NASA SP-7039(27)  
Section 1  
Abstracts

NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY

Section 1 • Abstracts

JULY 1985

(NASA-SP-7039 (27)-Section-1) NASA PATENT ABSTRACTS BIBLIOGRAPHY: A CONTINUING BIBLIOGRAPHY. SECTION 1: ABSTRACTS (SUPPLEMENT 27) (National Aeronautics and Space Administration) 47 p HC $10.00 00/84 20938

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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Annotated references to NASA-owned inventions covered by U.S. patents and applications for patent that were announced in Scientific and Technical Aerospace Reports (STAR) between January 1985 and June 1985
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.
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-661478) 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.

NASA
INDEX SECTION (SECTION 2)

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

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

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

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

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

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

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

HOW TO USE THIS PUBLICATION TO IDENTIFY NASA INVENTIONS

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

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

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

3. **Using Patent Classification Index:** To identify all inventions covered by issued NASA patents (does not include applications for patent) within a desired Patent Classification, (A) turn to the Patent Classification Number in the Number Index of Section 2 and find the associated invention(s), and (B) follow the instructions outlined in (2)(B), and (D) above.
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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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PATENT LICENSING REGULATIONS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
14 CFR Part 1245

Licensing of NASA Inventions

AGENCY: National Aeronautics and Space Administration.

ACTION: Interim regulation with comments requested.

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

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

ADDRESS: Mr. John 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; or (d) are otherwise authorized by law or treaty.

§ 1245.201 Policy and objective.

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

§ 1245.202 Definitions.

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

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

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

(d) "Small business firm" means a small business concern as defined at section 2 of Pub L. 85-536 (15 U S C 632) and implementing regulations of the Administrator of the Small Business Administration. For the purpose of these regulations, the size standard for small business concerns involved in Government procurement, contained in 13 C.F.R 121 3-8, and in subcontracting, contained in 13 CFR 121 3-12, will be used.

(e) "Practical application" means to manufacture in the case of a composition or product, in practice in the case of a process or method, or to operate in the case of a machine or system, and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are to the extent permitted by law or Government regulations available to the public on reasonable terms.

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

§ 1245.203 Authority to grant licenses.

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

Restrictions and Conditions

§ 1245.200 All licenses granted under this subpart.

(a) Restrictions (1) A license may be granted only if the applicant has supplied NASA with a satisfactory plan for development or marketing of the invention, or both, and with information about the applicant's capability to fulfill the plan.

(2) A license granting rights to use or sell under a NASA invention in the United States shall normally be granted only to a licensee who agrees that any products embodying the invention or produced through the use of the invention will be manufactured substantially in the United States.

(b) Conditions (a) 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

Subpart 2—Licensing of NASA Inventions

Sec. 1245.213 Transfer of custody
1245.214 Confidentiality of information.


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; or (d) are otherwise authorized by law or treaty.

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(e) "Practical application" means to manufacture in the case of a composition or product, in practice in the case of a process or method, or to operate in the case of a machine or system, and, in each case, under such conditions as to establish that the invention is being utilized and that its benefits are to the extent permitted by law or Government regulations available to the public on reasonable terms.

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(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 (a) 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:
(1) 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 agreements with 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.

sublicense shall be furnished to NASA.
(5) The license shall require the licensee to carry out the plan for development or marketing of the invention, or both, to bring the invention to practical application within a period specified in the license, and to continue to make the benefits of the invention reasonably accessible to the public.
(6) The license shall require the licensee to report periodically on the utilization or efforts at obtaining utilization that are being made by the licensee, with particular reference to the plan submitted.
(7) All licenses shall normally require royalties or other consideration
(8) A license shall be furnished to NASA.
(9) The license shall provide for the right of NASA to terminate the license, in whole or in part, if:
(i) NASA determines that the licensee is not executing the plan submitted with its request for a license and the licensee cannot otherwise demonstrate to the satisfaction of NASA that it has taken or can be expected to take within a reasonable time effective steps to achieve practical application of the invention;
(ii) NASA determines that such action is necessary to meet requirements for public use specified by Federal regulations issued after the date of the license and such requirements are not reasonably satisfied by the licensee;
(iii) The licensee has willfully made a false statement of or willfully omitted a material fact in the license application or in any report required by the license agreement, or
(iv) The licensee commits a substantial breach of a covenant or agreement contained in the license.
(10) The license may be modified or terminated, consistent with this subpart, upon mutual agreement of NASA and the licensee.
(11) Nothing relating to the grant of a license, nor the grant itself, shall be construed to confer upon any person any immunity from or defenses under the antitrust laws or from a charge of patent misuse, and the acquisition and use of rights pursuant to this subpart shall not be immunized from the operation of state or Federal law by reason of the source of the grant.
within a 60-day period and following consideration of such objections;

