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This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by RMS Associates.
Section 1 • Abstracts

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.
PUBLIC AVAILABILITY OF COPIES OF PATENTS AND PATENT APPLICATIONS

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

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

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

Inquiries concerning the NASA Patent Licensing Program or the availability of licenses for the commercial use of NASA-owned inventions covered by U.S. patents or pending applications for patent should be forwarded to the NASA Patent Counsel of the NASA installation having cognizance of the specific invention, or the 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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DOMESTIC: NASA and NASA-sponsored documents and a large number of aerospace publications are available to the public for reference purposes at the library maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York 10019

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In order to provide the general public with greater access to U S Government publications, Congress established the Federal Depository Library Program under the Government Printing Office (GPO), with 50 regional depositories responsible for permanent retention of material, inter-library loan, and reference services. Over 1,300 other depositories also exists. A list of the regional GPO libraries appears on the inside back cover.
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, GP-4, NASA, Washington, D.C. 20546

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

SUPPLEMENTARY INFORMATION:

PART 1245—PATENTS AND OTHER INTELLECTUAL PROPERTY RIGHTS

Subpart 2—Licensing of NASA Inventions

§ 1245.200 Scope of subpart.

This subpart prescribes the terms, conditions, and procedures upon which a NASA invention may be licensed. It does not affect licenses which 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; and (d) are otherwise authorized by law or treaty.

§ 1245.201 Policy and objective.

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

§ 1245.202 Definitions.

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

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

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

(d) “Small business firm” means a small business concern as defined at section 2 of Pub. L. 85-536 (15 U.S. C. 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of these regulations, the size standard for small business concerns involved in Government procurement, contained in 13 CFR 121.3-8, and in subcontracting, contained in 13 CFR 121.3-12, will be used.

(e) “Practical application” means to manufacture 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 to use the patent system to promote the utilization of inventions arising from NASA supported research and development.

(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 license.

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

§ 1245.206 Exclusive and partially exclusive licenses.

(a) Domestic licenses.
(1) Availability of licenses. Exclusive or partially exclusive licenses may be granted on NASA inventions: (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 (iv) in either situation, specified in (a)(1)(i) 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)(ii)(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 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 the interests of the Federal Government or the United States industry in foreign commerce will be enhanced, and
(iii) NASA has not determined that the granting 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:

(a) 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.

(b) The license shall be subject to any existing or future treaty or agreement under which the license is desired, including the United States.

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

(i) A determination 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;

(ii) A statement as to applicant's capability and intention to market the invention and geographic areas where applicant intends to use or sell the invention, or both;

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

(iv) A statement containing applicant's best knowledge of the extent to which the invention is being practiced by private industry or Government, or both, or is otherwise available commercially; and

(v) 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 Administrator for Patent Matters. Such review and final recommendation may include, and be based on, any additional information obtained from applicant and other sources that the Patent Counsel and the Director of Licensing deem relevant to the license requested. The determination to grant or deny the license shall be made by the Assistant General Counsel for Patent Matters based on the final recommendation of the Director of Licensing.

(b) When notice of a prospective exclusive or partially exclusive license is published in the Federal Register in accordance with §1245.206(a)(1)(ii)(A) or §1245.206(b)(1)(i), any written objections received in response thereto will be considered by the Director of Licensing in making the final recommendation to the Assistant General Counsel for Patent Matters.

(c) If the requested license, including any negotiated modifications, is denied by the Assistant General Counsel for Patent Matters, the applicant may request reconsideration by filing a written request for reconsideration within 30 days after receiving notice of denial. This 30-day period may be extended for good cause.

(d) In addition to, or in lieu of requesting reconsideration, the applicant may also appeal the denial of the license in accordance with §1245.211.

§1245.209 Notice to Attorney General.

A copy of the notice provided for in §§1245.206(a)(1)(ii)(A), (b) will be sent to the Attorney General.

§1245.210 Modification and termination of licenses.

