NASA SP-7037(41)

AERONAUTICAL ENGINEERING

A SPECIAL BIBLIOGRAPHY WITH INDEXES

Supplement 41

FEBRUARY 1974

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA SP-7037 (41)		

4. Title and Subtitle	5. Report Date
AERONAUTICAL ENGINEERING A Special Bibliogrpahy (Supplement 41)	February 1974
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
	10. Work Unit No.
9. Performing Organization Name and Address	11. Contract or Grant No.
National Aeronautics and Space Administration Washington, D. C. 20546	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This special bibliography lists 514 reports, articles, and other documents introduced into the NASA scientific and technical information system in January 1974.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Aerodynamics Aeronautical Engineering Aeronautics Bibliographies	Unclassified - Unlimited.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	151	

*For sale by the National Technical Information Service, Springfield, Virginia 22151

NASA SP-7037 (41)

AERONAUTICAL ENGINEERING

A Special Bibliography

Supplement 41

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in January 1974 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

Scientific and Technical Information Office
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
FEBRUARY 1974
Washington, D.C.

ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges:

IAA (A-10000 Series)	A74-10001—A74-12970
STAR (N-10000 Series)	N74-10001—N74-11803

This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Tisco, Inc.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through July 1, 1974.

This Supplement is available from the National Technical Information Service (NTIS), Springfield, Virginia 22151, for $4.00. For copies mailed to addresses outside the United States, add $2.50 per copy for handling and postage.

INTRODUCTION

Under the terms of an interagency agreement with the Federal Aviation Administration this publication has been prepared by the National Aeronautics and Space Administration for the joint use of both agencies and the scientific and technical community concerned with the field of aeronautical engineering. The first issue of this bibliography was published in September 1970 and the first supplement in January 1971. Since that time, monthly supplements have been issued.

This supplement to *Aeronautical Engineering—A Special Bibliography* (NASA SP-7037) lists 514 reports, journal articles, and other documents originally announced in January 1974 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*.

The coverage includes documents on the engineering and theoretical aspects of design, construction, evaluation, testing, operation, and performance of aircraft (including aircraft engines) and associated components, equipment, and systems. It also includes research and development in aerodynamics, aeronautics, and ground support equipment for aeronautical vehicles.

Each entry in the bibliography consists of a standard bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections, *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Three indexes—subject, personal author, and contract number—are included.

An annual cumulative index will be published.

AVAILABILITY OF CITED PUBLICATIONS

IAA ENTRIES (A74-10000 Series)

All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc., (AIAA), as follows: Paper copies are available at $5.00 per document up to a maximum of 20 pages. The charge for each additional page is 25 cents. Microfiche [1] are available at the rate of $1.00 per microfiche for documents identified by the # symbol following the accession number. A number of publications, because of their special characteristics, are available only for reference in the AIAA Technical Information Service Library. Minimum airmail postage to foreign countries is $1.00. Please refer to the accession number, e.g., A74-11072, when requesting publications.

STAR ENTRIES (N74-10000 Series)

A source from which a publication abstracted in this Section is available to the public is ordinarily given on the last line of the citation, e.g., Avail: NTIS. The following are the most commonly indicated sources (full addresses of these organizations are listed at the end of this introduction).

Avail: NTIS. Sold by the National Technical Information Service at the price shown in the citation. If no price is shown in a current *STAR* citation, it may be ascertained by referring to *Government Reports Announcements* or to NTIS. Beginning with documents announced in Issue 21, 1973, "stocked" reports, such as printed NASA reports are priced on a step schedule ranging irregularly from $2.75 for a 1-to-25 page report to $10.75 for 576 to 600 pages, plus $2.00 for each additional 100-page increment. Demand print reports (those for which a facsimile reproduction will be made to fill orders) are priced at $3.00 for the first 20 pages plus 25 cents for each five pages or portions thereof. These prices are not applied retroactively; i.e., reports previously announced at a certain price continue to be sold at that price. If "Avail: NTIS" without a price appeared in the citation of a NASA report (asterisked) it is sold at $3.00 whether printed copy or facsimile is supplied. Because of price changes and possible surcharges, it is recommended that for any document announced in *STAR* before July 1970, NTIS be queried as to the price. Document prices are subject to change without notice. See "Avail: SOD" below for documents available from both the Superintendent of Documents and NTIS.

Microfiche. Microfiche is available from NTIS at a standard price of $1.45 (regardless of age) for those documents identified by the # sign following the accession number (e.g., N74-10036#) and having an NTIS availability shown in the citation. Standing orders for microfiche of (1) the full collection of NTIS-available documents announced in *STAR* with the # symbol, (2) NASA reports only (identified by an asterisk (*)), (3) NASA-accessioned non-NASA reports only (for those who wish to maintain an integrated microfiche file of aerospace documents by the "N" accession number), or (4) any of these classes within one or more *STAR* categories, also may be placed with NTIS at greatly reduced prices per title (e.g., 45 cents) over individual requests. Inquiries concerning NTIS Selective Categories

(1) A microfiche is a transparent sheet of film, 105 x 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 24:1 reduction).

in Microfiche should be addressed to the Subscription Unit, National Technical Information Service.

Deposit Accounts and Customers Outside U.S. NTIS encourages its customers to open deposit accounts to facilitate the purchase of its documents now that prices vary so greatly.

NTIS customers outside the United States are reminded that they should add the following handling and postage charges to the standard or announced prices: hard (paper) copy, $2.50 each document; microfiche, $1.50 each document. For subscribers outside the United States who receive microfiche through the Selective Categories in Microfiche program, NTIS will add 15 cents for each title shipped.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The price is given following the availability line. (An order received by NTIS for one of these documents will be filled at the SOD price if hard copy is requested. NTIS will also fill microfiche requests, at the standard $1.45 price, for those documents identified by a # symbol.)

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the Mississippi Test Facility, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: NASA Scientific and Technical Information Office. Documents with this availability are usually news releases or informational brochures available without charge in paper copy.

Avail: AEC Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of U.S. Atomic Energy Commission reports, usually in microfiche form, are listed in *Nuclear Science Abstracts*. Services available from the USAEC and its depositories are described in a booklet, *Science Information Available from the Atomic Energy Commission* (TID-4550), which may be obtained without charge from the USAEC Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts*, and are sold by University Microfilms as xerographic copy (HC) at $10.00 each and microfilm at $4.00 each, regardless of the length of the manuscript. Handling and shipping charges are additional. All requests should cite the author and the Order Number as they appear in the citation.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc., (PHI), Redwood City, California. The U.S. price (including a service charge) is given, or a conversion table may be obtained from PHI.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown (If none is given, inquiry should be addressed to BLL).

Avail: ZLDI. Sold by the Zentralstelle für Luftfahrtdokumentation und -Information, Munich, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability: Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent Office. Sold by Commissioner of Patents, U.S. Patent Office, at the standard price of $.50 each, postage free.

Other availabilities: If the publication is available from a source other than the above, the publisher and his address will be displayed entirely on the availability line or in combination with the corporate author line.

GENERAL AVAILABILITY

All publications abstracted in this bibliography are available to the public through the sources as indicated in the *STAR Entries* and *IAA Entries* sections. It is suggested that the bibliography user contact his own library or other local libraries prior to ordering any publication inasmuch as many of the documents have been widely distributed by the issuing agencies, especially NASA. A listing of public collections of NASA documents is included on the inside back cover.

SUBSCRIPTION AVAILABILITY

This publication is available on subscription from the National Technical Information Service (NTIS). The annual subscription rate for the monthly supplements, excluding the annual cumulative index, is $18.00. All questions relating to subscriptions should be referred to the NTIS.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
750 Third Ave.
New York, N.Y. 10017

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents
U.S. Patent Office
Washington, D.C. 20231

Engineering Sciences Data Unit Ltd.
251-259 Regent Street
London W1R 7AD, England

ESRO/ELDO Space Documentation Service
European Space Research Organization
114, av. Charles de Gaulle
92-Neuilly-sur-Seine, France

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 33
College Park, Maryland 20740

National Aeronautics and Space
Administration
Scientific and Technical Information
Office (KSI)
Washington, D.C. 20546

National Technical Information Service
Springfield, Virginia 22151

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms, Inc.
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Inc.
Tylers Green
London, England

U.S. Atomic Energy Commission
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

Zentralstelle für Luftfahrtdoku-
mentation und-Information
8 München 86
Postfach 880
Federal Republic of Germany

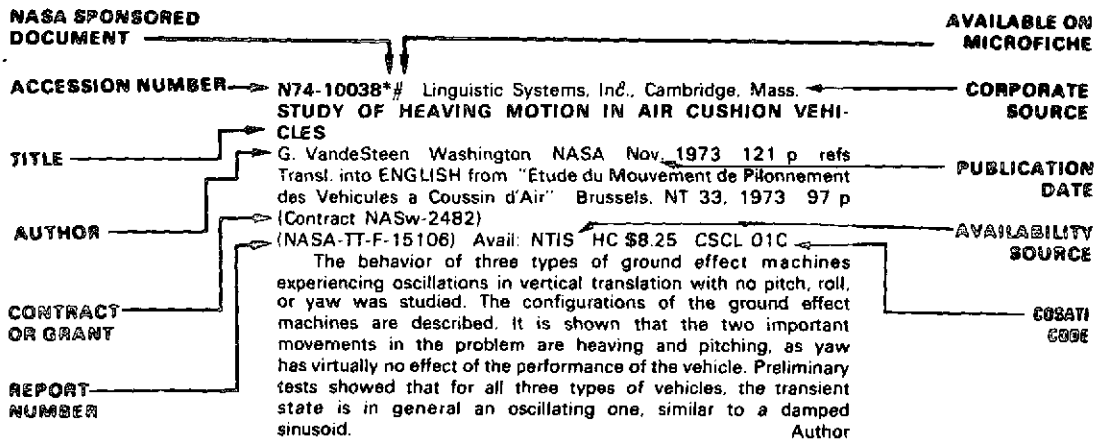
TABLE OF CONTENTS

Page

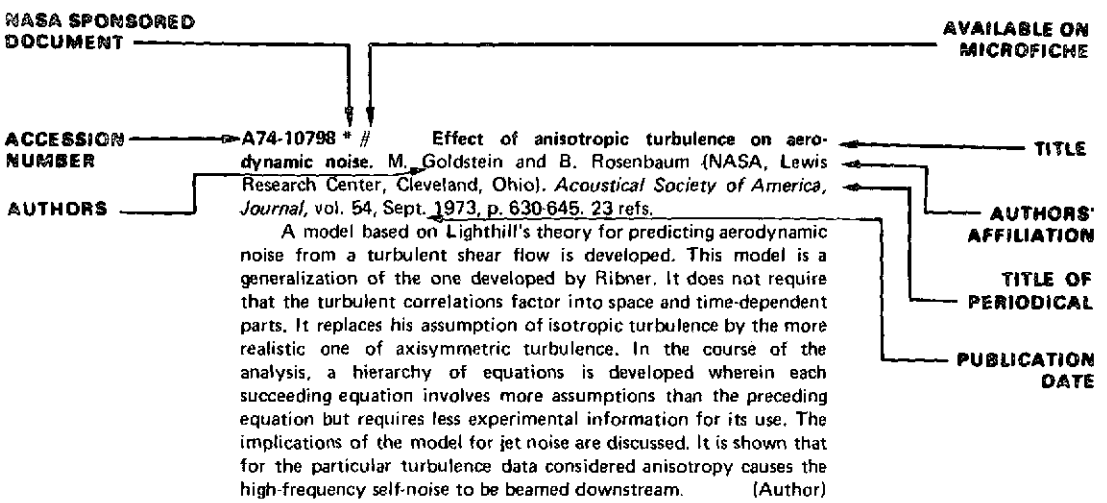
IAA Entries 1
STAR Entries 35

Subject Index A-1
Personal Author Index B-1
Contract Number Index C-1

TYPICAL CITATION AND ABSTRACT FROM *STAR*



TYPICAL CITATION AND ABSTRACT FROM *IAA*



AERONAUTICAL ENGINEERING

A Special Bibliography (Suppl. 41) FEBRUARY 1974

IAA ENTRIES

A74-10018 **A cylindrical phased-array antenna for ATC interrogation.** R. J. Giannini, J. H. Gutman, and P. W. Hannan (Hazeltine Corp., Greenlawn, N.Y.). *Microwave Journal*, vol. 16, Oct. 1973, p. 46-49. 8 refs.

Description of an electronically scanned, cylindrical phased-array interrogator antenna designed as an important element of air traffic control systems of the 1980's. The circular-cylinder antenna array comprises 224 columns with 16 stripline-dipole radiating elements in each column, and is 8 feet high and roughly 40 feet in diameter. The main fan beam of the antenna is used for aircraft interrogation at 1030 MHz and for reception of transponder replies at 1090 MHz. Details are given on the design, performance, and radiation patterns of the antenna. It is expected that the stationary nonrotating antenna will have almost negligible probability of mechanical failure. V.Z.

A74-10029 **Calculation of the characteristics of multistage axial turbomachines (Berechnung der Kennfelder mehrstufiger axialer Turbomaschinen).** N. Gasparovic and D. Stapersma. *Forschung im Ingenieurwesen*, vol. 39, no. 5, 1973, p. 133-143. 7 refs. In German.

The calculation is based on comparatively simple mathematical models for axial compressors and turbines. A theory of the processes occurring at an individual stage provides the starting point for the new approach. Multistage turbomachines are analyzed by a summation process, taking into account each stage in succession. The determination of the characteristic heat content value of the individual stage is discussed together with the computation of the temperature ratio, the pressure ratio, the corrected speed, the pressure parameter, the mass flow, and the losses. G.R.

A74-10030 **The behavior of axial compressor cascades in the case of deviations from purely cylindrical flow (Das Verhalten axialer Verdichtergitter bei Abweichungen von der rein zylindrischen Strömung).** J. Hourmouziadis. *(Deutsche Gesellschaft für Luft- und Raumfahrt, Sitzung des Fachausschusses für luftatmende Antriebie, Friedrichshafen, West Germany, Dec. 12, 1972.) Forschung im Ingenieurwesen*, vol. 39, no. 5, 1973, p. 144-148. 10 refs. In German.

An approach developed by Wu and Brown (1951) is very suitable for the calculation of two-dimensional flow in the blade channel. The approach is based on steady, frictionless flow without external mass forces. The effect of a variable radial extension of the flow is discussed together with the influence of peripheral velocity and stream surface inclination. A radial flow constriction is found to produce an improvement concerning the critical flow Mach number. G.R.

A74-10033 **Annular slot and frontal slot flow (Ringspalt- und Stirnspaltströmung).** H. W. Hahnemann (Verein Deutscher Ingenieure, Düsseldorf, West Germany). *Forschung im Ingenieurwesen*, vol. 39, no. 5, 1973, p. 164-166. In German.

Relations reported by Kleinert (1972) concerning the flow of a fluid through a narrow annular slot with smooth walls are considered. Kleinert has also investigated the effect of a rotation of the internal wall on the flow for the case in which the external wall is held in a fixed position. The theoretical results have been confirmed by an experimental investigation. Questions of radial frontal slot flow have also been studied by Kleinert (1972). G.R.

A74-10070 # **Inverting the mapping function (O odwracaniu funkcji odwzorowujacej).** M. E. Klonowska and I. A. Styczek. *Archiwum Budowy Maszyn*, vol. 20, no. 2, 1973, p. 369-371. In Polish.

Description of a method for determining the coefficients of a Laurent series expansion of the inverse of a function for mapping of a circle into an airfoil. These coefficients are obtained from a recurrent relationship that expresses them explicitly through the series expansion coefficients of the mapping function. T.M.

A74-10144 **The technology and economics of commercial airplane design. I.** J. E. Steiner (Boeing Co., Commercial Airplane Group, Renton, Wash.). *Esso Air World*, vol. 25, no. 5, 1973, p. 119-124.

Discussion of the relation between technology and economics in commercial aviation. Past and present priority orders of aircraft market requirements in speed, range, frequency, quietness, passenger comfort and economics are compared. Direct operating cost trends, aerodynamic efficiency trends, thrust-to-weight growth, engine fuel efficiency trends, payload efficiency, airline revenues vs passenger yield, progress in takeoff noise reduction, return on investment, and approach noise are covered. Improved technology, two-man crew, reduced block time and maintenance cost, and communality/facilities compatibility are listed as elements of improved commercial aircraft design economics. V.Z.

A74-10145 **The technology and economics of commercial airplane design. II.** J. E. Steiner (Boeing Co., Commercial Airplane Group, Renton, Wash.). *ESSO Air World*, vol. 25, no. 6, 1973, p. 147-152.

An overview of aircraft design durability aspects in terms of fatigue and corrosion avoidance, and bonding implies that any aircraft produced by this company can have a useful life of at least 15 years without increased maintenance costs. The use of the correct size aircraft for each principal job is suggested as an effective step for optimization of the economics of the airlines. Aircraft price is considered the most significant single factor of commercial aircraft design economics. Some statistical data are given to illustrate the economic aspects of commercial aviation. V.Z.

A74-10148 * # **Influence of noise requirements on STOL propulsion system designs.** R. J. Rulis (NASA, Lewis Research Center, V/STOL and Noise Div., Cleveland, Ohio). *NATO, AGARD,*

Meeting of the Propulsion and Energetics Panel of the Advisory Group for Aerospace Research and Development, 42nd, Schliersee, West Germany, Sept. 17-21, 1973, Paper. 13 p. 13 refs.

The severity of proposed noise goals for STOL systems has resulted in a new design approach for aircraft propulsion systems. It has become necessary to consider the influence of the noise goal on the design of engine components, engine systems, and the integrated nacelle, separately and collectively, from the onset of the design effort. This integrated system design approach is required in order to effect an optimization of the propulsion and aircraft system. Results from extensive design studies and pertinent test programs are presented which show the effect of noise specifications on component and system design, and the trade-offs possible of noise versus configuration and performance. The design optimization process of propulsion systems for powered lift systems is presented beginning with the component level and proceeding through to the final integrated propulsion system. Designs are presented which are capable of meeting future STOL noise regulations and the performance, installation and economic penalties are assessed as a function of noise level. (Author)

A74-10255 # Investigation of flow parameters in a turbine stage with a nonuniform inlet (Issledovanie parametrov potoka v stupeni turbomashiny pri neravnomernom vkhode). Iu. I. Shvets, Iu. N. Zdorenko, and T. M. Shan'ko (Akademiia Nauk Ukrainskoi SSR, Institut Tekhnicheskoi Teplofiziki; Kievskii Gosudarstvennyi Universitet, Kiev, Ukrainian SSR). *Teplofizika i Teplotekhnika,* no. 23, 1973, p. 34-36. In Russian.

A74-10271 An experimental study of subsonic jet noise and comparison with theory. K. K. Ahuja (Syracuse University, Syracuse, N.Y.) and K. W. Bushell (Rolls-Royce, Ltd., Derby, England). *Journal of Sound and Vibration,* vol. 30, Oct. 8, 1973, p. 317-341. 13 refs. Research supported by the National Gas Turbine Establishment and Rolls-Royce, Ltd.

Measurements of the noise field from three (1.52-, 2.4-, and 2.84-in.-diam) subsonic cold-air jets are presented. The tests were conducted in the anechoic chamber of National Gas Turbine Establishment, Pyestock, on a test rig with a very large contraction ratio (maximum 250:1, minimum 70:1) and with an air supply system which has been shown to produce a jet having a low turbulence level just upstream of the nozzle exit and whose noise is dominated by pure jet mixing noise. Comparison of the results is made with the theory by analyzing them in detail by determining both the jet velocity dependence and the directivity of the intensity of the radiation in 1/3 octave bands at particular values of the Doppler corrected Strouhal frequency. (Author)

A74-10322 Deflection of carbon fibre/acrylic foam sandwich beams. R. M. Ogorkiewicz (Imperial College of Science and Technology, London, England) and A. A. M. Sayigh (College of Engineering, Riyadh, Saudi Arabia). *Composites,* vol. 4, Nov. 1973, p. 254-257. 10 refs.

Theoretical analysis of the deflecting effect of bending loads on sandwich beams with foamed acrylic cores and epoxy-resin-bonded carbon fiber skins. Test results are used to correlate the theoretical results with expected actual behavior of these new materials. Suggestions for further development of these materials are given on the basis of the results. V.Z.

A74-10484 The application of fracture mechanics to the design of the barrel and driver tube of a hypersonic gun tunnel. C. C. Groothoff, L. Schra, and H. P. Van Leeuwen (Nationaal Luchtvaartlaboratorium, Amsterdam, Netherlands). In: Pressure vessel technology; Proceedings of the Second International Conference, San Antonio, Tex., October 1-4, 1973. Part 2. New York, American Society of Mechanical Engineers, 1973, p. 1007-1021. 11 refs.

A74-10494 Applications of composite materials. Edited by M. J. Salkind (United Aircraft Corp., Sikorsky Aircraft Div., Stratford, Conn.) and G. S. Holister (Open University, Bletchley, Bucks., England). Philadelphia, Pa., American Society for Testing and Materials (ASTM Special Technical Publication, No. 524), 1973. 192 p. Members, $13.40; nonmembers, $16.75.

The evolution of the high-performance fiber composite technology is reviewed in papers dealing with applications in military and commercial aircraft, VTOL aircraft, helicopter rotor blades, and space structures. Attention is given to the use of boron, graphite, fiberglass, and other types of reinforced composites in such elements as floor beams, skin compression panels, control surfaces, ceiling panels, fuselage shells, engine rotor blades, missile interstage adapters, pressure vessels, a dish antenna, a reentry vehicle, and a truss supporting structure. Fabrication techniques considered include automated tape layup, filament winding, and molding plus secondary bonding.

T.M.

A74-10495 Commercial aircraft. R. R. June and J. R. Lager (Boeing Co., Commercial Airplane Group, Seattle, Wash.). In: Applications of composite materials. Philadelphia, Pa., American Society for Testing and Materials, 1973, p. 1-42. 5 refs. Research sponsored by the Boeing Co.

The use of composite materials offers considerable potential for reducing structural weight and, therefore, increasing productivity of commercial aircraft. The application of composites must be performed selectively, as some structures offer considerable potential for cost effective use, whereas others are more cost effective as metal structures. Heavily loaded beams, columns, and stiffness critical control surfaces are at present the major areas of application of composite materials. (Author)

A74-10496 Military aircraft. L. E. Hackman (Composite Structures Engineering, Worthington, Ohio). In: Applications of composite materials. Philadelphia, Pa., American Society for Testing and Materials, 1973, p. 43-75. 21 refs.

Military aircraft have utilized fiber reinforced composites for more than twenty years. The bulk of this use has been glass fiber reinforced plastics, which have provided both improved structural efficiency and lower cost. Recently, the advent of high modulus composites has led to their use in highly loaded, stiffness critical wings and control surfaces, as well as other structures. This work details the major structural design approaches used for fiber composites in aircraft and summarizes several applications. (Author)

A74-10497 VTOL aircraft. M. J. Salkind (United Aircraft Corp., Sikorsky Aircraft Div., Stratford, Conn.). In: Applications of composite materials. Philadelphia, Pa., American Society for Testing and Materials, 1973, p. 76-107. 17 refs.

Fibrous composites offer significant potential for structural improvement in VTOL (vertical take off and landing) aircraft. In addition to the potential for light weight fuselage structures, composites offer the unique capability of providing dynamic tuning of the fuselage. Composites provide substantial potential for helicopter rotor blades because of improved fatigue capability, good damage tolerance, and ability to be molded in complex aerodynamic configurations. This chapter summarizes the major design considerations in VTOL aircraft and reviews composite hardware which has been developed to date. (Author)

A74-10498 Helicopter rotor blades. R. L. Pinckney (Boeing Co., Vertol Div., Philadelphia, Pa.). In: Applications of composite materials. Philadelphia, Pa., American Society for Testing and Materials, 1973, p. 108-133. 7 refs.

General information is given concerning the application of advanced structural composite materials to helicopter rotor blades. Three major advantages lie in airfoil configurations, weight savings, and the ability to tailor the dynamic frequencies and structural responses of the blade element to its operating parameters. Materials and design considerations, a master dimensioning system, tool and

fabrication concepts, full scale component testing, quality assurance, the application of composites to other helicopter components, and cost factors are discussed. Filament reinforced epoxy structures are compared with metal structures. Test data on several fiber reinforced epoxy materials and development test results of full-sized blade segments are given. F.R.L.

A74-10506 * # **Air transportation noise technology overview.** B. Maggin and D. Chestnutt (NASA, Washington, D.C.). *Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Aeronautical Meeting, Montreal, Canada, Oct. 29, 30, 1973, AIAA Paper 73-1152.* 10 p. 11 refs. Members, $1.50; nonmembers, $2.00.

The NASA and DOT technology program planning for quieter air transportation systems is reviewed. To put this planning in context, the nature of the noise problem and the projected nature of the air transportation fleet are identified. The technology program planning reviewed here is discussed in relation to the following areas of activity: systems analysis, community acceptance, basic research and technology, and the various classes of civil aircraft, i.e. existing and advanced transports, powered-lift transports, and general aviation. (Author)

A74-10507 # **Designing small gas turbine engines for low noise and clean exhaust.** H. C. Eatock, J. C. Plucinsky, and J. A. Saintsbury (United Aircraft of Canada, Ltd., Montreal, Canada). *Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Aeronautical Meeting, Montreal, Canada, Oct. 29, 30, 1973, AIAA Paper 73-1154.* 13 p. 8 refs. Members, $1.50; nonmembers, $2.00.

Design features contributing to the low noise signatures of current JT15D and PT6 engines are outlined. New aircraft for close-in or STOL operation will use low-speed 'quiet' propellers. Some early results from programs to keep noise from advanced PT6 engines below 'quiet' propeller noise are shown. As regards emissions, small gas turbines are clean compared to reciprocating engines but have higher idling emissions than large gas turbines. Exhaust emission levels promulgated by EPA are very challenging but the art of emission evaluation and reduction is developing rapidly. Encouraging results from recent experimental programs at UACL are cited. (Author)

A74-10508 # **Impact of emission regulations on gas turbine combustor design.** H. L. Morton and R. L. Marshall (United Aircraft Corp., Pratt and Whitney Aircraft Div., East Hartford, Conn.). *Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Aeronautical Meeting, Montreal, Canada, Oct. 29, 30, 1973, AIAA Paper 73-1155.* 9 p. 7 refs. Members, $1.50; nonmembers, $2.00.

The changes to be made in gas turbine combustor designs to meet the emission standards set in June, 1973, by the U.S. Environmental Protection Agency are discussed. It is concluded that the needed design changes are considerable for engines with thrusts in excess of 8000 pounds. Such changes are listed as fuel staging or variable geometry for airflow control in combustion reaction and a correspondingly increased complexity of control systems; increased numbers of fuel sources; possible use of water injection to reduce flame temperatures at high power; reduced levels of linear cooling in burner front; and premixing of fuel and air to improve the homogeneity of the reaction zone equivalent ratio. V.Z.

A74-10509 # **Designing for noise and emission control in general aviation.** J. L. Marinelli and R. L. Benefiel (Beech Aircraft Corp., Wichita, Kan.). *Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Aeronautical Meeting, Montreal, Canada, Oct. 29, 30, 1973, AIAA Paper 73-1158.* 7 p. 5 refs. Members, $1.50; nonmembers, $2.00.

This paper presents comments on some aspects of the changes in general aviation deisgn which may be made because of new noise and emission limiting regulations. In general, compliance with these regulations involves increased weight and drag and decreased power available. Noise and emission limitations should be carefully formulated with reference to the important airplane utility losses which may be caused by even small adverse weight, drag and power changes. (Author)

A74-10510 # **It's quiet in front.** A. F. Toplis and F. Cicci (De Havilland Aircraft of Canada, Ltd., Downsview, Ontario, Canada). *Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Aeronautical Meeting, Montreal, Canada, Oct. 29, 30, 1973, AIAA Paper 73-1159.* 11 p. 26 refs. Members, $1.50; nonmembers, $2.00.

A sample of the reactions of communities to airport noise is given. It is argued that existing studies show that a community-acceptable NEF value should be about 8 rather than the current 25 or 30. A small but extremely quiet transport aircraft, operating under a NEF limitation of this level, is shown to have a considerable advantage in runway passenger capacity over large but noisier aircraft. Some ways in which an operator of such an aircraft might use advertising to improve his competitive position are illustrated. (Author)

A74-10511 # **Current developments in main rotors at Bell Helicopter Company.** W. G. O. Sonneborn (Bell Helicopter Co., Fort Worth, Tex.). *Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Aeronautical Meeting, Montreal, Canada, Oct. 29, 30, 1973, AIAA Paper 73-1160.* 12 p. 12 refs. Members, $1.50; nonmembers, $2.00.

This paper reviews characteristics of a number of multibladed rotors suitable for a 15,000-pound helicopter. The study examined frequency placements both above and below one per rev. Predesign studies and model and flight tests indicate higher structural weight for stiff-in-plane designs, primarily because of unrelieved chordwise oscillatory loads. The scissors rotor, a four-bladed rotor with unequal blade spacing, can relieve chordwise loads through hub motion, much as the two-bladed rotor does. It offers potential reductions in weight and noise while maintaining the inherent mechanical stability of stiff-in-plane rotors. The paper also reports some of the latest advances in two-bladed rotors; showing that they are superior to other rotors in reliability and survivability. (Author)

A74-10546 **Simplified assembly of F-15 stressed.** C. Martin. *Aviation Week and Space Technology,* vol. 99, Oct. 29, 1973, p. 47-52.

It is pointed out that the production of the McDonnell Douglas F-15 air-superiority fighter takes only 80% of the time required for the company's older F-4. This savings in man-hours is the direct result of the extensive use of large, integrally machined parts in the build-up of the new fighter. Advanced metal fabrication techniques employed for the F-15 include hot forming of titanium skins for the lower inboard section of the wing, chemical milling of skins, and electrochemical milling of complex sheet metal parts. G.R.

A74-10568 # **Near-field trajectory of turbulent jets discharged at various inclinations into a uniform crossflow.** J. Wu (Hydronautics, Inc., Laurel, Md.). *AIAA Journal,* vol. 11, Nov. 1973, p. 1579-1581. Contract No. NOw-62-0604-c.

Using the results of an experiment conducted by Platten and Keffer (1971) on axisymmetric turbulent jets discharging at various angles of inclination into a uniform cross stream having various ratios between jet and stream velocities, it is shown that jet trajectories in the near field follow a universal law by which the variations in both the angle of inclination and the velocity ratio can be accommodated. The findings are of interest for the design of V/STOL aircraft, which,

during transition from hovering to forward flight, generate an analogous deflected-jet flow that can critically affect aircraft behavior. M.V.E.

A74-10572 * # Derivation of aerodynamic kernel functions. E. H. Dowell and C. S. Ventres (Princeton University, Princeton, N.J.). *AIAA Journal*, vol. 11, Nov. 1973, p. 1586-1588. 7 refs. NASA-supported research.

The method of Fourier transforms is used to determine the kernel function which relates the pressure on a lifting surface to the prescribed downwash within the framework of Dowell's (1971) shear flow model. This model is intended to improve upon the potential flow aerodynamic model by allowing for the aerodynamic boundary layer effects neglected in the potential flow model. For simplicity, incompressible, steady flow is considered. The proposed method is illustrated by deriving known results from potential flow theory. M.V.E.

A74-10573 # Unsteady flow of power-law fluids. I. S. Habib and T. Y. Na (Michigan, University, Dearborn, Mich.). *AIAA Journal*, vol. 11, Nov. 1973, p. 1588. 5 refs.

A noniterative solution is presented to the problem treated by Chen and Wollersheim (1972) after its reformulation for all power-law fluids as an initial-value rather than a boundary-value problem. This reformulation results in a simple expression which lends itself to integration in closed form. M.V.E.

A74-10616 * Fatigue of supersonic transport materials using simulated flight-by-flight loading. L. A. Imig (NASA, Langley Research Center, Materials Div., Hampton, Va.). In: Fatigue at elevated temperatures; Proceedings of the Symposium, Storrs, Conn., June 18-23, 1972. Philadelphia, Pa., American Society for Testing and Materials, 1973, p. 264-272. 5 refs.

Methods to reduce the fatigue test time for structural materials which are candidates for supersonic transport airplanes were investigated by conducting real-time and accelerated fatigue tests. The tests employed sequences of stresses and temperatures to simulate the flights of a Mach 3 transport airplane. Some of the simulated flights were altered to determine the effect of the design mean stress and the number of stress cycles per flight on fatigue life. Salt solution was also applied in other tests. Notched Ti-8Al-1Mo-1V and Ti-6Al-4V were used in the investigation. (Author)

A74-10622 Effect of several metallurgical variables on the thermal fatigue behavior of superalloys. D. H. Boone and C. P. Sullivan (United Aircraft Materials Engineering and Research Laboratory, East Hartford, Conn.). In: Fatigue at elevated temperatures; Proceedings of the Symposium, Storrs, Conn., June 18-23, 1972. Philadelphia, Pa., American Society for Testing and Materials, 1973, p. 401-414; Discussion, p. 415. 18 refs.

The effect of several metallurgical variables on the thermal fatigue behavior of high-temperature materials systems was studied, using a highly characterized high-velocity hot gas stream to produce a well-defined strain/temperature/time cycle. Metallurgical factors considered were: alloy compositions in both cast cobalt- and nickel-base superalloys, degree of microstructural refinement, grain orientation, effect of presence and morphology of carbides, surface/environmental interaction (surface stability), and protective coatings. The nickel-base alloys studied were superior or equivalent to the cobalt-base alloys when compared on uncoated and coated bases. Within a given alloy class the effect of alloy chemistry as it affects oxidation behavior was shown to be significant. On polycrystalline substrates, an inward type of diffusion aluminide coating improved fatigue performance, whereas an outward type was detrimental. Columnar-grained alloys when strained along the growth direction gave fatigue resistance superior to their polycrystalline counterparts. (Author)

A74-10783 The light-scattering matrix and types of optical weather. G. I. Gorchakov (Akademiia Nauk SSSR, Institut Fiziki Atmosfery, Moscow, USSR). *(Akademiia Nauk SSSR, Izvestiia, Fizika Atmosfery i Okeana*, vol. 9, Feb. 1973, p. 204-209.) *Academy of Sciences, USSR, Izvestiya, Atmospheric and Oceanic Physics*, vol. 9, Feb. 1973, p. 113-116. 10 refs. Translation.

It is shown that by analyzing the observation data, the optical characteristics of atmospheric air may be classified into the following four classes (optical weather types): haze, foggy haze, fog, and drizzle haze. The classification is not formal, but is rather based on the concept of the transformation of atmospheric aerosols by condensation. V.P.

A74-10798 * # Effect of anisotropic turbulence on aerodynamic noise. M. Goldstein and B. Rosenbaum (NASA, Lewis Research Center, Cleveland, Ohio). *Acoustical Society of America, Journal*, vol. 54, Sept. 1973, p. 630-645. 23 refs.

A model based on Lighthill's theory for predicting aerodynamic noise from a turbulent shear flow is developed. This model is a generalization of the one developed by Ribner. It does not require that the turbulent correlations factor into space and time-dependent parts. It replaces his assumption of isotropic turbulence by the more realistic one of axisymmetric turbulence. In the course of the analysis, a hierarchy of equations is developed wherein each succeeding equation involves more assumptions than the preceding equation but requires less experimental information for its use. The implications of the model for jet noise are discussed. It is shown that for the particular turbulence data considered anisotropy causes the high-frequency self-noise to be beamed downstream. (Author)

A74-10802 * A simplified fuel control approach for low-cost aircraft gas turbines. H. Gold (NASA, Lewis Research Center, Cleveland, Ohio). *Society of Automotive Engineers, Air Transportation Meeting, Miami, Fla., Apr. 24-26, 1973, Paper 730388*. 14 p. Members, $1.25; nonmembers, $2.00.

A hydromechanical approach to the problem of reducing the complexity and cost of turbine fuel controls without impairing performance and reliability is described and analyzed. The study applies to the modification of long-range high-performance turbine engines to meet short-range missile requirements. The generalized acceleration and deceleration control parameters are studied, and variable-orifice relations for acceleration and deceleration limits are derived. The hydromechanical speed-sensing and multiplying circuit and the fuel control schematic diagram are discussed. V.P.

A74-10825 The application of the vertical gyroscope for the artificial horizon (Die Anwendung des Vertikalkreisels im Künstlichen Horizont). R. Baumann (Bodenseewerk Gerätetechnik, Überlingen, West Germany). *Ortung und Navigation*, no. 2, 1973, p. 109-123. In German.

Devices have been developed to indicate the position of the horizon to the pilot in cases of poor visibility. Such devices have been based on the gyroscopic pendulum. The principles of operation of the gyroscopic pendulum are discussed together with design details utilized in various applications for the indication of the horizon. Attention is given to devices employing pneumatic power and devices using electric motors. A sphere producing a gyroscopic moment around the center is used in a number of designs. G.R.

A74-10880 # Application of military human factors techniques to general aviation accident prevention. J. D. Dougherty (Harvard University, Boston, Mass.). In: International Congress on Aviation and Space Medicine, 21st, Munich, West Germany, September 17-21, 1973, Preprints of Lectures.
Munich, Sekretariat, Internationaler Kongress für Luft- und Raumfahrtmedizin, 1973, p. 296-299. 9 refs.

A74-10936 # **Evolution philosophy.** *Aircraft Engineering*, vol. 45, Oct. 1973, p. 4, 5.

The development of the Fokker F28 since its first flight on May 9th, 1967 is described. The Netherlands Civil Aviation Authority certificate of airworthiness for transport category aircraft was obtained in February, 1969 while a type certificate was issued for the F28 by the FAA in March. The target, set in 1963, to bring out the smallest jet airliner exceeding F27 turboprop economy on short-haul sectors has, therefore, been achieved. However, the extensive use of the F28 in charter operations at an early stage caused Fokker to look for increases in gross weights while retaining operation flexibility. A certificate of airworthiness for the Mk 2000 was obtained in August 1972. Other developments are connected with the design of the Mk 5000 and Mk 6000. G.R.

A74-10937 # **Differential method for testing the optical standards of cockpit windshields.** H. Kohler (Vereinigte Flugtechnische Werke-Fokker GmbH, Bremen, West Germany). *Aircraft Engineering*, vol. 45, Oct. 1973, p. 28-30.

The described method is particularly suitable for the accurate testing of curved aircraft windshields. The given windshield curvature and manufacturing tolerances are considered as background to the evaluation. Consequently only those distortions due to genuine faults are registered. The method can be employed for qualitative and quantitative evaluatons. Details regarding the new method are discussed together with quantitative conclusions, method variations, and a review of previous testing methods. G.R.

A74-10976 **Solution of the plane problem of the aerodynamics of a rarefied gas on the basis of Boltzmann's kinetic equation.** F. G. Cheremisin (Akademiia Nauk SSSR, Vychislitel'nyi Tsentr, Moscow, USSR). *(Akademiia Nauk SSSR, Doklady*, vol. 29, Apr. 1, 1973, p. 811-814.) *Soviet Physics - Doklady*, vol. 18, Oct. 1973, p. 203, 204. Translation.

A74-10984 **Noise generation and the design of bypass lift jet engines (Zur Lärmentwicklung und Auslegung von Bypass-Hubtriebwerken).** J. Kurzke (München, Technische Universität, Munich, West Germany). *Zeitschrift für Flugwissenschaften*, vol. 21, Oct. 1973, p. 337-345. 24 refs. In German.

Noise development of bypass lift jet engines influences considerably their design. In order to be able to make statements on some important parameters, a relationship between aerodynamic and acoustic data must be provided. The first part of this paper deals with noise radiation in the outlet part of bypass engines. An application of the previously derived correlations to an aft-fan lift engine of special construction follows in the second part. Moreover, it appeared that, with prescribed noise limits, the maximum technically attainable turbine inlet temperature does not necessarily lead to the most favorable specific thrust and consumption values. (Author)

A74-10985 **The calculation of the buffeting limits of swept wings (Die Berechnung der Schüttelgrenzen von Pfeilflügeln).** G. Redeker (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Aerodynamik, Braunschweig, West Germany). *Zeitschrift für Flugwissenschaften*, vol. 21, Oct. 1973, p. 345-359. 45 refs. In German.

A method is described to determine the buffet boundaries of swept wings in the transonic flow regime. The existing method of F. Thomas for determining buffet boundaries of unswept wings and wings with moderate sweep has been extended to include the case of wings with high sweep. This is accomplished by considering an infinite yawed wing for which the transonic pressure distribution is calculated by C. S. Sinnott's method while the three-dimensional turbulent compressible boundary layer is determined by an integral method. The theoretically calculated buffet boundaries are in good agreement with corresponding experimental results for swept wings. (Author)

A74-10996 # **On the flow around the leading edge of a lifting airfoil (Sur l'écoulement au bord d'attaque d'un profil portant).** H. Werlé (ONERA, Châtillon-sous-Bagneux, Hauts-de-Seine, France). *La Recherche Aérospatiale*, July-Aug. 1973, p. 197-218. 29 refs. In French

In the Châtillon hydrodynamic tunnel, the enlarged leading edge method has been successfully applied to the physical study of two-dimensional flows which had previously been the subject of visualizations on complete models. The process made it possible to analyze in detail the phenomena occurring at the leading edge of a lifting airfoil, as well as their evolution as a function of angle of attack and other parameters. Tests define the location of the stagnation point, the extent of the zone of separation, and the effectiveness of the means used to reduce or avoid them, e.g., suction, blowing, slats, rotation, etc. F.R.L.

A74-10997 # **Methods of visualization of the leading edge separation bubble and analysis of results (Méthodes de visualisation du bulbe de décollement de bord d'attaque et analyse des résultats).** E. Erlich (ONERA, Châtillon-sous-Bagneux, Hauts-de-Seine, France). *La Recherche Aérospatiale*, July-Aug. 1973, p. 219-223. 21 refs. In French.

Various methods of flow visualization were applied in a wind tunnel on an airfoil section with a strong variation of curvature at the leading edge ('peaky') presenting a separation bubble (short bubble) at incidence. Visualizations by sublimating or viscous films and by colored indicators complement each other to define the positions of separation points, of transition within the bubble, and of reattachment. The information is supplemented by hydrodynamic tunnel visualizations. F.R.L.

A74-10999 # **The lifting surface theory applied to fixed wings and propellers (La théorie de la surface portante appliquée à l'aile fixe et à l'hélice).** R. Dat (ONERA, Châtillon-sous-Bagneux, Hauts-de-Seine, France). *La Recherche Aérospatiale*, July-Aug. 1973, p. 245-254. 7 refs. In French.

The integral equation which expresses the velocity potential induced by a lifting surface in arbitrary motion in relation to the fluid is formulated. This equation is applicable to fixed wings, propellers, and rotary wings, and makes it possible to treat the aeroelasticity problems of these structures with methods known to be effective for prediction of aircraft flutter. F.R.L.

A74-11000 # **Exploitation of spectral density curves in the case of wind tunnel flutter measurement (Exploitation des courbes de densité spectrale dans le cas de mesure de flottement en soufflerie).** R. Destuynder and R. Labourdette (ONERA, Châtillon-sous-Bagneux, Hauts-de-Seine, France). *La Recherche Aérospatiale*, July-Aug. 1973, p. 255-257. In French.

A74-11001 **Noise, an urgent problem with a slow solution (El ruido, problema urgente de lenta resolución).** J. A. Martínez Cabeza. *Revista de Aeronáutica y Astronáutica*, vol. 33, Sept. 1973, p. 669-680. In Spanish.

The magnitude of the noise problem for the airport vicinity is examined together with possible approaches for solving the problem. It is found that only a reduction of the noise produced by the aircraft can provide a feasible solution. Regulations regarding limitations for permissible aircraft noise are discussed along with details concerning the noise produced by a number of commercial airliners, results obtained in tests conducted with turboprop engines, and noise sources of the turbojet engine. Immediate solutions for

reducing the noise of turbojet engines are considered and an outlook regarding future developments related to the noise problem is given. G.R.

A74-11041 **The effects of wake splitter plates on the flow past a circular cylinder in the range of R from 10,000 to 60,000.** C. J. Apelt, G. S. West (Queensland, University, Brisbane, Australia), and A. A. Szewczyk (Notre Dame, University, Notre Dame, Ind.). *Journal of Fluid Mechanics*, vol. 61, Oct. 23, 1973, p. 187-198. 6 refs.

Experiments were carried out using models having L/D not greater than 2 and the resulting pressure distributions and vortex shedding characteristics are presented. A simple visualization technique which provides explanations of some of the measured results is described. It is concluded that splitter planes reduce the drag markedly by stabilizing the separation points and produce a wake narrower than that for a plain cylinder, raise the base pressure by as much as 50% and affect the Strouhal number to a lesser degree. Careful measurement techniques have enabled these effects to be presented accurately. (Author)

A74-11050 * # **Assessment of jets as acoustic shields by comparison of single- and multitube suppressor nozzle data.** V. H. Gray, O. A. Gutierrez (NASA, Lewis Research Center, Jet Acoustics Branch, Cleveland, Ohio), and D. O. Walker (Boeing Co., Seattle, Wash.). *American Institute of Aeronautics and Astronautics, Aero-Acoustics Conference, Seattle, Wash., Oct. 15-17, 1973, Paper 73-1001*. 20 p. 15 refs.

Recent 1/4 scale and engine size nozzle acoustic data, for both 37-tube and single nozzles, are used to test the jet-shielding principle. At low jet velocities the multitube nozzle total sound power approaches the equivalent of 37 single tubes (no shielding), while near-sonic and above, the small equivalent number of single tubes compares well with a geometric model of lateral radiation from only about a third of the circumference of the outer jets (nearly complete shielding). At high jet velocities, the geometric shielding hypothesis is in excellent agreement with acoustic data from which the downstream coalesced jet-noise is excluded. Present results are compared with an existing correlation for single jets, and with previous publications on multijet shielding. (Author)

A74-11051 * # **Flap noise prediction method for a powered lift system.** B. Clark, R. Dorsch, and M. Reshotko (NASA, Lewis Research Center, V/STOL and Noise Div., Cleveland, Ohio). *American Institute of Aeronautics and Astronautics, Aero-Acoustics Conference, Seattle, Wash., Oct. 15-17, 1973, Paper 73-1028*. 14 p. 8 refs.

A method is presented for estimating the noise generated by deflection of the engine exhaust for under-the-wing and over-the-wing versions of an externally blown flap configuration for powered lift. Correlation equations and curves are given for the OASPL and directivity and for spectra scaled to a high bypass 25,000-pound thrust size engine. Data are taken from TF34 engine tests and from large cold flow model tests. The correlations are empirical, and thus application of this prediction procedure is limited to geometrically similar configurations. Application of the method is illustrated by calculated sample footprints. (Author)

A74-11069 # **Chemical reactions calculations in turbulent flows - Application to a CO containing turbojet plume.** R. Borghi (ONERA, Châtillon-sous-Bagneux, Hauts-de-Seine, France). *(International Union of Theoretical and Applied Mechanics and International Union of Geodesy and Geophysics, Symposium on Turbulent Diffusion in Environmental Pollution, 2nd, Charlottesville, Va., Apr. 8-14, 1973.) ONERA, TP* no. 1229, 1973. 20 p. 15 refs.

Theoretical analysis of the behavior of pollutant species during the mixing of hot gases with the ambient air in a turbojet exhaust, taking into account turbulent diffusion and chemical reactions. Special attention is given to a hot gas jet in a turbojet engine with an after-burner in the event of a single bimolecular reaction between carbon monoxide and oxygen. V.Z.

A74-11072 # **Experimental study of shock-wave reflection upon boundary layer transition (Etude expérimentale de l'effet de la réflexion d'une onde de choc sur la transition de la couche limite).** J. C. Le Balleur and J. Delery (ONERA, Châtillon-sous-Bagneux, Hauts-de-Seine, France). *(Congrès Français de Mécanique, Poitiers, France, Sept. 17-20, 1973.) ONERA, TP* no. 1284, 1973. 26 p. 17 refs. In French.

The influence of shock-wave reflection upon boundary layer transition has been studied experimentally, using an optical technique. The experiments were performed in a two-dimensional flow, initially uniform at Mach number 1.95. The parameters of the study were the Reynolds number and the strength of the incident shock. The experiments showed that the pressure gradient associated with a shock-wave induces an important travel of the transition region in the upstream direction. As soon as the shock intensity becomes noticeable (pressure ratio larger than 1.3) transition occurs in the interaction region, independently of the Reynolds number. Further experiments would however be necessary for these results to be considered as having a general value. (Author)

A74-11075 # **Certain problems in estimating the rundown time of an engine (Niektore problemy oceny czasu wybiegu silnika).** R. Szczepanik (Instytut Techniczny Wojsk Lotniczych, Warsaw, Poland). *Technika Lotnicza i Astronautyczna*, vol. 28, Oct. 1973, p. 27-31, 39. 6 refs. In Polish.

The rundown time of a turbojet engine is defined as the elapsed interval between the instant when fuel delivery to the injection system is interrupted and the instant when the engine rotor shaft comes to a complete stop. Physical processes taking place during this interval are briefly examined together with factors which affect its duration. A mathematical formulation of the rundown process is developed, and a statistical method is described for estimating the rundown time from measurements and observations obtained in actual operation. T.M.

A74-11092 # **The technical evolution of aircraft (L'évolution technique des avions).** R. Boscher (Direction Technique des Constructions Aéronautiques, Service Technique Aéronautique, Paris, France). *Air et Cosmos*, Oct. 20, 1973, p. 53-56. In French.

Progress realized since the second world war is reviewed. The evolution of commercial aviation was at first characterized by the simple application to the civil field of techniques developed in military aviation. Major progress was made in the field of propulsion; the incentive of competition has given new impetus to theoretical and applied research. The predictable evolution in the technique of airframes with reference to the general concept, dimensioning of structures, materials, and fabrication processes, and the applications of technological progress to the new generations of aircraft are discussed. F.R.L.

A74-11093 # **Aircraft engines - Progress made in France over ten years, and possibilities for the ten years to come (Les propulseurs aéronautiques - Progrès accomplis en France depuis dix ans et possibilités pour les dix années à venir).** R. R. Ravaud (SNECMA, Paris, France). *Air et Cosmos*, Oct. 20, 1973, p. 57-59. In French.

Carrying capacity, greater speed, and longer range are the qualities which require engines of ever greater power and efficiency. Improved aerodynamics and materials have made it possible to achieve compression ratios higher than 20, delivering air at more than 500 C to the inlet of the combustion chamber, and to develop bypass jets. The engines constructed by SNECMA have become internationally known in the field of supersonic military aircraft. In the field of civil engines, SNECMA has largely developed its programs in

cooperation with other manufacturers. Future progress will lie in obtaining more thrust for less size and weight, reducing fuel consumption, lengthening engine life, and lowering price. Ways of achieving these goals are discussed. F.R.L.

A74-11094 # Civil air navigation equipment, on the ground and in the air (Les équipements civils de navigation aérienne, au sol et à bord). B. Palayret (Direction de la Navigation Aérienne, Service Technique, Paris, France). *Air et Cosmos*, Oct. 20, 1973, p. 70-73. In French.

Navigation, starting with ground facilities, is still based largely on MF means in spite of their imperfections (difficulty of finding the frequency, problems with atmospherics, low accuracy). VHF means are highly designed and developed, and mark out the network of airways, but their accuracy should be improved. On board, practically all long-range aircraft have adopted the inertial system. The foreseeable evolution of air trafffic control equipment and progress in the field of on-board equipment are discussed. F.R.L.

A74-11095 # Airports from 1963 to 1983 - Evolution or revolution (Les aéroports de 1963 à 1983 - Evolution ou révolution). J. Block (Paris, Aéroport, Paris, France). *Air et Cosmos*, Oct. 20, 1973, p. 75-77, 79. In French.

In 1963 there were 95,000 aircraft movements at Orly, and 60,000 at le Bourget. In 1972, 16,000,000 passengers were handled, but the increase in aircraft size required only twice the number of aircraft movements. Constraints due to noise indicate that, in the future, airports cannot enlarge their capacity; there will also be problems of limitations in financing. It is suggested that the solution of the problems assumes the concentration and solidarity of all the elements of the air transport system. F.R.L.

A74-11096 # The air transport of tomorrow - Economic obstacles to surmount (Le transport aérien de demain - Des obstacles économiques à surmonter). G. Besse (Institut du Transport Aérien, Paris, France). *Air et Cosmos*, Oct. 20, 1973, p. 81-83. In French.

To ensure the orderly development of world air transport, accurate forecasts must be available. Any over- or underestimation of requirements could cause financial problems particularly difficult to overcome. The concept of traffic flow is subject to numerous interpretations, and the actual traffic can vary sensibly depending on the definition utilized. It is necessary to be able to monitor the fluctuations of traffic demand, to have sufficient personnel and financial resources, and to provide overall economic planning. F.R.L.

A74-11097 # Progress in France in the last ten years in the field of helicopters - Prospects for the ten years to come (Progrès réalisés en France ces 10 dernières années dans le domaine des hélicoptères - Perspectives pour les dix années à venir). R. Mouille (Société Nationale Industrielle Aérospatiale, Paris, France). *Air et Cosmos*, Oct. 20, 1973, p. 97-101. In French.

Turbines have marked a decisive stage in the powering of helicopters by making possible important reductions of specific weight and size. Several types of hubs are under development which will be more reliable, and cheaper to fabricate and maintain. Concerning blades, progress will be the result of a systematic exploitation of aerodynamic research which will deal not only with airfoils, but also with the geometry of the group of blades, especially the tips, for performance improvement and reduction of noise. Tail rotors, transmissions, structures, and suspensions are discussed. F.R.L.

A74-11098 # Prospects for aerospace research (Prospective de la recherche aérospatiale). P. Contensou (ONERA, Châtillon-sous-Bagneux, Hauts-de-Seine, France). *Air et Cosmos*, Oct. 20, 1973, p. 136-139. In French.

The contribution of research is of a scientific nature. It is located in the ever-deeper comprehension of physical phenomena which set the industrial product in play, and in the mastery of mathematical methods which make it possible to pass from their fundamental laws to the complete definition of their efforts within the envisaged framework. The art of the engineer has evolved profoundly under the double influence of the progress of scientific knowledge and that of computational methods. Traditional optimization, development of simulation and methods of putting it to work, and new types of wind tunnels are discussed. The future of supersonic civil transport, approach to sonic speeds by subsonic aviation, the role of aviation in short range transport, and the development of the formulas for the control configured vehicle (CCV) are considered, as well as future formulas for space launchers. F.R.L.

A74-11101 # Collision avoidance and the future of air traffic control. S. Ratcliffe (Royal Radar Establishment, Malvern, Worcs., England). *Journal of Navigation*, vol. 26, Oct. 1973, p. 423-430. 7 refs.

Discussion of some initial findings of a long-term study of collision avoidance and ATC systems of the future. The ultimate goal of the study is the optimization of the division of responsibility between the flight crew and ground ATC and of the distribution of ATC tasks among individual controllers and ATC computers. Theoretical considerations are given concerning the longitudinal spacing of traffic on an airway and air-to-air collision avoidance systems. Expressions are derived to evaluate collision danger in some air traffic situations involving two aircraft. Also considered are the fundamental principles of air traffic flow organization. V.Z.

A74-11102 # Properties of air-derived and ground-derived aircraft landing guidance concepts. I. M. Hunter (Royal Aircraft Establishment, Bedford, Hants., England). *Journal of Navigation*, vol. 26, Oct. 1973, p. 431-449.

A set of three definitions is derived to facilitate an analysis of the properties of air and ground-dependent aircraft landing guidance concepts. The definitions concern aircraft flight parameters derived in sensors, guidance information transmission, and information interpretation. Graphic representations are given for typical air-derived and ground-derived aircraft landing guidance systems. The capacity, accuracy, and redundancy-integrity of the guidance concepts are considered. The topics also include electronic countermeasures, aircraft antenna installation, simultaneous and offset guidance, ATC requirements, frequency diversity, flare guidance, interference, and stretch potential. V.Z.

A74-11155 Nonlinear stability theory of the boundary layer. V. V. Struminskii (Akademiia Nauk SSSR, Institut Teoreticheskoi i Prikladnoi Mekhaniki, Novosibirsk, USSR). In: Heat and mass transfer in boundary layers. Volume 1.
Oxford and New York, Pergamon Press, 1972, p. 459-474. 27 refs.

Consideration of a number of problems of hydrodynamic stability which have a significant bearing on the transition from laminar to turbulent flow and on the phenomenon of boundary layer laminarization. After reviewing the basic premises of linear stability theory and the main results of this theory relating to the investigated problems, the results of attempts to verify the conclusions of linear stability theory are presented, as well as some results of flow studies in the transition region. The main works on nonlinear hydrodynamic stability theory are reviewed, including Landau's work (1944), in which he derived the equation for the amplitude modulus and pointed out the possibility of new patterns appearing in developing aerodynamic disturbances, and the works of Stuart (1958, 1960), Watson (1960), and others, which are devoted to the further development and generalization of Landau's theory. A.B.K.

A74-11175 # **Wing shear material.** B. Saelman. *SAWE Journal*, vol. 32, Oct.-Nov. 1973, p. 14.

Formulas expressing the weight of shear material in wings in terms of the basic geometric wing parameters are presented. These formulas provide a rational basis for the substantiation of wing weights and are applicable to various engineering wing materials. M.V.E.

A74-11198 Transportation noise - It's measurement and evaluation. J. Donovan and T. Ketcham (B & K Instruments, Inc., Cleveland, Ohio). *Sound and Vibration*, vol. 7, Oct. 1973, p. 4, 6, 8 (4 ff.). 7 refs.

Discussion of the latest techniques for the measurement and evaluation of vehicle passby noise, traffic noise, and community noise. Manual and computer methods, sound level recording meters, state-of-the-art outdoor microphone systems are covered. Also considered are vehicle passby evaluation by 3-D graphs of amplitude, frequency and time, and Noise Exposure Forecasts. V.Z.

A74-11199 Aircraft noise reduction - Alternatives versus cost. H. B. Safeer (U.S. Department of Transportation, Washington, D.C.). *Sound and Vibration*, vol. 7, Oct. 1973, p. 22-27. 8 refs.

Cost analysis of some alternative engineering and operational strategies aimed at noise reduction in airport areas is carried out, covering 23 American airports. Preliminary results are given for cost increases after the implementation of the alternate strategies at six airports. A practical procedure is described for comparing the relative cost-effectiveness of alternative approaches to the reduction of airport noise. The topics also include retrofit effectiveness, combined effects of retrofit and operational procedures, and population distribution around Atlanta, Kennedy International, LaGuardia, Los Angeles International, O'Hare and San Francisco International airports. V.Z.

A74-11204 # **Remote sensing of the earth's resources - Applications, benefits, methods.** H.-J. Austen, P. Böse, J.-P. Genzel, and R. Ockert. *Dornier-Post* (English Edition), no. 3, 1973, p. 22-27.

Studies are described which covered an investigation of the benefits of a remote sensing of earth resources using space technology, as well as data acquisition, transmission, processing, and evaluation for earth observation missions. For applications the basis of the study is a systematic broad-based listing of the applications already practiced or possible in the future and of their information requirements, together with an allocation to geographical areas of interest on the results of a poll of users and an extensive examination of the relevant literature. The information offers the beneficiary the possibility that planning, decision-making, or production processes can be made more efficient. The methods relevant to the project and their limitations, insofar as sensors and platforms are concerned, are discussed. F.R.L.

A74-11226 # **V/STOL deflector aerodynamic design criteria.** T. A. Wynosky and C. J. Szyszko (United Aircraft Corp., Pratt and Whitney Aircraft Div., East Hartford, Conn.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1181.* 11 p. Members, $1.50; nonmembers, $2.00.

Various V/STOL deflectors and nozzles were tested, using small-scale cold-flow models to determine the effect of geometric variations on the back-pressure disturbance, nozzle trust coefficient, and flow coefficient as a function of bypass ratio, duct Mach number, and deflector geometric parameters. During operation in the deflector mode, a static pressure gradient is created within the duct, which propagates upstream, producing distortion at the fan and turbine exits. In close coupled engine/deflector systems, this creates distortions severe enough to impair engine stability and nozzle performance. The duct pressure distortion data can be used to determine how close to the fan exit a deflector can be placed before fan stability is seriously compromised. Ground proximity tests showed that the nozzle exit plane may be less than a jet diameter above the ground before the exit flow is affected. V.P.

A74-11227 # **Deck heating effects due to VTOL jet exhaust impingement.** O. T. Castells and R. B. Mishler (General Electric Co., Aircraft Engine Group, Cincinnati, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1182.* 7 p. Members, $1.50; nonmembers, $2.00.

Optimum supersonic VTOL aircraft require high specific thrust engines. This results in high jet velocity and temperature with increased heating potential. The present study identifies deck temperature profile(s) for various jet exhaust configurations on a deck. The effects of various operational modes on the deck temperature are evaluated. Run up time and cycle conditions, along with jet configuration, are found to be the principal variables affecting deck peak temperature. Various methods of reducing peak deck temperature were considered. Safe operational usage of augmented turbojets for supersonic VTOL aircraft appears to be feasible with minor constraints. (Author)

A74-11228 # **VTOL recirculation and impingement model testing.** H. A. Weber (General Dynamics Corp., Convair Aerospace Div., San Diego, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1183.* 9 p. Members, $1.50; nonmembers, $2.00.

VTOL aircraft operating in ground effect are subject to hot gas reingestion and induced lift effects. Since these effects are highly configuration-dependent, an empirical approach is required to assess the viability of new aircraft designs. A recirculation and impingement model of a lift plus lift/cruise, jet-lift fighter aircraft has been tested and preliminary results are presented. Data includes the effects of ground height, aircraft attitude, and jet temperature on reingestion. The character of the flow field is described and related to model surface pressures as well as ground footprints. (Author)

A74-11229 # **Full-scale tests of an augmentor VTOL concept.** D. R. Campbell and B. Quinn (USAF, Aerospace Research Laboratories, Wright-Patterson AFB, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1185.* 8 p. Members, $1.50; nonmembers, $2.00.

Several questions relevant to the feasibility of achieving successful VTOL flight by use of thrust augmenting ejectors are addressed in a full-scale demonstrator test program. Results of the experimental investigation are presented in light of companion augmentor tests with a smaller, laboratory-size model. The present study was performed with a turbo-fan driven system, representing in many respects an aircraft-installed ejector configuration. The full-scale model was equipped with four separate ejectors in each wing. Overall performance of the full-scale model correlated well with the results of the companion laboratory test. Interaction between the four ejectors on a given wing was not significant with respect to the overall performance level. However, the distribution of thrust was affected and should be considered in future aircraft system designs. Safe engine operation was maintained throughout all test configurations. (Author)

A74-11230 # **Design competence - The mainspring to cost reduction.** W. H. Thomas (General Motors Corp., Detroit Diesel Allison Div., Indianapolis, Ind.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1187.* 7 p. Members, $1.50; nonmembers, $2.00.

The cost of most products has risen dramatically in the past several years. However, the cost of products required for national

defense has risen more than five times the rate of inflation. At the same time, money available for these products has decreased substantially. Efforts are being made by the Department of Defense to reduce these escalating costs. One of the tools being employed is a plan called 'design to cost.' This paper deals with this philosophy as it is being applied to the U.S. Army Heavy-Lift Helicopter (HLH) Engine Program. The XT701-AD-700 engine program is the first engine program to adopt the design-to-cost philosophy from its inception. This paper also discusses some specific examples of how it is being applied in the engine design and what the payoffs are expected to be. (Author)

A74-11231 # **A modular turbofan design for high availability and low life cycle cost.** J. W. Peach (AiResearch Manufacturing Co., Torrance, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1189.* 5 p. Members, $1.50; nonmembers, $2.00.

The Garrett ATF3 is a moderate by-pass ratio high pressure ratio turbofan designed for subsonic propulsion of manned or remote piloted aircraft. A major objective in the design of the ATF3 turbofan was to achieve a component arrangement requiring minimal special support equipment and a minimum expenditure of maintenance man hours. It was also required that life limited or expendable components be as few as possible and of low replacement cost. The three shaft design splits into seven modules and the remote high pressure rotor permits easy replacement of the entire high pressure module without uncoupling any shafts. Alternative to provisioning a spare engine, a high pressure and accessory module will cover over 90 percent of the service experienced reasons for an unscheduled engine removal at 25 percent of the cost of a spare engine. This is one of the design features of the engine which will substantially reduce its life cycle cost and improve its availability without significant increase in complexity or initial manufacturing cost. (Author)

A74-11234 # **External burning assisted projectile - Theory and experiment.** W. Smithey, M. Naber, G. Caswell, and A. E. Fuhs (U.S. Naval Postgraduate School, Monterey, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1193.* 9 p. 16 refs. Members, $1.50; nonmembers, $2.00. Navy-supported research.

This paper presents the results of the initial phases of experimental studies of the external burning assisted projectile (EBAP) at the Naval Postgraduate School. Combustion in the supersonic freestream creates compression waves which affect the base flow and pressure. This effect is studied using the axisymmetric Crocco-Lees base flow model. An attempt is made to include the effect of spin. Experimental studies are designed to provide data for a 5-inch projectile at 23,000 feet by matching Mach, Reynolds, and spin numbers. A test matrix presents the results for various amounts, degrees, and locations of compression. (Author)

A74-11245 * # **Wind tunnel tests of a 20 inch diameter 1.15 pressure ratio fan engine model.** H. L. Wesoky and F. W. Steffen (NASA, Lewis Research Center, Cleveland, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1216.* 21 p. 18 refs. Members, $1.50; nonmembers, $2.00.

Aerodynamic and acoustic measurements at a typical STOL aircraft takeoff and landing velocity demonstrated that a 1.35 inlet lip area contraction ratio was superior to a 1.26 ratio at high nacelle incidence angles. Reverse thrust, obtained with a variable pitch rotor, was lower at the landing velocity, and the noise level higher, than at the static condition. High speed tests showed that, for the design cruise Mach number of 0.75, internal losses and external drag were 27 per cent of the ideal fan net thrust, and propulsive efficiency was estimated to be 59 per cent for an 85 per cent efficient fan stage. For comparison, a similar 1.55 pressure ratio fan system would have a propulsive efficiency of 62 per cent. (Author)

A74-11255 # **Uncertainty in gas turbine measurements.** R. B. Abernethy (United Aircraft Corp., Pratt and Whitney Aircraft Div., West Palm Beach, Fla.) and J. W. Thompson, Jr. (ARO, Inc., Arnold Air Force Station, Tenn.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1230.* 10 p. Members, $1.50; nonmembers, $2.00.

This paper presents a standard method of treating measurement error for gas turbine engine performance parameters. The lack of a standard method for estimating the errors associated with gas turbine performance data has made it impossible to compare measurement systems between facilities, and there has been confusion over the interpretation of error analysis. The mathematical uncertainty model presented is based on two components of measurement error: the bias error and the precision error. The uncertainty estimate is the interval about the measurement that is expected to encompass the true value. The propagation of error from basic measurements through calculated performance parameters is presented. Traceability of measurement back to the National Bureau of Standards is reviewed. Both precision and bias errors are determined in part by their traceability to the standards of the National Bureau of Standards. Performance parameter errors are further propagated from the measurement errors through functional relationships. Methods for handling traceability and the propagation of error are described in the paper. (Author)

A74-11269 # **Airfoil design for high tip speed compressors.** P. C. Tramm and G. D. Huffman (General Motors Corp., Detroit Diesel Allison Div., Indianapolis, Ind.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1248.* 12 p. 12 refs. Members, $1.50; nonmembers, $2.00.

The use of new airfoil designs is being investigated to improve the efficiency of high tip speed fans and advanced multistage compressors. Results are presented for an early phase of the investigation which addresses to a design point inlet Mach number of 1.6. Results from two-dimensional cascade tests of airfoils designed to specific wave patterns and multiple circular arc airfoils are compared. Design flow conditions were partially achieved. Multiple circular arc airfoils have relatively good performance. Sources of aerodynamic inefficiency are identified. (Author)

A74-11270 * # **Mixing of multiple dilution jets with a hot primary airstream for gas turbine combustors.** J. D. Holdeman (NASA, Lewis Research Center, Cleveland, Ohio), R. E. Walker, and D. L. Kors (Aerojet Liquid Rocket Co., Sacramento, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1249.* 7 p. 5 refs. Members, $1.50; nonmembers, $2.00. Contract No. NAS3-15703.

The mixing of multiple air jets with a subsonic heated crossflow in a constant area duct was studied experimentally. The jet-to-mainstream momentum flux ratio was varied from 6 to 60. Temperature and pressure surveys were made at several downstream locations for orifice geometries with parametric variation of orifice size and spacing. A mixing efficiency parameter was defined which characterized the effectiveness of the mixing over the range of conditions examined. It was found that for a given momentum flux ratio, there exists a ratio of orifice spacing to duct height which provides the best mixing. (Author)

A74-11271 # **Swirling flow combustion - Fundamentals and application.** G. D. Lewis (United Aircraft Corp., Pratt and Whitney

Aircraft Div., West Palm Beach, Fla.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1250.* 5 p. Members, $1.50; nonmembers, $2.00.

Tests in a combustion centrifuge have demonstrated that the normal progression from laminar flamespeeds of about one foot per second (in hydrocarbon-air mixtures) to turbulent flamespeeds of up to 20 feet per second can be advanced to a third stage where flamespeeds in excess of 60 feet per second have been measured. A theory explaining how centrifugal force-enhanced buoyancy produces the increased flamespeeds and a description of preliminary efforts to make practical use of the phenomenon in a turbojet afterburner rig are presented. Elimination of screeching combustion in the rig is also described. (Author)

A74-11272 * # **Development of a turbine inlet gas temperature measurement and control system using a fluidic temperature sensor.** W. L. Webb (United Aircraft Corp., Pratt and Whitney Aircraft Div., West Palm Beach, Fla.) and P. J. Reukauf (NASA, Flight Research Center, Edwards, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1251.* 8 p. Members, $1.50; nonmembers, $2.00.

A74-11273 # **Emergency air start system for the F-14B flight test aircraft.** L. C. Anderson, W. H. Engelmann (AiResearch Manufacturing Company of Arizona, Phoenix, Ariz.), and E. Scicchitano (Grumman Aerospace Corp., Bethpage, N.Y.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1252.* 6 p. Members, $1.50; nonmembers, $2.00.

The design of a system for high-altitude inflight restarting of the F-14B aircraft's F401 turbofan engine is described. The system consists of tankage for nitrogen and fuel, pressure regulation, redundant valving, decomposition chambers, and servicing features such as fill valves, a fuel quantity indicator, a pressure gauge, and purge valves. Using a catalytically decomposed hydrazine/water monopropellant mixture, the system has a capacity for at least four inflight engine starts, using the existing pneumatic starter of the F14B aircraft. V.P.

A74-11284 * # **Possibilities for improved supersonic inlet performance.** N. E. Sorensen and D. P. Bencze (NASA, Ames Research Center, Moffett Field, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1271.* 8 p. 6 refs. Members, $1.50; nonmembers, $2.00.

The results from detailed large-scale inlet tests were examined to assess the penalties, in terms of vehicle cruise range, for boundary-layer bleed, less than ideal engine-face pressure recovery, inlet weight, and external cowl drag. The assessment suggested specific improvements in the design of the inlet system that may increase the range of a typical supersonic transport approximately 6.9%. While no single design improvement can account for a large increase in range, careful attention to each design detail can yield a substantial total improvement. Because of noise considerations, future engines for advanced supersonic transports may be approximately 50% larger than used for the present study, making the effects of improved inlet performance even more important. (Author)

A74-11285 # **A semi-empirical method for predicting subsonic diffuser performance.** W. W. Rhoades (LTV Aerospace Corp., Vought Systems Div., Dallas, Tex.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1272.* 9 p. 5 refs. Members, $1.50; nonmembers, $2.00.

A semi-empirical method for predicting subsonic diffuser performance is presented. This method is being used to develop a computerized diffuser performance prediction routine which will provide the capability for rapid estimates of subsonic diffuser performance while adding to the general understanding of diffusers. This technique has been shown successful in predicting preliminary performance estimates for diffusers of simple geometry. In addition, a feasibility study has shown that this method can be used to predict diffuser performance for diffusers of arbitrary geometry. (Author)

A74-11286 # **F-14 inlet maneuvering capability.** R. H. Tindell (Grumman Aerospace Corp., Bethpage, N.Y.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1273.* 9 p. Members, $1.50; nonmembers, $2.00.

Development of the F-14 inlet, in particular as it relates to the aircraft's exceedingly high maneuvering capability, is reviewed. Starting with the basic Navy requirements for an aggressive fighter aircraft, the fundamental problems of blending aircraft and engine operation, particularly at limiting conditions, are defined and the F-14 solutions are discussed. Inlet/airframe integration is discussed and relevant wind tunnel data are reviewed. A comparison of flight and wind tunnel engine face pressures is shown. The stable operational attitude corridor, i.e., pitch vs yaw is summarized. (Author)

A74-11287 # **Prediction of aircraft gas turbine NO/x/ emission dependence on engine operating parameters and ambient conditions.** W. S. Blazowski, D. E. Walsh, and K. D. Mach (USAF, Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1275.* 11 p. 11 refs. Members, $1.50; nonmembers, $2.00.

A74-11288 # **Measurement of gas turbine exhaust pollutants by Raman spectroscopy.** G. E. Bresowar (USAF, Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio) and D. A. Leonard (Avco Everett Research Laboratory, Everett, Mass.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1276.* 13 p. 10 refs. Members, $1.50; nonmembers, $2.00.

Description of a first-generation laser Raman spectrometer designed for measurement of aircraft gas turbine exhaust pollutant concentrations. The theory of the device is set forth, cross sections of some typical gas pollutants are discussed, the hardware of the device is described, and test results are given. The correlation between unburned hydrocarbons and the fluorescence indicates that the luminescent species may be a hydrocarbon. The decrease of the fluorescence level with decreasing hydrocarbon gives some promise that species such as NO and CH can be measured by using a Raman signal. V.Z.

A74-11289 # **Impact of emission regulations on future gas turbine engine combustors.** F. J. Verkamp, A. J. Verdouw, and J. G. Tomlinson (General Motors Corp., Detroit Diesel Allison Div., Indianapolis, Ind.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1277.* 8 p. Members, $1.50; nonmembers, $2.00.

Two hundred and twenty-four low emission gas turbine research combustors were tested. Future low emission gas turbine combustor categories are: (1) modified conventional combustors, and (2) advanced low emission combustors. Modified conventional combustors featuring airblast fuel injectors and primary zone fuel/air ratio control have marginal feasibility for meeting the EPA 1979 aircraft emission regulations. Further stringency in the emission

regulations will require advanced low emission combustors. However these combustors which have demonstrated 90% emission reduction incorporate features that at current technology levels will require compromises in gas turbine engine size, cost, durability, reliability, and cycle efficiency. (Author)

A74-11290 * # Odor intensity and characterization studies of exhaust from a turbojet engine combustor. H. F. Butze (NASA, Lewis Research Center, Cleveland, Ohio) and D. A. Kendall (NASA, Lewis Research Center, Cleveland, Ohio; Arthur D. Little, Inc., Cambridge, Mass.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1278.* 8 p. 5 refs. Members, $1.50; nonmembers, $2.00.

Sensory odor tests of the exhaust from a turbojet combustor operating at simulated idle conditions were made by a human panel sniffing diluted exhaust gas. Simultaneously, samples of undiluted exhaust gas were collected on adsorbent substrates, subsequently removed by solvent flushing, and analyzed chemically by liquid chromatographic methods. The concentrations of the principal malodorous species, the aromatic (unburned fuel-related) and the oxygenated (partially burned fuel) fractions, as determined chromatographically, correlated well with the intensity of the odor as determined by sniffing. Odor intensity increased as combustion efficiency decreased. Combustor modifications which increased combustion efficiency decreased odor intensity. (Author)

A74-11291 * # Aspects of large-scale, subsonic, wind-tunnel design for propulsion noise research. D. H. Hickey and M. W. Kelly (NASA, Ames Research Center, Large-Scale Aerodynamics Branch, Moffett Field, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1279.* 7 p. 7 refs. Members, $1.50; nonmembers, $2.00.

The case for full-scale acoustic testing of propulsion systems at flight conditions and the use of wind tunnels for this work are discussed. The problems associated with measuring noise in wind tunnels are discussed, and wind-tunnel design requirements to provide a useful facility for noise research are established. Full-scale subsonic wind-tunnel designs that meet the requirements are described, and it is shown that state-of-art acoustics technology must be used in the drive-fan design to minimize background noise. If this is successfully done, acoustic treatment in the drive system area may be avoided. (Author)

A74-11292 # Dynamic simulation of CONFLOW - A facility to provide hot-gas ground testing of air-breathing missiles under simulated flight conditions. W. Mitchell (Martin Marietta Aerospace, Aeromechanical Engineering Div., Orlando, Fla.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1281.* 10 p. Members, $1.50; nonmembers, $2.00.

A74-11298 * # The effect of noise constraints on engine cycle optimization for long-haul transports. R. J. Antl (NASA, Lewis Research Center, Quiet Engine Project Office, Cleveland, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1292.* 8 p. 10 refs. Members, $1.50; nonmembers, $2.00.

Optimum engine cycles were determined for noise levels of 10, 15, and 20 EPNdB below current FAA regulations, using 200-passenger trijet aircraft flying over ranges from 5555 to 10,200 km at cruise speeds of Mach 0.90 and 0.98. The tests showed that the noise constraints imposed compromises on the optimum cycle with resulting economic penalties. The economic penalties, however, could be effectively offset by applying advanced engine technologies. V.P.

A74-11302 # Integrated airframe-nozzle performance for designing twin-engine fighters. E. R. Glasgow (Lockheed-California Co., Burbank, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1303.* 15 p. 13 refs. Members, $1.50; nonmembers, $2.00. Contracts No. F33657-70-C-0511; No. F33615-72-C-1748.

Wind-tunnel data for designing fighter aircraft with twin buried engines and dual nozzles were obtained with large-scale twin-nozzle/afttbody configurations. Sufficient pressure and force balance data were obtained for representative exhaust nozzle pressure ratios to permit determination of such aft-end design variables as nozzles type, power setting position, axial position, solid body exhaust simulation, and lateral spacing; interfairing type, length, height, and base area; vertical stabilizer type, position, and rudder deflection; horizontal stabilizer deflection; and fuselage area distribution. For predicting aircraft performance, the effects on aft-end drag of support system interference, inlet mass flow, lifting surface span reduction, and tunnel Reynolds number were determined. V.P.

A74-11303 # Advanced technology thrust vectoring exhaust systems. J. C. Gill (General Motors Corp., Detroit Diesel Allison Div., Indianapolis, Ind.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1304.* 11 p. Members, $1.50; nonmembers, $2.00.

Systematic studies of a series of candidate thrust vectoring exhaust nozzle systems were performed to identify the best system for an advanced VTOL fighter/interceptor. The investigation used generalized nozzle and installation data in finding that a nozzle arrangement featuring a 'trap door' thrust vectoring device was competitive with other types for nonaugmented vertical operation and offered superior installation qualities. A three-bearing rotating elbow nozzle was best when partial afterburning was employed for deflected thrust. Nozzle selections were based on study results as well as subjective appraisals by aircraft companies. (Author)

A74-11304 * # Comparison of ground and flight test results using a modified F106B aircraft. F. A. Wilcox (NASA, Lewis Research Center, Cleveland, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1305.* 15 p. 44 refs. Members, $1.50; nonmembers, $2.00.

A F106 aircraft was modified by installing two additional underwing nacelles housing afterburning J85 engines to study exhaust nozzles in flight at Mach numbers up to 1.3. Installation effects were determined for several nozzles by comparing flight and wind-tunnel data. The effect is to decrease boattail drag and delay its drag rise Mach number to about 0.98. A study of Reynolds number effects, carried out at subsonic speeds with afterburning turbofan engines showed boattail drag to be sensitive to Reynolds number. In flight, drag was highest at the lowest Reynolds number, and decreased as the Re number was increased. Static and flyover noise measurements showed that, except for special cases, noise levels at takeoff (M = 0.4) were higher than predicted from static data. V.P.

A74-11309 # An analytical and experimental study of inlet ground vortices. D. L. Motycka, W. A. Walter, and G. L. Muller (United Aircraft Corp., Pratt and Whitney Aircraft Div., East Hartford, Conn.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1313.* 8 p. Members, $1.50; nonmembers, $2.00.

Previous studies of ground vortices have been primarily concerned with their ability to pick up debris and cause damage to an engine. However, ingestion of a vortex by an engine also represents a severe flow distortion condition which may result in compressor surge. An analytical study, using three-dimensional potential flow

theory, has been made to determine the flow properties of an ingested ground vortex at the compressor face of a jet engine. The effect of ambient wind speed and direction, engine installation, and engine mass flow rate on the location of the vortex at the compressor face was evaluated. Tangential and axial velocity distributions at the compressor face are presented. Experimental data from a subsonic inlet model test near a ground plane are compared to analytical predictions. (Author)

A74-11310 # Qualitative effects of cycle variables on turbine engine performance and stability. J. B. Day and M. S. Coalson (USAF, Aeronautical Systems Div., Wright-Patterson AFB, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1315.* 10 p. 6 refs. Members, $1.50; nonmembers, $2.00.

Equations are derived which show the relationships between the major components of certain configurations of turbine engines. Flow and work equality relationships which depict various rematch effects associated with changing engine operating mode form the basis for these equations. The equations are shown to have great utility in understanding the effects of bleed, power extraction, burner, tailpipe and fan duct pressure drops, changes in component efficiency, various flight regimes, and resized nozzles. The dependence of these effects on control mode is demonstrated. The limitation of the application of the analysis procedures described herein for certain engine configurations is described. (Author)

A74-11311 * # The effect of inlet temperature and pressure distortion on turbojet performance. W. M. Braithwaite, E. J. Graber, Jr., and C. M. Mehalic (NASA, Lewis Research Center, Cleveland, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1316.* 11 p. 12 refs. Members, $1.50; nonmembers, $2.00.

The effects on stability of steady-state, 180 degree extent circumferential distortions of inlet total temperature and pressure were experimentally determined for a turbojet engine. Results for both individual and combined temperature and pressure distortions are presented showing the losses incurred in stall pressure ratio and are compared with results predicted using a simplified parallel compressor model. The loss due to combined distortions was dependent upon the relative orientation between the low pressure and high temperature regions. Reasonable agreement was achieved between the predicted and observed loss in stall pressure ratio when based on a constant corrected speed relationship. (Author)

A74-11312 # The planar pressure pulse generator - A new dynamic distortion generator. P. H. Kutschenreuter, Jr., T. P. Collins, and W. F. Vier, III (General Electric Co., Cincinnati, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1317.* 7 p. 5 refs. Members, $1.50; nonmembers, $2.00.

A pulse generator intended for use in qualitative evaluation of the response of compression systems to large sinusoidal pressure fluctuations over a wide range of frequencies is described. It is a mechanical device incorporating coaxial rotors and a stator with matched holes. The frequency of the pulses generated is controlled by the rotor spinning rate. The amplitude is controlled by varying the axial rotor-to-stator spacing. No secondary flow is required, since the generator operates on compressor or engine air flow. Performance test data are examined. V.P.

A74-11313 # Supersonic mixing and combustion studies of ducted hydrogen-air flows at an inlet air Mach number of 2.6. J. E. Drewry, N. E. Scaggs (USAF, Fluid Dynamics Facilities Research Laboratory, Wright-Patterson AFB, Ohio), and M. E. Neer. *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1320.* 12 p. 14 refs. Members, $1.50; nonmembers, $2.00.

Experimental studies of the turbulent mixing and combustion of confined, coaxial hydrogen-air flows have been performed with matched inlet static pressures over a total temperature range of 500 R to near 2000 R for both hydrogen and air. Flow diagnostic measurements included impact pressure, static pressure, gas sampling, and absorption spectroscopy. Results from nonreacting flow studies indicated poor mixing between the supersonic air stream and the near-sonic hydrogen stream. Spectral studies of the combustor flowfield, utilizing the ultraviolet spectra associated with the 2 sigma-2 pi electronic transition of the OH molecule, were made with a low-resolution, rapid-scanning spectrometer. OH number densities, and mean temperatures were obtained via a graphical inversion technique using numerically determined spectral results. (Author)

A74-11314 * # Supersonic combustion of hydrogen injected perpendicular to a ducted vitiated airstream. R. C. Rogers and J. M. Eggers (NASA, Langley Research Center, Hampton, Va.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1322.* 11 p. 14 refs. Members, $1.50; nonmembers, $2.00.

The reaction of hydrogen injected into a supersonic vitiated airstream from perpendicular injectors equally spaced over opposite walls of a two-dimensional duct is experimentally investigated. Information is obtained in the form of pitot pressure and gas sample surveys of the duct exit flow and static pressures along the duct walls for several injector arrangements differing in number, spacing, and size of injectors and operating at two levels of equivalence ratio. The amount of the injected hydrogen reacted is deduced from the static pressure data using a one-dimensional theory and is correlated with relative injection pressure and injector spacing-to-diameter ratio. These results are used with a mixing distribution correlation derived from nonreacting hydrogen-air results to predict static pressure distributions. (Author)

A74-11315 # The case for hydrogen fueled transport aircraft. G. D. Brewer (Lockheed-California Co., Burbank, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1323.* 13 p. 14 refs. Members, $1.50; nonmembers, $2.00.

Arguments in favor of the substitution of liquid hydrogen for oil to power commercial aircraft are presented. Shortage of petroleum in the United States and the need for import will lead to unacceptable dependence on foreign nations, will cost the U.S. heavily in terms of deficit balance of payments, and can become a continuous threat of interruption of oil supply that will endanger our independence in the fields of commerce, world trade, diplomacy, and even our national security. In addition, hydrogen offers potential advantages when used in aircraft. Examples of subsonic and supersonic commercial aircraft are examined to determine the advantages in performance, pollution, noise, and cost. Some problems associated with the use of liquid hydrogen as a fuel are discussed. V.P.