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

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

(2) Conditions. In addition to the provisions of §1245 204, the following terms and conditions apply to foreign exclusive and partially exclusive licenses:

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

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

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

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

§1245 207 Application for a license.

An application for a license should be addressed to the Patent Counsel at the NASA installation having responsibility for the invention and shall normally include:

(a) Identification of the invention for which the license is desired, including the patent application serial number or patent number, title, and date, if known;

(b) Identification of the type of license for which the application is submitted;

(c) Name and address of the person, company, or organization applying for the license and the citizenship or place of incorporation of the applicant;

(d) Name, address, and telephone number of representative of applicant to whom copies of such license shall be sent;

(e) Nature and type of applicant’s business, identifying products or services which the applicant has successfully commercialized, and approximate number of applicant’s employees;

(f) Source of information concerning the availability of a license on the invention;

(g) A statement indicating whether applicant is a small business firm as defined in §1245 202(c);

(h) A detailed description of applicant’s plan for development or marketing of the invention, or both, which should include:

(1) A statement of the time, nature and amount of anticipated investment of capital and other resources which applicant believes will be required to bring the invention to practical application;

(2) A statement as to applicant’s capability and intention to fulfill the plan, including information regarding manufacturing, marketing, financial, and technical resources;

(3) A statement of the fields of use for which applicant intends to practice the invention;

(4) A statement of the geographic areas in which applicant intends to practice the invention, or both;

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

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

(k) Any other information which applicant believes will support a determination to grant the license to applicant.

§1245 208 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 modifications after negotiation with the licensee, or (3) deny the license. The Director of Licensing shall review the preliminary recommendation of the Patent Counsel and make a final recommendation to the NASA Assistant General Counsel for Patent Matters. Such review and final recommendation may include, and be based on, any additional information obtained from applicant and other sources that the Patent Counsel and the Director of Licensing deem relevant to the license requested. The determination to grant or deny the license shall be based on the final recommendation of the Director of Licensing.

(b) When notice of a prospective exclusive or partially exclusive license is published in the Federal Register in accordance with §1245 206(a)(1)(ii)(A) or §1245 206(b)(1)(i), any written objections received in response thereto will be considered by the Director of Licensing in making the final recommendation to the Assistant General Counsel for Patent Matters.

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

(d) In addition to, or in lieu of requesting reconsideration, the applicant may also appeal the denial of the license in accordance with §1245 211.

§1245 209 Notice to Attorney General.

A copy of the notice provided for in §§1245 206(a)(1)(ii)(A), and 1245 206(b)(1)(i) will be sent to the Attorney General.

§1245 210 Modification and termination of licenses.

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

§1245 211 Appeals.

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

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

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

(3) A person who timely filed a written objection in response to the notice required by §§1245 208(a)(1)(ii)(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. 81-3103 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)

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### ASTRONAUTICS

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For related information see also *Aeronautics*

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<td>Includes chemistry and materials (general), composite materials, inorganic and physical chemistry, metallic materials, nonmetallic materials, and propellants and fuels</td>
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<td><strong>CHEMISTRY AND MATERIALS</strong></td>
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<td>Includes physics (general), acoustics, atomic and molecular physics, nuclear and high-energy physics, optics, plasma physics, solid-state physics, and thermodynamics and statistical physics For related information see also Engineering</td>
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<td>SOCIAL SCIENCES</td>
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<td>Includes social sciences (general), administration and management, documentation and information science, economics and cost analysis; law and political science; and urban technology and transportation</td>
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<td>80 SOCIAL SCIENCES (GENERAL)</td>
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83 ECONOMICS AND COST ANALYSIS  N.A.
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84 LAW AND POLITICAL SCIENCE  N.A.
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85 URBAN TECHNOLOGY AND TRANSPORTATION  N.A.
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SPACE SCIENCES
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90 ASTROPHYSICS  N.A.
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91 LUNAR AND PLANETARY EXPLORATION  N.A.
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92 SOLAR PHYSICS  N.A.
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93 SPACE RADIATION  N.A.
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GENERAL

99 GENERAL  N.A.

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

Section 2 • Indexes

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xvi
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


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 are 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


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.