Before modifying or terminating a license, other than by mutual agreement, NASA shall furnish the licensee and any sublicensee of record and written notice of intention to modify or terminate the license, and the licensee and any sublicensee shall be allowed 30 days after such notice to remedy any breach of the license or show cause why the license should not be modified or terminated.

§1245.211 Appeals.

(a) The following parties may appeal to the NASA Administrator or designee any decision or determination concerning the grant, denial, interpretation, modification, or termination of a license:

(1) A person whose application for a license has been denied;

(2) A licensee whose license has been modified or terminated, in whole or in part, or

(3) A person who timely filed a written objection in response to the notice required by §§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. Boggs,
Administrator.
October 15, 1981.

[FR Doc. 81-31083 Filed 10-30-81; 8:45 am]
BILLING CODE 7510-01-M
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**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

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**ASTRONAUTICS**  
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For related information see also Aeronautics

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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.
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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
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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
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64 NUMERICAL ANALYSIS N.A.
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65 STATISTICS AND PROBABILITY N.A.
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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
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75 PLASMA PHYSICS N.A.
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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
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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
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GENERAL

99 GENERAL N.A.

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Section 2 • Indexes

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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-861476) 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 a releaseable attached store from an upper pylon section mounted under wing. The links allow the lower pylon section to rotate in pitch about a remote pivot point. A leaf spring connected between the lower section and electrical alignment system servomechanism provides pitch alignment of the lower section/store combination. The servomechanism utilizes an electric servomotor to drive gear train and reversibly move the leaf spring, thereby maintaining the pitch attitude of store within acceptable limits. Damper strokes when lower section rotates to damp large oscillations of store.

Official Gazette of the U S Patent and Trademark Office
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

RESEARCH AND SUPPORT FACILITIES (AIR)

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

N85-19990* National Aeronautics and Space Administration Kennedy Space Center, Cocoa Beach, Fla

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 attitude 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

N85-21178* National Aeronautics and Space Administration Langley Research Center, Hampton, Va

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. The
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

LAUNCH VEHICLES AND SPACE VEHICLES

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

N85-20008* National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala
LOW LOSS INJECTOR FOR LIQUID PROPELLANT ROCKET ENGINES Patent Application
G L VONPRAGENAU, inventor (to NASA) 10 Jan 1985 16 p
(NASA-CASE-MFG-25989-1, NAS 1 71 MFG-25989-1,
US-PATENT-APPL-SN-690273) Available NTIS HC A02/MF A01
CSCL 21H

A low pressure loss injector element is disclosed for the main combustion chamber of a rocket engine which includes a lox post terminating in a cylindrical barrel. A lox plug received within the barrel which is threaded in the lox post and includes an interchangeable lox metering sieve which meters the lox into an annular lox passage. A second annular gas passage is coaxial with the annular lox passage. A cylindrical sieve surrounds the annular gas passage and includes an interchangeable gas metering sieve with metering orifices through which a hot gas passes into the annular passage. The jets which emerge from the annular lox passage and annular gas passage intersect at a point which is recessed away from the combustion area. The procedure enhances mixing and combustion stability.

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 VONTIESENHAUSEN, inventor (to NASA) 23 Aug 1984 13 p
(NASA-CASE-MFS-25966-1, NAS 1 71 MFS-25966-1,
US-PATENT-APPL-SN-643522) Available 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
(NASA-CASE-LEW-13881-1, NAS 1 71 LEW-13881-1;
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 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.

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.

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. NiCrAlR, FeCrAlR, and CoCrAlR alloys are satisfactory as bond coating compositions where R=Y or Yb. These alloys contain, by weight, 24-36% chromium, 5-18% aluminum, and 0.05 to 1.5% yttrium or 0.05 to 0.5% ytterbium. The coatings containing ytterbium are preferred over those containing yttrium. An outer thermal barrier coating of partially stabilized zirconium oxide (zircona) 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.