A74-11316 # An experimental investigation of techniques for reducing objectionable exhaust emissions. S. A. Mosier and R. M. Pierce (United Aircraft Corp., Pratt and Whitney Aircraft Div., West Palm Beach, Fla.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1324.* 14 p. Members, $1.50; nonmembers, $2.00. Contract No. F33615-71-C-1870. AF Project 3066.

A comprehensive experimental investigation was conducted to identify and assess combustor design techniques for increasing combustion efficiency during part-power operation. Reduced con-

centrations of the products of incomplete combustion, unburned hydrocarbons and carbon monoxide, were a direct consequence. Three promising means for achieving these improvements were evaluated: air staging, fuel staging, and fuel-air premixing. With each technique the environment within the combustor was closely controlled in an attempt to effect a more complete reaction between fuel and air. The lowest concentrations of both unburned hydrocarbons and carbon monoxide were obtained with the premixing concept. (Author)

A74-11318 # **Cost - The emerging aerospace technology.** D. K. Jorden and M. A. Siegel (United Aircraft Corp., Pratt and Whitney Aircraft Div., West Palm Beach, Fla.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1327.* 5 p. Members, $1.50; nonmembers, $2.00.

A cost management system is designed to give product cost a priority level equal to that of performance, weight and durability. The system provides cost visibility in the conceptual design phase, cost avoidance in the design phase, and cost reduction in the development and production phases. Essential in this system is a central cost management department staffed with engineering, procurement and manufacturing specialists backed by the management. V.Z.

A74-11329 **HS.146.** *Flight International,* vol. 104, Oct. 18, 1973, p. 628-633.

The HS.146 71-seat feederliner is powered by four Avco Lycoming 502 turbofans located under the high wing. The aircraft has a sea-level takeoff performance as good as that of the HS.748, and at high altitude and high temperature it is better. On the ground it needs no ground-power unit if either the optional APU or starter battery pack is fitted. Extensive use of metal-to-metal bonding reduces the number of rivet holes to give improved fatigue resistance, and well proven corrosion protection techniques are used. The flying controls and the various systems are briefly described. F.R.L.

A74-11339 # **Prevention of transition over a backward step by suction.** M. Hahn and W. Pfenninger (Boeing Commercial Airplane Co., Seattle, Wash.). *Journal of Aircraft,* vol. 10, Oct. 1973, p. 618-622. Research supported by the Boeing Independent Research and Development Funds.

A study was made on prevention of transition of the flow downstream of a backward facing step by means of suction. Distributed suction was approached through closely spaced slots in the region downstream of the step. The optimum location and rate of suction to maintain laminar flow downstream of the step were determined. The effects of step height Reynolds number on transition of the boundary layer with and without suction were investigated. Suction in the region slightly upstream of reattachment shortened the reattachment length by about 20% and was very effective in preventing transition. The minimum suction rate required for laminarization of the flow downstream of the step was equivalent to 15-20% removal of the boundary-layer displacement thickness upstream of the step. The transition Reynolds number based on step height was increased from 1100 without suction to 2200 with suction. (Author)

A74-11340 # **Buckling of orthotropic, curved, sandwich panels in shear and axial compression.** O. B. Davenport (USAF, Aeronautical Systems Div., Wright-Patterson AFB, Ohio) and C. W. Bert (Oklahoma, University, Norman, Okla.). *Journal of Aircraft,* vol. 10, Oct. 1973, p. 632-634. 8 refs.

Analysis of the buckling behavior of clamped-edge panels under pure edge shear and of both simply supported and clamped panels subjected to combined shear and axial compression. Buckling loads are discussed for (1) a flat sandwich panel with isotropic, stainless steel facings and core, (2) a thin, homogeneous, isotropic aluminum panel, (3) a flat, thin, laminated, orthotropic boron-epoxy panel. T.M.

A74-11342 # **Prediction of airfoil shock location in transonic flow.** V. E. Studwell (USAF, Washington, D.C.) and J.-M. Wu (Tennessee, University, Tullahoma, Tenn.). *Journal of Aircraft,* vol. 10, Oct. 1973, p. 636-638. 5 refs. USAF-supported research. AF Project 2567.

Description of an engineering method for predicting shock-wave location on an airfoil moving at transonic speeds. Wind-tunnel experiments were used to establish correlations of pressure ratios with the onset Mach number and the local Mach number at separation. The correlation curves can be used to determine the position of the shock wave on the airfoil. T.M.

A74-11343 # **Longitudinal response of an aircraft due to a trailing vortex pair.** A. Ramirez, Jr., B. M. Rao, and A. E. Cronk (Texas A & M University, College Station, Tex.). *Journal of Aircraft,* vol. 10, Oct. 1973, p. 638, 639.

Description of an approximate method for predicting the response of a small aircraft in longitudinal motion when it is flying through the trailing vortex system of a large aircraft. Analysis of the longitudinal stability of motion of the small aircraft is analogous to the study of an arbitrary system subjected to a forced oscillation. The forced oscillation term is analogous to the input moments and forces due to the trailing vortex system. When the latter are zero, the problem reduces to one of describing the motion of an aircraft due to small disturbances. A numerical example illustrates the time histories of flight variables such as the changes in flight speed, angle of attack, and pitching angle. T.M.

A74-11348 **Tupolev 144 and Concorde - The official performances are compared for the first time (Tupolev 144 et Concorde - Les performances officielles sont comparées pour la première fois).** J. Morisset. *Air et Cosmos,* vol. 11, Sept. 8, 1973, p. 22, 23, 48. In French.

It appears that at supersonic speeds the Tu-144 is a little bit faster than the Concorde. However, the actual difference is less than it seems. The Tu-144 can withstand 20 C more than the Concorde, thanks to a much more intensive use of titanium alloys, in particular at the leading edge, where kinetic heating is most important. Besides, the Tu-144 will cruise at a height about 1000 m higher than the Concorde, but computation of the range under actual conditions remains inexact. The climb and descent profiles of the two aircraft are quite different. It is concluded that western aerodynamicists have succeeded in designing and perfecting a wing which is remarkable in all flight regions. F.R.L.

A74-11387 # **The influence of operational experience on aircraft escape system development.** R. H. Shannon (USAF, Inspection and Safety Center, Norton AFB, Calif.). *American Institute of Aeronautics and Astronautics, Crew Equipment Systems Conference, Las Vegas, Nev., Nov. 7-9, 1973, Paper 73-1340.* 5 p. Members, $1.50; nonmembers, $2.00.

Review of the progress of aircraft escape system technology, with the emphasis on the most recent ejection system designs and their timely improvement. It is held that increased attention to life support requirements in modern weapon designs should eliminate the need in interim system update programs and prevent injuries and mortality caused by escape system deficiency. V.Z.

A74-11414 **Hologram study of gas flow in a ballistic wind tunnel.** A. F. Belozerov, A. N. Berezkin, A. I. Razumovskaia, and N. M. Spornik (Akademiia Nauk SSSR, Fiziko-Tekhnicheskii Institut, Leningrad, USSR). *(Zhurnal Tekhnicheskoi Fiziki,* vol. 43, Apr. 1973, p. 777-781.) *Soviet Physics - Technical Physics,* vol. 18, Oct. 1973, p. 488-490. 6 refs. Translation.

A74-11424 # **Measured jet noise compared to California noise codes and health criteria.** S. R. Lane (California, University, Los Angeles, Calif.). *Acoustical Society of America, Meeting, 85th, Boston, Mass., Apr. 10-13, 1973, Paper.* 43 p. 13 refs.

Description of a jet noise measurement program carried out to determine if jet aircraft landing at Los Angeles International Airport violate newly enacted California airport noise standards. The highest noise levels detected on one flight path were generated by three- and four-engine turbojet and turbofan aircraft. These aircraft consistently produced noise levels in the 105 to 115 dB(A) range at the 5000 to 6000 feet ground positions below the flight paths. Measurements on another flight path are found to indicate that the noise levels to the side of the flight paths were several decibels less than values that would be obtained by simply subtracting the divergence loss factor from the direct overflight noise levels. It is concluded that these results indicate a potential weakness in the airport noise monitoring system, in that the fixed-position microphone systems stationed beneath the 'theoretical' landing paths will not indicate the maximum jet noise levels in the community when the aircraft flight paths are displaced 100 to 200 feet to the side. A.B.K.

A74-11426 # **Finite element solution of the incompressible flow over an airfoil in a nonuniform stream.** J. V. D. Vooren and T. E. Labrujere (Nationaal Luchtvaartlaboratorium, Amsterdam, Netherlands). *University of Southampton, International Conference on Numerical Methods in Fluid Dynamics, Southampton, England, Sept. 26-28, 1973, Paper.* 16 p.

Attention is given to the nonlinear problem of rotational flow around a two-dimensional airfoil, a problem which has become important because of the application of modern propulsion systems, and the development of wings maintaining high lift at low forward speed. A drawback of the method described by Chow et al. (1970), which is based on finite differences, is the difficulty of treating boundaries that do not fit into the prescribed finite difference network. This difficulty does not occur when the finite element method is used. A further advantage of this method is that refinement of the network does not lead to numerical or computational difficulties. A finite element method for the determination of the pressure distribution on an airfoil in an incompressible inviscid nonuniform channel flow is described. F.R.L.

A74-11428 # **Dynamic relaxation solution of three dimensional subsonic compressible oscillatory flow.** K. R. Rushton (Birmingham, University, Birmingham, England). *University of Southampton, International Conference on Numerical Methods in Fluid Dynamics, Southampton, England, Sept. 26-28, 1973, Paper.* 24 p. 5 refs.

When the equations of subsonic compressible oscillatory flow are written in terms of the real and imaginary parts of velocity potential, two 'Laplace type' differential equations in three space dimensions are obtained interconnected by involved boundary conditions. Solutions are obtained using the dynamic relaxation method which is an iterative finite difference technique. The advantages of using the dynamic relaxation method for this type of problem are discussed. (Author)

A74-11430 # **Boundary value problems of two-dimensional isentropic gas flow.** F. U. Minhas. *University of Southampton, International Conference on Numerical Methods in Fluid Dynamics, Southampton, England, Sept. 26-28, 1973, Paper.* 16 p.

This paper is concerned with a semi-empirical method for solving isentropic flow problems involving complicated boundaries. The basic principle of the method is to deduce an isentropic gas flow by the application of a two-dimensional hydraulic analogy. The method is applied to obtain the flow in a two-dimensional internal compression diffuser during the early phase of the starting flow. (Author)

A74-11434 # **Modeling of gas turbine combustors.** L. A. Kennedy (New York, State University, Buffalo, N.Y.) and C. Scaccia (Union Carbide Corp., New York, N.Y.). *University of Southampton, International Conference on Numerical Methods in Fluid Dynamics, Southampton, England, Sept. 26-28, 1973, Paper.* 23 p. 17 refs.

This investigation presents the results of numerically modeling the combustion processes within a continuous flow combustor. The model consists of a rectangular chamber having a rear facing step. The fuel and oxidant are injected from two separate inlets and the swirl produced by the inlet vanes in the actual physical situation is included. Dilution air is injected from the side wall. Finite rate chemistry was coupled with this two dimensional flow. The governing elliptical equations are solved numerically in the nonlinear convective terms to insure stability for all the Reynolds numbers considered. A relaxation technique was employed to integrate the numerically stiff rate equations. The burning of methane was examined using this model combustor with particular attention focused on the formation of nitric oxide and carbon monoxide. Velocity, temperature and concentration profiles were obtained within the combustor. The effect of a multidimensional flow field is examined and the computed results are compared with axial measurements in a laboratory combustor. (Author)

A74-11439 # **Suitability of the finite element method for analysis of unsteady flow around oscillating airfoils.** T. Bratanow and A. Ecer (Wisconsin, University, Milwaukee, Wis.). *University of Southampton, International Conference on Numerical Methods in Fluid Dynamics, Southampton, England, Sept. 26-28, 1973, Paper.* 36 p. 9 refs.

The suitability and advantages of the finite element method for analysis of unsteady incompressible viscous flow around pitching and plunging obstacles are presented. Several examples involving the application of Poisson's equation and Helmholtz's vorticity equation are analyzed. Physical and numerical aspects of the unsteady flow problems are discussed. The presented graphical data demonstrates the suitability of the developed method for visualization of the flow in terms of streamlines and vorticity and pressure distributions. (Author)

A74-11441 # **The whirl instability of a rigid rotor in a flexibly supported gas lubricated journal bearing.** D. A. Boffev (Edinburgh, University, Edinburgh, Scotland). *World Conference in Industrial Tribology, 1st, Indian Institute of Technology, New Delhi, India, Dec. 11-18, 1972, Paper.* 15 p. 28 refs. $1.00. Research supported by the Science Research Council.

Theoretical and experimental investigation of the effects of introducing a flexible damped support as a means of inhibiting self-excited whirl of a rigid rotor in a gas-lubricated bearing. The equations of motion for translational whirl are formulated for a rotor/bearing system in which the gas film is represented by dynamic stiffness and damping coefficients and the bearing is supported on isoelastic rings. The frequency-dependent gas film coefficients are evaluated numerically, using Lund's 'linearized pH' solution to the time-dependent Reynold's equation. Results are presented for an externally pressurized journal bearing, in which the supply pressure, bearing mass, and support parameters are varied. It is shown that, with a sufficiently high support damping/stiffness ratio, a gas bearing system can be achieved which is stable at all speeds. Experimental results of some tests conducted on a bearing supported in rubber O-rings are presented which demonstrate that substantial increases in threshold speed can be obtained with a flexible damped support. A.B.K.

A74-11445 # **Instability of rotors in MHD journal bearings.** P. A. Kulkarni (Walchand College of Engineering, Sangli, India) and B. V. A. Rao (Indian Institute of Technology, Madras, India). *World Conference in Industrial Tribology, 1st, Indian Institute of Technology, New Delhi, India, Dec. 11-18, 1972, Paper.* 6 p. 10 refs. $1.00.

In this paper, the instability of a rigid rotor supported on MHD journal bearings is theoretically discussed. Axial magnetic field and radial electric field are assumed. All induced effects are neglected and the generalised Reynolds's equation for the dynamically loaded bearing is formulated. The equation for an infinitely long model is solved and the radial and tangential load components are obtained. Using these, the spring and damping constants of the lubricant film (in all eight co-efficients) are derived. For the stability analysis, the equations of motion of the journal centre assuming small oscillation are set up and thence characteristic equation is obtained. The threshold of instability is evaluated using Routh's criteria. The influence of electromagnetic parameters on the stability is discussed. (Author)

A74-11451 # **Simplified physical model of spray combustion in a gas turbine engine.** A. M. Mellor (Purdue University, Lafayette, Ind.). *Combustion Institute, Technical Meeting, McGill University, Montreal, Canada, Oct. 11, 12, 1973, Paper.* 29 p. 32 refs. U.S. Environmental Protection Agency Contract No. R-801284.

Heterogeneous processes have been identified as important in determining levels of exhaust emissions from liquid-fueled gas turbine engines. From correlations of NO and CO emissions indices with differential fuel injection pressure, a simplified physical model of the spray combustion process in a turbine combustor has been developed. This model not only is consistent with previous experimental data obtained in this laboratory, but also assists in understanding the successes and failures of analytical combustor models available in the open literature. (Author)

A74-11459 **Sodium sulphate induced rapid oxidation of a chromium-titanium-silicon coating on niobium alloy B-66.** E. P. Whelan and J. M. Trenouth (National Aeronautical Establishment, Ottawa, Canada). *Journal of the Less-Common Metals*, vol. 33, Oct. 1973, p. 153-170. 30 refs.

The influence of Na_2SO_4 on the oxidation resistance of Cr-Ti-Si coatings on niobium alloy B-66 has been studied. Specimens contaminated by Na_2SO_4 were oxidised at 1100, 1200, and 1300 C in air. Initial mass gains of contaminated specimens were considerably greater than those of uncontaminated specimens. The reaction initiating the accelerated oxidation appears to involve the accelerated dissociation of Na_2SO_4 by the oxides SiO_2, TiO_2 and Cr_2O_3, formed on the surface of the coating during oxidation. Subsequent to this dissociation a new, soft, oxide scale is formed that provides less oxidation protection to the underlying silicide zone than the original oxide scale, leading to the rapid oxidation of the coating, and to penetration of the sub-scale coating by interstitials. Some similarities between this work and studies of the hot corrosion of nickel and nickel-base superalloys are discussed. (Author)

A74-11499 **Technology forecasting - Aircraft hazard detection.** C. L. Delaney (USAF, Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio). *Technological Forecasting and Social Change*, vol. 5, no. 3, 1973, p. 249-252.

This article describes the use of the scoring model technique to forecast aircraft hazard detection technology. The various factors relating to hazard detection were determined. These factors were combined into a single parameter which describes the relation of these factors to the technology being forecasted. The method of determining the value of each factor for the various detection systems utilized in the forecast are discussed. These include factors which were normalized, others which require judgmental evaluation, and one which was computed. The results of the forecast are presented, showing that the parameter derived adequately describes the hazard detection systems on which it was based. (Author)

A74-11500 **Measuring the radiation of a vertical gas jet.** A. G. Laktionov and A. I. Lur'e. *(Optiko-Mekhanicheskaia Promyshlennost', vol. 40, Mar. 1973.) Soviet Journal of Optical Technology*, vol. 40, Mar. 1973, p. 148, 149. Translation.

The profile of a vertical gas jet generated by ten turbojet engines located on the ground about 10 m apart is determined in the ground layer (i.e., up to 100-m altitude) from measurements of the thermal radiation of the jet. The photoelectric device used for these measurements is described. The expansion coefficient of the jet over the altitude range from 10 to 75 m has been found to be 0.06. M.V.E.

A74-11513 **Gas-phase nitrogen and methane chemistry in the atmosphere.** P. J. Crutzen (Stockholm, University, Stockholm, Sweden). In: Physics and chemistry of upper atmospheres; Proceedings of the Symposium, Orléans, France, July 31-August 11, 1972. Dordrecht, D. Reidel Publishing Co., 1973, p. 110-124. 66 refs.

Questions regarding the production and destruction of ozone are discussed together with sources and sinks for nitric oxide and nitrogen dioxide, odd hydrogen reactions, the oxidation of methane, and the SST problem. Calculated distributions of some of the trace gases in the stratosphere are presented in two tables. It is pointed out that many problems of both chemical and meteorological nature must be resolved before any reliable predictions can be made of ozone reductions due to the effects of large scale SST operation. G.R.

A74-11552 # **Blind landing (Aterizarea fara vizibilitate).** I. Aron. *Transporturi Auto, Navale si Aeriene*, vol. 3 (20), July 1973, p. 371-376. In Rumanian.

Review of the principles underlying the realization of automatic landing systems and of the performances of which these systems must be capable in order to satisfy the requirements of modern air transport. After citing the components which are generally present in such a landing system, the ILS system for determining the location of an aircraft relative to the landing strip is described. This system includes, in principle, a radio course beacon and a radio slope beacon. It is shown that the motion of the center of mass of an aircraft during automatic landing can be decomposed into a motion with respect to a curve exemplified by the radio slope beam and a motion with respect to the plane described by the radio course beam. A.B.K.

A74-11554 **Effect of exhaust deflectors on the design of lift plus lift/cruise V/STOL aircraft.** D. Migdal (Grumman Aerospace Corp., Bethpage, N.Y.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730959.* 9 p. Members, $1.25; nonmembers, $2.00. Navy-sponsored research.

Design and experimental studies are reviewed which demonstrate the effect of vectored nozzle type, shape, location and orientation on V/STOL aircraft design and performance. Single and twin engine aircraft differences are discussed. Complete aircraft sizing and mission results are displayed for twin engine aircraft. (Author)

A74-11555 **Electronic display mechanization for monitoring aircraft parameters.** R. A. Wallace and P. L. Narveson (Sperry Rand Corp., Sperry Flight Systems Div., Phoenix, Ariz.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730956.* 7 p. 6 refs. Members, $1.25; nonmembers, $2.00.

A concept for using cathode ray tube and digital techniques to display aircraft system parameters in the cockpit of a jet transport is presented in this paper. These parameters relate to engine thrust management and displays that are conventionally associated with the flight engineer's station. The sensor and signal processing requirements are integrated with those for recording of flight data in accordance with federal aviation regulations and also for maintenance considerations. (Author)

A74-11556 **Introduction to advanced systems monitor.** J. Donohue (Boeing Commercial Airplane Co., Renton, Wash.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730953.* 6 p. Members, $1.25; nonmembers, $2.00.

There is a trend in future commercial aircraft toward more integration of systems, functions, and displays. Many benefits can be realized through proper integration, the most significant being improved operating efficiency. The Advanced Systems Monitor (ASM) is a display integration device using digital data acquisition and processing techniques together with a cathode ray tube or other advanced integrated displays. The ASM provides operating data to the flight crew and maintenance data to the ground crew. While these two functions appear different, the difference is quite often in form rather than substance. The system parametric data used for performance indication to the flight crew often have the intelligence to identify malfunctioning units to the ground crew. This intelligence can be extracted through use of the computer. Incorporation of a computer in the ASM design provides processed data to the crews, as well as raw data. This processed data can take the form of specific instructions for corrective action when system malfunctions occur. (Author)

A74-11557 * **Evaluation of V/STOL research aircraft design.** W. H. Deckert and C. A. Holzhauser (NASA, Ames Research Center, Advanced VTOL Projects Office, Moffett Field, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730947.* 8 p. 8 refs. Members, $1.25; nonmembers, $2.00.

The evaluation and evolution of direct jet lift V/STOL transport aircraft designs are discussed. The V/STOL transport design selected as an example is a lift-fan design that was evaluated as a candidate configuration for a possible future V/STOL research transport. The paper includes discussion of potential advanced V/STOL landing approach profiles as key design requirements for V/STOL aircraft, description and experimental results of an integrated propulsion/control system designed to achieve desired advanced V/STOL near-terminal operating capabilities, and results from evaluating V/STOL designs on piloted moving-base simulators. This paper discusses use of the piloted moving-base simulator as a design tool for evolving satisfactory V/STOL stabilization and propulsion/control systems. Included are problems and solutions identified during simulation of simultaneous decelerating/descent steep curved landing approaches under instrument flight conditions. Simulation results are also compared to flight results obtained with the DO-31 V/STOL research transport. (Author)

A74-11558 **Evaluation of advanced air vehicle designs in the USAF.** W. M. O'Connor (USAF, Aeronautical Systems Div., Wright-Patterson AFB, Ohio). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730945.* 12 p. 8 refs. Members, $1.25; nonmembers, $2.00.

Design studies performed by the U.S. Air Force examine the implications of various capabilities. These internal studies highlight questionable areas, define critical elements, provide sensitivity information, and form the basis for understanding subsequent work. The Interactive Computer Aided Design (ICAD) system has been designed to combine the best capabilities of the computer and man. It develops data needed to permit a rational choice between alternate sets of requirements, and develops the internal expertise necessary to evaluate the design proposed to meet these requirements. (Author)

A74-11564 **An integrated approach to structural weight estimation.** L. Ascani and G. Hayase (Rockwell International Corp., El Segundo, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730936.* 12 p. Members, $1.25; nonmembers, $2.00. Research supported by the Rockwell International Corp.

A completely self-contained continuously running system, entitled Structural Weight Estimation Program (SWEEP), is described which will evaluate and optimize airframes of advanced aircraft with exceptional speed and accuracy by integrating all necessary disciplinary functions through data management modules that control the logic of the more than 200 subroutines. Structural weight of aircraft is determined by analytically evaluating the effects of loads, fatigue, stress, flutter, temperature, mass properties, manufacturing constraints, and materials in one computer run. The output of the program is a weight statement of the complete air vehicle, vehicle mass properties, and a description of primary structural members. V.P.

A74-11565 **Advanced flutter design techniques.** J. B. Bartley and M. J. Turner (Boeing Commercial Airplane Co., Renton, Wash.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730935.* 12 p. Members, $1.25; nonmembers, $2.00.

The general characteristics of flutter problems affecting the structural design of both subsonic and supersonic transport aircraft are discussed in relation to configuration constraints resulting from mission performance and environmental impact requirements. Combined analytical and experimental approaches employed in the assessment and solution of these problems are outlined. Included are discussions of the extensive application of automated procedures in the use of high-speed digital computers for flutter analysis and the dependence on highly sophisticated wind tunnel flutter model construction techniques to provide reliable experimental data. Illustrations of the application of design techniques to supersonic and subsonic aircraft are presented. (Author)

A74-11566 **Computer-aided design and drafting /CADD/ - An advanced designer's tool.** R. D. Ward and E. G. Koeller (McDonnell Aircraft Co., St. Louis, Mo.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730934.* 23 p. Members, $1.25; nonmembers, $2.00.

Computer graphics has become the bridge between the computer and the designer. McDonnell Douglas' CADD system was originally developed for parts layout and solutions to geometry problems, and this restriction was maintained until recently so development could be controlled. Now, with the maturing of the system, several disciplines are converting the computer graphics design package to their special applications. Recent advances in computer graphics software have been adapted to advanced design. The integration of these disciplines has required a number of changes in design techniques in order to evolve and evaluate a conceptual configuration. However, the time savings alone will allow advanced design teams to define and analyze more configurations earlier in the design cycle, resulting in much greater design visibility and with greater accuracy. (Author)

A74-11567 **Use of simulators in the design and development of flight control systems.** J. T. Gallagher and W. Nelson (Northrop Corp., Beverly Hills, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730933.* 9 p. 9 refs. Members, $1.25; nonmembers, $2.00.

Recent advances in the design and development of motion simulators, visual display systems, artificial force producers, and computer capability have enhanced the effectiveness of ground-based simulators in the design process. At Northrop, a systematic improvement in simulator subsystems has resulted in the existence of the Northrop large amplitude three-axis flight simulator which has 6 degrees of freedom. The simulator is a significant tool in the design of flight control systems, particularly in today's environment where

the aerospace industry is attempting to extend the performance envelopes of its products through the use of nonconventional configurations and radical flight control system concepts. (Author)

A74-11576 **Further development of the JT15D turbofan.** R. H. Anschutz (United Aircraft Corp., Pratt and Whitney Aircraft Div., East Hartford, Conn.) and D. L. Cook (United Aircraft of Canada, Ltd., Longueuil, Quebec, Canada). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730919.* 13 p. Members, $1.25; nonmembers, $2.00.

When the JT15D engine was first considered for potential high-altitude, low flight speed, long-endurance RPV applications by the U.S. Air Force, the questions were: (1) will the engine run at these altitudes, (2) can it deliver the required thrust, (3) can it deliver the required power extraction, (4) what is the specific fuel consumption, (5) what oil system modifications are needed, (6) what is the optimum control system, and (7) are there other unknowns. A JT15D-4 turbofan engine, with only minor modifications which were easily incorporated into engines coming off the production line, proved more than adequate to achieve predicted endurance goals and measured performance. (Author)

A74-11577 **The Garrett-AiResearch variable-cycle TFE731 turbofan engine.** W. R. Davenport and G. J. Dixon (AiResearch Manufacturing Company of Arizona, Phoenix, Ariz.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730918.* 10 p. Members, $1.25; nonmembers, $2.00. USAF-supported research.

In order to demonstate the potential benefits of variable-turbine geometry in a turbofan engine, the U.S. Air Force Aero Propulsion Laboratory funded Garrett-AiResearch to build and test a variable-cycle turbofan engine. The engine selected for the demonstration is the TFE731-2 two-spool, geared-turbofan engine modified to accept variable geometry in the LP turbine, LP compressor, and exhaust nozzles. Throughout approximately 72 hr of engine testing at sea level, static conditions, the variable-cycle engine has demonstrated that these variable-geometry components provide an effective means of rematching the engine components to obtain improved performance characteristics. For example, the concept of maintaining constant inlet total-airflow and low-pressure-compressor surge margin while modulating engine thrust was demonstrated during this testing. This concept, in turn, relates directly to the potential of improving installed engine performance over that of a fixed engine by reducing inlet spillage and aft-end external drag. (Author)

A74-11578 **Upper Surface Blowing technology as applied to the YC-14 airplane.** J. K. Wimpress (Boeing Co., Seattle, Wash.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730916.* 8 p. Members, $1.25; nonmembers, $2.00.

The exhaust from a high bypass ratio turbofan engine, passing over the upper surface of a wing and trailing edge flap system, can be deflected by the Coanda effect to create both deflected thrust and super circulation. This technique, known as Upper Surface Blowing, has been applied to the Air Force/Boeing YC-14 Advanced Medium STOL Transport airplane. Laboratory and wind tunnel tests have shown very efficient turning of the jet flow, large values of super circulation, and excellent boundary layer control of the external flow on the upper surface of the wing. This combination creates a powered lift system having unusual efficiency and versatility. (Author)

A74-11579 **External blowing flap technology on the USAF/McDonnell Douglas YC-15 /AMST/ program.** E. R. Heald (McDonnell Douglas Corp., Long Beach, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730915.* 9 p. Members, $1.25; nonmembers, $2.00.

A74-11580 **Air Force STOL tactical aircraft investigation - Evaluation of externally blown flaps.** M. H. Roe (Rockwell International Corp., Aircraft Div., Los Angeles, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730914.* 16 p. 6 refs. Members, $1.25; nonmembers, $2.00.

A74-11581 **STOL tactical aircraft investigation.** J. Hebert (General Dynamics Corp., Convair Aerospace Div., San Diego, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730913.* 16 p. 10 refs. Members, $1.25; nonmembers, $2.00. Contract No. F33615-71-C-1754.

Preliminary vehicle-sizing activities and subsequent design update based on related studies, wind tunnel tests, and flight simulations conducted during a STOL Tactical Aircraft Investigation are summarized. The designs developed during Part 1 of the study were based on state-of-the-art technology and powered by scaled derivative engines using existing cores. The three preliminary designs for the lift/propulsion concepts were then updated during Part 2 to complete the study. Resulting point designs are based on data from 1100 h of wind tunnel tests, aerodynamic and stability-and-control methodology development, and stability and flight control technology studies. Technology developed by Convair Aerospace during the STOL Tactical Aircraft Investigation shows that a light and efficient advanced medium STOL transport can be designed and produced. (Author)

A74-11582 ***Lycomings LTS 101* - Low cost turbine power in the 600 hp class.** A. Myers and E. Pease (Avco Corp., Avco Lycoming Div., Stratford, Conn.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730911.* 12 p. Members, $1.25; nonmembers, $2.00.

The LTS 101 has been designed to meet the requirements of low cost, high performance, and simplicity in a powerplant suitable for a variety of applications in the 600 shp class. This paper discusses the parametric cycle studies that led to integration of the LTS 101 aerodynamic components to achieve these goals, and presents results of full engine prototype tests. Design features that contribute to the low cost of ownership are described. (Author)

A74-11583 **Low cost supersonic expendable turbine engines.** T. E. Elsasser (U.S. Naval Air Propulsion Test Center, Trenton, N.J.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730910.* 8 p. Members, $1.25; nonmembers, $2.00.

The Navy is currently in the second phase of a program to develop a supersonic turbojet engine for tactical missile applications. The engines have been designed for a single mission only and for lowest possible cost. Three companies (AiResearch, Curtiss-Wright, and Pratt & Whitney Aircraft) are under contract to fabricate and test the critical components of their respective engine designs. Each engine is described with emphasis on its low cost design features and fabrication techniques. The overall program status and available results of the current critical component phase are presented. Design requirements and problems unique to expendable turbine engine development are also discussed. (Author)

A74-11584 **A simplified approach for estimating manufacturing cost at the part level.** D. E. Blanchfield, D. E. Lewis (United Aircraft Corp., Pratt and Whitney Aircraft Div., East Hartford, Conn.), and M. G. Woodbury. *Society of Automotive Engineers,*

National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730908. 10 p. Members, $1.25; nonmembers, $2.00.

A74-11585 **Advantages of aircraft system maturity.** W. W. Way (McDonnell Douglas Corp., Long Beach, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730907.* 7 p. Members, $1.25; nonmembers, $2.00.

The maturing air transportation industry is finding profitability to be increasingly elusive. The cost of maintaining the aircraft of this industry has a substantial impact on profitability. It is incumbent on aircraft and system designers to minimize the cost of maintaining those aircraft to maximize profitability. Choosing mature components and systems, which have demonstrated reliability, are familiar to maintenance personnel, and for which spare inventory exists, is an effective technique for minimizing maintenance costs of a new aircraft. This paper discusses examples of such applications and describes the values that can result. (Author)

A74-11588 **A corrosion inhibiting coating for structural airframe fasteners.** F. L. Gill (Hi-Shear Corp., Reading, Pa.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730902.* 8 p. 5 refs. Members, $1.25; nonmembers, $2.00.

Corrosion problems associated with using titanium fasteners to assemble aluminum airframe structures are reviewed. Data are presented describing the effectiveness of metallic platings and an aluminum filled organic based coating on fasteners to render the titanium-aluminum electrochemical couple inoperative. The aluminum enriched organic coating known as Hi-Kote 1 is shown to be more effective in minimizing corrosive attack on aluminum airframe structure in both saline and acidic environments. The effectiveness of Hi-Kote 1 in corrosion-fatigue tests of fastened aluminum structure is also reported. (Author)

A74-11589 **Improved fastener systems for fatigue and sealing redundancy of low shear transfer joints.** J. H. Ruhl and R. L. Hurd (Huck Manufacturing Co., Detroit, Mich.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730901.* 6 p. Members, $1.25; nonmembers, $2.00.

A74-11590 **AST - A fifth engine for environmental consideration.** R. D. FitzSimmons and W. C. Hoover (McDonnell Douglas Corp., Long Beach, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730899.* 7 p. 7 refs. Members, $1.25; nonmembers, $2.00.

No greater contribution seems to exist for improving supersonic transport economics than by improving the state of the art of jet noise suppressors. Exact matching of thrust requirements for supersonic cruise, transonic acceleration, climb, and especially takeoff-climb is complex. The present design becomes an equivalent five-engine configuration, where the extra thrust is required to enable environmental levels of FAR Part 36 to be achieved. The added size is required first to allow for engine throttling during takeoff run to provide reduced exhaust velocity and exhaust gas temperature consistent with suppressor structural limits, and secondly to make up for suppressor losses at takeoff flight speeds. As the engine selection must be closely tied to airplane selection, substantiation of the 2.2-M airplane selection is described. (Author)

A74-11591 **Propulsion technology advances needed for a quiet supersonic transport.** R. L. Foss and E. L. Bragdon (Lockheed-California Co., Burbank, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730898.* 15 p. Members, $1.25; nonmembers, $2.00.

Operation of a U.S. developed supersonic transport must and will meet community noise standards. This paper examines the airport noise problems of large transport aircraft, highlights critical considerations, and then studies possible solutions available from advanced propulsion technology. Engine sizing requirements to meet SST payload-range and airport performance criteria are reviewed first, and the impact of noise on the engine size and aircraft performance is then identified. Relief offered by noise suppressor development and technology advances that can be foreseen in the next decade for turbojet and turbofan engines are described. The advantages offered by a duct heating turbofan engine cycle are discussed. The potential offered by variable cycle engines to provide low noise characteristics with minimum penalty on performance are shown, and the practical restraints imposed on this potential by airframe aerodynamic noise is illustrated. (Author)

A74-11592 **Jet noise suppression systems for high-speed aircraft.** C. D. Simcox (Boeing Commercial Airplane Co., Seattle, Wash.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730897.* 10 p. 10 refs. Members, $1.25; nonmembers, $2.00.

Jet noise is a major problem for high-speed aircraft. Efficient methods of reduction must be found to have an economically viable and ecologically acceptable airplane. This paper discusses reduction techniques and constraints. Specific suppression systems are presented as an evaluation of current work. An analysis of the effect of suppressors on airplane performance is presented to demonstrate the requirement for step improvements over suppression systems considered previously. (Author)

A74-11593 * **Benefits of advanced propulsion technology for the advanced supersonic transport.** R. W. Hines and J. A. Sabatella (United Aircraft Corp., Pratt and Whitney Aircraft Div., East Hartford, Conn.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730896.* 11 p. Members, $1.25; nonmembers, $2.00. NASA-supported research.

Future supersonic transports will have to provide improvement in the areas of economics, range, and emissions relative to the present generation of supersonic transports, as well as meeting or improving upon FAR 36 noise goals. This paper covers the promising propulsion systems including variable-cycle engine concepts for long-range supersonic commercial transport application. The benefits of applying advanced propulsion technology to solve the economic and environmental problems are reviewed. The advanced propulsion technologies covered are in the areas of structures, materials, cooling techniques, aerodynamics, variable engine geometry, jet noise suppressors, acoustic treatment, and low-emission burners. The results of applying the advanced propulsion technology are presented in terms of improvement in overall system takeoff gross weight and return on investment. (Author)

A74-11594 **Development of parametricized computations for AST study engines.** R. Szeliga (General Electric Co., Aircraft Engine Group, West Lynn, Mass.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730895.* 9 p. Members, $1.25; nonmembers, $2.00.

A parametric computational concept has been developed that facilitates rapid and accurate generation of AST engine data suitable for mission analysis. This calculation tool, in the form of a computer program, considers the aerothermal, mechanical, installation, and noise aspects of different types of AST engines, while calculating installed performance, weight, and physical dimensions in a specified airflow size. (Author)

A74-11595 **The main rotor bifilar absorber and its effect on helicopter reliability/maintainability.** M. A. Wachs (United Aircraft Corp., Sikorsky Aircraft Div., Stratford, Conn.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730894.* 11 p. 6 refs. Members, $1.25; nonmembers, $2.00.

A74-11596 **Nodalization applied to helicopters.** D. Shipman (Bell Helicopter Co., Fort Worth, Tex.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730893.* 12 p. 10 refs. Members, $1.25; nonmembers, $2.00.

A new passive vibration isolation method has been developed which offers less static deflection and lower transmissibility at the operating frequency than conventional passive isolators. The method consists of attaching the object to be isolated to nodal points which are developed when an elastic beam is excited by a vibrating source. Attachment at the nodes dynamically decouples the driving and driven systems in a frequency band making isolation independent of the mass of the driven system. The immediate application is to eliminate helicopter fuselage vibration; however, because of its generality, it can be used wherever conventional isolators are used in isolating a limited range of vibration frequencies. (Author)

A74-11597 **Control of helicopter vibration using the dynamic antiresonant vibration isolator.** R. Jones (Kaman Aerospace Corp., Bloomfield, Conn.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730892.* 13 p. 10 refs. Members, $1.25; nonmembers, $2.00. Army-sponsored research.

Description of the dynamic antiresonant vibration isolator (DAVI), an inertially coupled isolation device which permits a high degree of isolation at discrete low frequencies without sacrifice of elastic stiffness. The principles upon which the DAVI is based and laboratory test results are presented to show the independence of DAVI isolation from the weight of the isolated item. The application of the DAVI to crew seat isolation is also discussed. A summary of the work done on the application of the DAVI to helicopter rotor isolation, including results of analysis and testing, is presented. (Author)

A74-11598 **The influence of design to cost and prototyping on the A-10 aircraft.** W. B. Trepel and G. A. Bohmann (Fairchild Republic Co., Farmingdale, N.Y.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730890.* 7 p. Members, $1.25; nonmembers, $2.00.

Increasing concern has been shown at all levels of government over the rising cost of major weapons systems. The implementation of the 'design to cost' approach is intended to reverse this trend by placing greater emphasis on the cost elements during systems design and by restraining the natural desire for maximum performance if the technology required involves the risk of cost escalation. These factors, however, must not detract from the basic goal - the production of a weapons system with acceptable, reliable performance within cost guidelines. The application of design to cost and the effect of prototyping are described as they apply to the A-10 close air support aircraft. (Author)

A74-11600 **Influence of prototype concept and cost ceilings on airframe design and manufacture of the YF-16 lightweight fighter.** W. C. Dietz and W. K. Bailey (General Dynamics Corp., Convair Aerospace Div., San Diego, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730888.* 9 p. Members, $1.25; nonmembers, $2.00.

A74-11601 **Advanced structural materials application for high-subsonic-speed transports.** R. H. Lange and L. W. Lassiter (Lockheed-Georgia Co., Marietta, Ga.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730887.* 11 p. 5 refs. Members, $1.25; nonmembers, $2.00.

This paper describes the results of parametric design studies of the application of filamentary composite materials in the structure of high-subsonic-speed transport aircraft. System costs and weight savings are presented as a function of percent utilization of composite materials from zero to 80%. The weight savings potential of composites for direct material substitution and for resized aircraft show gains of up to 25 and 50%, respectively. The state-of-the-art in structural design, analysis, fabrication, and test is discussed. Structural design concepts are shown and test validation is given, along with cost analyses. (Author)

A74-11602 **Material selection procedures for advanced transport aircraft.** J. M. Shults (General Dynamics Corp., Convair Aerospace Div., San Diego, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730884.* 8 p. 10 refs. Members, $1.25; nonmembers, $2.00. Contracts No. F33615-72-C-1185; No. F33615-73-C-3001; No. F33615-72-C-2149.

The selection criteria were developed and used in two development programs. It is pointed out that in recent years fracture mechanics parameters have had a great impact on the materials selected for use in aircraft. The material selection is an important element of the fracture control plan for any aircraft. The application of the selection criteria is discussed, taking into account also specific data for purposes of demonstration. G.R.

A74-11603 **Maintainability concepts used in the design and operation of Douglas commercial jet aircraft.** J. M. Bandy (Delta Air Lines, Inc., Atlanta, Ga.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730881.* 5 p. 7 refs. Members, $1.25; nonmembers, $2.00.

A74-11604 **Aerospace fluidics applications and circuit manufacture.** T. G. Sutton, Sr. and W. J. Anderson (AiResearch Manufacturing Co., Los Angeles, Calif.). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730880.* 13 p. Members, $1.25; nonmembers, $2.00.

The application of fluidics to the solution of aerospace control problems began at AiResearch in 1964. Several development programs have resulted in production applications related to the major AiResearch product lines which include gas turbines, propulsion engines, air motors, and environmental control systems. Early in these development programs, it was realized that the manufacture of monolithic flueric circuits would be necessary for aerospace use of this new technology. Research and investigation of production processes resulted in the use of photochemical machining and activated diffusion bonding for production and development fluidic circuitry manufacture. The use of these processes has lead to the successful application of fluidics to aerospace products. (Author)

A74-11605 **Spray cooled generators and design-to-cost at Westinghouse.** A. E. King (Westinghouse Electric Corp., Aerospace Electrical Div., Lima, Ohio). *Society of Automotive Engineers, National Aerospace Engineering and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730878.* 9 p. Members, $1.25; nonmembers, $2.00.

An aircraft generator development program is described that has achieved dramatic weight reductions with simultaneous improvements in reliability and performance through application of spray-oil cooling. The program plan employed the classic requirements for achievement based on design-to-cost principles. M.V.E.

A74-11606 * **New airfoil sections for general aviation aircraft.** W. H. Wentz, Jr. (Wichita State University, Wichita, Kan.). *Society of Automotive Engineers, National Aerospace Engineering*

and Manufacturing Meeting, Los Angeles, Calif., Oct. 16-18, 1973, Paper 730876. 9 p. 9 refs. Members, $1.25; nonmembers, $2.00. NASA-sponsored research.

A program has been undertaken to develop new airfoil sections suitable for general aviation aircraft, utilizing theoretical and experimental advanced technology developed in recent years primarily for subsonic jet transport and military aircraft. The airfoil development program is one component of the Advanced Technology Light Twin program sponsored by NASA Langley Research Center. Two-dimensional tests of a new airfoil have demonstrated high cruising performance over a fairly wide C sub 1 range, and a C sub 1 max value of 3.69 with Fowler flap and no leading-edge devices. Experimental and theoretical development of additional configurations is under way. (Author)

A74-11610 # **U.S. aerospace industry at the crossroads.** R. S. Attiyeh (McKinsey and Co., Inc., Los Angeles, Calif.), E. G. Friberg (McKinsey and Co., Inc., Washington, D.C.), and R. E. Cohen (U.S. Department of Commerce, Washington, D.C.). *Astronautics and Aeronautics,* vol. 11, Nov. 1973, p. 44-51.

It is pointed out that for the first time in recent history Europeans significantly challenge U.S. dominance of the Free World aerospace market. The European challenge comes from the substantial government funding of both military and commercial aircraft projects, such as the MRCA (multirole combat aircraft) and the A-300 B airbus. Approaches regarding the U.S. response to these developments are discussed, giving attention to the basic economics that must be considered in developing a successful long-term strategy for profitable operations. G.R.

A74-11615 **Research and development for future air transports.** J. Seddon (Ministry of Defence, London, England). *(European Convention on the Objectives for European Air Transport Operations, London, England, Jan. 10, 11, 1973.) Aeronautical Journal,* vol. 77, Sept. 1973, p. 459-464.

The aspects considered are the changing form of research, objectives for future research and development, research in the field, and the harnessing of resources. Other factors than the search for increased speed have transformed the picture of unidirectional progress. These are the economic factor and regard for social values, specifically with respect to noise and other atmospheric pollution. Definable objectives for future research and development are further improvement in the economics of the Mach 0.85 transport, exploitation of a significant speed range from Mach 0.85 to low supersonic, and optimization of the 'Mach 2 plus' transport. Another major objective is catering specifically for the short range market. Research now being carried on in the fields of aerodynamics, propulsion, structures, and avionics is reviewed. Research management and international cooperation can contribute greatly to the harnessing of resources. F.R.L.

A74-11617 **Digital computer simulation of the dynamic response of a twin-spool turbofan with mixed exhausts.** A. J. Fawke (British Gas Corp., Newcastle-upon-Tyne, England) and H. I. H. Saravanamuttoo (Carleton University, Ottawa, Canada). *Aeronautical Journal,* vol. 77, Sept. 1973, p. 471-478. 6 refs. Research supported by the Science Research Council.

A74-11618 **Some aspects of inlet/engine flow compatibility.** D. D. Williams and J. O. Yost (Rolls-Royce /1971/, Ltd., Bristol Engine Div., Bristol, England). *(International Council of the Aeronautical Sciences, Congress, 8th, Amsterdam, Netherlands, Aug. 28-Sept. 2, 1972.) Aeronautical Journal,* vol. 77, Sept. 1973, p. 483-492. 28 refs.

The effects of an inlet system on an axial flow gas turbine are principally on performance, stability, and mechanical integrity. Major attention is focused on the effects of total pressure distortion on the compressor system's performance and stability. Rig compressor tests are concerned with circumferential distortion, the propagation of circumferential distortions throughout the compressor, and radial distortions. Engine testing with simulated inlet distortions and behind representative inlets on the bench, in flying test beds, and in free-jet altitude test facilities prior to first flight of the prototype aircraft minimizes the risk of encountering intractable compatibility problems. Total pressure distortion parameters, limitations of theoretical predictions of distortion propagation, and dynamic distortion are considered. F.R.L.

A74-11685 # **Solution of the equations of motion of a gyrohorizon compass at finite deviation angles from the meridian (Reshenie uravnenii dvizheniia girogorizontkompasa pri konechnykh uglakh otklonenii ot meridiana).** Iu. K. Zhbanov. *Akademiia Nauk SSSR, Izvestiia, Mekhanika Tverdogo Tela,* July-Aug. 1973, p. 102-104. 7 refs. In Russian.

A74-11736 # **Creep fracture mechanisms in aluminum alloys.** R. N. Wilson (Royal Aircraft Establishment, Farnborough, Hants., England). In: The practical implications of fracture mechanisms; Proceedings of the Spring Meeting, Newcastle-upon-Tyne, England, March 27-29, 1973. London, Institution of Metallurgists, 1973, p. 103-111. 17 refs.

The behavior of precipitation-hardened alloys and of the Al-Cu-Mg-Si alloy Hiduminium RR58 on which the airframe of the Concorde is based are studied. A grain boundary wedge crack in Hiduminium RR58 is discussed. Associated with such cracking is considerable grain boundary shearing. A recent development in crack nucleation studies is the measurement of the crack density during creep life both as a function of stress and of temperature. In general the ductility achieved by a metal or alloy before fracture occurs is dependent upon the rate of straining, the elongation decreasing as the strain rate is decreased. The ductility is also sensitive to the temperature at which the metal is strained. As the ductility changes, so may the mode of fracture, an increasing proportion of grain boundary failure occurring with lower strain rates. Theories of the growth of creep cracks are discussed. F.R.L.

A74-11739 # **Aviation turbine fuel and its lubricating qualities (Flugturbinenkraftstoff und seine Schmiereigenschaft).** H. Ebert. *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 9, no. 5, 1973, p. 252-256. In German.

The requirements for the aviation turbine fuel produced in the German Democratic Republic are discussed, giving particular attention to the function of the fuel as lubricating agent. Substantial amounts of fuel have to be supplied to the aircraft-turbine combustion chambers with high pressure pumps of great operational precision. The environmental conditions for the operation include a low atmospheric pressure and an oxygen deficiency. The fuel system contains a considerable number of control elements. Approaches used for guaranteeing a supply of fuel of the desired characteristics are reported. G.R.

A74-11740 # **Operational problems with the aircraft type Tu-134 in the case of a use of the aircraft turbine fuel TS-1 (Betriebsprobleme mit dem Flugzeugtyp Tu-134 beim Einsatz des Flugturbinenkraftstoffes TS-1).** U. Günther (Gesellschaft für Internationalen Flugverkehr mbH, Berlin, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 9, no. 5, 1973, p. 257-260. In German.

It was found that the use in the Tu-134 of the fuel TS-1 as obtained from one producer resulted on various occasions in difficulties related to the operation of the high-pressure rotors of the engine. No such difficulties were experienced with TS-1 fuel supplied by another producer. After a thorough investigation the cause for the operational problems in the case of the fuel from the first producer could be traced to the inferior lubricating qualities of this fuel compared to the fuel produced by the second supplier. G.R.

A74-11741 # **The quality of the fuel (Qualität des Kraftstoffes).** A. Russkikh (Ministerstvo Grazhdanskoi Aviatsii, Moscow, USSR). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 9, no. 5, 1973, p. 261-264. In German. (Translation).

It has been found that modern aircraft propulsion systems require for satisfactory operation fuels which meet certain quality standards. These standards are related to the specification of upper limits with regard to the presence of solid materials, free water, and tar products. The complete absence of soap-like deposits is also necessary. The approaches used for maintaining fuel supplies of the required characteristics are discussed, giving attention to the preparation and the cleaning of the installations used to transport or store the fuel. Cleaning procedures for the fuel and control methods for assuring an appropriate fuel quality are also considered. G.R.

A74-11743 # **The Dolphin airship with undulating propulsion system - On-test-stand comparison with a helicopter (Delphinluftschiff mit Wellantrieb - Vergleich mit Hubschrauber am Stand).** W. Schmidt. *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 9, no. 5, 1973, p. 282-285. 5 refs. In German.

The undulating propulsion system makes it possible to employ the Dolphin airship for the lifting of payloads without any change in the gas volume. The Dolphin airship is capable to lift heavier payloads than the helicopter under conditions of smaller engine performance. The engine performance requirements are considered together with the size of the airship hull and the specifications for the propulsion system. G.R.

A74-11744 # **Flight-mechanics analysis of various flight conditions of conventional aircraft. VIII/2 - Mechanical foundations: Dynamic equations of motion of the control systems (Flugmechanische Analyse verschiedener Flugzustände konventioneller Flugzeuge. VIII/2 - Mechanische Grundlagen: Dynamische Bewegungsgleichungen der Steuersysteme).** F. Seidler (Hochschule für Verkehrswesen, Dresden, East Germany). *Technisch-ökonomische Informationen der zivilen Luftfahrt,* vol. 9, no. 5, 1973, p. 286-304. In German.

A74-11776 **AMST - The approach to the STOL transport of the US (AMST - Der Weg zum STOL-Transporter der USA).** N. Lynn. *Flug Revue/Flugwelt International,* Nov. 1973, p. 20-25. In German.

The Advanced Medium STOL Transport (AMST) program is to develop an aircraft which can be used to replace the Lockheed C-130 Hercules of the USAF. Each of two U.S. aerospace firms is to design and manufacture two AMST prototypes. New advanced technological methods are to be used to obtain an economical STOL transport design. The various intended military objectives for the new aircraft are discussed together with the major design specifications of the AMST and the individual characteristics of each of the two prototype versions. It is planned to develop also commercial AMST derivatives for civil aviation, including a model for 100 and a model for 180 passengers. G.R.

A74-11799 **engine for STOL** application. [illegible] G. Goldman (NASA, Lewis Research Center, V/STOL and Noise Div., Cleveland, Ohio). *American Institute of Aeronautics and Astronautics, Aero-Acoustics Conference, Seattle, Wash., Oct. 15-17, 1973, Paper 73-1031.* 20 p.

A TF-34 engine with an acoustically treated ground test nacelle was built and tested to determine the feasibility of suppressing fan and core engine noise to the stringent levels required for STOL or short-haul commercial aircraft. The design incorporates wall treatment for the fan and core plus three treated splitter rings in the inlet and two treated splitters in the aft fan duct. Maximum suppression of fan tone noise of 40-45 dB was obtained from both the inlet and aft fan treatment. At rated fan speed, overall noise was reduced by 21 PNdB to a value of 94 PNdB on a 500-foot sideline. The overall noise reduction value was limited by the jet noise floor. Thrust losses due to the acoustic treatment are also discussed. (Author)

A74-11805 **Stability and decay of free vortices behind a wing (Stabilität und Zerfall der freien Wirbel hinter einem Tragflügel).** H. Bippes (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für angewandte Mathematik und Mechanik, Freiburg im Breisgau, West Germany). *DFVLR-Nachrichten,* Oct. 1973, p. 455-457. In German.

An experimental investigation was conducted regarding the system of free vortices which detach themselves from a rectangular wing. During the tests the model was moved while the fluid medium remained at rest. This approach made it possible to observe the vortices for more than one minute until they finally decayed. The flow was made visible with the aid of hydrogen bubbles which were obtained by electrolysis of the medium water by means of a wire serving as cathode. G.R.

A74-11806 **System evaluation as an objective for a research institute (Systembewertung als Aufgabe eines Forschungsinstituts).** L. von Bonin (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Antriebssysteme, Braunschweig, West Germany). *DFVLR-Nachrichten,* Oct. 1973, p. 457-459. 8 refs. In German.

Parameter studies concerning VTOL weapons systems are discussed, giving attention to the effect of various propulsion systems and the takeoff weight of a VTOL subsonic weapons system for ground combat. Other investigations considered are concerned with the adaptation of the propulsion process to future flight missions and the evaluation of propulsion systems by means of a systems approach. In the latter approach the basic relations between wing and propulsion system design are explored and the system wing-propulsion unit is optimized with regard to a target objective. Two different aircraft configurations are finally compared on the basis of this target objective. G.R.

A74-11808 **Ten years transonic wind tunnel of the AVA Göttingen (Zehn Jahre Transsonischer Windkanal der AVA Göttingen).** W. Lorenz-Meyer (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Strömungsmechanik, Göttingen, West Germany). *DFVLR-Nachrichten,* Oct. 1973, p. 464-467. In German.

The wind tunnel is designed for experiments in the Mach number range from 0.5 to 2.2 and the Reynolds number range from 400,000 to 2,000,000. Tunnel design details are discussed together with the measurement objectives. A table showing the time of operation for the wind tunnel and the number of tests is presented together with a number of pictures of tunnel installations and of models used in the tests. G.R.

A74-11814 **The experimental response of simple structures to simulated sonic booms.** R. R. Hudson (University of Manchester Institute of Science and Technology, Manchester, England) and M. J. Crocker (Purdue University, Lafayette, Ind.). *(Anglo-Spanish-Netherlands Conference on Environmental Acoustics, 2nd, London, England, July 2-5, 1972.) Acustica,* vol. 29, Oct. 1973, p. 187-197. 11 refs.

The paper presents results obtained from an idealized model of a window under the influence of a sonic boom. The window was represented by a simply supported steel panel mounted at the end of an explosive-driven shock tube. In order to realize a simply supported panel the problem of providing edge support without clamping, damping or membrane stresses had to be overcome. The final panel had less than 1% critical damping and had a resonant frequency within 4% of the theoretical value. The panel strain was measured when it was subjected both to continuous wave and

transient acoustic excitation. The continuous wave strain is within 5% of the theoretical value calculated from a modal theory. This theory, in conjunction with the Duhamel integral, also gives a prediction of the transient strain time-history which is in good agreement with the experimental curves. (Author)

A74-11816 Noise design goals for the next generation of aircraft. N. S. Yeowart (Salford, University, Salford, England). *(Anglo-Spanish-Netherlands Conference on Environmental Acoustics, 2nd, London, England, July 2-5, 1972.) Acustica*, vol. 29, Oct. 1973, p. 225-227.

Existing noise laws for aircraft will not help to fix noise design goals for the next generation of aircraft. A more realistic concept of 'design for community acceptability' is introduced with examples of the resulting noise goals for STOL aircraft. The economic penalty of noise reduction attempts is contrasted with the benefits of increased useful land area for residential development. (Author)

A74-11824 # **An empirical model for calculating the critical conditions of flame stabilization.** O. Schurek (Vyzkumny a Zkusebni Letecky Ustav, Prague, Czechoslovakia). *Archiwum Procesow Spalania*, vol. 4, no. 1, 1973, p. 31-52.

Critical conditions for flame stabilization in jet-engine combustion chambers are analyzed by using a simplified combustor model that defines such quantities as mixture dwelling time, combustion efficiency, dimensionless temperature, characteristic reaction time, and a dimensionless value of mixture heating. Equations derived for these variables are in good agreement with original experiments conducted with (1) a tubular combustion chamber where fuel is atomized by a nozzle and (2) an annular combustion chamber using a rotating disk for fuel atomization. T.M.

A74-11835 **Wind conditions at the Cologne/Bonn airport and possibilities of forecasting them (Die Windverhältnisse am Flughafen Köln/Bonn und die Möglichkeiten einer Prognose).** K. W. Grober. *Meteorologische Rundschau*, vol. 26, Sept.-Oct. 1973, p. 152-156. In German.

Study of the role of local effects on the variation of the wind direction at the Cologne/Bonn airport. It is shown that the surface wind distribution at this airport is essentially influenced by the direction of the Rhine valley. In addition to this, there is a characteristic diurnal variation which is caused by the formation of a local warm depression south of Bonn. Finally, the Eifel mountains and their foothills play a role in the attenuation of the southwest wind. The conditions under which a forecast of wind direction is possible at this airport are noted. A.B.K.

A74-11843 **Torsion-flap-lag coupling on helicopter rotor blades.** R. E. Hansford and I. A. Simons (Westland Helicopters, Ltd., Yeovil, Somerset, England). *American Helicopter Society, Journal*, vol. 18, Oct. 1973, p. 2-12. 9 refs. Research supported by the Ministry of Defence.

A theoretical analysis shows that the torsional moment due to blade bending is dependent on the product of flapping and lagging moments. Relationships for the torsional loading in terms of the blade stiffness distributions and the fundamental flap and lag bending natural frequencies are also derived. In particular, it is shown that zero torsional coupling is obtainable only if the blade stiffnesses are matched everywhere outboard of the feathering hinge. However the coupling can be largely eliminated by careful choice of feathering hinge position and matched stiffness elements without imposing limitations on the blade lag and flap frequencies. The Westland hingeless rotor system is used to illustrate this solution to the problem. (Author)

A74-11844 * **Some conclusions regarding the aeroelastic stability of hingeless helicopter blades in hover and in forward flight.** P. Friedmann (California, University, Los Angeles, Calif.). *American Helicopter Society, Journal*, vol. 18, Oct. 1973, p. 13-23. 15 refs. Contract No. NAS2-6175.

In this paper results and conclusions obtained from the study of the aeroelastic instability of hingeless helicopter blades are presented. First, the large amplitude coupled flap-lag equations of motion of a hingeless elastic helicopter blade are solved using an asymptotic expansion procedure in multiple time scales. Both hover and forward flight cases are considered. Stability boundaries and amplitudes of nonlinear response are obtained. From these, the importance of the nonlinear coupling and the effect of the periodic coefficients is determined. Next, using a system of linearized coupled flap-lag-pitch equations in hover, various divergence mechanisms for hingeless blades are shown. Finally, the flutter boundaries for coupled flap-lag-pitch are obtained. The effect of the torsional degree of freedom on the flap-lag type of instability is investigated. Similarly the effect of lag on the flap-pitch type of instability is considered. In addition, the effect of various blade parameters on the stability boundaries is shown. (Author)

A74-11845 **An investigation of the vibratory and acoustic benefits obtainable by the elimination of the blade tip vortex.** R. P. White, Jr. (Rochester Applied Science Associates, Inc., Rochester, N.Y.). *American Helicopter Society, Journal*, vol. 18, Oct. 1973, p. 35-44. 24 refs.

In order to determine the location and strength of the trailed vortex field generated by a helicopter rotor system in forward flight, a theoretical analysis by Sadler (1971, 1972) for NASA was used to calculate the position and strength of the free vortex wake and the dynamic loads generated by the rotor blades operating in the aerodynamic environment created by this wake. The predicted results of this analysis were correlated with experimental results obtained with full-scale helicopters, and it has been demonstrated that the predicted and experimental results are in good agreement when the helicopter is in a steady-state flight condition and when it performs a coordinated turn, pull-up, or roll maneuver. The effect of eliminating the concentrated tip vortices from a helicopter rotor system is beneficial as regards the reduction in the dynamic loads that determine the life of helicopter blades and in the reduction of the acoustic output of blade slap which dominates the helicopter rotor noise when it occurs. F.R.L.

A74-11846 **The effects of second order blade bending on the angle of attack of hingeless rotor blades.** D. A. Peters and R. A. Ormiston (U.S. Army, Air Mobility Research and Development Laboratory, Moffett Field, Calif.). *American Helicopter Society, Journal*, vol. 18, Oct. 1973, p. 45-48.

Pitch-lag and pitch-flap coupling, whether induced by control system geometry or by elastic coupling between blade torsion and blade bending, greatly influences the stability of rotor blade motion. An expression for the angle of attack of an elastic rotor blade is derived which includes important second-order terms due to blade bending. These terms are interpreted as a dihedral effect and a kinematic pitch rotation which is independent of torsional deformations. These angle of attack terms can be expressed as effective pitch-lag and pitch-flap coupling, and are shown to be significant for rotor blade stability calculations. F.R.L.

A74-11874 # **Design and evaluation of aircraft pavements - 1971.** F. R. Martin, R. F. A. Judge, and M. B. Chammings (Department of the Environment, Croydon, England). *ASCE, Transportation Engineering Journal*, vol. 99, Nov. 1973, p. 785-799.

The current methods for calculating the load classification number (LCN) of aircraft and for designing and evaluating pavements are discussed and a simplified method of load classification group (LCG) is described. Stress induced by aircraft and the ability of supporting pavements to sustain such stress are analyzed to develop a pavement classification procedure for operational and engineering applications. The LCG has been designed for use by airfield authorities and aircraft operators for safe operation of aircraft on the ground and has been adopted in the United Kingdom and several other countries pending its formal adoption by the ICAO. V.Z.

A74-11899 # **Dynamical pressure distribution in aerodynamic bearing.** K. Hashiguchi (Mitsubishi Heavy Industries, Ltd., Tokyo, Japan) and A. Tamura (Tokyo Institute of Technology, Tokyo, Japan). *JSME, Bulletin,* vol. 16, Sept. 1973, p. 1410-1420; Discussion, p. 1420; Authors' Closure, p. 1420. 5 refs.

Analysis of the dynamic pressure distribution in an aerodynamic journal bearing, using the time-dependent Reynolds' equation for the small circular motion of the journal center. The relation between the small circular whirling motion of the journal center and the dynamic pressure distribution in the gas film is illustrated. A condition under which it is necessary to take into account the effect of the time history on the dynamic pressure distribution in solving Reynolds' equation is indicated. A.B.K.

A74-11908 **Scattering by a conducting aerofoil.** L. Shafai and P. Bhartia (Manitoba, University, Winnipeg, Manitoba, Canada). *Archiv für Elektronik und Übertragungstechnik,* vol. 27, Oct. 1973, p. 447, 448. Research supported by the University of Manitoba; National Research Council of Canada Grant No. A-7702.

An integral equation of induced currents is used in an analysis of the two-dimensional scattering of electromagnetic waves by conducting symmetrical and asymmetrical conducting aerofoils. Computer-calculated results are given for the scattered electromagnetic field and induced current produced by scattering. V.Z.

A74-11994 ***Effect of differences between the antennas of a Doppler velocity meter on its operational accuracy.*** V. I. Baburin, L. N. Zakhar'ev, and A. A. Lemanskii. *(Radiotekhnika,* vol. 27, Dec. 1972, p. 94-96.) *Telecommunications and Radio Engineering, Part II - Radio Engineering,* vol. 27, Dec. 1972, p. 112-114. Translation.

A74-12012 # **Experimental investigation of the vibrations of a gas-turbine engine rotor (Eksperimental'noe issledovanie kolebanii rotora GTD).** V. N. Tiulenev and V. A. Skibin (Tsentral'nyi Nauchno-Issledovatel'skii Institut Aviatsionnogo Motorostroeniia, Moscow, USSR). *Problemy Prochnosti,* vol. 5, Sept. 1973, p. 72-75. In Russian.

The coupled vibrations of the disks and blades of a gas-turbine rotor, excited by an electrodynamic vibrator and also by two piezoelectric transducers (each with a 9.5 kg weight), were measured by means of strain gauges. The mode shapes of vibrations, determined for three frequencies (249, 290, and 385 Hz) are studied. V.P.

A74-12126 **Investigation of the characteristics of tubular microphone windscreens for in-duct fan sound power measurements.** J. S. Wang and M. J. Crocker (Purdue University, Lafayette, Ind.). In: Noise-con 73; Proceedings of the National Conference on Noise Control Engineering, Washington, D.C., October 15-17, 1973. Conference sponsored by the Institute of Noise Control Engineering. Poughkeepsie, N.Y., Institute of Noise Control Engineering, 1973, p. 291-296. Research supported by the Air Conditioning and Refrigeration Institute, Air Moving and Conditioning Association, and Purdue University.

Description of a theoretical model of a microphone windscreen (or sampling tube) for measuring fan noise in a duct in the presence of flow noise. Using a control volume method, a theoretical model similar to that of Neise (1973) is constructed which is capable of predicting the frequency response and directivity of the sampling tube. A.B.K.

A74-12127 **Flow noise spectra from cylinders and aerofoils.** I. Kavrak. In: Noise-con 73; Proceedings of the National Conference on Noise Control Engineering, Washington, D.C., October 15-17, 1973. Conference sponsored by the Institute of Noise Control Engineering. Poughkeepsie, N.Y., Institute of Noise Control Engineering, 1973, p. 297-302. 6 refs.

Study of the spectral distribution of noise-generating flow perturbations emanating from circular cylinders and airfoils. It is shown that in the Reynolds number range from 10,000 to 50,000 the noise spectra from cylinders exhibit strong periodicity, with the fundamental frequency corresponding to a Strouhal number of 0.2, based on cylinder diameter. These spectra are found to contain the odd harmonics of the fundamental, while the even harmonics are practically nonexistent. The spectra from airfoils show multiple tone characteristics, close to a broadband nature. The fundamental frequency corresponds to a Strouhal number of 0.19, based on wake thickness. The inverse Fourier transformation of the spectra is given by a waveform believed to be representative of an asymmetric airfoil, where vortices are shed from one side only. A.B.K.

A74-12129 **The next step is straight up.** B. T. Cummings. *Skyline,* vol. 31, no. 4, 1973, p. 14-21.

Discussion of the development of a new instantly airborne, sleek V/STOL fighter/attack aircraft (XFV-12A), intended for the U.S. Navy, now in progress at Rockwell's Columbus Division. The unusual design feature of the aircraft is that the tail is in the front and the wings are in the rear or, in other words, the aircraft uses a forward 'canard' and rear-mounted, semi-delta wings with the vertical stabilizers placed at the tips of the wings. Located in each wing and canard are three movable flaps which can be rotated to a vertical position for vertical flight. The engine exhaust is then diverted and piped to the flaps where it is forced downward through nozzles which run the length of the flaps. The design is believed to yield a net 50 to 60% thrust increase over the thrust of the basic engine. V.Z.

A74-12176 **EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record.** Convention supported by the Institute of Electrical and Electronics Engineers. New York, Institute of Electrical and Electronics Engineers, Inc., 1973. 261 p. Members, $11.25; nonmembers, $15.

In the field of integrated multisensor navigation systems, the papers deal with applications of reduced order filtering in hybrid navigation, error model identification and performance predictions for airborne direct ranging loran, a tactical hybrid navigation scheme for mixed community coordination, broadcast data for area navigation, the integrated NAVSAT inertial system development program, and range-rate from DME-air data measurements. NASA programs are concerned with the applications of remote sensing to hydrology, the synchronous meteorological satellite (SMS) system, and orbital positioning of domestic satellites. A number of papers treat aspects of current domestic satellite programs, satellite communications for maritime users, the aeronautical satellite program, radar systems and technology, and new trends in spacecraft design. F.R.L.

A74-12177 **Reduced order filtering with applications in hybrid navigation.** J. A. D'Appolito and K. J. Roy (Analytic Sciences Corp., Reading, Mass.). In: EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 1-7. 7 refs. Contract No. F33615-72-1787.

The Kalman filter has gained wide acceptance as the best algorithm for mixing data in multisensor navigation systems. Implementation of the Kalman filter for high order dynamic systems, however, often requires excessive real time computer capacity. In this paper an algorithm is presented for a class of suitably constrained reduced-order filters which minimizes the variance of the estimated variables. The algorithm generates both the filter gain history and the true estimation error covariance. The algorithm is illustrated with a multisensor navigation system example involving

the mixing of beacon range and range-rate data with a high quality inertial system. The effect of several alternate filter state selections on navigation accuracy is examined in detail. (Author)

A74-12178 Error model identification and performance predictions for airborne direct ranging Loran. B. J. Uttam and J. A. D'Appolito (Analytic Sciences Corp., Reading, Mass.). In: EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 8-13. Contract No. F33615-70-C-1763.

With the availability of modern data processing techniques and low-cost stable time references, the use of Loran in a direct ranging mode offers certain potential advantages. This paper first describes the processing of airborne flight data from a Direct Ranging Loran (DRL) receiver to identify models for significant DRL system errors. These models are then used to generate performance predictions for an optimally integrated DRL system. Comparisons with conventional hyperbolic Loran are also given. DRL is shown to be capable of substantially improved position accuracy over that of conventional hyperbolic Loran, especially in regions of poor geometry. A stationary ground-align technique for improving DRL performance is also presented. (Author)

A74-12179 Tactical hybrid navigation scheme for mixed community coordination. R. C. Stow (Singer Co., Kearfott Div., Wayne, N.J.). In: EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 14-20.

This paper presents a tactical hybrid navigation scheme which allows for the effective coordination of air, ground, and sea based systems through cooperative use of the navigation sensor resources of all members in a tactical community. An integrated communications capability is required in this system approach and is briefly discussed. This concept is based upon the premise that the global sphere of required cooperative vehicle activity may be divided into various tactically self-contained areas within which navigation, communication, and identification of all community elements is required to a more fine grain resolution than that required for global operation. Thus, within the tactical area a common relative navigation grid system with tactically self-contained communication capability is required. Such a system is discussed in this paper together with the interface capabilities used to relate the tactical grid reference system to the global frame. (Author)

A74-12182 Range-rate from DME-air data measurements. B. Lee (McDonnell Aircraft Co., St. Louis, Mo.). In: EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 35-40.

A process for estimating the radial velocity of an aircraft to a known DME ground transponder by combining slant range information and air data is discussed. The idea is based on characterizing the flight of an aircraft by a series of connected intervals in which the profile is described by a polynomial in time having stationary coefficients. Radial velocity is itself a function of time dependent on these coefficients and is derived by linear methods from multiple measurements of range. A Kalman-Bucy filter mechanization for estimating the radial velocity from multiple measurements of range and air data is also described. (Author)

A74-12189 AEROSAT overview. D. R. Israel (FAA, Washington, D.C.). In: EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 135-138.

AEROSAT is an experimentation and evaluation program proposed by ESRO, Canada, and the United States. The total program will span almost ten years and cost in excess of $150M. Plans call for use of satellites to provide improved communication and surveillance capability for oceanic air traffic control. Information from this program will support ICAO in defining an operational satellite system for the mid-1980's. In response to objections from U.S. airlines, FAA has recently proposed several changes to the proposed program and MOU. These include modifications to preclude recovery of program costs through additional user charges, to limit the size and cost of the program and to add a limited VHF capability for U.S. testing. The FAA believes these changes will consolidate support for the program without compromising its goals. (Author)

A74-12190 AEROSAT performance specifications. J. B. Woodford (Aerospace Corp., El Segundo, Calif.). In: EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 139-145.

This paper describes the AEROSAT (aeronautical satellite) performance specifications which evolved during two years of international discussions. It represents, subject to the approval of the governments involved, a cooperative approach to a satellite system for demonstrations of the utility of satellite communications to aircraft in an oceanic operational environment. The AEROSAT program objectives, the system block diagram, and the satellite design objectives are briefly reviewed. Coverage zones for the Atlantic oceanic area are next given followed by the detailed specifications of the number and performance requirements for the channels to be used to transmit voice, data, and surveillance signals. Brief discussions of other provisions in the specifications and the electromagnetic frequency plan conclude the paper. (Author)

A74-12191 AEROSAT ground environment and test plan. F. S. Carr (FAA, Washington, D.C.). In: EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 146-151.

This paper discusses the test plan and ground equipment for AEROSAT. The data currently available from completed tests and studies is presented, as well as the results expected from the ATS-F tests currently planned. The limitations of these tests are described as well as other requirements which must be met to fully specify an operational system; these requirements and test limitations are used to define the test plan activities to be accomplished with the AEROSAT evaluation and development phase. The ground equipment design is presented. (Author)

A74-12192 A first generation of L-Band avionics for AEROSAT. J. Gutwein, E. Ferrari, and L. Klein (U.S. Department of Transportation, Transportation Systems Center, Cambridge, Mass.). In: EASCON '73: Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 152-161. 10 refs.

The objectives of experimental L-Band avionics for the Experimentation and Evaluation (E&E) Phase of AEROSAT are discussed. The impact of system design and tests dictate a flexible avionics test bed adaptable to a rapidly developing technology. A specification is presented for a first generation of L-Band avionics based upon the reference avionics interface parameters of the AEROSAT system specification. A brief review of L-Band technology of critical avionics sub-elements is given to substantiate the technical position of this specification. It is concluded that the status of L-Band avionics technology has advanced wherein the confidence level of avionics performance is consistent with system performance expectations and that cost/beneficial avionics can be projected for a future operational system beyond the E&E phase of AEROSAT. (Author)

A74-12193 **Description and cost of a satellite-based oceanic ATC system.** J. A. Scardina (Mitre Corp., McLean, Va.). In: EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 162-169. 5 refs.

This paper describes a configuration and operating concept for a satellite-based oceanic ATC and communication services system to serve the needs of oceanic aviation beginning in the mid 1980's. The operational satellite system described herein would provide voice and data communication for ATC and airline company operations as well as dependent and/or independent surveillance for aircraft position determination. The system is sized in terms of the number of satellite channels required to accommodate the estimated peak traffic load for 1990. Annual cost estimates for this candidate operational system are then presented for a configuration incorporating 2 automated ATC centers and compared to the extrapolated costs of the current oceanic system. (Author)

A74-12198 **Advanced enroute air traffic control radar system /ARSR-3/.** P. C. Ratliff (FAA, Washington, D.C.) and L. F. Meren (Westinghouse Electric Corp., Pittsburgh, Pa.). In: EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1973, p. 199-205.

In order to detect small aircraft under adverse conditions, the ARSR-3 features dual beam receivers, sharp cut-off on the underside of the elevation pattern, improved circular polarization, a coherent klystron transmitter, a range-azimuth-gating system, constant false alarm rate receivers, weather receivers, and dual channel, diplex operation. A system description is given and the performance characteristics are discussed. G.R.

A74-12203 **Progress in aerospace sciences. Volume 14.** Edited by D. Küchemann (Royal Aircraft Establishment, Farnborough, Hants., England), P. Carrière, B. Etkin, W. Fiszdon, N. Rott, S. Smolderen, I. Tani, and W. Wuest. Oxford and New York, Pergamon Press, 1973. 311 p. $37.50.

Recent theoretical and experimental advances in aerospace research are described in papers dealing with high-speed aerodynamic test facilities, magnetic suspension and balance systems for wind-tunnel studies, theoretical treatment of hypersonic flow past conical bodies, numerical prediction of base pressure in two-dimensional steady flows, and general aerodynamic noise theory with particular application to jet noise. Attention is given to the design and performance aspects of hypersonic test facilities, magnetic field configurations and system design aspects for magnetic support of models in wind tunnels, the problem of generating aerodynamic lift either for sustained hypersonic flight or during atmospheric reentry, existing theories for predicting base pressure in two-dimensional base flows without periodic vortex shedding, and recent developments in jet noise research. T.M.

A74-12204 **Magnetic balance and suspension systems for use with wind tunnels.** E. E. Covert, M. Finston, M. Vlajinac, and T. Stephens (MIT, Cambridge, Mass.). In: Progress in aerospace sciences. Volume 14. Oxford and New York, Pergamon Press, 1973, p. 27-107. 140 refs.

Description of the principles of operation and design features of magnetic balance and suspension systems used to provide interference-free support of models in wind-tunnel tests. The term balance is applied to cases where the suspension is used for direct measurement - e.g., unknown aerodynamic forces and torques applied to a model by the relative velocity of the wind are balanced by (1) known gravitational and inertial forces and torques and (2) magnetic forces and torques given in terms of electric currents. Attention is given to elementary magnetic concepts, generation of forces and torques, system analysis procedures, magnetic field configurations, materials employed, power supplies, cooling techniques, control systems, and scaling laws. T.M.

A74-12205 **Theory of hypersonic flow about a wing.** A. L. Gonor (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). In: Progress in aerospace sciences. Volume 14. Oxford and New York, Pergamon Press, 1973, p. 109-175. 59 refs.

Recent advances in the theory of hypersonic flow about bodies of novel shape are examined with reference to the problem of generating aerodynamic lift either for sustained hypersonic flow or during atmospheric reentry. Attention is given to analysis of hypersonic flow past conical wings with an attached shock wave, calculation of the entropy layer on the wing surface, and numerical evaluation of hypersonic flow about a finite thickness delta wing and caret wing. A solution of an optimization problem provides the configuration of a conical body having a maximum lift-to-drag ratio for an assumed constant coefficient of local friction and a pressure distribution described by Newton's law. T.M.

A74-12207 **Introduction to aerodynamic noise theory.** H. V. Fuchs and A. Michalke (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Turbulenzforschung, Berlin, West Germany). In: Progress in aerospace sciences. Volume 14. Oxford and New York, Pergamon Press, 1973, p. 227-297. 33 refs.

Advances in aerodynamic noise theory are reviewed in a unified approach based on Lighthill's wave-equation treatment. A general integral solution of the inhomogeneous wave equation is discussed with allowance for boundary effects, and Lighthill's acoustic analogy is described in terms of equivalent simple sources. Approximate procedures in aerodynamic noise theory are outlined, covering simplified descriptions of far-field sound intensity for various types of sources. Dimensional analysis is performed neglecting the effect of retarded time. Particular applications to jet noise are covered with the assumption of a specific structure of the turbulence convected by the flow. Spectral methods in jet noise theory are examined whereby individual frequency components of sound are derived by means of a Fourier transform with respect to time. T.M.

A74-12215 * # **The acoustics of aircraft engine-duct systems.** A. H. Nayfeh, J. E. Kaiser, and D. P. Telionis (Virginia Polytechnic Institute and State University, Blacksburg, Va.). *Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Aeronautical Meeting, Montreal, Canada, Oct. 29, 30, 1973, AIAA Paper 73-1153.* 37 p. 114 refs. Members, $1.50; nonmembers, $2.00. Grant No. NGR-47-004-109.

Noise generated in aircraft engines is usually suppressed by acoustically treating the engine ducts. The optimization of this treatment requires an understanding of the transmission and attenuation of the acoustic waves. A critical review is presented of the state of the art regarding methods of determining the transmission and attenuation parameters and the effect on these parameters of (1) acoustic properties of liners, (2) the mean velocity, including uniform and shear profiles and nonparallel flow, (3) axial and transverse temperature gradients, (4) slowly and abruptly varying cross sections, and (5) finite-amplitude waves and nonlinear duct liners. (Author)

A74-12216 # **A simulation approach for studying the interactions of noise, patronage, and economic viability for air transportation systems.** H. Solomon (Systems Control, Inc., Palo Alto, Calif.). *Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Aeronautical Meeting, Montreal, Canada, Oct. 29, 30, 1973, AIAA Paper 73-1161.* 12 p. Members, $1.50; nonmembers, $2.00.

The assessment of the potential of new transportation concepts requires the ability to forecast the interaction between prospective travelers, the demographic and socioeconomic conditions anticipated for the arena in which they are traveling, and the projected modes of transportation for both the intercity and port access segments of the trip. These factors are considered in the Transportation System Simulation (TSS) approach described. The TSS method is applied in a study of the STOL aircraft potential in short-haul, high density arenas. Study ground rules and guidelines are discussed together with a STOL system definition and a port related indirect operating cost program. G.R.

A74-12217 # **Aircraft noise relief potential at major hub airports.** S. Sokolsky (Aerospace Corp., Los Angeles, Calif.). *Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Aeronautical Meeting, Montreal, Canada, Oct. 29, 30, 1973, AIAA Paper 73-1164.* 13 p. 25 refs. Members, $1.50; nonmembers, $2.00.

The effectiveness of various strategies for alleviating noise due to aircraft operations over communities near hub airports is examined. Included are the effects of (1) power and flight path management, (2) measures for reducing source noise, (3) changes in the traffic mix and (4) introduction of 'quiet', advanced aircraft. The scenarios studied utilize recent traffic mixes observed at the Los Angeles International Airport as a baseline from which noise abatement alternatives are derived. The results indicate that introduction of quiet aircraft with improved terminal area performance capabilities may effect containment of adverse noise impact within the confines of the airport boundary. Reductions in the residential area exposed to high noise levels is also noted when two-segment approaches are flown and when various retrofit techniques are employed. (Author)

A74-12218 # **On the theory of jet noise and its applications.** G. M. Lilley (Southampton, University, Southampton, England), P. Morris, and B. J. Tester (Lockheed-Georgia Co., Marietta, Ga.). *American Institute of Aeronautics and Astronautics, Aero-Acoustics Conference, Seattle, Wash., Oct. 15-17, 1973, Paper 73-987.* 37 p. 26 refs. Members, $1.50; nonmembers, $2.00.

The main characteristics of the far field sound intensity are briefly reviewed along with the spectrum of a jet from Lighthill's formulation. The generalized convective wave equation for the inner flow is discussed, taking into account also the form of the solution of the characteristic (diffraction) equation. On the assumption that the large-scale turbulent structures possess little energy it is possible to derive linear equations describing the structure and motion of the turbulent shear flows. The inhomogeneous Orr-Sommerfeld equation has to be solved if the flow variables are Fourier decomposed in terms of wave number and frequency. G.R.

A74-12221 # **Transmission of sound through a two-dimensional shielding jet.** S. J. Cowan and R. W. Crouch (Boeing Commercial Airplane Co., Seattle, Wash.). *American Institute of Aeronautics and Astronautics, Aero-Acoustics Conference, Seattle, Wash., Oct. 15-17, 1973, Paper 73-1002.* 8 p. 11 refs. Members, $1.50; nonmembers, $2.00.

The measured transmission loss through a fluid layer acoustic shield has been compared to theoretical results. Good agreement between the experiment and theory was obtained. The experiment determined the transmission loss as a function of the acoustic source wave angle and frequency, and the shield temperature, velocity, and effective width. The shield temperature and velocity profiles were measured for use in the analysis. The results show that the shield provides an effective control of noise propagation. The required temperature, velocity, and size of the shield are such that it is an attractive concept for redirecting aircraft engine jet noise. (Author)

A74-12223 * # **Noise generation by ducted combustion systems.** H. H. Chiu, E. G. Plett, and M. Summerfield (Princeton University, Princeton, N.J.). *American Institute of Aeronautics and Astronautics, Aero-Acoustics Conference, Seattle, Wash., Oct. 15-17, 1973, Paper 73-1024.* 18 p. 11 refs. Members, $1.50; nonmembers, $2.00. Contract No. N00014-67-A-0151-0029; Grant No. NGR-31-001-241.

Analysis of the interaction between a zone of nonsteady combustion and its confining duct shows that resonant type oscillations occur with resulting noise intensities far greater than from corresponding unconfined flame zones. The blading action on the flow through the compressor and turbine of an engine generates discrete frequency noise which, it is found, is enhanced by the response of the combustion zone in between. Ducted combustor experiments verify the predicted resonant type noise, the amplitude and frequency of which are strongly influenced by the duct dimensions and end impedance. A convergent exit nozzle results in stronger internal resonant noise oscillations but also generates a higher jet velocity, with the attendant jet noise which exceeds noise from inside the duct at jet Mach numbers near unity. (Author)

A74-12224 * # **Sonic boom analysis for high altitude flight at high Mach number.** A. Ferri, M. Siclari, and L. Ting (New York University, Bronx, N.Y.). *American Institute of Aeronautics and Astronautics, Aero-Acoustics Conference, Seattle, Wash., Oct. 15-17, 1973, Paper 73-1034.* 30 p. 11 refs. Members, $1.50; nonmembers, $2.00. Grant No. NGL-33-016-119.

Numerical programs are presented which take into account the nonlinear effects of high Mach number, the entropy change across the shock, the entropy and enthalpy variations in the atmospheric layer and the gravitational effect. Extension of the programs for the axisymmetric problems to handle nonaxisymmetric terms is described. The asymmetry can be caused by the geometry of the body, the lift and also the fact that the variations in the atmospheric layer are two-dimensional. Numerical results demonstrating the influences of these effects and comparison with existing approximate theories are presented. (Author)

A74-12225 * # **Shuttle sonic boom - Technology and predictions.** P. F. Holloway (NASA, Langley Research Center, Hampton, Va.), G. A. Wilhold, J. H. Jones (NASA, Marshall Space Flight Center, Huntsville, Ala.), F. Garcia, Jr. (NASA, Johnson Space Center, Houston, Tex.), and R. M. Hicks (NASA, Ames Research Center, Moffett Field, Calif.). *American Institute of Aeronautics and Astronautics, Aero-Acoustics Conference, Seattle, Wash., Oct. 15-17, 1973, Paper 73-1039.* 10 p. 9 refs. Members, $1.50; nonmembers, $2.00.