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

N85-19981*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va


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/rack section, and releasable 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.

NASA
08 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

09 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, Cape Canaveral, 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 altitude and speed of the aircraft. A compass is connected for supply electrical signals for the computer indicating the heading of the airplane. The computer upon receiving signals from the pressure transducer and compass, computes the signals that are fed to the signal synthesizer which, in turn, generates simulated navigational signals.

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

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
LAUNCH VEHICLES AND SPACE VEHICLES

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

N85-11122*# National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala
MAGNETIC SPIN REDUCTION SYSTEM FOR FREE SPINNING OBJECTS Patent Application
G F VONTIESENHAUSEN, inventor (to NASA) 23 Aug 1984 13 p

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

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

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. NiCrAIR, FeCrAIR, and CoCrAIR alloys are satisfactory as bond coating compositions where R=Y or Yb. These alloys contain, by weight, 24.9-36.7% chromium, 5.4-18.5% aluminum, and 0.05 to 1.55% yttrium or 0.05 to 0.53% ytterbium. The coatings containing ytterbium are preferred over those containing yttrium. An outer thermal barrier coating of partially stabilized zirconium oxide (zircoma) 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 zircoma consists of mixtures of cubic, tetragonal, and monoclinic phases.

Contaminants in an extended medium such as the wall of a building are mapped by locating neutron excitation source on one side of the wall and a gamma ray spectrometer, including a gamma ray detector on the opposite side of the wall facing the excitation source. The source and detector are moved in unison in discrete steps over opposing wall surfaces so as to determine the chemical composition of the elements in a hemispheric region of the wall adjacent the detector with the radius of the region being substantially that of the mean free path distance of gamma rays emitted from elements interacting with neutrons on the detector side of the wall. The source and detector are reversed for relatively thick walls for mapping the distribution of elements on the other side of the wall thickness. The output of the detector is fed to a...
multichannel pulse height analyzer where the intensity of the various gamma ray spectral lines are indicated relative to a dominant constituent element such as silicon. Resolution of anomalies such as the presence of voids and/or determining the bulk density of the medium is achieved by substituting a gamma ray source technique is also applied to metal alloys, such as iron alloys, in either the solid or molten state.

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

A surface of a steel substrate is nitrided by exposing it to a beam of nitrogen ions under a low pressure. The pressure is much lower than that employed for ion-nitriding, and an ion source is used instead of a glow discharge. Both of these features reduce the introduction of impurities into the substrate surface.

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

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.

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

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

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

N85-20123* National Aeronautics and Space Administration
Langley Research Center, Hampton, Va

THERMOSET-THERMOPLASTIC AROMATIC POLYAMIDE CONTAINING N-PROPARGYL GROUPS Patent

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

Official Gazette of the U S Patent and Trademark Office

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

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

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

Official Gazette of the U S Patent and Trademark Office

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

HOT MELT ADHESIVE ATTACHMENT PAD Patent

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

Official Gazette of the U S Patent and Trademark Office

N85-20126* National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala

INSULATION BONDING TEST SYSTEM Patent

A method and a system for testing the bonding of foam insulation attached to metal is described. The system involves the use of an impacter which has a calibrated load cell mounted on a plunger and a hammer head mounted on the end of the plunger. When the impacter strikes the insulation at a point to be tested, the load cell measures the force of the impact and the precise time interval during which the hammer head is in contact with the insulation. This information is transmitted as an electrical signal to a load cell amplifier where the signal is conditioned and then transmitted to a fast Fourier transform (FFT) analyzer. The FFT analyzer produces energy spectral density curves which are displayed on a video screen. The termination frequency of the energy spectral density curve may be compared with a
N85-20128* # National Aeronautics and Space Administration
Langley Research Center, Hampton, Va

PROCESS FOR PREPARING ESSENTIALLY COLORLESS POLYIMIDE FILM CONTAINING PHENOXY-LINKED DIAMINES Patent Application
A K STCLAIR and T L STCLAIR, inventors (to NASA) 23 Aug 1984 11 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
Ames Research Center, Moffett Field, Calif

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 tris-imides derived from tris(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 tris(m-aminophenyl) phosphine oxides from the nitro analogues by reduction with hydrazine hydrate using palladiumed charcoal or Raney nickel as the catalyst and fiber reinforced cured resin composites.