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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 nitried 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 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

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 process for preparing a thermoplastic poly(midesulfone) is disclosed. This resulting material has thermoplastic properties which are generally associated with polysulfones but not polyamides. The solvent resistant which is generally associated with polyimides but not polysulfones. This system is processable in the 250 to 350°C range for molding, adhesive and laminating applications. This material is particularly useful in the construction industry or a spatial vacuum environment. The component is 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.
A predetermined empirical scale to determine whether a high quality bond, good bond, or debond is present at the point of impact.

**N85-20128**# National Aeronautics and Space Administration

**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 23 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.

**N85-21347**# National Aeronautics and Space Administration

**PHOSPHORUS-CONTAINING IMIDE RESINS Patent**

I K VARMA (NAS-NRC, 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 the nitro analogues by reduction with hydrazine hydrate using palladized charcoal or Raney nickel as the catalyst and fiber reinforced cured resin composites.

**N85-21348**# National Aeronautics and Space Administration

**OXIDATION PROTECTION COATINGS FOR POLYMERS Patent Application**

M J MIRTICH, B A BANKS, and J S SOVEY, inventors (to NASA) 11 Sep 1984 11 p


A polymer substrate is coated with a metal oxide film to provide oxidation protection in low earth orbital environments. The film contains about 4 volume percent polymer to provide flexibility. A coil of polymer material moves through an ion beam as it is fed between reels. The ion beam first cleans the polymer material surface and then sputters the film material from a target onto this surface.

**N85-21348**# National Aeronautics and Space Administration

**PHTHALOCYANINE POLYMERS Patent**

B N ACHAR (NAS-NRS, Washington, D C), G M FOHLEN, and J A PARKER, inventors (to NASA) 12 Feb 1985 14 p

Filed 10 Nov 1982 Supersedes N83-14275 (21 - 05, p 0643)


Phthalocyanine polymers, including polyphthalocyanines, are disclosed. They are prepared by reacting phthalonitrile with diazotized aromatic amines to form phthalonitrile polymers, which are then reacted with phthalonitrile. These phthalocyanine polymers are used to produce colored films that are useful as protective coatings for high temperature structures.
A method of forming 4,4',4'',4'''-tetraamino phthalocyanines involves reducing 4,4',4'',4'''-tetrarnitro 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.
N85-21352* National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio.
CHEMICAL APPROACH FOR CONTROLLING NIMIMIDE 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.

N85-21360*# National Aeronautics and Space Administration
Langley Research Center, Hampton, Va
PROCESS FOR PREPARING HIGHLY OPTICALLY TRANSPARENT-COLORLESS AROMATIC POLYIMIDE FILM Patent Application
A K ST CLAIR and T L ST CLAIR, inventors (to NASA) 23 Aug. 1984 21 p
An aromatic condensation polyimide film that is approximately 90% transparent at 500 nm, useful for thermal protective coatings and the process for preparing same are disclosed. A feature to achieve maximum optical transparency films requires the utilization of recrystallized and/or sublimated specific aromatic diamines and dihydroxy monomers and introduction bulky electron withdrawing groups and separator groups into the polymer molecular structure. The incorporation of bulky electron withdrawing groups in the diamine portion of the polymer structure serves to reduce the formation of interchain and intrachain charge transfer complexes which normally cause large absorptions in the UV visible range. Incorporation of separator atoms into either the diamine or dihydroxy monomers serves to reduce the amount of conjugation and inter and intrachain electronic interactions to lessen charge transfer complex formation.

N85-21351*# National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif
METAL (11) 4,4',4''-PHTHALOCYANINE TETRAMINES AS CURING AGENTS FOR EPOXY RESINS Patent Application
B N ACHAR and G M FOHLEN, inventors (to NASA) 16 Apr 1984 17 p
Metal, preferably divalent copper, cobalt or nickel, phthalocyanine tetramines are used as curing agents for epoxides. The resulting copolymers have high thermal and chemical resistance and are homogeneous. They are useful as binders for laminates, e.g., graphite cloth laminate.