Because the shuttle differs significantly in both geometric and operational characteristics from conventional supersonic aircraft, estimation of sonic boom characteristics required a new technology base. The prediction procedures thus developed are reviewed. Flight measurements obtained for both the ascent and entry phases of the Apollo 15 and 16 and for the ascent phase only of the Apollo 17 missions are presented which verify the techniques established for application to shuttle. Results of extensive analysis of the sonic boom overpressure characteristics completed to date are presented which indicate that this factor of the shuttle's environmental impact is predictable, localized, of short duration and acceptable. Efforts are continuing to define the shuttle sonic boom characteristics to a fine level of detail based on the final system design. (Author)

A74-12227 # **A positive approach to the problems of aircraft noise.** V. L. Blumenthal, R. E. Russell, and J. M. Streckenbach (Boeing Commercial Airplane Co., Seattle, Wash.). *Canadian Aeronautics and Space Institute and American Institute of Aeronautics and Astronautics, Aeronautical Meeting, Montreal, Canada, Oct. 29, 30, 1973, AIAA Paper 73-1157.* 12 p. 8 refs. Members, $1.50; nonmembers, $2.00.

The summary of an aircraft noise reduction program is presented, giving attention to multitube noise suppressors installed on early turbojet-powered aircraft, the quiet nacelle concept, and a 20-lobe jet noise suppressor enclosed in an acoustically lined ejector shroud. It is becoming more and more apparent that aerodynamic

noise must be considered in the design of future aircraft. An overview of current and future problems is given. It is pointed out that future noise reductions of significant magnitude will be dependent on research programs not yet begun. G.R.

A74-12280 **Recovery characteristics of a single-shielded self-aspirating thermocouple probe at low pressure levels and subsonic speeds.** C. E. Willbanks (ARO, Inc., Arnold Engineering Development Center, Arnold Air Force Station, Tenn.). *Journal of Physics, Part E - Scientific Instruments*, vol. 6, Nov. 1973, p. 1140-1144. 7 refs.

A74-12300 # **RB 211 - The first eighteen months operating experience /Sholto Douglas Memorial Lecture/.** K. G. Wilkinson (Rolls-Royce /1971/, Ltd., Derby, England). *Tech Air*, vol. 29, Nov. 1973, p. 2-6, 9.

The development history of the Rolls-Royce RB 211-22 turbofan engine is briefly reviewed, and attention is given to engine performance characteristics and servicing operations as experienced in the first eighteen months of commercial operation. Fan disk problems encountered in this engine are described in terms of research undertaken to determine the cause of disk failure and the corresponding design countermeasures. Graphs illustrate the pattern of service operations required in 1972 and 1973, the typical blade temperature distributions, and stress distributions in original and revised fan disk versions. Costs of engine operation, noise characteristics, and projected design improvements are covered. T.M.

A74-12306 **The friction and wear characteristics of plasma-sprayed NiO-CaF2 in rubbing contact with a ceramic matrix.** G. D. Moore (Owens-Illinois New Product Development Center, Toledo, Ohio) and J. E. Ritter, Jr. (Massachusetts, University, Amherst, Mass.). *American Society of Lubrication Engineers and American Society of Mechanical Engineers, Joint Lubrication Conference, Atlanta, Ga., Oct. 15-18, 1973, ASLE Preprint 73LC-1B-3.* 8 p. 8 refs. Members, $1.50; nonmembers, $2.00.

A74-12316 **Lithium soap dispersions as drag-reducing hydraulic fluids.** C. M. Henderson and R. C. Little (U.S. Navy, Naval Research Laboratory, Washington, D.C.). *American Society of Lubrication Engineers and American Society of Mechanical Engineers, Joint Lubrication Conference, Atlanta, Ga., Oct. 15-18, 1973, ASLE Preprint 73LC-5B-2.* 8 p. 5 refs. Members, $1.50; nonmembers, $2.00. Navy-supported research.

Lithium phenylstearate dispersions have been shown to be both shear resistant and drag reducing under conditions of continuous shear in a practical working environment simulating that used in military aircraft. Losses caused by fittings, valves, changes in diameter and the like, however, greatly detract from the performance of the fluid when comparisons are made with smooth pipe measurements on the same fluid. These results suggest that systems utilizing such fluids would have to be carefully designed to minimize such losses in order to maximize the drag-reduction benefits. (Author)

A74-12332 * # **Gas-lubricated foil bearings for high speed turboalternator - Construction and performance.** L. Licht, M. Branger (Ampex Corp., Redwood City, Calif.), and W. J. Anderson (NASA, Lewis Research Center, Cleveland, Ohio). *American Society of Lubrication Engineers and American Society of Mechanical Engineers, Joint Lubrication Conference, Atlanta, Ga., Oct. 15-18, 1973, ASME Paper 73-Lub-5.* 8 p. 15 refs. Members, $1.00; nonmembers, $3.00. NASA-sponsored research.

Foil bearings were designed and fabricated to replace pivoted-shoe journal bearings in a Brayton cycle turboalternator, within space limitations and constraints imposed by the existing machine. The foil bearings were integrated into a unified assembly with the rotor, housing, seals, and gimbal-mounted thrust bearing, without changes and modifications of machine components other than the journal bearings. The gas-lubricated foil bearings, which require no external pressure-source, furnished a stable support for a 21.9 pound rotor in the vertical attitude at speeds to 43,200 rpm. Excellent wipe-wear characteristics permitted well over 1000 start-stop cycles, without deterioration of performance in the entire speed range. The paper reviews salient aspects of design, fabrication, and performance. An account is given of rotor dynamics during starting, stopping, and traversing the region of resonances. The state of journal and foil surfaces is examined following intensive start-stop cycling and high-speed runs over extended periods of time. (Author)

A74-12333 * # **A thermal, thermoelastic, and wear simulation of a high-energy sliding contact problem.** F. E. Kennedy, Jr. and F. F. Ling (Rensselaer Polytechnic Institute, Troy, N.Y.). *American Society of Lubrication Engineers and American Society of Mechanical Engineers, Joint Lubrication Conference, Atlanta, Ga., Oct. 15-18, 1973, ASME Paper 73-Lub-6.* 9 p. 21 refs. Members, $1.00; nonmembers, $3.00. Grant No. NGR-33-018-152.

This paper describes an investigation of the sliding contact problem encountered in high-energy disk brakes. The analysis includes a simulation modeling, using the finite element method, of the thermoelastic instabilities that cause transient changes in contact to occur on the friction surface. In order to include the effect of wear of the concentrated contacts on the friction surface, a wear criterion is proposed that results in prediction of wear rates for disk brakes that are quite close to experimentally determined wear rates. The thermal analysis shows that the transient temperature distribution in a disk brake can be determined more accurately by use of this thermomechanical analysis than by a more conventional analysis that assumes constant contact conditions. It is also shown that lower, more desirable, temperatures in disk brakes can be attained by increasing the volume, the thermal conductivity, and especially, the heat capacity of the brake components. (Author)

A74-12352 * # **A life study of AISI M-50 and Super Nitralloy spur gears with and without tip relief.** D. P. Townsend and E. V. Zaretsky (NASA, Lewis Research Center, Cleveland, Ohio). *American Society of Lubrication Engineers and American Society of Mechanical Engineers, Joint Lubrication Conference, Atlanta, Ga., Oct. 15-18, 1973, ASME Paper 73-Lub-38.* 7 p. 13 refs. Members, $1.00; nonmembers, $3.00.

A74-12355 **Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973.** Conference sponsored by the Institution of Electrical Engineers. Stevenage, Herts., England, Institution of Electrical Engineers (IEE Conference Publication, No. 105), 1973. 445 p. $29.10.

Recent developments in radar theory and hardware are described in papers dealing with improvements designed to alleviate existing problems in ATC and surface navigation applications. Attention is given to ATC secondary surveillance radars with improved transponder signal triggering and detection, automatic surveillance radars featuring computer control of transmission parameters and data display, phased-array radars with reduced system cost and complexity, new techniques for MTI clutter locking, and applications of Kalman filtering to target tracking. Hardware improvements are described for antenna arrays, microwave sources, waveguide systems, and displays. Signal processing techniques and computer software are included for problems of clutter rejection, error-free extraction of information from raw radar data, and control of transmission parameters. T.M.

A74-12357 **Secondary surveillance radar in ATC.** C. Ullyatt (Royal Radar Establishment, Malvern, Worcs., England). In:

Radar Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973. Stevenage, Herts., England, Institution of Electrical Engineers, 1973, p. 20-25. 8 refs.

Existing major drawbacks of secondary surveillance radars in ATC applications are described in order to explain the rationale for continuing research and development efforts. Factors affecting the occupancy of transponders, interrogators, and decoders are discussed together with methods which can be employed to minimize saturation effects leading to loss of replies from transponders. Garbling problems which arise when aircraft are spaced too closely for adequate resolution are considered along with causes of position errors and destructive interference. T.M.

A74-12358 New developments in secondary surveillance radar. M. C. Stevens (Cossor Electronics, Ltd., Harlow, Essex, England). In: Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973. Stevenage, Herts., England, Institution of Electrical Engineers, 1973, p. 26-31.

The shortcomings of secondary surveillance radars presently used in ATC applications are delineated, and corresponding improvements in equipment design and operation are proposed. Attention is given to causes of lost or lacking transponder replies, garbling effects produced by reflection from other aircraft, and multipath propagation problems. Improvements in bearing measurement and in round trip reliability involve the use of monopulse techniques, modified pulse repetition frequencies, reduced interrogation rates, and selective addressing techniques. T.M.

A74-12359 Equipment for suppressing reflected secondary radar signals. E. Brook-Footitt (Cossor Electronics, Ltd., Harlow, Essex, England). In: Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973. Stevenage, Herts., England, Institution of Electrical Engineers, 1973, p. 38-42.

Description of an ATC secondary surveillance radar system designed to minimize false transponder replies caused by signal reflections from stationary and moving surfaces. The system relies on the transmission of two interrogator signals (spaced by 2 microsec) to suppress transponders which would otherwise be interrogated by reflections. This is similar to the improved three-pulse ISLS system recommended by ICAO, but the proposed system offers additional advantages of minimum interference to adjacent interrogators and minimum phase conflict in the transmission of interrogation pulses. Separate transmitters are employed along with directional antennas to suppress unwanted reflections in a desired sector only. T.M.

A74-12382 Present and future radar display techniques. D. W. G. Byatt (Marconi Research Laboratories, Great Baddow, Essex, England) and J. Wild (Marconi Radar Systems, Ltd., Chelmsford, Essex, England). In: Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973. Stevenage, Herts., England, Institution of Electrical Engineers, 1973, p. 201-206.

General discussion of advances in visual display systems used to present graphic and alpha-numeric radar information in ATC applications. CRT displays are described in terms of electrostatic and electromagnetic deflection systems, color display techniques, and storage capabilities offered by the use of an internal storage mesh. A LED panel display used to monitor the final approach of aircraft is explained by discussing target extraction circuitry, a memory unit, the decoder, and driving circuits. Merits and drawbacks of liquid crystal displays for radar applications are briefly evaluated. T.M.

A74-12389 Bird strike and the radar properties of birds. E. W. Houghton, F. Blackwell, and T. A. Wilmot (Royal Radar Establishment, Malvern, Worcs., England). In: Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973. Stevenage, Herts., England, Institution of Electrical Engineers, 1973, p. 257-262. 6 refs.

The current status of radar studies of bird movements and of the radar properties of birds is reviewed. Broad-scale movements are being tracked by means of military and ATC surveillance radars operating at S-band, usually fitted with on-demand MTI. At the peak of bird migrations, military and civilian surveillance radars can follow bird movements at heights of roughly 1500 m to the radar horizon at 80 to 90 n mi and 15 n mi, respectively. Airspeed can be obtained vectorially from the radar measured velocity and wind velocity. Models for determining the echo properties of birds are examined. Both flight and echo properties can be combined to give an estimate of the height and weight distribution of bird movements. V.P.

A74-12396 The improvement in performance of an S-band surveillance radar operating in conditions of rain clutter. R. N. Stevens and D. C. Cordiner (Marconi Radar Systems, Ltd., Chelmsford, Essex, England). In: Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973. Stevenage, Herts., England, Institution of Electrical Engineers, 1973, p. 297-302.

Circular polarization and pulse compression are considered as approaches to performance improvement in an S-band surveillance radar during rain clutter. A modified receiver channel using circular polarization is proposed for this purpose. The relatively low-cost modification of the receiver channel resulted in an appreciable performance improvement of the radar in controlling aircraft at low levels during rain clutter. The use of the modified completely separate receiver channel minimized interference in the existing radar system and inconvenience to the operation staff. V.Z.

A74-12402 A primary radar automatic track extractor. R. E. Howick (Marconi Radar Systems, Ltd., Chelmsford, Essex, England). In: Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973. Stevenage, Herts., England, Institution of Electrical Engineers, 1973, p. 339-346.

A method of generating track information from primary radar data is discussed which, although developed for the military environment, has possible applications in civil air traffic control systems. Two of the fundamental reasons for automating the tracking function are to reduce the manpower required to provide the tracking facility for automated air defense systems and to provide a constant level of vigilance for detecting air space intrusions. The tracking process is considered in two parts: the detection and initiation of new tracks, and the continuity following of established tracks. F.R.L.

A74-12403 Use of synthetic radar information - Operational and technical aspects. K. Mellberg (Stansaab Elektronik A.B., Barkarby, Sweden). In: Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973. Stevenage, Herts., England, Institution of Electrical Engineers, 1973, p. 347-351.

Synthetic radar information is derived by digital radar signal extraction techniques which reduce the radar information to volumes which can be handled and stored in digital computers. The storage facility automatically offers the possibility of high-repetition update of a display picture which then obtains a steady brightness and can be viewed under normal ambient lighting conditions, a convenience for controllers. Because of the high-repetition picture update a short-persistence tube phosphor can be used which does not give smearing effects. F.R.L.

A74-12406 Flexibility in computer-assisted radar - Controlled interceptions. R. G. Prior (Marconi Radar Systems, Ltd.,

Chelmsford, Essex, England). In: Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973. Stevenage, Herts., England, Institution of Electrical Engineers, 1973, p. 366-370.

The interception task entails the detection and tracking of an aircraft, the recognition of that aircraft as a real or potential threat, the assessment of whether an interception is possible, the selection of the optimum fighter weapons system and tactics, the approach to the target, and the attack. It is shown that software in modern air defence systems can now provide a greatly improved service both to executive controllers and to interception controllers, relieving them of much of the drudgery without depriving them of the ability to use their own intelligence and initiative. F.R.L.

A74-12424 # Selection of cutting conditions in the machining axial-flow compressor blades on an assembled rotor (O vybore rezhimov rezaniia pri obrabotke rabochikh lopatok osevykh kompressorov na sobrannom rotore). D. M. Bavel'skii, A. V. Belov, and A. V. Fisher. *Energomashinostroenie*, vol. 19, Sept. 1973, p. 26-29. In Russian.

The mechanism of the interaction between the cutting tool and the edges of the blades of a rotating rotor is examined, and a relation describing the static stresses arising in the blades as a function of the cutting conditions is derived. Within the scope of some limiting assumptions, the relation makes it possible to evaluate the magnitude of the stresses and to select the optimum cutting conditions. V.P.

A74-12441 A simplified method for studying the aerodynamic heating of axisymmetric bodies at an angle of attack (Metodo semplificato per lo studio del riscaldamento aerodinamico di corpi assialsimmetrici ad incidenza). E. Vallerani and G. Snider (FIAT S.p.A., Divisione Aviazione, Turin, Italy). *(Associazione Italiana di Aeronautica e Astronautica, Congresso Nazionale, 1st, Palermo, Italy, Oct. 27-31, 1971.) L'Aerotecnica - Missili e Spazio*, vol. 52, June 1973, p. 205-214. 9 refs. In Italian.

Description of a simplified method for studying the effect of the angle of attack on the distribution of the convective heat flux along axisymmetric bodies. Starting from simple hypotheses of geometrical nature, the geometry of the streamlines is determined, and the local values of the scale factor representing the divergence of the streamlines are estimated. The heat flux distribution both in laminar and in turbulent flow is analyzed, extending to the three-dimensional case formulas obtained in the axisymmetric case. Results obtained for a sphere-cone configuration with a half-angle of 30 deg at Mach 10 are discussed and are compared with available experimental data. A.B.K.

A74-12442 Transport vehicles - Weights and loads (Veicoli da trasporto - Pesi e carichi). R. Vannutelli (Roma, Università, Rome, Italy). *L'Aerotecnica Missili e Spazio*, vol. 52, June 1973, p. 215-220. In Italian.

Representation of the empty weights and payloads of the most well known commercial aircraft, starting from the DC 3, in the form of graphs showing the distinctive characteristics of propeller-driven, turboprop, and turbojet aircraft in passenger and cargo versions. It is shown that such graphs make it possible to determine the effect of the loads, the load distributions, the aircraft architectures, the materials employed, the load factors, etc., on the structural weights. They also make it possible to evaluate the quality of existing or planned aircraft, including all-wing types. A.B.K.

A74-12444 Study of unconventional gyroscopic apparatus. I (Etude des appareils gyroscopiques non conventionnels. I). J. Puls (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Dynamik der Flugsysteme, Oberpfaffenhofen, West Germany). *Navigation* (Paris), vol. 21, Oct. 1973, p. 393-402. 8 refs. In French.

Examination of unconventional gyroscopes known at present indicates that their accuracy cannot be compared with that of conventional apparatus. Only the electrostatic gyroscope has an accuracy which is comparable and even superior. This gyroscope is being further developed because of its possibilities of acceleration, often very high, and its robustness and low price. Gyroscopes with immersed rotors, rotating gyroscopes with internal centering, gyroscopes with liquid rotors, and gas gyroscopes are considered. F.R.L.

A74-12446 Application to zone navigation /R/Nav/ of hybrid navigation systems (Application à la navigation de zone (R/Nav/ des systèmes de navigation hybride). G. Ferlet (Société d'Applications Générales d'Electricité et de Mécanique, Paris, France). *(Instituts de Navigation Européens et Américains, Congrès International, Hanover, West Germany, Oct. 2-5, 1973.) Navigation* (Paris), vol. 21, Oct. 1973, p. 421-434. In French.

Zone navigation rests on the creation of phantom beacons, or rotating points, distinct from the VOR and DME radio beacons, between which the aircraft is piloted according to an orthodromic route. The judicious distribution of rotating points assigned to each aircraft leads to a better distribution of the air space. An experimental system, SEN (système expérimental de navigation) for zone navigation is described. The principal objective of SEN is to be an aid to the study and perfection of hybrid systems. SEN makes it possible to study the following problems: development of a complementary Inertia-Vor-DME system by optimal statistical filtering, and study of the man-machine dialog, one of the basic elements of zone navigation. F.R.L.

A74-12447 New concepts of visualization for aircraft (Nouveaux concepts de visualisation pour avions). M. Coussedière (Thomson - CSF, Division Equipments Avioniques et Spatiaux, Malakoff, Hauts-de-Seine, France). *Navigation* (Paris), vol. 21, Oct. 1973, p. 436-447. In French.

It is possible today to conceive of an integration of information at the instrument panel level thanks to electronic systems based on cathode ray tubes. The flexibility of electronics makes it possible to exhibit according to the pilot's choice, the visualization best adapted for each phase of flight, whether for 'head-up' or 'head-down' displays. The man-machine interface can be realized in the form of an electronic keyboard. Such an integration can present a sum total of information which is actually dispersed on several conventional electromechanical instruments, is not visualized on the conventional instrument panel, and can visualize only that information which is of interest. An operationals description is given, and technical characteristics and examples of apparatus that has been developed are described. F.R.L.

A74-12448 The aeronautical satellites: Deluxe gadgets or system of the future (Les satellites aéronautiques: Gadgets de luxe ou système de l'avenir). J. Villiers (Administration Centrale de l'Aviation Civile, Paris, France). *Navigation* (Paris), vol. 21, Oct. 1973, p. 448-454. In French.

It is shown that the total avionics cost, including the space section, of an aeronautical satellite is of the order of $12.50 per hour of flight of a long-range aircraft. Above Africa, in the absence of any supplementary benefit, putting aeronautical satellites to work would only increase the cost of the service rendered by less than 8 percent. It is pointed out that the aeronautical satellite service would be entirely paid for by an eventual average reduction of flight time of 0.4 percent. F.R.L.

A74-12449 Integrated navigation in the air and on the sea (Navigation intégrée dans les airs et sur la mer). P. Hugon. *Navigation* (Paris), vol. 21, Oct. 1973, p. 463-486. In French.

An attempt is made to show how, with present methods, technology has succeeded with a performance which may be costly, but is certainly admirable in that it makes possible integrated and

automatic navigation. The Collins ANS 70 A system intended for the DC-10 and the Mona-Ambac system of the Arma and Decca companies, intended for the Lockheed Tristar L-1011 are described. The latter is a modular system of zone navigation. Attention is given to the Magnavox satellite navigation system for maritime purposes. F.R.L.

A74-12495 * # **Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine.** N. E. Samanich, L. J. Heidelberg, and W. L. Jones (NASA, Lewis Research Center, STOL Project Propulsion Office, Cleveland, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1217.* 31 p. 10 refs.

A highly suppressed TF-34 engine was used to investigate engine and flap interaction noise associated with an externally blown flap STOL powered lift system. Noise, efficiency, and velocity decay characteristics of mixed and separate flow exhaust systems including convergent, co-annular, and lobed designs were determined with the engine operating alone. Noise data were then obtained for several of the exhaust configurations with the engine blowing a wing-flap segment. Noise for both the engine alone and the engine with blown flaps showed substantial differences for the various exhaust configurations tested. The differences in observed noise are related primarily to nozzle effective exhaust velocity, flap impingement velocity, and noise spectral shape. (Author)

A74-12496 * # **Some design considerations for supersonic cruise mixed compression inlets.** D. N. Bowditch (NASA, Lewis Research Center, Propulsion Aerodynamics Branch, Cleveland, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1269.* 19 p. 33 refs.

A mixed compression inlet designed for supersonic cruise has very demanding requirements for high total pressure recovery and low bleed and cowl drag. However, since the optimum inlet for supersonic cruise performance may have other undesirable characteristics, it is necessary to establish trade-offs between inlet performance and other inlet characteristics. The paper will review some of these trade-offs between the amount of internal compression, aerodynamic performance and angle-of-attack tolerance. Also some techniques in use at the Lewis Research Center for analysis of boundary layer control and subsonic diffuser flow will be discussed. (Author)

A74-12497 * # **Minimizing boundary layer bleed for a mixed compression inlet.** J. F. Wasserbauer, R. J. Shaw, and H. E. Neumann (NASA, Lewis Research Center, Cleveland, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1270.* 20 p. 8 refs.

An experimental investigation of a full scale mixed compression inlet sized for the TF30-P-3 turbofan engine was conducted at Mach 2.5 and 2.0 operating conditions. The two cone axisymmetric inlet had minimum internal contraction consistent with high total pressure recovery and low cowl drag. At Mach 2.5, inlet recovery exceeded 0.90 with only 0.02 centerbody bleed mass-flow ratio and zero cowl bleed. A centerbody bleed of approximately 0.05 gave a maximum inlet unstart angle-of-attack of 6.85 deg. Inlet performance and angle-of-attack tolerance is presented for operation at Mach 2.5 and 2.0. (Author)

A74-12515 **Eclipse flight of Concorde 001.** J. Beckman (Queen Mary College, London, England), J. Begot (CNRS, Institut d'Astrophysique, Paris, France), P. Charvin (Institut National d'Astronomie et de Geophysique, Meudon, Hauts-de-Seine, France), D. Hall (Kitt Peak National Observatory, Tucson, Ariz.), P. Lena, A. Soufflot (Paris VII, Université; Meudon, Observatoire, Meudon, Hauts-de-Seine, France), D. Liebenberg (California, University, Los Alamos, N. Mex.), and P. Wraight (Aberdeen, University, Aberdeen, Scotland). *Nature*, vol. 246, Nov. 9, 1973, p. 72-74. Research supported by the Société Nationale Industrielle Aérospatiale, Centre National de la Recherche Scientifique, Science Research Council, and NSF.

The five experiments conducted during the eclipse flight of Concorde 001 are discussed. One experiment was concerned with the examination of the upper chromosphere on the basis of the emission in the range from 300 to 1,500 micrometers. Another experiment had been designed to measure the lifetime of typical structures in the inner corona, to search for oscillatory motions, and to study the outer corona by photographic photometry. Other experiments are connected with the assessment of IR emission of the thermal corona, the near IR emission of the upper atmosphere, and the high resolution of the emission line corona. G.R.

A74-12710 # **Gas turbine engine mainshaft roller bearing-system analysis.** J. H. Rumbarger, E. G. Filetti, and D. Gubernick (Franklin Institute, Research Laboratories, Philadelphia, Pa.). *(American Society of Mechanical Engineers, Paper 73-Lub-J,* 1973.) *ASME, Transactions, Series F - Journal of Lubrication Technology,* vol. 95, Oct. 1973, p. 401-416. 23 refs. Research sponsored by the Franklin Institute.

An interdisciplinary systems analysis is presented for high-speed gas turbine engine mainshaft roller bearings which will enable the designer to meet the demands for ever higher rotative speeds and operating temperatures. The latest elastohydrodynamic experimental traction data are included. Analytical results cite a need for better definition of the rolling friction portion of the total traction. A fluid mechanics model for the detailed analysis of fluid drags is developed based upon a turbulent vortex-dominated flow and includes the effect of lubricant flow through the bearing. A complete thermal analysis including dynamic and thermal effects upon bearing dimensions and resulting clearances is also included. Heat transfer coefficients are given in detail. Shaft power loss and cage slip predictions as a function of load, speed, and lubricant supply correlate well with available experimental data. (Author)

A74-12752 # **Photographic pyrometry in an aeroballistic range.** P. H. Dugger, O. H. Bock, C. P. Enis, and B. W. Gilley (ARO, Inc., Arnold Engineering Development Center, Arnold Air Force Station, Tenn.). *In:* Optical instrumentation engineering in science, technology and society; Proceedings of the Sixteenth Annual Technical Meeting, San Mateo, Calif., October 16-18, 1972. Redondo Beach, Calif., Society of Photo-optical Instrumentation Engineers, 1973, p. 17-25. 19 refs. Contract No. F40600-73-C-0004.

A photographic pyrometry method was selected for the determination of the surface temperatures of aerodynamic models in free flight within aeroballistic ranges. The method makes use of a high-speed image converter camera system to obtain a step-motion self-luminosity photograph of the model in flight. Exposure times as short as 10 nanoseconds can be obtained. Calibration data from a carbon-arc reference source are recorded on identical film and are processed simultaneously with the model photograph. Densities on the film image of the model surface are measured and converted to temperatures, using the calibration data. G.R.

A74-12799 * # **Developing a technology base in planetary entry aerothermodynamics.** W. B. Olstad (NASA, Langley Research Center, Advanced Entry Analysis Branch, Hampton, Va.). *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 22 p. 46 refs.

The long-range objectives of the entry technology program are to insure that an adequate technology base for a great variety of mission options exists. Consideration has been given to the entry of

vehicles into the atmospheres of all the planets with the exception of Pluto. The experimental facilities for the studies are discussed, giving attention to shock tubes, the planetary entry radiation facility, ballistic ranges, the expansion tube, and arc jet facilities. Flight experiments are considered along with computational analyses and engineering approximations. G.R.

A74-12804 # **Prediction of unsteady airloads for the solution of the panel flutter problem of nosecones and conical shell structures.** H. Försching and K.-L. Chao (Aerodynamische Versuchsanstalt, Göttingen, West Germany). *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 8 p. 7 refs.

Applying the Slender Body Theory, the unsteady airloads on harmonically oscillating nosecone structures are calculated for various vibration parameters. The numerical results are presented as generalized airforces and are compared with corresponding results obtained by Piston Theory. (Author)

A74-12829 * # **A cost-effective approach for flight experiments - Application of Airborne Science aircraft experience to the Shuttle Sortie Lab.** D. R. Mulholland (NASA, Ames Research Center, Airborne Science Office, Moffett Field, Calif.). *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 15 p. 5 refs.

A74-12878 # **Air and space hi-jacking.** P. Magno and C. Verdacchi (Istituto Italiano di Diritto Spaziale, Rome, Italy). *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 44 p.

The various criminal aspects of air and space 'hijacking' are examined in terms of 'crime as an aim' and 'crime as a means.' The need for deliberate and timely action to counter such activities is emphasized. V.P.

A74-12911 **A new outbreak of Zeppelin fever.** T. Alexander. *Fortune*, vol. 88, Dec. 1973, p. 110-113, 162, 163, 168, 169.

The possibility that very large lighter-than-air vehicles may be of use in the future for specialized applications is examined. In principle, there is no reason why an airship could not remain aloft indefinitely, being loaded, refueled, and recrewed by airplanes, helicopters, or smaller airships flying up to rendezvous. Some advanced concepts are briefly reviewed. Aspects of obtaining developmental funding are briefly discussed. F.R.L.

A74-12916 # **Gas generator design for a wide variety of APU applications.** R. D. Marcy (Rockwell International Corp., Rocketdyne Div., Canoga Park, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1169.* 11 p. 6 refs. Members, $1.50; nonmembers, $2.00.

The selection and severity of specific gas generator requirements such as flow range, power demand response, gas temperature limitations, external heat rejection, pressure loss, specific horsepower, and life, lead to unique designs for varied APU applications. Analytical techniques and development testing generated advanced design concepts for three such Rocketdyne APU's: an extreme temperature, bipropellant pulse control, radiation-cooled design; a long-life, low-pressure, loss, low-heat rejection, monopropellant design; and a high-power, wide-flow range, low-temperature monopropellant design. Each satisfactorily met requirements for missile, Space Shuttle, and aircraft APU installations. (Author)

A74-12921 # **One-dimensional analysis of compressible ejector flows applicable to V/STOL aircraft design.** K. S. Nagaraja, D. L. Hammond, and J. E. Graetch (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1184.* 15 p. 16 refs. Members, $1.50; nonmembers, $2.00.

An analysis of one-dimensional, compressible, ejector flows has been developed for predicting the thrust augmentations which result from the mixing of the entrained, ambient air (called the secondary flow) with the aircraft engine air (called the primary flow) discharged through hypermixing nozzles into the ejector. Experiments conducted with large area ratio thrust augmentors have shown that thrust augmentation ratios of the order of 2.0 can be achieved. However, the practical integration of an ejector into an aircraft design limits the size of the ejector, and hence, the levels of augmentation ratios which can be achieved. More significantly, aircraft ejector flow is compressible. The analysis takes compressibility effects into consideration. (Author)

A74-12922 # **Cost impact of mission requirements on future engine design selection.** R. B. Dyson and W. J. Olsson (United Aircraft Corp., Pratt and Whitney Aircraft Div., East Hartford, Conn.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1186.* 6 p. Members, $1.50; nonmembers, $2.00.

Cost is becoming an increasingly important consideration in the selection of new weapon systems. Reducing the ownership costs of future military aircraft engines will require: (1) establishing minimum acceptable airplane performance requirements, and (2) selecting the engine technology level and configuration which will achieve these performance goals at the lowest life-cycle cost. Jet engines are examined from a cost and performance viewpoint and their cost relationship to airplane mission needs developed. Several hypothetical aircraft are studied to show the influence that cost considerations may have on future engine design trends. (Author)

A74-12928 # **Propulsion requirements for powered-lift aircraft.** H. F. Kleckner (Douglas Aircraft Co., Long Beach, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1214.* 7 p. Members, $1.50; nonmembers, $2.00.

Advanced design work on military and commercial transports based on the USAF Advanced Medium STOL Transport (AMST) permits a review of propulsion requirements for powered-lift transports. Key requirements are discussed for a baseline military transport and for a potentially profitable commercial derivative 175-passenger airplane that fits between the DC-9 and DC-10. Takeoff thrust is determined by airplane size and field length requirements, and cruise thrust is set by a speed requirement of Mach 0.75, compatible with the wing design and short-range operation. The outstanding off-design performance of the powered-lift commercial STOL transport is illustrated. Takeoff/cruise thrust compatibility is examined, and the impact of bypass ratios from 6 to 17 is discussed. Noise characteristics of powered-lift STOL transports are examined in relation to existing aircraft, FAR Part 36 requirements, and engine bypass ratio. (Author)

A74-12929 # **The Q-Fan Demonstrator Engine.** R. M. Levintan (United Aircraft Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1215.* 11 p. Members, $1.50; nonmembers, $2.00.

Design criteria as well as a general description are provided for the first full scale variable pitch fan engine tested in this country.

The test facility for this 6700 lb thrust engine is defined, and a summary of the test program is presented. Aerodynamic, acoustic and structural data from the initial test phase, are discussed. A ground adjustable mechanism was used to set fan blade angle for the first series of tests. A second test phase was conducted with a dynamic pitch change capability incorporated in the engine; the significance of reverse transient results are examined. (Author)

A74-12938 # An analytical study of icing simulation for turbine engines in altitude test cells. C. E. Willbanks and R. J. Schulz (ARO, Inc., Arnold Air Force Station, Tenn.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1280.* 11 p. 13 refs. Members, $1.50; nonmembers, $2.00.

An analytical study of icing simulation for aircraft turbine engines in altitude test cells was made. The importance of correctly simulating droplet-size distribution, liquid water content and humidity for testing anti-icing systems was investigated. A mathematical model of flow in an icing test cell was developed, and results of calculations for typical test conditions are presented. The results of the study lend further support to the fact that ground test facilities provide the best capability for conducting turbine engine icing tests. (Author)

A74-12939 # A new test capability for propulsion system testing. J. G. Mitchell (ARO, Inc., Arnold Engineering Development Center, Arnold Air Force Station, Tenn.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1283.* 14 p. 7 refs. Members, $1.50; nonmembers, $2.00.

The Air Force is presently designing a new aircraft propulsion system test facility which is intended to alleviate present test deficiencies and provide the growth potential to satisfy test requirements for the next several decades. This paper summarizes the planning and rationale which has led to definition of facility performance, with particular attention directed toward the more sophisticated testing requirements of modern supersonic propulsion systems. Several design studies which have been instrumental in defining major facility components are addressed. A progress report is given on the status of design and acquisition of the Aero-Propulsion Systems Test Facility (ASTF). (Author)

A74-12940 * # Sea level side loads in high-area-ratio rocket engines. L. H. Nave and G. A. Coffey (Rockwell International Corp., Rocketdyne Div., Canoga Park, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1284.* 66 p. 9 refs. Members, $1.50; nonmembers, $2.00. Contracts No. NAS8-25156; No. NAS8-27980.

An empirical separation and side load model to obtain applied aerodynamic loads has been developed based on data obtained from full-scale J-2S (265K-pound-thrust engine with an area ratio of 40:1) engine and model testing. Experimental data include visual observations of the separation patterns that show the dynamic nature of the separation phenomenon. Comparisons between measured and applied side loads are made. Correlations relating the separation location to the applied side loads and the methods used to determine the separation location are given. (Author)

A74-12941 # Military aircraft noise. P. A. Shahady (USAF, Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1291.* 9 p. 13 refs. Members, $1.50; nonmembers, $2.00.

Opportunities to reduce military aircraft noise without inhibiting mission capability are considered. Emphasis is placed on the need for a comprehensive military aircraft noise abatement program involving compatible land use in the vicinity of military airports, operational constraints and procedures to reduce noise impact and source noise reduction. The military to civil transfer of aircraft and engine technology is discussed together with the effect of increasing civil noise constraints on this evolutionary practice. Research and development activities to reduce military aircraft noise at the source are highlighted and plans to incorporate noise reduction technology early in the development cycle of military engines are outlined. Recommended noise goals for military aircraft are presented. (Author)

A74-12942 # The effect of inlet-noise suppression on propulsion system design. C. G. Hodge, L. J. Winslow, and S. K. Wood (Boeing Commercial Airplane Co., Seattle, Wash.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1294.* 17 p. 8 refs. Members, $1.50; nonmembers, $2.00.

The suppression of inlet fan noise with acoustic treatment and high-Mach-number flow passages influences airplane acoustic performance, propulsion performance, weight, and drag, as well as the maintainability, reliability, and technical risk of the propulsion system. All of these factors must be considered in the design process. This paper surveys the state of the art and the potential of different inlet-noise-suppression concepts with regard to these factors, and contains recommendations for future development work on inlet-noise suppression. (Author)

A74-12943 * # Influence of noise constraints on supersonic transport engine design. R. W. Hines and J. A. Sabatella (United Aircraft Corp., Pratt and Whitney Aircraft Div., East Hartford, Conn.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1295.* 8 p. Members, $1.50; nonmembers, $2.00. NASA-supported research.

The challenge to meet or better FAR 36 noise level requirements is particularly difficult in the SST due to the relatively high jet velocities required to give an acceptable supersonic powerplant. This requires careful tailoring of the powerplant cycle to give good flight performance with a jet velocity low enough to meet the noise requirements with a practical jet noise suppressor. The effect on engine cycle selection of meeting various noise levels will be reviewed. The range of engine cycles will cover turbojet and turbofan cycles, as well as variable cycle engines. The selection of the cycle parameters such as turbine temperature, bypass ratio, and fan pressure ratio as required to meet various noise levels will be reviewed. The effect on the engine design of jet noise suppression and engine acoustic treatment will also be reviewed. The impact of designing the engines at the different noise levels will be evaluated on an overall supersonic transport systems basis. (Author)

A74-12947 # Turbine engine exhaust nozzle performance. S. Wehofer and R. J. Matz (ARO, Inc., Arnold Air Force Station, Tenn.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1302.* 10 p. 9 refs. Members, $1.50; nonmembers, $2.00. USAF-sponsored research.

The internal fluid dynamic performance of various turbine engine nozzles was experimentally investigated. Nine fixed-geometry nozzles representative of contemporary turbofans operating at various power levels were evaluated with uniform inlet flow conditions and with radial nonuniformities in total pressure and total temperature. The test conditions are representative of both low bypass turbofan and turbojet tailpipe flows. The effects of nozzle throat lip geometry on nozzle performance are also evaluated. (Author)

A74-12948 # Afterbody drag flight test of the A-7E airplane. S. C. Walker (LTV Aerospace Corp., Vought Systems Div.,

Dallas, Tex.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1306.* 8 p. Members, $1.50; nonmembers, $2.00.

The test was a part of a continuing nozzle-afterbody technology development program. Primary objectives of the test were to isolate the influence of major parameters upon afterbody and base drag, and to improve in-flight performance evaluation of a fan engine. A new approach was introduced to closely control changes in certain parameters by acquiring data during quasi-steady state maneuvers. Instrumentation included static pressures, boundary layer rakes, nozzle thrust rake, and core and fan pressures and temperatures. Data are all of high quality and parameter influence on afterbody performance is clearly indicated. The propulsive jet pulls the base toward negative pressure at all pressure ratios investigated. The external flow causes base pressure to increase with increasing velocity. A stream thrust parameter correlates static and in-flight engine performance independent of flight altitude and Mach number. (Author)

A74-12951 * # **Preliminary results of flight tests of the propulsion system of the YF-12 airplane at Mach numbers to 3.0.** F. W. Burcham, Jr., J. K. Holzman, and P. J. Reukauf (NASA, Flight Research Center, Edwards, Calif.). *American Institute of Aeronautics and Astronautics and Society of Automotive Engineers, Propulsion Conference, 9th, Las Vegas, Nev., Nov. 5-7, 1973, AIAA Paper 73-1314.* 12 p. 5 refs. Members, $1.50; nonmembers, $2.00.

Flight tests of the propulsion system of a YF-12 airplane were made which included off-schedule inlet operation and deliberately induced unstarts and compressor stalls. The tests showed inlet/engine compatibility to be good through most of the flight envelope. The position of the terminal shock wave could be determined from throat static pressure profiles or from root-mean-square levels of throat static pressure fluctuations. A digital simulation of the control system showed an oscillation of the forward bypass doors to be caused by hysteresis in the bypass door actuator linkages. (Author)

STAR ENTRIES

N74-10002 Engineering Sciences Data Unit, London (England).
CONVERSION FACTOR FOR PROFILE DRAG INCREMENT FOR PART-SPAN FLAPS
Feb. 1973 3 p ref
(ESDU-Flaps-02.01.07-Amend-A) Copyright. Avail: Issuing Activity

The conversion factor for deriving the drag increment of part-span flaps of all types from full-span flaps is plotted against the ratio of flap span to wing span. It is assumed that the flap chord to wing chord ratio is constant along the span. Graphs are presented for five aerodynamic configurations. Author

N74-10003 Engineering Sciences Data Unit, London (England).
LIFT COEFFICENT INCREMENT DUE TO FULL-SPAN SPLIT FLAP: FLAP CHORD 0.15c
Feb. 1973 2 p refs
(ESDU-Flaps-01.01.05-Amend-A) Copyright. Avail: Issuing Activity

The lift coefficient increment due to a full span split flap of chord 0.15c is plotted against flap angle for various thickness to chord ratios of the wings. When the flap is closed the trailing edge of the flap is coincident with the trailing edge of the wing. The flap refers to the deflection of the flap from the closed position. It was determined that the lift coefficient increment does not depend to a great extent on the wing section and is not sensitive to Reynolds number. Author

N74-10004 Engineering Sciences Data Unit, London (England).
INFORMATION ON THE USE OF DATA ITEMS IN THE SERIES WINGS 02.04
Jul. 1973 2 p
(ESDU-Wings-02.04.00-Amend-A) Copyright Avail: Issuing Activity

The aerodynamic conditions of profile drag, surface friction, and laminar boundary flow are discussed. The procedures and requirements involved in computing profile drag are explained. The effect of the mean position of transition points on the upper and lower surfaces of the wing is analyzed. The effects of waviness and surface roughness on the breakdown of laminar flow are described. Author

N74-10005 Engineering Sciences Data Unit, London (England).
INFORMATION ON THE USE OF DATA ITEMS ON ROLLING MOMENT DERIVATIVES OF AN AEROPLANE
Jul. 1973 2 p ref
(ESDU-Aircraft-06.01.00) Copyright. Avail: Issuing Activity CSCL 01A

The rolling moment derivatives of an aircraft due to rolling, yawing, and sideslip are discussed. The main assumptions and approximations for deriving the data are explained. The documents which concern the effects of dihedral angle, planform, body configuration, and fin and rudder reactions are idenfified. Author

N74-10006 Engineering Sciences Data Unit, London (England).
AERODYNAMIC CHARACTERISTICS OF AEROFOILS IN COMPRESSIBLE INVISCID AIRFLOW AT SUBCRITICAL MACH NUMBERS
Apr. 1973 15 p refs Sponsored by Roy. Aeron. Soc.
(ESDU-72024-Amend-A) Copyright. Avail: Issuing Activity

The aerodynamic characteristics of airfoils in compressible, inviscid airflow at subcritical Mach numbers are discussed. Data for estimating the effect of air compressibility on the lift-curve slope at zero lift, the zero lift pitching moment coefficient, and the chordwise position of the aerodynamic center of the airfoil in inviscid flow are presented. Mathematical models, tables, and graphs are included to support the theoretical considerations. Author

N74-10007 Engineering Sciences Data Unit, London (England).
EFFECTS OF ISOLATED BODY AND WING-BODY INTERFERENCE ON ROLLING MOMENT DUE TO SIDESLIP
Jun. 1973 13 p refs Supersedes Aero-A.06.01.05 Sponsored by Roy. Aeron. Soc.
(ESDU-73006; Aero-A-06.01.05) Copyright. Avail: Issuing Activity

The effects of isolated body and wing-body interference on the rolling moment due to sideslip are discussed. The data apply to low speeds and to lift coefficients for which the flow over the wing-body combination remains fully attached. Mathematical models are developed to support the theoretical considerations. The data are presented in the form of tables and graphs. Author

N74-10008 Engineering Sciences Data Unit, London (England).
THE MEAN SKIN FRICTION COEFFICIENT FOR A ROUGH FLAT PLATE WITH A TURBULENT TWO-DIMENISONAL BOUNDARY LAYER IN COMPRESSIBLE ADIABATIC FLOW, WITH APPLICATION TO WEDGES, CYLINDERS AND CONES
Jul. 1973 19 p refs Supersedes Aero-W.02.04.08 and Aero-W.02.04.10 Sponsored by Roy. Aeronaut. Soc.
(ESDU-73016; Aero-W.02.04.08; Aero-W.02.04.10) Copyright. Avail: Issuing Activity

Data for the mean skin friction coefficient of a perfectly insulated (adiabatic flow) flat plate with an aerodynamically smooth or, in the more general case, a uniformly rough surface at zero incidence in air at Mach numbers from zero to five are presented. The data are derived with the assumption that fully developed turbulent flow exists from the leading edge of the plate, which is considered the virtual origin. The two dimensional supersonic flow about sharp wedges, the axisymmetric flow over cylinders, and the axisymmetric flow over pointed cones are discussed with respect to the factors applied to the flat plate data. Author

N74-10010 Engineering Sciences Data Unit, London (England).
AERODYNAMIC CENTRE IN TWO DIMENSIONAL FLOW
Apr. 1973 3 p ref
(ESDU-Aircraft-08.01.05-Amend-A) Copyright. Avail: Issuing Activity

Graphs are presented for finding the theoretical aerodynamic center of an airfoil in incompressible inviscid two dimensional flow. An example for finding the center is included. F.O.S.

N74-10011 Engineering Sciences Data Unit, London (England).
INFORMATION ON THE USE OF DATA ITEMS IN THE SERIES BODIES 02.04
Jul. 1973 1 p
(ESDU-Bodies-02.04.00-Amend-A) Copyright. Avail: Issuing Activity

The development of data pertaining to aerodynamic coefficients for streamlined bodies at small angles of incidence is discussed. The subjects involved are: (1) profile drag, (2) surface friction drag, and (3) laminar boundary layer flow. The effects of waviness, skin joints, and dust contamination on the location of the transition point are described. Author

N74-10012 Engineering Sciences Data Unit, London (England).
SUBSONIC PERFORMANCE DATA FOR NACA TYPE SUBMERGED AIR INTAKES
Apr. 1973 2 p
(ESDU-66029) Copyright. Avail: Issuing Activity

The aerodynamic characteristics of submerged intakes are analyzed. The classification of the intakes according to planform geometry is explained. The performance of the submerged intakes is expressed in terms of the ram efficiency which is primarily dependent on the boundary layer conditions. The data are based on local sonic and supersonic conditions. Author

N74-10013# Aeronautical Research Inst. of Sweden, Stockholm.
COMPUTATION OF VORTEX MODELS FOR WINGS AT HIGH ANGLE OF ATTACK IN INCOMPRESSIBLE FLOW
Sven G. Hedman 1973 23 p refs
(FFA-AU-653) Avail: NTIS HC $3.25

The vortex lattice method is applied in the solution of the thin wing lifting problem. The strength of the horse shoe vortices and a set of trailing vortex definition points are computed. The flow is required to be tangential in a number of collocation points on the wing and on the trailing vortices. This is expressed in a system of equations. It is shown how the system can be solved in two ways. In the first the system is partitioned into two subsystems, one where the boundary conditions of the wing are used for the determination of the vortex strengths, and one where the boundary conditions of the free vortices determine the positions of the vortices. In the second method the whole system is solved simultaneously by means of Newton-Raphson's rule. Author

N74-10014*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EXPLORATORY INVESTIGATION AT MACH NUMBERS FROM 0.40 TO 0.95 OF THE EFFECTS OF JETS BLOWN OVER A WING
Lawrence E. Putnam Washington Nov. 1973 71 p refs
(NASA-TN-D-7367; L-9067) Avail: NTIS HC $3.50 CSCL 01A

An exploratory investigation has been made at Mach numbers from 0.40 to 0.95 to determine the effects on lift, drag, and pitching moment of blowing a jet exhaust over the upper surface of a 50 deg swept leading-edge wing. Also investigated were the effects of varying the longitudinal and vertical location of the nozzle exit on the induced effects of jet blowing. Author

N74-10015*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EFFECT OF BLOCKAGE RATIO ON DRAG AND PRESSURE DISTRIBUTIONS FOR BODIES OF REVOLUTION AT TRANSONIC SPEEDS
Lana M. Couch and Cuyler W. Brooks, Jr. Washington Nov. 1973 111 p refs
(NASA-TN-D-7331; L-8449) Avail: NTIS HC $4.25 CSCL 01A

Experimental data were obtained in two wind tunnels for 13 models over a Mach number range from 0.70 to 1.02. Effects of increasing test-section blockage ratio in the transonic region near a Mach number of 1.0 included change in the shape of the drag curves, premature drag creep, delayed drag divergence, and a positive increment of pressures on the model afterbodies. Effects of wall interference were apparent in the data even for a change in blockage ratio from a very low 0.000343 to an even lower 0.000170. Therefore, models having values of blockage ratio of 0.0003 - an order of magnitude below the previously considered safe value of 0.0050 - had significant errors in the drag-coefficient values obtained at speeds near a Mach number of 1.0. Furthermore, the flow relief afforded by slots or perforations in test-section walls - designed according to previously accepted criteria for interference-free subsonic flow - does not appear to be sufficient to avoid significant interference of the walls with the model flow field for Mach numbers very close to 1.0. Author

N74-10016# National Center for Atmospheric Research, Boulder, Colo. Facilities Lab.
WIND TUNNEL AND FIELD INVESTIGATIONS OF SHAPES FOR BALLOON SHELTERS
Robert H. Meroney and Erich J. Plate Feb. 1973 61 p refs Sponsored by NSF
(NCAR-TN/EDD-82) Avail: NTIS HC $5.25 CSCL 01A

The results of a series of wind tunnel and field tests performed in support of a program to develop a balloon inflation and launch shelter are discussed. The study discusses scaling criteria for simulating a shelter; velocity, turbulence, and frequency spectra downwind of four basic shelter shapes; the effects of screen materials on a shelter's efficiency; and the influence of the presence of a simulated balloon upon the effectiveness of the shelter. Author

N74-10017*# National Aeronautics and Space Administration, Washington, D.C.
AERONAUTICS: SPACE IN THE SEVENTIES
Dec. 1971 27 p Original contains color illustrations
(NASA-EP-85) Avail: NTIS HC $3.50 CSCL 01A

The aeronautical research activities of NASA during the 1970 time period are discussed. The four types of aeronautical research are defined as: (1) proof of concept, (2) extension of the art, (3) future needs, and (4) problem solving. Photographs and illustrations of various research projects are presented. The procedures for conducting typical research projects are described. Author

N74-10019*# Nielsen Engineering and Research, Inc., Mountain View, Calif.
THE EFFECTS OF LEADING-EDGE SERRATIONS ON REDUCING FLOW UNSTEADINESS ABOUT AIRFOILS, AN EXPERIMENTAL AND ANALYTICAL INVESTIGATION Final Report
R. G. Schwind and H. J. Allen Washington NASA Nov. 1973 97 p refs
(Contract NAS2-6010)
(NASA-CR-2344) Avail: NTIS HC $3.75 CSCL 01A

High frequency surface pressure measurements were obtained from wind-tunnel tests over the Reynolds number range 1.2 times one million to 6.2 times one million on a rectangular wing of NACA 63-009 airfoil section. Measurements were also obtained with a wide selection of leading-edge serrations added to the basic airfoil. Under a two-dimensional laminar bubble very close to the leading edge of the basic airfoil there is a large spatial peak in rms pressure. Frequency analysis of the pressure signals in this region show a large, high-frequency energy peak which is interpreted as an oscillation in size and position of the bubble. The serrations divide the bubble into segments and reduce the peak rms pressures. A low Reynolds number flow visualization test on a hydrofoil in water was also conducted. A von Karman vortex street was found trailing from the rear of the foil. Its frequency is at a much lower Strouhal number than in the high Reynolds number experiment, and is related to the trailing-edge and boundary-layer thicknesses. Author

N74-10020*# Hamilton Standard, Windsor Locks, Conn.
NOISE AND WAKE STRUCTURE MEASUREMENTS IN A SUBSONIC TIP SPEED FAN Final Report
B. Magliozzi, D. B. Hanson, B. V. Johnson, and F. B. Metzger Washington NASA Nov. 1973 94 p refs
(Contract NAS1-11670)
(NASA-CR-2323) Avail: NTIS HC $3.75 CSCL 20D

The results of an experimental program are reported which show the effect of blade angle, tip speed, fan pressure ratio, and thrust on noise of a model fan of 0.457m (18 inches) diameter operating at subsonic tip speeds at pressure ratios between 1.06 and 1.15. The fan used in this study had 12 blades, 7 stator vanes, and a spacing between the rotor and stator of 1.85 blade chords. This fan was originally designed for aerodynamic testing and was considered a good performer. It was used in the noise test program as it incorporated features found to reduce noise in an earlier analytical parametric study.

For a given pressure ratio the fan was shown to exhibit minimum noise at the blade angle and tip speed near that of maximum aerodynamic efficiency. Also, the noise level and spectrum character of this fan showed excellent correlation with scaled data of a similar larger diameter fan. Results of the program confirm the trends shown in the earlier analytical parametric study which showed that fan noise could be reduced for a given thrust and pressure ratio by increasing fan solidity, improving fan aerodynamic design, and operating the fan at an optimum subsonic tip speed. In addition to noise, the blade wake characteristics at the leading edge of the stator were measured in this program. At root and tip sections some difference between predicted and measured wakes was found. However comparisons between predicted and measured wakes at mid span locations was found to be good. Author

N74-10021*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SOME DESIGN CONSIDERATIONS FOR SUPERSONIC CRUISE MIXED COMPRESSION INLETS
David N. Bowditch 1973 20 p refs Presented at the Propulsion Joint Specialist Conf., Las Vegas, Nev., 5-7 Nov. 1973; sponsored by AIAA
(NASA-TM-X-71460; E-7756) Avail: NTIS HC $3.00 CSCL 01A

A mixed compression inlet designed for supersonic cruise has very demanding requirements for high total pressure recovery and low bleed and cowl drag. However, since the optimum inlet for supersonic cruise performance may have other undesirable characteristics, it is necessary to establish trade-offs between inlet performance and other inlet characteristics. Some of these trade-offs between the amount of internal compression, aerodynamic performance and angle-of-attack tolerance are reviewed. Techniques for analysis of boundary layer control and subsonic diffuser flow are discussed. Author

N74-10022*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF TRANSONIC FAN STAGE WITH WEIGHT FLOW PER UNIT ANNULUS AREA OF 208 KILOGRAMS PER SECOND PER SQUARE METER (42.6 (LB/SEC)/SQ FT)
Donald C. Urasek, George Kovich, and Royce D. Moore Washington Nov. 1973 98 p refs
(NASA-TM-X-2903; E-7229) Avail: NTIS HC $3.75 CSCL 01A

Performance was obtained for a 50-cm-diameter compressor designed for a high weight flow per unit annulus area of 208 (kg/sec)/sq m. Peak efficiency values of 0.83 and 0.79 were obtained for the rotor and stage, respectively. The stall margin for the stage was 23 percent, based on equilvant weight flow and total-pressure ratio at peak efficiency and stall. Author

N74-10023# Cranfield Inst. of Technology (England). Coll. of Aeronautics and Aerodynamics.
AN INVESTIGATION OF A NONPLANAR VORTEX LATTICE METHOD FOR WING CALCULATIONS Progress Report
Y. L. Sinai and E. A. Boyd Jun. 1973 68 p refs
(Cranfield-Aero-17) Avail: NTIS HC $5.50

A non-planar vortex lattice method, its application to the subsonic problem of any number of complex planforms arbitrarily arranged in space, and some results of a Fortran 4 program which is based on this method are discussed. The program is applied to two rectangular planforms (aspect ratios of 4 and 8), a swept and tapered planform, an elliptic wing and two rectangular wings (both of aspect ratio 8) in tandem, and comparison is made with other lifting-surface results. Particular emphasis is placed on the results for the elliptic wing which can be compared with an exact potential flow solution. These results are used as a basis for a preliminary choice for the optimum layout of the lattice over the planform and for suggestions regarding future investigations in this context. Particular reference is made to the value of K (the vortex drag factor) for the elliptic wing and to the side-force acting on the tips of plane rectangular wings. Author

N74-10024*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
FORTRAN PROGRAM FOR PREDICTING OFF-DESIGN PERFORMANCE OF CENTRIFUGAL COMPRESSORS
Michael R. Galvas Washington Nov. 1973 59 p refs Prepared in cooperation with Army Air Mobility R and D Lab., Cleveland
(NASA-TN-D-7487; E-7480) Avail: NTIS HC $3.50 CSCL 01A

A FORTRAN program for calculating the off-design performance of centrifugal compressors with channel diffusers is presented. Use of the program requires complete knowledge of the overall impeller and diffuser geometries. Individual losses are computed using analytical equations and empirical correlations which relate loss levels to velocity diagram characteristics and overall geometry. On a given speed line compressor performance is calculated for a range of inlet velocity levels. At flow rates between surge and choke, individual efficiency decrements, compressor overall efficiency, and compressor total pressure ratio are tabulated. An example case of performance comparison with a compressor built by a commercial engine manufacturer is presented to demonstrate the correlation with limited experimental data. Author

N74-10025*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECTS OF INCREASED LEADING-EDGE THICKNESS ON PERFORMANCE OF A TRANSONIC ROTOR BLADE
Lonnie Reid and Donald C. Urasek Washington Nov. 1972 57 p refs
(NASA-TN-D-7489; E-7076) Avail: NTIS HC $3.50 CSCL 01A

A single-stage transonic compressor was tested with two rotor blade leading-edge configurations to investigate the effect of increased leading-edge thickness on the performance of a transonic blade row. The original rotor blade configuration was modified by cutting back the leading edge sufficiently to double the blade leading-edge thickness and thus the blade gap blockage in the tip region. At design speed this modification resulted in a decrease in rotor overall peak efficiency of four points. The major portion of this decrement in rotor overall peak efficiency was attributed to the flow conditions in the outer 30 percent of the blade span. At 70 and 90 percent of design speed, the modification had very little effect on rotor overall performance. Author

N74-10026*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPARISON OF PREDICTED AND MEASURED LOW-SPEED PERFORMANCE OF TWO 51 CENTIMETER-DIAMETER INLETS AT INCIDENCE ANGLE
James A. Albers Washington Nov. 1973 41 p refs
(NASA-TM-X-2937; E-7546) Avail: NTIS HC $3.00 CSCL 01A

Theoretical and experimental internal flow characteristics of two 51-cm-diameter inlets are compared. Theoretical flow characteristics along the inlet surface were obtained from an axisymmetric potential flow and boundary layer analysis. The experimental data were obtained from low-speed tests of a high-bypass-ratio turbofan engine simulator. Comparisons between calculated internal surface pressure distributions and experimental data are presented for a free-system velocity of 45 m/sec and for incidence angles from 0 deg to 50 deg. Analysis of boundary layer separation on the inlet lip at incidence angle is the major emphasis of this report. Theoretical boundary layer shape factors, skin friction coefficients, and velocity profiles in the boundary layer are presented, along with the location of the transition region. Theoretical and experimental separation locations are also discussed. Author

N74-10027*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF TRANSONIC FAN STAGE WITH WEIGHT FLOW PER UNIT ANNULUS AREA OF 198 KILOGRAMS PER SECOND PER SQUARE METER (40.6(LB/SEC)/SQ FT)

George Kovich, Royce D. Moore, and Donald C. Urasek Washington Nov. 1973 92 p refs
(NASA-TM-X-2905; E-7205) Avail: NTIS HC $3.75 CSCL 01A

The overall and blade-element performance are presented for an air compressor stage designed to study the effect of weight flow per unit annulus area on efficiency and flow range. At the design speed of 424.8 m/sec the peak efficiency of 0.81 occurred at the design weight flow and a total pressure ratio of 1.56. Design pressure ratio and weight flow were 1.57 and 29.5 kg/sec (65.0 lb/sec), respectively. Stall margin at design speed was 19 percent based on the weight flow and pressure ratio at peak efficiency and at stall. Author

N74-10028*# *Chrysler Corp., New Orleans, La. Data Management Services.*
TRANSONIC AERODYNAMIC CHARACTERISTICS ASSOCIATED WITH VARIATIONS IN THE GEOMETRY OF THE FORWARD PORTION OF IRREGULAR PLANFORM WINGS
Bernard Spencer, Jr. (NASA. Langley Res. Center) and David R. Stone (NASA. Langley Res. Center) Sep. 1973 356 p refs
(Contract NAS9-13247)
(NASA-CR-128781; DMS-DR-2041) Avail: NTIS HC $20.00 CSCL 01A

The experimental aerodynamic characteristics of three basic wing planforms on a conceptual orbiter fuselage (designated the LO-100) have been obtained in the 8-Foot Transonic Pressure Tunnel. The study included variations in the forward portion (fillet) of each basic wing. Fillet sweeps to 78 deg were investigated while holding the spanwise intersection of the fillet and wing constant. The data were obtained at Mach numbers of 0.35 to 1.2 and at Reynolds number (depending on Mach number) of 1.9 million to 2.11 million per foot. The angle of attack was varied from about minus 2 deg to 22 deg at 0 deg of sideslip. Author

N74-10029*# Lockheed-Georgia Co., Marietta.
ADDITIONAL THREE-DIMENSIONAL BOUNDARY-LAYER COMPUTATIONS FOR A FINITE SWEPT WING
J. F. Nash, R. M. Scruggs, and W. A. Stevens [1972] 62 p refs
(Contract NAS1-12153)
(NASA-CR-132335) Avail: NTIS HC $5.25 CSCL 01A

Calculations have been made of the three-dimensional, compressible, turbulent boundary layer on the finite supercritical wing of the NASA modified F-8 transonic research airplane. The calculations were based on the wing pressure distribution measured in flight at M = 0.90, instead of on wind tunnel data at M = 0.50 and 0.99. Data on the boundary-layer thickness, displacement thickness, skin-friction components, and integrated streamwise skin friction are presented for points along the streamwise stations at which pressure measurements were made. Author

N74-10030*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A STUDY OF METHODS WHICH PREDICT SUPERSONIC FLOW FIELDS FROM BODY GEOMETRY, DISTANCE, AND MACH NUMBER
Robert J. Mack Washington Nov. 1973 25 p refs
(NASA-TN-D-7387; L-8940) Avail: NTIS HC $2.75 CSCL 01A

A study of seven methods for predicting flow-field pressure signatures from the parameters Mach number, body geometry, and field-path distance has been made. The methods included the method of characteristics, which served as a standard of comparison; a shock-capturing method; three Whitham theory methods; a modified characteristics method; and a bicharacteristics method. Results from each method were also compared with recently obtained wind-tunnel data for a cone-cylinder model at Mach numbers of 2.96 and 4.63 with ratios of radial distance to cone length of 2 and 5. The comparisons at a Mach number of 2.96 showed that signatures from all the methods correlated well with wind-tunnel data and with the signatures predicted by the method of characteristics. At a Mach number of 4.63, however, the agreement between the signatures obtained in the wind tunnel and those predicted by theory varied from good to poor, as did the agreement between the signatures obtained by the method of characteristics and the other six methods. It should be noted that these results and comparisons indicate pressure prediction capabilities only for the near-field flow about bodies of revolution. Author

N74-10031*# *Aeronautical Research Inst. of Sweden, Stockholm. Aerodynamics Dept.*
RESEARCH ON THE SONIC BOOM PROBLEM. PART 2: FLOW FIELD MEASUREMENT IN WIND TUNNEL AND CALCULATION OF SECOND ORDER F-FUNCTION Final Report
M. Landahl, H. Soerensen, and L. Hilding Washington NASA Nov. 1973 111 p refs
(Grant NGR-52-120-001)
(NASA-CR-2340; FFA-AU-621-Pt-2) Avail: NTIS HC $4.25 CSCL 20D

An experimental investigation has been carried out in a wind tunnel to test some of the results of Landahl's second order theory. The slender models consisted of a parabolic spindle, tested at M = 3, and a wing body configuration, suggested by Ferri, and tested at M = 2.7. The theory indicates that shock position and strength at an arbitrary distance can be calculated by means of near field measurements. The results show that this method is an appropriate one for simple bodies and for bodies with complicated geometries as well. Author

N74-10032# Naval Ordnance Lab., White Oak, Md.
AN EMPIRICAL EQUATION FOR PREDICTION OF TRANSITION LOCATION ON CONES IN SUPER-OR HYPERSONIC FLIGHT
Neal Tetervin 14 Jun. 1973 28 p refs
(AD-765692; NOLTR-73-127) Avail: NTIS CSCL 16/3

An empirical equation has been developed for the prediction of transition location on blunt and sharp cones. The equation predicts the transition location fairly well for 48 ballistics range tests for cones without ablation and for 40 flight tests for cones with ablation ranging from zero to large. The equation is applicable for cones in supersonic or hypersonic flight. The experimental data cover a range of local Mach numbers at transition from 2.8 to 14.7 and a range of the ratio of local wall to local stream temperature at transition from .074 to 1.43. Author (GRA)

N74-10033# Mississippi State Univ., State College. Dept. of Aerophysics and Aerospace Engineering.
TWO-DIMENSIONAL WIND TUNNEL TEST ON A VARIABLE-CAMBER AIRFOIL WITH DISTRIBUTED SUCTION BOUNDARY-LAYER CONTROL Final Report
L. J. Mertaugh, N. S. Kiran, and S. Dey May 1973 73 p refs
(Contract DAAJ02-67-C-0016; DA Proj. 1F1-62204-A-142)
(AD-766304; EIRS-ASE-73-2; USAAMRDL-TR-73-3) Avail: NTIS CSCL 01/1

The report presents the results of a test program that was intended to investigate possible improvements in the methods used to predict the suction distribution required to prevent separation of the turbulent boundary layer at high lift coefficients, and provide experimental data on a variable-camber airfoil with distributed-suction boundary-layer control. Two, 2-dimensional wind-tunnel models were tested, and test speeds between 56 and 131 feet per second were used. Model lift and moment data were obtained. (Modified author abstract) GRA

N74-10034* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
LIGHTWEIGHT, VARIABLE SOLIDITY KNITTED PARACHUTE FABRIC Patent
Frederick R. Matthews, Jr. and Erskine C. White, inventors (to NASA) Issued 9 Oct. 1973 6 p Filed 23 Dec. 1971 Supersedes N72-21004 (10 - 12, p 1553)

(NASA-Case-LAR-10776-1; US-Patent-3,764,097; US-Patent-Appl-SN-211332; US-Patent-Class-244-145) Avail: US Patent Office CSCL 11E

A parachute fabric for aerodynamic decelerator applications is described. The fabric will permit deployment of the decelerator at high altitudes and low density conditions. The fabric consists of lightweight, highly open, circular knitted parachute fabric with ribbon-like yarns to assist in air deflection.

Official Gazette of the U.S. Patent Office

N74-10035 International Civil Aviation Organization, Montreal (Quebec).

AIRWORTHINESS COMMITTEE TENTH MEETING

1973 189 p Conf. Held at Montreal, 22 May - 8 Jun. 1973 (Doc-9065; Air-C-10) Copyright. Avail: Issuing Activity

The proceedings of an Airworthiness Committee meeting are presented. The committee is composed of representatives from various foreign nations and is concerned with improving the flight safety of all types of aircraft and operations. The subjects discussed are: (1) airworthiness policy, (2) aircraft flying qualities, (3) aircraft performance problems, (4) crash survival, and (5) structural problems involving gust criteria. Author

N74-10036# Joint Publications Research Service, Arlington, Va.

COMPUTATION OF THE AERODYNAMIC CHARACTERISTICS OF A RECTANGULAR WING WITH PLATES MOVING AT LOW SUBSONIC SPEED NEAR A SCREEN

S. D. Yermolenko, Yu. A. Rogozin, and G. V. Rogachev 24 Oct. 1973 11 p ref Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved., Aviats. Tekh. (Kazan), no. 3, 1972 p 105-112 (JPRS-60353) Avail: NTIS HC $3.00 CSCL 01A

The computation results are discussed of the aerodynamic characteristics of a rectangular wing with plates moving at a low subsonic speed near a screen. Author

N74-10037*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

NOISE TESTS OF A HIGH-ASPECT-RATIO SLOT NOZZLE WITH VARIOUS V-GUTTER TARGET THRUST REVERSERS

James R. Stone and Orlando A. Gutierrez 1973 22 p refs Presented at 86th Meeting of the Acoustical Soc. of Am., Los Angeles, 30 Oct. - 2 Nov. 1973 (NASA-TM-X-71470; E-7771) Avail: NTIS HC $3.25 CSCL 20A

The results of experiments on the noise generated by a 1.33- by 91.4 cm slot nozzle with various V-gutter reversers, and some thrust measurements are presented. The experiments were conducted with near-ambient temperature jets at nozzle pressure ratios of 1.25 to 3.0, yielding jet velocities of about 190 to 400 m/sec. At pressure ratios of 2 or less, the reversers, in addition to being noisier than the nozzle alone, also had a more uniform directional distribution and more high-frequency noise. At pressure ratios above 2, the nozzle alone generated enough shock noise that the levels were about the same as for the reversers. The maximum overall sound pressure level and the effective overall sound power level both varied with the sixth power of jet velocity over the range tested. The data were scaled up to a size suitable for reversing the wing-flap slot nozzle flow of a 45 400-kg augmentor-wing-type airplane on the ground, yielding perceived noise levels well above 95 PNdB on a 152-m sideline. Author

N74-10038*# Linguistic Systems, Inc., Cambridge, Mass.

STUDY OF HEAVING MOTION IN AIR CUSHION VEHICLES

G. VandeSteen Washington NASA Nov. 1973 121 p refs Transl. into ENGLISH from "Etude du Mouvement de Pilonnement des Vehicules a Coussin d'Air" Brussels, NT 33, 1973 97 p (Contract NASw-2482) (NASA-TT-F-15106) Avail: NTIS HC $8.25 CSCL 01C

The behavior of three types of ground effect machines experiencing oscillations in vertical translation with no pitch, roll, or yaw was studied. The configurations of the ground effect machines are described. It is shown that the two important movements in the problem are heaving and pitching, as yaw has virtually no effect of the performance of the vehicle. Preliminary tests showed that for all three types of vehicles, the transient state is in general an oscillating one, similar to a damped sinusoid. Author

N74-10039# Teer (James G.) and Co., College Station, Tex.

STUDIES OF THE EFFECTS OF SONIC BOOM ON BIRDS Final Report

James G. Teer and Joe C. Truett Sep. 1973 82 p refs (Contract DOT-FA72WAI-238; DI-14-16-0001-5351-FR) (FAA-RD-73-148) Avail: NTIS HC $6.25

A field study was carried out to try to discover if occurence of sonic booms created by overflying aircraft was adversely affecting reproduction of wild birds. Several measures of reproductive success in mourning doves, mockingbirds, cardinals, and, lark sparrows were compared between a test area and a control area. The test area was subject to sonic booms occurring 2 or 3 times a week; the control area was essentially free from sonic boom disturbance. Some differences in various phases of reproductive success were found between the 2 areas. However, none of the comparisons indicated that the differences were caused by other than natural environmental factors. In the final analysis, the authors could find no evidence that sonic boom disturbance affected phases of bird reproduction studied in the program. Author

N74-10040# National Aviation Facilities Experimental Center, Atlantic City, N.J.

LIGHTNING EFFECTS ON GENERAL AVIATION AIRCRAFT Final Report, Jan. - Sep. 1972

J. A. Plumer Oct. 1973 57 p refs (Contract DOT-FA72NA-656) (FAA-NA-73-32(2); FAA-RD-73-99) Avail: NTIS HC $5.00

To determine the actual lightning vulnerability of typical light aircraft systems and components, and demonstrate the required vulnerability assessment techniques, analyses and laboratory tests were performed on several typical light aircraft and some of their systems and components. The engineering and laboratory evaluation of component or system vulnerability are described. Author

N74-10041# National Transportation Safety Board, Washington, D.C.

AIRCRAFT ACCIDENT REPORT: AIR IOWA, INCORPORATED, BEECH E18S, N310WA, DAVENPORT IOWA, 19 APR. 1973

3 Oct. 1973 23 p (NTSB-AAR-73-18) Avail: NTIS HC $3.25

An aircraft accident involving the crash of a Beechcraft E18S aircraft during approach to the municipal airport at Davenport, Iowa on 19 April, 1973 is reported. The suspected cause of the accident was in-flight failure of the right wing from a preexisting fatigue crack in the lower spar cap of the wing. Author

N74-10042*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

EFFECT OF EXHAUST NOZZLE CONFIGURATION ON AERODYNAMIC AND ACOUSTIC PERFORMANCE OF AN EXTERNALLY BLOWN FLAP SYSTEM WITH A QUIET 5:1 BYPASS RATIO ENGINE

N. E. Samanich, L. J. Heidelberg, and W. L. Jones 1973 32 p refs Presented at the Propulsion Joint Specialist Conf., Las Vegas, Nev., 5-7 Nov. 1973; sponsored by AIAA and SAE (NASA-TM-X-71466; E-7765) Avail: NTIS HC $3.75 CSCL 01C

A highly suppressed TF-34 engine was used to investigate engine and flap interaction noise associated with an externally

blown flap STOL powered lift system. Noise, efficiency, and velocity decay characteristics of mixed and separate flow exhaust systems including convergent, co-annular, and lobed designs were determined with the engine operating alone. Noise data were then obtained for several of the exhaust configurations with the engine blowing a wing-flap segment. Noise for both the engine alone and the engine with blown flaps showed substantial differences for the various exhaust configurations tested. The differences in observed noise are related primarily to nozzle effective exhaust velocity, flap impingement velocity, and noise spectral shape. Author

N74-10043*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
REFAN PROGRAM. PHASE 1: SUMMARY REPORT
Eldon W. Sams and Donald L. Bresnahan Oct. 1973 70 p refs
(NASA-TM-X-71456; E-7749) Avail: NTIS HC $5.50 CSCL 20A

The Refan Program is aimed at a large reduction in aircraft approach and takeoff noise in the vicinity of airports caused by the JT3D-powered 707's and DC-8's and the JT8D-powered 727's, 737's and DC-9's. These aircraft represent a major part of the existing commercial fleet. The noise reductions can be achieved by engine and nacelle modifications in the form of aircraft retrofit kits. Engine turbomachinery noise is reduced by replacing the current two-stage fan with a larger single-stage fan and by nacelle acoustic treatment. Jet noise is reduced by the reduction on jet velocity caused by additional turbine work extraction to drive the larger bypass fan. The predicted net effect of these modifications on installed performance is large noise reductions on both approach and takeoff, increased takeoff thrust, decreased takeoff field length, and maintained or improved aircraft range depending on the amount of acoustic treatment included. The Refan Program is being conducted in two phases under contracts with one engine and two airframe companies. Results of the Phase I work are summarized in this report which describes the refan nacelle configurations studied, the airplane modifications required to install the nacelles, and the resulting airplane performance and noise reductions predicted for all five aircraft. Author

N74-10044*# Aerospace Corp., El Segundo, Calif. Civil Programs Div.
AN ECONOMIC ASSESSMENT OF STOL AIRCRAFT POTENTIAL INCLUDING TERMINAL AREA ENVIRONMENTAL CONSIDERATIONS. VOLUME 2: APPENDICES
H. L. Solomon and S. Sokolsky Jul. 1973 233 p refs
(Contract NAS2-6473)
(NASA-CR-114605; ATR-73(7305)-1-Vol-2) Avail: NTIS HC $13.75 CSCL 01C

An economic assessment of short takeoff aircraft for short haul air transportation applications is presented. The economic viability and environmental compatibility of short takeoff aircraft service in high density areas were evaluated. The subjects discussed are: (1) aircraft configurations and performance, (2) airfield and terminal requirements, and (3) direct and indirect operating costs. Author

N74-10045*# Aerospace Corp., El Segundo, Calif. Civil Programs Div.
SMALL V/STOL AIRCRAFT ANALYSIS. VOLUME 2: APPENDICES
K. R. Smith, Jr. and F. W. Belina Jun. 1973 80 p refs
(Contract NAS2-6473)
(NASA-CR-114629; ATR-73(7302)-1-Vol-2) Avail: NTIS HC $6.00 CSCL 01C

A survey of general aviation activities in the United States was principally conducted through interviews with users, manufacturers, trade associations, and government organizations. A list of the organizations interviews is presented. The data became the basis for defining the current and future general aviation missions and performance. The economic characteristics of general aviation are examined. The desires of each organization regarding future aircraft characteristics are summarized. Author

N74-10046# National Aerospace Lab., Tokyo (Japan).
SIMULATION STUDY ON FLARE CONTROL SYSTEM BY OPTIMIZATION THEORY
Akira Watanabe and Yuso Horikawa Mar. 1973 27 p refs In JAPANESE; ENGLISH summary
(NAL-TR-312) Avail: NTIS HC $3.50

The simulation of a flare control system for an automatic aircraft landing system was conducted. Digital simulation analyses were conducted for three systems. The simulation showed that an exponential flight path was applicable to the flare control system. The characteristics of the flight paths and the performance of the systems are discussed. Author

N74-10047# National Aerospace Lab., Tokyo (Japan).
SOME EFFECTS OF CENTER OF GRAVITY LOCATIONS OF ADDED MASS ON TRANSONIC FLUTTER CHARACTERISTICS OF LOW ASPECT RATIO AND SWEPTBACK THIN CANTILEVER WING
Eiichi Nakai, Toshiyuki Morita, Takao Kikuchi, Masatoshi Tokubo, and Minoru Takahashi Mar. 1973 15 p refs In JAPANESE; ENGLISH summary
(NAL-TR-314) Avail: NTIS HC $3.00

An experimental investigation of some effects of varied location of added mass at wing tip on transonic flutter characteristics of thin cantilever wings has been conducted in a transonic blowdown wind tunnel for flutter testing at Mach number between 0.819 and 1.192. The wings have sweptback angle of 42.5 at leading edge and of 10 at trailing edge, panel aspect ratio of 1.344 and taper ratio of 0.336. The flutter boundary expressed by the experimental flutter-velocity coefficient is characterized by having maximum values at around Mach number 1.03. The stable region expands by moving the C.G. location forward of the added mass. Author

N74-10048*# General Electric Co., Schenectady, N.Y. Specialty Fluidics Operation.
FLUIDIC EMERGENCY ROLL CONTROL SYSTEM Final Report
K. B. Haefner and T. S. Honda Mar. 1973 98 p
(Contract NAS2-5467)
(NASA-CR-114588) Avail: NTIS HC $7.00 CSCL 01C

A fluidic emergency roll control system for aircraft stabilization in the event of primary flight control failure was evaluated. The fluidic roll control units were designed to provide roll torque proportional to an electrical command as operated by two diametrically opposed thrust nozzles located in the wing tips. The control package consists of a solid propellant gas generator, two diametrically opposed vortex valve modulated thrust nozzles, and an electromagnetic torque motor. The procedures for the design, development, and performance testing of the system are described. Author

N74-10049*# General Electric Co., Cincinnati, Ohio. Advanced Engineering and Technology Programs Dept.
REMOTE LIFT FAN STUDY PROGRAM, VOLUME 4
May 1973 208 p refs
(Contract NAS3-14406)
(NASA-CR-121277; GE-AEG120-Vol-4) Avail: NTIS HC $12.50 CSCL 01C

A study program to select and conduct preliminary design of advanced technology lift fan systems to meet low noise goals of future V/STOL transport aircraft is discussed. This volume contains results of additional studies conducted to support the main preliminary design effort done under the Remote Lift Fan Study Program (Contract NAS3-14406) and a companion effort, the Integral Lift Fan Study (NAS3-14404). These results cover engine emission study, a review of existing engines for research aircraft application and support data for aircraft studies. Author

N74-10050# National Transportation Safety Board, Washington, D.C.
AIRCRAFT INCIDENT REPORT: EASTERN AIR LINES, INCORPORATED, BOEING 727-225, N8843E, TOLEDO, OHIO, 10 APRIL 1973

27 Sep. 1973 12 p
(NTSB-AAR-73-17) Avail: NTIS HC $3.00

An aircraft accident involving a Boeing 727 aircraft which struck some trees during an instrument approach to the Toledo Express Airport, Toledo, Ohio on 10 April, 1973 is reported. The aircraft successfully completed the landing after the tree strike. It was decided that the accident was caused by failure of the flight crew to adhere to established instrument approach procedures. Author

N74-10051*# Massachusetts Inst. of Tech., Cambridge.
MOTORLESS FLIGHT RESEARCH, 1972 Final Report
James L. Nash-Webber, ed. Washington NASA Nov. 1973 639 p refs
(Grant NGR-22-009-731)
(NASA-CR-2315) Avail: NTIS HC $12.75 CSCL 01C

The proceedings of a symposium on motorless flight research are presented. The subjects discussed are: (1) glider aerodynamic and design, (2) instrumentation, (3) structural concepts and materials, (4) soaring meteorology, (5) self-launching and ultralight sailplanes, and (6) performance testing. Author

N74-10052*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ACOUSTIC CHARACTERISTICS OF A LARGE-SCALE AUGMENTOR WING MODEL AT FORWARD SPEED
Michael D. Falarski and David G. Koenig Washington Nov. 1973 42 p refs Prepared in cooperation with Army Air Mobility R and D Lab., Moffett Field, Calif.
(NASA-TM-X-2940; A-4964) Avail: NTIS HC $3.00 CSCL 01A

The augmentor wing concept is being studied as one means of attaining short takeoff and landing (STOL) performance in turbofan powered aircraft. Because of the stringent noise requirements for STOL operation, the acoustics of the augmentor wing are undergoing extensive research. The results of a wind tunnel investigation of a large-scale swept augmentor model at forward speed are presented. The augmentor was not acoustically treated, although the compressor supplying the high pressure primary air was treated to allow the measurement of only the augmentor noise. Installing the augmentor flap and shroud on the slot primary nozzle caused the acoustic dependence on jet velocity to change from eighth power to sixth power. Deflecting the augmentor at constant power increased the perceived noise level in the forward quadrant. The effect of airspeed was small. A small aft shift in perceived noise directivity was experienced with no significant change in sound power. Sealing the lower augmentor slot at a flap deflection of 70 deg reduced the perceived noise level in the aft quadrant. The seal prevented noise from propagating through the slot. Author

N74-10053# European Space Research Organization, Paris (France).
INVESTIGATION AND APPLICATION OF TWO METHODS OF DETERMINING CO-EFFICIENTS OF TRANSFER FUNCTIONS OF LONGITUDINAL MOTION OF AIRCRAFT FROM MEASURED INPUT AND OUTPUT DATA
W. Boegel Sep. 1973 81 p refs Transl. into ENGLISH of Untersuch. und Anwend. zweier Verfahren zur Ermittlung der Flugzeug-Laengsbewegung aus gemessenen Verlaeufen von Ein- und Ausgaengen, DLR-FB-73-39, DFVLR, 31 Jan. 1973
(ESRO-TT-2; DLR-FB-73-39) Avail: NTIS HC $6.25

The basic principles and applications of the two methods to be investigated are briefly described. The first may be classified as an equation of motion method and the second as a response curve fitting method. Several variations of the first method are also given for special applications. This is followed by a description of the digital computer programs which were used to test the methods with digitally simulated input and output data. In addition to information on the propagation of random and systematic errors, the results provide guidelines for the design of the input function and the choice of parameters or methods in carrying out and evaluating tests. The application of the methods to flight measurements is illustrated with an example of measurements of the oscillation in the angle of incidence in the Piaggio P 149 D aircraft. Author

N74-10054# Naval Postgraduate School, Monterey, Calif.
A HELICOPTER FLIGHT PERFORMANCE SYSTEM USING AN LSI MICROPROCESSOR M.S. Thesis
Edwin Eugene Eloe and Richard Tazewell Scott, Jr. Jun. 1973 60 p refs
(AD-765680) Avail: NTIS CSCL 01/2

The report presents the development of a helicopter gross weight calculator. Required qualities for aircraft system components such as durability, reliability, and low weight are met using an LSI micro-processor. The prototype system which was developed weighs approximately four pounds and has approximate dimensions of 7 inches x 5 inches x 1/2 inches. The cost estimate for the system is less than $350. The calculator solution is based on the solution technique currently being used by Naval aviators which is obtained from nomographs in the aircraft NATOPS manual. Minor modifications are required to make this system applicable to different helicopter types. A listing of the calculator program and a discussion of the prototype's operation are included. Author (GRA)

N74-10055# Naval Postgraduate School, Monterey, Calif.
LSO/PILOT INTERACTION SIMULATOR M.S. Thesis
Phillip Gary Stueck Jun. 1973 87 p refs
(AD-765686) Avail: NTIS CSCL 01/2

The thesis investigates the feasibility of simulating the Landing Signal Officer (LSO)/pilot interaction during the approach to a landing on an aircraft carrier. A simulator was created which duplicated the LSO's operational environment through the use of computer-generated visual displays. The LSO and the pilot were placed in this simulated carrier approach environment by (1) displaying a representation of the landing area plus a meatball and angle of attack information to the pilot while (2) simultaneously displaying the aircraft's approach to the LSO. Test results demonstrated the basic feasibility of simulating the LSO/pilot interaction and its application as a research tool in studying LSO models, wave-off techniques and landing techniques. Author (GRA)

N74-10056# Army Aviation Systems Command, St. Louis, Mo.
MAJOR ITEM SPECIAL STUDY (MISS). CH-54A T/R BLADE Interim Report, Jan. 1964 - Dec. 1972
Aug. 1973 27 p
(AD-766227; USAAVSCOM-TR-73-17) Avail: NTIS CSCL 01/3

The report describes a value engineering analysis of a helicopter rotor blade. Major Item Special Study (MISS) reports are performed on DA Form 2410 reportable components. These are time change items and certain condition change items selected because of high cost or need for intensive management. Basically, the MISS reports are concerned with analyzing reported removal data presented in the Major Item Removal Frequency (MIRF) report. The failure modes reported for each removal are examined and grouped into categories which are intended to clarify the intent of the data reporting. From this data, removal distributions can be plotted and an MTR (mean time to removal) can be calculated. The MISS reports then investigate possible cost savings based on total elimination of selected failure modes. These modes are chosen because of the percentage of failures they represent and/or because they appear to be feasible Product Improvement Program (PIP) areas. Author (GRA)