N85-20129* # National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio

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.
A method of forming 4,4',4"',4""'-tetraamino phthalocyanines involves reducing 4,4',4"',4""'-tetranoitro 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.

Polyimide resins suitable for use as composite matrix materials are formed by copolymerization of maleic and norbornenyl endcapped monomers and oligomers. The copolymers can be cured at temperatures under about 300 C by controlling the available concentration of the maleic end-capped reactant. Control can be achieved by adding sufficient amounts of said maleic reactant, or by chemical modification of either copolymer, so as to either increase Diels-Alder retrogression of the norbornenyl capped reactant and/or holding initiation and polymerization to a rate compatible with the availability of the maleic-capped reactant.

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

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


Polyimide resins suitable for use as composite matrix materials are formed by copolymerization of maleic and norbornenyl endcapped monomers and oligomers. The copolymers can be cured at temperatures under about 300 °C by controlling the available concentration of the maleic 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 norbornenyI capped reactant and/or hold initiation and polymerization to a rate compatible with the availability of the maleic capped reactant.

Official Gazette of the US Patent and Trademark Office

POLYIMIDE FILM Patent Application


An aromatic condensation polyimide film that is approximately 90% transparent at 500 nm, useful for thermal protective coatings and the process for preparing same are disclosed. A feature to achieve maximum optical transparency films requires the utilization of recrystallized and/or sublimated specific aromatic diamines and dianhydride monomers and introduction bulky electron withdrawing groups and separator groups into the polymer molecular structure. The incorporation of bulky electron withdrawing groups in the dianhydride portion of the polymer structure serves to reduce the amount of conjugation and inter and intrachain electronic interactions to lessen charge transfer complex formation.

FIRE RESISTANT PHOSPHORUS CONTAINING COMPOUNDS, POLYMIDES AND COPOLYMIDES Patent Application


Phosphorus containing polyimides and copolymides are synthesized in a two step polycondensation reaction from 1-(diorgano oxyphosphonyl)methyl-2,4- and -2,6-diambenzenes and tetracarboxylic anhydride. The diorganooxyphosphonyl group includes alkyl, such as ethyl, substituted alkyl, such as s 2-chloroethyl, and aryl such as phenyl. The tetracarboxylic anhydrides include compounds such as pyromellitic dianhydride and benzenophenone tetracarboxylic dianhydride. The glass transition temperature of the polyimides is reduced by incorporation of the (diorganooxyphosphonyl)methyl groups. Both the molecular weight and the thermal stability of the polymers are reduced with increasing concentration of the phosphorus moieties. The phosphorus containing copolymides show a considerably higher degree of fire resistance as compared to that of the corresponding common polyimides, and can be used in matrix composites composites in very thermally stable high temperature graphite composites for aircraft applications.
A novel class of fire and heat resistant bisimide resins prepared by thermal polymerization of maleimido or citraconimido substituted 1-(dialkox phosphonyl)methyl-2,4 and -2,6-diamino benzene was presented. The polymer precursors are prepared by reacting 1-(diorgano oxophosphonyl)methyl-2,4- and -2,6-diamino benzenes with maleic anhydride or citraconic anhydride in a mole ratio 1:2. Chain extension of the monomers is achieved by reacting the mono-N-maleimido derivatives of 1-(diorgano oxophosphonyl)methyl-2,4 and -2,6-diaminobenzenes with aryl tetracarboxylic dianhydrides, such as benzophenone tetracarboxylic dianhydride, or aryl diisocyanates, such as methylenebis (4-phenylisocyanate), 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 very thin layer of highly textured carbon is applied to a copper surface by a dc mode 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.

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.