N85-21362*# National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif
FIRE RESISTANT POLYMERS BASED ON 1-(DIORGANO OXYPHOSPHONYL)methyl-2,4- AND 2,6-DIAMINO BENZENES Patent Application
J A MIKROYANNIDIS and D A KOURTIDES, inventors (to NASA) 11 Apr 1984 17 p
1-(diorgano oxyphosphonyl)methyl-2,4- and -2,6-diamino benzenes are reacted with polyacylhalides 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-diamno benzene was presented. The polymer precursors are prepared by reacting 1-(diorgano oxyphosphonyl)methyl-2,4- and -2,6-diamino benzene 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 benzene with aryl tetracarboxylic dianhydrides, such as benzophenone tetracarboxylic dianhydride, or aryl diisocyanates, such as methylenebis(4-phenyl isocyanate), 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.

A nebulization reflux concentrator for removing trace gas contaminants from a sample gas is described. Sample gas from a gas supply is drawn by a suction source into a vessel. The gas enters vessel through an atomizing nozzle, thereby atomizing and entraining a scrubbing liquid solvent drawn through a siphon tube from a scrubbing liquid reservoir. The gas and entrained liquid rise through the concentrator and impinge upon a solvent-phobic filter, whereby purified gas exits through the filter housing and contaminated liquid coalesces on the solvent-phobic filter and falls into a reservoir.

A diamondlike carbon film is deposited in the surface of a substrate by exposing the surface to an argon ion beam containing a hydrocarbon. The current density in the ion beam is low during initial deposition of the film. Subsequent to this initial low current condition, the ion beam is increased to full power. At the same time, a second argon ion beam is directed toward the surface of the substrate. The second ion beam has an energy level much greater than that of the ion beam containing the hydrocarbon.

A vacuum arc from a spot at the face of a graphite cathode to a graphite anode produces a beam of carbon ions and atoms. A carbon coating from this beam is deposited on an ion beam sputtered target to produce diamondlike carbon flakes. A graphite tube encloses the cathode, and electrical isolation is provided by an insulating sleeve. The tube forces the vacuum arc spot to be confined to the surface on the outermost end of the cathode. Without the tube the arc spot will wander to the side of the cathode. This spot movement results in low rates of carbon deposition, and the properties of the deposited flakes are more graphite-like than diamond-like.

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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
(NASA-CASE-LEW-14130-1, NAS 1 71 LEW-14130-1,
US-PATENT-APPL-SN-659475) Avail NTIS HC A02/MF A01
CSCL 13H

A very thin layer of highly textured carbon is applied to a copper surface by a technique 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
Application
J EVANS and P A STUDER, inventors (to NASA) 19 Feb 1985 9 p Filed 28 Jan 1983 Superseded N83-20153 (15 - 10, p 1526)
(NASA-CASE-GSC-12799-1; NAS 1 71 GSC-12799-1,
US-PATENT-4,500,265, US-PATENT-APPL-SN-481724,
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.
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 RMC 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.

N85-21428* 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.

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 ins which provides a controlled light signal to a camera tube. The camera tube converts the light signal provided by the lens ins into electrical signals. A feedback circuit in response to the electrical signals generated by the camera tube, provides feedback signals to the lens ins and the camera tube. This assures that the normalized video signal is maintained in a second illumination range.
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. Comparator 16 and multivibrator 17 are for producing pulses whenever the noisy cyclic signal exceeds the reference level during the negative half-cycle.
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.

A direct band-gap semiconductor is exposed to intensity-modulated photon radiation having a characteristic energy at least as great as the energy gap of the semiconductor. This produces a time dependent concentration of excess charge carriers through the material, producing a luminescence signal modulated at the same frequency as the incident radiation but shifted in phase by an amount related to the lifetime of minority carriers. In a preferred embodiment, the phase shift of the luminescence signal is determined by transforming it to a modulated electrical signal and mixing the electrical signal with a reference signal modulated at the same frequency and having a phase which is known relative to the incident radiation. Minority carrier lifetime is calculated by integrating a direct current component of the mixed signal ($F_{dc}$) over a 2-pi range in phase of the reference signal.