N74-10057# Army Aviation Systems Command, St. Louis, Mo. Systems Performance Assessment Div.
MAJOR ITEM SPECIAL STUDY (MISS). CH-54A CLUTCH ASSEMBLY (APP) Interim Report, Jan. 1964 - Dec. 1972
Aug. 1973 24 p
(AD-766226; USAAVSCOM-TR-73-16) Avail: NTIS CSCL 01/3

The report describes a value engineering evaluation of helicopter rotor clutches. GRA

N74-10058# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SIMULATING THE SYSTEM OF AUTOMATIC CORRECTION OF AIRCRAFT COORDINATES ON AN ANALOG COMPUTER
G. M. Burakov 16 Aug. 1973 11 p refs Transl. into ENGLISH from Vopr. Eksplutatsii i Primeneniya Vychislitelnoi Tekhn. v Grazhdanskoi Aviatsii (USSR), no. 207, 1971 p 110-117
(AD-765991; FTD-HT-23-731-73) Avail: NTIS CSCL 01/4

One of the ways of solving the problem of improving the accuracy in the realization of extreme motion of the aircraft's center of mass is the construction of a system of discrete automatic correction, which represents a closed system of the highest order with respect to the aircraft-autopilot circuit. In the terms of pulsed control of functionals this system is described by the equations of the generalized objects and laws governing the control. The selection of these laws establishes the control algorithm which is reduced to the shaping of the correcting pulse and realization of the effect. GRA

N74-10059# Naval Air Development Center, Warminster, Pa. Air Vehicle Technology Dept.
TEST PLAN REPORT FOR CATAPULT FATIGUE. TEST OF THE MODEL E-2 A/B AIRPLANE
Edward F. Kantz 25 Jun. 1973 20 p refs
(AD-765708; NADC-73139-30) Avail: NTIS CSCL 01/3

A laboratory fatigue test will be performed on an E-2 airframe to determine whether the airframe will sustain the effects of 3000 catapult launches without structural failure. Author (GRA)

N74-10060# Beta Industries, Inc., Dayton, Ohio.
CRASHWORTHY LANDING GEAR STUDY Final Report
Norman S. Phillips, Richard W. Carr, and Richard S. Scranton Apr. 1973 210 p refs
(Contract DAAJ02-70-C-0055; DA Proj. 1F1-62203-A-529)
(AD-765489; BII-214-6) Avail: NTIS CSCL 01/3

The purpose of the reported effort was twofold: to develop rotary-wing landing gear concepts and criteria which, when applied, would lessen the magnitude of crash forces transferred to occupiable areas of helicopters involved in severe yet survivable accidents; to use the concepts and criteria to design, fabricate, and test an experimental prototype skid landing gear system. Landing gear design criteria, crash criteria, energy-absorbing design criteria, and applicable specifications were collected and analyzed to establish the state of the art in the landing gear design and energy absorber design. Once this was accomplished, the data were used to develop preliminary design criteria and concepts for three classes of rotary-wing aircraft. The concepts were selected to be compatible with combined loads and various attitudes. (Modified author abstract) GRA

N74-10061# Texas A&M Univ., College Station. Dept. of Aerospace Engineering.
RESEARCH ON AIRCRAFT DYNAMICS FOR SUBSONIC FLIGHT Final Report, 1 Sep. 1968 - 31 May 1973
William P. Jones Jul. 1973 13 p refs
(Contract DAHC04-69-C-0015)
(AD-765657; AROD-T-5-8-E) Avail: NTIS CSCL 01/3

The report is submitted as a collection of abstracts of papers published by the scientific personnel of the aircraft dynamics group of Texas A and M University. A list of invited presentations is also included. GRA

N74-10062# Naval Postgraduate School, Monterey, Calif.
SOME PERFORMANCE CHARACTERISTICS OF THE BELL 100 TON SURFACE EFFECT SHIP M.S. Thesis
Lonnie Francis Cagle Jun. 1973 151 p refs
(AD-765689) Avail: NTIS CSCL 13/10

A computer program for simulating the performance of the 100-B surface effect ship is used to study the longitudinal motions of the ship under various wave conditions. An investigation into the effect that waves have on bow seal, stern seal, and plenum pressures is conducted. The relationship between the different pressures and their associated requirements of input air from the fans is studied. It is concluded that the computer program is limited to a certain range of speeds. The concept of the ship capturing air to reduce drag and increase its speed is questionable due to the rapid replenishment of air required to keep the ship riding on its bubble of air. (Modified author abstract) GRA

N74-10063# Mississippi State Univ., State College. Dept. of Aerophysics and Aerospace Engineering.
INVESTIGATION OF THE SUCTION SYSTEM AND BOUNDARY-LAYER CHARACTERISTICS ON A HIGH-LIFT, BLC L-19 TEST AIRCRAFT Final Report
L. J. Mertaugh and S. Burt May 1973 58 p refs
(Contract DAAJ02-67-C-0016; DA Proj. 1F1-62204-A-142)
(AD-766305; AASE-72-70; USAAMRDL-TR-73-2) Avail: NTIS CSCL 01/3

The report presents the results of a test program which was intended to document the boundary-layer control system characteristics of the high-lift L-19 aircraft. This aircraft incorporates a distributed-suction, turbulent-boundary-layer control system which allows trimmed lift coefficients of 4.8 to be developed. In addition to presenting the description of the suction hole distribution and computed values of the suction velocity distribution, comparisons are made between the measured boundary-layer characteristics and one empirical, turbulent-boundary-layer profile description. The large influence of suction velocity on the wall shear stress is shown through the use of the momentum integral equation. Author (GRA)

N74-10064# United Aircraft Corp., Stratford, Conn. Sikorsky Aircraft Div.
VIBRATION EFFECTS ON HELICOPTER RELIABILITY AND MAINTAINABILITY Final Report
Angelo C. Veca Apr. 1973 123 p refs
(Contract DAAJ02-71-C-0037; DA Proj. 1F1-63204-D-38B)
(AD-766307; SER-611567USAAMRDL-TR-73-11) Avail: NTIS CSCL 01/3

Differences in reliability and maintainability data were examined on two groups of USAF H-3 helicopters with distinctly different vibration characteristics. One H-3 helicopter group was equipped with the rotor-mounted vibration adsorber, a device which reduces helicopter vibration induced by the rotor, and a second aircraft group did not have the absorber. The aircraft were alike in all other respects. The analyses performed on these data show a significant reduction in the failure rate and direct maintenance for the H-3 helicopters with absorbers and with reduced vibration levels. Correspondingly, life-cycle costs show a significant reduction of approximately 10% for the overall aircraft. At the subsystem and component levels, the same reductions are shown in almost every case with the exception of certain navigation and avionics components. (Modified author abstract) GRA

N74-10065# Air Force Weapons Lab., Kirtland AFB, N.Mex.
COCKPIT AIR FILTRATION REQUIREMENTS OF THE B-1 IN A NUCLEAR DUST ENVIRONMENT Technical Report, Jul. 1972 - Apr. 1973
Rayford P. Patrick, William A. Yingling, and George D. Arnett Jul. 1973 134 p refs
(AF Proj. 8809)
(AD-766711; AFWL-TR-73-83) Avail: NTIS CSCL 01/3

Results are presented which will aid in determining cockpit filtration requirements for the B-1 environmental control system when the B-1 penetrates radioactive dust clouds generated by surface detonations of nuclear weapons. The ionizing doses accumulated from being surrounded by the radiating cloud and the dust mass and associated ionizing doses from dust trapped in the filter and in the cockpit are presented. A technique for determining the filter point design conditions is discussed. Representative candidate filters are investigated, and an optimum filter is selected from the candidates. The evaluation techniques presented here may be used to investigate the adequacy of any proposed filter. Author (GRA)

N74-10066# Naval Postgraduate School, Monterey, Calif.
AIRCRAFT FUEL TANK ENTRY WALL-PROJECTILE INTERACTION STUDIES M.S. Thesis
Kenneth Scott Bates, Jr. Jun. 1973 55 p refs
(AD-765667) Avail: NTIS CSCL 01/3

Hydraulic ram is the physical production of pressure wave wall loadings due to projectile penetration and their effect on a fuel cell. Facilities were designed and testing conducted in preparation for investigation of the hydraulic ram phenomenon. A ballistic range was designed that yielded projectile velocity and flight attitude information before and after wall penetration. Wall specimens of a single thickness were impacted by a range of projectile sizes, weights, shapes, and velocities. This yielded the energy absorbed by the wall without fluid damping.
Author (GRA)

N74-10067# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SYMMETRICAL EIGEN FORMS OF THE VIBRATIONS OF A SUPPORTING SURFACE AND OF AN ELASTIC FUSELAGE
Z. I. Burman and K. M. Shaidukov 29 Jan. 1973 19 p refs Transl. into ENGLISH from Issled. po Plastin i Obolochek (Kazan), no. 6, 1970 p 656-665
(AF Proj. 1369)
(AD-756285; FTD-HT-23-1815-72) Avail: NTIS CSCL 01/3

The report discusses a scheme for calculating the frequencies and forms of symmetrical vibrations of two crossed beams, one of which is exposed to bending torsional vibrations (a wing) while the second, only bending ones (a fuselage). The method of collocations is applied by using integral matrixes.
Author (GRA)

N74-10068# Clemson Univ., S.C. Dept. of Zoology.
RADAR TECHNIQUES FOR AIR FORCE APPLICATIONS IN AVOIDANCE OF BIRD-AIRCRAFT COLLISIONS AND IMPROVEMENT OF FLIGHT SAFETY Interim Technical Report
Sidney A. Gauthreaux, Jr. Dec. 1972 7 p refs
(Grant AF-AFOSR-1974-71; AF Proj. 9777)
(AD-754981; AFOSR-73-0030TR) Avail: NTIS CSCL 01/2

During the year three major objectives were accomplished: an evaluation of airborne radar systems for possible detection of birds aloft, an evaluation of the FAA airport surveillance radar (ASR-4) for monitoring bird movements in the vicinity of airports, and an evaluation of the precision approach radar (PAR) or ground control approach (GCA) radars for monitoring bird movements through airport landing corridors. The precision approach radar or ground control approach radar along with the airport surveillance radar were found to provide all the necessary data to avoid bird/aircrarft collisions. Furthermore, the flight controllers are in contact with the pilots and can warn them of dangerous concentrations of birds in their flight paths.
Author (GRA)

N74-10069# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass. Instrumentation Papers.
LAUNCHING OF SMALL INFLATED BALLOONS FROM CARGO AIRCRAFT
James C. Payne, Edward Young, and Catherine Rice 20 Apr. 1973 23 p refs
(AF Proj. 6665)
(AD-766428; AFCRL-TR-73-0276; AFCRL-IP-187) Avail: NTIS CSCL 01/3

A simple, inexpensive method has been developed for air-launching constant-level plastic balloons in rapid succession from a transport-type aircraft. The entire launch system is palletized upon one 24 ft-modular airdrop platform; no alterations to the aircraft are needed. The balloon, encased in a nylon bag, is inflated inside the aircraft, and extracted by parachute. The bag then falls away, releasing the balloon and payload. Four regular crew members can inflate and launch several 8-ft diam, polyethylene balloons at 10-min intervals from a C-130 aircraft flying at speeds up to 130 knots and at altitudes up to 10,000 feet.
Author (GRA)

N74-10070# Goodyear Aerospace Corp., Akron, Ohio.
STABILITY AND DYNAMIC BEHAVIOR OF TWO TETHERED BALLOON SYSTEMS Final Report, 1 Mar. 1972 - 30 May 1973
George R. Doyle, Jr., Jerome J. Vorachek, and Donald B. Block 30 Jun. 1973 99 p refs
(Contract F19628-72-C-0219; AF Proj. 6665)
(AD-766439; GER-15960; AFCRL-TR-73-0396) Avail: NTIS CSCL 01/3

The stability characteristics and dynamic motions of a tethered balloon are of interest in determining design criteria under which safe operating conditions are achievable. An analytical investigation was conducted for two tethered barrage balloons using two separate mathematical tools. The balloon motion is assumed to be uncoupled into longitudinal and lateral modes of motion. The equilibrium stability characteristics of both modes of motion are determined by solving for the complex roots of the characteristic equations. The dynamics of the motion, under the influences of wind gust or initial displacements, are found by numerically integrating the equations of motion on a digital computer. The effects of different tether lengths, payload weights and wind conditions are considered. It was found that the stability analysis was able to accurately determine the frequencies of oscillation and the mode shapes as displayed in the dynamic results. In general, the most significant result is the reduction of stability in both the longitudinal and lateral degrees of freedom as the tether length is shortened.
Author (GRA)

N74-10071# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
OPTIMAL INCOMPLETE FEEDBACK CONTROL OF LINEAR STOCHASTIC SYSTEMS Final Report, Jul. 1971 - Feb. 1973
Robert E. Heath, II Jun. 1973 226 p refs
(AF Proj. 8219)
(AD-766440; AFFDL-TR-73-36) Avail: NTIS CSCL 01/3

The problem of incomplete feedback control of stochastic linear systems is considered. The system is modeled by an uncertain parameter linear differential equation driven by Gaussian white noise and an incomplete observation which is a linear transformation of the states. The optimal control is the linear transformation of the observation which minimizes the expected value of a quadratic performance index. For both finite and infinite time problems, necessary conditions that the optimal control law must satisfy are derived. Time-varying and constant gains are considered for the finite-time problem. For the infinite-time problem only time-invariant gains are considered. The gradient derived for the infinite-time problem is applied to a flight control design problem. This problem concerns finding feedback gains to improve the lateral handling qualities of an F4 aircraft at two different flight conditions. The resulting control laws give quite adequate aircraft handling qualities for the aircraft at both flight conditions.
Author (GRA)

N74-10072# Naval Ship Research and Development Center, Bethesda, Md.
RESPONSE PREDICTIONS OF HELICOPTER LANDING PLATFORM FOR THE USS BELKNAP (DLG-26) AND USS GARCIA (DE-1040)-CLASS DESTROYERS
Susan Lee Bales, William G. Meyers, and Grant A. Rossignol Jul. 1973 102 p refs
(AD-766450; NSRDC-3868) Avail: NTIS CSCL 01/2

Motion-response predictions of the helicopter landing platform for the USS BELKNAP (DLG-26) and USS GARCIA (DE-1040)-Class destroyers are presented. Predictions have been obtained by a computer-implemented procedure, which calculates response statistics at an arbitrary point on a ship in long-crested, irregular seas. The procedure is based on ship-motion theories in the state of the art. Results are presented for several ship speeds, states of sea, and ship headings--ranging from head to following waves. Existing envelopes of helicopter operations are discussed.

and suggestions have been made, based upon the results of this study, for the listed new operational envelopes in higher states of seas: responses other than roll, e.g., vertical response at the landing platform, must be considered; quartering sea landings may be safer than bow sea landings; and to increase safety of operations, BELKNAP should be stabilized in roll.
Author (GRA)

N74-10073# Avco Lycoming Div., Stratford, Conn.
SPRING OVERRIDING AIRCRAFT CLUTCH Final Report
P. Lynwander, A. G. Meyer, and S. Chachakis May 1973 151 p refs
(Contract DAAJ02-71-C-0035)
(AD-766309; TR-105-7-12; USAAMRDL-TR-73-17) Avail: NTIS CSCL 21/5

The purpose of this program was to investigate the performance of high-speed overriding spring clutch assemblies for use in a multiengine helicopter application. The design operating conditions were 3,570 inch-pounds torque transmitted at 26,500 rpm. Two clutch configurations were evaluated. An extensive test program was conducted as follows: Full-speed dynamic clutch override test; differential speed dynamic clutch override test; dynamic engagement test; static cyclic torque fatigue test; and static overload test. GRA

N74-10153# Joint Publications Research Service, Arlington, Va.
SATELLITE COMMUNICATIONS SYSTEMS
Nikolay Ivanovich Kalashnikov 17 Nov. 1971 68 p refs Transl. into ENGLISH of the book "Sistemy Svyazi Cherez Iskusstvennyye Sputniki Zemli " Moscow, Communications Publishing House, 1969
(JPRS-54505) Avail: NTIS HC $5.50

Multiplexing principles for communications lines are discussed in terms of a channeling device for transmitting a television signal and a sound signal. The transmitting and receiving devices used in ground stations are described, and the required secondary equipment systems are listed. Particular reference is made to the ground stations of the Molniya I and Orbita satellites. The design principles of onboard receiving and transmitting equipment and antennas are also examined. T.M.R.

N74-10155# Chicago Univ., Ill. Dept. of Geophysical Sciences.
OBJECTIVE DETERMINATION OF THE NOISE LEVEL IN DOPPLER SPECTRA
P. H. Hildebrand and Sekhon 11 Sep. 1973 20 p refs Sponsored in part by United Airlines Foundation Prepared in cooperation with Illinois Inst. of Technol.
(Grant NSF GA-38109)
(TR-32) Avail: NTIS HC $3.00

A method is described for the objective determination of the noise level in Doppler spectra. The method makes use of physical properties of white noise and is suitable for automatic computation. Author

N74-10159# Army Medical Research Lab., Fort Knox, Ky.
SPEECH INTELLIGIBILITY TESTING WITH THE MODIFIED RHYME TEST IN AVIATION TYPE NOISE Interim Report
James D. Mosko 30 Mar. 1973 13 p ref
(DA Proj. 3A0-61102-B-71P)
(AD-765470; USAMRL-1027) Avail: NTIS CSCL 17/2

Twenty-eight young adult male subjects listened to several versions of a Modified Rhyme Test (MRT) at three different S/N ratios and three levels of background noise. The average percent correct data were evaluated in terms of ear receiving signals, noise level, and S/N ratio. The data indicate an appropriateness of the MRT paradigm for evaluating the auditory capabilities of military personnel. (Modified author abstract)
GRA

N74-10165# Applied Physics Lab., Johns Hopkins Univ., Silver Spring, Md.
A LOW COST TELEMETRY SYSTEM Final Invention Report
Robert B. Givens and Richard L. Hudson 7 Aug. 1973 5 p Sponsored by NSF
(PB-222403/8; NSF-73-57-GI-12) Avail: NTIS HC $3.00 CSCL 09F

The subject invention relates to a portable, lightweight, low power, telemetry system for use in small drone aircraft of the type used by hobbyists. Such a system greatly expands the capabilities of conventional radiosonde equipment by allowing more data channels to be included with minimal increase in weight and complexity. The instant system uses PPM-FM telemetry (pulse position modulation + or - frequency modulation) with the desired information being encoded, modulated, then transmitted by use of a standard of FM transmitter. GRA

N74-10169# Ohio State Univ., Columbus. ElectroScience Lab.
BILINEAR SURFACE REPRESENTATION OF RADAR SCATTERING FOR AIRCRAFT
J. S. Chahal and L. J. White Jul. 1973 82 p refs
(Grant AF-AFOSR-1710-69; AF Proj. 9769)
(AD-766320; ESL-2768-10; AFOSR-73-1528TR) Avail: NTIS CSCL 17/9

Previous research has demonstrated the feasibility of using multiple low frequency radar returns for aircraft target classification. The surfaces corresponding to this aircraft data in frequency space have been represented by a bilinear approximation. This surface representation has allowed the identification of the regions where two surfaces might intersect, and other regions where classification becomes difficult. Several classification methods are investigated using the bilinear surface approximation, and the results of a simulation study are reported. Author (GRA)

N74-10202*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LOW SPEED PHASELOCK SPEED CONTROL SYSTEM Patent Application
Robert W. Fulcher and John Sudex, inventors (to NASA) Filed 27 Sep. 1973 29 p
(NASA-Case-GSC-11127-1; US-Patent-Appl-SN-401466) Avail: NTIS HC $3.50 CSCL 09A

A phaselock speed control system is reported that provides extremely accurate speed control, particularly at low speeds, of a brushless dc motor. The overall speed control system includes a phase comparator which compares a reference frequency signal with an encoder frequency signal. An integrator/converter unit converts the output of the phase comparator into an analog error voltage which is compensated and biased to derive a bi-directional error signal for further combination with the output from an overspeed control circuit in an operational amplifier to develop the torque polarity and control signal. NASA

N74-10229# Army Test and Evaluation Command, Aberdeen Proving Ground, Md.
TRANSPORTABILITY
7 Feb. 1973 74 p
(AD-765456; TOP-1-2-500) Avail: NTIS CSCL 09/3

The report describes a method for evaluation of military equipment transportability characteristics; discusses preliminary activities, facilities, and equipment required; and provides procedures for lifting and tiedown attachments; rail, highway, and marine transportability; terminals handling and movement; air portability, fixed and rotary wing, internal and external carried, to include airdropped materiel, shock, vibration, safety, human factors, and maintenance evaluation. Appendixes provide railway landing procedures, highway vehicle and load limits, marine transport environmental factors and characteristics, aircraft capacities, shock and vibration environments during transport by rail, sea, and air. The method is applicable to equipment whether towed, self-propelled, or moved by carrier over highway, cross-country, railway, waterway, or air. Author (GRA)

N74-10263* McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
THE ABLATION PERFORMANCE OF FOAMS IN A LOW HEAT FLUX
D. H. Smith and D. R. Hender *In* NASA. Goddard Space Flight Center Space Simulation, 7th 1973 p 465-476 refs

CSCL 11G

Tests of ablation performance of low-density, polyurethane-based foams have been conducted in a low heat flux plasma arc environment. It is shown that fire retardant chemicals included in the foam have a significant effect in reducing surface recession, and that these materials are attractive candidates for ablative cryogenic insulation systems. Author

N74-10297*# Grumman Aerospace Corp., Bethpage, N.Y.
USER'S GUIDE FOR A COMPUTER PROGRAM TO ANALYZE THE LRC 16 FT TRANSONIC DYNAMICS TUNNEL CABLE MOUNT SYSTEM
P. Barbero and J. Chin [1973] 205 p refs
(Contract NAS1-10635)
(NASA-CR-132313) Avail: NTIS HC $12.25 CSCL 14B

The theoretical derivation of the set of equations is discussed which is applicable to modeling the dynamic characteristics of aeroelastically-scaled models flown on the two-cable mount system in a 16 ft transonic dynamics tunnel. The computer program provided for the analysis is also described. The program calculates model trim conditions as well as 3 DOF longitudinal and lateral/directional dynamic conditions for various flying cable and snubber cable configurations. Sample input and output are included. Author

N74-10303# Weapons Research Establishment, Salisbury (Australia).
THE IMPROVEMENT IN MACH NUMBER DISTRIBUTION AND REDUCTION OF PRESSURE FLUCTUATIONS IN THE TRANSONIC WORKING SECTION OF WIND TUNNEL S.1
E. R. A. Landers and P. G. Marshallsay Apr. 1973 19 p refs
(WRE-TN-925) Avail: NTIS HC $3.00

A set of slotted top and bottom liners was used to generate transonic speeds in tunnel S.1 at Weapons Research Establishment. Model supports normally used for supersonic speeds were found to have a large influence on the Mach number distribution and were redesigned to minimize interference to the flow in the working section. Excessive pressure fluctuations were traced to unsteady flow in the cavity between the end of the transonic liners and the diffuser entry. Fairings fitted to this section have greatly reduced the magnitude of the pressure fluctuations. Author

N74-10304# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
LATERAL DISTRIBUTION OF AIRCRAFT TRAFFIC Final Report, Jun. 1970 - Jul. 1971
Donald N. Brown and Owen O. Thompson Jul. 1973 64 p refs
(AD-765435; AEWES-Misc-Paper-S-73-56) Avail: NTIS CSCL 01/5

In the development of pavement design and evaluation criteria for aircraft with complex gear configurations (C-5A, B-747, etc.), it has been revealed that current procedures for relating aircraft operations (passes) to pavement coverages (stress and/or deflection repetitions) are cumbersome and inaccurate. The procedure for converting aircraft passes to pavement coverage has been reexamined by developing theoretical normal traffic distribution curves and fitting these curves to the limited number of actual traffic distribution curves available for four aircraft (B-47, B-52, KC-97, and KC-135). In this manner, more realistic pass-to-coverage (p/c) ratios have been developed for most currently used military and civil aircraft. The revised p/c ratios are presented and are recommended for use in pavement design and evaluation criteria. (Modified author abstract) GRA

N74-10311 Engineering Sciences Data Unit, London (England).
DRAG OF STREAMLINE SOLIDS OF REVOLUTION (TRANSITION AT NOSE)
Jul. 1973 3 p ref
(ESDU-Bodies-02.04.01-Amend-A) Copyright. Avail: Issuing Activity

The total drag coefficient for streamline solids of revolution with the transition from laminar to turbulent flow at the nose was determined and graphed against Reynolds number for various diameter/length ratios. The total drag coefficient is based on the surface area (wetted surface) of the body. An aerodynamically smooth surface is assumed. The curves are not applicable if the boundary layer separates from the body appreciably ahead of the tail. This is the case when the diameter/length ratio is more than about 0.3. Author

N74-10318*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
EFFECT OF GEOMETRY VARIATIONS ON LEE-SURFACE VORTEX-INDUCED HEATING FOR FLAT-BOTTOM THREE-DIMENSIONAL BODIES AT MACH 6
Jerry N. Hefner Washington Nov. 1973 30 p refs
(NASA-TN-D-7447; L-9209) Avail: NTIS HC $3.00 CSCL 20D

Studies have shown that vortices can produce relatively severe heating on the leeward surfaces of conceptual hypersonic vehicles and that surface geometry can strongly influence this vortex-induced heating. Results which show the effects of systematic geometry variations on the vortex-induced lee-surface heating on simple flat-bottom three-dimensional bodies at angles of attack of 20 deg and 40 deg are presented. The tests were conducted at a free-stream Mach number of 6 and at a Reynolds number of 1.71 x 10 to the 7th power per meter. Author

N74-10321*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
MINIMIZING BOUNDARY LAYER BLEED FOR A MIXED COMPRESSION INLET
Joseph F. Wasserbauer, Robert J. Shaw, and Harvey E. Neumann 1973 21 p refs Presented at Propulsion Joint Specialist Conf., Las Vegas, Nev., 5-7 Nov. 1973; cosponsored by AIAA and SAE
(NASA-TM-X-71461; E-7757) Avail: NTIS HC $3.25 CSCL 20D

An experimental investigation of a full scale mixed compression inlet sized for the TF30-P-3 turbofan engine was conducted at Mach 2.5 and 2.0 operating conditions. The two cone axisymmetric inlet had minimum internal contraction consistent with high total pressure recovery and low cowl drag. At Mach 2.5, inlet recovery exceeded 0.90 with only 0.02 centerbody bleed mass-flow ratio and zero cowl bleed. A centerbody bleed of approximately 0.05 gave a maximum inlet unstart angle-of-attack of 6.85 deg. Inlet performance and angle-of-attack tolerance is presented for operation at Mach 2.5 and 2.0. Author

N74-10322# National Aerospace Lab., Tokyo (Japan).
EXPERIMENTAL INVESTIGATION OF TWO-DIMENSIONAL CASCADE PERFORMANCE WITH BLUNT TRAILING EDGE BLADE SECTIONS AT TRANSONIC INLET MACH NUMBER RANGE
Hajime Sakaguchi, Hiroshi Kondo, Susumu Takamori, and Keigo Iwashita Mar. 1973 53 p refs In JAPANESE; ENGLISH summary
(NAL-TR-313) Avail: NTIS HC $4.75

The cascade performance of blunt trailing edge blades with camber angles of 12 and 35 degrees were investigated at Mach numbers from 0.6 to 1.4 over the range of incidence angles up to a positive stall in a transonic cascade wind tunnel. The test Reynolds number range was 300,000 to 800,000 based on the blade chord. Experiments were made with the boundary layer suction from porous side walls at the test section to establish two-dimensional flow in the cascade. Total pressure and flow

angle measurements were made by traversing a five hole probe in the outlet flow from the cascade. Author

N74-10326# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ANALYSIS OF THE LONGITUDINAL DISTURBED MOTION OF A SURFACE SKIMMER
E. P. Vachasov and G. F. Kurochka 6 Aug. 1973 15 p refs Transl. into ENGLISH from Samoletostr. Tekh. Vozdush. Flota (USSR), no. 29, 1972 p 7-13
(AF Proj. G101)
(AD-765992; FTD-HT-23-587-73) Avail: NTIS CSCL 20/4

The longitudinal disturbed motion of a surface skimmer, like that of common aircraft, is determined by the following processes: By varying the magnitude of the velocity of the center of gravity; By varying the direction of flight; and by rotating the aircraft relative to the Oz axis which passes through its center of gravity. These processes are interconnected and are examined together. GRA

N74-10328# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INVESTIGATION OF THE EFFECT OF GRIDS ON THE CHARACTERISTICS OF A TURBULENT FLOW
V. A. Lebiga and V. V. Chernykh 6 Aug. 1973 17 p refs Transl. into ENGLISH from Izv. Sibirsk. Otd. akad. Nauk SSSR (Novosibirsk), no. 8, Jun. 1972 p 47-53
(AF Proj. G101)
(AD-765999; FTD-HT-23-585-73) Avail: NTIS CSCL 20/4

Certain structural measures make it possible to obtain a uniform flow in a wind tunnel test section with a low degree of turbulence. One of these measures is grids in the prechamber of the wind tunnel which equalize the fields of average speed and reduce the intensity of turbulent fluctuations. This article gives the results of an investigation on the effect of the specific resistance of a grid and a number of grids in sequence on reduction of the turbulent fluctuations in speed. GRA

N74-10335# Naval Postgraduate School, Monterey, Calif. Dept. of Aeronautics.
A STUDY OF SUPERSONIC FLOW PAST VIBRATING SHELLS AND CASCADES
Christian W. Brix, Jr. Jun. 1973 135 p refs
(AD-765735) Avail: NTIS CSCL 20/4

Supersonic flow past oscillating cylindrical shells and oscillating flat-plate cascades is analyzed using linearized characteristics methods. Pressure distributions and generalized aerodynamic forces are computed for arbitrary radius to length ratios, axial and circumferential wave numbers, Mach numbers, and reduced frequencies. Pressure distributions are computed for flat-plate cascades with supersonic leading edge locus for arbitrary solidity, stagger angle, frequency, and interblade phase angle. For comparison, a two-blade solution is developed using the method of singularities. (Modified author abstract) GRA

N74-10338# Stevens Inst. of Tech., Hoboken, N.J. Davidson Lab.
CONTROL FAILURE SIMULATIONS OF THE PHM HYDROFOIL CRAFT USING A 1/20-SCALE DYNAMIC MODEL WITH AUTOMATIC CONTROL Final Report
Charles J. Henry Apr. 1973 47 p refs
(Contract N00014-67-A-0202-0019)
(AD-766098; SIT-DL-73-1662) Avail: NTIS CSCL 13/10

A 1/20-scale model of the PHM hydrofoil craft was developed with automatic control. Heave, pitch and roll motions were controlled by means of flaps on the forward secondary foil and on the port and starboard aft main foils. Motions lateral to the tank were constrained in this phase of the test program. The control system logic also provided for simulations of control system failure wherein any one flap or any combination of flaps can be thrown hard against mechanical stops. Only one flap was failed in any one run in this study. The trajectories subsequent to simulated control system failure were recorded for this five-degree-of-freedom model. Failures which lead to broaching of the bow foil appear to be serious. Failures which lead to hull impact do not appear dangerous. The results are discussed in more detail in the report. Recommendations for further development and utilization of this automatically-controlled, model, hydrofoil-supported platform are discussed. A second test phase with six-degrees-of-freedom and with steering control has been initiated. Author (GRA)

N74-10340# ARO, Inc., Arnold Air Force Station, Tenn.
AN EXPERIMENTAL INVESTIGATION OF AN ACOUSTIC METHOD FOR MEASURING GAS MASS FLOW Final Report, Jul. 1971 - Jul. 1972
L. J. David and T. L. Giltinan AEDC Sep. 1973 59 p ref. Sponsored by AEDC
(ARO Proj. PW5213)
(AD-766419; ARO-PWT-TR-73-5; AEDC-TR-73-140) Avail: NTIS CSCL 14/2

Airflow through the test section of a 1- by 1-ft transonic wind tunnel under subsonic flow conditions was measured by an acoustic method to evaluate feasibility of the method. The method was based on measuring the time of travel of an acoustic signal between a transmitter and a receiver which were located on opposite walls of the tunnel on a line perpendicular to the direction of airflow. An electrical discharge arc-gap transmitter was developed which emits a signal pressure wave with an output intensity significantly greater than that of the tunnel noise. Calibration of the wave velocity increment under quiescent conditions demonstrated good repeatability. (Modified author abstract) GRA

N74-10404# Kentucky Univ., Lexington. Dept. of Civil Engineering.
EFFECTS OF STRAIN AMPLITUDE ON THE SHEAR MODULUS OF SOILS Technical Report, 1 Oct. 1971 - 1 Nov. 1972
Bobby O. Hardin Mar. 1973 77 p refs
(Contract F29601-72-C-0027; AF Proj. 683M)
(AD-757516; UKY-TR63-72-CE23; AFWL-TR-72-201) Avail: NTIS CSCL 08/13

One hundred twenty-three simple shear tests of 24 different soils were conducted. Most were constant-amplitude repeated load tests. A few of the tests involved mixed amplitudes of loading with rest periods between loads. Based on the results, a practical procedure for reducing the shear modulus of soils with increasing strain amplitude was developed. It was shown that for a wide variety of soil types and conditions the procedure gives reasonably accurate results compared to values measured in the laboratory. The study of mixed amplitudes and rest periods indicated that the procedure can be applied to mixed traffic conditions. Author (GRA)

N74-10440 Institut Franco-Allemand de Recherches, St. Louis (France).
TRANSONIC FLOW AROUND SLENDER BODIES [TRANSSONISCHE UMSTROEMUNG SCHLANKER KOERPER]
Marc Giraud *In its* Papers on Ballistics and Phys. of Transience 1973 p 77-95 refs In GERMAN; ENGLISH summary

Experimental results of transonic flow around slender fin-stabilized bodies of revolution in a ballistic range are reported. The phenomena associated with transonic flow around a body of revolution are outlined. Both the effect of deceleration on the wave drag, and the effect of pendulation on the boundary layer transition are examined. ESRO

N74-10461# Solar, San Diego, Calif.
TURBINE INLET GAS TEMPERATURE SENSOR FOR ENGINE CONTROL Final Report, May 1971 - Jan. 1973
Manfred I. Seegall, David A. Rohy, and William A. Compton

Wright-Patterson AFB, Ohio AFFDL Feb. 1973 264 p refs (Contract F33615-71-C-1510; AF Proj. 1987)
(AD-765193; RDR-1748; AFFDL-TR-73-49) Avail: NTIS CSCL 21/5

A research and development program is described; the objective is the design, analysis, testing and demonstration of a nuclear radiation sensor system to measure the turbine inlet gas temperature. This sensor is constructed on the basis of the electron radiation beam, transmitted across the turbine flow duct, being attenuated proportionally to the gas density. A concurrently obtained pressure signal feeding into an electronic computing system generates, from the basic laws of electron beam attenuation and the gas law, a signal proportional to the mean gas temperature across the turbine flow duct. The sensor as a whole has been named the gas-temperature-density sensors.
Author

N74-10480# Picatinny Arsenal, Dover, N.J.
EVALUATION OF THE ADHESIVE BONDING PROCESSES USED IN HELICOPTER MANUFACTURE. PART 4: NONDESTRUCTIVE INSPECTION OF ADHESIVE BONDS USING HOLOGRAPHIC TECHNIQUES
Modesto J. Barbarisi, Brian R. Chisholm, and Paul J. Kisatsky Oct. 1972 26 p
(AD-765455; PA-TR-4419-Pt-4) Avail: NTIS CSCL 13/8

Double exposure holographic techniques are used to nondestructively examine the condition of adhesive bonds in honeycomb panels. The panels are subjected to a high humidity environment which causes adhesive degradation. Periodically the panels are holographically examined. Observation of the fringe patterns reveals that the gradual degradation of the bond can be readily seen as the humidity attacks the adhesive starting with the outer edges, working its way inward. Two different prebonding preparation techniques are examined. The different rates of attack on the two types of panels are clearly recorded by the holographic technique. Since the panels were in no way destroyed or affected, these experiments give strong evidence of the power of optical holography as a nondestructive test which not only indicates disbonds but may even relate to bond strength or quality. Author (GRA)

N74-10484# United Aircraft Corp., Stratford, Conn. Sikorsky Aircraft Div.
DYNAMIC TEST OF GEARS MANUFACTURED BY ADVANCED FORGING TECHNIQUES Final Report
Harold K. Frint May 1973 63 p refs
(Contract DAAJ02-69-C-0060; DA Proj. 1G1-62207-AA-72)
(AD-765491; SER-50680; USAAMRDL-TR-73-13) Avail: NTIS CSCL 13/9

The purpose of the project was to evaluate the dynamic fatigue strength of spur gear teeth produced by advanced forging techniques in comparison to those manufactured by conventional forging methods. All of the advanced forging processes evaluated in this program used high-energy-rate forging techniques which produced gear blanks with integrally forged teeth. The die design and type of press were different for the three advanced processes; however, they produced similar as-forged gear blanks except for some variations in flash formation. On the basis of the results obtained, the best advanced forging process shows and advantage over the conventional forging process which is in the order of 5 to 8 percent. (Modified author abstract) GRA

N74-10486# Mechanical Technology, Inc., Latham, N.Y.
INVESTIGATION OF ROTOR DYNAMIC AND HIGH SPEED BEARING TECHNOLOGY FOR A 3 KW TURBOALTERNATOR Interim Report, 16 Sep. 1971 - 31 Dec. 1972
Warren D. Waldron Feb. 1973 108 p refs
(Contract DAAK02-72-C-0043)
(AD-765501; MTI-73TR11) Avail: NTIS CSCL 13/9

The report presents the initial results of an analytical and test rig investigation to identify any limitations or problems relative to high-speed bearings and rotor dynamics for future, very small (3KW) turboalternators. The results reported cover the following three tasks: An analytical effort to select a representative 3KW turboalternator configuration in terms of the major aerodynamic and electrical rotating components; An analytical effort to determine shaft-assembly/bearing-system arrangements applicable to the 3KW turboalternator configuration; A detailed design and initial test of a full scale test rig representative of the optimum shaft-assembly/bearing-system arrangement for the 3KW turboalternator. (Modified author abstract) GRA

N74-10491# Honeywell, Inc., Minneapolis, Minn. Government and Aeronautical Products Div.
HYDROFLUIDIC SERVOACTUATOR DEVELOPMENT Final Technical Report, 18 Nov. 1971 - 31 Oct. 1972
Holger C. Kent and J. Robert Sjolund May 1973 58 p
(Contract DAAJ02-72-C-0017)
(AD-766308; GAPD-W0510-FR; USAAMRDL-TR-73-12) Avail: NTIS CSCL 13/7

The report covers the design and development of a hydrofluidic servoactuator. The objective of the program was to demonstrate the feasibility of a servoactuator utilizing a hydrofluidic amplifier cascade input stage which replaces the bellows-flapper-nozzle of a conventional servovalve, a spring-centered spool valve, a fluid feedback transducer, and an actuator. The servoactuator was designed to utilize U.S. Army aircraft hydraulic fluid, meeting specifications of MIL-H-5606, and to meet the performance of a UH-1 helicopter. Author (GRA)

N74-10541# Aeronautical Research Inst. of Sweden, Stockholm.
ICE AND LANDING SURFACE DEMOULDING: REPLICA FABRICATION
Goeran Lundstroem 1973 13 p refs
(FAA-memo-90) Avail: NTIS HC $3.00

A method for using silicone rubber molding to obtain impressions of ice structures on wings and other aircraft surfaces is discussed. The limitations of the silicone material when used with deep and narrow grooved surfaces are described. The result of an experimental study to determine the effect of silicone oil on the performance of the rubber is presented. Author

N74-10584*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A BUOYANT TORNADO-PROBE CONCEPT INCORPORATING AN INVERTED LIFTING DEVICE
Frederick C. Grant Washington Nov. 1973 29 p refs
(NASA-TN-D-7335; L-8969) Avail: NTIS HC $3.00 CSCL 04B

Addition of an inverted lifting device to a simple balloon probe is shown to make possible low-altitude entry to tornado cores with easier launch conditions than for the simple balloon probe. Balloon-lifter combinations are particularly suitable for penetration of tornadoes with average to strong circulation, but tornadoes of less than average circulation which are inaccessible to simple balloon probes become accessible. The increased launch radius which is needed for access to tornadoes over a wide range of circulation results in entry times of about 3 minutes. For a simple balloon probe the uninflated balloon must be first dropped on, or near, the track of the tornado from a safe distance. The increase in typical launch radius from about 0.75 kilometer to slightly over 1.0 kilometer with a balloon-lifter combination suggests that a direct air launch may be feasible.
Author

N74-10597# Naval Weapons Center, China Lake, Calif.
PROJECT FOGGY CLOUD 4, PHASE 1. EVALUATION OF WARM FOG DISSIPATION TECHNIQUES
Edward E. Hindman, II, Richard S. Clark, and Pierre St.Amand Aug. 1973 58 p refs
(AD-766086; NWC-TP-5413) Avail: NTIS CSCL 04/2

Project Foggy Cloud IV, Phase 1, is part of a continuing series of experiments concerning the modification and dispersal of warm fog and stratus clouds. Tests were conducted at the Arcata-Eureka airport, Humboldt County, Calif., from 26 July to 7 October 1971, using a fixed-wing aircraft as a delivery vehicle. The seeding agents were water and a solution of ammonium nitrate, urea, and water developed during Project Foggy Cloud 1. The effects of the wing-tip vortices from the aircraft were investigated. One of the three definitive tests with wing-tip vortices improved the visibility above field minimums. One of the four definitive tests with water improved visibility above minimums. Three of the six definitive tests with the ammonium nitrate/urea/water solution improved visibility above minimums. The technique using the hygroscopic solution was the most effective. Author (GRA)

N74-10602# Naval Air Engineering Center, Philadelphia, Pa. Ground Support Equipment Dept.
POLLUTION IN THE GROUND SUPPORT ENVIRONMENT Final Report
Peter B. Zacharkin and William H. Womer Jul. 1973 29 p refs
(AD-764854; NAEC-GSED-69) Avail: NTIS CSCL 13/2

The study was initiated to survey the Naval Air/Ground Support environment to determine if there are pollution problems related to ground support equipment. Three major objectives exist in this study. (a) To identify specific pollution-causing systems of all types in the Navy ground support environment. (b) To recommend practical solutions to these specific pollution-causing problems. (c) To insure that all future procurements of GSE are as pollution free as practicable, by aligning the pollution limitations of GSE with the corresponding requirements for similar equipment established by EPA. GRA

N74-10605# Air Force Cambridge Research Labs., L. G. Hanscom Field, Mass.
THERMAL WARM FOG DISSIPATION: HEAT REQUIREMENTS AND PROJECTED UTILIZATION OF A SYSTEM FOR TRAVIS AFB, CALIFORNIA Air Force Surveys in Geophysics.
Alan I. Weinstein 18 Jun. 1973 31 p refs
(AF Proj. 7605)
(AD-766247; AFCRL-TR-73-0367; AFCRL-AFSIG-270) Avail: NTIS CSCL 04/2

Climatological records of fog occurrence and wind characteristics in fog are used to design a passive ground-based heat system for the dispersal of warm fog at Travis AFB, California. The array of heat sources is patterned after that described by FIDO engineers for parallel winds. The burner array shape is similar to an elongated horseshoe that encloses the upwind end of the runway, with the parallel legs 450 ft apart terminating 240 ft short of a 700-ft-long cross leg. An analysis of air traffic records in combination with fog statistics indicates that the system could be used to aid approximately 900 (2600) landings and takeoffs in an average (extreme) year during the fog-plagued months from November to February. Assuming a burn time of five minutes per landing or takeoff, the heaters could be expected to operate approximately 75 (260) h and consume approximately eleven (48) million gallons of fuel in an average (extreme) year. During the time the system is operating it generates heat at a rate of approximately 10 billion BTU/h. Author (GRA)

N74-10611# Weather Wing (3rd), Offutt AFB, Nebr.
THERMAL PARAMETERS AS A PREDICTOR OF PRECIPITATION TYPE FOR KINCHELOE AFB, MICHIGAN
Limon E. Forter, Jr., Dale G. Rogers, Michael P. Cranciolo, and Barry W. Satchwell Feb. 1973 23 p refs Revised
(AD-754927; Rept-3WW-TN-72-1-Rev) Avail: NTIS CSCL 04/2

The paper presents a summary of thermal parameters as predictors of precipitation type at Kincheloe AFB, MI. The material presented in this paper may be used in the preparation of an objective forecast when the input data is extracted from current observations and prognostic facsimile charts. The Sault Ste. Marie, MI, radiosonde data (0000Z and 1200Z) are correlated against precipitation type that occurred at Sault Ste. Marie AFB, MI. Thermal parameter combinations used in this study are: 1000-850mb thickness, 1000-700mb thickness, 1000-500mb thickness, 850-700mb thickness; surface, 950mb, 850mb and 700mb temperatures; 850mb wind direction. Author (GRA)

N74-10618# National Aviation Facilities Experimental Center, Atlantic City, N.J.
A FEASIBILITY STUDY AND PRELIMINARY EVALUATION OF THE USE OF A BIASED GLIDE SLOPE TECHNIQUE FOR NOISE ABATEMENT APPROACH Final Report, Nov. 1972 - Apr. 1973
Robert H. Pursel Nov. 1973 35 p ref
(FAA-RD-73-153; FAA-NA-73-62) Avail: NTIS HC $3.75

A feasibility study and a preliminary evaluation of the technique of conducting noise abatement approaches by using a biased glide slope deviation signal were conducted. Manual approaches using a flight director system and automatic approaches using an automatic flight control system were flown at angles up to 0.9 degrees above the commissioned glide slope angle. A ramp washout of the bias was used with the washout time constant and initiation altitude of the washout treated as variables. It was concluded that the average glide slope beam will allow a biased approach of about 0.7 degrees above the commissioned angle and that the technique is operationally feasible. Author

N74-10619*# International Business Machines Corp., Gaithersburg, Md. Electronics Systems Center.
CONTINENTAL LAND MASS AIR TRAFFIC CONTROL (COLM ATC) Final Report, Aug. 1971 - Dec. 1972
J. A. Pecar and J. E. Henrich 21 Jun. 1973 274 p refs
(Contract NAS5-21656)
(NASA-CR-132831) Avail: NTIS HC $15.75 CSCL 17G

The application of various satellite systems and techniques relative to providing air traffic control services for the continental United States was studied. Three satellite configurations were reviewed. The characteristics and capabilities of the satellites are described. The study includes consideration for the various ranging waveforms, multiple access alternatives, and the power and bandwidth required as a function of the number of users. Author

N74-10620# Lincoln Lab., Mass. Inst. of Tech., Lexington.
PROVISIONAL SIGNAL FORMATS FOR THE DISCRETE ADDRESS BEACON SYSTEM
P. Drouilhet, ed. 9 Nov. 1973 58 p refs
(Contracts DOT-FA72WAI-261; F19628-73-C-0002)
(ATC-30; FAA-RD-73-175) Avail: NTIS HC $5.00 CSCL 17G

The characteristics of the signals which form the Discrete Address Beacon System (DABS) interrogations and replies are defined. The utilization of the described formats to effect the surveillance and data link communication functions is discussed. The signals are used to design and construct a system test and evaluation during the DABS development program. The modifications required for an operational implementation of the DABS are identified. Author

N74-10621# Lincoln Lab., Mass. Inst. of Tech., Lexington.
AN OPTIMUM INTERFERENCE DETECTOR FOR DABS MONOPULSE DATA EDITING
R. J. McAulay and T. P. McGarty 26 Sep. 1973 37 p refs
(Contracts DOT-FA72WAI-261; F19628-73-C-0002)
(ESD-TR-73-253; TN-1973-48) Avail: NTIS HC $4.00 CSCL 17G

In the application of the Discrete Address Beacon System (DABS)concept to Air Traffic Control(ATC) surveillance, estimates of aircraft position must be made using as few replies as possible, preferably one. This requires the use of monopulse techniques. Since the beacon system provides high signal-to-noise ratios(SNR),

the fundamental limitation to direction finding(DF) performance is due to externally generated interference from multipath signals and from the present Air Traffic Control Radar Beacon System (ATCRBS). Since there are many bits in any one DABS reply it should be possible to generate an accurate azimuth estimate if those that bear interference could be detected and deleted from the sample. In this report, the generalized likelihood ratio test is used to derive an optimum interference statistic. The detector performance is then analyzed in detail with respect to its dependence on SNR, interference-to-signal ratio (ISR) and on the relative phase between the target and interfering signals. It is shown that good detection performance can be obtained if the phase difference between the target and interference signals are either in- or out-of-phase. Author

N74-10622# Federal Aviation Administration, Washington, D.C. Office of Systems Engineering Management.
A SYNCHRONIZED DISCRETE-ADDRESS BEACON SYSTEM
Thomas S. Amlie 31 Oct. 1973 10 p
(FAA-EM-74-3; FAA-AEM-1) Avail: NTIS HC $3.00

The characteristics of the secondary radar or air traffic control radar beacon system are discussed. The deficiencies of the system are described and the procedures for overcoming the deficiencies by a discrete system are proposed. The display devices in the aircraft are explained. It is stated that such a surveillance system will provide several additional benefits and services to the aircraft operator at minimum cost and complexity. Author

N74-10623# Transportation Systems Center, Cambridge, Mass.
EVALUATION OF ILS LOCALIZER SIGNAL SPECIFICATION DURING GROUND ROLLOUT Final Report, Jul 1971 - Jul. 1972
Joseph S. Koziol, Jr. Aug. 1973 99 p refs
(AD-765761; DOT-TSC-FAA-72-27; FAA-RD-73-31) Avail: NTIS CSCL 17/7

The International Civil Aviation Organization (ICAO) has developed a specification for localizer information on the runway surface appropriate for rollout guidance during Category III B operations. The suitability of this specification was evaluated by systems analysis and simulation and is reported herein. The results of the performance evaluation for a representative rollout guidance system indicate that the specification is too stringent especially for higher frequency type localizer disturbances and therefore should consider the spectral characteristics of the localizer disturbance. A more relaxed specification was therefore developed by taking additional advantage of the sensitivity effect of the localizer receiver and the attenuating effect of the rollout guidance system on localizer disturbances. GRA

N74-10625# Transportation Systems Center, Cambridge, Mass.
HUMAN FACTORS EXPERIMENTS FOR DATA LINK Interim Report, Aug. 1972 - Jan. 1973
Edwin H. Hilborn and Leonard R. Devanna Apr. 1973 46 p refs
(Contract DOT-IA-FA-313)
(AD-760401; TSC-FAA-73-6; FAA-RD-73-55; IR-2) Avail: NTIS CSCL 17/7

Two experiments involving the coding of Air Traffic Control messages for digital data link transmission are reported. Reaction times and error rates to slide presentations were recorded for both experiments as a means for assessing the relative meaningfulness of messages. Experiment I studied the differences between long and short abbreviations with and without spaces. The need for the use of spaces was demonstrated. Experiment 2 provided a procedural variation using the same stimulus material as that reported in Section III of Report FAA-RD-72-150, with generally comparable results. It was again determined that for short ATC messages differences in type font were not significant, that arrows were generally better than words for altitude and heading commands, that a format of three short lines was better than one extended line, and that L and R as heading commands were extremely difficult to comprehend. (Modified author abstract) GRA

N74-10709*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AN EVALUATION OF THE RELATIVE FIRE HAZARDS OF JET A AND JET B FOR COMMERCIAL FLIGHT
Robert R. Hibbard and Paul T. Hacker Oct. 1973 30 p refs
(NASA-TM-X-71437; E-7693) Avail: NTIS HC $3.50 CSCL 21D

The relative fire hazards of Jet A and Jet B aircraft fuels are evaluated. The evaluation is based on a consideration of the presence of and/or the generation of flammable mixtures in fuel systems, the ignition characteristics, and the flame propagation rates for the two fuel types. Three distinct aircraft operating regimes where fuel type may be a factor in fire hazards are considered. These are: (1) ground handling and refueling, (2) flight, and (3) crash. The evaluation indicates that the overall fire hazards for Jet A are less than for Jet B fuel. Author

N74-10717# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
STUDY OF ELASTOPLASTIC DEFORMATION WITH FRICTION IN HYDROCARBON MEDIA
A. F. Aksenov, P. V. Nazarenko, and A. I. Kozachenko 10 Aug. 1973 8 p refs Transl. into ENGLISH of the mono. "O Prirode Treniya Tverdykh Tel" USSR, 1971 p 38-40
(AD-765997; FTD-HT-23-42-74) Avail: NTIS CSCL 21/5

With the development of jet and turboprop engineering, the problem has arisen of increasing the antifriction and antiwear properties of fuels which, for many parts of the fuel units, are lubrication media. The Russian translation briefly studies the nature of the change in elastoplastic deformations of the surface layers of metals with friction in media consisting of jet fuels and their components. GRA

N74-10722*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPERIMENTAL EVALUATION OF A TF30-P-3 TURBOFAN ENGINE IN AN ALTITUDE FACILITY: EFFECT OF STEADY-STATE TEMPERATURE DISTORTION
Willis M. Braithwaite Washington Nov. 1973 27 p refs
(NASA-TM-X-2921; E-7499) Avail: NTIS HC $3.00 CSCL 21E

The effects of circumferential distortion of the total temperature entering 25, 50, and 75 percent of the inlet circumferential annulus of a turbofan engine were determined. Complete compressor stall resulted from distortions of from 14 to 20 percent of the face averaged temperature. Increasing the temperature level in one sector resulted in that sector moving toward stall by decreasing the equivalent rotor speeds while the pressure ratio remained approximately constant. Stall originated as a rotating zone in the low-pressure compressor which resulted as a terminal stall in the high-pressure compressor. Decreasing the Reynolds number index to 0.25 from 0.5 reduced the required distortion for stall by 50 percent for the conditions investigated. Author

N74-10725*# AiResearch Mfg. Co., Phoenix, Ariz.
STUDY OF SMALL TURBOFAN ENGINES APPLICABLE TO GENERAL-AVIATION AIRCRAFT Final Report
G. L. Merrill, G. A. Burnett, C. C. Alsworth et al Sep. 1973 182 p refs
(Contract NAS2-6799)
(NASA-CR-114630; AiResearch-73-210148) Avail: NTIS HC $11.25 CSCL 21E

The applicability of small turbofan engines to general aviation aircraft is discussed. The engine and engine/airplane performance, weight, size, and cost interrelationships are examined. The effects of specific engine noise constraints are evaluated. The factors inhibiting the use of turbofan engines in general aviation aircraft are identified. Author

N74-10726*# Pratt and Whitney Aircraft, East Hartford, Conn.
IMPACT RESISTANCE OF FIBER COMPOSITE BLADES USED IN AIRCRAFT TURBINE ENGINES

L. A. Friedrich and J. L. Preston, Jr. May 1973 150 p refs
(Contract NAS3-15568)
(NASA-CR-134502; PWA-4727) Avail: NTIS HC $9.50 CSCL 21E

Resistance of advanced fiber reinforced epoxy matrix composite materials to ballistic impact was investigated as a function of impacting projectile characteristics, and composite material properties. Ballistic impact damage due to normal impacts, was classified as transverse (stress wave delamination and splitting), penetrative, or structural (gross failure). Steel projectiles were found to be > gelatin > ice projectiles in causing penetrative damage leading to reduced tensile strength. Gelatin and ice projectiles caused either transverse or structural damage, depending upon projectile mass and velocity. Improved composite transverse tensile strength, use of dispersed ply lay-ups, and inclusion of PRD-49-1 or S-glass fibers correlated with improved resistance of composite materials to transverse damage. In non-normal impacts against simulated blade shapes, the normal velocity component of the impact was used to correlate damage results with normal impact results. Stiffening the leading edge of simulated blade specimens led to reduced ballistic damage, while addition of a metallic leading edge provided nearly complete protection against 0.64 cm diameter steel, and 1.27 cm diameter ice and gelatin projectiles, and partial protection against 2.54 cm diameter projectiles of ice and gelatin. Author

N74-10729*# Douglas Aircraft Co., Inc., Long Beach, Calif.
DC-9/JT8D REFAN, PHASE 1 Final Report
Nov. 1973 332 p refs
(Contract NAS3-16814)
(NASA-CR-121252; MDC-J5738) Avail: NTIS HC $18.75 CSCL 21E

Analyses and design studies were conducted on the technical and economic feasibility of installing the JT8D-109 refan engine on the DC-9 aircraft. Design criteria included minimum change to the airframe to achieve desired acoustic levels. Several acoustic configurations were studied with two selected for detailed investigations. The minimum selected acoustic treatment configuration results in an estimated aircraft weight increase of 608 kg (1,342 lb) and the maximum selected acoustic treatment configuration results in an estimated aircraft weight increase of 809 kg (1,784 lb). The range loss for the minimum and maximum selected acoustic treatment configurations based on long range cruise at 10 668 m (35,000 ft) altitude with a typical payload of 6 804 kg (15,000 lb) amounts to 54 km (86 n. mi.) respectively. Estimated reduction in EPNL's for minimum selected treatment show 8 EPNdB at approach, 12 EPNdB for takeoff with power cutback, 15 EPNdB for takeoff without power cutback and 12 EPNdB for sideline using FAR Part 36. Little difference was estimated in EPNL between minimum and maximum treatments due to reduced performance of maximum treatment. No major technical problems were encountered in the study. The refan concept for the DC-9 appears technically feasible and economically viable at approximately $1,000,000 per airplane. An additional study of the installation of JT3D-9 refan engine on the DC-8-50/61 and DC-8-62/63 aircraft is included. Three levels of acoustic treatment were suggested for DC-8-50/61 and two levels for DC-8-62/63. Results indicate the DC-8 technically can be retrofitted with refan engines for approximately $2,500,000 per airplane. Author

N74-10730*# Mobil Research and Development Corp., Paulsboro, N.J. Research Dept.
MICROFOG LUBRICANT APPLICATION SYSTEM FOR ADVANCED TURBINE ENGINE COMPONENTS, PHASE 3 Final Report
R. J. Petrucco and S. J. Leonardi 30 Jul. 1973 129 p refs
(Contract NAS3-16729)
(NASA-CR-121271) Avail: NTIS HC $8.50 CSCL 21E

The wetting characteristics and deposit forming tendencies of a series of lubricants were evaluated using a microfog jet delivery system to wet a flat heated rotating disc. The performances of the nine lubricants are discussed in terms of the various testing parameters which include temperature, disc speed and lubricant gas flow rates. Also discussed are the heat transfer characteristics of two of the lubricants on that same plane disc specimen. The wetting characteristics and heat transfer characteristics of one of the lubricants on a complex disc simulating bearing geometry are also discussed. Author

N74-10732*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
NASA/GE QUIET ENGINE A ACOUSTIC TEST RESULTS
S. B. Kazin and J. E. Paas Oct. 1973 209 p refs
(Contract NAS3-12430)
(NASA-CR-121175; GE-R73AEG363) Avail: NTIS HC $12.50 CSCL 21E

Eight configurations were examined to determine the effect of design/treatment variations on the engine's noise characteristics. The maximum 200-foot (61-m) sideline, perceived noise levels (PNL) for the baseline configuration, which incorporated fan frame treatment only, were 105.5 PNdB at approach and 117.9 PNdB at takeoff. With extended treatment in the fan duct, these levels were reduced to 103.0 PNdB and 110.5 PNdB. The configuration which was fully suppressed, including both fan inlet and exhaust splitters, reduced the noise further to 98.7 PNdB at approach and 110.9 PNdB at takeoff. Although Engine 'A' was not designed for actual flight application, the ground static results were projected to in-flight conditions to indicate potential reductions of landing approach and take-off noise levels for a DC8 aircraft. The projected airport community noise levels for this class of aircraft were considerably below the FAA regulations. The projected noise levels of DC8 aircraft with four fully suppressed Engines 'A' are more than 25 EPNdB below those of the current DC8 and more than 10 EPNdB below FAR Part-36. Author

N74-10733*# McDonnell-Douglas Corp., Long Beach, Calif.
DC-9/JT8D REFAN, PHASE 1 Final Report
Nov. 1973 332 p refs
(Contract NAS3-16814)
(NASA-CR-121252; MDC-J5738) Avail: NTIS HC $18.75 CSCL 21E

Analyses and design studies were conducted from August 1972 to June 1973 on the technical and economic feasibility of installing the JT8D-109 refan engine on the DC-9 aircraft. Design criteria included minimum change to the airframe to achieve desired acoustic levels. Several acoustic configurations were studied. The minimum selected acoustic treatment configuration results in an estimated aircraft weight increase of 608 kg (1,342 lb) and the maximum selected acoustic treatment configuration results in an estimated aircraft weight increase of 809 kg (1,784 lb). The range loss for the minimum and maximum selected acoustic treatment configurations based on long range cruise at 10,668 m (35,000 ft) altitude with a typical payload of 6,804 kg (15,000 lb) amounts to 54 km (86 n. mi.) respectively. Estimated reduction for minimum selected treatment show 8 EPNdB at approach, 12 EPNdB for takeoff with power cutback, 15 EPNdB for takeoff without power cutback, and 12 EPNdB for sideline. Little difference was estimated between minimum and maximum treatments due to reduced performance of maximum treatment. No major technical problems were encountered in the study. The refan concept for the DC-9 appears technically feasible and economicall viable at approximately $1,000,000 per airplane. Author

N74-10734*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF A SINGLE-STAGE TRANSONIC COMPRESSOR WITH A BLADE-TIP SOLIDITY OF 1.5 AND COMPARISON WITH 1.3 AND 1.7 SOLIDITY STAGES
Walter M. Osborn, Donald C. Urasek, and Royce D. Moore
Washington Nov. 1973 98 p refs
(NASA-TM-X-2926; E-7255) Avail: NTIS HC $3.75 CSCL 21E

The overall and blade-element performance of a transonic compressor stage with a tip solidity of 1.5 is presented over the stable operating range at rotative speeds from 50 to 100 percent of design speed. State peak efficiency of 0.82 was obtained at a weight flow of 29.4 kg/sec (200.4 (kg/sec)/m2

of annulus area) and a pressure ratio of 1.71. Stall margin at design speed was 14 percent. A comparison of three stages in a solidity study showed that the performance of the 1.5 solidity stage and the 1.3 solidity stage were nearly identical but that the performance of the 1.7 solidity stage was significantly lower. Author

N74-10735*# Rao (G. V. R.) and Associates, Sherman Oaks, Calif.
THEORETICAL STUDIES OF TONE NOISE FROM A FAN ROTOR Final Report
G. V. R. Rao, W. T. Chu, and R. V. Digumarthi Washington NASA Nov. 1973 85 p refs
(Contract NAS2-6401)
(NASA-CR-2354) Avail: NTIS HC $3.75 CSCL 21E

An analytical study was made of some possible rotor alone noise sources of dipole, quadrapole and monopole characters which generate discrete tone noise. Particular emphasis is given to the tone noise caused by fan inlet flow distortion and turbulence. Analytical models are developed to allow prediction of absolute levels. Experimental data measured on a small scale fan is presented which indicates inlet turbulence interaction with a fan rotor can be a source of tone noise. Predicted and measured tone noise for the small scale rotor are shown to be in reasonable agreement. Author

N74-10736# Purdue Univ., Lafayette, Ind.
UNSTEADY FLUID DYNAMIC RESPONSE OF AN AXIAL-FLOW COMPRESSOR STAGE WITH DISTORTED INFLOW
John J. Adamczyk and Franklin O. Carta Jul. 1973 63 p refs
Prepared in cooperation with United Aircraft Corp.
(Contract N00014-67-A-0226-0005; NR Proj. 098-038)
(AD-766084; SQUID-TR-UARL-2-PU; UARL-M91103-7) Avail: NTIS CSCL 21/5

A nonlinear, large disturbance theory has been developed which couples, interactively, the flow through the blade passages of a turbomachine blade row and an axially distorted flow field. The blade row analysis is based on the time-dependent energy equation of the flow through the passage and includes a nonlinear description of cascade loss and turning correlations from available experimental sources. The flow field analysis involves the nonlinear, time-dependent equations for the vorticity and the stream function. Coupling of the two is accomplished through the boundary conditions by mutual relationships between the pressure change across the blade row and the change in vorticity in the flow field analyses. Within the assumptions that the flow is two-dimensional and incompressible, the numerical solution is capable of predicting the influence of an upstream axial distortion on the onset of a circumferentially rotating stall pattern for a single blade row. The speed of rotation of the stall cell and the spatial attenuation of the distortion wave are also predicted, and although the observed experimental data are generally available only for multistage systems, the predicted results for the single blade row are in qualitively good agreement with the data. (Modified author abstract) GRA

N74-10737# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CALCULATING PRESSURE IN COMBUSTION CHAMBER OF PULSEJET ENGINE DURING FILLING PROCESS
E. P. Polebichek and V. V. Zhdanov 16 Aug. 1973 12 p refs Transl. into ENGLISH from Saloletostroenie i Tekhn. Vozdushnogo Flota (USSR), no. 28, 1972 p 10-15
(AD-766045; FTD-HT-23-809-73) Avail: NTIS CSCL 21/5

The filling process of the combustion chamber in a pulsejet engine is studied with hydraulic losses on the valve device. A dependence is established between valve pressure loss and the main factors which determine the current process. A simple approximate formula is derived, which enables a degree of accuracy sufficient for engineering problems for determining pressure in the combustion chamber as it is being filled with a fresh working medium. GRA

N74-10738# Army Aviation Systems Command, St. Louis, Mo.
MAJOR ITEM SPECIAL STUDY (MISS). CH-54A TURBINE ENGINE Interim Report, Jan. 1964 - Dec. 1972
Aug. 1973 24 p
(AD-766228; USAAVSCOM-TR-73-18) Avail: NTIS CSCL 21/5

The report describes a value engineering analysis of a helicopter engine. Major Item Special Study (MISS) reports are performed on DA Form 2410 reportable components. These are time change items and certain condition change items slected because of high cost or need for intensive management. Basically, the MISS reports are concerned with analyzing reported removal data presented in the Major Item Removal Frequency (MIRF) report. The failure modes reported for each removal are examined and grouped into categories which are intended to clarify the intent of the data reporting. From this data, removal distributions can be plotted and an MTR (mean time to removal) can be calculated. The MISS reports then investigate possible cost savings based on total elimination of selected failure modes. These modes are chosen because of the percentage of failures they represent and/or because they appear to be feasible Product Improvement Program (PIP) areas. Author (GRA)

N74-10739# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AERODYNAMIC CALCULATION OF BLADES IN AXIAL-FLOW TURBOMACHINES
Ya. A. Sirotkin 31 May 1973 614 p refs Transl. into ENGLISH of the publ. "Aerodinamicheskii Raschet Lopatok Osevykh Turbomashin" Moscow, 1972 p 1-448
(AD-765932; FTD-MT-24-1809-72) Avail: NTIS CSCL 21/5

The report discusses the direct and inverse problems of calculating the stages of axial turbine machines within the framework of the theory of cylindrical and conical stages with consideration of blockage of the flow by the blades and of the slope and curvature of the meridian lines of the current. A mathematical formulation is presented for these problems along with methods of solving them on the electronic computer and manually. GRA

N74-10740# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HIGH TEMPERATURE COOLED GAS TURBINES (ANALYSIS AND DESIGN)
V. L. Ivanov and V. I. Lokai 11 Jun. 1973 294 p refs Transl. into ENGLISH of the publ. "Vysokotemperaturnye Okhlazhdaemye Okhlazhdaemye Gazovye Turbiny" USSR, 1971 p 1-232
(AD-766031; FTD-HC-23-1366-72) Avail: NTIS CSCL 21/5

Contents: High-temperature gas turbine engines; Heat transfer in gas turbine engine components; Cooling of gas turbine engine components; Analysis and design of cooled turbines. GRA

N74-10741# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MIXING AND COMBUSTION PROCESSES IN JET ENGINES
A. G. Prudnikov, M. S. Volynskii, and V. N. Sagalovich 5 Jul. 1973 552 p refs Transl. into ENGLISH of the publ. "Protsessy Smeseobrazovaniya i Goreniya v Vozdushno-Reaktivnyyh" Moscow, 1971 p 1-356
(AD-766030; FTD-HC-23-1339-72) Avail: NTIS CSCL 21/5

The report consists of two parts. Part One is concerned principally with the physics of the interaction of droplets or solid particles with a gas stream in the presence of heat and mass exchange and with the influence of these factors on the characteristics of the engine. The problems of liquid injection (the basic parameters of the fuel-supply system and methods of measurement) are considered, dimensionless relationships are cited for spray spectra in a supersonic stream, and ranges and vaporizabilities in fuel sprays are determined. Part Two describes

the process of turbulent mixing for various boundary conditions with or without evolution of heat on the basis of a consistent method of calculation; the relationships obtained can be used to calculate turbulent mixing in the cases of free jet, jet at a wall, and a jet in a nozzle. GRA

N74-10742# Stemco Mfg. Co., Longview, Tex.
TRUCK NOISE VIA DIESEL EXHAUST AND AIR INTAKE NOISE Final Report
Raymond E. Hunt, Kenneth C. Kirkland, and Stanley P. Reyle Jul. 1973 411 p refs
(Contract DOT-TSC-533)
(PB-222624/9; DOT-TSC-OST-73-12) Avail: NTIS HC $8.25 CSCL 21G

Exhaust and air intake noise was studied on five truck and bus diesel engines; the Detroit Diesel 671 and 8V-71, the Cummins NHC-250 and NTC-350, and the Mack ENDT-675. The noise source was isolated and its sound level measured at a distance of 50 feet. Detailed exhaust tests was conducted on all engines with three basic styles of exhaust systems. Each system was tested with several mufflers from different manufacturers. Sound levels without mufflers were also measured on each engine. The results of these tests are summarized and comparisons are made of exhaust systems, engines, and mufflers. Air intake noise tests were conducted with and without air cleaners installed. At least two different air cleaners were tested on each engine. A comparison is made of air intake sound levels between the engines and intake systems. A survey is made of muffler and air cleaner manufacturers to obtain information on size, price, and expected performance of the products tested. A survey on engine specifications is also included. Author (GRA)

N74-10745# United Aircraft of Canada, Ltd., Longueuil (Quebec).
LOW NOx EMISSION COMBUSTOR FOR AUTOMOBILE Final Report
H. C. Eatock, J. A. Saintsbury, P. Sampath, J. R. Keilbach, and L. J. Spadaccini Feb. 1973 259 p refs
(Contract EPA-68-04-0015)
(PB-222075/4; APTD-1457; ER-700) Avail: NTIS HC $6.75 CSCL 21E

The emission levels that could be reached by development on two combustors representing a 12:1 pressure ratio simple cycle gas turbine, and a 5:1 pressure ratio regenerative cycle gas turbine, both for automotive application were evaluated. Goals were to equal or better the EPA 1975-76 Federal Emission Standards for automobiles. Some 60 atmospheric rig tests were carried out on the simple-cycle combustor whilst 39 atmospheric rig tests were carried out on the regenerative cycle combustor. Some 430 pressure test points involving over 200 modifications to combustor geometry were run. Various fuel injection methods were employed, such as pressure atomizing, air-assisted pressure atomizing, and air-blast atomizing. For reasons of reliability and primary zone leanness, the air-blast atomizer was the final selection. The best results were obtained by the introduction of sufficient air to provide a lean head end (in the form of 3 stages of swirl) while maintaining fairly high temperatures in the intermediate zone, the remainder of the air being introduced into the dilution zone. Effects of outside parameters on combustor emissions were also evaluated. GRA

N74-10746# Northern Research and Engineering Corp., Cambridge, Mass.
LOW NOx EMISSION COMBUSTOR FOR AUTOMOBILE GAS TURBINE ENGINES
E. P. Demetri and R. J. Murad Feb. 1973 182 p refs
(Contract EPA-68-04-0017)
(PB-222340/2; APTD-1454) Avail: NTIS HC $11.25 CSCL 13B

Two research combustors were designed and tested, one of which was representative of low pressure-ratio, regenerative gas turbine cycles and the other representative of high pressure-ratio, nonregenerative cycles. The design goal was to achieve emission levels not exceeding one-half of the Federal 1957/76 emission standards. The overall aim was to develop design guidelines on the basis of detailed experimental data. Extensive modifications were made to conventional combustor configurations, but direct use was made of existing combustor design technology. Full-scale models were tested over wide ranges of operating conditions representative of typical driving cycles. Cold-flow tests were made to measure aerodynamic performance and detailed combustion tests were made to measure emission, combustion, and thermal performance. GRA

N74-10749# General Motors Corp., Indianapolis, Ind. Detroit Diesel Allison Div.
TEST OF A SUPERSONIC COMPRESSOR CASCADE, VOLUME 1 Interim Report, Jul. 1971 - Aug. 1972
Robert L. Holtman, G. David Huffman, Robert B. McClure, and George T. Sinnet Wright-Patterson AFB, Ohio ARL Dec. 1972 411 p refs 2 Vol.
(Contract F33615-71-C-1766; AF Proj. 7065)
(AD-756870; ARL-72-0170-Vol-1) Avail: NTIS CSCL 21/5

The report describes in detail the experimental investigation of a stationary, linear, supersonic compressor blade cascade. The cascade incorporated contoured sidewalls to control the change in stream-tube area in the quasi-axial direction. The blades had a constant spanwise geometry. The selected blade element was from a recent compressor configuration resulting from the Aerospace Research Laboratories supersonic axial compressor research program. The investigation covered a range of inlet relative Mach numbers of 1.40 - 1.50 and a range of static pressure ratios of approximately 1.5 - 2.1. Volume 1 describes the cascade design, instrumentation, data reduction techniques, test results, and correlation of results with design characteristics. Author (GRA)

N74-10750# General Motors Corp., Indianapolis, Ind. Detroit Diesel Allison Div.
TEST OF A SUPERSONIC COMPRESSOR CASCADE, VOLUME 2 Interim Report, Jul. 1971 - Apr. 1972
Robert L. Holtman, David G. Huffman, Robert B. McClure, and George T. Sinnet Wright-Patterson AFB, Ohio ARL Dec. 1972 323 p refs 2 Vol.
(Contract F33615-71-C-1765; AF Proj. 7065)
(AD-756871; ARL-72-0170-Vol-2) Avail: NTIS CSCL 21/5

The report describes in detail the experimental investigation of a stationary, linear, supersonic compressor blade cascade. The cascade incorporated contoured sidewalls to control the change in stream-tube area in the quasi-axial direction. The blades had a constant spanwise geometry. The selected blade element was from a recent compressor configuration resulting from the Aerospace Research Laboratories supersonic axial compressor research program. The investigation covered a range of inlet relative Mach numbers of 1.40 - 1.50 and a range of static pressure ratios of approximately 1.5 - 2.1. Volume 1 describes the cascade design, instrumentation, data reduction techniques, test results, and correlation of results with design characteristics. Volume 2 describes additional work with vortex generators mounted on the blades and compares these results with the plain blade results. Author (GRA)

N74-10751# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AVIATION GAS TURBINE ENGINES (SELECTED PORTIONS)
G. S. Zhiritskii, V. I. Lokay, M. K. Maksutova, and V. A. Strunkin Nov. 1972 632 p refs Transl. into ENGLISH from the publ. "Gazovyye Turbiny Dvigateley Letatelnyth Apparatov" Moscow, Mashinostr., 1971 448 p
(AD-756810; FTD-MT-24-287-72) Avail: NTIS CSCL 21/5

This book will acquaint the reader with the working processes in gas turbines, methods of thermodynamic and gas dynamic calculation of turbines in nominal and variable modes, the system for cooling the hot portions of the turbine and its calculation, various structures, and strength calculations for the principal parts of the turbine. In addition the book gives a brief survey of

designs of gas turbines. This book is a textbook for students at Aviation Technical Institutions of Higher Learning. It may also be useful to gas-turbine designers. Author (GRA)

N74-10783*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
STUDY OF AIRBORNE SCIENCE EXPERIMENT MANAGEMENT CONCEPTS FOR APPLICATION TO SPACE SHUTTLE. VOLUME 3: APPENDIXES
Donald R. Mulholland, John O. Reller, Jr., Carr B. Neel, and Louis C. Haughney Aug. 1973 83 p refs
(NASA-TM-X-62289) Avail: NTIS HC $6.25 CSCL 22A

Detailed information is presented concerning specific airborne missions in support of the ASSESS program. These missions are the AIDJEX expeditions, meteor shower expeditions, CAT and atmospheric sampling missions, ocean color expeditions, and the Lear Jet missions. F.O.S.

N74-10846# Institut Franco-Allemand de Recherches, St. Louis (France).
DAMAGE THRESHOLD DETERMINATION OF LIGHT WALLS SUBMITTED TO SINGLE OR REPEATED BANGS, PART 1 [DETERMINATION DU SEUIL D'ENDOMMAGEMENT DE CLOISONS LEGERES EXPOSEES A DES BANGS UNITAIRES OU REPETES. PREMIERE PARTIE]
J. P. Thybaut, B. Antoine, and Ch. Johe 20 Dec. 1972 54 p refs In FRENCH
(Contract DRME-72/184)
(ISL-35/72-Pt-1) Avail: NTIS HC $4.75

The behavior and fatigue of light walls submitted to sonic bangs were investigated using N-shock waves produced by a shock generator and impacting a plastered brick wall. Wall measuring instruments included extensometric gages, displacement sensors, and accelerometers. Results on degradation thresholds showed that 7 to 8 m bar bangs provoke horizontal tracks. Vertical cracks were induced by 13 to 14 m bar bangs, while diagonal cracks were generated by 16 m bar bangs. Complete wall rupture occurred when higher than 20 m bar bangs were used. Fatigue tests revealed that walls, when submitted to 12 m bar bang intensity, can be subjected to a hundred of bangs without any damage. ESRO

N74-10863*# Aeronautical Research Associates of Princeton, Inc., N.J.
SOME ANALYSES OF THE CHEMISTRY AND DIFFUSION OF SST EXHAUST MATERIALS DURING PHASE 3 OF THE WAKE PERIOD
Glenn R. Hilst, Coleman DuP. Donaldson, and Ross Contiliano Jul. 1973 88 p refs
(Contract NAS1-11873)
(NASA-CR-132323; ARAP-199) Avail: NTIS HC $6.50 CSCL 21B

In the generally stably stratified lower stratosphere, SST exhaust plumes could spend a significant length of time in a relatively undispersed state. This effort has utilized invariant modeling techniques to simulate the separate and combined effects of atmospheric turbulence, turbulent diffusion, and chemical reactions of SST exhaust materials in the lower stratosphere. The primary results to date are: (1) The combination of relatively slow diffusive mixing and rapid chemical reactions during the Phase III wake period minimizes the effect of SST exhausts on O3 depletion by the so-called NOx catalytic cycle. While the SST-produced NO is substantially above background concentrations, it appears diffusive mixing of NO and O3 is simply too slow to produce the O3 depletions originally proposed. (2) The time required to dilute the SST exhaust plume may be a significant fraction of the total time these materials are resident in the lower stratosphere. If this is the case, then prior estimates of the environmental impact of these materials must be revised significantly downward. Author

N74-10866# National Aviation Facilities Experimental Center, Atlantic City, N.J.
ULTRAVIOLET AND NEAR-INFRARED SPECTRAL ANALYSIS OF A BURNER-CAN BURN-THROUGH FLAME Final Report
Richard Hill Nov. 1973 27 p
(FAA-NA-73-86; FAA-RD-73-154) Avail: NTIS HC $3.50

The near-infrared and ultraviolet spectrum of a burner-can burn-through flame was analyzed using a J47 engine to produce the burn-through flame. Charts of the power output of the flame in the near-infrared and ultraviolet were produced for various engine power settings. Author

N74-10869# ARO, Inc., Arnold Air Force Station, Tenn.
LAMINAR HEAT TRANSFER ON SHARP AND BLUNT TEN-DEGREE CONES IN CONICAL AND PARALLEL LOW-DENSITY FLOW Final Report, 13 Mar. 1971 - 7 Apr. 1972
D. E. Boylan AEDC Aug. 1973 63 p refs
(AD-765546; ARO-VKF-TR-73-47; AEDC-TR-73-106) Avail: NTIS CSCL 16/3

The report presents heat-transfer-rate measurements on sharp and blunt 10-deg half-angle cones at angles of attack between -9 and -10 deg in a low-density, hypersonic wind tunnel. Circumferential and longitudinal distributions are presented for cold wall conditions for a range at Mach and Reynolds numbers. The effect of source-like flows was studied by utilizing both conical and contoured expansion nozzles with the same free-stream similarity parameters and model wall temperatures. Comparisons are made with previously published experimental and theoretical results. Author (GRA)

N74-10890# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
IN PLACE OF CONGESTION: SOME OBSERVATIONS ON THE TRANSPORT OF FREIGHT
Ralf Bonwit Jul. 1973 115 p refs
(TT-7308) Avail: NTIS HC $7.75

An assessment of freight transport technology is presented with emphasis on land and air transport for highly industralized countries. The modal split between rail and road freight transport for Europe and North America is discussed along with forecasts of freight movements between 1970 and 1990. Pipeline systems, air freight, urban goods delivery, freight consolidation centers, and automatic handling are analyzed. It is concluded that the decisive factor for the severe impact of freight transport on Britain was not the lack of technology, but failure to apply it. F.O.S.

N74-10891# Stichting Nationaal Lucht- en Ruimtevaartlaboratorium, Delft (Netherlands).
STICHTING NATIONAL AEROSPACE LABORATORY, REVIEW FOR THE YEAR 1972 [STICHTING NATIONAAL LUCHT- EN RUIMTEVAARTLABORATORIUM VERSLAG OVER HET JAAR 1972]
1972 119 p refs In DUTCH; ENGLISH summary
Avail: NTIS HC $8.00

Aerospace research activities during 1972 included the following topics: The development of a method for calculating three-dimensional turbulent boundary layers; crack propagation in titanium alloys; various computations for aircraft development using wind tunnel results; fatigue and fracture toughness of aircraft construction materials; approach and landing control; and environmental and earth surface surveys. G.G.

N74-10897# Office National d'Etudes et de Recherches Aerospatiales, Paris (France).
AEROSPACE ACTIVITIES Annual report, 1972
Jun. 1973 143 p refs
Avail: NTIS HC $9.25

The 1972 ONERA annual report covers the following: adminstration; spacecraft testing facility; aerodynamics department activities; Modane large wind tunnel; structures; physics; materials; computing center; and Toulouse Research Center. A list of patents, news releases, publications, and technical notes with abstracts, technical memoranda, and films is given. ESRO

N74-10899# AAI Corp., Baltimore, Md.
HIGH LEVEL CONTAINER Final Technical Report
Anthony L. Farinacci and Don B. Bruner Mar. 1973 125 p refs
(Contract DAAG17-72-C-0075)
(AD-766306; ER-7194; USA-NLABS-TR-73-55-AD) Avail: NTIS CSCL 15/7

A study was conducted to identify feasible approaches for the airdrops of containerized cargo from aircraft flying at heights beyond the reach of certain types of ground fire. The primary application would be the resupply of combat units which on occasion may necessarily be within close proximity to enemy forces. Concepts for equipment and techniques were generated and evaluated for their ability to guide the containers through the airspace and land safely in the limited area of the drop zone. Author

N74-10904# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Systems and Logistics.
MOD-METRIC TESTED FOR BIAS M. S. thesis
Lykes S. Henderson, Jr. and Russell W. Arendell 7 Mar. 1973 108 p refs
(AD-760081; SLSR-4-73A) Avail: NTIS CSCL 15/5

The original intent of the thesis was to develop a revised stocking model that specifically considered a recent technological improvement in the maintainability design of certain weapons systems. This improvement seemed to offer great potential for reduced inventory investment. The Air Force introduced a modular repair concept with the F-111 aircraft in the early 1960's, but no new stocking model had been considered for improving management techniques. In July of 1972 Captain John Muckstadt of Headquarters, Air Force Logistics Command, commenced work on a revised model for solving the problem. The thesis effort was then diverted from designing a new model to the study of Muckstadt's technique and the testing of his model for bias. GRA

N74-10905# Ministry of Defence, London (England).
TECHNICAL EVALUATION REPORT ON FLUID DYNAMICS PANEL SPECIALISTS' MEETING ON AERODYNAMIC DRAG
S. F. J. Butler Paris AGARD Sep. 1973 14 p refs Conf. held at Izmir, Turkey, 10-13 Apr. 1973
(AGARD-AR-58) Avail NTIS HC $3.00

The proceedings of a conference on the development of methods for predicting aerodynamic drag are presented. The subjects discussed are: (1) aircraft and wing drag characteristics, (2) helicopter drag, (3) base drag and separation, (4) interaction effects, (5) hypersonic drag, and (7) testing techniques for flight and wind tunnel comparisons. Author

N74-10906# National Aerospace Lab., Amsterdam (Netherlands).
CALCULATION OF INSTATIONARY PRESSURE DISTRIBUTIONS AND GENERALIZED AERODYNAMIC FORCES WITH THE DOUBLET-LATTICE METHOD
R. Roos and R. J. Waan 15 Nov. 1972 39 p refs Sponsored by Directorate of Material Air
(NLR-TR-72037-U) Avail: NTIS HC $4.00

To calculate pressure distributions on configurations consisting of thin wings oscillating harmonically in subsonic flow, the douplet-lattices method was applied and a short outline of the fundamentals of this method given. For a wide range of configurations calculated, results were compared with results of kernel function methods and experimental data. The versatility of the method is demonstrated by the variety of planforms and vibration modes that were used. Some conclusions are made with regard to the number of panels and calculation time. The necessary number of panels varies from 40 for pitching wing configuration to about 150 for T-tail configuration. Calculation times for both doublet-lattice and kernal methods are of the same order. ESRO

N74-10907* Lockheed-California Co., Burbank.
MULTISTAGE AEROSPACE CRAFT Patent
Donald Lee Kelly, inventor (to NASA) Issued 16 Oct. 1973 1 p Filed 20 Feb. 1964 Sponsored by NASA
(NASA-Case-XMF-02263; US-Patent-Des-228,688; US-Patent-Appl-SN-78766; US-Patent-Class-D71-1) Avail: US Patent Office CSCL 01C

A conceptual design of a multi-stage aerospace craft is presented. Two perspective views of the vehicle are developed to show the two component configuration with delta wing, four vertical tail surfaces, tricycle landing gear, and two rocket exhaust nozzles at the rear of the fuselage. Engines for propulsion in the atmosphere are mounted on the fuselage in front of the wing root attachment. P.N.F.