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
W R WADE, inventor (to NASA) (Proteon Associates, Inc) 28 Sep 1984 23 p Sponsored by NASA

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

N85-21428* National Aeronautics and Space Administration
Pasadena Office, Calif
MULTICOMPUTER COMMUNICATION SYSTEM Patent
A K AGRAWAL (JPL, California Inst of Tech, Pasadena), P G MULLEN (JPL, California Inst of Tech, Pasadena), and V V VADAKAN, inventors (to NASA) (JPL, California Inst of Tech, Pasadena) 8 Jan 1985 17 p Filed 3 Apr 1981 Supersedes N83-20634 (21 - 10, p 1596) Sponsored by NASA

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.

Official Gazette of the U S Patent and Trademark Office
A double reference pulse phase locked loop is described which measures the phase shift between tone burst signals initially derived from the same periodic signal source (voltage controlled oscillator) and delayed by different amounts because of two different paths. A first path is from the transducer to the surface of a sample and back, and a second path is from the transducer to the opposite surface and back. A first pulse phase locked loop including a phase detector and a phase shifter forces the tone burst signals delayed by the second path in phase quadrature with the periodic signal source. A second pulse phase locked loop including a second phase detector forces the tone burst signals delayed by the first path into phase quadrature with the phase shifted periodic signal source.

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

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

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

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

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

A method and apparatus to measure the thickness of liquid independent of liquid conductivity are disclosed. Two pairs of round, corrosion resistant wires 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 is 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,

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 S1, V sub S2) are averaged and algebraically related to the opposite type output pulse (V sub c) occurring between the averaged pulses to provide a precise indication of the angle of a shaft coupled to the resolver at the instant of the occurrence of the intermediately occurring pulse (V sub c).

EMITTED VIBRATION MEASUREMENT DEVICE AND METHOD
Patent Application

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

A fluid sampler for collecting a plurality of discrete samples over separate time intervals is presented. The sampler comprises a sample assembly with an inlet and a plurality of discrete 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.
35 INSTRUMENTATION AND PHOTOGRAPHY

N85-21595 National Aeronautics and Space Administration
Lyndon B Johnson Space Center, Houston, Tex
SELF-CHARGING METERING AND DISPENSING DEVICE FOR FLUIDS Patent

A self-metering and dispensing device for fluids obtained from a pressured 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.

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determined. The state-of-charge is then shown on a visual display.

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N85-21597 National Aeronautics and Space Administration
Pasadena Office, Calif
CARBON GRANULE PROBE MICROPHONE FOR LEAK DETECTION Patent

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.

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

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

LASERS AND MASERS

PROJECTION LENS SCANNING LASER VELOCIMETER SYSTEM Patent Application

A laser Doppler velocimeter system is disclosed that has a laser, a waist position adjusting lens, and a beam splitter which direct laser beams parallel to the optical axis of the negative lens. The negative lens is fixed relative to an afocal lens pair. A pair planar mirrors intersect at right angles and respectively intersect the optical axis and the optical axis of the afocal lens pair. Mirrors are movable along the optical axis toward and away from the afocal lens pair to focus the laser beams in focus area while maintaining a constant beam waist, crossing angle, and intersection with other laser beams. This produces a constant sensitive volume as the focus is changed.

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

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

METHOD OF AND APPARATUS FOR MEASURING TEMPERATURE AND PRESSURE Patent
C L KORB and J E KALSHOVEN, JR, inventors (to NASA)
15 Jan 1985 17 p Filed 28 May 1982 Supersedes N82-29560

Aval US Patent and Trademark Office CSCL 20E

N85-20338* National Aeronautics and Space Administration Lyndon B Johnson Space Center, Houston, Tex
SLOW OPENING VALVE Patent
D F DRAPEAU, inventor (to NASA) (Hamilton Standard, Windsor Locks, Conn ) 20 Nov 1984 6 p Filed 25 Jun 1982 Supersedes N82-28641

Aval US Patent and Trademark Office CSCL 13K

N85-20337* National Aeronautics and Space Administration Goddard Space Flight Center, Greenbelt, Md
LINEAR MAGNETIC BEARINGS Patent

Aval US Patent and Trademark Office CSCL 13I

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 dampening any undesired axial movement of the armature or to axially move the armature either continuously or fixedly.

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the body in frictional abutting relationship and serially rotated by
the handle to uniformly resist handle movement independently of
the extent of handle movement.

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

N85-20377*# National Aeronautics and Space Administration
Lewis Research Center, Cleveland, Ohio.