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.

A hollow cathode apparatus is described, which can be rapidly and reliably started. An ignitor positioned upstream from the hollow cathode, generates a puff of plasma that flows with the primary gas to be ionized through the cathode. The plasma puff creates a high voltage breakdown between the downstream end of the cathode and a keeper electrode, to heat the cathode to an electron-emitting temperature.
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.

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 utilizes a linear phase error as a result of distortion in a feedback loop. Respective responses are thus obtained from the three modes of calibration.

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.
35 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,
US-PATENT-CLASS-73-862 S4) Avail US Patent and
Trademark Office CSCL 14B

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.

N85-20295* National Aeronautics and Space Administration
Langley Research Center, Hampton, Va
MINIATURE ELECTROOPTICAL AIR FLOW SENSOR Patent
D D KERSHNER, inventor (to NASA) 4 Dec 1984 10 p
Filed 14 Apr 1983 Supersedes N83-25539 (21 - 14, p 2320)
(NASA-CASE-LAR-13065-1, NAS 1 71 LAR-13065-1,
Trademark Office CSCL 14B

A sensor for measuring flow direction and airspeed that is suitable, because of its small size, for rapid instrumentation of research airplanes is disclosed. A propeller driven sphere rotating at a speed proportional to airspeed presents a reflective target to an electro-optical system such that the duty cycle of the resulting electrical output is proportional to yaw angle and the frequency is proportional to airspeed.

N85-20298*# National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala
ANGULAR MEASUREMENT SYSTEM Patent Application
J R CURRIE and R KISSEL, 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 $S_1$, $V_{sub S_2}$) 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

**ADJUSTABLE INDICATING DEVICE FOR LOAD POSITION**
Patent Application
C. Heller, inventor (to NASA) 20 Dec 1984 10 p
(NASA-CASE-MFS-20087-1, NAS 1 71 MFS-20087-1, US-PATENT-APPL-SN-684154) Avail NTIS HC A02/MF A01 CSCL 14B

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.

**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.

**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 inlet and outlet sides. 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.
N85-21595* National Aeronautics and Space Administration
Lyndon B Johnson Space Center, Houston, Tex
SELF-CHARGING METERING AND DISPENSING DEVICE FOR FLUIDS Patent
Avail US Patent and Trademark Office CSCL 14B
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.

N85-21596* National Aeronautics and Space Administration
Pasadena Office, Calif
STATE-OF-CHARGE COULOMETER Patent
J J ROWLETTE, inventor (to NASA) (JPL, California Inst of Tech, Pasadena) 12 Feb 1985 15 p Filed 9 Apr 1982
Avail US Patent and Trademark Office CSCL 14B
A coulometer for accurately measuring the state-of-charge of an open-cell battery utilizing an aqueous electrolyte, includes a current meter for measuring the battery/discharge current and a flow meter for measuring the rate at which the battery produces gas during charge and discharge. Coupled to the flow meter is a gas analyzer which measures the oxygen fraction of the battery gas. The outputs of the current meter, flow meter, and gas analyzer are coupled to a programmed microcomputer which includes a CPU and program and data memories. The microcomputer calculates that fraction of charge and discharge current consumed in the generation of gas so that the actual state-of-charge can be determined. The state-of-charge is then shown on a visual display.