N74-10908# Advisory Group for Aerospace Research and Development, Paris (France).
SPECIALISTS MEETING ON HELICOPTER ROTOR PREDICTION METHODS
Aug. 1973 150 p refs Mostly in ENGLISH; partly in FRENCH Conf. held at Milan, 30-31 Mar. 1973
(AGARD-CP-122; AGARD-CP-122) Avail: NTIS HC $9.50

The proceedings of a conference on methods for predicting the dynamic loads on helicopter rotors are presented. The subjects discussed are: (1) rotary wing design technology, (2) rotor system evaluation using helicopter flight simulation program, (3) load prediction methods for hingeless rotor helicopters, and (4) integrated rotor/body loads prediction.

N74-10909 Kaman Aerospace Corp., Bloomfield, Conn.
ROTARY WING DESIGN METHODOLOGY
Andrew Z. Lemnios *In* AGARD Specialists Meeting on Helicopter Rotor Prediction Methods Aug. 1973 14 p refs

A nonlinear aeroelastic blade loads analysis is described for calculating the coupled responses, airloads distributions, and performance of helicopter rotors. The analysis is divided into two major parts: (1) calculation of blade transient stability behavior by means of linearized, coupled equations of motion; (2) calculation of periodic blade dynamics and airloads distributions using fully coupled, nonlinear equations of motion. The analysis includes six response modes and two input control modes. The equations of motion include all nonlinear inertial coupling effects and nonlinear aerodynamic effects such as reverse flow, Mach number variations, large induced flow angles, unsteady aerodynamics, and variable inflow. Additional features to the analysis are the inclusion of feedback mechanical coupling among the assumed modes and the inclusion of springs and dampers for each mode. Author

N74-10910 Boeing Co., Philadelphia, Pa. Structures Staff.
CURRENT LOADS TECHNOLOGY FOR HELICOPTER ROTORS
Richard Gabel *In* AGARD Specialists Meeting on Helicopter Rotor Prediction Methods Aug. 1973 11 p refs

Prediction of fatigue design loads is essential for proper sizing of helicopter rotor systems. The C-60 rotor loads computer program is discussed. It incorporates the effects of airfoil section geometry, compressibility, stall, three-dimensional flow, unsteady aerodynamics, and nonuniform inflow to provide reliable rotor loads for steady-state flight conditions even into the blade stall region. Rotor loads predictions are compared with actual flight test data from Boeing CH-47 and Model 347 helicopters. An

approach to component sizing is presented in which a fatigue design loads histogram is constructed using calculated steady-state flight loads and empirically-determined maneuver loads. Current efforts to improve rotor loads predictions through incorporation of fully coupled lag-pitch-flap routines, simulation of control system dynamics, and development of maneuver loads programs are discussed. Author

N74-10911 Advisory Group for Aerospace Research and Development, Paris (France).
PREDICTION OF HELICOPTER ROTOR LOADS
J. Gallot *In its* Specialists Meeting on Helicopter Rotor Prediction Methods Aug. 1973 8 p refs In FRENCH; ENGLISH summary

The correct design of a rotor requires quite a precise knowledge of the alternating loads to which blade and hub are submitted. The problem of the stress evaluation, from the early design stage, may lead very sophisticated methods, because the blade is operating in a very complex environment. Nevertheless simplified methods may give sufficiently precise results to set up correctly the dimensions of the main elements of the rotor. The method described here supposes simple aerodynamics, independent of blade elastic deformations. The degree of simplification achieved in this theoretical method seems to be justified by the correlation obtained with experimental airloads measured on a model rotor, and stresses recorded on the same rotor or a full-scale semi-articulated rotor. Author

N74-10912 United Aircraft Corp., Stratford, Conn. Sikorsky Aircraft Div.
HELICOPTER ROTOR LOADS PREDICTIONS
Peter J. Arcidiacono and Raymond G. Carlson *In* AGARD Specialists Meeting on Helicopter Rotor Prediction Methods Aug. 1973 12 p refs

A review is presented of the assumptions and techniques forming the basis for detailed computation of rotor loads. Typical correlation results showing the effects of variable inflow and unsteady aerodynamics on blade stresses and control loads are presented. These effects are shown generally to improve the accuracy of predicted results. A discussion of areas where further work can be expected to provide a stronger technical foundation for present analyses is presented. The principal areas include more detailed modeling of (1) the dynamic stall process, (to define unsteady drag, airfoil and blade sweep effects), (2) blade lifting surface effects (to model more accurately blade-vortex interaction effects) and (3) airframe dynamics effects (to define more accurately the dynamic coupling between blade and hub motions). Author

N74-10913 Bell Helicopter Co., Fort Worth, Tex.
ROTOR SYSTEM DESIGN AND EVALUATION USING A GENERAL PURPOSE HELICOPTER FLIGHT SIMULATION PROGRAM
Richard L. Bennett *In* AGARD Specialists Meeting on Helicopter Rotor Prediction Methods Aug. 1973 15 p refs

New helicopter rotor systems are designed and existing configurations are evaluated by means of a general purpose helicopter flight simulation computer program. Discussed in this paper are both the analysis incorporated in the program and examples of the results obtained from the program. The three major parts of the analysis are: (1) mathematical model of an elastic rotor based on the modal technique, (2) rotor aerodynamics, and (3) basic rigid vehicle flight mechanics. The interrelationship among these three parts are discussed. The program has been used in support of the following phases of rotor system design and evaluation: (1) rotor blade frequency placement, (2) wind tunnel simulation, (3) steady state flight simulation, and (4) transient or maneuvering flight simulation. Author

N74-10914 Westland Helicopters, Ltd., Yeovil (England).
THE PREDICTION OF LOADING ACTIONS ON HIGH SPEED SEMI-RIGID HELICOPTERS
K. T. McKenzie and D. A. S. Howell *In* AGARD Specialists Meeting on Helicopter Rotor Prediction Methods Aug. 1973 19 p refs

The analytical techniques employed to predict the primary loading actions of a high speed semi-rigid rotor helicopter are described. The loading actions considered are overall aircraft trim balance, oscillatory rotor loading and vibratory forcing of the airframe. Some of the design considerations associated with each of these loading actions and the correlation with flight test analysis are presented. A description is given of a technique for the analysis of flight test results which has enabled a detailed comparison of the harmonic response of individual modes to be made. Author

N74-10915 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
LOADS PREDICTION METHODS FOR HINGELESS ROTOR HELICOPTERS
G. Reichert *In* AGARD Specialists Meeting on Helicopter Rotor Prediction Methods Aug. 1972 12 p refs

The special loading condition of the hingeless rotor helicopter is discussed. For the prediction of the loads, the aeroelastic behaviour of the rotor blades including characteristic coupling effects has to be considered. To determine the properties of the hingeless rotor system in an analytical approach, a mathematical model can be used, which simulates the aerodynamic and dynamic behaviour adequately. There is good experience with an aerodynamically and dynamically equivalent system of an articulated rotor with high hinge offset. Analytical data as well as flight test data will be shown for different flight conditions including maneuvers. There is relatively good correlation. The loads necessary for the structural design of the rotor can be predicted reasonably well. The methods are not satisfactory for control loads in stalled conditions and for high harmonic vibratory loads. Author

N74-10916 Army Air Mobility Research and Development Lab., Moffett Field, Calif.
INTEGRATED ROTOR/BODY LOADS PREDICTION
R. M. Carlson and A. W. Kerr (Lockheed-Calif., Burbank) *In* AGARD Specialists Meeting on Helicopter Rotor Prediction Methods Aug. 1972 8 p refs

An interdisciplinary analysis, which has grown out of a requirement for a nonlinear handling qualities evaluation tool, has been mechanized in a fashion which provides a capability to predict rotor loads affected by rotor/airframe interaction in steady-state and transient flight conditions. The modeling philosophy in developing this analysis combines the capabilities of a team of analysts from several specialties to create a versatile model which provides consistent data for numerous applications. This philosophy is presented in addition to a description of the model and a summary of its range of applications. Examples involving rotor loads prediction are presented: (1) evaluation of clearance between rotor blades and fuselage during extreme maneuvers, (2) estimation of four-bladed rotor reactionless inplane mode stability and loads, and (3) general maneuver capability and transient loads estimation. Also presented are areas proposed for continued development and refinement of the model to further increase its range of applications. Author

N74-10917*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
AIRCRAFT NOISE REDUCTION TECHNOLOGY
Mar. 1973 144 p refs
(NASA-TM-X-68241; E-7397) Avail: NTIS HC $9.25 CSCL 20A

Aircraft and airport noise reduction technology programs conducted by NASA are presented. The subjects discussed are: (1) effects of aircraft noise on individuals and communities, (2) status of aircraft source noise technology, (3) operational procedures to reduce the impact of aircraft noise, and (4) NASA

relations with military services in aircraft noise problems. References to more detailed technical literature on the subjects discussed are included. Author

N74-10918*# Scientific Translation Service, Santa Barbara, Calif.
AERODYNAMIC PROBLEMS OF STOL AIRCRAFT
Rene J. Ceresuela Washington NASA Nov. 1973 34 p refs Transl. into ENGLISH from Aeronaut. Astronaut (Paris), no. 41, 1973 p 43-56 Presented at 2d Intern. Student Conf. of the Intern. Astronaut. Congr., Vienna, 10 Oct. 1972
(Contract NASw-2483)
(NASA-TT-F-15182) Avail: NTIS HC $3.75 CSCL 01B

Some of the aerodynamic problems raised by the development of future STOL aircraft are discussed. This discussion emphasizes three characteristic aspects of these aircraft: (1) using the engine air flow to induce most of the lifting forces generated by the wing confers a new severity to the definition of the aircraft behavior in case of engine failure: (2) the important circulation around the wing, the variations in angle of attack and sideslip due to gusts applied at low speed, subject the aircraft lifting surfaces to highly deflected flow configurations, at present very difficult to predict through calculation; this situation justifies its turn the creation of new facilities and calculation methods; and (3) a constraint relative to noise, recently made even more severe, is added to other design constraints to make more complex the economic optimation of projects, by the enforced rejection of solutions that are aerodynamically attractive but are intolerably noisy. Author

N74-10919# National Transportation Safety Board, Washington, D.C.
AIRCRAFT ACCIDENT REPORTS: BRIEF FORMAT, US CIVIL AVIATION. ISSUE NO. 1: 1973 ACCIDENTS
10 Aug. 1973 531 p
(NTSB-BA-73-8) Avail: NTIS HC $28.75

Selected aircraft accident reports, in brief format, occurring in U.S. Civil Aviation operations during calendar year 1973 are presented. The 899 General Aviation accidents contained in this publication represent a random selection. The brief format presents the facts, conditions, circumstances, and probable cause(s) for each accident. Additional statistical information is tabulated by type of accident, phase of operation, kind of flying, injury index, aircraft damage, conditions of light, pilot certificate, injuries, and causal factors. Author

N74-10920# Battelle-Northwest, Richland, Wash. Atmospheric Sciences Dept.
METEOROLOGICAL INFORMATION FOR VERTICAL AND SHORT TAKE-OFF AND LAND (V/STOL) OPERATIONS IN BUILT-UP URBAN AREAS: AN ANALYSIS Interim Report
J. V. Ramsdell and D. C. Powell Sep. 1973 243 p refs
(Contract DOT-FA72WAI-263)
(FAA-RD-72-135) Avail: NTIS HC $14.25

An analysis was conducted to identify potential meteorological problems of terminal operations of V/STOL aircraft in built-up urban areas, and to evaluate the adequacy of existing meteorological information to achieve satisfactory development and ensure safe, expeditious operation of a V/STOL transportation system. Existing meteorological information was found inadequate in several respects. To remedy this, a meteorological observation system has been designed for a climatological survey of representative V/STOL port sites in Seattle, Washington. The proposed climatological survey includes meteorological observations at three locations including a typical STOL port site, and elevated VTOL port site and a reference site at the Seattle-Tacoma airport. A technique for estimating wind roses is proposed. The technique involves the use of data collected during the short observation period to modify a wind rose from the closest site having a stable climatology. Author

N74-10921# Lockheed-Georgia Co., Marietta.
V/STOL NOISE PREDICTION AND REDUCTION Final Report, Jun. 1972 - Aug. 1973
Wiley A. Guinn, Dennis F. Blakney, and John S. Gibson Aug. 1973 397 p refs
(Contract DOT-FA72WA-3099)
(LG73ER0062; FAA-RD-73-145) Avail: NTIS HC $22.00

A four phase program of aircraft noise prediction and reduction for V/STOL aircraft is presented. The phases are as follows: (1) identification of noise sources in rotary and jet stream type propulsion systems, (2) definition of noise generating mechanisms for jet stream V/STOL systems, (3) analysis of applicable noise reduction concepts, and (4) numerical analysis and computer programs for predicting far field noise environment of various types of V/STOL aircraft. Author

N74-10922*# Kanner (Leo) Associates, Redwood City, Calif.
VIEWS REGARDING THE VALIDITY OF RESULTS FROM SIMULATION TESTING IN COMPARISON WITH THE RESULTS FROM ACTUAL FLIGHT TEST
U. Schulz and H. Seelmann Washington NASA Nov. 1973 22 p refs Transl. into ENGLISH from "Report on the Third Meeting of the DGLR-Symposium, Flight Testing Technology: Reliability of Results Derived from Simulation in Comparison with Results of actual Flight", West German report DLR-MITT-72-18, Oct. 1- 972 p 29-52 Conf. Held at Bremen, 28 Apr. 1972
(Contract NASw-2481)
(NASA-TT-F-15172) Avail: NTIS HC $3.25 CSCL 01C

A comparison of the validity of results obtained by flight simulation with results obtained from actual flight tests is presented. The background for the development of the simulator is discussed. The techniques for conducting the simulation are outlined. Examples of flight simulation operations are developed. Results of the comparison indicate good correlation between simulation and flight test data. Author

N74-10923*# Kanner (Leo) Associates, Redwood City, Calif.
COMPARISON OF SIMULATION AND FLIGHT TESTING AT AUTOMATIC STOL LANDING
H. Boehret Washington NASA Nov. 1973 21 p Transl. into ENGLISH from "Report on the Third Meeting of the DGLR-Symposium, Flight Testing Technology: Reliability of Results Derived from Simulation in Comparison with Results of Actual Flight", West German report DLR-Mitt-72-18, Oct. 1972 p 7-28 Conf. held at Bremen, 28 Apr. 1972
(Contract NASw-2481)
(NASA-TT-F-15171) Avail: NTIS HC $3.25 CSCL 01C

The comparison of simulation and flight test results for automatic STOL landings is presented. The subjects discussed are: (1) description of flight control system, (2) control of flight path during approach, (3) control of aerodynamic flow conditions, (4) description of simulator, (5) influence of nonlinearity, and (6) application of radar for altitude measurements. Author

N74-10924# Laboratorium fuer Betriebsfestigkeit, Darmstadt (West Germany).
SERVICE LOADS ON NOSE LANDING GEARS OF THE F-104 AIRPLANE [BETRIEBSKRAEFTE AN BUGFAHRWERKEN DES FLUGZEUGES F-104 G]
O. Buxbaum Dec. 1972 73 p refs In GERMAN Sponsored by Messerschmitt-Boelkow-Blohm G.m.b.H.
(LBF-TB-103/1972) Avail: NTIS HC $5.75

Vertical, lateral and drag loads on nose gears were recorded continuously during 50 flights of two-F-104 G aircraft, and were analyzed statistically. Cumulative frequency and extreme value distributions of the loads in the three axes are presented, as well as information about the correlations between simultaneously occurring load components for the loading conditions, landing, spring-back, taxiing, transition, braking, engine run-up, turning and pivoting. ESRO

N74-10925# Boeing Aerospace Co., Seattle, Wash.
STOL TACTICAL AIRCRAFT INVESTIGATION. VOLUME 1: CONFIGURATION DEFINITION (MEDIUM STOL TRANSPORT WITH VECTORED THRUST/MECHANICAL FLAPS) Final Technical Report, 8 Jun. 1971 - 12 Jan. 1973

Richard H. Carroll, John W. Jants, and Peter Milns May 1973 208 p refs
(Contract F33615-71-C-1757; AF Proj. 643A)
(AD-766637; D180-14408-1; AFFDL-TR-73-19-Vol-1) Avail: NTIS CSCL 01/3

A configuration for an Advanced Medium STOL Transport (AMST) using vectored thrust for powered lift is defined in detail. Capability to operate from an austere forward airfield of 2000 feet length at the midpoint of 500 nm radius mission with 28,000 lbs of payload is substantiated by aerodynamic, propulsion, structural, and weights data. The vectored thrust powered lift concept is compared with other powered lift schemes considered for the AMST. A program of continuing research and development in tactical airlift and STOL technology is recommended. Author (GRA)

N74-10926# Boeing Aerospace Co., Seattle, Wash.
STOL TACTICAL AIRCRAFT INVESTIGATION. VOLUME 2, PART 1: AERODYNAMIC TECHNOLOGY (DESIGN COMPENDIUM, VECTORED THRUST/MECHANICAL FLAPS) Final Technical Report, 8 Jun. 1971 - 8 Dec. 1972
William J. Runciman, Gary R. Letsinger, Bernard F. Ray, and Fred W. May May 1973 236 p refs
(Contract F33615-71-C-1757; AF Proj. 643A)
(AD-766639; D180-14409-1; AFFDL-TR-73-19-Vol-1-Pt-1) Avail: NTIS CSCL 01/3

The report presents methods for predicting the performance determining aerodynamic characteristics and the stability derivatives of transport-type configurations employing the vectored-thrust mechanical-flap high-lift concept. These methods are suitable for preliminary design. They have been automated in a FORTRAN 4 computer program, for which a users manual and listing are included in this document. Author (GRA)

N74-10927# General Dynamics/Convair, San Diego, Calif.
STOL TACTICAL AIRCRAFT INVESTIGATION. VOLUME 1: CONFIGURATION DEFINITION Final Report, 7 Jun. 1971 - 31 Jan. 1973
J. Herbert, Jr., C. A. Whitney, R. E. Johnston, G. B. Nicoloff, E. C. Laudeman, G. F. Campbell, A. Mattia, B. Bracka, W. Service, H. Stocker et al Wright-Patterson AFB, Ohio AFFDL May 1973 158 p refs
(Contract F33615-71-C-1754; AF Proj. 643A)
(AD-766941; GDCA-DHG73-001-Vol-1; AFFDL-TR-73-21-Vol-1) Avail: NTIS CSCL 01/3

The overall objective of the design effort was to conduct a preliminary vehicle-sizing activity to establish baseline configurations for the STOL tactical aircraft investigation. These preliminary baselines were used for the takeoff and landing studies and as a point of departure for wind tunnel test planning and flight control technology activities. The lift/propulsion concepts studied were: Externally Blown Flap (EBF); Mechanical Flap plus Vectored Thrust (MF/VT); and Internally Blown Flap (IBF). The report summarizes the design activities for the three-month and six-month configuration reviews. GRA

N74-10928# General Dynamics/Convair, San Diego, Calif.
STOL TACTICAL AIRCRAFT INVESTIGATION. VOLUME 3: PERFORMANCE GROUND RULES AND METHODS. BOOK 1: TAKEOFF AND LANDING GROUND RULES Final Report, 7 Jun. 1971 - 31 Jan. 1973
J. Herbert, Jr., C. A. Whitney, E. C. Laudeman, and G. T. Draper Wright-Patterson AFB, Ohio AFFDL May 1973 55 p refs
(Contract F33615-71-C-1754; AF Proj. 643A)
(AD-766942; GDCA-DHG73-001-Vol-3-1; AFFDL-TR-73-21-Vol-3-1) Avail: NTIS CSCL 01/3

The takeoff and landing performance of tactical STOL transports is entirely dependent on rough field operational capability, ground rules, and specified criteria. A brief study was conducted to assess the impact of stall margins, rolling friction, braking friction, rotation rate, and climb gradient. The STOL handling qualities criteria that provide allowances for the relationship of takeoff and landing distances were briefly investigated. Recommended guidelines, takeoff and landing ground rules, and minimum flying speed are presented. (Modified author abstract) GRA

N74-10929# Whittaker Corp., San Diego, Calif. Research and Development Div.
LOW COST, FIBER GLASS REINFORCED PLASTIC FUEL TANK, VOLUME 1 Final Report, May 1970 - Jun. 1972
Vance A. Chase Apr. 1973 190 p refs
(Contract F33615-70-C-1636)
(AD-766361; AFML-TR-73-26-Vol-1) Avail: NTIS CSCL 01/3

Fiber glass reinforced plastic composite fuel tanks (300 gal.) for the A7D aircraft were developed and tested. The primary objective of this program was to demonstrate feasibility of utilizing fiber reinforced plastic composite materials for fabrication of aircraft tankage on a production basis at low cost. A plywrapping fabrication process in combination with a cost effective design and inexpensive materials selection resulted in a tank considerably lower in cost than the metal equivalent. A cost projection for production quantities of plastic fuel tanks shows a 38% cost saving over metal tanks for a 1200-unit production run. The tank developed utilized woven glass roving and epoxy resin for the main shell and polyester sheet molding compound for the nose and tail cone assemblies. (Modified author abstract) GRA

N74-10930# Naval Aerospace Medical Research Lab., Pensacola, Fla.
ORIENTATION-ERROR ACCIDENTS IN REGULAR ARMY AIRCRAFT DURING FISCAL YEAR 1970: RELATIVE INCIDENCE AND COST
Jorma I. Niven, W. Carroll Hixson, and Emil Spezia 10 Aug. 1973 47 p refs Prepared in cooperation with Army Aeromedical Res. Lab.
(MF51524005)
(AD-767028; NAMRL-1188; USAARL-74-3) Avail: NTIS CSCL 01/2

The report is the fourth in a series of dealing with the pilot disorientation/vertigo accident problem in Army fixed wing and rotary wing flight operations. Incidence and cost data presented for fiscal year 1970 include a total of 81 major and minor orientation-error accidents (25 of which were fatal), resulting in 80 fatalities, 104 nonfatal injuries, and an over-all aircraft damage cost of $19,355,689. The contribution of rotary wing accidents to this total was 75 accidents (24 of which were fatal), resulting in 79 fatalities, 98 nonfatal injuries, and over-all aircraft damage cost of $17,060,490. Author (GRA)

N74-10931# Whittaker Corp., San Diego, Calif. Research and Development Div.
LOW COST, FIBER GLASS REINFORCED PLASTIC FUEL TANK, VOLUME 2 Final Technical Report, May 1970 - Jun. 1972
Vance A. Chase Apr. 1973 260 p refs
(Contract F33615-70-C-1636)
(AD-766490; MJO-3019; AFML-TR-73-26-Vol-2) Avail: NTIS CSCL 13/4

Fiber glass reinforced plastic composite fuel tanks (300 gal.) for the A7D aircraft were developed and tested. The primary objective of the program was to demonstrate feasibility of using fiber reinforced plastic composite materials for fabrication of aircraft tankage on a production basis at low cost. The objective was satisfactorily met. Fatigue data for the composite and adhesive bonded materials used in fabrication of the tank was developed. Analysis of the tank involving loads, weight, stress, nesting, and tank volume was performed. Procedure and results of these analyses are reported. Author (GRA)

N74-10932# Air Force Materials Lab., Wright-Patterson AFB, Ohio.
A UNIQUE METHOD FOR MONITORING CABIN AIR POLLUTION FROM ENGINE OIL IN THE EB-57 D AIRCRAFT Final Technical Report, Sep. 1968 - Jul. 1970
William J. Crawford and Henry A. Wells May 1973 23 p
(AF Proj. 7360)
(AD-766701; AFML-TR-72-244) Avail: NTIS CSCL 01/3

A simple reliable method for monitoring engine oil pollution in aircraft cabin atmospheres is presented. The method involves use of a specially designed sampling device and a standard quantitative infrared spectroscopic procedure. The report describes the use of this device to evaluate an air decontamination

system on the EB-57D aircraft. A catalytic filter has been recommended for use in the EB-57D aircraft to lower the oil content in the cabin atmosphere. Author (GRA)

N74-10933# Whittaker Corp., San Diego, Calif. Research and Development Div.
MANUFACTURING METHODS TECHNOLOGY (MM/T) FOR BALLISTIC-TOLERANT FLIGHT CONTROL COMPONENTS Final Technical Report, Jun. 1971 - Jan. 1973
R. L. VanAuken May 1973 86 p refs
(Contract DAAJ02-71-C-0062; DA Proj. 1F1-62208-A-170)
(AD-766744; MJO-4314; USAAMRDL-TR-73-20) Avail: NTIS CSCL 01/3

The objective of this program was to develop manufacturing methods and technology for producing glass reinforced plastic, ballistic-tolerant flight control components with a high degree of reliability while using low-cost fabrication techniques. This objective was achieved through development of component designs to obtain simplicity and ease of manufacture. Maximum use was made of commercially available, finished material forms which required a minimum of additional processing. Matched die molding processes were developed which allowed rapid manufacture of parts to final net dimensions. Assembly techniques were developed which used adhesive bonding in precision fixtures and allowed a high degree of reproducibility and reliability of the finished component. (Modified author abstract) GRA

N74-10935# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
ESTIMATION OF AN AERONAUTICAL EQUIPMENT MISSION RELIABILITY M.S. Thesis
Robert N. Cockburn May 1973 83 p refs
(AD-766886; GSA/MA/73-1) Avail: NTIS CSCL 01/3

The report develops methods for estimating the probability that an aeronautical equipment will operate satisfactorily for the duration of a specific mission. The failure times are modeled by exponential and Weibull densities. The parameters are estimated from multiple independent grouped and censored samples. Several estimation methods are developed for each model. In addition, the equations to obtain maximum-likelihood estimates are derived. However, they would have to be solved iteratively. Monte Carlo simulation is used to compare estimates with the data grouped and with the failure times known. Author (GRA)

N74-10936# General Dynamics/Convair, San Diego, Calif. Aerospace Div.
STOL TACTICAL AIRCRAFT INVESTIGATION. VOLUME 3: PERFORMANCE GROUND RULES AND METHODS. BOOK 2: TAKEOFF AND LANDING DIGITAL COMPUTER PROGRAM Final Report, 7 Jun. 1971 - 31 Jan. 1973
J. Hebert, Jr. and C. A. Whitney May 1973 133 p refs
(Contract F33615-71-C-1754; AF Proj. 643A)
(AD-766943; GDCA-DHB73-001-Vol-3-2;
AFFDL-TR-73-21-Vol-3-2) Avail: NTIS CSCL 01/3

The MILSTOL (MILitary STOL) takeoff and landing digital computer program was developed to compute takeoff and landing characteristics of powered-lift STOL aircraft. It calculates a point mass takeoff and/or landing for a trimmed configuration with either externally blown jet flaps, internally blown jet flaps, or mechanical flaps with vectored thrust. Contained in this report are: Discussion of assumptions and methods used in the trajectory calculations; Definition of common list variables; Definition of the input variables and sample input data for the externally blown jet flap configuration; Sample output for the externally blown flap configuration; and Program listings and flow charts. The program is written in FORTRAN IV for use on CDC 6000 series digital computers and requires 37 K sub 8 central memory for loading and execution. GRA

N74-10937# Boeing Aerospace Co., Seattle, Wash.
STOL TACTICAL AIRCRAFT INVESTIGATION. VOLUME 2, PART 2: A LIFTING LINE ANALYSIS METHOD FOR JET-FLAPPED WINGS Final Technical Report, Jun. 1971 - Mar. 1973
Franklyn J. Davenport Jun. 1973 116 p refs
(Contract F33615-71-C-1757; AF Proj. 643A)
(AD-766877; D180-14403-2-Vol-2-Pt-2;
AFFDL-TR-73-19-Vol-2-Pt-2) Avail: NTIS CSCL 01/3

An analytical procedure is developed for jet flapped wings, in which three-dimensional features of the trailing vortex system are represented. More conservative induced drag is predicted than by analyses based on the traditional planar vortex system. Illustrative examples are given showing that this method gives better agreement with measured drag than the planar-vortex methods. Author (GRA)

N74-10938# Boeing Aerospace Co., Seattle, Wash.
STOL TACTICAL AIRCRAFT INVESTIGATION. VOLUME 3: TAKEOFF AND LANDING PERFORMANCE GROUND RULES FOR POWERED LIFT STOL TRANSPORT AIRCRAFT Final Technical Report, 8 Jun. - 8 Sep. 1971
Franklyn J. Davenport, Arnold E. Rengstorff, and Vernon F. VanHeyingen May 1973 60 p refs
(Contract F33615-71-C-175; AF Proj. 643A)
(AD-766840; D180-14403-1-Vol-3; AFFDL-TR-73-19-Vol-3)
Avail: NTIS CSCL 01/3

Rules for determining takeoff and landing distances of STOL transport airplanes equipped with powered-lift systems are proposed and discussed. These rules related to speed margins and maneuvering capability required for safe operations and to the procedures for computation of required runway lengths. The most significant difference between the proposed rules and conventional performance rules is that speed margins and maneuvering g - margins should be based on the airplane's capability with power on. Procedures for calculation of powered-lift STOL performance are stated in detail. Author (GRA)

N74-10939# Boeing Aerospace Co., Seattle, Wash.
STOL TACTICAL AIRCRAFT INVESTIGATION. VOLUME 5, PART 2: FLIGHT CONTROL TECHNOLOGY: PILOTED SIMULATION OF A MEDIUM STOL TRANSPORT WITH VECTORED THRUST MECHANICAL FLAPS Final Technical Report, Jun. 1971 - Dec. 1972
James H. Vincent May 1973 249 p refs
(Contract F33615-71-C-1757)
(AD-766843; D180-14412-2-Vol-5-Pt-2;
AFFDL-TR-73-19-Vol-5-Pt-2) Avail: NTIS CSCL 01/3

Fixed base and piloted simulation studies were conducted to evaluate control systems for a STOL tactical transport equipped with vectored thrust. Unaugmented aircraft flying qualities were found to be unacceptable. However, an augmented control system configuration was found to give excellent flying qualities and satisfactory behavior following engine or control system component failure. The present flying qualities standard for STOL aircraft, MIL-F-83300, was reviewed and several changes are suggested. Author (GRA)

N74-10940# Boeing Aerospace Co., Seattle, Wash.
STOL TACTICAL AIRCRAFT INVESTIGATION. VOLUME 6: AIR CUSHION LANDING SYSTEM STUDY Final Technical Report, 8 Jun. 1971 - 7 Feb. 1972
Lloyd H. Gardner, Charles J. Pizzichemi, and Peter Milns May 1973 99 p refs
(Contract F33615-61-C-1757)
(AD-766844; D180-14407-1-Vol-6; AFFDL-TR-73-19-Vol-6)
Avail: NTIS CSCL 01/3

Analyses and design studies have been conducted to determine the characteristics of an Air Cushion Landing System (ACLS) as it would be applied to an Advanced Medium STOL Transport (AMST) equipped with mechanical flaps and a vectored thrust powered lift system. It was determined that an ACLS would be feasible on an AMST type airplane, but requires a special housing arrangement which broadens the ACLS footprint area when it is deployed. Furthermore, special provisions are needed for ground handling and parking. Because it eliminates some of the concentrated loads associated with conventional landing gear, and is easily faired for low drag when retracted, the ACLS would permit a noticeable reduction in aircraft empty

weight for a given mission requirement, if structural provisions for conventional landing gear are not included in the airframe. Substantial uncertainties remain unresolved especially with respect to aircraft/air cushion landing dynamics and spray/debris effects. Author (GRA)

N74-10941# Ohio State Univ. Research Foundation, Columbus.
STUDY OF THE ELECTROSTATIC FIELD AND CHARGE DISTRIBUTION IN A VORTEX SEEDED WITH DUST Interim Technical Report
John W. Daugherty and Henry R. Velkoff Jul. 1973 355 p refs
(Grant DA-31-124-ARO(D)-246; DA Proj. 200-10501-B-700)
(AD-766815; AROD-4942-21-E) Avail: NTIS CSCL 01/3

A program was undertaken to investigate the vortex geometry, particle distribution and electric field distribution in a trailing vortex shed from an airfoil tip placed in a dust laden flow. A differential airfoil, positioned in a subsonic wind tunnel, generated the trailing vortex. Dust conditions, typical of a helicopter landing zone, were simulated by seeding the wind tunnel flow with P.V.C. plastic pellets, No. 3 sand, and No. 120 sand. A vaned probe was used to measure the vortex geometry. A particle impact probe and a miniature field meter were used to map the particle distribution and electric field distribution across the trailing vortex. Vortex geometry particle distribution and electric field intensity were measured throughout the plane normal to the wind tunnel axis at several locations downstream from the airfoil. (Modified author abstract) GRA

N74-10942* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SOLID STATE CONTROLLER THREE AXES CONTROLLER Patent
Charles L. Bailey, Jr., inventor (to NASA) Issued 6 Nov. 1973 10 p Filed 15 Mar. 1973 Supersedes N73-20041 (11 - 11, p 1237)
(NASA-Case-MSC-12394-1; US-Patent-3,771,037;
US-Patent-Appl-SN-341662; US-Patent-Class-318-580;
US-Patent-Class-318-628; US-Patent-Class-244-83) Avail: US Patent Office CSCL 13I

The reported flight controller features a handle grip which is mounted on a longitudinally extending control element. The handle grip is pivotally mounted on the control element about a pitch axis which is perpendicular to the longitudinal axis through the control element. The pivotal mounting includes a resilient force mounting mechanism which centers the grip relative to the control element. Rotation of the handle grip produces a direct rotation of a transducer element in a transducer which provides an electrical indication of the rotative movement about three mutually perpendicular axes.
Official Gazette of the U.S. Patent Office

N74-11018# Standard Electrik Lorenz A.G., Stuttgart (West Germany).
AEROSAT AND MARSAT: SATELLITES FOR MOBILE SERVICES [AEROSAT UND MARSAT, SATELLITEN FUER MOBILE DIENSTE]
H. C. Freiesleben and H. J. Wollak 1973 10 p refs In GERMAN Presented at the DGLR Symp. Nachrichtensatelliten, Stuttgart, 16-17 May 1973
Avail: NTIS HC $3.00

The Aerosat and Marsat communication satellite projects for air traffic control and ship navigation are discussed. Some of the problems reviewed are: frequency assignment, antennas for aircraft and ships, type of modulation, satellite multiple access techniques, transponders, and multipath propagation. ESRO

N74-11059*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
A ROLL-PITCH INTERACTION SIMULATOR AND A CONTROL POSITION COMMAND ENCODER FOR REMOTE PILOTING OF SPIN-ENTRY RESEARCH MODELS
Charles W. Meissner, Jr. Washington Nov. 1973 21 p
(NASA-TN-D-7361; L-9076) Avail: NTIS HC $2.75 CSCL 01C

The Langley Research Center uses radio-controlled, scaled aircraft models to study the spin-entry characteristics of aircraft. Recent spin-entry studies required the use of an electronic proportional-control system for manipulating model control surfaces. In order to meet control system requirements, a special-purpose analog computer was designed to simulate the coupling between roll and pitch controls. A digital encoder was designed to encode the voltage analogs of control-surface position into a special pulse format for transmission to the model. This paper describes the two special developments and their relationship to the functions of the overall control system.
Author

N74-11065# Antenna Corp. of America, Harleysville, Pa.
IMPROVEMENT OF PERFORMANCE CHARACTERISTICS OF A CLASS OF BROADBAND CIRCULARLY POLARIZED ANTENNAS Final Report
Sep. 1972 129 p refs
(Contract N62269-72-C-0325)
(AD-766473) Avail: NTIS CSCL 09/5

The report covers a development program for the improvement of performance characteristics of a class of broadband circularly polarized antennas for use with tactical airborne jamming equipment. A historical record of the program, testing procedures, significant results, conclusions, and recommendations are covered. Author (GRA)

N74-11077*# Rensselaer Polytechnic Inst., Troy, N.Y. School of Engineering.
ANALYSIS AND DESIGN OF A CAPSULE LANDING SYSTEM AND SURFACE VEHICLE CONTROL SYSTEM FOR MARS EXPLORATION Progress Report, 1 Jul. 1972 - 30 Jun. 1973
D. K. Frederick, P. K. Lashmet, G. N. Sandor, C. N. Shen, E. V. Smith, and S. W. Yerazunis 30 Jun. 1973 175 p refs
(Grant NGL-33-018-091)
(NASA-GR-136069; RPI-TR-MP-35) Avail: NTIS HC $10.75 CSCL 13F

Problems related to the design and control of a mobile planetary vehicle to implement a systematic plan for the exploration of Mars are reported. Problem areas include: vehicle configuration, control, dynamics, systems and propulsion; systems analysis, terrain modeling and path selection; and chemical analysis of specimens. These tasks are summarized: vehicle model design, mathematical model of vehicle dynamics, experimental vehicle dynamics, obstacle negotiation, electrochemical controls, remote control, collapsibility and deployment, construction of a wheel tester, wheel analysis, payload design, system design optimization, effect of design assumptions, accessory optimal design, on-board computer subsystem, laser range measurement, discrete obstacle detection, obstacle detection systems, terrain modeling, path selection system simulation and evaluation, gas chromatograph/mass spectrometer system concepts, and chromatograph model evaluation and improvement. Author

N74-11091*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
TEST OF LOX COMPATIBILITY FOR ASPHALT AND CONCRETE RUNWAY MATERIALS
C. V. Meyers, Coleman J. Bryan, and Billy J. Lockhart Dec. 1973 34 p refs
(NASA-TM-X-64086; KSC-MTB-238-72) Avail: NTIS HC $3.75 CSCL 01E

A literature survey and a telephone canvass of producers and users of LOX is reported which yielded one report of an accident resulting from a LOX spill on asphalt, one discussion

of hazardous conditions, and an unreferenced mention of an incident. Laboratory tests using standard LOX impact apparatus yielded reactions with both old and new alphalt, but none with concrete. In the final test, using a larger sample of asphalt, the reaction caused extensive damage to equipment. Initial field experiments using 2-meter square asphalt slabs covered with LOX, conducted during rainy weather, achieved no reaction with plummets, and limited reaction with a blasting cap as a reaction initiator. In a final plummet-initiated test on a dry slab, a violent reaction, which appeared to have propagated over the entire slab surface, destroyed the plummet fixture and threw fragments as far as 48 meters. Author

N74-11082*# Linguistic Systems, Inc., Cambridge, Mass.
GROUND LIGHTING EQUIPMENT
M. Gouet Washington NASA Nov. 1973 10 p Transl. into ENGLISH of the publ. "Les Materiels de Balisage" Paris, Assoc. Franc. des Ingr. et Techniciens de l'Aeron. et de l'Espace, 1967 9 p Presented at 8th Intern Aeron. Congr., Paris, 29-31 May 1967
(Contract NASw-2482)
(NASA-TT-F-15176) Avail: NTIS HC $3.00 CSCL 01E

The importance of visual aids in airport ground lighting equipment is discussed in terms of lower operational standards. Different types of light beaconing devices are presented along with the effects of the lowering of minimums on aircraft guidance and landing. The lighting equipment used in France is also described. T.M.R.

N74-11083*# Linguistic Systems, Inc., Cambridge, Mass.
VISUAL LANDINGS IN REGIONAL AND LOCAL AIRPORTS
Silvia Schellenberg Washington NASA Nov. 1973 15 p refs Transl. into ENGLISH from AEG Mitt. (W. Germany), v. 62, 1972 p 34-39
(Contract NASw-2482)
(NASA-TT-F-15177) Avail: NTIS HC $3.00 CSCL 01E

The basic plans for the ground lighting facilities worked up by AEG-Telefunken in cooperation with the German Federal Institute for Flying safety are presented. The program is broken down into five sections, each section offering recommendations for the different situations found at most regional airports. These sections are: (1) lighting the takeoff and loading runways, (2) obstacle lights and beacons, (3) runway beaconing, (4) approach beaconing, and (5) switching and control systems. Author

N74-11084*# Kanner (Leo) Associates, Redwood City, Calif.
INFORMATION CONTENT OF DIFFERENT RUNWAY LIGHTING PATTERNS
J. Kylstra and J. Hoogerheide Washington NASA Nov. 1973 13 p refs Transl. into ENGLISH from Aeromed. Acta (Soesterburg), v. 9, 1963 1964 p 21-29
(Contract NASw-2481)
(NASA-TT-F-15179) Avail: NTIS HC $3.00 CSCL 01E

Commercial pilots sitting before and looking at a television screen, on which were presented moving dots or bars simulating an approach to a visual landing system, were asked to discriminate between level flight or flight with change in altitude in the sense of a descent. There were 4 patterns of light markings: single row, double row, single crossbars and double crossbars. Changes in altitude were significantly better observed in the double patterns than in the single patterns. Author

N74-11095*# Kanner (Leo) Associates, Redwood City, Calif.
SELECTED PROBLEMS REGARDING THE FORMATION OF A SIMULATION MODEL
K. H. Unterreiner Washington NASA Nov. 1973 15 p Transl. into ENGLISH from "Report on the Third Meeting of the DGLR-Symposium, Flight Testing Technology: Reliability of Results derived from Simulation in Comparison with Results of Actual Flight", West German report DLR-Mitt-72-18, Oct. 1972 p 67-78 Conf. held at Bremen, 28 Apr. 1972
(Contract NASw-2481)
(NASA-TT-F-15173) Avail: NTIS HC $3.00 CSCL 14B

Selected problems in the formation of simulation models are presented. The construction of a flight control system for a V/STOL aircraft simulator is used as the example. Sources of errors in the construction of the system are explained and diagrams of typical systems are provided. Graphs of response curves and a table of performance data are included. Author

N74-11096*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MOTION SOFTWARE FOR A SYNERGISTIC SIX-DEGREE-OF-FREEDOM MOTION BASE
Russell V. Parrish, James E. Dieudonne, and Dennis J. Martin, Jr. (Electron. Assoc., Inc.) Washington Dec. 1973 44 p refs (NASA-TN-D-7350; L-8798) Avail: NTIS HC $3.00 CSCL 14B

Computer software for the conversion of fixed-base simulations into moving-base simulations utilizing a synergistic six-degree-of-freedom motion simulator has been developed. This software includes an actuator extension transformation, inverse actuator extension transformation, a centroid transformation, and a washout circuit. Particular emphasis is placed upon the washout circuitry as adapted to fit the synergistic motion simulator. The description of the washout circuitry and illustration by means of a sample flight emphasize that translational cue representation may be of good fidelity, but care in the selection of parameters is very necessary, particularly in regard to anomalous rotational cues. Author

N74-11097*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
OPTIMIZATION OF WAVE CANCELLATION IN VARIABLE POROSITY TRANSONIC WIND TUNNEL FLOWS
John William Davis Washington Nov. 1973 137 p refs (NASA-TN-D-7432; M-108) Avail: NTIS HC $4.50 CSCL 14B

A technique has been developed which is capable of determining the optimum wall configuration for a variable porosity perforated wall transonic wind tunnel. The technique is based on a mathematical model arrived at by considering the results of theory and past experimental investigations. A performance index was determined as a function of the significant wind tunnel parameters by comparing a formulation of this mathematical model, using MSFC 14 inch Trisonic Wind Tunnel experimental results, to interference free results. The resulting relationship was then used to determine the combination of wind tunnel parameters which should yield minimum reflected wave interference. A theoretical development of wall porosity requirements for thick wall inclined hole test sections is included which follows the trends and generally the magnitude of available experimental data. This theory is useful in studying the present variable porosity case, but also should be of value in studies concerning the wave cancellation process for fixed porosity walls. Author

N74-11099# Institut Franco-Allemand de Recherches, St. Louis (France).
STUDY OF CONDENSATION PHENOMENA IN THE ISL LASER WIND TUNNEL USING LIGHT DIFFUSION [UNTERSUCHUNG DER KONDENSATION IM LASER-WINDKANAL DES ISL DURCH LICHTSTREUUNG]
H. Mach 7 Nov. 1972 25 p refs In GERMAN
(Contract DRME-72/545)
(ISL-RT-19/72) Avail: NTIS HC $3.25

The condensation resulting from sudden cooling behind the Laval nozzle in a supersonic wind tunnel was investigated by means of CO2 laser light scattering. For quantitative analysis, the scattered light having an angle of 90 deg relative to the primary radiation, was measured. The medium was dried air under different pressures (20-300 torr working pressure) and two different mixtures of CO2/N2/He. the wavelength and polarization of the scattered radiation point at relatively large scattering particles with rapid growth. Comparsion of measurements leads to the conclusion that the condensation consists of

residual water, and not CO2, which indicates the presence of moisture notwithstanding evacuation of the gas container.
ESRO

N74-11101# Army Construction Engineering Research Lab., Champaign, Ill.
KEYED JOINT PERFORMANCE UNDER HEAVY LOAD AIRCRAFT
John L. Rice Aug. 1973 16 p refs Sponsored by Army
(AD-766706; CERL-TM-S-13) Avail: NTIS CSCL 13/2

The poor performance of keyed longitudinal construction joints in rigid airfield pavements under simulated C-5A traffic operations is presented. The data presented were collected from a full scale test track pavement supported on a low-strength subgrade. No deficiencies in materials or construction were found which would have adversely affected the performance of the keyed joint. The failures observed in the keyed joint demonstrate that a balanced design will result using the Corps of Engineers keyed joint dimensions. Author (GRA)

N74-11102# Air Force Weapons Lab., Kirtland AFB, N.Mex.
THE BEHAVIOR OF FLEXIBLE AIRFIELD PAVEMENTS UNDER LOADS: THEORY AND EXPERIMENTS Technical Report, 1 Apr. 1971 - 1 Apr. 1973
Y. T. Chou and R. H. Ledbetter Jul. 1973 181 p refs
(AF Proj.-683M)
(AD-766480; AFWL-TR-72-215) Avail: NTIS CSCL 01/2

The instrumentation data of the multiple-wheel heavy gear load (MWHGL) tests were reduced and analyzed. By incorporating the performance of test pavements under traffic, relations between load and pavement response were established. A method was developed to compute the measured stresses and deflections of the test pavements; based on the method, the stresses and deflections can be computed for similar types of airfield pavements under different loads. Correlations were established between computed parameters and traffic performance data from the MWHGL test section as well as from many other pavement tests conducted by the Corps of Engineers. Based on the instrumentation data, the principle of superposition was found to be valid for flexible pavements. Attempts were made to reevaluate the equivalent single-wheel loads for MWHGLs by many different methods. Author (GRA)

N74-11112 Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.
TURBULENT BOUNDARY LAYER GROWTH AT HYPERSONIC SPEEDS
J. L. Stollery May 1973 20 p refs
(IC-AERO-73-04) Avail: Issuing Activity

Starting from the momentum integral equation, simple relations for all the gross features of a turbulent boundary layer at hypersonic speeds, such as Stanton number and skin friction coefficient, were derived. These relations show explicitly the dependence on the hypersonic viscous interaction parameter, the wall temperature ratio, and the pressure gradient. The analysis was repeated for laminar flow and of the results with existing well-established relations showed agreement. ESRO

N74-11113*# Advanced Technology Labs., Inc., Westbury, N.Y.
ANALYSIS AND DESIGN OF THREE DIMENSIONAL SUPERSONIC NOZZLES. VOLUME 1: NOZZLE-EXHAUST FLOW FIELD ANALYSIS BY A REFERENCE PLANE CHARACTERISTICS TECHNIQUE
S. Dash and P. DelGuidice Oct. 1972 197 p refs
(Contract NAS1-10327)
(NASA-CR-132350; ATL-TR-166-Vol-1) Avail: NTIS HC $12.00 CSCL 20D

A second order numerical method employing reference plane characteristics has been developed for the calculation of geometrically complex three dimensional nozzle-exhaust flow fields, heretofore uncalculable by existing methods. The nozzles may have irregular cross sections with swept throats and may be stacked in modules using the vehicle undersurface for additional expansion. The nozzles may have highly nonuniform entrance conditions, the medium considered being an equilibrium hydrogen-air mixture. The program calculates and carries along the underexpansion shock and contact as discrete discontinuity surfaces, for a nonuniform vehicle external flow. Author

N74-11114*# Advanced Technology Labs., Inc., Westbury, N.Y.
ANALYSIS AND DESIGN OF THREE DIMENSIONAL SUPERSONIC NOZZLES. VOLUME 2: NUMERICAL PROGRAM FOR ANALYSIS OF NOZZLE-EXHAUST FLOW FIELDS
P. Kalben Oct. 1972 175 p
(Contract NAS1-10327)
(NASA-CR-132351; ATL-TR-166-Vol-2) Avail: NTIS HC $10.75 CSCL 20D

The FORTRAN IV Program developed to analyze the flow field associated with scramjet exhaust systems is presented. The instructions for preparing input and interpreting output are described. The program analyzes steady three dimensional supersonic flow by the reference plane characteristic technique. The governing equations and numerical techniques employed are presented in Volume 1 of this report. Author

N74-11115*# Advanced Technology Labs., Inc., Westbury, N.Y.
ANALYSIS AND DESIGN OF THREE DIMENSIONAL SUPERSONIC NOZZLES. VOLUME 3: A DESIGN TECHNIQUE FOR MULTIPLE NOZZLE CONFIGURATIONS
A. Ferri Oct. 1972 24 p
(Contract NAS1-10327)
(NASA-CR-132352; ATL-TR-166-Vol-3) Avail: NTIS HC $3.25 CSCL 20D

An iteration procedure for optimum nozzle design with application to hypersonic aircraft is discussed. In the procedure, intial values of several of the design parameters are assumed from simplified approximate considerations and are then varied systematically in order to determine the value of each parameter which optimizes nozzle performance. Improvements in nozzle performance are obtained by perturbing the initially assumed values of the geometric parameters on the basis of a computer analysis. Author

N74-11116*# Advanced Technology Labs., Inc., Westbury, N.Y.
ANALYSIS AND DESIGN OF THREE DIMENSIONAL SUPERSONIC NOZZLES. VOLUME 4: SIMILARITY LAWS FOR NOZZLE FLOWS
A. Ferri and G. Roffe Oct. 1972 31 p refs
(Contract NAS1-10327)
(NASA-CR-132353; ATL-TR-166-Vol-4) Avail: NTIS HC $3.75 CSCL 20D

The development of nozzles for hypersonic aircraft is discussed. The simulation of actual nozzle flows with low temperature nonreactive gases is described. Mathematical models of the flow equations nd thermodynamic relations are developed. Cold flow simulation tests were conducted and the results are included. Author

N74-11118*# Northrop Corp., Hawthorne, Calif. Aircraft Div.
ANALYSIS OF STRATIFIED AND CLOSELY SPACED JETS EXHAUSTING INTO A CROSSFLOW
H. Ziegler and P. T. Woller Nov. 1973 117 p refs
(Contract NAS1-11524)
(NASA-CR-132297; NOR-73-77) Avail: NTIS HC $8.00 CSCL 20D

Procedures have been developed for determining the flow field about jets with velocity stratification exhausting into a crossflow. Jets with three different types of exit velocity stratification have been considered: (1) jets with a relatively high velocity core; (2) jets with a relatively low velocity core; and (3) jets originating from a vaned nozzle. The procedure

developed for a jet originating from a high velocity core nozzle is to construct an equivalent nozzle having the same mass flow and thrust but having a uniform exit velocity profile. Calculations of the jet centerline and induced surface static pressures have been shown to be in good agreement with test data for a high velocity core nozzle. The equivalent ideal nozzle has also been shown to be a good representation for jets with a relatively low velocity core and for jets originating from a vaned nozzle in evaluating jet-induced flow fields. For the singular case of a low velocity core nozzle, namely a nozzle with a dead air core, and for the vaned nozzle, an alternative procedure has been developed. The internal mixing which takes place in the jet core has been properly accounted for in the equations of motion governing the jet development. Calculations of jet centerlines and induced surface static pressures show good agreement with test data these nozzles. Author

N74-11119*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
CONTROL OF SUPERSONIC WIND-TUNNEL NOISE BY LAMINARIZATION OF NOZZLE-WALL BOUNDARY LAYER
Ivan E. Beckwith, William D. Harvey, Julius E. Harris, and Barbara B. Holley Washington Dec. 1973 58 p refs
(NASA-TM-X-2879; L-9090) Avail: NTIS HC $3.50 CSCL 20D

One of the principal design requirements for a quiet supersonic or hypersonic wind tunnel is to maintain laminar boundary layers on the nozzle walls and thereby reduce disturbance levels in the test flow. The conditions and apparent reasons for laminar boundary layers which have been observed during previous investigations on the walls of several nozzles for exit Mach numbers from 2 to 20 are reviewed. Based on these results, an analysis and an assessment of nozzle design requirements for laminar boundary layers including low Reynolds numbers, high acceleration, suction slots, wall temperature control, wall roughness, and area suction are presented. Author

N74-11125# Naval Ship Research and Development Center, Bethesda, Md.
HYDRODYNAMIC FORCES ON OSCILLATING AND NONOSCILLATING SMOOTH CIRCULAR CYLINDERS IN CROSSFLOW Final Report
David W. Coder Oct. 1972 91 p refs
(AD-767022; NSRDC-3639) Avail: NTIS CSCL 20/4

A 12-in-diameter, 6-ft-long cylinder was towed horizontally 4 ft beneath the water surface and perpendicular to the flow. The cylinder was towed at a constant velocity under the following conditions: nonoscillating, oscillating in heave, oscillating in pitch (around the axis of the cylinder), and simultaneously oscillating in pitch and heave. Experimental data on lift, drag, and moment were obtained for Reynolds number from about 100,000 to above 1 million. The results show that the oscillations can significantly influence the magnitude of the lift, drag, and moments.
Author (GRA)

N74-11128# West Virginia Univ., Morgantown. Dept. of Aerospace Engineering.
THE STABILITY OF HELICAL VORTEX FILAMENTS IN THE WAKE OF A HOVERING ROTOR
Ojars Skujins and Richard E. Walters May 1973 143 p refs
(Contract N00014-68-A-0512; NR Proj. 215-163)
(AD-766828; TR-36) Avail: NTIS CSCL 20/4

An experimental investigation was performed to study the geometry and stability of the wake of a hovering rotor out of ground effect. A schlieren system in conjunction with a high speed drum camera was developed for this purpose, so that real-time sequence photographs could be taken of the vortex filaments as they were convected downstream. Two, three, and four bladed 16-inch diameter rotors were used operating at rotor speeds of up to 9000 RPM. The effects of a rotor speed, number of blades, and collective pitch, were correlated with the stability of the vortex wake system. Four modes of vortex filament instabilities were observed. Other topics discussed are the effect of rotor blade mismatching upon the performance of the rotor; and the effect of rotor blade tip modifications upon the trailing vortex formation and performance of the rotor system. Blade tips of elliptical, square and ogee designs were investigated. Schlieren pictures are included from both studies. (Modified author abstract) GRA

N74-11129# Naval Ordnance Lab., White Oak, Md.
TURBULENCE MEASUREMENTS WITH A LASER DOPPLER VELOCIMETER
William J. Yanta 1 May 1973 85 p refs
(AD-766781; NOLTR-73-94) Avail: NTIS CSCL 20/4

Turbulence measurements with a Laser Doppler Velocimeter (LDV) using the dual scatter or differential Doppler mode have been made in a subsonic, fully developed channel flow. The measurements were made using only those light scattering particles occurring naturally in air. Results include mean velocity profiles, turbulence intensities, Reynolds stress distributions and a skewness measurement of the velocity distribution function across the channel. Statistical techniques were used to obtain the various turbulence parameters. Guidelines have been established for the amount of data needed to obtain results with a specified accuracy and confidence level. Measurements have also been made to determine the particle-size distribution. An aerodynamic means was used to determine the size distribution, in contrast to the usual optical procedures. (Modified author abstract) GRA

N74-11164*# Naval Research Lab., Washington, D.C.
TERRAIN PROPERTIES AND TOPOGRAPHY FROM SKYLAB ALTIMETRY Monthly Progress Report, Sep. 1973
Allan Shapiro, Principal Investigator 26 Oct. 1973 1 p EREP
(NASA Order T-4716-B)
(E74-10043; NASA-CR-135884) Avail: NTIS HC $3.00 CSCL 08E

There are no author-identified significant results in this report.

N74-11187*# Battelle Columbus Labs., Ohio.
GEODETIC ANALYSIS OF SKYLAB ALTIMETRY PRELIMINARY DATA - SL/2 EREP PASS 9
A. G. Mourad, Principal Investigator and D. M. J. Fubara 21 Nov. 1973 28 p refs Presented at the Fall Ann. Meeting of the Am. Geophys. Union, San Francisco, 11 Dec. 1973 EREP
(Contract NAS9-13276)
(E74-10086; NASA-CR-135975) Avail: NTIS HC $3.50 CSCL 08E

The author has identified the following significant results. The analysis was based on a time series intrinsic relationship between the satellite ephemeris, altimeter measured ranges, and the corresponding a priori values of subsatellite geoidal heights. Using sequential least squares processing with parameter weighting, the objective was to recover (1) the absolute geoidal heights of the subsatellite points, and (2) the associated altimeter calibration constant(s). Preliminary results from Skylab altimetry are given, using various combinations of orbit ephemeris and altimeter ranges as computed differently by NASA/JSC and NASA/Wallops. The influences of orbit accuracy, weighting functions, and a priori ground truth are described, based on the various combination solutions. It is shown that to deduce geoidal height by merely subtracting the height of the satellite from the altimeter range is inadmissible. The results of such direct subtraction can be very misleading if the orbit used is computed from data that included altimeter data used as height constraints. In view of the current state of knowledge, the use of geodetic ground truth samples as control benchmarks appears indispensable for the recovery of absolute geoidal heights with correct scale.

N74-11198*# Naval Research Lab., Washington, D.C.
[ADAPTATION OF COMPUTER PROGRAMMING TO OUTPUT FORM OF ALTIMETER DATA] Monthly Progress

Report, 1 Jul. - 1 Aug. 1973
A. Shapiro, Principal Investigator 24 Aug. 1973 1 p EREP (NASA Order T-4716-B)
(E74-10087; NASA-CR-135976; MR-1) Avail: NTIS HC $3.00 CSCL 05B

There are no author-identified significant results in this report.

N74-11202*# Research Triangle Inst., Research Triangle Park, N.C.
[RADAR BACKSCATTERING AS A MEANS FOR MEASURING OCEAN SURFACE PARAMETERS USING S193 ALTIMETRY AND S190B PHOTOGRAPHY] Monthly Progress Report, 1-31 Oct. 1973
Charles L. Britt, Jr., Principal Investigator 26 Nov. 1973 1 p EREP
(Contract NAS9-13304)
(E74-10092; NASA-CR-136004) Avail: NTIS HC $3.00 CSCL 08J

There are no author-identified significant results in this report.

N74-11204*# *National Aeronautics and Space Administration.* Lewis Research Center, Cleveland, Ohio.
AIRBORNE PROFILING OF ICE THICKNESS USING A SHORT PULSE RADAR
R. S. Vickers (Colo. State Univ.), J. Heighway, and R. Gedney 1973 7 p refs Presented at Advanced Concepts and Techniques in the Study of Snow and Ice Resources, Monterey, Calif., 2-6 Dec. 1973
(NASA-TM-X-71481) Avail: NTIS HC $3.00 CSCL 08L

The acquisition and interpretation of ice thickness data from a mobile platform has for some time been a goal of the remote sensing community. Such data, once obtainable, is of value in monitoring the changes in ice thickness over large areas, and in mapping the potential hazards to traffic in shipping lanes. Measurements made from a helicopter-borne ice thickness profiler of ice in Lake Superior, Lake St. Clair and the St. Clair river as part of NASA's program to develop an ice information system are described. The profiler described is a high resolution, non-imaging, short pulse radar, operating at a carrier frequency of 2.7 GHz. The system can resolve reflective surfaces separated by as little as 10 cm. and permits measurement of the distance between resolvable surfaces with an accuracy of about 1 cm. Data samples are given for measurements both in a static (helicopter hovering), and a traverse mode. Ground truth measurements taken by an ice auger team traveling with the helicopter are compared with the remotely sensed data and the accuracy of the profiler is discussed based on these measurements. Author

N74-11223 Puget Sound Univ., Tacoma, Wash.
NASA REMOTE SENSING OF SEA ICE IN AIDJEX
W. J. Campbell *In* WMO Means of Acquisition and Commun. of Ocean Data, Vol. 2 1973 p 56-66 refs

AIDJEX (Arctic Ice Dynamics Joint Experiment) is described as an international and interdisciplinary study of the sea ice of the Arctic Ocean whose objective is to understand the dynamics and thermodynamic interaction between sea ice and its environment. A series of three AIDJEX pilot experiments using microwave radiometers aboard a CV-990 aircraft were made during the spring of 1970, 1971, and 1972, in the southern Beaufort Sea. The experiments and their results are described. ESRO

N74-11274# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
TURBULENCE NEAR THE TROPOPAUSE IN THE PRESENCE OF MOUNTAIN WAVES
G. S. Buldovskii 10 Aug. 1973 18 p refs Transl. into ENGLISH from Analiz Meteorol. Uslovii dlya Aviatsii (USSR), no. 95, 1972 p 17-26
(AD-766577; FTD-MT-24-744-73) Avail: NTIS CSCL 04/2

Investigation of the conditions for the development of turbulence near the tropopause, especially above a mountainous region, has great current significance in connection with the forthcoming flights of supersonic passenger aircraft. Near the tropopause there will be a transition zone to supersonic speed. The report discusses research on the conditions of turbulence near the tropopause above mountainous regions and simultaneous distribution of turbulence in the troposphere and the lower stratosphere. GRA

N74-11295# Army Electronics Command, Fort Monmouth, N.J.
DESIGN CONSIDERATIONS FOR THE CALCULATOR, ALTITUDE ML-646 (XE-1/UM)
Thomas J. Richter Aug. 1973 37 p refs
(DA Proj. 1T0-61102-B-53A)
(AD-766699; ECOM-5504) Avail: NTIS CSCL 04/2

The purpose of this effort was to investigate the parameters that would affect the design of a non-electronic calculator intended for emergency use in the Automatic Atmospheric Sounding Set AN/TMQ-19. The designed calculator, ML-646(XE-1)/UM, is used to compute meteorological balloon altitude; it is the result of trade-offs involving basic measurement accuracies of the ground tracking system, AN/TMQ-19, curvature of the earth corrections, geopotential altitude above surface, refractivity, and pitch and roll of the ground tracking system. Author (GRA)

N74-11296# General Electric Co., Schenectady, N.Y. Microwave Tube Operation.
HIGH SENSITIVITY 1000F GAS MULTIPLICATION UV FLAME DETECTOR FOR AIRCRAFT Final Technical Report, 3 Apr. 1972 - 30 Jun. 1973
Ralph J. Bondley 30 Jun. 1973 80 p refs
(Contract F33615-72-C-1269)
(AD-766960; AFAPL-TR-73-62) Avail: NTIS CSCL 14/2

The program was undertaken to design and develop an ultraviolet sensitive Geiger-Mueller type sensor to be used as a flame detector in aircraft engine compartments. Major objectives of the program include low operating voltage, solar blindness, fast response or counting characteristics, and operation at the high temperatures encountered in engine compartments. The design emphasis was directed toward meeting the requirements of flight qualified hardware. Selection of sensor materials to withstand the temperature environment, and development of processing techniques for assembling these materials into UV sensors constitutes a major part of this program. Spectral response characteristics, electrical characteristics of the detector, and design details of a side-mounted housing are included in this report. Author (GRA)

N74-11298# General Applied Science Labs., Inc., Westbury, N.Y.
STUDY OF MOIRE MEASURING TECHNIQUES FOR WIND TUNNEL MODEL DEFORMATION Final Report
Manlio Abele, Charles Roger, and Ernest Sanlorenzo Arnold AF Station, Tenn. AEDC Sep. 1973 71 p refs
(Contract F40600-72-C-0009)
(AD-766892; AEDC-TR-73-154) Avail: NTIS CSCL 14/2

An analytical and experimental study has been conducted to determine the feasibility of using Moire techniques for the accurate measurement of model distortions expected to be encountered in the HIRT Facility. A comprehensive study of the basic characteristics of Moire techniques has been carried out to determine the best approach which could both satisfy the constraints imposed by the size and configuration of the test section, and provide the necessary accuracy in the measurement of the local distortion. The results of the study suggest the selection of a measuring technique where the grating is an integral part of the surface of the test model. A Moire is formed by the

superimposition of two images of the grating obtained in the undistorted and distorted condition of the test model. A null method of analyzing the Moire pattern allows the accurate measurement of the local distortion. (Modified author abstract) GRA

N74-11304*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
TEST CHARACTERISTICS OF A WELDED ROTOR IN A 36,000-RPM LUNDELL ALTERNATOR
Stacy Lumannick, David W. Medwid, and George Tulisiak Washington Nov. 1973 15 p refs
(NASA-TM-X-2944; E-7535) Avail: NTIS HC $2.75 CSCL 10A

Two four-pole Lundell-type rotors consisting of magnetic and nonmagnetic materials were fabricated by weld-depositing Inconel 625 between two sections of AISI 4617 steel. The rotors had a major diameter of 8.28 cm (3.26 in.). Saturation curves for load and no-load conditions with one of the rotors installed in a 1200-Hz Brayton-cycle research alternator are presented. The other identical rotor was spin-tested to a speed of 63,000 rmp, which was equal to 175 percent of the rated speed. Author

N74-11336# Erlangen-Nuremberg Univ. (West Germany).
MANUFACTURE AND PROPERTIES OF TITANIUM AND TITANIUM ALLOYS EMPHASIZING THEIR USE IN AERONAUTICS. PART 1: MANUFACTURE AND PROCESSING [HERSTELLUNG UND EIGENSCHAFTEN VON TITAN UND TITANLEGIERUNGEN UNTER BESONDERER BERUECKSICHTIGUNG DER LUFTFAHRT. TEIL 1: HERSTELLUNG UND VERARBEITUNG]
May 1973 72 p refs In GERMAN Proc. of the 3rd Internal Colloq. of the Mater. Sci. Inst. II, Erlangen, West Ger., 11-12 Oct. 1972 4 Vol.
Avail: NTIS HC $5.75

Aspects of processing and manufacturing titanium and alloys for aircraft structures and parts are highlighted. The manufacturing process of ingots, including the Kroll process for producing sponge metal, and the smelting of electrodes in vacuum furnaces, is described. A review is presented of forming techniques, including drop forging for European Airbus parts. Problems in processing techniques and in the manufacture of aircraft parts are discussed.

N74-11338 Krupp (Fried.) G.m.b.H., Essen (West Germany).
MANUFACTURE OF TITANIUM AND TITANIUM ALLOY SEMIFINISHED PRODUCTS [HERSTELLUNG VON HALBZEUGEN AUS TITAN UND TITANLEGIERUNGEN]
W. Knorr *In* Erlangen-Nuremberg Univ. Manuf. and Properties of Titanium and Titanium Alloys emphasizing their Use in Aeron., Pt. 1 May 1973 30 p refs In GERMAN

A review is presented of forming techniques for titanium and titanium alloys. The following items are discussed: hot forming conditions, processing of the ingots, manufacturing of flat products, and extruding. Methods for quality control are mentioned. Special attention is paid to drop-forged aircraft parts, e.g. for the European Airbus. ESRO

N74-11339 Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany).
STATUS AND DEVELOPMENT TENDENCIES OF TITANIUM PROCESSING [STAND- UND ENTWICKLUNGSTENDENZEN DER TITANVERARBEITUNG]
Helmut Kellerer and Guenter Gans *In* Erlangen-Nuremberg Univ. Manuf. and Properties of Titanium and Titanium Alloys emphasizing their Use in Aeron., Pt. 1 May 1973 24 p refs In GERMAN

The processing techniques, and the problems involved therein, in the manufacture of titanium and alloy aircraft parts are reviewed. The topics discussed are: deformation, machining, electron beam welding and diffusion welding, surface treatment and heat treatment. It is shown that the difficulties in processing titanium have, in general, been resolved. In present developments the objectives are essentially to reduce production costs, to determine more specifically the effect of the single processing steps on the material properties, and to improve quality control. ESRO

N74-11378# Air Force Inst. of Tech., Wright-Patterson AFB, Ohio. School of Engineering.
OPTIMAL INCOMPLETE FEEDBACK CONTROL OF LINEAR STOCHASTIC SYSTEMS Ph.D. Thesis
Robert E. Heath, II Jun. 1973 163 p refs
(AD-766878; DS/MA/73-1) Avail: NTIS CSCL 12/1

The problem of incomplete feedback control of stochastic linear systems is considered. The system is modeled by an uncertain parameter linear differential equation driven by Gaussian white noise and an incomplete observation which is a linear transformation of the states. The optimal control is the linear transformation which minimizes the expected value of a quadratic performance index. For both the finite and infinite time problems, necessary conditions that the optimal control law must satisfy are derived. Time varying and constant gains are considered for the finite time problem. For the infinite time problem only time invariant gains are considered. The gradient derived for the infinite time problem is applied to a flight control design problem. This problem concerns finding feedback gains to improve the lateral handling qualities of an F-4 at two different flight conditions. The resulting control laws give quite adequate aircraft handling qualities for the aircraft at both flight conditions. Author (GRA)

N74-11380 Electricite de France, Chatou. Div. Echanges Atmospheriques.
INTEREST AND FEASIBILITY STUDY OF ATMOSPHERIC TURBULENCE AND THERMAL GRADIENTS SIMULATION Final Report [RECHERCHES SUR L'INTERET ET LES POSSIBILITES DE REPRODUCTION EN SIMILITUDE DE LA TURBULENCE ATMOSPHERIQUE ET DES GRADIENTS THERMIQUES]
P. Mery Dec. 1972 26 p refs In FRENCH
(Contract DGRST-69-01-906)
Avail: Issuing Activity

A feasibility study on atmospheric turbulence and thermal gradients simulation is presented. Strict or weak similarity laws are established for the simulation of diffusive phenomena in conditions of neutral stability or instability. The possibility of relating in situ experiments to simulated experiments is assessed. A simulation technique is presented of the atmospheric limit layer for various vertical thermal gradient configurations and associated turbulence. Measurement methods are discussed for direct determination of energy spectra, turbulent intensities, and vertical heat flux of a stratified flow. The required technology for a wind tunnel adapted to simulating industrial air pollution is described, and elements of a 1/5 scale model of such a wind tunnel are presented. ESRO

N74-11431*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
PRELIMINARY ASSESSMENT OF THE MICROWAVE LANDING SYSTEM REQUIREMENTS FOR STOL OPERATIONS
Clifford N. Burrous, Stuart C. Brown, Tsuyoshi Goka, and Kun E. Park Oct. 1973 151 p refs
(NASA-TM-X-62310) Avail: NTIS Hc $9.75 CSCL 01B

The results of an investigation made to assess the Microwave Landing System (MLS) Requirements for use by civil STOL aircraft are described. The principal MLS characteristics investigated in the report were signal accuracy and volume of coverage. The study utilized a nonlinear six-degree-of-freedom digital simulation

of a De Havilland Buffalo C-8A aircraft. Fully automatic control of timed curve flight down to touchdown was simulated. Selected MLS accuracy and coverage parameters for the azimuth, primary elevation, flare evelation and DME signals were varied. The resulting STOL aircraft system performance in following a representative curved flight path was statistically determined. Coverage requirements for STOL aircraft operating in the terminal area environment were also investigated. Author

N74-11432# Lincoln Lab., Mass. Inst. of Tech., Lexington.
INTERROGATION SCHEDULING ALGORITHMS FOR A DISCRETE ADDRESS BEACON SYSTEM
A. Spiridon and A. D. Kaminsky 17 Oct. 1973 106 p refs
(Contracts DOT-FA72WAI-261; F19628-73-C-0002; FAA Proj. 034-241-012)
(ATC-19; FAA-RD-73-166) Avail: NTIS HC $7.50

Several scheduling algorithms that may form part of the interrogation management function of a discrete address beacon system are described. These include scheduling algorithms that can handle unequal message lengths and types which can schedule a message very rapidly (dynamic scheduling). The algorithms are evaluated in terms of the computation required to execute them and their packing efficiencies. Author

N74-11433*# Linguistic Systems, Inc., Cambridge, Mass.
MODERN BEACONING IN AIRPORTS FOR BAD WEATHER FLIGHTS
E. Stauffert Washington NASA Nov. 1973 16 p Transl. into ENGLISH from Air Tech. (France), v. 9, 1965 p 51-58
(Contract NASw-2482)
(NASA-TT-F-15178) Avail: NTIS HC $3.00 CSCL 17G

The arrangement, sizes, and kinds of airport beacons necessary if aircraft landings are to be made in conditions of poor visibility are discussed. The amount of candlepower needed for a given visibility range is derived. Installation of the beacons, in terms of arrangement with respect to lane markers and angle with the horizontal, and also with respect to the kind of construction used for the runway, is described. Author

N74-11435# RAND Corp., Santa Monica, Calif.
SOME USER BENEFITS ACHIEVABLE FROM AN ADVANCED AIR TRAFFIC MANAGEMENT SYSTEM
T. F. Kirkwood, G. K. Smith, W. L. Stanley, S. Wildhorn, and R. J. Gladstone Jul. 1973 162 p refs
(Contract DOT-TSC-344)
(R-1320-DOT) Avail: NTIS HC $10.25

A study was conducted to identify and quantify the major benefits to aircraft operators, passengers, and shippers arising from improvements to the air traffic control system. The study emphasized the following subjects: (1) increased terminal area capacity and (2) improved aviation safety. The types of aviation considered were general aviation, certified air carriers, and military operations. The basic measure of the safety improvements is the number of accidents that might be avoided or prevented through introduction of the improved air traffic control system. Author

N74-11436# RAND Corp., Santa Monica, Calif.
COST COMPARISONS OF ADVANCED AIR TRAFFIC MANAGEMENT SYSTEMS
D. J. Dreyfuss, H. E. Boren, Jr., F. Kontrovich, J. R. Lind, P. A. Conine, and N. E. Feldman Jul. 1973 162 p refs
(Contract DOT-TSC-344)
(R-1319-DOT) Avail: NTIS HC $10.25

A study of the cost of the Advanced Air Traffic management Systems for operational use in the latter portion of this century was conducted. The results consist of a cost evaluation of several alternative concepts of air traffic control that differ in the basing of the signal receiver (space or ground), the date of initial operational capability, the level of automation, the structure (centralized or disbursed), and the total system cost. The computer program for conducting the cost estimate comparisons is included. Author

N74-11592# Bureau of Mines, Bartlesville, Okla. Energy Research Center.
AVIATION TURBINE FUELS, 1972 Petroleum Products Survey No. 79
Ella Mae Shelton Mar. 1973 15 p refs
Avail: NTIS HC $3.00

Properties of aviation turbine fuels produced in the United States during 1972 are reported in accordance with a cooperative agreement between the American Petroleum Institute and the Bureau of Mines of the United States Department of the Interior. By agreement with the American Petroleum Institute, identification of the data by item number is confidential. Analytical data are presented for 117 samples of aviation turbine fuels, representing the products of 16 companies. The data were reported by the manufacturers as typical of their 1972 production. The analyses were made in their laboratories and the results submitted to the Bureau of Mines for compilation. Author

N74-11597*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
RADIALLY LEANED OUTLET GUIDE VANES FOR FAN SOURCE NOISE REDUCTION
S. B. Kazin Nov. 1973 86 p refs
(Contract NAS3-12430)
(NASA-CR-134486; R73AEG176) Avail: NTIS HC $6.50 CSCL 20A

Two quiet engine program half scale fans one with a subsonic and the other with a supersonic fan tip speed at takeoff were run with 30 degree leaned and radial outlet guide vanes. Acoustic data at takeoff fan speed on the subsonic tip speed fan showed decreases in 200-foot sideline noise of from 1 to 2 PNdb. The supersonic tip speed fan a takeoff fan speed, however, showed noise increases of up 3 PNdb and a decrease in fan efficiency. At approach fan speed, the subsonic tip speed fan showed a noise decrease of 2.3 PNdb at the 200-foot sideline maximum angle and an increase in efficiency. The supersonic tip speed fan showed noise increase of 3.5 PNdb and no change in efficiency. The decrease in fan efficiency and the nature of the noise increase largely high frequency broadband noise lead to the speculation that an aerodynamic problem occurred. Author

N74-11601# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE ECONOMIC EFFICIENCY OF RAISING THE FLYING LIFE AND RELIABILITY OF GAS-TURBINE ENGINES
V. M. Akimov, D. E. Starik et al 30 Aug. 1973 243 p refs Transl. into ENGLISH of the mono. "Ekonomicheskaya Effektivnost Povysheniya Resursa i Nadezhnosti Gasoturbinnykh Dvigatelei" USSR, 1972 p 1-170
(AD-767027; FTD-MT-24-291-73) Avail: NTIS CSCL 21/5

The report relates to the development of contemporary concepts of reliability and service life of aviation gas-turbine engines (GTE) and to an examination of the technical and economic aspects of the problem of ascertaining and increasing engine service life. The basic criteria of evaluating reliability of GTE are examined and the principles of approaching the solution of questions of ascertaining service life taking economic factors into account are examined. Methods of evaluating the economic efficiency of increasing service life and reliability of engines are discussed and an analysis of the dependence of expenditures for series and repair work on the length of service life is presented. GRA

N74-11602# Washington Univ., Seattle. Aerospace Research Lab.
THROUGHFLOW THEORY FOR TURBOMACHINES Final Report, Oct. 1971 - May 1972
Gordon C. Oates and Charles J. Knight Wright-Patterson AFB, Ohio AFAPL Jun. 1973 120 p refs
(Contract F33615-72-C-1082; AF Proj. 3066)
(AD-766537; AFAPL-TR-73-61) Avail: NTIS CSCL 21/5

Throughflow theory for flow in axial turbomachines is

formulated in a way to allow consideration of the effects of variable hub and tip radii, the effects of free boundaries and the effects of compressibility. A procedure is developed for the very rapid calculation of incompressible flow through many blade rows in an annulus of constant hub and tip radii. An analysis formulation including the effects of variation in wall radii is also presented. A variational procedure for the numerical description of highly nonlinear flow field is developed for the description of incompressible flows through many blade rows in ducts of varying hub and tip radii. The associated computer program leads to rapid calculation of desired examples. Finally, a computer program is given to calculate the effects of compressibility on radial equilibrium flows. Author (GRA)

N74-11604# Battelle Columbus Labs., Ohio.
CURRENT AND FUTURE MATERIALS USAGE IN AIRCRAFT GAS TURBINE ENGINES
Ward F. Simmons Jun. 1973 100 p refs
(Contract DSA900-73-C-0922)
(AD-766334; MCIC-73-14) Avail: NTIS CSCL 21/5

The report gives the current state-of-the-art of materials usage in aircraft gas turbine engines including auxiliary power units, and discusses the trends in future materials such as composites, powder metallurgy, controlled solidification, eutectic alloys, refractory metals, and ceramics. Also, discussed are new processing techniques such as thermomechanical processing (TMP) and Gatorizing, trade name. The appendix has 17 tables of materials used for components in such current production engines as the P-WA JT9D and the G.E. CF-6. The appendix also has a glossary of gas turbine engine terms. Author (GRA)

N74-11605# ARO, Inc., Arnold Air Force Station, Tenn.
EMISSION MEASUREMENTS OF A J93 TURBOJET ENGINE Final Report, 8 Jun. - 31 Jul. 1972
D. L. Davidson and A. F. Domal AEDC Sep. 1973 99 p refs
(AD-766648; ARO-ETF-TR-73-46; AEDC-TR-73-132) Avail: NTIS CSCL 21/5

Exhaust gas emission measurements were made at the nozzle of a J93 turbojet engine at simulated flight conditions from sea-level static to Mach 2.0 at 75,000 ft and Mach 2.6 at 65,000 ft. Real time measurements of CO, CO2, CxHy, NO, and NOx were taken over a range of after-burning and nonafterburning engine power settings using a gas sampling system designed to adhere to SAE ARP 1256 specifications. In addition, NO and OH were measured in situ by a narrow-line UV spectral absorption technique. Batch-type measurements of particulates and other trace constituents of the exhaust gas were also made. Major results of the test were that emissions vary significantly with combustor inlet pressure and temperature and, therefore, with Mach number and altitude. (Modified author abstract) GRA

N74-11606# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
SENSING JET ENGINE PERFORMANCE AND INCIPIENT FAILURE WITH ELECTROSTATIC PROBES Technical Report, 1 Sep. 1969 - 15 Nov. 1971
Robert P. Couch and Dennis R. Rossbach Dec. 1972 114 p refs
(AF Proj. 8222)
(AD-766653; AFFDL-TR-71-173) Avail: NTIS CSCL 01/4

Jet exhaust plasma densities have been investigated with electrostatic probes and have been found to vary exponentially from 3 x 3,000,000 cubic centimeters to 4 x 10 to the 7th power cubic centimeters depending on the mixture ratio. The plasma has been found to contain few electrons and to be primarily positive and negative ions. It has been discovered that electrostatic probes can be used to detect the particles which proceed a number of jet engine failures. Two theories are set forth; one for interpreting the I-V trace and one for the current spikes seen prior to jet engine failures. Further studies are recommended to exploit the engine failure prediction capabilities and use the mixture ratio sensitivity to obtain engine performance and to predict compressor stalls. Author (GRA)

N74-11661# Toronto Univ. (Ontario).
MEASUREMENT OF TURBULENCE INPUTS FOR V/STOL APPROACH PATHS IN A SIMULATED PLANETARY BOUNDARY LAYER
B. Etkin, G. W. Johnston, and H. W. Teunissen Jul. 1973 97 p refs
(Contract F33615-73-C-3013)
(UTIAS-189) Avail: NTIS HC $7.00

A study relating to the prediction of V/STOL flight path perturbations during steep landing descents was completed. The possibility of utilizing turbulence correlation data accummulated by means of fixed survey probes in a simulated planetary boundary layer model to predict the aircraft response is discussed. It is shown that this technique although necessarily limited in certain respects, represents an excellent starting point for more rigorous aircraft studies which may eventually be required. A large number of fixed probe hot wire correlation measurements of the turbulent velocity components were completed with a scaled model of the planetary boundary layer. The majority of these measurements were confined to a mean velocity power law variation of n = 0.16 with limited turbulence data also taken with n = 0.35. The feasibility of extending the present techniques with a more sophisticated moving hot wire turbulence probe was studied. A specific moving probe design concept has been examined and a first costing estimate developed. Author

N74-11680* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MODEL STUDIES OF CROSSWIND LANDING-GEAR CONFIGURATIONS FOR STOL AIRCRAFT
Sandy M. Stubbs and Thomas A. Byrdsong *In its* The 8th Aerospace Mech. Symp. Oct. 1973 p 145-154

CSCL 22B

A dynamic model was used to directly compare four different crosswind landing gear mechanisms. The model was landed as a free body onto a laterally sloping runway used to simulate a crosswind side force. A radio control system was used for steering to oppose the side force as the model rolled to a stop. The configuration in which the landing gears are alined by the pilot and locked in the direction of motion prior to touchdown gave the smoothest runout behavior with the vehicle maintaining its crab angle throughout the landing roll. Nose wheel steering was confirmed to be better than steering with nose and main gears differentially or together. Testing is continuing to obtain quantitative data to establish an experimental data base for validation of an analytical program that will be capable of predicting full scale results. Author

N74-11681* National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.
MODEL SUPPORT ROLL BALANCE AND ROLL COUPLING
Roy E. Sharpes and William J. Carroll *In its* The 8th Aerospace Mech. Symp. Oct. 1973 p 155-163

CSCL 22B

The design concepts of two specialized wind tunnel model support mechanisms are described. The forced oscillation roll balance mechanism was designed to meet the specific requirement to measure aerodynamic forces and moments to permit determination of the damping-in-roll parameters of winged configurations. A variable speed motor is used to oscillate the model by means of an offset crank. The oscillating motion is resisted by a torsion spring to provide a restoring torque and is attached to the section forward of the strain-gage balance. This spring action allows the model to be oscillated at a frequency for velocity resonance, whereby the mechanical spring and any aerodynamic spring balance. This spring action allows the model to be oscillated at a frequency for velocity resonance, whereby the mechanical spring and any aerodynamic spring balance out the model inertia. The only torque then required to oscillate the model at that particular frequency is equal to that due to aerodynamic damping. The second mechanism, a roll coupling for remotely rotating a model, was designed to invert or roll a model about its longitudinal axis when mounted for testing. Author

N74-11691* Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
HELICOPTER VISUAL AID SYSTEM
Ronald L. Baisley *In* NASA. Langley Res. Center The 8th Aerospace Mech. Symp. Oct. 1973 p 293-309 ref

CSCL 01C

The helicopter visual aid system has been built and flight tested in situations representative of actual flight missions. The mechanisms discussed contributed greatly to the successful performance of the system throughout the 160 hours of flight testing. It has demonstrated that the visual aid concept can provide improved daytime visual capability, greatly improved nighttime capability, surveillance from greater distances and/or altitudes, covert operation at night through the use of the IR searchlight, and a photographic recording at the scene being viewed. Author

N74-11718# Institut Franco-Allemand de Recherches, St. Louis (France).
STRONG AND WEAK SHOCK WAVES. EXPERIMENTS AND CALCULATIONS [STARKE UND SCHWACHE STOSSWELLEN. EXPERIMENTE UND BERECHNUNGEN]
M. Schaffar 30 Jan. 1973 18 p refs In GERMAN
(ISL-NB-1/73) Avail: NTIS HC $3.00

Experimental results were compiled concerning the behavior of structural steel- and synthetic resin concrete elements exposed to strong and weak shock waves. The test facilities (blast load simulator, shock tube) and methods used are described. The investigations of structural steel concrete elements led to a plate shape, which can withstand the shock waves. The manufacture of shear plates is rather combersome, as a good cohesion between concrete and steel is strictly necessary. A solution was found by using synthetic resin concrete instead, which is lighter and has a more homogeneous structure. The effects of sonic booms on the thin internal walls of a house were also investigated using a sonic boom generator. It is shown that thin internal walls can withstand sonic booms of at least seven to eight times the normal Concorde boom. ESRO

N74-11719# National Aerospace Lab., Amsterdam (Netherlands). Div. Structures and Materials.
A MATHEMATICAL THEORY OF PLASTICITY FOR STRAIN HARDENING MATERIALS EXHIBITING INITIAL ANISOTROPY
A. U. DeKoning 20 Sep. 1972 25 p refs Sponsored by Neth. Agency for Aerospace Programs
(NLR-TR-72117-U) Avail: NTIS HC $3.25

A model is presented for anisotropic hardening in continuous plastic deformation of rolled sheet materials used in aircraft structures and exhibiting anisotropy due to initial permanent strains. Isotropic material behavior is assumed for all elastic deformations. The plastic behavior of the material is described by a series model: an infinite number of particles with linear strain hardening behavior is linked in series in such a way that all are submitted to the same stress. Procedures for deriving anisotropy parameters and a strain hardening coefficient are presented. It is concluded that further studies are necessary not only for a deeper insight into the yielding behavior of materials but also for analysis of problems related to residual stresses, plastic energy dissipation and ductile fracture criteria. ESRO

N74-11722# Grumman Aerospace Corp., Bethpage, N.Y. Research Dept.
NONLINEAR CRACK ANALYSIS WITH FINITE ELEMENTS
Harry Armen, Jr., Earnesto Saleme, Alan Pifko, and Howard Levine Jul. 1973 50 p refs
(AD-766558; RE-460J) Avail: NTIS CSCL 11/6

The paper is concerned with the use of finite element methods to provide a reasonably accurate and realistic analytic representation of the nonlinear behavior of arbitrary two dimensional bodies containing cracks. Specific methods are proposed that would provide capabilities necessary to obtain information concerning An accurate description of the maximum, minimum, and residual near-tip stress and strain fields. The effects of crack closure on the near-tip behavior of the stress and strain field during cyclic loading into the plastic range; The stress-strain and displacement field behavior associated with a nonstationary crack; and the effects of large rotation near the crack-tip. (Modified author abstract) GRA

N74-11738*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
USE OF AN AIR-ASSISTED FUEL NOZZLE TO REDUCE IDLE EMISSIONS OF A JT8D ENGINE COMBUSTOR
Leonidas C. Papathakos and Robert E. Jones Washington Nov. 1973 10 p refs
(NASA-TM-X-2946; E-7580) Avail: NTIS HC $2.75 CSCL 20M

Tests were performed at typical engine idle conditions on a single-can JT8D combustor installed in a 24 centimeter (9.45 in.) housing to evaluate the effect of an air-assist nozzle on reducing exhaust emissions. By injecting high-pressure air through the secondary-flow passage of a standard duplex fuel nozzle, it was possible to reduce hydrocarbon emissions from 840 parts per million to 95 parts per million and carbon monoxide emissions from 873 parts per million to 258 parts per million, NOX emissions increased slightly from 18 parts per million to 22 parts per million. An air-assist differential pressure of only 20.1 newtons per square centimeter (29.1 psi) and an airflow rate of only 0.22 percent of the total combustor airflow was required. Author

N74-11740# Institut Franco-Allemand de Recherches, St. Louis (France).
REACTION MODES OCCURRING AT DETONATION OF EXPLOSIVE GAS MIXTURE DUE TO DETACHED SHOCK FRONT FROM A BLUNT MOCKUP AT SUPERSONIC SPEEDS [UEBER DIE REAKTIONSFORMEN BEI DER ZUENDUNG EINES EXPLOSIVEN GASGEMISCHES DURCH DEN ABGELOESTEN STOSS VOR EINEM MIT UEBERSCHALLGESCHWINDIGKEIT FLIEGENDEN, STUMPFEN MODELL]
H. F. Lehr 30 Aug. 1972 34 p refs In GERMAN
(ISL-28/72) Avail: NTIS HC $3.75

The different reaction and flow types associated with the shock induced combustion of a premixed, detonable gas mixture are described. The combustion of the gas mixture is induced by a shock wave formed in front of a hypersonic blunt body. The velocity range examined contains the detonation velocity of the investigated gas mixture. It appears that this value has an important role. A summary is given of all the tests carried out with spherical bodies and with hydrogen/oxygen and hydrogen/air mixtures. The H2/O2 mixture has some peculiarities in its reaction form in the Mach number range between M = 4 and 5 at low pressure, which are common to the systems H2/O2 and H2/air. ESRO

N74-11743*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering.
THE ENERGY DILEMMA AND ITS IMPACT ON AIR TRANSPORTATION
Calvin R. Dyer, ed., Michael Z. Sincoff, ed., and Paul D. Cribbins, ed. 1973 171 p refs
(Grant NGT-47-003-028)
(NASA-CR-135993) Avail: NTIS HC $10.75 CSCL 05A

The dimensions of the energy situation are discussed in relation to air travel. Energy conservation, fuel consumption, and combustion efficiency are examined, as well as the proposal for subsonic aircraft using hydrogen fuel.