VARIABLE FRICTION SECONDARY SEAL FOR FACE SEALS
Patent Application
E. DIrusso, inventor (to NASA) 16 Nov 1984 8 p
(NASA-CASE-LEW-14170-1, NAS 171 LEW-14170-1,
US-PATENT-APPL-SN-672224) Avail: NTIS HC A02/MF A01
CSCL 11A

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

N85-21649* National Aeronautics and Space Administration
Lyndon B. Johnson Space Center, Houston, Tex.

CONNECTION SYSTEM Patent
B. MCCandless, II, inventor (to NASA) 20 Nov 1984 9 p
Filed 30 Jun 1982 Supersedes N82-31689 (20-22, p 3137)
(NASA-CASE-MSC-20319-1, NAS 171 MSC-20319-1,
US-PATENT-4,483,639, US-PATENT-APPL-SN-393582,
Office CSCL 131

A mechanical connection system comprises a first body defining
a receptacle and a second body defining a pin matingly receivable
in the receptacle by relative movement in a first directional mode.
A primary latch is 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 selectivity 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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N85-20378*# National Aeronautics and Space Administration
Marshall Space Flight Center, Huntsville, Ala.

TUBE COUPLING DEVICE Patent Application
W. N. MEYERS and L. A. HEIN, inventors (to NASA) 18 Jan
1985 12 p
(NASA-CASE-MFS-25964-1, NAS 171 MFS-25964-1,
US-PATENT-APPL-SN-692801) Avail: NTIS HC A02/MF A01
CSCL 13K

A first annular ring has a keyed opening sized to fit around
the nut region of a male coupling and a second annular ring has
a keyed opening sized to fit around the 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.
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.

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.

An apparatus and method is disclosed for keeping interior walls of a reaction vessel free of undesirable deposits of solid materials in gas-to-solid reactions. The apparatus includes a movable cleaning head which is configured to be substantially complementary to the interior contour of the walls of the reaction vessel. The head ejects a stream of gas with a relatively high velocity into a narrow space between the head and the walls. The head is moved substantially continuously to at least intermittently blow the stream of gas to substantially the entire surface of the walls wherein undesirable solid deposition is likely to occur. The disclosed apparatus and process is particularly useful for keeping the walls of a free-space silane-gas-to-solid-silicon reactor free of undesirable silicon deposits.

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.

Includes remote sensing of earth resources by aircraft and spacecraft, photogrammetry, and aerial photography.
received signals are fed to several channels which are tuned to separate selected frequencies. Their outputs are fed to a processor with a memory for storage. As the antenna points to pixels within a calibration area around a buoy of known coordinates, signals are likewise received and stored. Exactly measured sea temperature is received from the buoy. After passing over several calibration areas, a forward stepwise regression analysis is performed to produce an expression which selects the significant from the insignificant channels and assigns weights (coefficients) to them. The expression is used to determine the sea temperature at each pixel based on the signals received therefrom. Wind temperature, pressure, and wind speed at each pixel can also be calculated.

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ENERGY PRODUCTION AND CONVERSION

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

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

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

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N85-20535* National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio
LITHIUM COUNTERDOPED SILICON SOLAR CELL Patent

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

NASA

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

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

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

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46 GEOPHYSICS

Includes aeronomy, upper and lower atmosphere studies, ionospheric and magnetospheric physics, and geomagnetism.

N85-21846* National Aeronautics and Space Administration Pasadena Office, Calif

METHOD AND APPARATUS FOR CALIBRATING THE IONOSPHERE AND APPLICATION TO SURVEILLANCE OF GEOPHYSICAL EVENTS Patent


Supersedes N82-26890 (20 - 17, p 2441)


The columnar electron content of the ionosphere between a spacecraft and a receiver is measured in real-time by cross correlating two coherently modulated signals transmitted at different frequencies (L1,L2) from the spacecraft to the receiver using a cross correlator. The time difference of arrival of the modulated signals is proportional to electron content of the ionosphere. A variable delay is adjusted relative to a fixed delay in the respective channels (L1,L2) to produce a maximum at the cross correlator output. The difference in delay required to produce this maximum is a measure of the columnar electron content of the ionosphere. A plurality of monitoring stations and spacecraft (Global Positioning System satellites) are employed to locate any terrestrial event that produces an ionospheric disturbance.

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52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation, and weightlessness.