N85-21597* National Aeronautics and Space Administration
Pasadena Office, Calif
CARBON GRANULE PROBE MICROPHONE FOR LEAK DETECTION Patent
S P PARTHASARATHY, inventor (to NASA) (JPL, California Inst of Tech, Pasadena) 12 Feb 1985 5 p Filed 1 Jun 1983
Avail US Patent and Trademark Office CSCL 14B
A microphone which is not subject to corrosion is provided by employing carbon granules to sense sound waves. The granules are packed into a ceramic tube and no diaphragm is used. A pair of electrodes is located in the tube adjacent the carbon granules and are coupled to a sensing circuit. Sound waves cause pressure changes on the carbon granules which results in a change in resistance in the electrical path between the electrodes. This change in resistance is detected by the sensing circuit. The microphone is suitable for use as a leak detection probe in recovery boilers, where it provides reliable operation without corrosion problems associated with conventional microphones.
N85-21598* National Aeronautics and Space Administration
Wallops Flight Center, Wallops Island, Va.
THIN FILM STRAIN TRANSDUCER Patent
J L RAND, inventor (to NASA) (Southwest Research Inst, San
Antonio) 12 Feb 1985 7 p Filed 26 Aug 1983 Supersedes
N84-12448 (22-03, p 0376) Division of US Patent No. 4,425,808,
US Patent Appl SN-352827, filed 26 Feb 1982 Sponsored by
NASA (NASA-CASE-WLP-10055-2, NAS 1 71:WLP-10055-2,
US-PATENT-CLASS-29-610SG) Avail US Patent and
Trademark Office CSCL 14B
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

N85-21610* National Aeronautics and Space Administration
Langley Research Center, Hampton, Va.
A TWO-AXIS, SELF-NULLING SKIN FRICTION BALANCE Patent
Application
P TCHENG, inventors (to NASA) and F H SUPPLEE, JR 28
Feb 1985 9 p (NASA-CASE-LAR-13294-1, NAS 1 71 LAR-13294-1,
US-PATENT-APPL-SN-706681) Avail NTIS HC A02/MF A01
CSCL 14B
A skin friction force measuring device is described which is
comprised of a first pivoted L shaped arm, a second arm pivoted
on one end of the L shaped arm with a sensing element attached
to an end of the second arm In response to skin friction forces
on the sensing element the arms are pivoted about the two pivots
and two nulling means force the pivots back to their zero position
The outputs of the two nulling means are indicative of the skin
friction forces along two perpendicular axes in the plane of the
sensing element

N85-21631* National Aeronautics and Space Administration
Pasadena Office, Calif
PORTABLE REMOTE LASER SENSOR FOR METHANE LEAK
DETECTION Patent
W B GRANT (JPL, California Inst. of Tech, Pasadena) and E D
HINKLEY, JR, inventor (to NASA) (JPL, California Inst of Tech,
Pasadena) 18 Dec 1984 13 p Filed 24 Sep 1982 Supersedes
N83-33137 (21-21, p 3471) Sponsored by NASA
(NASA-CASE-NPO-15790-1, NAS 1 71 NPO-15790-1,
Avail US Patent and Trademark Office CSCL 20E
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

36 LASERS AND MASERS

36 LASERS AND MASERS
Includes parametric amplifiers.
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, reference laser beams with weak absorption characteristics are transmitted and 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 simultaneous laser pulse transmitter and receiver.

Includes auxiliary systems (non-power), machine elements and processes, and mechanical equipment.

A self-regulating, nonfrictional, active magnetic bearing is 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 damping 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, completes the valve movement at a substantially faster rate.

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, completes the valve movement at a substantially faster rate. A series of stop rings are received about
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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N85-20377*# National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio.
VARIABLE FRICTION SECONDARY SEAL FOR FACE SEALS
Patent Application
E. DI Russo, inventor (to NASA) 16 Nov 1984 8 p
(NASA-CASE-LEW-14170-1, NAS 1 71 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.

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

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 1 71 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
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.

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

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 1 71 MSC-20319-1,
US-PATENT-4,483,639, US-PATENT-APPL-SN-393582,
Office CSCL 13I
A mechanical connection system comprises a first body defining
a receptacle and a second body defining a pin mateably receivable
in the receptacle by relative movement in a first directional mode.
A primary latch is engagable 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
engagement of the primary latch and a releasing position permitting
release of the primary latch. The lock includes an operator portion
engagable 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 selectively insertable into and disengagable
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.