N74-11745* Old Dominion Univ., Norfolk, Va.
THE AIR TRANSPORTATION/ENERGY SYSTEM
In its The Energy Dilemma and Its Impact on Air Transportation 1973 p 49-70 refs
CSCL 05A

The changing pattern of transportation is discussed, and the energy intensiveness of various modes of transportation is also analyzed. Sociopsychological data affecting why people travel by air are presented, along with governmental regulation and air transportation economics. The aviation user tax structure is shown in tabular form. J.A.M.

N74-11746* Old Dominion Univ., Norfolk, Va.
ENERGY CONSERVATION AND AIR TRANSPORTATION
In its The Energy Dilemma and Its Impact on Air Transportation 1973 p 71-94 refs
CSCL 05A

Air transportation demand and passenger energy demand are discussed, in relation to energy conservation. Alternatives to air travel are reviewed, along with airline advertising and ticket pricing. Cargo energy demand and airline systems efficiency are also examined, as well as fuel conservation techniques. Maximum efficiency of passenger aircraft, from B-747 to V/STOL to British Concorde, is compared. J.A.M.

N74-11747* Old Dominion Univ., Norfolk, Va.
AN INITIAL STEP: A DEMONSTRATION PROJECT
In its The Energy Dilemma and Its Impact on Air Transportation 1973 p 95-117 refs
CSCL 05A

To initiate the transition into a clean and diverse energy environment independent of fossil-based fuels, the rapid development of a subsonic, hydrogen-fueled aircraft is recommended. Tables are presented on characteristics of synthetic fuels, comparisions with JP-4 and gasoline, comparison of nitric oxide emissions from hydrocarbon and hydrogen fuels vs. final flame temperature, and sensitivity limits of LH2 detectors. J.A.M.

N74-11748* Old Dominion Univ., Norfolk, Va.
CONCLUSIONS AND RECOMMENDATIONS
In its The Energy Dilemma and Its Impact on Air Transportation 1973 p 119-173 refs
CSCL 05A

Conclusions and recommendations are presented for an analysis of the total energy situation; the effect of the energy problem on air transportation; and hydrogen fuel for aircraft. Properties and production costs of fuels, future prediction for energy and transportation, and economic aspects of hydrogen production are appended. J.A.M.

N74-11791# RAND Corp., Santa Monica, Calif.
ENERGY TRENDS AND THEIR FUTURE EFFECTS UPON TRANSPORTATION
W. E. Mooz Jul. 1973 27 p refs
(P-5046) Avail: NTIS HC $3.50

The impact of fuel shortages on the transportation energy is discussed. The areas investigated are: (1) the demand for energy for transportation purposes, (2) the supply of energy for transportation purposes, and (3) the espected price of energy. Graphs are included to show the overall energy requirements, comparative energy intensiveness values for different methods of transportation, recent trends in automobile fuel use, a history of rail, truck, and air cargo development, and an analysis of annual energy consumed by all transport modes in the United States. P.N.F.

N74-11801# City of Tacoma, City Manager's Office, Wash.
PROJECT/COST/BENEFIT Summary Report, 1st Half of 1972
Harvey R. Singleton Jan. 1973 33 p
(Contract NSF GT-34903)
(PB-222339/4) Avail: NTIS Hc $3.75 CSCL 13B

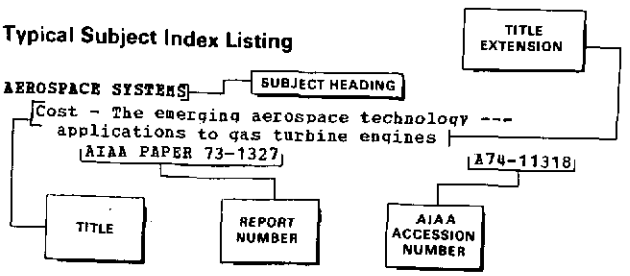
The report is a listing of the projects with their cost and benefits, carried out under Tacoma's Totem One Program for 1972. The program is a technology transfer experiment utilizing a consortium of industrial and university talent, with city personnel. It uses an actual problem solving approach to build institutional capacity to integrate technological innovations systematically. GRA

N74-11803# Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
AEDC FISCAL YEAR 1974 AIR FORCE TECHNICAL OBJECTIVE DOCUMENT Final Report
Sep. 1973 89 p refs
(AD-766719; AEDC-TR-73-120) Avail: NTIS CSCL 14/2

The report describes eighteen technical objectives in environmental facility simulation technology. The facility technology of concern includes new facility technology improvements in test techniques, instrumentation technology, gas properties and comparison of wind tunnel and flight test data. These technical objectives constitute the Arnold Engineering Development Center's FY 1974 Technical Objectives Document. This document supersedes TOD 71-43. Author (GRA)

SUBJECT INDEX

Typical Subject Index Listing



The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of *the document content*, a title extension is added, separated from the title by three hyphens. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

A

A-7 AIRCRAFT
Afterbody drag flight test of the A-7E airplane
[AIAA PAPER 73-1306] A74-12948
Low cost, fiber glass reinforced plastic fuel tank, volume 1 --- for A-7 aircraft application
[AD-766361] N74-10929
Low cost, fiber glass reinforced plastic fuel tank, volume 2 --- development and evaluation for application to A-7 aircraft
[AD-766400] N74-10931
A-10 AIRCRAFT
The influence of design to cost and prototyping on the A-10 aircraft
[SAE PAPER 730890] A74-11598
ABLATION
The ablation performance of foams in a low heat flux --- plasma arc tests on polyurethane-based foams N74-10263
AC GENERATORS
Gas-lubricated foil bearings for high speed turboalternator - Construction and performance
[ASME PAPER 73-LUB-5] A74-12332
Investigation of rotor dynamic and high speed bearing technology for a 3 KW turbo-alternator
[AD-765501] N74-10486
Test characteristics of a welded rotor in a 36,000-rpm Lundell alternator
[NASA-TM-X-2944] N74-11304
ACCIDENT PREVENTION
Application of military human factors techniques to general aviation accident prevention A74-10880
Some user benefits achievable from an advanced air traffic management system
[R-1320-DOT] N74-11435
ACOUSTIC ATTENUATION
Assessment of jets as acoustic shields by comparison of single- and multitube suppressor nozzle data
[AIAA PAPER 73-1001] A74-11050
The acoustics of aircraft engine-duct systems
[AIAA PAPER 73-1153] A74-12215
Transmission of sound through a two-dimensional shielding jet
[AIAA PAPER 73-1002] A74-12221
ACOUSTIC MEASUREMENTS
An experimental study of subsonic jet noise and comparison with theory A74-10271
Transportation noise - It's measurement and evaluation A74-11198
Aspects of large-scale, subsonic, wind-tunnel design for propulsion noise research
[AIAA PAPER 73-1279] A74-11291
The effect of noise constraints on engine cycle optimization for long-haul transports
[AIAA PAPER 73-1292] A74-11298
Measured jet noise compared to California noise codes and health criteria A74-11424
Investigation of the characteristics of tubular microphone windscreens for in-duct fan sound power measurements A74-12126
Noise and wake structure measurements in a subsonic tip speed fan
[NASA-CR-2323] N74-10020
NASA/GE quiet engine A acoustic test results
[NASA-CR-121175] N74-10732
Truck noise via diesel exhaust and air intake noise --- acoustic measurements for evaluation of various exhaust and intake systems
[PB-222624/9] N74-10742
ACOUSTIC PROPERTIES
Acoustic characteristics of a large-scale augmentor wing model at forward speed
[NASA-TM-X-2940] N74-10052
Aircraft noise reduction technology --- to show impact on individuals and communities, component noise sources, and operational procedures to reduce impact
[NASA-TM-X-68241] N74-10917
ACOUSTIC SIMULATION
The experimental response of simple structures to simulated sonic booms A74-11814
ACOUSTICS
Radially leaned outlet guide vanes for fan source noise reduction
[NASA-CR-134486] N74-11597
ADHESIVE BONDING
Evaluation of the adhesive bonding processes used in helicopter manufacture. Part 4: Nondestructive inspection of adhesive bonds using holographic techniques
[AD-765455] N74-10480
ADIABATIC CONDITIONS
The mean skin friction coefficient for a rough flat plate with a turbulent two-dimenisonal boundary layer in compressible adiabatic flow, with application to wedges, cylinders and cones
[ESDU-73016] N74-10008
AERODYNAMIC BALANCE
Magnetic balance and suspension systems for use with wind tunnels A74-12204
Aerodynamic centre in two dimensional flow
[ESDU-AIRCRAFT-08.01.05-AMEND-A] N74-10010
AERODYNAMIC BRAKES
Lightweight, variable solidity knitted parachute fabric --- for aerodynamic decelerators
[NASA-CASE-LAR-10776-1] N74-10034
AERODYNAMIC CHARACTERISTICS
The technical evolution of aircraft A74-11092
V/STOL deflector aerodynamic design criteria --- geometric variations effects
[AIAA PAPER 73-1181] A74-11226
Some design considerations for supersonic cruise mixed compression inlets
[AIAA PAPER 73-1269] A74-12496

Subsonic performance data for NACA type submerged air intakes
[ESDU-66029] N74-10012
Aeronautics: Space in the seventies
[NASA-EP-85] N74-10017
Transonic aerodynamic characteristics associated with variations in the geometry of the forward portion of irregular planform wings
[NASA-CR-128781] N74-10028
Computation of the aerodynamic characteristics of a rectangular wing with plates moving at low subsonic speed near a screen
[JPRS-60353] N74-10036
Study of heaving motion in air cushion vehicles
[NASA-TT-F-15106] N74-10038
Stability and dynamic behavior of two tethered balloon systems
[AD-766439] N74-10070

AERODYNAMIC COEFFICIENTS
Conversion factor for profile drag increment for part-span flaps
[ESDU-FLAPS-02.01.07-AMEND-A] N74-10002
Lift coefficent increment due to full-span split flap: Flap chord 0.15c
[ESDU-FLAPS-01.01.05-AMEND-A] N74-10003
Information on the use of data items in the series wings 02.04
[ESDU-WINGS-02.04.00-AMEND-A] N74-10004
Aerodynamic characteristics of aerofoils in compressible inviscid airflow at subcritical Mach numbers
[ESDU-72024-AMEND-A] N74-10006
Effects of isolated body and wing-body interference on rolling moment due to sideslip
[ESDU-73006] N74-10007
Information on the use of data items in the series bodies 02.04
[ESDU-BODIES-02.04.00-AMEND-A] N74-10011
Drag of streamline solids of revolution (transition at nose)
[ESDU-BODIES-02.04.01-AMEND-A] N74-10311

AERODYNAMIC CONFIGURATIONS
Conversion factor for profile drag increment for part-span flaps
[ESDU-FLAPS-02.01.07-AMEND-A] N74-10002
Lift coefficent increment due to full-span split flap: Flap chord 0.15c
[ESDU-FLAPS-01.01.05-AMEND-A] N74-10003
Aerodynamic characteristics of aerofoils in compressible inviscid airflow at subcritical Mach numbers
[ESDU-72024-AMEND-A] N74-10006
Effects of isolated body and wing-body interference on rolling moment due to sideslip
[ESDU-73006] N74-10007
Information on the use of data items in the series bodies 02.04
[ESDU-BODIES-02.04.00-AMEND-A] N74-10011
Subsonic performance data for NACA type submerged air intakes
[ESDU-66029] N74-10012
Computation of vortex models for wings at high angle of attack in incompressible flow
[FFA-AU-653] N74-10013
Some design considerations for supersonic cruise mixed compression inlets
[NASA-TM-X-71460] N74-10021
Comparison of predicted and measured low-speed performance of two 51 centimeter-diameter inlets at incidence angle
[NASA-TM-X-2937] N74-10026
A study of methods which predict supersonic flow fields from body geometry, distance, and Mach number
[NASA-TN-D-7387] N74-10030
Study of heaving motion in air cushion vehicles
[NASA-TT-F-15106] N74-10038
Refan program. Phase 1: Summary report
[NASA-TM-X-71456] N74-10043
Effect of geometry variations on lee-surface vortex-induced heating for flat-bottom three-dimensional bodies at Mach 6
[NASA-TN-D-7447] N74-10318
Technical evaluation report on Fluid Dynamics Panel Specialists' Meeting on Aerodynamic Drag
[AGARD-AR-58] N74-10905
Multistage aerospace craft --- perspective drawings of conceptual design
[NASA-CASE-XMF-02263] N74-10907
Rotary wing design methodology --- based on nonlinear aeroelastic blade loads analysis
N74-10909
Helicopter rotor loads predictions --- assumptions and techniques for numerical analysis of aerodynamic loads
N74-10912
Rotor system design and evaluation using a general purpose helicopter flight simulation program
N74-10913
The prediction of loading actions on high speed semi-rigid helicopters
N74-10914
Loads prediction methods for hingeless rotor helicopters
N74-10915
Aerodynamic problems of STOL aircraft
[NASA-TT-F-15182] N74-10918
STOL tactical aircraft investigation. Volume 1: Configuration definition (medium STOL transport with vectored thrust/mechanical flaps)
[AD-766637] N74-10925
STOL tactical aircraft investigation. Volume 2, part 1: Aerodynamic technology (design compendium, vectored thrust/mechanical flaps)
[AD-766639] N74-10926

AERODYNAMIC DRAG
External burning assisted projectile - Theory and experiment
[AIAA PAPER 73-1193] A74-11234
Information on the use of data items in the series bodies 02.04
[ESDU-BODIES-02.04.00-AMEND-A] N74-10011
Exploratory investigation at Mach numbers from 0.40 to 0.95 of the effects of jets blown over a wing
[NASA-TN-D-7367] N74-10014
Drag of streamline solids of revolution (transition at nose)
[ESDU-BODIES-02.04.01-AMEND-A] N74-10311
Technical evaluation report on Fluid Dynamics Panel Specialists' Meeting on Aerodynamic Drag
[AGARD-AR-58] N74-10905

AERODYNAMIC FORCES
Flight-mechanics analysis of various flight conditions of conventional aircraft. VIII/2 - Mechanical foundations: Dynamic equations of motion of the control systems
A74-11744
Dynamical pressure distribution in aerodynamic bearing
A74-11899
Magnetic balance and suspension systems for use with wind tunnels
A74-12204
Calculation of instationary pressure distributions and generalized aerodynamic forces with the doublet-lattice method --- on thin wings oscillating harmonically in subsonic flow
[NLR-TR-72037-U] N74-10906

AERODYNAMIC HEATING
A simplified method for studying the aerodynamic heating of axisymmetric bodies at an angle of attack
A74-12441
Effect of geometry variations on lee-surface vortex-induced heating for flat-bottom three-dimensional bodies at Mach 6
[NASA-TN-D-7447] N74-10318

AERODYNAMIC INTERFERENCE
Effects of isolated body and wing-body interference on rolling moment due to sideslip
[ESDU-73006] N74-10007
Integrated rotor/body loads prediction
N74-10916

AERODYNAMIC LOADS
Longitudinal response of an aircraft due to a trailing vortex pair
A74-11343
Prediction of unsteady airloads for the solution of the panel flutter problem of nosecones and conical shell structures
A74-12804
Sea level side loads in high-area-ratio rocket engines
[AIAA PAPER 73-1284] A74-12940
Specialists Meeting on Helicopter Rotor Prediction Methods
[AGARD-CP-122] N74-10908

Rotary wing design methodology --- based on nonlinear aeroelastic blade loads analysis N74-10909
Prediction of helicopter rotor loads --- based on alternating aerodynamic loads imposed on rotary wing and rotor hub N74-10911
Helicopter rotor loads predictions --- assumptions and techniques for numerical analysis of aerodynamic loads N74-10912
The prediction of loading actions on high speed semi-rigid helicopters N74-10914
Loads prediction methods for hingeless rotor helicopters N74-10915
Integrated rotor/body loads prediction N74-10916

AERODYNAMIC NOISE
An experimental study of subsonic jet noise and comparison with theory A74-10271
Effect of anisotropic turbulence on aerodynamic noise --- Lighthill theory mathematical model for axisymmetric turbulence A74-10798
Investigation of the characteristics of tubular microphone windscreens for in-duct fan sound power measurements A74-12126
Flow noise spectra from cylinders and aerofoils A74-12127
Progress in aerospace sciences. Volume 14 --- Book A74-12203
Introduction to aerodynamic noise theory A74-12207
Noise generation by ducted combustion systems --- resonant oscillations
[AIAA PAPER 73-1024] A74-12223
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[AIAA PAPER 73-1217] A74-12495
Control of supersonic wind-tunnel noise by laminarization of nozzle-wall boundary layer
[NASA-TM-X-2879] N74-11119

AERODYNAMIC STABILITY
The effects of second order blade bending on the angle of attack of hingeless rotor blades A74-11846
Stability and dynamic behavior of two tethered balloon systems
[AD-766439] N74-10070

AERODYNAMIC STALLING
Experimental evaluation of a TF30-P-3 turbofan engine in an altitude facility: Effect of steady-state temperature distortion
[NASA-TM-X-2921] N74-10722

AERODYNAMICS
Solution of the plane problem of the aerodynamics of a rarefied gas on the basis of Boltzmann's kinetic equation A74-10976
Progress in aerospace sciences. Volume 14 --- Book A74-12203
Aerodynamic calculation of blades in axial-flow turbomachines
[AD-765932] N74-10739

AEROELASTICITY
The lifting surface theory applied to fixed wings and propellers A74-10999
Exploitation of spectral density curves in the case of wind tunnel flutter measurement A74-11000
Some conclusions regarding the aeroelastic stability of hingeless helicopter blades in hover and in forward flight A74-11844
The effects of second order blade bending on the angle of attack of hingeless rotor blades A74-11846

AERONAUTICAL ENGINEERING
Information on the use of data items in the series wings 02.04
[ESDU-WINGS-02.04.00-AMEND-A] N74-10004
Information on the use of data items on rolling moment derivatives of an aeroplane
[ESDU-AIRCRAFT-06.01.00] N74-10005
Aeronautics: Space in the seventies
[NASA-EP-85] N74-10017

AERONAUTICAL SATELLITES
AEROSAT overview --- aeronautical satellites for oceanic ATC A74-12189
AEROSAT performance specifications --- aeronautical satellite for oceanic aircraft communication A74-12190
AEROSAT ground environment and test plan --- aeronautical satellites for ATC A74-12191
A first generation of L-Band avionics for AEROSAT --- experimentation and evaluation phase of aeronuatical satellites A74-12192
Description and cost of a satellite-based oceanic ATC system --- voice and data communication channel capacity requirements A74-12193
The aeronautical satellites: Deluxe gadgets or system of the future --- economic factors A74-12448

AEROSOLS
The light-scattering matrix and types of optical weather --- atmospheric aerosols, haze, fog, drizzle A74-10783

AEROSPACE ENGINEERING
Prospects for aerospace research A74-11098
Aerospace activities N74-10897

AEROSPACE INDUSTRY
U.S. aerospace industry at the crossroads --- response to European competition A74-11610

AEROSPACE SCIENCES
Progress in aerospace sciences. Volume 14 --- Book A74-12203

AEROSPACE SYSTEMS
Cost - The emerging aerospace technology --- applications to gas turbine engines
[AIAA PAPER 73-1327] A74-11318
Aerospace fluidics applications and circuit manufacture
[SAE PAPER 730880] A74-11604
EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record A74-12176
Stichting National Aerospace Laboratory, review for the year 1972 N74-10891

AEROSPACEPLANES
Multistage aerospace craft --- perspective drawings of conceptual design
[NASA-CASE-XMF-02263] N74-10907

AEROTHERMODYNAMICS
Developing a technology base in planetary entry aerothermodynamics A74-12799

AIR BREATHING ENGINES
Dynamic simulation of CONFLOW - A facility to provide hot-gas ground testing of air-breathing missiles under simulated flight conditions
[AIAA PAPER 73-1281] A74-11292
Supersonic mixing and combustion studies of ducted hydrogen-air flows at an inlet air Mach number of 2.6
[AIAA PAPER 73-1320] A74-11313
Low cost supersonic expendable turbine engines --- tactical missile applications
[SAE PAPER 730910] A74-11583

AIR CARGO
A new outbreak of Zeppelin fever --- freight and passenger dirigible revival A74-12911
High level container --- for aerial resupply of military units
[AD-766306] N74-10899

AIR CONDITIONING EQUIPMENT
Cockpit air filtration requirements of the B-1 in a nuclear dust environment
[AD-766711] N74-10065

AIR COOLING
High temperature cooled gas turbines (analysis and design)
[AD-766031] N74-10740
AIR DEFENSE
A primary radar automatic track extractor --- for air defense systems
A74-12402
Flexibility in computer-assisted radar - controlled interceptions --- software in air defense
A74-12406
AIR FLOW
The mean skin friction coefficient for a rough flat plate with a turbulent two-dimenisonal boundary layer in compressible adiabatic flow, with application to wedges, cylinders and cones
[ESDU-73016] N74-10008
Effect of blockage ratio on drag and pressure distributions for bodies of revolution at transonic speeds
[NASA-TN-D-7331] N74-10015
The effects of leading-edge serrations on reducing flow unsteadiness about airfoils, an experimental and analytical investigation
[NASA-CR-2344] N74-10019
FORTRAN program for predicting off-design performance of centrifugal compressors
[NASA-TM-D-7487] N74-10024
Performance of transonic fan stage with weight flow per unit annulus area of 198 kilograms per second per square meter (40.6(lb/sec)/sq ft)
[NASA-TM-X-2905] N74-10027
AIR INTAKES
Subsonic performance data for NACA type submerged air intakes
[ESDU-66029] N74-10012
AIR JETS
An experimental study of subsonic jet noise and comparison with theory
A74-10271
Mixing of multiple dilution jets with a hot primary airstream for gas turbine combustors
[AIAA PAPER 73-1249] A74-11270
AIR NAVIGATION
The application of the vertical gyroscope for the artificial horizon --- low visibility air navigation
A74-10825
Civil air navigation equipment, on the ground and in the air
A74-11094
Properties of air-derived and ground-derived aircraft landing guidance concepts
A74-11102
Range-rate from DME-air data measurements --- for aircraft radial velocity estimation
A74-12182
AEROSAT overview --- aeronautical satellites for oceanic ATC
A74-12189
AEROSAT performance specifications --- aeronautical satellite for oceanic aircraft communication
A74-12190
Application to zone navigation /R/Nav/ of hybrid navigation systems
A74-12446
Integrated navigation in the air and on the sea --- automatic systems
A74-12449
AIR PIRACY
Air and space hi-jacking --- criminal aspects
A74-12878
AIR POLLUTION
Impact of emission regulations on gas turbine combustor design
[AIAA PAPER 73-1155] A74-10508
Measurement of gas turbine exhaust pollutants by Raman spectroscopy
[AIAA PAPER 73-1276] A74-11288
Impact of emission regulations on future gas turbine engine combustors
[AIAA PAPER 73-1277] A74-11289
Pollution in the ground support environment --- at Naval air facilities
[AD-764854] N74-10602
Low NOx emission combustor for automobile --- evaluation of various fuel injection methods
[PB-222075/4] N74-10745
Low NOx emission combustor for automobile gas turbine engines --- design and tests of two research combustors
[PB-222340/2] N74-10746
A unique method for monitoring cabin air pollution from engine oil in the EB-57 D aircraft
[AD-766701] N74-10932
Interest and feasibility study of atmospheric turbulence and thermal gradients simulation --- application to air pollution and meteorology
N74-11380
AIR TRAFFIC
Airports from 1963 to 1983 - Evolution or revolution
A74-11095
The air transport of tomorrow - Economic obstacles to surmount
A74-11096
Lateral distribution of aircraft traffic --- application to pavement design criteria for aircraft with complex landing gear
[AD-765435] N74-10304
AIR TRAFFIC CONTROL
A cylindrical phased-array antenna for ATC interrogation
A74-10018
Civil air navigation equipment, on the ground and in the air
A74-11094
Collision avoidance and the future of air traffic control
A74-11101
Properties of air-derived and ground-derived aircraft landing guidance concepts
A74-11102
AEROSAT overview --- aeronautical satellites for oceanic ATC
A74-12189
AEROSAT ground environment and test plan --- aeronautical satellites for ATC
A74-12191
Description and cost of a satellite-based oceanic ATC system --- voice and data communication channel capacity requirements
A74-12193
Advanced enroute air traffic control radar system /ARSR-3/ --- small aircraft detection
A74-12198
Secondary surveillance radar in ATC --- operational problems
A74-12357
New developments in secondary surveillance radar --- design improvements for ATC
A74-12358
Equipment for suppressing reflected secondary radar signals --- ATC surveillance radar system design
A74-12359
Use of synthetic radar information - Operational and technical aspects
A74-12403
Radar techniques for Air Force applications in avoidance of bird-aircraft collisions and improvement of flight safety
[AD-754981] N74-10068
Continental Land Mass Air Traffic Control (COLM ATC) --- using three artificial satellite configurations
[NASA-CR-132831] N74-10619
Provisional signal formats for the discrete address beacon system --- for air traffic control applications
[ATC-30] N74-10620
An optimum interference detector for DABS monopulse data editing --- for application to air traffic control
[ESD-TR-73-253] N74-10621
A synchronized discrete-address beacon system --- for air traffic control improvement
[FAA-EM-74-3] N74-10622
Human factors experiments for data link --- coding of air traffic control messages
[AD-760401] N74-10625
Aerosat and Marsat: Satellites for mobile services
N74-11018

Interrogation scheduling algorithms for a discrete address beacon system --- for air traffic control applications
[ATC-19] N74-11432
Some user benefits achievable from an advanced air traffic management system
[R-1320-DOT] N74-11435
Cost comparisons of advanced air traffic management systems
[R-1319-DOT] N74-11436

AIR TRANSPORTATION
Air transportation noise technology overview
[AIAA PAPER 73-1152] A74-10506
The air transport of tomorrow - Economic obstacles to surmount
A74-11096
Advantages of aircraft system maturity --- profitability
[SAE PAPER 730907] A74-11585
Research and development for future air transports
A74-11615
A simulation approach for studying the interactions of noise, patronage, and economic viability for air transportation systems
[AIAA PAPER 73-1161] A74-12216
An economic assessment of STOL aircraft potential including terminal area environmental considerations. Volume 2: Appendices
[NASA-CR-114605] N74-10044
The energy dilemma and its impact on air transportation
[NASA-CR-135993] N74-11743
The air transportation/energy system
N74-11745
Energy conservation and air transportation
N74-11746
Conclusions and recommendations --- for problems in energy situation, air transportation, and hydrogen fuel
N74-11748
Energy trends and their future effects upon transportation --- applied to rail, truck, and air cargo operations and private energy uses
[P-5046] N74-11791

AIRBORNE EQUIPMENT
Error model identification and performance predictions for airborne direct ranging Loran
A74-12178
Airborne profiling of ice thickness using a short pulse radar
[NASA-TM-X-71481] N74-11204

AIRCRAFT
Bilinear surface representation of radar scattering for aircraft --- methods for target classification
[AD-766320] N74-10169
Analysis of the longitudinal disturbed motion of a surface skimmer --- like common aircraft
[AD-765992] N74-10326

AIRCRAFT ACCIDENTS
Application of military human factors techniques to general aviation accident prevention
A74-10880
Aircraft accident report: Air Iowa, Incorporated, Beech E18S, N310WA, Davenport Iowa, 19 Apr. 1973
[NTSB-AAR-73-18] N74-10041
Aircraft incident report: Eastern Air Lines, Incorporated, Boeing 727-225, N8843E, Toledo, Ohio, 10 April 1973
[NTSB-AAR-73-17] N74-10050
Radar techniques for Air Force applications in avoidance of bird-aircraft collisions and improvement of flight safety
[AD-754981] N74-10068
Aircraft accident reports: Brief format, US Civil Aviation. Issue no. 1: 1973 accidents
[NTSB-BA-73-8] N74-10919
Orientation-error accidents in regular Army aircraft during fiscal year 1970: Relative incidence and cost
[AD-767028] N74-10930

AIRCRAFT ANTENNAS
Effect of differences between the antennas of a Doppler velocity meter on its operational accuracy
A74-11994
Satellite communications systems --- multiplexing for communication lines, equipment of earth stations, and onboard receiver transmitter and antennas
[JPRS-54505] N74-10153
Improvement of performance characteristics of a class of broadband circularly polarized antennas --- for use with tactical airborne jamming equipment
[AD-766473] N74-11065

AIRCRAFT BRAKES
A thermal, thermoelastic, and wear simulation of a high-energy sliding contact problem
[ASME PAPER 73-LUB-6] A74-12333

AIRCRAFT CARRIERS
Deck heating effects due to VTOL jet exhaust impingement
[AIAA PAPER 73-1182] A74-11227
LSO/pilot interaction simulator --- for analysis of flight hazards during approach to landing on aircraft carrier
[AD-765686] N74-10055
Test plan report for catapult fatique. Test of the model E-2 A/B airplane
[AD-765708] N74-10059

AIRCRAFT COMMUNICATION
A cylindrical phased-array antenna for ATC interrogation
A74-10018
AEROSAT overview --- aeronautical satellites for oceanic ATC
A74-12189
AEROSAT performance specifications --- aeronautical satellite for oceanic aircraft communication
A74-12190

AIRCRAFT COMPARTMENTS
Differential method for testing the optical standards of cockpit windshields
A74-10937
A unique method for monitoring cabin air pollution from engine oil in the EB-57 D aircraft
[AD-766701] N74-10932

AIRCRAFT CONFIGURATIONS
Integrated airframe-nozzle performance for designing twin-engine fighters
[AIAA PAPER 73-1303] A74-11302
An integrated approach to structural weight estimation
[SAE PAPER 730936] A74-11564
A new outbreak of Zeppelin fever --- freight and passenger dirigible revival
A74-12911
Propulsion requirements for powered-lift aircraft
[AIAA PAPER 73-1214] A74-12928

AIRCRAFT CONTROL
Flight-mechanics analysis of various flight conditions of conventional aircraft. VIII/2 - Mechanical foundations: Dynamic equations of motion of the control systems
A74-11744
Flexibility in computer-assisted radar - Controlled interceptions --- software in air defense
A74-12406
Fluidic emergency roll control system --- for emergency aircraft control following failure of primary roll control system
[NASA-CR-114588] N74-10048
Investigation and application of two methods of determining co-efficients of transfer functions of longitudinal motion of aircraft from measured input and output data --- equations of motion and response curve fitting
[ESRO-TT-2] N74-10053
A roll-pitch interaction simulator and a control position command encoder for remote piloting of spin-entry research models
[NASA-TN-D-7361] N74-11059

AIRCRAFT DESIGN
The technology and economics of commercial airplane design. I
A74-10144
The technology and economics of commercial airplane design. II
A74-10145
Designing for noise and emission control in general aviation
[AIAA PAPER 73-1158] A74-10509

F-14 inlet maneuvering capability
[AIAA PAPER 73-1273] A74-11286
The influence of operational experience on aircraft escape system development
[AIAA PAPER 73-1340] A74-11387
Effect of exhaust deflectors on the design of lift plus lift/cruise V/STOL aircraft
[SAE PAPER 730959] A74-11554
Evaluation of V/STOL research aircraft design --- landing approaches, propulsion/control, piloted moving base simulator
[SAE PAPER 730947] A74-11557
Evaluation of advanced air vehicle designs in the USAF
[SAE PAPER 730945] A74-11558
Advanced flutter design techniques --- subsonic and SST aircraft
[SAE PAPER 730935] A74-11565
Computer-aided design and drafting /CADD/ - An advanced designer's tool
[SAE PAPER 730934] A74-11566
Use of simulators in the design and development of flight control systems
[SAE PAPER 730933] A74-11567
External blowing flap technology on the USAF/McDonnell Douglas YC-15 /AMST/ program
[SAE PAPER 730915] A74-11579
Air Force STOL tactical aircraft investigation - Evaluation of externally blown flaps
[SAE PAPER 730914] A74-11580
STOL tactical aircraft investigation --- transports configuration sizing and design
[SAE PAPER 730913] A74-11581
Propulsion technology advances needed for a quiet supersonic transport
[SAE PAPER 730898] A74-11591
The influence of design to cost and prototyping on the A-10 aircraft
[SAE PAPER 730890] A74-11598
Material selection procedures for advanced transport aircraft
[SAE PAPER 730884] A74-11602
Maintainability concepts used in the design and operation of Douglas commercial jet aircraft
[SAE PAPER 730881] A74-11603
New airfoil sections for general aviation aircraft --- cruising and flap development tests
[SAE PAPER 730876] A74-11606
Ten years transonic wind tunnel of the AVA Goettingen --- design and measurement objectives
A74-11808
Noise design goals for the next generation of aircraft --- community of STOL aircraft
A74-11816
The next step is straight up --- V/STOL fighter-attack aircraft for minicarriers
A74-12129
A positive approach to the problems of aircraft noise
[AIAA PAPER 73-1157] A74-12227
One-dimensional analysis of compressible ejector flows applicable to V/STOL aircraft design
[AIAA PAPER 73-1184] A74-12921
Aeronautics: Space in the seventies
[NASA-EP-85] N74-10017
Small V/STOL aircraft analysis. Volume 2: Appendices --- to determine current and future general aviation missions and performance requirements
[NASA-CR-114629] N74-10045
Remote lift fan study program, volume 4
[NASA-CR-121277] N74-10049
Motorless flight research, 1972 --- glider design, airframes, and soaring flight developments
[NASA-CR-2315] N74-10051
Multistage aerospace craft --- perspective drawings of conceptual design
[NASA-CASE-XMF-02263] N74-10907

AIRCRAFT DETECTION
Advanced enroute air traffic control radar system /ARSR-3/ --- small aircraft detection
A74-12198
A primary radar automatic track extractor --- for air defense systems
A74-12402

AIRCRAFT ENGINES
Influence of noise requirements on STOL propulsion system designs
A74-10148
Designing small gas turbine engines for low noise and clean exhaust
[AIAA PAPER 73-1154] A74-10507
A simplified fuel control approach for low-cost aircraft gas turbines
[SAE PAPER 730388] A74-10802
Aircraft engines - Progress made in France over ten years, and possibilities for the ten years to come
A74-11093
A modular turbofan design for high availability and low life cycle cost
[AIAA PAPER 73-1189] A74-11231
Wind tunnel tests of a 20 inch diameter 1.15 pressure ratio fan engine model
[AIAA PAPER 73-1216] A74-11245
Prediction of aircraft gas turbine NO/x/ emission dependence on engine operating parameters and ambient conditions
[AIAA PAPER 73-1275] A74-11287
Impact of emission regulations on future gas turbine engine combustors
[AIAA PAPER 73-1277] A74-11289
Qualitative effects of cycle variables on turbine engine performance and stability
[AIAA PAPER 73-1315] A74-11310
AST - A fifth engine for environmental consideration
[SAE PAPER 730899] A74-11590
Spray cooled generators and design-to-cost at Westinghouse
[SAE PAPER 730878] A74-11605
The Dolphin airship with undulating propulsion system - On-test-stand comparison with a helicopter --- payload capacity and engine performance
A74-11743
RB 211 - The first eighteen months operating experience /Sholto Douglas Memorial Lecture/
A74-12300
An analytical study of icing simulation for turbine engines in altitude test cells
[AIAA PAPER 73-1280] A74-12938
Preliminary results of flight tests of the propulsion system of the YF-12 airplane at Mach numbers to 3.0
[AIAA PAPER 73-1314] A74-12951
Refan program. Phase 1: Summary report
[NASA-TM-X-71456] N74-10043
Study of small turbofan engines applicable to general-aviation aircraft
[NASA-CR-114630] N74-10725
Impact resistance of fiber composite blades used in aircraft turbine engines
[NASA-CR-134502] N74-10726
Aviation gas turbine engines (selected portions)
[AD-756810] N74-10751

AIRCRAFT EQUIPMENT
Civil air navigation equipment, on the ground and in the air
A74-11094
Electronic display mechanization for monitoring aircraft parameters
[SAE PAPER 730956] A74-11555
Aircraft fuel tank entry wall-projectile interaction studies
[AD-765667] N74-10066
A synchronized discrete-address beacon system --- for air traffic control improvement
[FAA-EM-74-3] N74-10622
Estimation of an aeronautical equipment mission reliability
[AD-766886] N74-10935

AIRCRAFT FUELS
Aviation turbine fuel and its lubricating qualities
A74-11739
Operational problems with the aircraft type Tu-134 in the case of a use of the aircraft turbine fuel TS-1
A74-11740
The quality of the fuel --- aviation fuel purity maintenance during transport and storage
A74-11741
Aviation turbine fuels, 1972
N74-11592

AIRCRAFT GUIDANCE
Properties of air-derived and ground-derived aircraft landing guidance concepts
A74-11102

AIRCRAFT HAZARDS
Technology forecasting - Aircraft hazard detection A74-11499
Bird strike and the radar properties of birds --- migration patterns monitoring A74-12389
An evaluation of the relative fire hazards of jet A and jet B for commercial flight [NASA-TM-X-71437] N74-10709

AIRCRAFT INSTRUMENTS
New concepts of visualization for aircraft --- instrument panel display integration A74-12447

AIRCRAFT LANDING
Properties of air-derived and ground-derived aircraft landing guidance concepts A74-11102
Blind landing --- automatic systems A74-11552
Simulation study on flare control system by optimization theory [NAL-TR-312] N74-10046
LSO/pilot interaction simulator --- for analysis of flight hazards during approach to landing on aircraft carrier [AD-765686] N74-10055
Response predictions of helicopter landing platform for the USS BELKNAP (DLG-26) and USS GARCIA (DE-1040)-Class destroyers [AD-766450] N74-10072
A feasibility study and preliminary evaluation of the use of a biased glide slope technique for noise abatement approach [FAA-RD-73-153] N74-10618
Comparison of simulation and flight testing at automatic STOL landing [NASA-TT-F-15171] N74-10923
STOL tactical aircraft investigation. Volume 3: Takeoff and landing performance ground rules for powered lift STOL transport aircraft [AD-766640] N74-10938
Preliminary assessment of the microwave landing system requirements for STOL operations [NASA-TM-X-62310] N74-11431
Modern beaconing in airports for bad weather flights [NASA-TT-F-15178] N74-11433

AIRCRAFT MAINTENANCE
The main rotor bifilar absorber and its effect on helicopter reliability/maintainability [SAE PAPER 730894] A74-11595
Maintainability concepts used in the design and operation of Douglas commercial jet aircraft [SAE PAPER 730881] A74-11603
Vibration effects on helicopter reliability and maintainability [AD-766307] N74-10064
The economic efficiency of raising the flying life and reliability of gas-turbine engines [AD-767027] N74-11601

AIRCRAFT MODELS
VTOL recirculation and impingement model testing --- flow fields in ground effect test [AIAA PAPER 73-1183] A74-11228
Photographic pyrometry in an aeroballistic range --- aerodynamic model surface temperature measurement A74-12752
Study of Moire measuring techniques for wind tunnel model deformation [AD-766892] N74-11298

AIRCRAFT NOISE
Air transportation noise technology overview [AIAA PAPER 73-1152] A74-10506
Designing for noise and emission control in general aviation [AIAA PAPER 73-1158] A74-10509
It's quiet in front --- community reaction to aircraft noise [AIAA PAPER 73-1159] A74-10510
Noise, an urgent problem with a slow solution --- aircraft noise reduction in airport vicinity A74-11001
Flap noise prediction method for a powered lift system [AIAA PAPER 73-1028] A74-11051
Aircraft noise reduction - Alternatives versus cost A74-11199
Noise design goals for the next generation of aircraft --- community of STOL aircraft A74-11816
The acoustics of aircraft engine-duct systems [AIAA PAPER 73-1153] A74-12215
Aircraft noise relief potential at major hub airports [AIAA PAPER 73-1164] A74-12217
The effect of inlet-noise suppression on propulsion system design [AIAA PAPER 73-1294] A74-12942
Refan program. Phase 1: Summary report [NASA-TM-X-71456] N74-10043
Speech intelligibility testing with the modified rhyme test in aviation type noise [AD-765470] N74-10159
A feasibility study and preliminary evaluation of the use of a biased glide slope technique for noise abatement approach [FAA-RD-73-153] N74-10618
Aircraft noise reduction technology --- to show impact on individuals and communities, component noise sources, and operational procedures to reduce impact [NASA-TM-X-68241] N74-10917
Aerodynamic problems of STOL aircraft [NASA-TT-F-15182] N74-10918
V/STOL noise prediction and reduction [LG73ER0062] N74-10921

AIRCRAFT PARTS
Further development of the JT15D turbofan --- Remotely Piloted Vehicle applications [SAE PAPER 730919] A74-11576
A life study of AISI M-50 and Super Nitralloy spur gears with and without tip relief [ASME PAPER 73-LUB-38] A74-12352
Manufacture and properties of titanium and titanium alloys emphasizing their use in aeronautics. Part 1: Manufacture and processing --- conference N74-11336
Manufacture of titanium and titanium alloy semifinished products --- with application to production of drop-forged aircraft parts N74-11338
Status and development tendencies of titanium processing --- metallurgical techniques for manufacture of aircraft parts N74-11339

AIRCRAFT PERFORMANCE
Evolution philosophy --- Fokker F28 aircraft A74-10936
The technical evolution of aircraft A74-11092
The effect of noise constraints on engine cycle optimization for long-haul transports [AIAA PAPER 73-1292] A74-11298
Integrated airframe-nozzle performance for designing twin-engine fighters [AIAA PAPER 73-1303] A74-11302
The case for hydrogen fueled transport aircraft [AIAA PAPER 73-1323] A74-11315
Tupolev 144 and Concorde - The official performances are compared for the first time A74-11348
New concepts of visualization for aircraft --- instrument panel display integration A74-12447
Information on the use of data items on rolling moment derivatives of an aeroplane [ESDU-AIRCRAFT-06.01.00] N74-10005
Small V/STOL aircraft analysis. Volume 2: Appendices --- to determine current and future general aviation missions and performance requirements [NASA-CR-114629] N74-10045
Remote lift fan study program, volume 4 [NASA-CR-121277] N74-10049
Motorless flight research, 1972 --- glider design, airframes, and soaring flight developments [NASA-CR-2315] N74-10051
Simulating the system of automatic correction of aircraft coordinates on an analog computer [AD-765991] N74-10058
Research on aircraft dynamics for subsonic flight [AD-765657] N74-10061
Study of small turbofan engines applicable to general-aviation aircraft [NASA-CR-114630] N74-10725

Aerodynamic problems of STOL aircraft
[NASA-TT-F-15182] N74-10918
Views regarding the validity of results from simulation testing in comparison with the results from actual flight test
[NASA-TT-F-15172] N74-10922
Comparison of simulation and flight testing at automatic STOL landing
[NASA-TT-F-15171] N74-10923
STOL tactical aircraft investigation. Volume 1: Configuration definition (medium STOL transport with vectored thrust/mechanical flaps)
[AD-766637] N74-10925
STOL tactical aircraft investigation. Volume 2, part 1: Aerodynamic technology (design compendium, vectored thrust/mechanical flaps)
[AD-766639] N74-10926
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 1: Takeoff and landing ground rules
[AD-766942] N74-10928
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 2: Takeoff and landing digital computer program
[AD-766943] N74-10936
STOL tactical aircraft investigation. Volume 3: Takeoff and landing performance ground rules for powered lift STOL transport aircraft
[AD-766640] N74-10938
Motion software for a synergistic six-degree-of-freedom motion base
[NASA-TN-D-7350] N74-11096

AIRCRAFT PRODUCTION
Simplified assembly of F-15 stressed --- production time and labor cost reduction
A74-10546

AIRCRAFT RELIABILITY
The main rotor bifilar absorber and its effect on helicopter reliability/maintainability
[SAE PAPER 730894] A74-11595
Airworthiness Committee tenth meeting
[DOC-9065] N74-10035
Estimation of an aeronautical equipment mission reliability
[AD-766886] N74-10935

AIRCRAFT SAFETY
Design and evaluation of aircraft pavements - 1971
A74-11874
Airworthiness Committee tenth meeting
[DOC-9065] N74-10035
High sensitivity 1000F gas multiplication UV flame detector for aircraft
[AD-766960] N74-11296

AIRCRAFT SPECIFICATIONS
Evolution philosophy --- Fokker F28 aircraft
A74-10936

AIRCRAFT STABILITY
Longitudinal response of an aircraft due to a trailing vortex pair
A74-11343
Some conclusions regarding the aeroelastic stability of hingeless helicopter blades in hover and in forward flight
A74-11844
Information on the use of data items on rolling moment derivatives of an aeroplane
[ESDU-AIRCRAFT-06.01.00] N74-10005
Simulating the system of automatic correction of aircraft coordinates on an analog computer
[AD-765991] N74-10058

AIRCRAFT STRUCTURES
The next step is straight up --- V/STOL fighter-attack aircraft for minicarriers
A74-12129

AIRCRAFT WAKES
Longitudinal response of an aircraft due to a trailing vortex pair
A74-11343

AIRFOIL PROFILES
Inverting the mapping function --- coefficients for circle-airfoil transformation function expansion
A74-10070
On the flow around the leading edge of a lifting airfoil
A74-10996
Methods of visualization of the leading edge separation bubble and analysis of results
A74-10997
Prevention of transition over a backward step by suction --- laminar boundary layer control
A74-11339
Prediction of airfoil shock location in transonic flow
A74-11342
Finite element solution of the incompressible flow over an airfoil in a nonuniform stream
A74-11426

AIRFOILS
Airfoil design for high tip speed compressors --- fan technology
[AIAA PAPER 73-1248] A74-11269
Suitability of the finite element method for analysis of unsteady flow around oscillating airfoils
A74-11439
New airfoil sections for general aviation aircraft --- cruising and flap development tests
[SAE PAPER 730876] A74-11606
Scattering by a conducting aerofoil --- electromagnetic radiation
A74-11908
Flow noise spectra from cylinders and aerofoils
A74-12127
Aerodynamic characteristics of aerofoils in compressible inviscid airflow at subcritical Mach numbers
[ESDU-72024-AMEND-A] N74-10006
The effects of leading-edge serrations on reducing flow unsteadiness about airfoils, an experimental and analytical investigation
[NASA-CR-2344] N74-10019
Two-dimensional wind tunnel test on a variable-camber airfoil with distributed suction boundary-layer control
[AD-766304] N74-10033

AIRFRAME MATERIALS
Commercial aircraft --- weight reduction by composite materials
A74-10495
A corrosion inhibiting coating for structural airframe fasteners
[SAE PAPER 730902] A74-11588
Influence of prototype concept and cost ceilings on airframe design and manufacture of the YF-16 lightweight fighter
[SAE PAPER 730888] A74-11600

AIRFRAMES
Test plan report for catapult fatigue. Test of the model E-2 A/B airplane
[AD-765708] N74-10059
Symmetrical eigen forms of the vibrations of a supporting surface and of an elastic fuselage
[AD-756285] N74-10067
Nonlinear crack analysis with finite elements --- for application to airframes
[AD-766558] N74-11722

AIRLINE OPERATIONS
The technology and economics of commercial airplane design. I
A74-10144
Advantages of aircraft system maturity --- profitability
[SAE PAPER 730907] A74-11585
Maintainability concepts used in the design and operation of Douglas commercial jet aircraft
[SAE PAPER 730881] A74-11603

AIRPLANE PRODUCTION COSTS
The technology and economics of commercial airplane design. II
A74-10145

AIRPORT BEACONS
Modern beaconing in airports for bad weather flights
[NASA-TT-F-15178] N74-11433

AIRPORT PLANNING
Airports from 1963 to 1983 - Evolution or revolution
A74-11095
The air transport of tomorrow - Economic obstacles to surmount
A74-11096
Noise design goals for the next generation of aircraft --- community of STOL aircraft
A74-11816

Wind conditions at the Cologne/Bonn airport and possibilities of forecasting them
A74-11835
Design and evaluation of aircraft pavements - 1971
A74-11874
Aircraft noise relief potential at major hub airports
[AIAA PAPER 73-1164] A74-12217
Military aircraft noise --- abatement program
[AIAA PAPER 73-1291] A74-12941

AIRPORTS
It's quiet in front --- community reaction to aircraft noise
[AIAA PAPER 73-1159] A74-10510
Noise, an urgent problem with a slow solution --- aircraft noise reduction in airport vicinity
A74-11001
Visual landings in regional and local airports
[NASA-TT-F-15177] N74-11093

AIRSHIPS
The Dolphin airship with undulating propulsion system - On-test-stand comparison with a helicopter --- payload capacity and engine performance
A74-11743
A new outbreak of Zeppelin fever --- freight and passenger dirigible revival
A74-12911

ALGORITHMS
Reduced order filtering with applications in hybrid navigation --- minimum variance Kalman filter algorithm
A74-12177
Interrogation scheduling algorithms for a discrete address beacon system --- for air traffic control applications
[ATC-19] N74-11432

ALTIMETERS
Terrain properties and topography from Skylab altimetry --- Oregon, Utah, Texas, and Nevada
[E74-10043] N74-11164
Geodetic analysis of Skylab altimetry preliminary data - SL/2 EREP pass 9 --- time series analysis of geoidal heights
[E74-10086] N74-11197
Adaptation of computer programming to output form of altimeter data --- Sierra Nevada and Grand Canyon regions
[E74-10087] N74-11198
Radar backscattering as a means for measuring ocean surface parameters using S193 altimetry and S190B photography
[E74-10092] N74-11202

ALTITUDE SIMULATION
An analytical study of icing simulation for turbine engines in altitude test cells
[AIAA PAPER 73-1280] A74-12938

ALUMINUM ALLOYS
Creep fracture mechanisms in aluminum alloys
A74-11736

ANALOG SIMULATION
Dynamic simulation of CONFLOW - A facility to provide hot-gas ground testing of air-breathing missiles under simulated flight conditions
[AIAA PAPER 73-1281] A74-11292

ANGLE OF ATTACK
On the flow around the leading edge of a lifting airfoil
A74-10996
The effects of second order blade bending on the angle of attack of hingeless rotor blades
A74-11846
A simplified method for studying the aerodynamic heating of axisymmetric bodies at an angle of attack
A74-12441

ANISOTROPY
Effect of anisotropic turbulence on aerodynamic noise --- Lighthill theory mathematical model for axisymmetric turbulence
A74-10798

ANNULAR FLOW
Annular slot and frontal slot flow --- turbulent flow resistance coefficients
A74-10033

ANTENNA RADIATION PATTERNS
A cylindrical phased-array antenna for ATC interrogation
A74-10018
Effect of differences between the antennas of a Doppler velocity meter on its operational accuracy
A74-11994

ANTIFRICTION BEARINGS
Investigation of rotor dynamic and high speed bearing technology for a 3 KW turbo-alternator
[AD-765501] N74-10486

APPROACH
Measurement of turbulence inputs for V/STOL approach paths in a simulated planetary boundary layer
[UTIAS-189] N74-11661

APPROACH CONTROL
A feasibility study and preliminary evaluation of the use of a biased glide slope technique for noise abatement approach
[FAA-RD-73-153] N74-10618

AREA NAVIGATION
Application to zone navigation /R/Nav/ of hybrid navigation systems
A74-12446

ARIZONA
Adaptation of computer programming to output form of altimeter data --- Sierra Nevada and Grand Canyon regions
[E74-10087] N74-11198

ARTIFICIAL SATELLITES
Continental Land Mass Air Traffic Control (COLM ATC) --- using three artificial satellite configurations
[NASA-CR-132831] N74-10619

ASPHALT
Test of LOX compatibility for asphalt and concrete runway materials
[NASA-TM-X-64086] N74-11091

ASTRIONICS
BASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record
A74-12176

ATMOSPHERIC CHEMISTRY
Gas-phase nitrogen and methane chemistry in the atmosphere
A74-11513

ATMOSPHERIC ELECTRICITY
Lightning effects on general aviation aircraft
[FAA-NA-73-32(2)] N74-10040

ATMOSPHERIC ENTRY
Theory of hypersonic flow about a wing
A74-12205
Developing a technology base in planetary entry aerothermodynamics
A74-12799
An empirical equation for prediction of transition location on cones in super-or hypersonic flight
[AD-765692] N74-10032

ATMOSPHERIC OPTICS
The light-scattering matrix and types of optical weather --- atmospheric aerosols, haze, fog, drizzle
A74-10783

ATMOSPHERIC TURBULENCE
Measurement of turbulence inputs for V/STOL approach paths in a simulated planetary boundary layer
[UTIAS-189] N74-11661

AUTOMATIC CONTROL
Integrated navigation in the air and on the sea --- automatic systems
A74-12449
Control failure simulations of the PHM hydrofoil craft using a 1/20-scale dynamic model with automatic control
[AD-766098] N74-10338

AUTOMATIC LANDING CONTROL
Blind landing --- automatic systems
A74-11552
Simulation study on flare control system by optimization theory
[NAL-TR-312] N74-10046

AUTOMATIC PILOTS
Blind landing --- automatic systems
A74-11552
Simulating the system of automatic correction of aircraft coordinates on an analog computer
[AD-765991] N74-10058

AUTOMOBILE ENGINES
Low NOx emission combustor for automobile --- evaluation of various fuel injection methods
[PB-222075/4] N74-10745
Low NOx emission combustor for automobile gas turbine engines --- design and tests of two research combustors
[PB-222340/2] N74-10746
AUXILIARY POWER SOURCES
Gas generator design for a wide variety of APU applications
[AIAA PAPER 73-1169] A74-12916
AVIONICS
EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record
A74-12176
Error model identification and performance predictions for airborne direct ranging Loran
A74-12178
A first generation of L-Band avionics for AEROSAT --- experimentation and evaluation phase of aeronautical satellites
A74-12192
AXIAL COMPRESSION LOADS
Buckling of orthotropic, curved, sandwich panels in shear and axial compression
A74-11340
AXIAL FLOW
Unsteady fluid dynamic response of an axial-flow compressor stage with distorted inflow
[AD-766084] N74-10736
AXIAL FLOW TURBINES
Some aspects of inlet/engine flow compatibility
A74-11618
Throughflow theory for turbomachines
[AD-766537] N74-11602
AXISYMMETRIC BODIES
A simplified method for studying the aerodynamic heating of axisymmetric bodies at an angle of attack
A74-12441
AXISYMMETRIC FLOW
Effect of anisotropic turbulence on aerodynamic noise --- Lighthill theory mathematical model for axisymmetric turbulence
A74-10798

B

B-1 AIRCRAFT
Cockpit air filtration requirements of the B-1 in a nuclear dust environment
[AD-766711] N74-10065
B-57 AIRCRAFT
A unique method for monitoring cabin air pollution from engine oil in the EB-57 D aircraft
[AD-766701] N74-10932
BACKSCATTERING
Radar backscattering as a means for measuring ocean surface parameters using S193 altimetry and S190B photography
[E74-10092] N74-11202
BALLISTIC RANGES
Photographic pyrometry in an aeroballistic range --- aerodynamic model surface temperature measurement
A74-12752
BALLISTIC TRAJECTORIES
Hologram study of gas flow in a ballistic wind tunnel
A74-11414
BALLOONS
Lauching of small inflated balloons from cargo aircraft --- using palletized modular airdrop platform
[AD-766428] N74-10069
A buoyant tornado-probe concept incorporating an inverted lifting device --- and balloon combination
[NASA-TN-D-7335] N74-10584
BASE FLOW
External burning assisted projectile - Theory and experiment
[AIAA PAPER 73-1193] A74-11234
BEAMS (SUPPORTS)
Deflection of carbon fibre/acrylic foam sandwich beams
A74-10322
BEAUFORT SEA (NORTH AMERICA)
Nasa remote sensing of sea ice in AIDJEX
N74-11223
BEECHCRAFT 18 AIRCRAFT
Aircraft accident report: Air Iowa, Incorporated, Beech E18S, N310WA, Davenport Iowa, 19 Apr. 1973
[NTSB-AAR-73-18] N74-10041
BENDING DIAGRAMS
Deflection of carbon fibre/acrylic foam sandwich beams
A74-10322
BENDING VIBRATION
Torsion-flap-lag coupling on helicopter rotor blades
A74-11843
BIRDS
Bird strike and the radar properties of birds --- migration patterns monitoring
A74-12389
Studies of the effects of sonic boom on birds
[PAA-RD-73-148] N74-10039
Radar techniques for Air Force applications in avoidance of bird-aircraft collisions and improvement of flight safety
[AD-754981] N74-10068
BLADE TIPS
An investigation of the vibratory and acoustic benefits obtainable by the elimination of the blade tip vortex
A74-11845
Performance of a single-stage transonic compressor with a blade-tip solidity of 1.5 and comparison with 1.3 and 1.7 solidity stages
[NASA-TM-X-2926] N74-10734
BLIND LANDING
Blind landing --- automatic systems
A74-11552
BLUNT BODIES
Reaction modes occurring at detonation of explosive gas mixture due to detached shock front from a blunt nockup at supersonic speeds
[ISL-28/72] N74-11740
BOATS
Control failure simulations of the PHM hydrofoil craft using a 1/20-scale dynamic model with automatic control
[AD-766098] N74-10338
BODIES OF REVOLUTION
A study of methods which predict supersonic flow fields from body geometry, distance, and Mach number
[NASA-TN-D-7387] N74-10030
Drag of streamline solids of revolution (transition at nose)
[ESDU-BODIES-02.04.01-AMEND-A] N74-10311
Transonic flow around slender bodies --- transonic flow around slender and fin stabilized bodies of revolution
N74-10440
BODY-WING CONFIGURATIONS
Effects of isolated body and wing-body interference on rolling moment due to sideslip
[ESDU-73006] N74-10007
BOEING 727 AIRCRAFT
Aircraft incident report: Eastern Air Lines, Incorporated, Boeing 727-225, N8843E, Toledo, Ohio, 10 April 1973
[NTSB-AAR-73-17] N74-10050
BOLTZMANN TRANSPORT EQUATION
Solution of the plane problem of the aerodynamics of a rarefied gas on the basis of Boltzmann's kinetic equation
A74-10976
BOUNDARY LAYER COMBUSTION
Swirling flow combustion - Fundamentals and application --- hydrocarbon-air flame velocity, turbojet afterburner application
[AIAA PAPER 73-1250] A74-11271
BOUNDARY LAYER CONTROL
Prevention of transition over a backward step by suction --- laminar boundary layer control
A74-11339
Upper Surface Blowing technology as applied to the YC-14 airplane
[SAE PAPER 730916] A74-11578
Minimizing boundary layer bleed for a mixed compression inlet
[AIAA PAPER 73-1270] A74-12497

Two-dimensional wind tunnel test on a variable-camber airfoil with distributed suction boundary-layer control
[AD-766304] N74-10033
Investigation of the suction system and boundary-layer characteristics on a high-lift, BLC L-19 test aircraft
[AD-766305] N74-10063
Minimizing boundary layer bleed for a mixed compression inlet --- sized for TF30-P-3 turbofan engine at Mach 2.0 and 2.5
[NASA-TM-X-71461] N74-10321
STOL tactical aircraft investigation. Volume 6: Air cushion landing system study
[AD-766644] N74-10940

BOUNDARY LAYER SEPARATION
Prediction of airfoil shock location in transonic flow
A74-11342

BOUNDARY LAYER STABILITY
Nonlinear stability theory of the boundary layer
A74-11155

BOUNDARY LAYER TRANSITION
Experimental study of shock-wave reflection upon boundary layer transition
[ONERA, TP NO. 1284] A74-11072
Nonlinear stability theory of the boundary layer
A74-11155
Prevention of transition over a backward step by suction --- laminar boundary layer control
A74-11339
Drag of streamline solids of revolution (transition at nose)
[ESDU-BODIES-02.04.C1-AMEND-A] N74-10311

BOUNDARY VALUE PROBLEMS
Unsteady flow of power-law fluids
A74-10573
Boundary value problems of two-dimensional isentropic gas flow
A74-11430

BUBBLES
Methods of visualization of the leading edge separation bubble and analysis of results
A74-10997

BUCKLING
Buckling of orthotropic, curved, sandwich panels in shear and axial compression
A74-11340

BUFFETING
The calculation of the buffeting limits of swept wings --- transonic flow regime
A74-10985

BUILDINGS
Wind tunnel and field investigations of shapes for balloon shelters
[NCAR-TN/EDD-82] N74-10016

BURNTHROUGH (FAILURE)
Ultraviolet and near-infrared spectral analysis of a burner-can burn-through flame
[PAA-NA-73-86] N74-10866

C

C-5 AIRCRAFT
Keyed joint performance under heavy load aircraft
[AD-766706] N74-11101

CABIN ATMOSPHERES
Cockpit air filtration requirements of the B-1 in a nuclear dust environment
[AD-766711] N74-10065

CALCULATORS
Design considerations for the calculator, altitude ML-646 (XE-1/UM)
[AD-766699] N74-11295

CALIFORNIA
Thermal warm fog dissipation: Heat requirements and projected utilization of a system for Travis AFB, California
[AD-766247] N74-10605

CARBON DIOXIDE LASERS
Study of condensation phenomena in the ISL laser wind tunnel using light diffusion
[ISL-BT-19/72] N74-11099

CARBON FIBER REINFORCED PLASTICS
Deflection of carbon fibre/acrylic foam sandwich beams
A74-10322

CARBON MONOXIDE
Chemical reactions calculations in turbulent flows - Application to a CO containing turbojet plume
[ONERA, TP NO. 1229] A74-11069

CARET WINGS
Theory of hypersonic flow about a wing
A74-12205

CARGO
In place of congestion: Some observations on the transport of freight
[TT-7308] N74-10890

CARGO AIRCRAFT
Upper Surface Blowing technology as applied to the YC-14 airplane
[SAE PAPER 730916] A74-11578
External blowing flap technology on the USAF/McDonnell Douglas YC-15 /AMST/ program
[SAE PAPER 730915] A74-11579
STOL tactical aircraft investigation --- transports configuration sizing and design
[SAE PAPER 730913] A74-11581

CASCADE FLOW
The behavior of axial compressor cascades in the case of deviations from purely cylindrical flow
A74-10030
Experimental investigation of two-dimensional cascade performance with blunt trailing edge blade sections at transonic inlet Mach number range
[NAL-TR-313] N74-10322
A study of supersonic flow past vibrating shells and cascades --- using linearized characteristic methods
[AD-765735] N74-10335
Test of a supersonic compressor cascade, volume 1
[AD-756870] N74-10749
Test of a supersonic compressor cascade, volume 2 --- effects of vortex generators mounted on blades
[AD-756871] N74-10750

CASTING
Ice and landing surface demoulding: Replica fabrication
[FFA-MEMO-90] N74-10541

CATAPULTS
Test plan report for catapult fatique. Test of the model E-2 A/B airplane
[AD-765708] N74-10059

CATHODE RAY TUBES
Electronic display mechanization for monitoring aircraft parameters
[SAE PAPER 730956] A74-11555
Present and future radar display techniques --- CRT, LED and liquid crystals for ATC applications
A74-12382

CENTRIFUGAL COMPRESSORS
FORTRAN program for predicting off-design performance of centrifugal compressors
[NASA-TN-D-7487] N74-10024

CENTRIFUGAL FORCE
Swirling flow combustion - Fundamentals and application --- hydrocarbon-air flame velocity, turbojet afterburner application
[AIAA PAPER 73-1250] A74-11271

CH-3 HELICOPTER
Vibration effects on helicopter reliability and maintainability
[AD-766307] N74-10064

CH-54 HELICOPTER
Major Item Special Study (MISS). CH-54A T/R blade
[AD-766227] N74-10056
Major Item Special Study (MISS). CH-54A clutch assembly (APP)
[AD-766226] N74-10057
Major Item Special Study (MISS). CH-54A turbine engine
[AD-766228] N74-10738

CHANNEL CAPACITY
Description and cost of a satellite-based oceanic ATC system --- voice and data communication channel capacity requirements
A74-12193

CHEMICAL ANALYSIS
Some analyses of the chemistry and diffusion of SST exhaust materials during phase 3 of the wake period --- in lower stratosphere
[NASA-CR-132323] N74-10863
Aviation turbine fuels, 1972
N74-11592

CHEMICAL REACTIONS
Chemical reactions calculations in turbulent flows - Application to a CO containing turbojet plume [ONERA, TP NO. 1229] A74-11069
Some analyses of the chemistry and diffusion of SST exhaust materials during phase 3 of the wake period --- in lower stratosphere [NASA-CR-132323] N74-10863

CHROMATOGRAPHY
Odor intensity and characterization studies of exhaust from a turbojet engine combustor [AIAA PAPER 73-1278] A74-11290

CHROMOSPHERE
Eclipse flight of Concorde 001 --- 30 June 1973 A74-12515

CIRCULAR CYLINDERS
The effects of wake splitter plates on the flow past a circular cylinder in the range of R from 10,000 to 50,000 A74-11041
Flow noise spectra from cylinders and aerofoils A74-12127

CIRCULAR PLATES
Strong and weak shock waves. Experiments and calculations [ISL-NB-1/73] N74-11718

CIVIL AVIATION
Aircraft accident reports: Brief format, US Civil Aviation. Issue no. 1: 1973 accidents [NTSB-BA-73-8] N74-10919

CLEAR AIR TURBULENCE
Turbulence near the tropopause in the presence of mountain waves [AD-766577] N74-11274

CLOUD SEEDING
Project Foggy Cloud 4, phase 1. Evaluation of warm fog dissipation techniques --- and stratus cloud modification [AD-766086] N74-10597

CLUTCHES
Major Item Special Study (MISS). CH-54A clutch assembly (APP) [AD-766226] N74-10057
Spring overriding aircraft clutch --- for multiengine helicopters [AD-766309] N74-10073

CLUTTER
The improvement in performance of an S-band surveillance radar operating in conditions of rain clutter A74-12396

COANDA EFFECT
Upper Surface Blowing technology as applied to the YC-14 airplane [SAE PAPER 730916] A74-11578

COCKPITS
Differential method for testing the optical standards of cockpit windshields A74-10937

CODING
Human factors experiments for data link --- coding of air traffic control messages [AD-760401] N74-10625

COLD FLOW TESTS
Flap noise prediction method for a powered lift system [AIAA PAPER 73-1028] A74-11051
V/STOL deflector aerodynamic design criteria --- geometric variations effects [AIAA PAPER 73-1181] A74-11226

COLLISION AVOIDANCE
Collision avoidance and the future of air traffic control A74-11101
Some user benefits achievable from an advanced air traffic management system [R-1320-DOT] N74-11435
Cost comparisons of advanced air traffic management systems [R-1319-DOT] N74-11436

COMBUSTION
Low NOx emission combustor for automobile --- evaluation of various fuel injection methods [PB-222075/4] N74-10745

COMBUSTION CHAMBERS
Aircraft engines - Progress made in France over ten years, and possibilities for the ten years to come A74-11093
Mixing of multiple dilution jets with a hot primary airstream for gas turbine combustors [AIAA PAPER 73-1249] A74-11270
Impact of emission regulations on future gas turbine engine combustors [AIAA PAPER 73-1277] A74-11289
Odor intensity and characterization studies of exhaust from a turbojet engine combustor [AIAA PAPER 73-1278] A74-11290
An experimental investigation of techniques for reducing objectionable exhaust emissions [AIAA PAPER 73-1324] A74-11316
Modeling of gas turbine combustors A74-11434
Simplified physical model of spray combustion in a gas turbine engine A74-11451
An empirical model for calculating the critical conditions of flame stabilization A74-11824
Calculating pressure in combustion chamber of pulsejet engine during filling process [AD-766045] N74-10737
Low NOx emission combustor for automobile gas turbine engines --- design and tests of two research combustors [PB-222340/2] N74-10746
Use of an air-assisted fuel nozzle to reduce idle emissions of a jt8d engine combustor [NASA-TM-X-2946] N74-11738

COMBUSTION EFFICIENCY
An experimental investigation of techniques for reducing objectionable exhaust emissions [AIAA PAPER 73-1324] A74-11316

COMBUSTION PHYSICS
Mixing and combustion processes in jet engines --- physics of interaction of droplets or solid particles with gas stream [AD-766030] N74-10741

COMBUSTION PRODUCTS
Prediction of aircraft gas turbine NO/x/ emission dependence on engine operating parameters and ambient conditions [AIAA PAPER 73-1275] A74-11287
Measurement of gas turbine exhaust pollutants by Raman spectroscopy [AIAA PAPER 73-1276] A74-11288
Modeling of gas turbine combustors A74-11434

COMBUSTION VIBRATION
Noise generation by ducted combustion systems --- resonant oscillations [AIAA PAPER 73-1024] A74-12223

COMMERCIAL AIRCRAFT
The technology and economics of commercial airplane design. I A74-10144
The technology and economics of commercial airplane design. II A74-10145
Commercial aircraft --- weight reduction by composite materials A74-10495
Noise, an urgent problem with a slow solution --- aircraft noise reduction in airport vicinity A74-11001
Transport vehicles - Weights and loads --- commercial aircraft A74-12442
Propulsion requirements for powered-lift aircraft [AIAA PAPER 73-1214] A74-12928

COMMUNICATION EQUIPMENT
Transportability --- of military equipment [AD-765456] N74-10229
Interrogation scheduling algorithms for a discrete address beacon system --- for air traffic control applications [ATC-19] N74-11432

COMMUNICATION SATELLITES
Satellite communications systems --- multiplexing for communication lines, equipment of earth stations, and onboard receiver transmitter and antennas [JPRS-54505] N74-10153
Continental Land Mass Air Traffic Control (COLM ATC) --- using three artificial satellite configurations [NASA-CR-132831] N74-10619

Aerosat and Marsat: Satellites for mobile services
N74-11018
COMPOSITE MATERIALS
Applications of composite materials --- Book
A74-10494
Commercial aircraft --- weight reduction by composite materials
A74-10495
Military aircraft --- structural design with fiber reinforced composite materials
A74-10496
VTOL aircraft --- fibrous composites for structural weight reduction
A74-10497
Advanced structural materials application for high-subsonic-speed transports
[SAE PAPER 730887] A74-11601
Impact resistance of fiber composite blades used in aircraft turbine engines
[NASA-CR-134502] N74-10726
Low cost, fiber glass reinforced plastic fuel tank, volume 1 --- for A-7 aircraft application
[AD-766361] N74-10929
Low cost, fiber glass reinforced plastic fuel tank, volume 2 --- development and evaluation for application to A-7 aircraft
[AD-766400] N74-10931
COMPRESSIBLE FLOW
Dynamic relaxation solution of three dimensional subsonic compressible oscillatory flow
A74-11428
One-dimensional analysis of compressible ejector flows applicable to V/STOL aircraft design
[AIAA PAPER 73-1184] A74-12921
Aerodynamic characteristics of aerofoils in compressible inviscid airflow at subcritical Mach numbers
[ESDU-72024-AMEND-A] N74-10006
COMPRESSION WAVES
External burning assisted projectile - Theory and experiment
[AIAA PAPER 73-1193] A74-11234
COMPRESSOR BLADES
Selection of cutting conditions in the machining axial-flow compressor blades on an assembled rotor
A74-12424
Aerodynamic calculation of blades in axial-flow turbomachines
[AD-765932] N74-10739
Test of a supersonic compressor cascade, volume 2 --- effects of vortex generators mounted on blades
[AD-756871] N74-10750
COMPRESSOR EFFICIENCY
An analytical and experimental study of inlet ground vortices
[AIAA PAPER 73-1313] A74-11309
The effect of inlet temperature and pressure distortion on turbojet performance
[AIAA PAPER 73-1316] A74-11311
COMPRESSORS
Airfoil design for high tip speed compressors --- fan technology
[AIAA PAPER 73-1248] A74-11269
COMPUTER DESIGN
A helicopter flight performance system using an LSI microprocessor --- for calculating gross weight
[AD-765680] N74-10054
COMPUTER GRAPHICS
Computer-aided design and drafting /CADD/ - An advanced designer's tool
[SAE PAPER 730934] A74-11566
Use of synthetic radar information - Operational and technical aspects
A74-12403
COMPUTER PROGRAMMING
Adaptation of computer programming to output form of altimeter data --- Sierra Nevada and Grand Canyon regions
[E74-10087] N74-11198
COMPUTER PROGRAMS
An integrated approach to structural weight estimation
[SAE PAPER 730936] A74-11564
Development of parametricized computations for AST study engines
[SAE PAPER 730895] A74-11594
Application to zone navigation /R/Nav/ of hybrid navigation systems
A74-12446
An investigation of a nonplanar vortex lattice method for wing calculations
[CRANFIELD-AERO-17] N74-10023
FORTRAN program for predicting off-design performance of centrifugal compressors
[NASA-TN-D-7487] N74-10024
A helicopter flight performance system using an LSI microprocessor --- for calculating gross weight
[AD-765680] N74-10054
Current loads technology for helicopter rotors --- based on rotor loads computer program for determining fatigue design loads
N74-10910
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 2: Takeoff and landing digital computer program
[AD-766943] N74-10936
Motion software for a synergistic six-degree-of-freedom motion base
[NASA-TN-D-7350] N74-11096
COMPUTER TECHNIQUES
Introduction to advanced systems monitor --- for flight crew and maintenance data
[SAE PAPER 730953] A74-11556
Flexibility in computer-assisted radar - Controlled interceptions --- software in air defense
A74-12406
COMPUTERIZED DESIGN
A semi-empirical method for predicting subsonic diffuser performance
[AIAA PAPER 73-1272] A74-11285
Evaluation of advanced air vehicle designs in the USAF
[SAE PAPER 730945] A74-11558
Computer-aided design and drafting /CADD/ - An advanced designer's tool
[SAE PAPER 730934] A74-11566
Digital computer simulation of the dynamic response of a twin-spool turbofan with mixed exhausts
A74-11617
COMPUTERIZED SIMULATION
LSO/pilot interaction simulator --- for analysis of flight hazards during approach to landing on aircraft carrier
[AD-765686] N74-10055
Some performance characteristics of the Bell 100 ton surface effect ship --- based on computerized simulation
[AD-765689] N74-10062
Test of a supersonic compressor cascade, volume 1
[AD-756870] N74-10749
Selected problems regarding the formation of a simulation model --- dynamic structural analysis of V/STOL flight control system
[NASA-TT-F-15173] N74-11095
CONCORDE AIRCRAFT
Tupolev 144 and Concorde - The official performances are compared for the first time
A74-11348
Eclipse flight of Concorde 001 --- 30 June 1973
A74-12515
CONCRETES
Test of LOX compatibility for asphalt and concrete runway materials
[NASA-TM-X-64086] N74-11091
Strong and weak shock waves. Experiments and calculations
[ISL-NB-1/73] N74-11718
CONDENSATES
Study of condensation phenomena in the ISL laser wind tunnel using light diffusion
[ISL-RT-19/72] N74-11099
CONFERENCES
EASCON '73; Electronics and Aerospace Systems Convention, Washington, D.C., September 17-19, 1973, Record
A74-12176
Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973
A74-12355

Technical evaluation report on Fluid Dynamics Panel Specialists' Meeting on Aerodynamic Drag
[AGARD-AR-58] N74-10905
Specialists Meeting on Helicopter Rotor Prediction Methods
[AGARD-CP-122] N74-10908
Manufacture and properties of titanium and titanium alloys emphasizing their use in aeronautics. Part 1: Manufacture and processing --- conference
N74-11336

CONICAL BODIES
An empirical equation for prediction of transition location on cones in super-or hypersonic flight
[AD-765692] N74-10032
Laminar heat transfer on sharp and blunt ten-degree cones in conical and parallel low-density flow --- measurements in hypersonic wind tunnels
[AD-765546] N74-10869

CONICAL SHELLS
Prediction of unsteady airloads for the solution of the panel flutter problem of nosecones and conical shell structures
A74-12804

CONSTRUCTION MATERIALS
Advanced structural materials application for high-subsonic-speed transports
[SAE PAPER 730887] A74-11601

CONTROL EQUIPMENT
Control failure simulations of the PHM hydrofoil craft using a 1/20-scale dynamic model with automatic control
[AD-766098] N74-10338

CONTROL SIMULATION
Evaluation of V/STOL research aircraft design --- landing approaches, propulsion/control, piloted moving base simulator
[SAE PAPER 730947] A74-11557

CONTROL SURFACES
Flight-mechanics analysis of various flight conditions of conventional aircraft. VIII/2 - Mechanical foundations: Dynamic equations of motion of the control systems
A74-11744

CONTROL THEORY
Optimal incomplete feedback control of linear stochastic systems
[AD-766878] N74-11378

CONTROLLERS
Solid state controller three axes controller
[NASA-CASE-MSC-12394-1] N74-10942

COOLING SYSTEMS
Spray cooled generators and design-to-cost at Westinghouse
[SAE PAPER 730878] A74-11605

CORROSION RESISTANCE
A corrosion inhibiting coating for structural airframe fasteners
[SAE PAPER 730902] A74-11588

COST ANALYSIS
Aircraft noise reduction - Alternatives versus cost
A74-11199
A new outbreak of Zeppelin fever --- freight and passenger dirigible revival
A74-12911
Cost impact of mission requirements on future engine design selection
[AIAA PAPER 73-1186] A74-12922
Cost comparisons of advanced air traffic management systems
[R-1319-DOT] N74-11436
Project/cost/benefit
[PB-222339/4] N74-11801

COST EFFECTIVENESS
The technology and economics of commercial airplane design. II
A74-10145
A modular turbofan design for high availability and low life cycle cost
[AIAA PAPER 73-1189] A74-11231
Lycomings LTS 101 - Low cost turbine power in the 600 hp class
[SAE PAPER 730911] A74-11582
Description and cost of a satellite-based oceanic ATC system --- voice and data communication channel capacity requirements
A74-12193
A cost-effective approach for flight experiments - Application of Airborne Science aircraft experience to the Shuttle Sortie Lab
A74-12829

COST ESTIMATES
A simplified approach for estimating manufacturing cost at the part level
[SAE PAPER 730908] A74-11584

COST REDUCTION
Simplified assembly of F-15 stressed --- production time and labor cost reduction
A74-10546
A simplified fuel control approach for low-cost aircraft gas turbines
[SAE PAPER 730388] A74-10802
Design competence - The mainspring to cost reduction
[AIAA PAPER 73-1187] A74-11230
Cost - The emerging aerospace technology --- applications to gas turbine engines
[AIAA PAPER 73-1327] A74-11318
The influence of design to cost and prototyping on the A-10 aircraft
[SAE PAPER 730890] A74-11598
Influence of prototype concept and cost ceilings on airframe design and manufacture of the YF-16 lightweight fighter
[SAE PAPER 730888] A74-11600
Advanced structural materials application for high-subsonic-speed transports
[SAE PAPER 730887] A74-11601
Spray cooled generators and design-to-cost at Westinghouse
[SAE PAPER 730878] A74-11605

CRACK PROPAGATION
The application of fracture mechanics to the design of the barrel and driver tube of a hypersonic gun tunnel
A74-10484
Damage threshold determination of light walls submitted to single or repeated bangs, part 1
[ISL-35/72-PT-1] N74-10846

CRACKING (FRACTURING)
Nonlinear crack analysis with finite elements --- for application to airframes
[AD-766558] N74-11722

CRASH LANDING
Crashworthy landing gear study --- to establish energy-absorbing design criteria applicable to rotary wing aircraft
[AD-765489] N74-10060

CREEP PROPERTIES
Creep fracture mechanisms in aluminum alloys
A74-11736

CRITICAL FLOW
An empirical model for calculating the critical conditions of flame stabilization
A74-11824

CROSS FLOW
Near-field trajectory of turbulent jets discharged at various inclinations into a uniform crossflow
A74-10568
Mixing of multiple dilution jets with a hot primary airstream for gas turbine combustors
[AIAA PAPER 73-1249] A74-11270
Analysis of stratified and closely spaced jets exhausting into a crossflow --- aerodynamic characteristics of lift-jet, vectored thrust, and lift fan V/STOL aircraft
[NASA-CR-132297] N74-11118

CRUISING FLIGHT
Possibilities for improved supersonic inlet performance
[AIAA PAPER 73-1271] A74-11284
New airfoil sections for general aviation aircraft --- cruising and flap development tests
[SAE PAPER 730876] A74-11606
Some design considerations for supersonic cruise mixed compression inlets
[AIAA PAPER 73-1269] A74-12496

CURRENT DISTRIBUTION
Scattering by a conducting aerofoil --- electromagnetic radiation
A74-11908

CURVED PANELS
Buckling of orthotropic, curved, sandwich panels in shear and axial compression
A74-11340

CYCLIC LOADS
Effect of several metallurgical variables on the thermal fatigue behavior of superalloys
A74-10622
CYLINDRICAL ANTENNAS
A cylindrical phased-array antenna for ATC interrogation
A74-10018
CYLINDRICAL BODIES
Hydrodynamic forces on oscillating and nonoscillating smooth circular cylinders in crossflow --- for towed bodies
[AD-767022] N74-11125
CYLINDRICAL SHELLS
A study of supersonic flow past vibrating shells and cascades --- using linearized characteristic methods
[AD-765735] N74-10335