N85-20639* National Aeronautics and Space Administration Marshall Space Flight Center, Huntsville, Ala

PHOTOREFRACTIVE OCULAR SCREENING SYSTEM Patent Application

J H KERR (Electro-Optics Consultants, Inc) and J R RICHARDSON, inventors (to NASA) 28 Sep 1984 25 p


CSCL 06B

A method and apparatus for detecting human eye defects, particularly detection of refractive error is presented. Eye reflex is recorded on color film when the eyes are exposed to a flash of light. The photographs are compared with predetermined standards, to detect eye defects.

NASA
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

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

**N85-20666**
National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif

**ELBOW AND KNEE JOINT FOR HARD SPACE SUITS AND THE LIKE Patent Application**

H C VYKUKAL, inventor (to NASA) 20 Dec 1984 22 p
(NASA-CASE-ARC-11610-1, NAS 1 71 ARC-11610-1, US-PATENT-APPL-SN-684190) Avail NTIS HC A02/MF A01 CSCL 06K

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

**N85-21987**
National Aeronautics and Space Administration
Ames Research Center, Moffett Field, Calif

**TORSO SIZING RING CONSTRUCTION FOR HARD SPACE SUIT Patent Application**

H C VYKUKAL, inventor (to NASA) 20 Dec 1984 15 p
(NASA-CASE-ARC-11616-1, NAS 1 71 ARC-11616-1, US-PATENT-APPL-SN-684193) Avail NTIS HC A02/MF A01 CSCL 06K

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.
60 COMPUTER OPERATIONS AND HARDWARE

N85-20680* National Aeronautics and Space Administration
Pasadena Office, Calif
REED-SOLOMON DECODER Patent Application
C R LAHMEYER (JPL, California Inst of Tech, Pasadena) 21 Nov 1984 35 p Sponsored by NASA
(NASA-CASE-NPO-15982-1, NAS 171 NPO-15982-1,
US-PATENT-APPL-SN-673685) Available NTIS HC A03/MF A01
CSCL 09B

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.

N85-21992* National Aeronautics and Space Administration
Pasadena Office, Calif
AUTOMATIC MULTI-BANKING OF MEMORY FOR MICROPROCESSORS Patent
G A WIKER, inventor (to NASA) (JPL, California Inst of Tech, Pasadena) 6 Nov 1984 10 p Filed 7 Aug 1981 Supersedes
N82-11785 (20 - 02, p 0250) Sponsored by NASA
(NASA-CASE-NPO-15295-1, NAS 171 NPO-15295-1,
US-PATENT-4,481,570, US-PATENT-APPL-SN-291645,
CSCL 09B

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.

AOCUSTICS

Includes sound generation, transmission, and attenuation

N85-22104* National Aeronautics and Space Administration
Pasadena Office, Calif.
ACOUSTIC AGGLOMERATION METHODS AND APPARATUS Patent
M B BARMATZ, inventor (to NASA) (JPL, California Inst of Tech, Pasadena) 9 Oct 1984 7 p Filed 24 Mar 1982 Supersedes
N82-27087 (20 - 17, p 2469) Sponsored by NASA
(NASA-CASE-NPO-15466-1, NAS 171 NPO-15466-1,
US-PATENT-4,475,921, US-PATENT-APPL-SN-361217,
CSCL 20A

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 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.

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ACOUSTICS

Includes sound generation, transmission, and attenuation

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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SOLID-STATE PHYSICS

Includes superconductivity

LOW STRESS SEMICONDUCTOR-INSULATOR INTERFACE FOR CRYOGENIC DEVICE APPLICATIONS Patent Application
G SHERRILL (JPL, California Inst of Tech, Pasadena) and R J MATTAUCH, inventors (to NASA) (JPL, California Inst of Tech, Pasadena) 10 Jan 1985 8 p
(Contract NAS7-100)

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

TOTAL IMMERSION CRYSTAL GROWTH Patent Application
A D MORRISON, inventor (to NASA) (JPL, California Inst of Tech, Pasadena) 21 Nov 1984 20 p
(Contract NAS7-100)

Crystals of wide band gap materials are produced by positioning a holder receiving a seed crystal at the interface between a body of molten wide band gap material and an overlying layer of temperature-controlled, encapsulating liquid. The temperature of the layer decreases from the crystallization temperature of the crystal 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.
**Abstract**

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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