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N85-21650* National Aeronautics and Space Administration
Kennedy Space Center, Cape Canaveral, Fla.
WASHER AND WASHER SEAT Patent Application
J. E. HAM and J. D. LAMB, inventors (to NASA) 27 Nov 1984 11 p
Filed 8 Oct 1982 Supersedes N82-31691 (20 • 22, p 3141)
(NASA-CASE-KSC-20120-1, NAS 1 71 KSC-20120-1,
Office CSCL 13I
A washer and washer seat comprising the washer and a seat
engagable with the washer. The washer includes a rib extending
radially from the periphery of the washer and the seat
engagable with the rib for forming a seal.

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

APPARATUS AND METHOD TO KEEP THE WALLS OF A FREE-SPACE REACTOR FREE FROM DEPOSITS OF SOLID MATERIALS Patent
K A YAMAKAWA, inventor (to NASA) (JPL, California Inst of Tech, Pasadena) 19 Feb 1985 10 p Filed 8 Sep 1982 Supersedes N83-12986 (21 - 03, p 0455) Sponsored by NASA

A wideband passive synthetic-aperture multichannel receiver with an antenna 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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44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries, 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

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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N85-20535* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
LITHIUM COUNTERDOPED SILICON SOLAR CELL Patent
I WEINBERG and H W. BRANDHORST, JR., inventors (to NASA) 7 Nov 1984 10 p (NASA-CASE-LEW-14177-1, NAS 1 71 LEW-14177-1, US-PATENT-APPL-SN-669140) Avail. NTIS HC A02/MF A01 CSCL 10A

The resistance to radiation damage of an n(+)-p boron doped silicon solar cell is improved by lithium counterdoping. Even though lithium is an n-dopant in silicon, the lithium is introduced in small enough quantities so that the cell base remains p-type. The lithium is introduced into the solar cell wafer by implantation of lithium ions whose energy is about 50 keV. After this lithium implantation, the wafer is annealed in a nitrogen atmosphere at 375°C for two hours.

NASA

N85-21768* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
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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N85-21769* National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala
SOLAR POWERED ACTUATOR WITH CONTINUOUSLY VARIABLE AUXILIARY POWER CONTROL Patent
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.

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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 171 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
truncked 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 for rotation 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 171 ARC-11616-1,
US-PATENT-APPL-SN-684193) Avail NTIS HC A02/MF A01
CSCL 06O

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 171 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
comprising 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.

NASA
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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Includes light phenomena

An unobscured three mirror wide-angle telesopic 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 coincide with the system's optical axis. An iris diaphragm forming an aperture stop is located between the secondary and tertiary mirror with its center 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.

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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 SiO$_2$ 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 encapsulating liquid. The temperature of the layer decreases from the crystal growth temperature 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 within 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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Public Services Department
P O Box 12921— Cap Sta
Austin, TX 78753
(512) 471-2996

TEXAS TECH UNIV LIBRARY
Govt Dept
Lubbock, TX 79409
(806) 742-2686

UTAH STATE UNIVERSITY
Merrill Library, U M C 30
Logan, UT 84322
(801) 750-2592

UNIVERSITY OF VIRGINIA
Alderman Lib — Pub Doc
Charlottesville, VA 22901
(804) 924-3123

WASHINGTON STATE LIBRARY
Documents Section
Olympia, WA 98504
(206) 753-4027

WEST VIRGINIA LIBRARY
Governor’s State Library
Charlestown, WV 25414
(304) 293-0061

MILWAUKEE PUBLIC LIBRARY
814 West Wisconsin Avenue
Milwaukee, WI 53233
(414) 278-3000

ST HIST LIB OF WISCONSIN
University of Wisconsin
Government Pub Section
816 State Street
Madison, WI 53706
(608) 262-4347

WYOMING STATE LIBRARY
Supreme Ct & Library Bld
Cheyenne, WY 82002
(307) 777-6344