D

DATA ACQUISITION
Remote sensing of the earth's resources - Applications, benefits, methods
A74-11204
Views regarding the validity of results from simulation testing in comparison with the results from actual flight test
[NASA-TT-F-15172] N74-10922
DATA LINKS
Human factors experiments for data link --- coding of air traffic control messages
[AD-760401] N74-10625
DATA MANAGEMENT
Information on the use of data items in the series wings 02.04
[ESDU-WINGS-02.04.00-AMEND-A] N74-10004
DATA SYSTEMS
Introduction to advanced systems monitor --- for flight crew and maintenance data
[SAE PAPER 730953] A74-11556
Information on the use of data items in the series wings 02.04
[ESDU-WINGS-02.04.00-AMEND-A] N74-10004
DATA TRANSMISSION
Description and cost of a satellite-based oceanic ATC system --- voice and data communication channel capacity requirements
A74-12193
DC 9 AIRCRAFT
DC-9/JT8D refan, Phase 1 --- technical and economic feasibility of retrofitting DC-9 aircraft with refan engine to achieve desired acoustic levels
[NASA-CR-121252] N74-10729
DEFLECTORS
V/STOL deflector aerodynamic design criteria --- geometric variations effects
[AIAA PAPER 73-1181] A74-11226
Effect of exhaust deflectors on the design of lift plus lift/cruise V/STOL aircraft
[SAE PAPER 730959] A74-11554
DEFORMATION
Study of Moire measuring techniques for wind tunnel model deformation
[AD-766892] N74-11298
DEGREES OF FREEDOM
Motion software for a synergistic six-degree-of-freedom motion base
[NASA-TN-D-7350] N74-11096
DELTA WINGS
Theory of hypersonic flow about a wing
A74-12205
DETONABLE GAS MIXTURES
Reaction modes occurring at detonation of explosive gas mixture due to detached shock front from a blunt nosecap at supersonic speeds
[ISL-28/72] N74-11740
DIESEL ENGINES
Truck noise via diesel exhaust and air intake noise --- acoustic measurements for evaluation of various exhaust and intake systems
[PB-222624/9] N74-10742
DIFFUSERS
A semi-empirical method for predicting subsonic diffuser performance
[AIAA PAPER 73-1272] A74-11285
DIFFUSION FLAMES
High sensitivity 1000F gas multiplication UV flame detector for aircraft
[AD-766960] N74-11296
DIGITAL SIMULATION
Digital computer simulation of the dynamic response of a twin-spool turbofan with mixed exhausts
A74-11617
Simulation study on flare control system by optimization theory
[NAL-TR-312] N74-10046
DIGITAL SYSTEMS
Use of synthetic radar information - Operational and technical aspects
A74-12403
DIGITAL TECHNIQUES
Electronic display mechanization for monitoring aircraft parameters
[SAE PAPER 730956] A74-11555
DISPERSIONS
Lithium soap dispersions as drag-reducing hydraulic fluids
[ASLE PREPRINT 73LC-5B-2] A74-12316
DISPLAY DEVICES
Electronic display mechanization for monitoring aircraft parameters
[SAE PAPER 730956] A74-11555
Introduction to advanced systems monitor --- for flight crew and maintenance data
[SAE PAPER 730953] A74-11556
Use of simulators in the design and development of flight control systems
[SAE PAPER 730933] A74-11567
Present and future radar display techniques --- CRT, LED and liquid crystals for ATC applications
A74-12382
Use of synthetic radar information - Operational and technical aspects
A74-12403
New concepts of visualization for aircraft --- instrument panel display integration
A74-12447
DISTANCE MEASURING EQUIPMENT
Range-rate from DME-air data measurements --- for aircraft radial velocity estimation
A74-12182
DOPPLER EFFECT
Effect of differences between the antennas of a Doppler velocity meter on its operational accuracy
A74-11994
Turbulence measurements with a laser Doppler velocimeter
[AD-766781] N74-11129
DOPPLER RADAR
Objective determination of the noise level in Doppler spectra
[TR-32] N74-10155
DRAG CHUTES
Lightweight, variable solidity knitted parachute fabric --- for aerodynamic decelerators
[NASA-CASE-LAR-10776-1] N74-10034
Lauching of small inflated balloons from cargo aircraft --- using palletized modular airdrop platform
[AD-766428] N74-10069
DRAG MEASUREMENT
Afterbody drag flight test of the A-7E airplane
[AIAA PAPER 73-1306] A74-12948
DRAG REDUCTION
Possibilities for improved supersonic inlet performance
[AIAA PAPER 73-1271] A74-11284
Lithium soap dispersions as drag-reducing hydraulic fluids
[ASLE PREPRINT 73LC-5B-2] A74-12316
DRONE AIRCRAFT
A low cost telemetry system --- for use in small small drone aircraft
[PB-222403/8] N74-10165
DROPS (LIQUIDS)
Mixing and combustion processes in jet engines --- physics of interaction of droplets or solid particles with gas stream
[AD-766030] N74-10741
DUCTED BODIES
Noise generation by ducted combustion systems --- resonant oscillations
[AIAA PAPER 73-1024] A74-12223

DUCTED FLOW
Annular slot and frontal slot flow --- turbulent flow resistance coefficients A74-10033
Supersonic mixing and combustion studies of ducted hydrogen-air flows at an inlet air Mach number of 2.6
[AIAA PAPER 73-1320] A74-11313
Supersonic combustion of hydrogen injected perpendicular to a ducted vitiated airstream
[AIAA PAPER 73-1322] A74-11314
The acoustics of aircraft engine-duct systems
[AIAA PAPER 73-1153] A74-12215
DUCTILITY
Creep fracture mechanisms in aluminum alloys A74-11736
DYNAMIC MODELS
The experimental response of simple structures to simulated sonic booms A74-11814
Model studies of crosswind landing-gear configurations for STOL aircraft N74-11680
DYNAMIC RESPONSE
Digital computer simulation of the dynamic response of a twin-spool turbofan with mixed exhausts A74-11617
DYNAMIC STRUCTURAL ANALYSIS
Symmetrical eigen forms of the vibrations of a supporting surface and of an elastic fuselage
[AD-756285] N74-10067

E

E-2 AIRCRAFT
Test plan report for catapult fatigue. Test of the model E-2 A/B airplane
[AD-765708] N74-10059
EARTH RESOURCES SURVEY PROGRAM
Remote sensing of the earth's resources - Applications, benefits, methods A74-11204
ECHO SUPPRESSORS
Equipment for suppressing reflected secondary radar signals --- ATC surveillance radar system design A74-12359
ECONOMIC FACTORS
The technology and economics of commercial airplane design. I A74-10144
The technology and economics of commercial airplane design. II A74-10145
Airports from 1963 to 1983 - Evolution or revolution A74-11095
The air transport of tomorrow - Economic obstacles to surmount A74-11096
The case for hydrogen fueled transport aircraft
[AIAA PAPER 73-1323] A74-11315
Advantages of aircraft system maturity --- profitability
[SAE PAPER 730907] A74-11585
U.S. aerospace industry at the crossroads --- response to European competition A74-11610
Research and development for future air transports A74-11615
A simulation approach for studying the interactions of noise, patronage, and economic viability for air transportation systems
[AIAA PAPER 73-1161] A74-12216
The aeronautical satellites: Deluxe gadgets or system of the future --- economic factors A74-12448
EFFECTIVE PERCEIVED NOISE LEVELS
It's quiet in front --- community reaction to aircraft noise
[AIAA PAPER 73-1159] A74-10510
Radially leaned outlet guide vanes for fan source noise reduction
[NASA-CR-134486] N74-11597
EJECTION SEATS
The influence of operational experience on aircraft escape system development
[AIAA PAPER 73-1340] A74-11387
EJECTORS
Full-scale tests of an augmentor VTOL concept --- ejector-in-wing configuration
[AIAA PAPER 73-1185] A74-11229
One-dimensional analysis of compressible ejector flows applicable to V/STOL aircraft design
[AIAA PAPER 73-1184] A74-12921
ELASTIC BENDING
The effects of second order blade bending on the angle of attack of hingeless rotor blades A74-11846
ELASTIC DAMPING
The whirl instability of a rigid rotor in a flexibly supported gas lubricated journal bearing A74-11441
ELASTIC DEFORMATION
Study of elastoplastic deformation with friction in hydrocarbon media --- with application to jet engine fuels
[AD-765997] N74-10717
ELASTIC MEDIA
Exploitation of spectral density curves in the case of wind tunnel flutter measurement A74-11000
ELECTRIC CONDUCTORS
Scattering by a conducting aerofoil --- electromagnetic radiation A74-11908
ELECTRIC FIELDS
Study of the electrostatic field and charge distribution in a vortex seeded with dust
[AD-766815] N74-10941
ELECTRIC GENERATORS
Spray cooled generators and design-to-cost at Westinghouse
[SAE PAPER 730878] A74-11605
ELECTROMAGNETIC FIELDS
Instability of rotors in MHD journal bearings A74-11445
ELECTROMAGNETIC SCATTERING
Scattering by a conducting aerofoil --- electromagnetic radiation A74-11908
ELECTRONIC COUNTERMEASURES
Improvement of performance characteristics of a class of broadband circularly polarized antennas --- for use with tactical airborne jamming equipment
[AD-766473] N74-11065
ELECTRONIC EQUIPMENT
New concepts of visualization for aircraft --- instrument panel display integration A74-12447
Transportability --- of military equipment
[AD-765456] N74-10229
ELECTROSTATIC PROBES
Sensing jet engine performance and incipient failure with electrostatic probes
[AD-766653] N74-11606
ENERGY BUDGETS
The energy dilemma and its impact on air transportation
[NASA-CR-135993] N74-11743
The air transportation/energy system N74-11745
Energy conservation and air transportation N74-11746
Conclusions and recommendations --- for problems in energy situation, air transportation, and hydrogen fuel N74-11748
ENERGY REQUIREMENTS
Energy trends and their future effects upon transportation --- applied to rail, truck, and air cargo operations and private energy uses
[P-5046] N74-11791
ENERGY SOURCES
Energy trends and their future effects upon transportation --- applied to rail, truck, and air cargo operations and private energy uses
[P-5046] N74-11791
ENGINE CONTROL
A simplified fuel control approach for low-cost aircraft gas turbines
[SAE PAPER 730388] A74-10802
ENGINE DESIGN
Influence of noise requirements on STOL propulsion system designs A74-10148

Designing small gas turbine engines for low noise and clean exhaust
[AIAA PAPER 73-1154] A74-10507
Impact of emission regulations on gas turbine combustor design
[AIAA PAPER 73-1155] A74-10508
Noise generation and the design of bypass lift jet engines
A74-10984
Aircraft engines - Progress made in France over ten years, and possibilities for the ten years to come
A74-11093
Design competence - The mainspring to cost reduction
[AIAA PAPER 73-1187] A74-11230
A modular turbofan design for high availability and low life cycle cost
[AIAA PAPER 73-1189] A74-11231
Airfoil design for high tip speed compressors --- fan technology
[AIAA PAPER 73-1248] A74-11269
Emergency air start system for the F-14B flight test aircraft
[AIAA PAPER 73-1252] A74-11273
P-14 inlet maneuvering capability
[AIAA PAPER 73-1273] A74-11286
The effect of noise constraints on engine cycle optimization for long-haul transports
[AIAA PAPER 73-1292] A74-11298
Qualitative effects of cycle variables on turbine engine performance and stability
[AIAA PAPER 73-1315] A74-11310
An experimental investigation of techniques for reducing objectionable exhaust emissions
[AIAA PAPER 73-1324] A74-11316
Cost - The emerging aerospace technology --- applications to gas turbine engines
[AIAA PAPER 73-1327] A74-11318
Further development of the JT15D turbofan --- Remotely Piloted Vehicle applications
[SAE PAPER 730919] A74-11576
The Garrett-AiResearch variable-cycle TFE731 turbofan engine
[SAE PAPER 730918] A74-11577
Lycomings LTS 101 - Low cost turbine power in the 600 hp class
[SAE PAPER 730911] A74-11582
Low cost supersonic expendable turbine engines --- tactical missile applications
[SAE PAPER 730910] A74-11583
AST - A fifth engine for environmental consideration
[SAE PAPER 730899] A74-11590
Benefits of advanced propulsion technology for the advanced supersonic transport
[SAE PAPER 730896] A74-11593
Development of parametricized computations for AST study engines
[SAE PAPER 730895] A74-11594
Digital computer simulation of the dynamic response of a twin-spool turbofan with mixed exhausts
A74-11617
Highly noise suppressed bypass 6 engine for STOL application
[AIAA PAPER 73-1031] A74-11799
Some design considerations for supersonic cruise mixed compression inlets
[AIAA PAPER 73-1269] A74-12496
Cost impact of mission requirements on future engine design selection
[AIAA PAPER 73-1186] A74-12922
The Q-Fan Demonstrator Engine --- variable pitch fan engine design and tests
[AIAA PAPER 73-1215] A74-12929
The effect of inlet-noise suppression on propulsion system design
[AIAA PAPER 73-1294] A74-12942
Influence of noise constraints on supersonic transport engine design
[AIAA PAPER 73-1295] A74-12943

ENGINE FAILURE
Sensing jet engine performance and incipient failure with electrostatic probes
[AD-766653] N74-11606

ENGINE INLETS
Development of a turbine inlet gas temperature measurement and control system using a fluidic temperature sensor
[AIAA PAPER 73-1251] A74-11272
P-14 inlet maneuvering capability
[AIAA PAPER 73-1273] A74-11286
The effect of inlet temperature and pressure distortion on turbojet performance
[AIAA PAPER 73-1316] A74-11311

ENGINE NOISE
Influence of noise requirements on STOL propulsion system designs
A74-10148
Noise generation and the design of bypass lift jet engines
A74-10984
Flap noise prediction method for a powered lift system
[AIAA PAPER 73-1028] A74-11051
Aspects of large-scale, subsonic, wind-tunnel design for propulsion noise research
[AIAA PAPER 73-1279] A74-11291
Comparison of ground and flight test results using a modified F106B aircraft
[AIAA PAPER 73-1305] A74-11304
Jet noise suppression systems for high-speed aircraft
[SAE PAPER 730897] A74-11592
Highly noise suppressed bypass 6 engine for STOL application
[AIAA PAPER 73-1031] A74-11799
The acoustics of aircraft engine-duct systems
[AIAA PAPER 73-1153] A74-12215
Noise and wake structure measurements in a subsonic tip speed fan
[NASA-CR-2323] N74-10020
Refan program. Phase 1: Summary report
[NASA-TM-X-71456] N74-10043
Acoustic characteristics of a large-scale augmentor wing model at forward speed
[NASA-TM-X-2940] N74-10052
Truck noise via diesel exhaust and air intake noise --- acoustic measurements for evaluation of various exhaust and intake systems
[PB-222624/9] N74-10742
V/STOL noise prediction and reduction
[LG73ER0062] N74-10921

ENGINE PARTS
A simplified approach for estimating manufacturing cost at the part level
[SAE PAPER 730908] A74-11584
Current and future materials usage in aircraft gas turbine engines
[AD-766334] N74-11604

ENGINE STARTERS
Emergency air start system for the F-14B flight test aircraft
[AIAA PAPER 73-1252] A74-11273

ENGINE TESTS
Wind tunnel tests of a 20 inch diameter 1.15 pressure ratio fan engine model
[AIAA PAPER 73-1216] A74-11245
The planar pressure pulse generator - A new dynamic distortion generator
[AIAA PAPER 73-1317] A74-11312
Further development of the JT15D turbofan --- Remotely Piloted Vehicle applications
[SAE PAPER 730919] A74-11576
The Garrett-AiResearch variable-cycle TFE731 turbofan engine
[SAE PAPER 730918] A74-11577
Some aspects of inlet/engine flow compatibility
A74-11618
Recovery characteristics of a single-shielded self-aspirating thermocouple probe at low pressure levels and subsonic speeds
A74-12280
The Q-Fan Demonstrator Engine --- variable pitch fan engine design and tests
[AIAA PAPER 73-1215] A74-12929
An analytical study of icing simulation for turbine engines in altitude test cells
[AIAA PAPER 73-1280] A74-12938
A new test capability for propulsion system testing --- Aero-Propulsion Systems Test Facility design
[AIAA PAPER 73-1283] A74-12939
Sea level side loads in high-area-ratio rocket engines
[AIAA PAPER 73-1284] A74-12940

ENVIRONMENT EFFECTS
Shuttle sonic boom - Technology and predictions --- environmental impact
[AIAA PAPER 73-1039] A74-12225

ENVIRONMENT PROTECTION
Impact of emission regulations on gas turbine combustor design
[AIAA PAPER 73-1155] A74-10508
Measured jet noise compared to California noise codes and health criteria
A74-11424
AST - A fifth engine for environmental consideration
[SAE PAPER 730899] A74-11590
Research and development for future air transports
A74-11615
ENVIRONMENT SIMULATION
A simulation approach for studying the interactions of noise, patronage, and economic viability for air transportation systems
[AIAA PAPER 73-1161] A74-12216
ENVIRONMENTAL CONTROL
Aircraft noise relief potential at major hub airports
[AIAA PAPER 73-1164] A74-12217
Cockpit air filtration requirements of the B-1 in a nuclear dust environment
[AD-766711] N74-10065
EPOXY RESINS
Low cost, fiber glass reinforced plastic fuel tank, volume 1 --- for A-7 aircraft application
[AD-766361] N74-10929
EQUATIONS OF MOTION
Solution of the equations of motion of a gyrohorizon compass at finite deviation angles from the meridian
A74-11685
Flight-mechanics analysis of various flight conditions of conventional aircraft. VIII/2 - Mechanical foundations: Dynamic equations of motion of the control systems
A74-11744
User's guide for a computer program to analyze the LRC 16 ft transonic dynamics tunnel cable mount system
[NASA-CR-132313] N74-10297
EQUIPMENT SPECIFICATIONS
AEROSAT performance specifications --- aeronautical satellite for oceanic aircraft communication
A74-12190
Analysis and design of a capsule landing system and surface vehicle control system for Mars exploration
[NASA-CR-136069] N74-11077
Design considerations for the calculator, altitude ML-646 (XE-1/UM)
[AD-766699] N74-11295
ERROR ANALYSIS
Uncertainty in gas turbine measurements --- bias and precision error model
[AIAA PAPER 73-1230] A74-11255
ESCAPE SYSTEMS
The influence of operational experience on aircraft escape system development
[AIAA PAPER 73-1340] A74-11387
ESTIMATING
An integrated approach to structural weight estimation
[SAE PAPER 730936] A74-11564
EXHAUST FLOW SIMULATION
Effect of exhaust deflectors on the design of lift plus lift/cruise V/STOL aircraft
[SAE PAPER 730959] A74-11554
EXHAUST GASES
Impact of emission regulations on gas turbine combustor design
[AIAA PAPER 73-1155] A74-10508
Designing for noise and emission control in general aviation
[AIAA PAPER 73-1158] A74-10509
Chemical reactions calculations in turbulent flows - Application to a CO containing turbojet plume
[ONERA, TP NO. 1229] A74-11069
Prediction of aircraft gas turbine NO/x/ emission dependence on engine operating parameters and ambient conditions
[AIAA PAPER 73-1275] A74-11287
Measurement of gas turbine exhaust pollutants by Raman spectroscopy
[AIAA PAPER 73-1276] A74-11288
Impact of emission regulations on future gas turbine engine combustors
[AIAA PAPER 73-1277] A74-11289
Odor intensity and characterization studies of exhaust from a turbojet engine combustor
[AIAA PAPER 73-1278] A74-11290
An experimental investigation of techniques for reducing objectionable exhaust emissions
[AIAA PAPER 73-1324] A74-11316
Simplified physical model of spray combustion in a gas turbine engine
A74-11451
Exploratory investigation at Mach numbers from 0.40 to 0.95 of the effects of jets blown over a wing
[NASA-TN-D-7367] N74-10014
Some analyses of the chemistry and diffusion of SST exhaust materials during phase 3 of the wake period --- in lower stratosphere
[NASA-CR-132323] N74-10863
Emission measurements of a J93 turbojet engine
[AD-766648] N74-11605
Use of an air-assisted fuel nozzle to reduce idle emissions of a jt8d engine combustor
[NASA-TM-X-2946] N74-11738
EXHAUST NOZZLES
Assessment of jets as acoustic shields by comparison of single- and multitube suppressor nozzle data
[AIAA PAPER 73-1001] A74-11050
Advanced technology thrust vectoring exhaust systems
[AIAA PAPER 73-1304] A74-11303
Comparison of ground and flight test results using a modified F106B aircraft
[AIAA PAPER 73-1305] A74-11304
Effect of exhaust deflectors on the design of lift plus lift/cruise V/STOL aircraft
[SAE PAPER 730959] A74-11554
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[AIAA PAPER 73-1217] A74-12495
Analysis and design of three dimensional supersonic nozzles. Volume 1: Nozzle-exhaust flow field analysis by a reference plane characteristics technique
[NASA-CR-132350] N74-11113
EXHAUST SYSTEMS
Designing small gas turbine engines for low noise and clean exhaust
[AIAA PAPER 73-1154] A74-10507
EXTERNALLY BLOWN FLAPS
Flap noise prediction method for a powered lift system
[AIAA PAPER 73-1028] A74-11051
External blowing flap technology on the USAF/McDonnell Douglas YC-15 /AMST/ program
[SAE PAPER 730915] A74-11579
Air Force STOL tactical aircraft investigation - Evaluation of externally blown flaps
[SAE PAPER 730914] A74-11580
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[AIAA PAPER 73-1217] A74-12495
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[NASA-TM-X-71466] N74-10042
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 1: Takeoff and landing ground rules
[AD-766942] N74-10928

F

F-4 AIRCRAFT
Optimal incomplete feedback control of linear stochastic systems
[AD-766440] N74-10071
F-8 AIRCRAFT
Additional three-dimensional boundary-layer computations for a finite swept wing
[NASA-CR-132335] N74-10029
F-14 AIRCRAFT
Emergency air start system for the F-14B flight test aircraft
[AIAA PAPER 73-1252] A74-11273

F-14 inlet maneuvering capability
[AIAA PAPER 73-1273] A74-11286
F-15 AIRCRAFT
Simplified assembly of F-15 stressed --- production time and labor cost reduction
A74-10546
F-28 TRANSPORT AIRCRAFT
Evolution philosophy --- Fokker F28 aircraft
A74-10936
F-104 AIRCRAFT
Service loads on nose landing gears of the F-104 airplane --- by statistical analysis
[LBF-TB-103/1972] N74-10924
F-111 AIRCRAFT
Mod-metric tested for bias
[AD-760081] N74-10904
FAILURE ANALYSIS
Damage threshold determination of light walls submitted to single or repeated bangs, part 1
[ISL-35/72-PT-1] N74-10846
Aircraft accident reports: Brief format, US Civil Aviation. Issue no. 1: 1973 accidents
[NTSB-BA-73-8] N74-10919
FANS
Investigation of the characteristics of tubular microphone windscreens for in-duct fan sound power measurements
A74-12126
FAR FIELDS
On the theory of jet noise and its applications --- Lighthill theory
[AIAA PAPER 73-987] A74-12218
FASTENERS
A corrosion inhibiting coating for structural airframe fasteners
[SAE PAPER 730902] A74-11588
Improved fastener systems for fatigue and sealing redundancy of low shear transfer joints
[SAE PAPER 730901] A74-11589
FATIGUE LIFE
Improved fastener systems for fatigue and sealing redundancy of low shear transfer joints
[SAE PAPER 730901] A74-11589
A life study of AISI M-50 and Super Nitralloy spur gears with and without tip relief
[ASME PAPER 73-LUB-38] A74-12352
Current loads technology for helicopter rotors --- based on rotor loads computer program for determining fatigue design loads
N74-10910
FATIGUE TESTS
Fatigue of supersonic transport materials using simulated flight-by-flight loading
A74-10616
Dynamic test of gears manufactured by advanced forging techniques
[AD-765491] N74-10484
FEEDBACK CONTROL
Optimal incomplete feedback control of linear stochastic systems
[AD-766440] N74-10071
Optimal incomplete feedback control of linear stochastic systems
[AD-766878] N74-11378
FIGHTER AIRCRAFT
Integrated airframe-nozzle performance for designing twin-engine fighters
[AIAA PAPER 73-1303] A74-11302
Computer-aided design and drafting /CADD/ - An advanced designer's tool
[SAE PAPER 730934] A74-11566
Influence of prototype concept and cost ceilings on airframe design and manufacture of the YF-16 lightweight fighter
[SAE PAPER 730888] A74-11600
The next step is straight up --- V/STOL fighter-attack aircraft for minicarriers
A74-12129
Preliminary results of flight tests of the propulsion system of the YF-12 airplane at Mach numbers to 3.0
[AIAA PAPER 73-1314] A74-12951
FINITE ELEMENT METHOD
Finite element solution of the incompressible flow over an airfoil in a nonuniform stream
A74-11426
Suitability of the finite element method for analysis of unsteady flow around oscillating airfoils
A74-11439
A thermal, thermoelastic, and wear simulation of a high-energy sliding contact problem
[ASME PAPER 73-LUB-6] A74-12333
Nonlinear crack analysis with finite elements --- for application to airframes
[AD-766558] N74-11722
FIRE PREVENTION
Technology forecasting - Aircraft hazard detection
A74-11499
FIRES
An evaluation of the relative fire hazards of jet A and jet B for commercial flight
[NASA-TM-X-71437] N74-10709
FIXED WINGS
Aircraft accident report: Air Iowa, Incorporated, Beech E18S, N310WA, Davenport Iowa, 19 Apr. 1973
[NTSB-AAR-73-18] N74-10041
FLAME PROPAGATION
Swirling flow combustion - Fundamentals and application --- hydrocarbon-air flame velocity, turbojet afterburner application
[AIAA PAPER 73-1250] A74-11271
Noise generation by ducted combustion systems --- resonant oscillations
[AIAA PAPER 73-1024] A74-12223
FLAME STABILITY
An empirical model for calculating the critical conditions of flame stabilization
A74-11824
FLAMES
Ultraviolet and near-infrared spectral analysis of a burner-can burn-through flame
[FAA-NA-73-86] N74-10866
FLAPS (CONTROL SURFACES)
New airfoil sections for general aviation aircraft --- cruising and flap development tests
[SAE PAPER 730876] A74-11606
FLAT PLATES
Solution of the plane problem of the aerodynamics of a rarefied gas on the basis of Boltzmann's kinetic equation
A74-10976
The mean skin friction coefficient for a rough flat plate with a turbulent two-dimensional boundary layer in compressible adiabatic flow, with application to wedges, cylinders and cones
[ESDU-73016] N74-10008
FLIGHT ALTITUDE
Sonic boom analysis for high altitude flight at high Mach number
[AIAA PAPER 73-1034] A74-12224
FLIGHT CHARACTERISTICS
Propulsion requirements for powered-lift aircraft
[AIAA PAPER 73-1214] A74-12928
FLIGHT CONTROL
Use of simulators in the design and development of flight control systems
[SAE PAPER 730933] A74-11567
Simulating the system of automatic correction of aircraft coordinates on an analog computer
[AD-765991] N74-10058
Optimal incomplete feedback control of linear stochastic systems
[AD-766440] N74-10071
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 1: Takeoff and landing ground rules
[AD-766942] N74-10928
Manufacturing Methods Technology (MM/T) for ballistic-tolerant flight control components
[AD-766744] N74-10933
STOL tactical aircraft investigation. Volume 2, part 2: A lifting line analysis method for jet-flapped wings
[AD-766877] N74-10937
Solid state controller three axes controller
[NASA-CASE-MSC-12394-1] N74-10942
Selected problems regarding the formation of a simulation model --- dynamic structural analysis of V/STOL flight control system
[NASA-TT-F-15173] N74-11095

FLIGHT HAZARDS
Bird strike and the radar properties of birds --- migration patterns monitoring A74-12389
Lightning effects on general aviation aircraft [FAA-NA-73-32(2)] N74-10040
Aircraft accident reports: Brief format, US Civil Aviation. Issue no. 1: 1973 accidents [NTSB-BA-73-8] N74-10919
FLIGHT MECHANICS
Flight-mechanics analysis of various flight conditions of conventional aircraft. VIII/2 - Mechanical foundations: Dynamic equations of motion of the control systems A74-11744
FLIGHT PATHS
Simulation study on flare control system by optimization theory [NAL-TR-312] N74-10046
FLIGHT SAFETY
Airworthiness Committee tenth meeting [DOC-9065] N74-10035
LSO/pilot interaction simulator --- for analysis of flight hazards during approach to landing on aircraft carrier [AD-765686] N74-10055
Continental Land Mass Air Traffic Control (COLM ATC) --- using three artificial satellite configurations [NASA-CR-132831] N74-10619
Provisional signal formats for the discrete address beacon system --- for air traffic control applications [ATC-30] N74-10620
An optimum interference detector for DABS monopulse data editing --- for application to air traffic control [ESD-TR-73-253] N74-10621
Meteorological information for vertical and short take-off and land (V/STOL) operations in built-up urban areas: An analysis [FAA-RD-72-135] N74-10920
Some user benefits achievable from an advanced air traffic management system [R-1320-DOT] N74-11435
Cost comparisons of advanced air traffic management systems [R-1319-DOT] N74-11436
FLIGHT SIMULATION
Fatigue of supersonic transport materials using simulated flight-by-flight loading A74-10616
Prospects for aerospace research A74-11098
Dynamic simulation of CONFLOW - A facility to provide hot-gas ground testing of air-breathing missiles under simulated flight conditions [AIAA PAPER 73-1281] A74-11292
A cost-effective approach for flight experiments - Application of Airborne Science aircraft experience to the Shuttle Sortie Lab A74-12829
A new test capability for propulsion system testing --- Aero-Propulsion Systems Test Facility design [AIAA PAPER 73-1283] A74-12939
Rotor system design and evaluation using a general purpose helicopter flight simulation program N74-10913
Views regarding the validity of results from simulation testing in comparison with the results from actual flight test [NASA-TT-F-15172] N74-10922
Model support roll balance and roll coupling --- design of wind tunnel model support mechanism N74-11681
FLIGHT SIMULATORS
Evaluation of V/STOL research aircraft design --- landing approaches, propulsion/control, piloted moving base simulator [SAE PAPER 730947] A74-11557
Use of simulators in the design and development of flight control systems [SAE PAPER 730933] A74-11567
Comparison of simulation and flight testing at automatic STOL landing [NASA-TT-F-15171] N74-10923
Motion software for a synergistic six-degree-of-freedom motion base [NASA-TN-D-7350] N74-11096
FLIGHT TESTS
Comparison of ground and flight test results using a modified F106B aircraft [AIAA PAPER 73-1305] A74-11304
Shuttle sonic boom - Technology and predictions --- environmental impact [AIAA PAPER 73-1039] A74-12225
Afterbody drag flight test of the A-7E airplane [AIAA PAPER 73-1306] A74-12948
Preliminary results of flight tests of the propulsion system of the YF-12 airplane at Mach numbers to 3.0 [AIAA PAPER 73-1314] A74-12951
Views regarding the validity of results from simulation testing in comparison with the results from actual flight test [NASA-TT-F-15172] N74-10922
Comparison of simulation and flight testing at automatic STOL landing [NASA-TT-F-15171] N74-10923
Helicopter visual aid system N74-11691
AEDC Fiscal Year 1974 Air Force technical objective document --- facility improvements, test techniques, instrumentation, gas properties, and wind tunnel and flight test data comparisons [AD-766719] N74-11803
FLOW CHARACTERISTICS
Investigation of flow parameters in a turbine stage with a nonuniform inlet A74-10255
The effects of leading-edge serrations on reducing flow unsteadiness about airfoils, an experimental and analytical investigation [NASA-CR-2344] N74-10019
Some design considerations for supersonic cruise mixed compression inlets [NASA-TM-X-71460] N74-10021
FORTRAN program for predicting off-design performance of centrifugal compressors [NASA-TN-D-7487] N74-10024
Comparison of predicted and measured low-speed performance of two 51 centimeter-diameter inlets at incidence angle [NASA-TM-X-2937] N74-10026
Performance of transonic fan stage with weight flow per unit annulus area of 198 kilograms per second per square meter (40.6 (lb/sec)/sq ft) [NASA-TM-X-2905] N74-10027
Two-dimensional wind tunnel test on a variable-camber airfoil with distributed suction boundary-layer control [AD-766304] N74-10033
Noise tests of a high-aspect-ratio slot nozzle with various V-gutter target thrust reversers [NASA-TM-X-71470] N74-10037
Analysis and design of three dimensional supersonic nozzles. Volume 3: A design technique for multiple nozzle configurations [NASA-CR-132352] N74-11115
Analysis and design of three dimensional supersonic nozzles. Volume 4: Similarity laws for nozzle flows [NASA-CR-132353] N74-11116
FLOW DEFLECTION
Near-field trajectory of turbulent jets discharged at various inclinations into a uniform crossflow A74-10568
FLOW DISTORTION
An analytical and experimental study of inlet-ground vortices [AIAA PAPER 73-1313] A74-11309
Some aspects of inlet/engine flow compatibility A74-11618
FLOW DISTRIBUTION
On the flow around the leading edge of a lifting airfoil A74-10996
Methods of visualization of the leading edge separation bubble and analysis of results A74-10997
Measuring the radiation of a vertical gas jet A74-11500
A study of methods which predict supersonic flow fields from body geometry, distance, and Mach number [NASA-TN-D-7387] N74-10030

Study of the electrostatic field and charge distribution in a vortex seeded with dust
[AD-766815] N74-10941
Analysis and design of three dimensional supersonic nozzles. Volume 1: Nozzle-exhaust flow field analysis by a reference plane characteristics technique
[NASA-CR-132350] N74-11113
Analysis and design of three dimensional supersonic nozzles. Volume 2: Numerical program for analysis of nozzle-exhaust flow fields
[NASA-CR-132351] N74-11114
Analysis of stratified and closely spaced jets exhausting into a crossflow --- aerodynamic characteristics of lift-jet, vectored thrust, and lift fan V/STOL aircraft
[NASA-CR-132297] N74-11118

FLOW GEOMETRY
Analysis and design of three dimensional supersonic nozzles. Volume 1: Nozzle-exhaust flow field analysis by a reference plane characteristics technique
[NASA-CR-132350] N74-11113
Analysis and design of three dimensional supersonic nozzles. Volume 2: Numerical program for analysis of nozzle-exhaust flow fields
[NASA-CR-132351] N74-11114
Analysis and design of three dimensional supersonic nozzles. Volume 4: Similarity laws for nozzle flows
[NASA-CR-132353] N74-11116

FLOW RESISTANCE
Annular slot and frontal slot flow --- turbulent flow resistance coefficients
A74-10033

FLOW THEORY
Progress in aerospace sciences, Volume 14 --- Book
A74-12203
Theory of hypersonic flow about a wing
A74-12205
Throughflow theory for turbomachines
[AD-766537] N74-11602

FLOW VISUALIZATION
Methods of visualization of the leading edge separation bubble and analysis of results
A74-10997
Hologram study of gas flow in a ballistic wind tunnel
A74-11414
Stability and decay of free vortices behind a wing
A74-11805

FLOWMETERS
Turbulence measurements with a laser Doppler velocimeter
[AD-766781] N74-11129

FLUERICS
Aerospace fluidics applications and circuit manufacture
[SAE PAPER 730880] A74-11604

FLUID FILMS
Dynamical pressure distribution in aerodynamic bearing
A74-11899

FLUID FLOW
Hydrodynamic forces on oscillating and nonoscillating smooth circular cylinders in crossflow --- for towed bodies
[AD-767022] N74-11125

FLUID ROTOR GYROSCOPES
Study of unconventional gyroscopic apparatus. I
A74-12444

FLUIDIC CIRCUITS
Development of a turbine inlet gas temperature measurement and control system using a fluidic temperature sensor
[AIAA PAPER 73-1251] A74-11272
Aerospace fluidics applications and circuit manufacture
[SAE PAPER 730880] A74-11604
Fluidic emergency roll control system --- for emergency aircraft control following failure of primary roll control system
[NASA-CR-114588] N74-10048

FLUIDICS
Hydrofluidic servoactuator development
[AD-766308] N74-10491

FLUTTER ANALYSIS
Exploitation of spectral density curves in the case of wind tunnel flutter measurement
A74-11000
Advanced flutter design techniques --- subsonic and SST aircraft
[SAE PAPER 730935] A74-11565
Some effects of cneter of gravity locations of added mass on transonic flutter characteristics of low aspect ratio and sweptback thin cantilever wing
[NAL-TR-314] N74-10047

FOG
The light-scattering matrix and types of optical weather --- atmospheric aerosols, haze, fog, drizzle
A74-10783
Project Foggy Cloud 4, phase 1. Evaluation of warm fog dissipation techniques --- and stratus cloud modification
[AD-766086] N74-10597
Thermal warm fog dissipation: Heat requirements and projected utilization of a system for Travis AFB, California
[AD-766247] N74-10605

FOIL BEARINGS
Gas-lubricated foil bearings for high speed turboalternator - Construction and performance
[ASME PAPER 73-LUB-5] A74-12332

FORCE DISTRIBUTION
Specialists Meeting on Helicopter Rotor Prediction Methods
[AGARD-CP-122] N74-10908
Rotary wing design methodology --- based on nonlinear aeroelastic blade loads analysis
N74-10909
The prediction of loading actions on high speed semi-rigid helicopters
N74-10914
Integrated rotor/body loads prediction
N74-10916

FORGING
Dynamic test of gears manufactured by advanced forging techniques
[AD-765491] N74-10484

FORMING TECHNIQUES
Manufacture and properties of titanium and titanium alloys emphasizing their use in aeronautics. Part 1: Manufacture and processing --- conference
N74-11336
Manufacture of titanium and titanium alloy semifinished products --- with application to production of drop-forged aircraft parts
N74-11338
status and development tendencies of titanium processing --- metallurgical techniques for manufacture of aircraft parts
N74-11339

FORTRAN
FORTRAN program for predicting off-design performance of centrifugal compressors
[NASA-TN-D-7487] N74-10024

FRACTURE MECHANICS
The application of fracture mechanics to the design of the barrel and driver tube of a hypersonic gun tunnel
A74-10484
Material selection procedures for advanced transport aircraft
[SAE PAPER 730884] A74-11602

FRACTURE STRENGTH
Creep fracture mechanisms in aluminum alloys
A74-11736

FRANCE
Aerospace activities
N74-10897

FRENCH SPACE PROGRAMS
Prospects for aerospace research
A74-11098

FREQUENCY CONTROL
The planar pressure pulse generator - A new dynamic distortion generator
[AIAA PAPER 73-1317] A74-11312

FREQUENCY MODULATION
A low cost telemetry system --- for use in small small drone aircraft
[PB-222403/8] N74-10165

FREQUENCY RESPONSE
Investigation of the characteristics of tubular microphone windscreens for in-duct fan sound power measurements
A74-12126
FRICTION
Study of elastoplastic deformation with friction in hydrocarbon media --- with application to jet engine fuels
[AD-765997] N74-10717
FRICTION FACTOR
Information on the use of data items in the series bodies 02.04
[ESDU-BODIES-02.04.00-AMEND-A] N74-10011
FUEL COMBUSTION
An experimental investigation of techniques for reducing objectionable exhaust emissions
[AIAA PAPER 73-1324] A74-11316
FUEL CONSUMPTION
Energy trends and their future effects upon transportation --- applied to rail, truck, and air cargo operations and private energy uses
[P-5046] N74-11791
FUEL CONTROL
A simplified fuel control approach for low-cost aircraft gas turbines
[SAE PAPER 730388] A74-10802
Aerospace fluidics applications and circuit manufacture
[SAE PAPER 730880] A74-11604
FUEL INJECTION
Supersonic combustion of hydrogen injected perpendicular to a ducted vitiated airstream
[AIAA PAPER 73-1322] A74-11314
Simplified physical model of spray combustion in a gas turbine engine
A74-11451
Low NOx emission combustor for automobile --- evaluation of various fuel injection methods
[PB-222075/4] N74-10745
FUEL PUMPS
Aviation turbine fuel and its lubricating qualities
A74-11739
FUEL SPRAYS
An empirical model for calculating the critical conditions of flame stabilization
A74-11824
FUEL TANKS
Aircraft fuel tank entry wall-projectile interaction studies
[AD-765667] N74-10066
Low cost, fiber glass reinforced plastic fuel tank, volume 1 --- for A-7 aircraft application
[AD-766361] N74-10929
Low cost, fiber glass reinforced plastic fuel tank, volume 2 --- development and evaluation for application to A-7 aircraft
[AD-766400] N74-10931
FULL SCALE TESTS
Current developments in main rotors at Bell Helicopter Company --- multibladed concepts, frequency placement
[AIAA PAPER 73-1160] A74-10511
Full-scale tests of an augmentor VTOL concept --- ejector-in-wing configuration
[AIAA PAPER 73-1185] A74-11229
FUNCTIONS (MATHEMATICS)
Inverting the mapping function --- coefficients for circle-airfoil transformation function expansion
A74-10070

G

GAS BEARINGS
The whirl instability of a rigid rotor in a flexibly supported gas lubricated journal bearing
A74-11441
Dynamical pressure distribution in aerodynamic bearing
A74-11899
GAS FLOW
Hologram study of gas flow in a ballistic wind tunnel
A74-11414
Boundary value problems of two-dimensional isentropic gas flow
A74-11430
Noise tests of a high-aspect-ratio slot nozzle with various V-gutter target thrust reversers
[NASA-TM-X-71470] N74-10037
An experimental investigation of an acoustic method for measuring gas mass flow
[AD-766419] N74-10340
AEDC Fiscal Year 1974 Air Force technical objective document --- facility improvements, test techniques, instrumentation, gas properties, and wind tunnel and flight test data comparisons
[AD-766719] N74-11803
GAS GENERATORS
Gas generator design for a wide variety of APU applications
[AIAA PAPER 73-1169] A74-12916
Fluidic emergency roll control system --- for emergency aircraft control following failure of primary roll control system
[NASA-CR-114588] N74-10048
GAS JETS
Measuring the radiation of a vertical gas jet
A74-11500
GAS LUBRICANTS
Gas-lubricated foil bearings for high speed turboalternator - Construction and performance
[ASME PAPER 73-LUB-5] A74-12332
GAS STREAMS
Mixing and combustion processes in jet engines --- physics of interaction of droplets or solid particles with gas stream
[AD-766030] N74-10741
GAS TEMPERATURE
Turbine inlet gas temperature sensor for engine control --- nuclear radiation system
[AD-765193] N74-10461
GAS TURBINE ENGINES
Designing small gas turbine engines for low noise and clean exhaust
[AIAA PAPER 73-1154] A74-10507
Impact of emission regulations on gas turbine combustor design
[AIAA PAPER 73-1155] A74-10508
Uncertainty in gas turbine measurements --- bias and precision error model
[AIAA PAPER 73-1230] A74-11255
Mixing of multiple dilution jets with a hot primary airstream for gas turbine combustors
[AIAA PAPER 73-1249] A74-11270
Development of a turbine inlet gas temperature measurement and control system using a fluidic temperature sensor
[AIAA PAPER 73-1251] A74-11272
Prediction of aircraft gas turbine NO/x/ emission dependence on engine operating parameters and ambient conditions
[AIAA PAPER 73-1275] A74-11287
Measurement of gas turbine exhaust pollutants by Raman spectroscopy
[AIAA PAPER 73-1276] A74-11288
Impact of emission regulations on future gas turbine engine combustors
[AIAA PAPER 73-1277] A74-11289
Qualitative effects of cycle variables on turbine engine performance and stability
[AIAA PAPER 73-1315] A74-11310
Cost - The emerging aerospace technology --- applications to gas turbine engines
[AIAA PAPER 73-1327] A74-11318
Modeling of gas turbine combustors
A74-11434
Simplified physical model of spray combustion in a gas turbine engine
A74-11451
Some aspects of inlet/engine flow compatibility
A74-11618
Experimental investigation of the vibrations of a gas-turbine engine rotor
A74-12012
Gas turbine engine mainshaft roller bearing-system analysis
[ASME PAPER 73-LUB-J] A74-12710
High temperature cooled gas turbines (analysis and design)
[AD-766031] N74-10740
Low NOx emission combustor for automobile --- evaluation of various fuel injection methods
[PB-222075/4] N74-10745

Low NOx emission combustor for automobile gas turbine engines --- design and tests of two research combustors
[PB-222340/2] N74-10746
The economic efficiency of raising the flying life and reliability of gas-turbine engines
[AD-767027] N74-11601
Current and future materials usage in aircraft gas turbine engines
[AD-766334] N74-11604
GAS TURBINES
A simplified fuel control approach for low-cost aircraft gas turbines
[SAE PAPER 730388] A74-10802
A simplified approach for estimating manufacturing cost at the part level
[SAE PAPER 730908] A74-11584
Turbine inlet gas temperature sensor for engine control --- nuclear radiation system
[AD-765193] N74-10461
Aviation gas turbine engines (selected portions)
[AD-756810] N74-10751
GEAR TEETH
A life study of AISI M-50 and Super Nitralloy spur gears with and without tip relief
[ASME PAPER 73-LUB-38] A74-12352
GEARS
Dynamic test of gears manufactured by advanced forging techniques
[AD-765491] N74-10484
GEIGER COUNTERS
High sensitivity 1000F gas multiplication UV flame detector for aircraft
[AD-766960] N74-11296
GENERAL AVIATION AIRCRAFT
Designing for noise and emission control in general aviation
[AIAA PAPER 73-1158] A74-10509
Application of military human factors techniques to general aviation accident prevention
A74-10880
New airfoil sections for general aviation aircraft --- cruising and flap development tests
[SAE PAPER 730876] A74-11606
Lightning effects on general aviation aircraft
[FAA-NA-73-32(2)] N74-10040
Small V/STOL aircraft analysis. Volume 2: Appendices --- to determine current and future general aviation missions and performance requirements
[NASA-CR-114629] N74-10045
Study of small turbofan engines applicable to general-aviation aircraft
[NASA-CR-114630] N74-10725
GEODESY
Geodetic analysis of Skylab altimetry preliminary data - SL/2 EREP pass 9 --- time series analysis of geoidal heights
[E74-10086] N74-11197
GEOIDS
Geodetic analysis of Skylab altimetry preliminary data - SL/2 EREP pass 9 --- time series analysis of geoidal heights
[E74-10086] N74-11197
GERMANY
Visual landings in regional and local airports
[NASA-TT-F-15177] N74-11093
GLASS FIBER REINFORCED PLASTICS
Military aircraft --- structural design with fiber reinforced composite materials
A74-10496
GLIDE PATHS
Aircraft incident report: Eastern Air Lines, Incorporated, Boeing 727-225, N8843E, Toledo, Ohio, 10 April 1973
[NTSB-AAR-73-17] N74-10050
A feasibility study and preliminary evaluation of the use of a biased glide slope technique for noise abatement approach
[FAA-RD-73-153] N74-10618
Evaluation of ILS localizer signal specification during ground rollout
[AD-765761] N74-10623
GLIDERS
Motorless flight research, 1972 --- glider design, airframes, and soaring flight developments
[NASA-CR-2315] N74-10051
GOVERNMENT PROCUREMENT
The influence of design to cost and prototyping on the A-10 aircraft
[SAE PAPER 730890] A74-11598
Influence of prototype concept and cost ceilings on airframe design and manufacture of the YF-16 lightweight fighter
[SAE PAPER 730888] A74-11600
GRAIN BOUNDARIES
Creep fracture mechanisms in aluminum alloys
A74-11736
GRAPHS (CHARTS)
Transport vehicles - Weights and loads --- commercial aircraft
A74-12442
GRIDS
Investigation of the effect of grids on the characteristics of a turbulent flow --- for wind tunnel applications
[AD-765999] N74-10328
GROUND BASED CONTROL
A synchronized discrete-address beacon system --- for air traffic control improvement
[FAA-EM-74-3] N74-10622
Some user benefits achievable from an advanced air traffic management system
[R-1320-DOT] N74-11435
Cost comparisons of advanced air traffic management systems
[R-1319-DOT] N74-11436
GROUND EFFECT MACHINES
Study of heaving motion in air cushion vehicles
[NASA-TT-F-15106] N74-10038
Some performance characteristics of the Bell 100 ton surface effect ship --- based on computerized simulation
[AD-765689] N74-10062
STOL tactical aircraft investigation. Volume 6: Air cushion landing system study
[AD-766644] N74-10940
GROUND STATIONS
Wind tunnel and field investigations of shapes for balloon shelters
[NCAR-TN/EDD-82] N74-10016
GROUND SUPPORT EQUIPMENT
AEROSAT ground environment and test plan --- aeronautical satellites for ATC
A74-12191
Pollution in the ground support environment --- at Naval air facilities
[AD-764854] N74-10602
GROUND TESTS
Dynamic simulation of CONFLOW - A facility to provide hot-gas ground testing of air-breathing missiles under simulated flight conditions
[AIAA PAPER 73-1281] A74-11292
Comparison of ground and flight test results using a modified F106B aircraft
[AIAA PAPER 73-1305] A74-11304
GROUND WIND
An analytical and experimental study of inlet ground vortices
[AIAA PAPER 73-1313] A74-11309
GROUND-AIR-GROUND COMMUNICATIONS
Civil air navigation equipment, on the ground and in the air
A74-11094
GUIDE VANES
Radially leaned outlet guide vanes for fan source noise reduction
[NASA-CR-134486] N74-11597
GYRO HORIZONS
The application of the vertical gyroscope for the artificial horizon --- low visibility air navigation
A74-10825
Solution of the equations of motion of a gyrohorizon compass at finite deviation angles from the meridian
A74-11685
GYROCOMPASSES
Solution of the equations of motion of a gyrohorizon compass at finite deviation angles from the meridian
A74-11685

GYROSCOPES
The application of the vertical gyroscope for the artificial horizon --- low visibility air navigation
A74-10825
Study of unconventional gyroscopic apparatus. I
A74-12444

H

HANGARS
Wind tunnel and field investigations of shapes for balloon shelters
[NCAR-TN/EDD-82] N74-10016
HAWKER SIDDELEY AIRCRAFT
HS.146 --- short haul passenger aircraft
A74-11329
HAZE
The light-scattering matrix and types of optical weather --- atmospheric aerosols, haze, fog, drizzle
A74-10783
HEAT EXCHANGERS
The friction and wear characteristics of plasma-sprayed NiO-CaF2 in rubbing contact with a ceramic matrix
[ASLE PREPRINT 73LC-1B-3] A74-12306
HEAT FLUX
A simplified method for studying the aerodynamic heating of axisymmetric bodies at an angle of attack
A74-12441
HEAT RESISTANT ALLOYS
Effect of several metallurgical variables on the thermal fatigue behavior of superalloys
A74-10622
HEAT TRANSFER
Deck heating effects due to VTOL jet exhaust impingement
[AIAA PAPER 73-1182] A74-11227
HELICOPTER CONTROL
Control of helicopter vibration using the dynamic antiresonant vibration isolator
[SAE PAPER 730892] A74-11597
HELICOPTER DESIGN
Helicopter rotor blades --- design with fiber reinforced epoxy resin bonded composite materials
A74-10498
Current developments in main rotors at Bell Helicopter Company --- multibladed concepts, frequency placement
[AIAA PAPER 73-1160] A74-10511
Progress in France in the last ten years in the field of helicopters - Prospects for the ten years to come
A74-11097
The main rotor bifilar absorber and its effect on helicopter reliability/maintainability
[SAE PAPER 730894] A74-11595
Nodalization applied to helicopters --- vibration isolation
[SAE PAPER 730893] A74-11596
Torsion-flap-lag coupling on helicopter rotor blades
A74-11843
Some conclusions regarding the aeroelastic stability of hingeless helicopter blades in hover and in forward flight
A74-11844
An investigation of the vibratory and acoustic benefits obtainable by the elimination of the blade tip vortex
A74-11845
Specialists Meeting on Helicopter Rotor Prediction Methods
[AGARD-CP-122] N74-10908
Rotary wing design methodology --- based on nonlinear aeroelastic blade loads analysis
N74-10909
Current loads technology for helicopter rotors --- based on rotor loads computer program for determining fatigue design loads
N74-10910
Prediction of helicopter rotor loads --- based on alternating aerodynamic loads imposed on rotary wing and rotor hub
N74-10911
Helicopter rotor loads predictions --- assumptions and techniques for numerical analysis of aerodynamic loads
N74-10912
Rotor system design and evaluation using a general purpose helicopter flight simulation program
N74-10913
The prediction of loading actions on high speed semi-rigid helicopters
N74-10914
Loads prediction methods for hingeless rotor helicopters
N74-10915
Integrated rotor/body loads prediction
N74-10916
HELICOPTER ENGINES
Progress in France in the last ten years in the field of helicopters - Prospects for the ten years to come
A74-11097
Design competence - The mainspring to cost reduction
[AIAA PAPER 73-1187] A74-11230
Lycomings LTS 101 - Low cost turbine power in the 600 hp class
[SAE PAPER 730911] A74-11582
Spring overriding aircraft clutch --- for multiengine helicopters
[AD-766309] N74-10073
Major Item Special Study (MISS). CH-54A turbine engine
[AD-766228] N74-10738
HELICOPTER PERFORMANCE
A helicopter flight performance system using an LSI microprocessor --- for calculating gross weight
[AD-765680] N74-10054
Research on aircraft dynamics for subsonic flight
[AD-765657] N74-10061
HELICOPTER PROPELLER DRIVE
Major Item Special Study (MISS). CH-54A clutch assembly (APP)
[AD-766226] N74-10057
Spring overriding aircraft clutch --- for multiengine helicopters
[AD-766309] N74-10073
HELICOPTER WAKES
Study of the electrostatic field and charge distribution in a vortex seeded with dust
[AD-766815] N74-10941
HELICOPTERS
Evaluation of the adhesive bonding processes used in helicopter manufacture. Part 4: Nondestructive inspection of adhesive bonds using holographic techniques
[AD-765455] N74-10480
Technical evaluation report on Fluid Dynamics Panel Specialists' Meeting on Aerodynamic Drag
[AGARD-AR-58] N74-10905
Manufacturing Methods Technology (MM/T) for ballistic-tolerant flight control components
[AD-766744] N74-10933
Study of the electrostatic field and charge distribution in a vortex seeded with dust
[AD-766815] N74-10941
Helicopter visual aid system
N74-11691
HIGH ALTITUDE
Sonic boom analysis for high altitude flight at high Mach number
[AIAA PAPER 73-1034] A74-12224
HIGH STRENGTH STEELS
A life study of AISI M-50 and Super Nitralloy spur gears with and without tip relief
[ASME PAPER 73-LUB-38] A74-12352
HIGH TEMPERATURE ENVIRONMENTS
High temperature cooled gas turbines (analysis and design)
[AD-766031] N74-10740
HIGH TEMPERATURE LUBRICANTS
Microfog lubricant application system for advanced turbine engine components, phase 3 --- wetting characteristics and deposit forming tendencies of lubricants
[NASA-CR-121271] N74-10730
HOLOGRAPHIC INTERFEROMETRY
Hologram study of gas flow in a ballistic wind tunnel
A74-11414

HOLOGRAPHY
Evaluation of the adhesive bonding processes used in helicopter manufacture. Part 4: Nondestructive inspection of adhesive bonds using holographic techniques
[AD-765455] N74-10480
HORN ANTENNAS
Improvement of performance characteristics of a class of broadband circularly polarized antennas --- for use with tactical airborne jamming equipment
[AD-766473] N74-11065
HOVERING STABILITY
Some conclusions regarding the aeroelastic stability of hingeless helicopter blades in hover and in forward flight
A74-11844
HUMAN FACTORS ENGINEERING
Application of military human factors techniques to general aviation accident prevention
A74-10880
HUMAN PERFORMANCE
Speech intelligibility testing with the modified rhyme test in aviation type noise
[AD-765470] N74-10159
HYBRID NAVIGATION SYSTEMS
Reduced order filtering with applications in hybrid navigation --- minimum variance Kalman filter algorithm
A74-12177
Tactical hybrid navigation scheme for mixed community coordination --- integrated communication and global interface capabilities
A74-12179
Application to zone navigation /B/Nav/ of hybrid navigation systems
A74-12446
HYDRAULIC ANALOGIES
Boundary value problems of two-dimensional isentropic gas flow
A74-11430
HYDRAULIC FLUIDS
Lithium soap dispersions as drag-reducing hydraulic fluids
[ASLE PREPRINT 73LC-5B-2] A74-12316
Hydrofluidic servoactuator development
[AD-766308] N74-10491
HYDROCARBON COMBUSTION
Swirling flow combustion - Fundamentals and application --- hydrocarbon-air flame velocity, turbojet afterburner application
[AIAA PAPER 73-1250] A74-11271
Modeling of gas turbine combustors
A74-11434
HYDROCARBON FUELS
Study of elastoplastic deformation with friction in hydrocarbon media --- with application to jet engine fuels
[AD-765997] N74-10717
HYDRODYNAMICS
Hydrodynamic forces on oscillating and nonoscillating smooth circular cylinders in crossflow --- for towed bodies
[AD-767022] N74-11125
HYDROFOIL CRAFT
Control failure simulations of the PHM hydrofoil craft using a 1/20-scale dynamic model with automatic control
[AD-766098] N74-10338
HYDROGEN
Conclusions and recommendations --- for problems in energy situation, air transportation, and hydrogen fuel
N74-11748
HYDROGEN FUELS
Supersonic mixing and combustion studies of ducted hydrogen-air flows at an inlet air Mach number of 2.6
[AIAA PAPER 73-1320] A74-11313
Supersonic combustion of hydrogen injected perpendicular to a ducted vitiated airstream
[AIAA PAPER 73-1322] A74-11314
The case for hydrogen fueled transport aircraft
[AIAA PAPER 73-1323] A74-11315
An initial step: A demonstration project --- promoting subsonic, hydrogen-fueled aircraft
N74-11747
HYPERSONIC AIRCRAFT
Multistage aerospace craft --- perspective drawings of conceptual design
[NASA-CASE-XMF-02263] N74-10907
HYPERSONIC FLIGHT
An empirical equation for prediction of transition location on cones in super-or hypersonic flight
[AD-765692] N74-10032
HYPERSONIC FLOW
Theory of hypersonic flow about a wing
A74-12205
Analysis and design of three dimensional supersonic nozzles. Volume 3: A design technique for multiple nozzle configurations
[NASA-CR-132352] N74-11115
Analysis and design of three dimensional supersonic nozzles. Volume 4: Similarity laws for nozzle flows
[NASA-CR-132353] N74-11116
HYPERSONIC HEAT TRANSFER
Laminar heat transfer on sharp and blunt ten-degree cones in conical and parallel low-density flow --- measurements in hypersonic wind tunnels
[AD-765546] N74-10869
HYPERSONIC SPEED
Effect of geometry variations on lee-surface vortex-induced heating for flat-bottom three-dimensional bodies at Mach 6
[NASA-TN-D-7447] N74-10318
Turbulent boundary layer growth at hypersonic speeds --- noting dependence on wall temperature ratio, pressure gradients, and viscous interaction parameter
[IC-AERO-73-04] N74-11112
HYPERVELOCITY PROJECTILES
External burning assisted projectile - Theory and experiment
[AIAA PAPER 73-1193] A74-11234
HYPERVELOCITY WIND TUNNELS
The application of fracture mechanics to the design of the barrel and driver tube of a hypersonic gun tunnel
A74-10484

I

ICE
Ice and landing surface demoulding: Replica fabrication
[FFA-MEMO-90] N74-10541
ICE FORMATION
An analytical study of icing simulation for turbine engines in altitude test cells
[AIAA PAPER 73-1280] A74-12938
ICE MAPPING
Airborne profiling of ice thickness using a short pulse radar
[NASA-TM-X-71481] N74-11204
IMPACT RESISTANCE
Impact resistance of fiber composite blades used in aircraft turbine engines
[NASA-CR-134502] N74-10726
IMPACT TESTS
Aircraft fuel tank entry wall-projectile interaction studies
[AD-765667] N74-10066
IN-FLIGHT MONITORING
Introduction to advanced systems monitor --- for flight crew and maintenance data
[SAE PAPER 730953] A74-11556
INCOMPRESSIBLE FLOW
Finite element solution of the incompressible flow over an airfoil in a nonuniform stream
A74-11426
Aerodynamic centre in two dimensional flow
[ESDU-AIRCRAFT-08.01.05-AMEND-A] N74-10010
Computation of vortex models for wings at high angle of attack in incompressible flow
[FFA-AU-653] N74-10013
Throughflow theory for turbomachines
[AD-766537] N74-11602
INERTIAL NAVIGATION
Civil air navigation equipment, on the ground and in the air
A74-11094

INFORMATION SYSTEMS
New concepts of visualization for aircraft --- instrument panel display integration
A74-12447
INLET FLOW
An analytical and experimental study of inlet ground vortices
[AIAA PAPER 73-1313] A74-11309
Some aspects of inlet/engine flow compatibility
A74-11618
The effect of inlet-noise suppression on propulsion system design
[AIAA PAPER 73-1294] A74-12942
Turbine engine exhaust nozzle performance --- inlet flow conditions effects
[AIAA PAPER 73-1302] A74-12947
Some design considerations for supersonic cruise mixed compression inlets
[NASA-TM-X-71460] N74-10021
Comparison of predicted and measured low-speed performance of two 51 centimeter-diameter inlets at incidence angle
[NASA-TM-X-2937] N74-10026
Turbine inlet gas temperature sensor for engine control --- nuclear radiation system
[AD-765193] N74-10461
INLET NOZZLES
Investigation of flow parameters in a turbine stage with a nonuniform inlet
A74-10255
INSTRUMENT APPROACH
Aircraft incident report: Eastern Air Lines, Incorporated, Boeing 727-225, N8843E, Toledo, Ohio, 10 April 1973
[NTSB-AAR-73-17] N74-10050
INSTRUMENT ERRORS
Uncertainty in gas turbine measurements --- bias and precision error model
[AIAA PAPER 73-1230] A74-11255
INSTRUMENT LANDING SYSTEMS
A feasibility study and preliminary evaluation of the use of a biased glide slope technique for noise abatement approach
[FAA-RD-73-153] N74-10618
Evaluation of ILS localizer signal specification during ground rollout
[AD-765761] N74-10623
Preliminary assessment of the microwave landing system requirements for STOL operations
[NASA-TM-X-62310] N74-11431
Modern beaconing in airports for bad weather flights
[NASA-TT-F-15178] N74-11433
INSTRUMENTS
AEDC Fiscal Year 1974 Air Force technical objective document --- facility improvements, test techniques, instrumentation, gas properties, and wind tunnel and flight test data comparisons
[AD-766719] N74-11803
INTAKE SYSTEMS
F-14 inlet maneuvering capability
[AIAA PAPER 73-1273] A74-11286
Some design considerations for supersonic cruise mixed compression inlets
[NASA-TM-X-71460] N74-10021
Comparison of predicted and measured low-speed performance of two 51 centimeter-diameter inlets at incidence angle
[NASA-TM-X-2937] N74-10026
INTEGRAL EQUATIONS
Scattering by a conducting aerofoil --- electromagnetic radiation
A74-11908
INTEGRATED CIRCUITS
A helicopter flight performance system using an LSI microprocessor --- for calculating gross weight
[AD-765680] N74-10054
INTERCEPTION
Flexibility in computer-assisted radar - Controlled interceptions --- software in air defense
A74-12406
INTERFERENCE DRAG
The improvement in Mach number distribution and reduction of pressure fluctuations in the transonic working section of wind tunnel 5.1
[WRE-TN-925] N74-10303
INTERNATIONAL COOPERATION
Air and space hi-jacking --- criminal aspects
A74-12878
INTERROGATION
A cylindrical phased-array antenna for ATC interrogation
A74-10018
INVISCID FLOW
Aerodynamic characteristics of aerofoils in compressible inviscid airflow at subcritical Mach numbers
[ESDU-72024-AMEND-A] N74-10006
IONOSPHERIC SOUNDING
Design considerations for the calculator, altitude ML-646 (XE-1/UM)
[AD-766699] N74-11295
ISENTROPIC PROCESSES
Boundary value problems of two-dimensional isentropic gas flow
A74-11430

J

J-2 ENGINE
Sea level side loads in high-area-ratio rocket engines
[AIAA PAPER 73-1284] A74-12940
J-93 ENGINE
Emission measurements of a J93 turbojet engine
[AD-766648] N74-11605
JET AIRCRAFT
Electronic display mechanization for monitoring aircraft parameters
[SAE PAPER 730956] A74-11555
Maintainability concepts used in the design and operation of Douglas commercial jet aircraft
[SAE PAPER 730881] A74-11603
JET AIRCRAFT NOISE
An experimental study of subsonic jet noise and comparison with theory
A74-10271
Assessment of jets as acoustic shields by comparison of single- and multitube suppressor nozzle data
[AIAA PAPER 73-1001] A74-11050
The effect of noise constraints on engine cycle optimization for long-haul transports
[AIAA PAPER 73-1292] A74-11298
Measured jet noise compared to California noise codes and health criteria
A74-11424
AST - A fifth engine for environmental consideration
[SAE PAPER 730899] A74-11590
Propulsion technology advances needed for a quiet supersonic transport
[SAE PAPER 730898] A74-11591
Jet noise suppression systems for high-speed aircraft
[SAE PAPER 730897] A74-11592
Highly noise suppressed bypass 6 engine for STOL application
[AIAA PAPER 73-1031] A74-11799
On the theory of jet noise and its applications --- Lighthill theory
[AIAA PAPER 73-987] A74-12218
A positive approach to the problems of aircraft noise
[AIAA PAPER 73-1157] A74-12227
The Q-Fan Demonstrator Engine --- variable pitch fan engine design and tests
[AIAA PAPER 73-1215] A74-12929
Military aircraft noise --- abatement program
[AIAA PAPER 73-1291] A74-12941
Influence of noise constraints on supersonic transport engine design
[AIAA PAPER 73-1295] A74-12943
DC-9/JT8D refan, Phase 1 --- technical and economic feasibility of retrofitting DC-9 aircraft with refan engine to achieve desired acoustic levels
[NASA-CR-121252] N74-10729
JET ENGINE FUELS
The case for hydrogen fueled transport aircraft
[AIAA PAPER 73-1323] A74-11315
An evaluation of the relative fire hazards of jet A and jet B for commercial flight
[NASA-TM-X-71437] N74-10709
Aviation turbine fuels, 1972
N74-11592

JET ENGINES
An analytical and experimental study of inlet ground vortices
[AIAA PAPER 73-1313] A74-11309
An empirical model for calculating the critical conditions of flame stabilization
A74-11824
Cost impact of mission requirements on future engine design selection
[AIAA PAPER 73-1186] A74-12922
Mixing and combustion processes in jet engines --- physics of interaction of droplets or solid particles with gas stream
[AD-766030] N74-10741
The economic efficiency of raising the flying life and reliability of gas-turbine engines
[AD-767027] N74-11601
Sensing jet engine performance and incipient failure with electrostatic probes
[AD-766653] N74-11606

JET EXHAUST
Deck heating effects due to VTOL jet exhaust impingement
[AIAA PAPER 73-1182] A74-11227
Analysis of stratified and closely spaced jets exhausting into a crossflow --- aerodynamic characteristics of lift-jet, vectored thrust, and lift fan V/STOL aircraft
[NASA-CR-132297] N74-11118

JET FLOW
Near-field trajectory of turbulent jets discharged at various inclinations into a uniform crossflow
A74-10568
Noise generation by ducted combustion systems --- resonant oscillations
[AIAA PAPER 73-1024] A74-12223
Exploratory investigation at Mach numbers from 0.40 to 0.95 of the effects of jets blown over a wing
[NASA-TN-D-7367] N74-10014

JET IMPINGEMENT
Deck heating effects due to VTOL jet exhaust impingement
[AIAA PAPER 73-1182] A74-11227
VTOL recirculation and impingement model testing --- flow fields in ground effect test
[AIAA PAPER 73-1183] A74-11228

JET LIFT
VTOL recirculation and impingement model testing --- flow fields in ground effect test
[AIAA PAPER 73-1183] A74-11228

JET MIXING FLOW
Mixing of multiple dilution jets with a hot primary airstream for gas turbine combustors
[AIAA PAPER 73-1249] A74-11270
Supersonic mixing and combustion studies of ducted hydrogen-air flows at an inlet air Mach number of 2.6
[AIAA PAPER 73-1320] A74-11313

JET PROPULSION
The technical evolution of aircraft
A74-11092

JOINTS (JUNCTIONS)
Improved fastener systems for fatigue and sealing redundancy of low shear transfer joints
[SAE PAPER 730901] A74-11589
Keyed joint performance under heavy load aircraft
[AD-766706] N74-11101

JOURNAL BEARINGS
The whirl instability of a rigid rotor in a flexibly supported gas lubricated journal bearing
A74-11441
Instability of rotors in MHD journal bearings
A74-11445
Dynamical pressure distribution in aerodynamic bearing
A74-11899

K

KALMAN FILTERS
Reduced order filtering with applications in hybrid navigation --- minimum variance Kalman filter algorithm
A74-12177
Range-rate from DME-air data measurements --- for aircraft radial velocity estimation
A74-12182

KERNEL FUNCTIONS
Derivation of aerodynamic kernel functions
A74-10572

KINETIC EQUATIONS
Solution of the plane problem of the aerodynamics of a rarefied gas on the basis of Boltzmann's kinetic equation
A74-10976

L

LAMINAR BOUNDARY LAYER
Nonlinear stability theory of the boundary layer
A74-11155
Prevention of transition over a backward step by suction --- laminar boundary layer control
A74-11339
Control of supersonic wind-tunnel noise by laminarization of nozzle-wall boundary layer
[NASA-TM-X-2879] N74-11119

LAMINAR FLOW
Drag of streamline solids of revolution (transition at nose)
[ESDU-BODIES-02.04.01-AMEND-A] N74-10311

LAMINAR HEAT TRANSFER
A simplified method for studying the aerodynamic heating of axisymmetric bodies at an angle of attack
A74-12441
Laminar heat transfer on sharp and blunt ten-degree cones in conical and parallel low-density flow --- measurements in hypersonic wind tunnels
[AD-765546] N74-10869

LANDING
Measurement of turbulence inputs for V/STOL approach paths in a simulated planetary boundary layer
[UTIAS-189] N74-11661

LANDING AIDS
Analysis and design of a capsule landing system and surface vehicle control system for Mars exploration
[NASA-CR-136069] N74-11077
Ground lighting equipment --- landing aids
[NASA-TT-F-15176] N74-11092
Visual landings in regional and local airports
[NASA-TT-F-15177] N74-11093
Preliminary assessment of the microwave landing system requirements for STOL operations
[NASA-TM-X-62310] N74-11431

LANDING GEAR
Crashworthy landing gear study --- to establish energy-absorbing design criteria applicable to rotary wing aircraft
[AD-765489] N74-10060
Lateral distribution of aircraft traffic --- application to pavement design criteria for aircraft with complex landing gear
[AD-765435] N74-10304
Service loads on nose landing gears of the F-104 airplane --- by statistical analysis
[LBF-TB-103/1972] N74-10924
STOL tactical aircraft investigation. Volume 6: Air cushion landing system study
[AD-766644] N74-10940
Model studies of crosswind landing-gear configurations for STOL aircraft
N74-11680

LANDING LOADS
Service loads on nose landing gears of the F-104 airplane --- by statistical analysis
[LBF-TB-103/1972] N74-10924

LANDING SIMULATION
Evaluation of V/STOL research aircraft design --- landing approaches, propulsion/control, piloted moving base simulator
[SAE PAPER 730947] A74-11557

LATERAL CONTROL
Fluidic emergency roll control system --- for emergency aircraft control following failure of primary roll control system
[NASA-CR-114588] N74-10048

LEADING EDGES
On the flow around the leading edge of a lifting airfoil
A74-10996

The effects of leading-edge serrations on reducing flow unsteadiness about airfoils, an experimental and analytical investigation
[NASA-CR-2344] N74-10019
Effects of increased leading-edge thickness on performance of a transonic rotor blade --- in single stage transonic compressor
[NASA-TN-D-7489] N74-10025
LIFE SUPPORT SYSTEMS
Cockpit air filtration requirements of the B-1 in a nuclear dust environment
[AD-766711] N74-10065
LIFT
Conversion factor for profile drag increment for part-span flaps
[ESDU-FLAPS-02.01.07-AMEND-A] N74-10002
Exploratory investigation at Mach numbers from 0.40 to 0.95 of the effects of jets blown over a wing
[NASA-TN-D-7367] N74-10014
LIFT AUGMENTATION
Noise generation and the design of bypass lift jet engines
A74-10984
Lift coefficent increment due to full-span split flap: Flap chord 0.15c
[ESDU-FLAPS-01.01.05-AMEND-A] N74-10003
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[NASA-TM-X-71466] N74-10042
Acoustic characteristics of a large-scale augmentor wing model at forward speed
[NASA-TM-X-2940] N74-10052
LIFT DEVICES
Derivation of aerodynamic kernel functions
A74-10572
Flap noise prediction method for a powered lift system
[AIAA PAPER 73-1028] A74-11051
A buoyant tornado-probe concept incorporating an inverted lifting device --- and balloon combination
[NASA-TN-D-7335] N74-10584
LIFT DRAG RATIO
Theory of hypersonic flow about a wing
A74-12205
LIFT FANS
Remote lift fan study program, volume 4
[NASA-CR-121277] N74-10049
LIFTING BODIES
The lifting surface theory applied to fixed wings and propellers
A74-10999
LIFTING ROTORS
Theoretical studies of tone noise from a fan rotor
[NASA-CR-2354] N74-10735
LIGHT AIRCRAFT
Investigation of the suction system and boundary-layer characteristics on a high-lift, BLC L-19 test aircraft
[AD-766305] N74-10063
LIGHT EMITTING DIODES
Present and future radar display techniques --- CRT, LED and liquid crystals for ATC applications
A74-12382
LIGHT SCATTERING
The light-scattering matrix and types of optical weather --- atmospheric aerosols, haze, fog, drizzle
A74-10783
Study of condensation phenomena in the ISL laser wind tunnel using light diffusion
[ISL-RT-19/72] N74-11099
LIGHTHILL GAS MODEL
Introduction to aerodynamic noise theory
A74-12207
LIGHTHILL METHOD
On the theory of jet noise and its applications --- Lighthill theory
[AIAA PAPER 73-987] A74-12218
LIGHTING EQUIPMENT
Ground lighting equipment --- landing aids
[NASA-TT-F-15176] N74-11092
LIGHTNING
Lightning effects on general aviation aircraft
[FAA-NA-73-32(2)] N74-10040
LINEAR SYSTEMS
Optimal incomplete feedback control of linear stochastic systems
[AD-766440] N74-10071
LIQUID CRYSTALS
Present and future radar display techniques --- CRT, LED and liquid crystals for ATC applications
A74-12382
LIQUID HYDROGEN
The case for hydrogen fueled transport aircraft
[AIAA PAPER 73-1323] A74-11315
LIQUID OXYGEN
Test of LOX compatibility for asphalt and concrete runway materials
[NASA-TM-X-64086] N74-11091
LITHIUM COMPOUNDS
Lithium soap dispersions as drag-reducing hydraulic fluids
[ASLE PREPRINT 73LC-5B-2] A74-12316
LOAD TESTS
The application of fracture mechanics to the design of the barrel and driver tube of a hypersonic gun tunnel
A74-10484
LOADS (FORCES)
The behavior of flexible airfield pavements under loads: Theory and experiments
[AD-766480] N74-11102
LOGISTICS
High level container --- for aerial resupply of military units
[AD-766306] N74-10899
LONGITUDINAL CONTROL
Investigation and application of two methods of determining co-efficients of transfer functions of longitudinal motion of aircraft from measured input and output data --- equations of motion and response curve fitting
[ESRO-TT-2] N74-10053
LONGITUDINAL STABILITY
Longitudinal response of an aircraft due to a trailing vortex pair
A74-11343
LORAN
Error model identification and performance predictions for airborne direct ranging Loran
A74-12178
LOW VISIBILITY
The application of the vertical gyroscope for the artificial horizon --- low visibility air navigation
A74-10825
LUBRICATING OILS
A unique method for monitoring cabin air pollution from engine oil in the EB-57 D aircraft
[AD-766701] N74-10932
LUBRICATION
Aviation turbine fuel and its lubricating qualities
A74-11739
LUBRICATION SYSTEMS
Gas turbine engine mainshaft roller bearing-system analysis
[ASME PAPER 73-LUB-J] A74-12710
Microfog lubricant application system for advanced turbine engine components, phase 3 --- wetting characteristics and deposit forming tendencies of lubricants
[NASA-CR-121271] N74-10730

M

MACH NUMBER
Sonic boom analysis for high altitude flight at high Mach number
[AIAA PAPER 73-1034] A74-12224
MACHINE TOOLS
Selection of cutting conditions in the machining axial-flow compressor blades on an assembled rotor
A74-12424
MACHINING
Selection of cutting conditions in the machining axial-flow compressor blades on an assembled rotor
A74-12424
MAGNETIC SUSPENSION
Magnetic balance and suspension systems for use with wind tunnels
A74-12204

MAGNETOHYDRODYNAMIC STABILITY
Instability of rotors in MHD journal bearings
A74-11445
MAINTAINABILITY
The main rotor bifilar absorber and its effect on helicopter reliability/maintainability
[SAE PAPER 730894] A74-11595
Maintainability concepts used in the design and operation of Douglas commercial jet aircraft
[SAE PAPER 730881] A74-11603
MAN MACHINE SYSTEMS
Evaluation of advanced air vehicle designs in the USAF
[SAE PAPER 730945] A74-11558
A primary radar automatic track extractor --- for air defense systems
A74-12402
MANAGEMENT PLANNING
Cost - The emerging aerospace technology --- applications to gas turbine engines
[AIAA PAPER 73-1327] A74-11318
MANUAL CONTROL
Solid state controller three axes controller
[NASA-CASE-MSC-12394-1] N74-10942
MANUFACTURING
A simplified approach for estimating manufacturing cost at the part level
[SAE PAPER 730908] A74-11584
Manufacture and properties of titanium and titanium alloys emphasizing their use in aeronautics. Part 1: Manufacture and processing --- conference
N74-11336
Manufacture of titanium and titanium alloy semifinished products --- with application to production of drop-forged aircraft parts
N74-11338
MARINE ENVIRONMENTS
Nasa remote sensing of sea ice in AIDJEX
N74-11223
MARINE PROPULSION
Some performance characteristics of the Bell 100 ton surface effect ship --- based on computerized simulation
[AD-765689] N74-10062
MARINE TECHNOLOGY
Some performance characteristics of the Bell 100 ton surface effect ship --- based on computerized simulation
[AD-765689] N74-10062
MARKET RESEARCH
U.S. aerospace industry at the crossroads --- response to European competition
A74-11610
MARS PROBES
Analysis and design of a capsule landing system and surface vehicle control system for Mars exploration
[NASA-CR-136069] N74-11077
MASS FLOW
Calculation of the characteristics of multistage axial turbomachines --- mathematical model for temperature, pressure and flow parameters
A74-10029
MATERIALS HANDLING
The quality of the fuel --- aviation fuel purity maintenance during transport and storage
A74-11741
High level container --- for aerial resupply of military units
[AD-766306] N74-10899
Energy trends and their future effects upon transportation --- applied to rail, truck, and air cargo operations and private energy uses
[P-5046] N74-11791
MATERIALS SCIENCE
Material selection procedures for advanced transport aircraft
[SAE PAPER 730884] A74-11602
MATERIALS TESTS
Fatigue of supersonic transport materials using simulated flight-by-flight loading
A74-10616
MATHEMATICAL MODELS
Calculation of the characteristics of multistage axial turbomachines --- mathematical model for temperature, pressure and flow parameters
A74-10029
Effect of anisotropic turbulence on aerodynamic noise --- Lighthill theory mathematical model for axisymmetric turbulence
A74-10798
Uncertainty in gas turbine measurements --- bias and precision error model
[AIAA PAPER 73-1230] A74-11255
Modeling of gas turbine combustors
A74-11434
Technology forecasting - Aircraft hazard detection
A74-11499
Investigation of the characteristics of tubular microphone windscreens for in-duct fan sound power measurements
A74-12126
MCDONNELL DOUGLAS AIRCRAFT
External blowing flap technology on the USAF/McDonnell Douglas YC-15 /AMST/ program
[SAE PAPER 730915] A74-11579
MEASURING INSTRUMENTS
Emission measurements of a J93 turbojet engine
[AD-766648] N74-11605
MECHANICAL DRIVES
Spring overriding aircraft clutch --- for multiengine helicopters
[AD-766309] N74-10073
MECHANICAL PROPERTIES
Material selection procedures for advanced transport aircraft
[SAE PAPER 730884] A74-11602
METAL COATINGS
Sodium sulphate induced rapid oxidation of a chromium-titanium-silicon coating on niobium alloy B-66
A74-11459
METAL CUTTING
Selection of cutting conditions in the machining axial-flow compressor blades on an assembled rotor
A74-12424
METAL FATIGUE
A life study of AISI M-50 and Super Nitralloy spur gears with and without tip relief
[ASME PAPER 73-LUB-38] A74-12352
METEOROLOGICAL BALLOONS
Design considerations for the calculator, altitude ML-646 (XE-1/UM)
[AD-766699] N74-11295
METEOROLOGICAL PARAMETERS
Thermal parameters as a predictor of precipitation type for Kincheloe AFB, Michigan
[AD-754927] N74-10611
Meteorological information for vertical and short take-off and land (V/STOL) operations in built-up urban areas: An analysis
[FAA-RD-72-135] N74-10920
METEOROLOGY
Interest and feasibility study of atmospheric turbulence and thermal gradients simulation --- application to air pollution and meteorology
N74-11380
METHANE
Gas-phase nitrogen and methane chemistry in the atmosphere
A74-11513
MICHIGAN
Thermal parameters as a predictor of precipitation type for Kincheloe AFB, Michigan
[AD-754927] N74-10611
MICROPHONES
Investigation of the characteristics of tubular microphone windscreens for in-duct fan sound power measurements
A74-12126
MICROWAVE EQUIPMENT
A first generation of L-Band avionics for AEROSAT --- experimentation and evaluation phase of aeronautical satellites
A74-12192
Preliminary assessment of the microwave landing system requirements for STOL operations
[NASA-TM-X-62310] N74-11431
MIDAIR COLLISIONS
Collision avoidance and the future of air traffic control
A74-11101
Radar techniques for Air Force applications in avoidance of bird-aircraft collisions and improvement of flight safety
[AD-754981] N74-10068

MIGRATION
Bird strike and the radar properties of birds --- migration patterns monitoring
A74-12389
MILITARY AIR FACILITIES
Military aircraft noise --- abatement program
[AIAA PAPER 73-1291] A74-12941
Lateral distribution of aircraft traffic --- application to pavement design criteria for aircraft with complex landing gear
[AD-765435] N74-10304
Pollution in the ground support environment --- at Naval air facilities
[AD-764854] N74-10602
Thermal warm fog dissipation: Heat requirements and projected utilization of a system for Travis AFB, California
[AD-766247] N74-10605
Thermal parameters as a predictor of precipitation type for Kincheloe AFB, Michigan
[AD-754927] N74-10611
MILITARY AIRCRAFT
Military aircraft --- structural design with fiber reinforced composite materials
A74-10496
Evaluation of advanced air vehicle designs in the USAF
[SAE PAPER 730945] A74-11558
Upper Surface Blowing technology as applied to the YC-14 airplane
[SAE PAPER 730916] A74-11578
External blowing flap technology on the USAF/McDonnell Douglas YC-15 /AMST/ program
[SAE PAPER 730915] A74-11579
Air Force STOL tactical aircraft investigation - Evaluation of externally blown flaps
[SAE PAPER 730914] A74-11580
STOL tactical aircraft investigation --- transports configuration sizing and design
[SAE PAPER 730913] A74-11581
AMST - The approach to the STOL transport of the US
A74-11776
System evaluation as an objective for a research institute --- VTOL weapons systems
A74-11806
Cost impact of mission requirements on future engine design selection
[AIAA PAPER 73-1186] A74-12922
Propulsion requirements for powered-lift aircraft
[AIAA PAPER 73-1214] A74-12928
Military aircraft noise --- abatement program
[AIAA PAPER 73-1291] A74-12941
Orientation-error accidents in regular Army aircraft during fiscal year 1970: Relative incidence and cost
[AD-767028] N74-10930
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 2: Takeoff and landing digital computer program
[AD-766943] N74-10936
STOL tactical aircraft investigation. Volume 2, part 2: A lifting line analysis method for jet-flapped wings
[AD-766877] N74-10937
STOL tactical aircraft investigation. Volume 3: Takeoff and landing performance ground rules for powered lift STOL transport aircraft
[AD-766640] N74-10938
STOL tactical aircraft investigation. Volume 5, part 2: Flight control technology: Piloted simulation of a medium STOL transport with vectored thrust mechanical flaps
[AD-766643] N74-10939
STOL tactical aircraft investigation. Volume 6: Air cushion landing system study
[AD-766644] N74-10940
MILITARY HELICOPTERS
Design competence - The mainspring to cost reduction
[AIAA PAPER 73-1187] A74-11230
Response predictions of helicopter landing platform for the USS BELKNAP (DLG-26) and USS GARCIA (DE-1040)-Class destroyers
[AD-766450] N74-10072
Orientation-error accidents in regular Army aircraft during fiscal year 1970: Relative incidence and cost
[AD-767028] N74-10930
MILITARY TECHNOLOGY
Application of military human factors techniques to general aviation accident prevention
A74-10880
Computer-aided design and drafting /CADD/ - An advanced designer's tool
[SAE PAPER 730934] A74-11566
Transportability --- of military equipment
[AD-765456] N74-10229
High level container --- for aerial resupply of military units
[AD-766306] N74-10899
MISSILE DESIGN
Low cost supersonic expendable turbine engines --- tactical missile applications
[SAE PAPER 730910] A74-11583
MISSILE TESTS
Dynamic simulation of CONFLON - A facility to provide hot-gas ground testing of air-breathing missiles under simulated flight conditions
[AIAA PAPER 73-1281] A74-11292
MISSION PLANNING
Development of parametricized computations for AST study engines
[SAE PAPER 730895] A74-11594
MODELS
A mathematical theory of plasticity for strain hardening materials exhibiting initial anistoropy
[NLR-TR-72117-U] N74-11719
MOIRE EFFECTS
Study of Moire measuring techniques for wind tunnel model deformation
[AD-766892] N74-11298
MOLDING MATERIALS
Ice and landing surface demoulding: Replica fabrication
[FFA-MEMO-90] N74-10541
MONTE CARLO METHOD
Estimation of an aeronautical equipment mission reliability
[AD-766886] N74-10935
MOTION STABILITY
Analysis of the longitudinal disturbed motion of a surface skimmer --- like common aircraft
[AD-765992] N74-10326
MOUNTAINS
Turbulence near the tropopause in the presence of mountain waves
[AD-766577] N74-11274
MULTIPLEXING
Satellite communications systems --- multiplexing for communication lines, equipment of earth stations, and onboard receiver transmitter and antennas
[JPRS-54505] N74-10153
MULTISPECTRAL PHOTOGRAPHY
Radar backscattering as a means for measuring ocean surface parameters using S193 altimetry and S190B photography
[E74-10092] N74-11202

