locate any terrestrial event that produces an ionospheric disturbance.

- **Title:** PHOTOREFRACTOR OCULAR SCREENING SYSTEM
  - **Abstract:** A method and apparatus for detecting human eye defects, particularly detection of refractive error is presented. Eye reflex is recorded on color film when the eyes are exposed to a flash of light. The photographs are compared with predetermined standards, to detect eye defects.
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering, biotechnology, and space suits and protective clothing

**N85-20666*#** National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif
ELBOW AND KNEE JOINT FOR HARD SPACE SUITS AND THE LIKE Patent Application
H C VYKUKAL, inventor (to NASA) 20 Dec 1984 22 p
(NASA-CASE-ARC-11610-1, NAS 1 71 ARC-11610-1,
US-PATENT-APPL-SN-684190) Avail NTIS HC A02/MF A01
CSCL 06K

An elbow or knee joint for a hard space suit or similar usage is formed of three serially-connected rigid sections which have truncated spherical configurations. The ends of each section form solid geometric angles, and the sections are interconnected by hermetically-sealed ball bearings. The outer two sections are fixed together, rotating in a direction opposite to rotation of the center section. A preferred means to make the outer sections track each other in rotation comprises a rotatable continuous chain which engages sockets circumferentially spaced on the facing sides of the outer races of the bearings. The joint has a single pivot point and the bearing axes are always contained in a single plane for any articulation of the joint. Thus flexure of the joint simulates the coplanar flexure of the knee or elbow and is not susceptible to lockup.

**N85-21987*#** National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif
TORSO SIZING RING CONSTRUCTION FOR HARD SPACE SUIT Patent Application
H C VYKUKAL, inventor (to NASA) 20 Dec 1984 15 p
(NASA-CASE-ARC-11616-1, NAS 1 71 ARC-11616-1,
US-PATENT-APPL-SN-684193) Avail NTIS HC A02/MF A01
CSCL 060

A hard suit for use in space or diving applications has an adjustable length torso covering that will fit a large variety of wearers. The upper and lower sections of the covering interconnect so that the covering will fit wearers with short torsos. One or more sizing rings may be inserted between 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 section has a similarly slanted coupler which may interfit with the upper section coupler to accommodate the smallest torso size. 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.

**N85-21986*#** National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif
SHOULDER AND HIP JOINT FOR HARD SPACE SUITS AND THE LIKE Patent Application
H C VYKUKAL, inventor (to NASA) 20 Dec 1984 21 p
(NASA-CASE-ARC-11543-1, NAS 1 71 ARC-11543-1,
US-PATENT-APPL-SN-684192) Avail NTIS HC A02/MF A01
CSCL 06K

Shoulder and hip joints for hard space suits are disclosed which comprise 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 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 is partially within the inner race of the bearing between the torso and the innermost spherical section further to reduce bulk.
A Reed-Solomon decoder with dedicated hardware for five sequential algorithms was designed with overall pipelining by memory swapping between input, processing and output memories, and internal pipelining through the five algorithms. The code definition used in decoding is specified by a keyword received with each block of data so that a number of different code formats may be decoded by the same hardware.

A microprocessor system is provided with added memories to expand its address spaces beyond its address word length capacity by using indirect addressing instructions of a type having a detectable operations code and dedicating designated address spaces of memory to each of the added memories, one space to a memory. By decoding each operations code of instructions read from main memory into a decoder to identify indirect addressing instructions of the specified type, and then decoding the address that follows in a decoder to determine which added memory is associated therewith, the associated added memory is selectively enabled through a unit while the main memory is disabled to permit the instruction to be executed on the location to which the effective address of the indirect address instruction points, either before the indirect address is read from main memory or afterwards, depending on how the system is arranged by a switch.

Methods are described for using acoustic energy to agglomerate fine particles on the order of one micron diameter that are suspended in gas, to provide agglomerates large enough for efficient removal by other techniques. The gas with suspended particles, is passed through the length of a chamber while acoustic energy at a resonant chamber mode is applied to set up one or more acoustic standing wave patterns that vibrate the suspended particles to bring them together so they agglomerate. Several widely different frequencies can be applied to efficiently vibrate particles of widely differing sizes. The standing wave pattern can be applied along directions transversed to the flow of the gas. The particles can be made to move in circles by applying acoustic energy in perpendicular directions with the energy in both directions being of the same wavelength but 90 deg out of phase.
A system is described for acoustically levitating an object within a portion of a chamber that is heated to a high temperature, while a driver at the opposite end of the chamber is maintained at a relatively low temperature. The cold end of the chamber is constructed so it can be telescoped to vary the length ($L_1$) of the cold end portion and therefore of the entire chamber, so that the chamber remains resonant to a normal mode frequency, and so that the pressure at the hot end of the chamber is maximized. The precise length of the chamber at any given time, is maintained at an optimum resonant length by a feedback loop.

The feedback loop includes an acoustic pressure sensor at the hot end of the chamber, which delivers its output to a control circuit which controls a motor that varies the length ($L$) of the chamber to a level where the sensed acoustic pressure is a maximum.

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An unobscured three mirror wide-angle telescopic imaging system comprised of an input baffle which provides a 20 deg (Y axis) x 301 deg (X axis) field of view, a primary mirror having a convex spherical surface, a secondary mirror having a concave ellipsoidal reflecting surface, and a tertiary mirror having a concave spherical reflecting surface. The mirrors comprise mirror elements which are offset segments of parent mirrors whose axes and vertices commonly lie on the system’s optical axis. An iris diaphragm forming an aperture stop is located between the secondary and tertiary mirror with its center also being coincident with the optical axis and being further located at the beam waist of input light beams reflected from the primary and secondary mirror surfaces. At the system focus, following the tertiary mirror, is located a flat detector which may be, for example, a TV imaging tube or a photographic film. When desirable, a spectral transmission filter is placed in front of the detector in close proximity thereto.

An optical proximity sensor for optically detecting an object within a predetermined detection volume is described. More specifically, an optical proximity sensor is disclosed having an illuminator assembly including lens and a plurality of light-emitting diodes located at first predetermined positions along the focal plane of the illuminator lens. A detector assembly including a detector lens and a plurality of photodiodes located at second predetermined positions along the focal plane of the detector lens is also provided. The two lenses are spaced apart a predetermined distance in order to define a predetermined detection volume. Additionally, a combination of optical proximity sensors, according to the invention, is disclosed wherein the sensors can be used in conjunction with a vehicle to provide a safety system for warning an operator when an object is within a volume defined by the proximity sensor combination.

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The problem of GaAs device degradation at cryogenic temperatures at the interface of a GaAs device layer and openings in an overlying SiO2 passivation layer is addressed. This problem is solved by providing a semi-insulating GaAs passivation layer epitaxially grown on the underlying GaAs device layer. This structure provides a lattice-matched passivation layer not subject to severe mechanical stress at cryogenic temperatures.

Crystals of wide band gap materials are produced by positioning a holder receiving a seed crystal at the interface between a body of molten wide band gap material and an overlying layer of temperature-controlled, encapsulating liquid. The temperature of the layer decreases from the crystallization temperature of the crystal at the interface with the melt to a substantially lower temperature at which formation of crystal defects does not occur, suitably a temperature of 200°C to 600°C. After initiation of crystal growth, the leading edge of the crystal is pulled through the layer until the leading edge of the crystal enters the ambient gas headspace which may also be temperature controlled. The length of the column of liquid encapsulant may exceed the length of the crystal such that the leading edge and trailing edge of the crystal are both simultaneously with the column of the crystal. The crystal can be pulled vertically by means of a pulling-rotation assembly or horizontally by means of a low-angle withdrawal mechanism.
Abstracts are provided for 92 patents and patent applications entered into the NASA scientific and technical information system during the period January 1985 through June 1985. Each entry consists of a citation, an abstract, and in most cases, a key illustration selected from the patent or patent application.
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