N

NACELLES
A positive approach to the problems of aircraft noise
[AIAA PAPER 73-1157] A74-12227
NAVIGATION AIDS
The application of the vertical gyroscope for the artificial horizon --- low visibility air navigation
A74-10825
Visual landings in regional and local airports
[NASA-TT-F-15177] N74-11093
NAVIGATION INSTRUMENTS
Integrated navigation in the air and on the sea --- automatic systems
A74-12449
NAVIGATION SATELLITES
Aerosat and Marsat: Satellites for mobile services
N74-11018
NAVY
Pollution in the ground support environment --- at Naval air facilities
[AD-764854] N74-10602
NEAR INFRARED RADIATION
Ultraviolet and near-infrared spectral analysis of a burner-can burn-through flame
[FAA-NA-73-86] N74-10866

NETHERLANDS
Stichting National Aerospace Laboratory, review for the year 1972 N74-10891

NEVADA
Terrain properties and topography from Skylab altimetry --- Oregon, Utah, Texas, and Nevada [E74-10043] N74-11164

NICKEL ALLOYS
A life study of AISI M-50 and Super Nitralloy spur gears with and without tip relief [ASME PAPER 73-LUB-38] A74-12352

NIOBIUM ALLOYS
Sodium sulphate induced rapid oxidation of a chromium-titanium-silicon coating on niobium alloy B-66 A74-11459

NITRIC OXIDE
Gas-phase nitrogen and methane chemistry in the atmosphere A74-11513

NITROGEN
Gas-phase nitrogen and methane chemistry in the atmosphere A74-11513

NITROGEN DIOXIDE
Gas-phase nitrogen and methane chemistry in the atmosphere A74-11513

NITROGEN OXIDES
Prediction of aircraft gas turbine NO/x/ emission dependence on engine operating parameters and ambient conditions [AIAA PAPER 73-1275] A74-11287

NODES (STANDING WAVES)
Nodalization applied to helicopters --- vibration isolation [SAE PAPER 730893] A74-11596

NOISE (SOUND)
Transportation noise - It's measurement and evaluation A74-11198

NOISE GENERATORS
Flow noise spectra from cylinders and aerofoils A74-12127
Introduction to aerodynamic noise theory A74-12207
Theoretical studies of tone noise from a fan rotor [NASA-CR-2354] N74-10735

NOISE INTENSITY
It's quiet in front --- community reaction to aircraft noise [AIAA PAPER 73-1159] A74-10510
Objective determination of the noise level in Doppler spectra [TR-32] N74-10155
Aircraft noise reduction technology --- to show impact on individuals and communities, component noise sources, and operational procedures to reduce impact [NASA-TM-X-68241] N74-10917

NOISE POLLUTION
Transportation noise - It's measurement and evaluation A74-11198

NOISE PROPAGATION
Transmission of sound through a two-dimensional shielding jet [AIAA PAPER 73-1002] A74-12221

NOISE REDUCTION
Air transportation noise technology overview [AIAA PAPER 73-1152] A74-10506
Designing small gas turbine engines for low noise and clean exhaust [AIAA PAPER 73-1154] A74-10507
Designing for noise and emission control in general aviation [AIAA PAPER 73-1158] A74-10509
Noise, an urgent problem with a slow solution --- aircraft noise reduction in airport vicinity A74-11001
Assessment of jets as acoustic shields by comparison of single- and multitube suppressor nozzle data [AIAA PAPER 73-1001] A74-11050
Progress in France in the last ten years in the field of helicopters - Prospects for the ten years to come A74-11097
Aircraft noise reduction - Alternatives versus cost A74-11199
The effect of noise constraints on engine cycle optimization for long-haul transports [AIAA PAPER 73-1292] A74-11298
Propulsion technology advances needed for a quiet supersonic transport [SAE PAPER 730898] A74-11591
Jet noise suppression systems for high-speed aircraft [SAE PAPER 730897] A74-11592
Highly noise suppressed bypass 6 engine for STOL application [AIAA PAPER 73-1031] A74-11799
Noise design goals for the next generation of aircraft --- community of STOL aircraft A74-11816
An investigation of the vibratory and acoustic benefits obtainable by the elimination of the blade tip vortex A74-11845
Aircraft noise relief potential at major hub airports [AIAA PAPER 73-1164] A74-12217
A positive approach to the problems of aircraft noise [AIAA PAPER 73-1157] A74-12227
Military aircraft noise --- abatement program [AIAA PAPER 73-1291] A74-12941
The effect of inlet-noise suppression on propulsion system design [AIAA PAPER 73-1294] A74-12942
Influence of noise constraints on supersonic transport engine design [AIAA PAPER 73-1295] A74-12943
Refan program. Phase 1: Summary report [NASA-TM-X-71456] N74-10043
A feasibility study and preliminary evaluation of the use of a biased glide slope technique for noise abatement approach [FAA-RD-73-153] N74-10618
Theoretical studies of tone noise from a fan rotor [NASA-CR-2354] N74-10735
Aircraft noise reduction technology --- to show impact on individuals and communities, component noise sources, and operational procedures to reduce impact [NASA-TM-X-68241] N74-10917
V/STOL noise prediction and reduction [LG73ER0062] N74-10921
Control of supersonic wind-tunnel noise by laminarization of nozzle-wall boundary layer [NASA-TM-X-2879] N74-11119
Radially leaned outlet guide vanes for fan source noise reduction [NASA-CR-134486] N74-11597

NOISE SPECTRA
An experimental study of subsonic jet noise and comparison with theory A74-10271
Flow noise spectra from cylinders and aerofoils A74-12127
On the theory of jet noise and its applications --- Lighthill theory [AIAA PAPER 73-987] A74-12218

NOISE TOLERANCE
Measured jet noise compared to California noise codes and health criteria A74-11424

NONDESTRUCTIVE TESTS
Evaluation of the adhesive bonding processes used in helicopter manufacture. Part 4: Nondestructive inspection of adhesive bonds using holographic techniques [AD-765455] N74-10480

NONUNIFORM FLOW
Investigation of flow parameters in a turbine stage with a nonuniform inlet A74-10255
Finite element solution of the incompressible flow over an airfoil in a nonuniform stream A74-11426

NORMAL SHOCK WAVES
Prediction of airfoil shock location in transonic flow A74-11342

NOSE CONES
Prediction of unsteady airloads for the solution of the panel flutter problem of nosecones and conical shell structures
A74-12804
NOZZLE DESIGN
V/STOL deflector aerodynamic design criteria --- geometric variations effects
[AIAA PAPER 73-1181] A74-11226
Integrated airframe-nozzle performance for designing twin-engine fighters
[AIAA PAPER 73-1303] A74-11302
Advanced technology thrust vectoring exhaust systems
[AIAA PAPER 73-1304] A74-11303
Simplified physical model of spray combustion in a gas turbine engine
A74-11451
Noise tests of a high-aspect-ratio slot nozzle with various V-gutter target thrust reversers
[NASA-TM-X-71470] N74-10037
Analysis and design of three dimensional supersonic nozzles. Volume 1: Nozzle-exhaust flow field analysis by a reference plane characteristics technique
[NASA-CR-132350] N74-11113
Analysis and design of three dimensional supersonic nozzles. Volume 2: Numerical program for analysis of nozzle-exhaust flow fields
[NASA-CR-132351] N74-11114
Analysis and design of three dimensional supersonic nozzles. Volume 3: A design technique for multiple nozzle configurations
[NASA-CR-132352] N74-11115
NOZZLE FLOW
Noise tests of a high-aspect-ratio slot nozzle with various V-gutter target thrust reversers
[NASA-TM-X-71470] N74-10037
Fluidic emergency roll control system --- for emergency aircraft control following failure of primary roll control system
[NASA-CR-114588] N74-10048
Analysis and design of three dimensional supersonic nozzles. Volume 1: Nozzle-exhaust flow field analysis by a reference plane characteristics technique
[NASA-CR-132350] N74-11113
Analysis and design of three dimensional supersonic nozzles. Volume 2: Numerical program for analysis of nozzle-exhaust flow fields
[NASA-CR-132351] N74-11114
Analysis and design of three dimensional supersonic nozzles. Volume 3: A design technique for multiple nozzle configurations
[NASA-CR-132352] N74-11115
Analysis and design of three dimensional supersonic nozzles. Volume 4: Similarity laws for nozzle flows
[NASA-CR-132353] N74-11116
NOZZLE GEOMETRY
V/STOL deflector aerodynamic design criteria --- geometric variations effects
[AIAA PAPER 73-1181] A74-11226
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[AIAA PAPER 73-1217] A74-12495
Turbine engine exhaust nozzle performance --- inlet flow conditions effects
[AIAA PAPER 73-1302] A74-12947
NOZZLE THRUST COEFFICIENTS
Turbine engine exhaust nozzle performance --- inlet flow conditions effects
[AIAA PAPER 73-1302] A74-12947
NUMERICAL ANALYSIS
Sonic boom analysis for high altitude flight at high Mach number
[AIAA PAPER 73-1034] A74-12224

O

OCEAN SURFACE
Radar backscattering as a means for measuring ocean surface parameters using S193 altimetry and S190B photography
[E74-10092] N74-11202
ODORS
Odor intensity and characterization studies of exhaust from a turbojet engine combustor
[AIAA PAPER 73-1278] A74-11290
OLFACTORY PERCEPTION
Odor intensity and characterization studies of exhaust from a turbojet engine combustor
[AIAA PAPER 73-1278] A74-11290
ONBOARD EQUIPMENT
Civil air navigation equipment, on the ground and in the air
A74-11094
OPERATIONAL PROBLEMS
Advantages of aircraft system maturity --- profitability
[SAE PAPER 730907] A74-11585
Operational problems with the aircraft type Tu-134 in the case of a use of the aircraft turbine fuel TS-1
A74-11740
RB 211 - The first eighteen months operating experience /Sholto Douglas Memorial Lecture/
A74-12300
OPTICAL MEASUREMENT
Experimental study of shock-wave reflection upon boundary layer transition
[ONERA, TP NO. 1284] A74-11072
Measuring the radiation of a vertical gas jet
A74-11500
OPTICAL PROPERTIES
Differential method for testing the optical standards of cockpit windshields
A74-10937
OPTIMIZATION
The acoustics of aircraft engine-duct systems
[AIAA PAPER 73-1153] A74-12215
OREGON
Terrain properties and topography from Skylab altimetry --- Oregon, Utah, Texas, and Nevada
[E74-10043] N74-11164
ORTHOTROPIC PLATES
Buckling of orthotropic, curved, sandwich panels in shear and axial compression
A74-11340
OSCILLATING CYLINDERS
Hydrodynamic forces on oscillating and nonoscillating smooth circular cylinders in crossflow --- for towed bodies
[AD-767022] N74-11125
OSCILLATING FLOW
Dynamic relaxation solution of three dimensional subsonic compressible oscillatory flow
A74-11428
OVERPRESSURE
Shuttle sonic boom - Technology and predictions --- environmental impact
[AIAA PAPER 73-1039] A74-12225
OXIDATION
Sodium sulphate induced rapid oxidation of a chromium-titanium-silicon coating on niobium alloy B-66
A74-11459
OXIDATION RESISTANCE
Sodium sulphate induced rapid oxidation of a chromium-titanium-silicon coating on niobium alloy B-66
A74-11459

P

PANEL FLUTTER
Prediction of unsteady airloads for the solution of the panel flutter problem of nosecones and conical shell structures
A74-12804
PARACHUTE DESCENT
Lauching of small inflated balloons from cargo aircraft --- using palletized modular airdrop platform
[AD-766428] N74-10069
High level container --- for aerial resupply of military units
[AD-766306] N74-10899
PARACHUTE FABRICS
Lightweight, variable solidity knitted parachute fabric --- for aerodynamic decelerators
[NASA-CASE-LAR-10776-1] N74-10034

PASSENGER AIRCRAFT
Evolution philosophy --- Fokker F28 aircraft
A74-10936
HS.146 --- short haul passenger aircraft
A74-11329
Research and development for future air transports
A74-11615
PATTERN REGISTRATION
Information content of different runway lighting patterns --- visual pattern discrimination of landing displays
[NASA-TT-F-15179] N74-11094
PAVEMENTS
Design and evaluation of aircraft pavements - 1971
A74-11874
Lateral distribution of aircraft traffic --- application to pavement design criteria for aircraft with complex landing gear
[AD-765435] N74-10304
Effects of strain amplitude on the shear modulus of soils
[AD-757516] N74-10404
Keyed joint performance under heavy load aircraft
[AD-766706] N74-11101
The behavior of flexible airfield pavements under loads: Theory and experiments
[AD-766480] N74-11102
PAYLOADS
The Dolphin airship with undulating propulsion system - On-test-stand comparison with a helicopter --- payload capacity and engine performance
A74-11743
Transport vehicles - Weights and loads --- commercial aircraft
A74-12442
Stability and dynamic behavior of two tethered balloon systems
[AD-766439] N74-10070
PERFORMANCE PREDICTION
A semi-empirical method for predicting subsonic diffuser performance
[AIAA PAPER 73-1272] A74-11285
Integrated airframe-nozzle performance for designing twin-engine fighters
[AIAA PAPER 73-1303] A74-11302
Error model identification and performance predictions for airborne direct ranging Loran
A74-12178
Afterbody drag flight test of the A-7E airplane
[AIAA PAPER 73-1306] A74-12948
Sensing jet engine performance and incipient failure with electrostatic probes
[AD-766653] N74-11606
PERFORMANCE TESTS
Possibilities for improved supersonic inlet performance
[AIAA PAPER 73-1271] A74-11284
Operational problems with the aircraft type Tu-134 in the case of a use of the aircraft turbine fuel TS-1
A74-11740
AEROSAT ground environment and test plan --- aeronautical satellites for ATC
A74-12191
Performance of transonic fan stage with weight flow per unit annulus area of 208 kilograms per second per square meter (42.6 (lb/sec)/sq ft)
[NASA-TM-X-2903] N74-10022
Test of a supersonic compressor cascade, volume 1
[AD-756870] N74-10749
Test characteristics of a welded rotor in a 36,000-rpm Lundell alternator
[NASA-TM-X-2944] N74-11304
PHASE LOCKED SYSTEMS
Low speed phaselock speed control system --- for brushless dc motor
[NASA-CASE-GSC-11127-1] N74-10202
PHASED ARRAYS
A cylindrical phased-array antenna for ATC interrogation
A74-10018
PHOTOGRAPHIC MEASUREMENT
Photographic pyrometry in an aeroballistic range --- aerodynamic model surface temperature measurement
A74-12752
PHYSIOLOGICAL EFFECTS
Studies of the effects of sonic boom on birds
[FAA-RD-73-148] N74-10039
PILOT PERFORMANCE
LSO/pilot interaction simulator --- for analysis of flight hazards during approach to landing on aircraft carrier
[AD-765686] N74-10055
Orientation-error accidents in regular Army aircraft during fiscal year 1970: Relative incidence and cost
[AD-767028] N74-10930
Information content of different runway lighting patterns --- visual pattern discrimination of landing displays
[NASA-TT-F-15179] N74-11094
PITCH (INCLINATION)
Response predictions of helicopter landing platform for the USS BELKNAP (DLG-26) and USS GARCIA (DE-1040)-Class destroyers
[AD-766850] N74-10072
PITCHING MOMENTS
Exploratory investigation at Mach numbers from 0.40 to 0.95 of the effects of jets blown over a wing
[NASA-TN-D-7367] N74-10014
PLANETARY ATMOSPHERES
Developing a technology base in planetary entry aerothermodynamics
A74-12799
PLASMA JET WIND TUNNELS
The ablation performance of foams in a low heat flux --- plasma arc tests on polyurethane-based foams
N74-10263
PLASTIC ANISOTROPY
A mathematical theory of plasticity for strain hardening materials exhibiting initial anistoropy
[NLR-TR-72117-U] N74-11719
PLASTIC DEFORMATION
Study of elastoplastic deformation with friction in hydrocarbon media --- with application to jet engine fuels
[AD-765997] N74-10717
PLUMES
Chemical reactions calculations in turbulent flows - Application to a CO containing turbojet plume
[ONERA, TP NO. 1229] A74-11069
PNEUMATIC CONTROL
Aerospace fluidics applications and circuit manufacture
[SAE PAPER 730880] A74-11604
POLYURETHANE FOAM
The ablation performance of foams in a low heat flux --- plasma arc tests on polyurethane-based foams
N74-10263
POROUS MATERIALS
Optimization of wave cancellation in variable porosity transonic wind tunnel flows
[NASA-TN-D-7432] N74-11097
POSITION (LOCATION)
Provisional signal formats for the discrete address beacon system --- for air traffic control applications
[ATC-30] N74-10620
An optimum interference detector for DABS monopulse data editing --- for application to air traffic control
[ESD-TR-73-253] N74-10621
POSITION ERRORS
Error model identification and performance predictions for airborne direct ranging Loran
A74-12178
Secondary surveillance radar in ATC --- operational problems
A74-12357
POSITION INDICATORS
Evaluation of ILS localizer signal specification during ground rollout
[AD-765761] N74-10623
POTENTIAL FLOW
Derivation of aerodynamic kernel functions
A74-10572
POTENTIAL THEORY
The behavior of axial compressor cascades in the case of deviations from purely cylindrical flow
A74-10030
The lifting surface theory applied to fixed wings and propellers
A74-10999

PRECESSION
Solution of the equations of motion of a gyrohorizon compass at finite deviation angles from the meridian A74-11685

PRECIPITATION (METEOROLOGY)
Thermal parameters as a predictor of precipitation type for Kincheloe AFB, Michigan [AD-754927] N74-10611

PRECIPITATION HARDENING
Creep fracture mechanisms in aluminum alloys A74-11736

PREDICTION ANALYSIS TECHNIQUES
Specialists Meeting on Helicopter Rotor Prediction Methods [AGARD-CP-122] N74-10908
Prediction of helicopter rotor loads --- based on alternating aerodynamic loads imposed on rotary wing and rotor hub N74-10911
Helicopter rotor loads predictions --- assumptions and techniques for numerical analysis of aerodynamic loads N74-10912
Rotor system design and evaluation using a general purpose helicopter flight simulation program N74-10913
Integrated rotor/body loads prediction N74-10916

PRESSURE DISTRIBUTION
Calculation of the characteristics of multistage axial turbomachines --- mathematical model for temperature, pressure and flow parameters A74-10029
The effects of wake splitter plates on the flow past a circular cylinder in the range of R from 10,000 to 50,000 A74-11041
The effect of inlet temperature and pressure distortion on turbojet performance [AIAA PAPER 73-1316] A74-11311
Dynamical pressure distribution in aerodynamic bearing A74-11899
Effect of blockage ratio on drag and pressure distributions for bodies of revolution at transonic speeds [NASA-TN-D-7331] N74-10015
Calculation of instationary pressure distributions and generalized aerodynamic forces with the doublet-lattice method --- on thin wings oscillating harmonically in subsonic flow [NLR-TR-72037-U] N74-10906

PRESSURE EFFECTS
Derivation of aerodynamic kernel functions A74-10572

PRESSURE OSCILLATIONS
The planar pressure pulse generator - A new dynamic distortion generator [AIAA PAPER 73-1317] A74-11312
The improvement in Mach number distribution and reduction of pressure fluctuations in the transonic working section of wind tunnel S.1 [WRE-TN-925] N74-10303

PRESSURE RECOVERY
Some design considerations for supersonic cruise mixed compression inlets [AIAA PAPER 73-1269] A74-12496

PRODUCTION ENGINEERING
The technology and economics of commercial airplane design. II A74-10145
Current and future materials usage in aircraft gas turbine engines [AD-766334] N74-11604

PROJECT MANAGEMENT
Influence of prototype concept and cost ceilings on airframe design and manufacture of the YF-16 lightweight fighter [SAE PAPER 730888] A74-11600

PROJECT PLANNING
Air transportation noise technology overview [AIAA PAPER 73-1152] A74-10506

PROJECTILES
Aircraft fuel tank entry wall-projectile interaction studies [AD-765667] N74-10066

PROPELLER BLADES
The lifting surface theory applied to fixed wings and propellers A74-10999

PROPELLER FANS
Wind tunnel tests of a 20 inch diameter 1.15 pressure ratio fan engine model [AIAA PAPER 73-1216] A74-11245

PROPULSION SYSTEM CONFIGURATIONS
Influence of noise requirements on STOL propulsion system designs A74-10148

PROPULSION SYSTEM PERFORMANCE
Noise generation and the design of bypass lift jet engines A74-10984
Aspects of large-scale, subsonic, wind-tunnel design for propulsion noise research [AIAA PAPER 73-1279] A74-11291
Qualitative effects of cycle variables on turbine engine performance and stability [AIAA PAPER 73-1315] A74-11310
The effect of inlet temperature and pressure distortion on turbojet performance [AIAA PAPER 73-1316] A74-11311
Propulsion technology advances needed for a quiet supersonic transport [SAE PAPER 730898] A74-11591
Benefits of advanced propulsion technology for the advanced supersonic transport [SAE PAPER 730896] A74-11593
Some aspects of inlet/engine flow compatibility A74-11618
Propulsion requirements for powered-lift aircraft [AIAA PAPER 73-1214] A74-12928
A new test capability for propulsion system testing --- Aero-Propulsion Systems Test Facility design [AIAA PAPER 73-1283] A74-12939
The effect of inlet-noise suppression on propulsion system design [AIAA PAPER 73-1294] A74-12942

PROTECTIVE COATINGS
Sodium sulphate induced rapid oxidation of a chromium-titanium-silicon coating on niobium alloy B-66 A74-11459
A corrosion inhibiting coating for structural airframe fasteners [SAE PAPER 730902] A74-11588

PROTOTYPES
The influence of design to cost and prototyping on the A-10 aircraft [SAE PAPER 730890] A74-11598
Influence of prototype concept and cost ceilings on airframe design and manufacture of the YF-16 lightweight fighter [SAE PAPER 730888] A74-11600

PUBLIC RELATIONS
It's quiet in front --- community reaction to aircraft noise [AIAA PAPER 73-1159] A74-10510

PULSE GENERATORS
The planar pressure pulse generator - A new dynamic distortion generator [AIAA PAPER 73-1317] A74-11312

PULSE RADAR
Airborne profiling of ice thickness using a short pulse radar [NASA-TM-X-71481] N74-11204

PULSEJET ENGINES
Calculating pressure in combustion chamber of pulsejet engine during filling process [AD-766045] N74-10737

Q

QUALITY CONTROL
The quality of the fuel --- aviation fuel purity maintenance during transport and storage A74-11741
Major Item Special Study (MISS). CH-54A T/R blade [AD-766227] N74-10056
Major Item Special Study (MISS). CH-54A clutch assembly (APP) [AD-766226] N74-10057
Major Item Special Study (MISS). CH-54A turbine engine [AD-766228] N74-10738

QUIET ENGINE PROGRAM
Propulsion technology advances needed for a quiet supersonic transport
[SAE PAPER 730898] A74-11591
NASA/GE quiet engine A acoustic test results
[NASA-CR-121175] N74-10732

R

RADAR ANTENNAS
Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973 A74-12355
RADAR BEACONS
Provisional signal formats for the discrete address beacon system --- for air traffic control applications
[ATC-30] N74-10620
An optimum interference detector for DABS monopulse data editing --- for application to air traffic control
[ESD-TR-73-253] N74-10621
A synchronized discrete-address beacon system --- for air traffic control improvement
[FAA-EM-74-3] N74-10622
Interrogation scheduling algorithms for a discrete address beacon system --- for air traffic control applications
[ATC-19] N74-11432
RADAR DETECTION
Advanced enroute air traffic control radar system /ARSR-3/ --- small aircraft detection A74-12198
Secondary surveillance radar in ATC --- operational problems A74-12357
A primary radar automatic track extractor --- for air defense systems A74-12402
RADAR EQUIPMENT
Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973 A74-12355
Present and future radar display techniques --- CRT, LED and liquid crystals for ATC applications A74-12382
RADAR RECEIVERS
The improvement in performance of an S-band surveillance radar operating in conditions of rain clutter A74-12396
RADAR SCATTERING
Bilinear surface representation of radar scattering for aircraft --- methods for target classification
[AD-766320] N74-10169
Radar backscattering as a means for measuring ocean surface parameters using S193 altimetry and S190B photography
[E74-10092] N74-11202
RADAR TARGETS
Bilinear surface representation of radar scattering for aircraft --- methods for target classification
[AD-766320] N74-10169
RADAR TRACKING
Bird strike and the radar properties of birds --- migration patterns monitoring A74-12389
A primary radar automatic track extractor --- for air defense systems A74-12402
Use of synthetic radar information - Operational and technical aspects A74-12403
Flexibility in computer-assisted radar - Controlled interceptions --- software in air defense A74-12406
Radar techniques for Air Force applications in avoidance of bird-aircraft collisions and improvement of flight safety
[AD-754981] N74-10068
RADIAL FLOW
The behavior of axial compressor cascades in the case of deviations from purely cylindrical flow A74-10030
RADIAL VELOCITY
Range-rate from DME-air data measurements --- for aircraft radial velocity estimation A74-12182
RADIATION DETECTORS
High sensitivity 1000F gas multiplication UV flame detector for aircraft
[AD-766960] N74-11296
RADIATION HAZARDS
Cockpit air filtration requirements of the B-1 in a nuclear dust environment
[AD-766711] N74-10065
RADIATION MEASUREMENT
Measuring the radiation of a vertical gas jet A74-11500
RADIATION MEASURING INSTRUMENTS
Turbine inlet gas temperature sensor for engine, control --- nuclear radiation system
[AD-765193] N74-10461
RADIO BEACONS
Blind landing --- automatic systems A74-11552
Application to zone navigation /R/Nav/ of hybrid navigation systems A74-12446
RADIO COMMUNICATION
Tactical hybrid navigation scheme for mixed community coordination --- integrated communication and global interface capabilities A74-12179
RADIO CONTROL
A roll-pitch interaction simulator and a control position command encoder for remote piloting of spin-entry research models
[NASA-TN-D-7361] N74-11059
RADIO FREQUENCY INTERFERENCE
Objective determination of the noise level in Doppler spectra
[TR-32] N74-10155
RADIO NAVIGATION
Tactical hybrid navigation scheme for mixed community coordination --- integrated communication and global interface capabilities A74-12179
RADIO TELEMETRY
A low cost telemetry system --- for use in small small drone aircraft
[PB-222403/8] N74-10165
RAIL TRANSPORTATION
Energy trends and their future effects upon transportation --- applied to rail, truck, and air cargo operations and private energy uses
[P-5046] N74-11791
RAIN
The improvement in performance of an S-band surveillance radar operating in conditions of rain clutter A74-12396
RAMAN SPECTRA
Measurement of gas turbine exhaust pollutants by Raman spectroscopy
[AIAA PAPER 73-1276] A74-11288
RANGE AND RANGE RATE TRACKING
Reduced order filtering with applications in hybrid navigation --- minimum variance Kalman filter algorithm A74-12177
Range-rate from DME-air data measurements --- for aircraft radial velocity estimation A74-12182
RANGEFINDING
Error model identification and performance predictions for airborne direct ranging Loran A74-12178
RAREFIED GAS DYNAMICS
Solution of the plane problem of the aerodynamics of a rarefied gas on the basis of Boltzmann's kinetic equation A74-10976
RECIRCULATIVE FLUID FLOW
VTOL recirculation and impingement model testing --- flow fields in ground effect test
[AIAA PAPER 73-1183] A74-11228
RECTANGULAR WINGS
Stability and decay of free vortices behind a wing A74-11805

Computation of the aerodynamic characteristics of a rectangular wing with plates moving at low subsonic speed near a screen
[JPRS-60353] N74-10036

REDUNDANT COMPONENTS
Improved fastener systems for fatigue and sealing redundancy of low shear transfer joints
[SAE PAPER 730901] A74-11589

REENTRY PHYSICS
Developing a technology base in planetary entry aerothermodynamics
A74-12799

REENTRY VEHICLES
An empirical equation for prediction of transition location on cones in super-or hypersonic flight
[AD-765692] N74-10032

REINFORCED PLASTICS
Helicopter rotor blades --- design with fiber reinforced epoxy resin bonded composite materials
A74-10498
Low cost, fiber glass reinforced plastic fuel tank, volume 1 --- for A-7 aircraft application
[AD-766361] N74-10929
Low cost, fiber glass reinforced plastic fuel tank, volume 2 --- development and evaluation for application to A-7 aircraft
[AD-766400] N74-10931
Manufacturing Methods Technology (MM/T) for ballistic-tolerant flight control components
[AD-766744] N74-10933

REINFORCING FIBERS
Applications of composite materials --- Book
A74-10494
VTOL aircraft --- fibrous composites for structural weight reduction
A74-10497
Helicopter rotor blades --- design with fiber reinforced epoxy resin bonded composite materials
A74-10498
Impact resistance of fiber composite blades used in aircraft turbine engines
[NASA-CR-134502] N74-10726

RELAXATION METHOD (MATHEMATICS)
Dynamic relaxation solution of three dimensional subsonic compressible oscillatory flow
A74-11428

RELIABILITY ANALYSIS
Simulating the system of automatic correction of aircraft coordinates on an analog computer
[AD-765991] N74-10058

RELIABILITY ENGINEERING
Advanced enroute air traffic control radar system /ARSR-3/ --- small aircraft detection
A74-12198
New developments in secondary surveillance radar --- design improvements for ATC
A74-12358
Vibration effects on helicopter reliability and maintainability
[AD-766307] N74-10064
The behavior of flexible airfield pavements under loads: Theory and experiments
[AD-766480] N74-11102

REMOTE SENSORS
Remote sensing of the earth's resources - Applications, benefits, methods
A74-11204
Nasa remote sensing of sea ice in AIDJEX
N74-11223

REMOTELY PILOTED VEHICLES
Further development of the JT15D turbofan --- Remotely Piloted Vehicle applications
[SAE PAPER 730919] A74-11576

REPRODUCTION
Studies of the effects of sonic boom on birds
[FAA-RD-73-148] N74-10039

RESEARCH AIRCRAFT
A cost-effective approach for flight experiments - Application of Airborne Science aircraft experience to the Shuttle Sortie Lab
A74-12829
Research on aircraft dynamics for subsonic flight
[AD-765657] N74-10061
A roll-pitch interaction simulator and a control position command encoder for remote piloting of spin-entry research models
[NASA-TN-D-7361] N74-11059

RESEARCH AND DEVELOPMENT
Prospects for aerospace research
A74-11098
Research and development for future air transports
A74-11615

RESEARCH FACILITIES
System evaluation as an objective for a research institute --- VTOL weapons systems
A74-11806
Ten years transonic wind tunnel of the AVA Goettingen --- design and measurement objectives
A74-11808
Aerospace activities
N74-10897

RESEARCH MANAGEMENT
Study of airborne science experiment management concepts for application to space shuttle. Volume 3: Appendixes
[NASA-TM-X-62289] N74-10783

RESEARCH PROJECTS
Aeronautics: Space in the seventies
[NASA-EP-85] N74-10017
Motorless flight research, 1972 --- glider design, airframes, and soaring flight developments
[NASA-CR-2315] N74-10051
Stichting National Aerospace Laboratory, review for the year 1972
N74-10891

RESEARCH VEHICLES
Evaluation of V/STOL research aircraft design --- landing approaches, propulsion/control, piloted moving base simulator
[SAE PAPER 730947] A74-11557

RESONANT FREQUENCIES
Symmetrical eigen forms of the vibrations of a supporting surface and of an elastic fuselage
[AD-756285] N74-10067

RIGID ROTORS
The whirl instability of a rigid rotor in a flexibly supported gas lubricated journal bearing
A74-11441
Instability of rotors in MHD journal bearings
A74-11445
Some conclusions regarding the aeroelastic stability of hingeless helicopter blades in hover and in forward flight
A74-11844
The effects of second order blade bending on the angle of attack of hingeless rotor blades
A74-11846
Loads prediction methods for hingeless rotor helicopters
N74-10915

ROCKET NOZZLES
Sea level side loads in high-area-ratio rocket engines
[AIAA PAPER 73-1284] A74-12940

ROLLER BEARINGS
Gas turbine engine mainshaft roller bearing-system analysis
[ASME PAPER 73-LUB-J] A74-12710

ROLLING MOMENTS
Effects of isolated body and wing-body interference on rolling moment due to sideslip
[ESDU-73006] N74-10007

ROTARY GYROSCOPES
Study of unconventional gyroscopic apparatus. I
A74-12444

ROTARY STABILITY
The whirl instability of a rigid rotor in a flexibly supported gas lubricated journal bearing
A74-11441
Instability of rotors in MHD journal bearings
A74-11445

ROTARY WING AIRCRAFT
Crashworthy landing gear study --- to establish energy-absorbing design criteria applicable to rotary wing aircraft
[AD-765489] N74-10060

ROTARY WINGS
Helicopter rotor blades --- design with fiber reinforced epoxy resin bonded composite materials
A74-10498
Current developments in main rotors at Bell Helicopter Company --- multibladed concepts, frequency placement
[AIAA PAPER 73-1160] A74-10511

The lifting surface theory applied to fixed wings and propellers
A74-10999
Progress in France in the last ten years in the field of helicopters - Prospects for the ten years to come
A74-11097
The main rotor bifilar absorber and its effect on helicopter reliability/maintainability
[SAE PAPER 730894] A74-11595
Torsion-flap-lag coupling on helicopter rotor blades
A74-11843
Major Item Special Study (MISS). CH-54A T/R blade
[AD-766227] N74-10056
Research on aircraft dynamics for subsonic flight
[AD-765657] N74-10061
Specialists Meeting on Helicopter Rotor Prediction Methods
[AGARD-CP-122] N74-10908
Rotary wing design methodology --- based on nonlinear aeroelastic blade loads analysis
N74-10909
Current loads technology for helicopter rotors --- based on rotor loads computer program for determining fatigue design loads
N74-10910
Prediction of helicopter rotor loads --- based on alternating aerodynamic loads imposed on rotary wing and rotor hub
N74-10911
Helicopter rotor loads predictions --- assumptions and techniques for numerical analysis of aerodynamic loads
N74-10912
Rotor system design and evaluation using a general purpose helicopter flight simulation program
N74-10913
The prediction of loading actions on high speed semi-rigid helicopters
N74-10914
Loads prediction methods for hingeless rotor helicopters
N74-10915
Integrated rotor/body loads prediction
N74-10916
The stability of helical vortex filaments in the wake of a hovering rotor
[AD-766828] N74-11128

ROTOR AERODYNAMICS
Current developments in main rotors at Bell Helicopter Company --- multibladed concepts, frequency placement
[AIAA PAPER 73-1160] A74-10511

ROTOR BLADES
Helicopter rotor blades --- design with fiber reinforced epoxy resin bonded composite materials
A74-10498
Torsion-flap-lag coupling on helicopter rotor blades
A74-11843
Some conclusions regarding the aeroelastic stability of hingeless helicopter blades in hover and in forward flight
A74-11844
An investigation of the vibratory and acoustic benefits obtainable by the elimination of the blade tip vortex
A74-11845
The effects of second order blade bending on the angle of attack of hingeless rotor blades
A74-11846
Major Item Special Study (MISS). CH-54A T/R blade
[AD-766227] N74-10056

ROTOR BLADES (TURBOMACHINERY)
Effects of increased leading-edge thickness on performance of a transonic rotor blade --- in single stage transonic compressor
[NASA-TN-D-7489] N74-10025

ROTORS
Investigation of rotor dynamic and high speed bearing technology for a 3 KW turbo-alternator
[AD-765501] N74-10486
Test characteristics of a welded rotor in a 36,000-rpm Lundell alternator
[NASA-TM-X-2944] N74-11304

ROVING VEHICLES
Analysis and design of a capsule landing system and surface vehicle control system for Mars exploration
[NASA-CR-136069] N74-11077

RUNWAY LIGHTS
Ground lighting equipment --- landing aids
[NASA-TT-F-15176] N74-11092
Information content of different runway lighting patterns --- visual pattern discrimination of landing displays
[NASA-TT-F-15179] N74-11094

RUNWAYS
Test of LOX compatibility for asphalt and concrete runway materials
[NASA-TM-X-64086] N74-11091
Visual landings in regional and local airports
[NASA-TT-F-15177] N74-11093
Keyed joint performance under heavy load aircraft
[AD-766706] N74-11101
The behavior of flexible airfield pavements under loads: Theory and experiments
[AD-766480] N74-11102

S

S MATRIX THEORY
The light-scattering matrix and types of optical weather --- atmospheric aerosols, haze, fog, drizzle
A74-10783

SAFETY DEVICES
Technology forecasting - Aircraft hazard detection
A74-11499
Airworthiness Committee tenth meeting
[DOC-9065] N74-10035

SANDWICH STRUCTURES
Deflection of carbon fibre/acrylic foam sandwich beams
A74-10322
Buckling of orthotropic, curved, sandwich panels in shear and axial compression
A74-11340

SATELLITE DESIGN
The aeronautical satellites: Deluxe gadgets or system of the future --- economic factors
A74-12448

SCALE MODELS
The effects of wake splitter plates on the flow past a circular cylinder in the range of R from 10,000 to 50,000
A74-11041

SEA ICE
Nasa remote sensing of sea ice in AIDJEX
N74-11223

SEALERS
Improved fastener systems for fatique and sealing redundancy of low shear transfer joints
[SAE PAPER 730901] A74-11589

SEALS (STOPPERS)
The friction and wear characteristics of plasma-sprayed NiO-CaF2 in rubbing contact with a ceramic matrix
[ASLE PREPRINT 73LC-1B-3] A74-12306

SECONDARY RADAR
Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973
A74-12355
Secondary surveillance radar in ATC --- operational problems
A74-12357
New developments in secondary surveillance radar --- design improvements for ATC
A74-12358
Equipment for suppressing reflected secondary radar signals --- ATC surveillance radar system design
A74-12359

SEPARATED FLOW
On the flow around the leading edge of a lifting airfoil
A74-10996
Methods of visualization of the leading edge separation bubble and analysis of results
A74-10997

SERIES (MATHEMATICS)
Inverting the mapping function --- coefficients for circle-airfoil transformation function expansion
A74-10070

SERVICE LIFE
The application of fracture mechanics to the design of the barrel and driver tube of a hypersonic gun tunnel
A74-10484
Major Item Special Study (MISS). CH-54A T/R blade
[AD-766227] N74-10056
Major Item Special Study (MISS). CH-54A clutch assembly (APP)
[AD-766226] N74-10057
Test plan report for catapult fatigue. Test of the model E-2 A/B airplane
[AD-765708] N74-10059
Vibration effects on helicopter reliability and maintainability
[AD-766307] N74-10064
Major Item Special Study (MISS). CH-54A turbine engine
[AD-766228] N74-10738
SERVOMECHANISMS
Hydrofluidic servoactuator development
[AD-766308] N74-10491
SHEAR FLOW
Derivation of aerodynamic kernel functions
A74-10572
SHEAR PROPERTIES
Wing shear material --- structural weight formulas
A74-11175
Effects of strain amplitude on the shear modulus of soils
[AD-757516] N74-10404
SHEAR STRENGTH
Lithium soap dispersions as drag-reducing hydraulic fluids
[ASLE PREPRINT 73LC-5B-2] A74-12316
SHEAR STRESS
Buckling of orthotropic, curved, sandwich panels in shear and axial compression
A74-11340
Improved fastener systems for fatigue and sealing redundancy of low shear transfer joints
[SAE PAPER 730901] A74-11589
SHIELDING
Transmission of sound through a two-dimensional shielding jet
[AIAA PAPER 73-1002] A74-12221
SHIPS
Response predictions of helicopter landing platform for the USS BELKNAP (DLG-26) and USS GARCIA (DE-1040)-Class destroyers
[AD-766450] N74-10072
Aerosat and Marsat: Satellites for mobile services
N74-11018
SHOCK TUBES
The experimental response of simple structures to simulated sonic booms
A74-11814
SHOCK TUNNELS
Developing a technology base in planetary entry aerothermodynamics
A74-12799
SHOCK WAVE INTERACTION
Experimental study of shock-wave reflection upon boundary layer transition
[ONERA, TP NO. 1284] A74-11072
Strong and weak shock waves. Experiments and calculations
[ISL-NB-1/73] N74-11718
SHOCK WAVES
Research on the sonic boom problem. Part 2: Flow field measurement in wind tunnel and calculation of second order F-function
[NASA-CR-2340] N74-10031
SHORT HAUL AIRCRAFT
Prospects for aerospace research
A74-11098
HS.146 --- short haul passenger aircraft
A74-11329
An economic assessment of STOL aircraft potential including terminal area environmental considerations. Volume 2: Appendices
[NASA-CR-114605] N74-10044
SHORT TAKEOFF AIRCRAFT
Influence of noise requirements on STOL propulsion system designs
A74-10148
Wind tunnel tests of a 20 inch diameter 1.15 pressure ratio fan engine model
[AIAA PAPER 73-1216] A74-11245
Air Force STOL tactical aircraft investigation - Evaluation of externally blown flaps
[SAE PAPER 730914] A74-11580
STOL tactical aircraft investigation --- transports configuration sizing and design
[SAE PAPER 730913] A74-11581
AMST - The approach to the STOL transport of the US
A74-11776
Highly noise suppressed bypass 6 engine for STOL application
[AIAA PAPER 73-1031] A74-11799
Noise design goals for the next generation of aircraft --- community of STOL aircraft
A74-11816
Propulsion requirements for powered-lift aircraft
[AIAA PAPER 73-1214] A74-12928
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[NASA-TM-X-71466] N74-10042
An economic assessment of STOL aircraft potential including terminal area environmental considerations. Volume 2: Appendices
[NASA-CR-114605] N74-10044
Acoustic characteristics of a large-scale augmentor wing model at forward speed
[NASA-TM-X-2940] N74-10052
Investigation of the suction system and boundary-layer characteristics on a high-lift, BLC L-19 test aircraft
[AD-766305] N74-10063
Aerodynamic problems of STOL aircraft
[NASA-TT-F-15182] N74-10918
Comparison of simulation and flight testing at automatic STOL landing
[NASA-TT-F-15171] N74-10923
STOL tactical aircraft investigation. Volume 1: Configuration definition (medium STOL transport with vectored thrust/mechanical flaps)
[AD-766637] N74-10925
STOL tactical aircraft investigation. Volume 2, part 1: Aerodynamic technology (design compendium, vectored thrust/mechanical flaps)
[AD-766639] N74-10926
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 1: Takeoff and landing ground rules
[AD-766942] N74-10928
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 2: Takeoff and landing digital computer program
[AD-766943] N74-10936
STOL tactical aircraft investigation. Volume 2, part 2: A lifting line analysis method for jet-flapped wings
[AD-766877] N74-10937
STOL tactical aircraft investigation. Volume 3: Takeoff and landing performance ground rules for powered lift STOL transport aircraft
[AD-766640] N74-10938
STOL tactical aircraft investigation. Volume 5, part 2: Flight control technology: Piloted simulation of a medium STOL transport with vectored thrust mechanical flaps
[AD-766643] N74-10939
STOL tactical aircraft investigation. Volume 6: Air cushion landing system study
[AD-766644] N74-10940
Preliminary assessment of the microwave landing system requirements for STOL operations
[NASA-TM-X-62310] N74-11431
Model studies of crosswind landing-gear configurations for STOL aircraft
N74-11680
SIERRA NEVADA MOUNTAINS (CA)
Adaptation of computer programming to output form of altimeter data --- Sierra Nevada and Grand Canyon regions
[E74-10087] N74-11196
SIGNAL PROCESSING
Use of synthetic radar information - Operational and technical aspects
A74-12403

SIGNAL REFLECTION
Equipment for suppressing reflected secondary radar signals --- ATC surveillance radar system design A74-12359

SILICONE RUBBER
Ice and landing surface demoulding: Replica fabrication
[FFA-MEMO-90] N74-10541

SIMILARITY THEOREM
Interest and feasibility study of atmospheric turbulence and thermal gradients simulation --- application to air pollution and meteorology N74-11380

SIMULATORS
A roll-pitch interaction simulator and a control position command encoder for remote piloting of spin-entry research models
[NASA-TN-D-7361] N74-11059

SIZE DETERMINATION
STOL tactical aircraft investigation --- transports configuration sizing and design
[SAE PAPER 730913] A74-11581

SKIN FRICTION
Unsteady flow of power-law fluids A74-10573
The mean skin friction coefficient for a rough flat plate with a turbulent two-dimenisonal boundary layer in compressible adiabatic flow, with application to wedges, cylinders and cones
[ESDU-73016] N74-10008

SLENDER BODIES
Prediction of unsteady airloads for the solution of the panel flutter problem of nosecones and conical shell structures A74-12804
Research on the sonic boom problem. Part 2: Flow field measurement in wind tunnel and calculation of second order F-function
[NASA-CR-2340] N74-10031
Transonic flow around slender bodies --- transonic flow around slender and fin stabilized bodies of revolution N74-10440

SLIDING CONTACT
A thermal, thermoelastic, and wear simulation of a high-energy sliding contact problem
[ASME PAPER 73-LUB-6] A74-12333

SLIDING FRICTION
The friction and wear characteristics of plasma-sprayed NiO-CaF2 in rubbing contact with a ceramic matrix
[ASLE PREPRINT 73LC-1B-3] A74-12306

SOAPS
Lithium soap dispersions as drag-reducing hydraulic fluids
[ASLE PREPRINT 73LC-5B-2] A74-12316

SOCIAL FACTORS
Noise design goals for the next generation of aircraft --- community of STOL aircraft A74-11816
A simulation approach for studying the interactions of noise, patronage, and economic viability for air transportation systems
[AIAA PAPER 73-1161] A74-12216

SODIUM COMPOUNDS
Sodium sulphate induced rapid oxidation of a chromium-titanium-silicon coating on niobium alloy B-66 A74-11459

SOIL MECHANICS
Effects of strain amplitude on the shear modulus of soils
[AD-757516] N74-10404

SOLAR ECLIPSES
Eclipse flight of Concorde 001 --- 30 June 1973 A74-12515

SOLID LUBRICANTS
The friction and wear characteristics of plasma-sprayed NiO-CaF2 in rubbing contact with a ceramic matrix
[ASLE PREPRINT 73LC-1B-3] A74-12306

SOLID PROPELLANTS
Mixing and combustion processes in jet engines --- physics of interaction of droplets or solid particles with gas stream
[AD-766030] N74-10741

SONIC BOOMS
The experimental response of simple structures to simulated sonic booms A74-11814
Sonic boom analysis for high altitude flight at high Mach number
[AIAA PAPER 73-1034] A74-12224
Shuttle sonic boom - Technology and predictions --- environmental impact
[AIAA PAPER 73-1039] A74-12225
Research on the sonic boom problem. Part 2: Flow field measurement in wind tunnel and calculation of second order F-function
[NASA-CR-2340] N74-10031
Studies of the effects of sonic boom on birds
[FAA-RD-73-148] N74-10039
Damage threshold determination of light walls submitted to single or repeated bangs, part 1
[ISL-35/72-PT-1] N74-10846
Strong and weak shock waves. Experiments and calculations
[ISL-NB-1/73] N74-11718

SOUND FIELDS
On the theory of jet noise and its applications --- Lighthill theory
[AIAA PAPER 73-987] A74-12218
V/STOL noise prediction and reduction
[LG73ER0062] N74-10921

SOUND INTENSITY
Introduction to aerodynamic noise theory A74-12207

SOUND TRANSMISSION
Transmission of sound through a two-dimensional shielding jet
[AIAA PAPER 73-1002] A74-12221
An experimental investigation of an acoustic method for measuring gas mass flow
[AD-766419] N74-10340

SPACE ENVIRONMENT SIMULATION
Study of airborne science experiment management concepts for application to space shuttle. Volume 3: Appendixes
[NASA-TM-X-62289] N74-10783

SPACE LAW
Air and space hi-jacking --- criminal aspects A74-12878

SPACE SHUTTLES
Shuttle sonic boom - Technology and predictions --- environmental impact
[AIAA PAPER 73-1039] A74-12225
A cost-effective approach for flight experiments - Application of Airborne Science aircraft experience to the Shuttle Sortie Lab A74-12829
Study of airborne science experiment management concepts for application to space shuttle. Volume 3: Appendixes
[NASA-TM-X-62289] N74-10783

SPACECRAFT COMMUNICATION
Satellite communications systems --- multiplexing for communication lines, equipment of earth stations, and onboard receiver transmitter and antennas
[JPRS-54505] N74-10153

SPACECRAFT MODELS
Photographic pyrometry in an aeroballistic range --- aerodynamic model surface temperature measurement A74-12752

SPACECRAFT POWER SUPPLIES
Gas generator design for a wide variety of APU applications
[AIAA PAPER 73-1169] A74-12916

SPACELAB
A cost-effective approach for flight experiments - Application of Airborne Science aircraft experience to the Shuttle Sortie Lab A74-12829

SPECTRAL ENERGY DISTRIBUTION
Exploitation of spectral density curves in the case of wind tunnel flutter measurement A74-11000

SPECTRUM ANALYSIS
Ultraviolet and near-infrared spectral analysis of a burner-can burn-through flame
[FAA-NA-73-86] N74-10866

SPEECH
Human factors experiments for data link --- coding of air traffic control messages
[AD-760401] N74-10625
SPEECH RECOGNITION
Speech intelligibility testing with the modified rhyme test in aviation type noise
[AD-765470] N74-10159
SPEED CONTROL
Low speed phaselock speed control system --- for brushless dc motor
[NASA-CASE-GSC-11127-1] N74-10202
SPEED INDICATORS
Effect of differences between the antennas of a Doppler velocity meter on its operational accuracy
A74-11994
SPRAY NOZZLES
Use of an air-assisted fuel nozzle to reduce idle emissions of a jt8d engine combustor
[NASA-TM-X-2946] N74-11738
SPRAYED COATINGS
The friction and wear characteristics of plasma-sprayed NiO-CaF2 in rubbing contact with a ceramic matrix
[ASLE PREPRINT 73LC-1B-3] A74-12306
SPRAYING
Spray cooled generators and design-to-cost at Westinghouse
[SAE PAPER 730878] A74-11605
STABILITY DERIVATIVES
Information on the use of data items on rolling moment derivatives of an aeroplane
[ESDU-AIRCRAFT-06.01.00] N74-10005
Study of heaving motion in air cushion vehicles
[NASA-TT-F-15106] N74-10038
STATIC TESTS
Sea level side loads in high-area-ratio rocket engines
[AIAA PAPER 73-1284] A74-12940
STATISTICAL ANALYSIS
Certain problems in estimating the rundown time of an engine --- turbojet
A74-11075
Estimation of an aeronautical equipment mission reliability
[AD-766886] N74-10935
STOCHASTIC PROCESSES
Optimal incomplete feedback control of linear stochastic systems
[AD-766440] N74-10071
Optimal incomplete feedback control of linear stochastic systems
[AD-766878] N74-11378
STOPPING
Certain problems in estimating the rundown time of an engine --- turbojet
A74-11075
STORAGE STABILITY
The quality of the fuel --- aviation fuel purity maintenance during transport and storage
A74-11741
STRAIN HARDENING
A mathematical theory of plasticity for strain hardening materials exhibiting initial anistoropy
[NLR-TR-72117-U] N74-11719
STRAIN RATE
Effect of several metallurgical variables on the thermal fatigue behavior of superalloys
A74-10622
Effects of strain amplitude on the shear modulus of soils
[AD-757516] N74-10404
STRATIFIED FLOW
Analysis of stratified and closely spaced jets exhausting into a crossflow --- aerodynamic characteristics of lift-jet, vectored thrust, and lift fan V/STOL aircraft
[NASA-CR-132297] N74-11118
STRATOSPHERE
Some analyses of the chemistry and diffusion of SST exhaust materials during phase 3 of the wake period --- in lower stratosphere
[NASA-CR-132323] N74-10863
STRATUS CLOUDS
Project Foggy Cloud 4, phase 1. Evaluation of warm fog dissipation techniques --- and stratus cloud modification
[AD-766086] N74-10597
STREAMLINED BODIES
Information on the use of data items in the series bodies 02.04
[ESDU-BODIES-02.04.00-AMEND-A] N74-10011
STRESS ANALYSIS
Design and evaluation of aircraft pavements - 1971
A74-11874
STRESS CONCENTRATION
Selection of cutting conditions in the machining axial-flow compressor blades on an assembled rotor
A74-12424
STRUCTURAL ANALYSIS
Test plan report for catapult fatigue. Test of the model E-2 A/B airplane
[AD-765708] N74-10059
STRUCTURAL DESIGN
Military aircraft --- structural design with fiber reinforced composite materials
A74-10496
Advanced flutter design techniques --- subsonic and SST aircraft
[SAE PAPER 730935] A74-11565
Design and evaluation of aircraft pavements - 1971
A74-11874
STRUCTURAL FAILURE
Aircraft accident report: Air Iowa, Incorporated, Beech E18S, N370WA, Davenport Iowa, 19 Apr. 1973
[NTSB-AAR-73-18] N74-10041
STRUCTURAL STABILITY
Prediction of unsteady airloads for the solution of the panel flutter problem of nosecones and conical shell structures
A74-12804
STRUCTURAL VIBRATION
Nodalization applied to helicopters --- vibration isolation
[SAE PAPER 730893] A74-11596
Control of helicopter vibration using the dynamic antiresonant vibration isolator
[SAE PAPER 730892] A74-11597
Experimental investigation of the vibrations of a gas-turbine engine rotor
A74-12012
STRUCTURAL WEIGHT
Commercial aircraft --- weight reduction by composite materials
A74-10495
VTOL aircraft --- fibrous composites for structural weight reduction
A74-10497
Wing shear material --- structural weight formulas
A74-11175
An integrated approach to structural weight estimation
[SAE PAPER 730936] A74-11564
Advanced structural materials application for high-subsonic-speed transports
[SAE PAPER 730887] A74-11601
Transport vehicles - Weights and loads --- commercial aircraft
A74-12442
SUBSONIC AIRCRAFT
Advanced flutter design techniques --- subsonic and SST aircraft
[SAE PAPER 730935] A74-11565
Advanced structural materials application for high-subsonic-speed transports
[SAE PAPER 730887] A74-11601
Motorless flight research, 1972 --- glider design, airframes, and soaring flight developments
[NASA-CR-2315] N74-10051
An initial step: A demonstration project --- promoting subsonic, hydrogen-fueled aircraft
N74-11747
SUBSONIC FLOW
An experimental study of subsonic jet noise and comparison with theory
A74-10271
Mixing of multiple dilution jets with a hot primary airstream for gas turbine combustors
[AIAA PAPER 73-1249] A74-11270
A semi-empirical method for predicting subsonic diffuser performance
[AIAA PAPER 73-1272] A74-11285
Dynamic relaxation solution of three dimensional subsonic compressible oscillatory flow
A74-11428

Recovery characteristics of a single-shielded self-aspirating thermocouple probe at low pressure levels and subsonic speeds
A74-12280
An experimental investigation of an acoustic method for measuring gas mass flow
[AD-766419] N74-10340
Calculation of instationary pressure distributions and generalized aerodynamic forces with the doublet-lattice method --- on thin wings oscillating harmonically in subsonic flow
[NLR-TR-72037-U] N74-10906

SUBSONIC SPEED
Noise and wake structure measurements in a subsonic tip speed fan
[NASA-CR-2323] N74-10020
An investigation of a nonplanar vortex lattice method for wing calculations
[CRANFIELD-AERO-17] N74-10023
Computation of the aerodynamic characteristics of a rectangular wing with plates moving at low subsonic speed near a screen
[JPRS-60353] N74-10036
Research on aircraft dynamics for subsonic flight
[AD-765657] N74-10061

SUBSONIC WIND TUNNELS
Aspects of large-scale, subsonic, wind-tunnel design for propulsion noise research
[AIAA PAPER 73-1279] A74-11291
Turbulence measurements with a laser Doppler velocimeter
[AD-766781] N74-11129

SUCTION
Prevention of transition over a backward step by suction --- laminar boundary layer control
A74-11339

SUMMARIES
Stichting National Aerospace Laboratory, review for the year 1972
N74-10891

SUPERCRITICAL WINGS
Additional three-dimensional boundary-layer computations for a finite swept wing
[NASA-CR-132335] N74-10029

SUPERSONIC AIRCRAFT
The technical evolution of aircraft
A74-11092
Aircraft engines - Progress made in France over ten years, and possibilities for the ten years to come
A74-11093

SUPERSONIC BOUNDARY LAYERS
Minimizing boundary layer bleed for a mixed compression inlet
[AIAA PAPER 73-1270] A74-12497

SUPERSONIC COMBUSTION
External burning assisted projectile - Theory and experiment
[AIAA PAPER 73-1193] A74-11234
Supersonic mixing and combustion studies of ducted hydrogen-air flows at an inlet air Mach number of 2.6
[AIAA PAPER 73-1320] A74-11313
Supersonic combustion of hydrogen injected perpendicular to a ducted vitiated airstream
[AIAA PAPER 73-1322] A74-11314
Reaction modes occurring at detonation of explosive gas mixture due to detached shock front from a blunt mockup at supersonic speeds
[ISL-28/72] N74-11740

SUPERSONIC COMMERCIAL AIR TRANSPORT
Advanced flutter design techniques --- subsonic and SST aircraft
[SAE PAPER 730935] A74-11565

SUPERSONIC COMPRESSORS
Performance of a single-stage transonic compressor with a blade-tip solidity of 1.5 and comparison with 1.3 and 1.7 solidity stages
[NASA-TM-X-2926] N74-10734
Test of a supersonic compressor cascade, volume 1
[AD-756870] N74-10749
Test of a supersonic compressor cascade, volume 2 --- effects of vortex generators mounted on blades
[AD-756871] N74-10750

SUPERSONIC FLIGHT
Low cost supersonic expendable turbine engines --- tactical missile applications
[SAE PAPER 730910] A74-11583
Sonic boom analysis for high altitude flight at high Mach number
[AIAA PAPER 73-1034] A74-12224

SUPERSONIC FLOW
A study of methods which predict supersonic flow fields from body geometry, distance, and Mach number
[NASA-TN-D-7387] N74-10030
Research on the sonic boom problem. Part 2: Flow field measurement in wind tunnel and calculation of second order F-function
[NASA-CR-2340] N74-10031
A study of supersonic flow past vibrating shells and cascades --- using linearized characteristic methods
[AD-765735] N74-10335
Analysis and design of three dimensional supersonic nozzles. Volume 2: Numerical program for analysis of nozzle-exhaust flow fields
[NASA-CR-132351] N74-11114

SUPERSONIC FLUTTER
A study of supersonic flow past vibrating shells and cascades --- using linearized characteristic methods
[AD-765735] N74-10335

SUPERSONIC INLETS
Possibilities for improved supersonic inlet performance
[AIAA PAPER 73-1271] A74-11284
Some design considerations for supersonic cruise mixed compression inlets
[AIAA PAPER 73-1269] A74-12496
Minimizing boundary layer bleed for a mixed compression inlet
[AIAA PAPER 73-1270] A74-12497
Subsonic performance data for NACA type submerged air intakes
[ESDU-66029] N74-10012
Minimizing boundary layer bleed for a mixed compression inlet --- sized for TF30-P-3 turbofan engine at Mach 2.0 and 2.5
[NASA-TM-X-71461] N74-10321

SUPERSONIC JET FLOW
Deck heating effects due to VTOL jet exhaust impingement
[AIAA PAPER 73-1182] A74-11227

SUPERSONIC NOZZLES
Comparison of ground and flight test results using a modified F106B aircraft
[AIAA PAPER 73-1305] A74-11304

SUPERSONIC TRANSPORTS
Fatigue of supersonic transport materials using simulated flight-by-flight loading
A74-10616
Prospects for aerospace research
A74-11098
Possibilities for improved supersonic inlet performance
[AIAA PAPER 73-1271] A74-11284
AST - A fifth engine for environmental consideration
[SAE PAPER 730899] A74-11590
Propulsion technology advances needed for a quiet supersonic transport
[SAE PAPER 730898] A74-11591
Jet noise suppression systems for high-speed aircraft
[SAE PAPER 730897] A74-11592
Benefits of advanced propulsion technology for the advanced supersonic transport
[SAE PAPER 730896] A74-11593
Development of parametricized computations for AST study engines
[SAE PAPER 730895] A74-11594
Influence of noise constraints on supersonic transport engine design
[AIAA PAPER 73-1295] A74-12943
Some analyses of the chemistry and diffusion of SST exhaust materials during phase 3 of the wake period --- in lower stratosphere
[NASA-CR-132323] N74-10863

SUPERSONIC WIND TUNNELS
Study of condensation phenomena in the ISL laser wind tunnel using light diffusion
[ISL-RT-19/72] N74-11099
Control of supersonic wind-tunnel noise by laminarization of nozzle-wall boundary layer
[NASA-TM-X-2879] N74-11119

SUPPORT SYSTEMS
Model support roll balance and roll coupling --- design of wind tunnel model support mechanism
N74-11681
SUPPRESSORS
Assessment of jets as acoustic shields by comparison of single- and multitube suppressor nozzle data
[AIAA PAPER 73-1001] A74-11050
Jet noise suppression systems for high-speed aircraft
[SAE PAPER 730897] A74-11592
SURFACE NAVIGATION
Integrated navigation in the air and on the sea --- automatic systems
A74-12449
SURFACE PROPERTIES
The mean skin friction coefficient for a rough flat plate with a turbulent two-dimensional boundary layer in compressible adiabatic flow, with application to wedges, cylinders and cones
[ESDU-73016] N74-10008
Ice and landing surface demoulding: Replica fabrication
[PPA-MEMO-90] N74-10541
SURFACE TEMPERATURE
Photographic pyrometry in an aeroballistic range --- aerodynamic model surface temperature measurement
A74-12752
SURVEILLANCE
AEROSAT overview --- aeronautical satellites for oceanic ATC
A74-12189
SURVEILLANCE RADAR
Radar - Present and future; Proceedings of the International Conference, London, England, October 23-25, 1973
A74-12355
Secondary surveillance radar in ATC --- operational problems
A74-12357
New developments in secondary surveillance radar --- design improvements for ATC
A74-12358
Equipment for suppressing reflected secondary radar signals --- ATC surveillance radar system design
A74-12359
The improvement in performance of an S-band surveillance radar operating in conditions of rain clutter
A74-12396
SWEPT WINGS
The calculation of the buffeting limits of swept wings --- transonic flow regime
A74-10985
Exploratory investigation at Mach numbers from 0.40 to 0.95 of the effects of jets blown over a wing
[NASA-TN-D-7367] N74-10014
Additional three-dimensional boundary-layer computations for a finite swept wing
[NASA-CR-132335] N74-10029
SWEPTBACK WINGS
Some effects of cneter of gravity locations of added mass on transonic flutter characteristics of low aspect ratio and sweptback thin cantilever wing
[NAL-TR-314] N74-10047
SWIRLING
Swirling flow combustion - Fundamentals and application --- hydrocarbon-air flame velocity, turbojet afterburner application
[AIAA PAPER 73-1250] A74-11271
SYNOPTIC METEOROLOGY
Wind conditions at the Cologne/Bonn airport and possibilities of forecasting them
A74-11835
SYSTEM EFFECTIVENESS
New developments in secondary surveillance radar --- design improvements for ATC
A74-12358
SYSTEMS ANALYSIS
Air transportation noise technology overview
[AIAA PAPER 73-1152] A74-10506
The planar pressure pulse generator - A new dynamic distortion generator
[AIAA PAPER 73-1317] A74-11312
System evaluation as an objective for a research institute --- VTOL weapons systems
A74-11806
SYSTEMS ENGINEERING
The influence of operational experience on aircraft escape system development
[AIAA PAPER 73-1340] A74-11387
An integrated approach to structural weight estimation
[SAE PAPER 730936] A74-11564
Tactical hybrid navigation scheme for mixed community coordination --- integrated communication and global interface capabilities
A74-12179
Equipment for suppressing reflected secondary radar signals --- ATC surveillance radar system design
A74-12359
Manufacturing Methods Technology (MM/T) for ballistic-tolerant flight control components
[AD-766744] N74-10933
Helicopter visual aid system
N74-11691

T

TECHNOLOGICAL FORECASTING
Airports from 1963 to 1983 - Evolution or revolution
A74-11095
The air transport of tomorrow - Economic obstacles to surmount
A74-11096
Technology forecasting - Aircraft hazard detection
A74-11499
Shuttle sonic boom - Technology and predictions --- environmental impact
[AIAA PAPER 73-1039] A74-12225
TECHNOLOGY ASSESSMENT
The technology and economics of commercial airplane design. I
A74-10144
Applications of composite materials --- Book
A74-10494
The technical evolution of aircraft
A74-11092
AEROSAT overview --- aeronautical satellites for oceanic ATC
A74-12189
AEROSAT ground environment and test plan --- aeronautical satellites for ATC
A74-12191
A first generation of L-Band avionics for AEROSAT --- experimentation and evaluation phase of aeronuatical satellites
A74-12192
Present and future radar display techniques --- CRT, LED and liquid crystals for ATC applications
A74-12382
In place of congestion: Some observations on the transport of freight
[TT-7308] N74-10890
Aircraft noise reduction technology --- to show impact on individuals and communities, component noise sources, and operational procedures to reduce impact
[NASA-TM-X-68241] N74-10917
AEDC Fiscal Year 1974 Air Force technical objective document --- facility improvements, test techniques, instrumentation, gas properties, and wind tunnel and flight test data comparisons
[AD-766719] N74-11803
TECHNOLOGY TRANSFER
Project/cost/benefit
[PB-222339/4] N74-11801
TECHNOLOGY UTILIZATION
Remote sensing of the earth's resources - Applications, benefits, methods
A74-11204
Benefits of advanced propulsion technology for the advanced supersonic transport
[SAE PAPER 730896] A74-11593
Integrated navigation in the air and on the sea --- automatic systems
A74-12449
Influence of noise constraints on supersonic transport engine design
[AIAA PAPER 73-1295] A74-12943

TELECOMMUNICATION
Satellite communications systems --- multiplexing for communication lines, equipment of earth stations, and onboard receiver transmitter and antennas
[JPRS-54505] N74-10153

TEMPERATURE COMPENSATION
Recovery characteristics of a single-shielded self-aspirating thermocouple probe at low pressure levels and subsonic speeds
A74-12280

TEMPERATURE DISTRIBUTION
Calculation of the characteristics of multistage axial turbomachines --- mathematical model for temperature, pressure and flow parameters
A74-10029
The effect of inlet temperature and pressure distortion on turbojet performance
[AIAA PAPER 73-1316] A74-11311

TEMPERATURE GRADIENTS
Experimental evaluation of a TF30-P-3 turbofan engine in an altitude facility: Effect of steady-state temperature distortion
[NASA-TM-X-2921] N74-10722

TEMPERATURE MEASUREMENT
Development of a turbine inlet gas temperature measurement and control system using a fluidic temperature sensor
[AIAA PAPER 73-1251] A74-11272
Photographic pyrometry in an aeroballistic range --- aerodynamic model surface temperature measurement
A74-12752

TEMPERATURE SENSORS
Development of a turbine inlet gas temperature measurement and control system using a fluidic temperature sensor
[AIAA PAPER 73-1251] A74-11272

TERMINAL BALLISTICS
Aircraft fuel tank entry wall-projectile interaction studies
[AD-765667] N74-10066

TERMINAL FACILITIES
An economic assessment of STOL aircraft potential including terminal area environmental considerations. Volume 2: Appendices
[NASA-CR-114605] N74-10044
Meteorological information for vertical and short take-off and land (V/STOL) operations in built-up urban areas: An analysis
[FAA-RD-72-135] N74-10920
Visual landings in regional and local airports
[NASA-TT-F-15177] N74-11093
Modern beaconing in airports for bad weather flights
[NASA-TT-F-15178] N74-11433

TERRAIN ANALYSIS
Terrain properties and topography from Skylab altimetry --- Oregon, Utah, Texas, and Nevada
[E74-10043] N74-11164

TEST EQUIPMENT
An experimental investigation of an acoustic method for measuring gas mass flow
[AD-766419] N74-10340

TEST FACILITIES
Dynamic simulation of CONFLOW - A facility to provide hot-gas ground testing of air-breathing missiles under simulated flight conditions
[AIAA PAPER 73-1281] A74-11292
Progress in aerospace sciences. Volume 14 --- Book
A74-12203
A new test capability for propulsion system testing --- Aero-Propulsion Systems Test Facility design
[AIAA PAPER 73-1283] A74-12939
Effect of blockage ratio on drag and pressure distributions for bodies of revolution at transonic speeds
[NASA-TN-D-7331] N74-10015
AEDC Fiscal Year 1974 Air Force technical objective document --- facility improvements, test techniques, instrumentation, gas properties, and wind tunnel and flight test data comparisons
[AD-766719] N74-11803

TETHERED BALLOONS
Stability and dynamic behavior of two tethered balloon systems
[AD-766439] N74-10070

TEXAS
Terrain properties and topography from Skylab altimetry --- Oregon, Utah, Texas, and Nevada
[E74-10043] N74-11164

TF-30 ENGINE
Minimizing boundary layer bleed for a mixed compression inlet
[AIAA PAPER 73-1270] A74-12497
Experimental evaluation of a TF30-P-3 turbofan engine in an altitude facility: Effect of steady-state temperature distortion
[NASA-TM-X-2921] N74-10722

TF-34 ENGINE
Highly noise suppressed bypass 6 engine for STOL application
[AIAA PAPER 73-1031] A74-11799
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[NASA-TM-X-71466] N74-10042

THERMAL CYCLING TESTS
Fatigue of supersonic transport materials using simulated flight-by-flight loading
A74-10616

THERMAL FATIGUE
Fatigue of supersonic transport materials using simulated flight-by-flight loading
A74-10616
Effect of several metallurgical variables on the thermal fatigue behavior of superalloys
A74-10622

THERMAL SIMULATION
A thermal, thermoelastic, and wear simulation of a high-energy sliding contact problem
[ASME PAPER 73-LUB-6] A74-12333

THERMOCOUPLES
Recovery characteristics of a single-shielded self-aspirating thermocouple probe at low pressure levels and subsonic speeds
A74-12280

THERMODYNAMIC PROPERTIES
Aviation turbine fuels, 1972
N74-11592

THERMOELASTICITY
A thermal, thermoelastic, and wear simulation of a high-energy sliding contact problem
[ASME PAPER 73-LUB-6] A74-12333

THICKNESS
Effects of increased leading-edge thickness on performance of a transonic rotor blade --- in single stage transonic compressor
[NASA-TN-D-7489] N74-10025

THIN WINGS
Some effects of cneter of gravity locations of added mass on transonic flutter characteristics of low aspect ratio and sweptback thin cantilever wing
[NAL-TR-314] N74-10047
Calculation of instationary pressure distributions and generalized aerodynamic forces with the doublet-lattice method --- on thin wings oscillating harmonically in subsonic flow
[NLR-TR-72037-U] N74-10906

THREE DIMENSIONAL FLOW
Additional three-dimensional boundary-layer computations for a finite swept wing
[NASA-CR-132335] N74-10029

THREE DIMENSIONAL MOTION
Solid state controller three axes controller
[NASA-CASE-MSC-12394-1] N74-10942

THRESHOLDS (PERCEPTION)
Damage threshold determination of light walls submitted to single or repeated bangs, part 1
[ISL-35/72-PT-1] N74-10846

THRUST AUGMENTATION
Full-scale tests of an augmentor VTOL concept --- ejector-in-wing configuration
[AIAA PAPER 73-1185] A74-11229
The next step is straight up --- V/STOL fighter-attack aircraft for minicarriers
A74-12129
One-dimensional analysis of compressible ejector flows applicable to V/STOL aircraft design
[AIAA PAPER 73-1184] A74-12921

THRUST MEASUREMENT
External burning assisted projectile - Theory and experiment
[AIAA PAPER 73-1193] A74-11234

THRUST REVERSAL
Noise tests of a high-aspect-ratio slot nozzle with various V-gutter target thrust reversers [NASA-TM-X-71470] N74-10037
THRUST VECTOR CONTROL
Advanced technology thrust vectoring exhaust systems [AIAA PAPER 73-1304] A74-11303
Effect of exhaust deflectors on the design of lift plus lift/cruise V/STOL aircraft [SAE PAPER 730959] A74-11554
STOL tactical aircraft investigation. Volume 1: Configuration definition (medium STOL transport with vectored thrust/mechanical flaps) [AD-766637] N74-10925
STOL tactical aircraft investigation. Volume 2, part 1: Aerodynamic technology (design compendium, vectored thrust/mechanical flaps) [AD-766639] N74-10926
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 1: Takeoff and landing ground rules [AD-766942] N74-10928
STOL tactical aircraft investigation. Volume 2, part 2: A lifting line analysis method for jet-flapped wings [AD-766877] N74-10937
STOL tactical aircraft investigation. Volume 5, part 2: Flight control technology: Piloted simulation of a medium STOL transport with vectored thrust mechanical flaps [AD-766643] N74-10939
TIME MEASUREMENT
Certain problems in estimating the rundown time of an engine --- turbojet A74-11075
TIME SERIES ANALYSIS
Geodetic analysis of Skylab altimetry preliminary data - SL/2 EREP pass 9 --- time series analysis of geoidal heights [E74-10086] N74-11197
TIP SPEED
Airfoil design for high tip speed compressors --- fan technology [AIAA PAPER 73-1248] A74-11269
Noise and wake structure measurements in a subsonic tip speed fan [NASA-CR-2323] N74-10020
The stability of helical vortex filaments in the wake of a hovering rotor [AD-766828] N74-11128
TITANIUM
A corrosion inhibiting coating for structural airframe fasteners [SAE PAPER 730902] A74-11588
Manufacture and properties of titanium and titanium alloys emphasizing their use in aeronautics. Part 1: Manufacture and processing --- conference N74-11336
Manufacture of titanium and titanium alloy semifinished products --- with application to production of drop-forged aircraft parts N74-11338
Status and development tendencies of titanium processing --- metallurgical techniques for manufacture of aircraft parts N74-11339
TITANIUM ALLOYS
Manufacture and properties of titanium and titanium alloys emphasizing their use in aeronautics. Part 1: Manufacture and processing --- conference N74-11336
Manufacture of titanium and titanium alloy semifinished products --- with application to production of drop-forged aircraft parts N74-11338
Status and development tendencies of titanium processing --- metallurgical techniques for manufacture of aircraft parts N74-11339
TOPOGRAPHY
Terrain properties and topography from Skylab altimetry --- Oregon, Utah, Texas, and Nevada [E74-10043] N74-11164
TORNADOES
A buoyant tornado-probe concept incorporating an inverted lifting device --- and balloon combination [NASA-TM-D-7335] N74-10584
TORQUE MOTORS
Low speed phaselock speed control system --- for brushless dc motor [NASA-CASE-GSC-11127-1] N74-10202
TORSIONAL STRESS
Torsion-flap-lag coupling on helicopter rotor blades A74-11843
TOWED BODIES
Hydrodynamic forces on oscillating and nonoscillating smooth circular cylinders in crossflow --- for towed bodies [AD-767022] N74-11125
TRAILING-EDGE FLAPS
Lift coefficent increment due to full-span split flap: Flap chord 0.15c [ESDU-FLAPS-01.01.05-AMEND-A] N74-10003
TRANSFORMATIONS (MATHEMATICS)
Inverting the mapping function --- coefficients for circle-airfoil transformation function expansion A74-10070
TRANSIENT LOADS
Experimental evaluation of a TF30-P-3 turbofan engine in an altitude facility: Effect of steady-state temperature distortion [NASA-TM-X-2921] N74-10722
TRANSIENT RESPONSE
The experimental response of simple structures to simulated sonic booms A74-11814
Investigation and application of two methods of determining co-efficients of transfer functions of longitudinal motion of aircraft from measured input and output data --- equations of motion and response curve fitting [RSRO-TT-2] N74-10053
TRANSITION FLOW
Nonlinear stability theory of the boundary layer A74-11155
TRANSMISSION LOSS
Transmission of sound through a two-dimensional shielding jet [AIAA PAPER 73-1002] A74-12221
TRANSMITTER RECEIVERS
Satellite communications systems --- multiplexing for communication lines, equipment of earth stations, and onboard receiver transmitter and antennas [JPRS-54505] N74-10153
TRANSONIC COMPRESSORS
Performance of transonic fan stage with weight flow per unit annulus area of 208 kilograms per second per square meter (42.6 (lb/sec)/sq ft) [NASA-TM-X-2903] N74-10022
Effects of increased leading-edge thickness on performance of a transonic rotor blade --- in single stage transonic compressor [NASA-TN-D-7489] N74-10025
TRANSONIC FLOW
The calculation of the buffeting limits of swept wings --- transonic flow regime A74-10985
Prediction of airfoil shock location in transonic flow A74-11342
Effect of blockage ratio on drag and pressure distributions for bodies of revolution at transonic speeds [NASA-TN-D-7331] N74-10015
Performance of transonic fan stage with weight flow per unit annulus area of 198 kilograms per second per square meter (40.6 (lb/sec)/sq ft) [NASA-TM-X-2905] N74-10027
Experimental investigation of two-dimensional cascade performance with blunt trailing edge blade sections at transonic inlet Mach number range [NAL-TR-313] N74-10322
Transonic flow around slender bodies --- transonic flow around slender and fin stabilized bodies of revolution N74-10440

Optimization of wave cancellation in variable porosity transonic wind tunnel flows
[NASA-TN-D-7432] N74-11097

TRANSONIC SPEED
Some effects of cneter of gravity locations of added mass on transonic flutter characteristics of low aspect ratio and sweptback thin cantilever wing
[NAL-TR-314] N74-10047

TRANSONIC WIND TUNNELS
Ten years transonic wind tunnel of the AVA Goettingen --- design and measurement objectives A74-11808

Transonic aerodynamic characteristics associated with variations in the geometry of the forward portion of irregular planform wings
[NASA-CR-128781] N74-10028

User's guide for a computer program to analyze the LRC 16 ft transonic dynamics tunnel cable mount system
[NASA-CR-132313] N74-10297

The improvement in Mach number distribution and reduction of pressure fluctuations in the transonic working section of wind tunnel S.1
[WRE-TN-925] N74-10303

TRANSPORT AIRCRAFT
Advanced structural materials application for high-subsonic-speed transports
[SAE PAPER 730887] A74-11601

Material selection procedures for advanced transport aircraft
[SAE PAPER 730884] A74-11602

AMST - The approach to the STOL transport of the US A74-11776

A simulation approach for studying the interactions of noise, patronage, and economic viability for air transportation systems
[AIAA PAPER 73-1161] A74-12216

Transport vehicles - Weights and loads --- commercial aircraft A74-12442

Remote lift fan study program, volume 4
[NASA-CR-121277] N74-10049

Lauching of small inflated balloons from cargo aircraft --- using palletized modular airdrop platform
[AD-766428] N74-10069

STOL tactical aircraft investigation. Volume 2, part 2: A lifting line analysis method for jet-flapped wings
[AD-766877] N74-10937

STOL tactical aircraft investigation. Volume 5, part 2: Flight control technology: Piloted simulation of a medium STOL transport with vectored thrust mechanical flaps
[AD-766643] N74-10939

TRANSPORTATION
Transportability --- of military equipment
[AD-765456] N74-10229

In place of congestion: Some observations on the transport of freight
[TT-7308] N74-10890

TROPOPAUSE
Turbulence near the tropopause in the presence of mountain waves
[AD-766577] N74-11274

TROPOSPHERE
Turbulence near the tropopause in the presence of mountain waves
[AD-766577] N74-11274

TRUCKS
Truck noise via diesel exhaust and air intake noise --- acoustic measurements for evaluation of various exhaust and intake systems
[PB-222624/9] N74-10742

Energy trends and their future effects upon transportation --- applied to rail, truck, and air cargo operations and private energy uses
[P-5046] N74-11791

TU-134 AIRCRAFT
Operational problems with the aircraft type Tu-134 in the case of a use of the aircraft turbine fuel TS-1 A74-11740

TU-144 AIRCRAFT
Tupolev 144 and Concorde - The official performances are compared for the first time A74-11348

TURBINE BLADES
Experimental investigation of the vibrations of a gas-turbine engine rotor A74-12012

Experimental investigation of two-dimensional cascade performance with blunt trailing edge blade sections at transonic inlet Mach number range
[NAL-TR-313] N74-10322

Impact resistance of fiber composite blades used in aircraft turbine engines
[NASA-CR-134502] N74-10726

TURBINE ENGINES
Investigation of flow parameters in a turbine stage with a nonuniform inlet A74-10255

Progress in France in the last ten years in the field of helicopters - Prospects for the ten years to come A74-11097

Lycoming LTS 101 - Low cost turbine power in the 600 hp class
[SAE PAPER 730911] A74-11582

Low cost supersonic expendable turbine engines --- tactical missile applications
[SAE PAPER 730910] A74-11583

A simplified approach for estimating manufacturing cost at the part level
[SAE PAPER 730908] A74-11584

Aviation turbine fuel and its lubricating qualities A74-11739

Operational problems with the aircraft type Tu-134 in the case of a use of the aircraft turbine fuel TS-1 A74-11740

Recovery characteristics of a single-shielded self-aspirating thermocouple probe at low pressure levels and subsonic speeds A74-12280

An analytical study of icing simulation for turbine engines in altitude test cells
[AIAA PAPER 73-1280] A74-12938

Microfog lubricant application system for advanced turbine engine components, phase II --- wetting characteristics and deposit forming tendencies of lubricants
[NASA-CR-121271] N74-10730

TURBINE EXHAUST NOZZLES
The Garrett-AiResearch variable-cycle TFE731 turbofan engine
[SAE PAPER 730918] A74-11577

Turbine engine exhaust nozzle performance --- inlet flow conditions effects
[AIAA PAPER 73-1302] A74-12947

TURBINE WHEELS
Experimental investigation of the vibrations of a gas-turbine engine rotor A74-12012

TURBOCOMPRESSORS
Calculation of the characteristics of multistage axial turbomachines --- mathematical model for temperature, pressure and flow parameters A74-10029

The behavior of axial compressor cascades in the case of deviations from purely cylindrical flow A74-10030

The Garrett-AiResearch variable-cycle TFE731 turbofan engine
[SAE PAPER 730918] A74-11577

Selection of cutting conditions in the machining axial-flow compressor blades on an assembled rotor A74-12424

Performance of transonic fan stage with weight flow per unit annulus area of 198 kilograms per second per square meter (40.6 (lb/sec)/sq ft)
[NASA-TM-X-2905] N74-10027

Performance of a single-stage transonic compressor with a blade-tip solidity of 1.5 and comparison with 1.3 and 1.7 solidity stages
[NASA-TM-X-2926] N74-10734

Unsteady fluid dynamic response of an axial-flow compressor stage with distorted inflow
[AD-766084] N74-10736

Aerodynamic calculation of blades in axial-flow turbomachines
[AD-765932] N74-10739

TURBOFAN AIRCRAFT
BS.146 --- short haul passenger aircraft A74-11329

TURBOFAN ENGINES
Full-scale tests of an augmentor VTOL concept --- ejector-in-wing configuration
[AIAA PAPER 73-1185] A74-11229
A modular turbofan design for high availability and low life cycle cost
[AIAA PAPER 73-1189] A74-11231
Emergency air start system for the F-14B flight test aircraft
[AIAA PAPER 73-1252] A74-11273
Advanced technology thrust vectoring exhaust systems
[AIAA PAPER 73-1304] A74-11303
Qualitative effects of cycle variables on turbine engine performance and stability
[AIAA PAPER 73-1315] A74-11310
Further development of the JT15D turbofan --- Remotely Piloted Vehicle applications
[SAE PAPER 730919] A74-11576
The Garrett-AiResearch variable-cycle TFE731 turbofan engine
[SAE PAPER 730918] A74-11577
Digital computer simulation of the dynamic response of a twin-spool turbofan with mixed exhausts
A74-11617
RB 211 - The first eighteen months operating experience /Sholto Douglas Memorial Lecture/
A74-12300
The Q-Fan Demonstrator Engine --- variable pitch fan engine design and tests
[AIAA PAPER 73-1215] A74-12929
Turbine engine exhaust nozzle performance --- inlet flow conditions effects
[AIAA PAPER 73-1302] A74-12947
Noise and wake structure measurements in a subsonic tip speed fan
[NASA-CR-2323] N74-10020
Performance of transonic fan stage with weight flow per unit annulus area of 198 kilograms per second per square meter (40.6(lb/sec)/sq ft)
[NASA-TM-X-2905] N74-10027
Acoustic characteristics of a large-scale augmentor wing model at forward speed
[NASA-TM-X-2940] N74-10052
Minimizing boundary layer bleed for a mixed compression inlet --- sized for TF30-P-3 turbofan engine at Mach 2.0 and 2.5
[NASA-TM-X-71461] N74-10321
Study of small turbofan engines applicable to general-aviation aircraft
[NASA-CR-114630] N74-10725
DC-9/JT8D refan, Phase 1 --- technical and economic feasibility of retrofitting DC-9 aircraft with refan engine to achieve desired acoustic levels
[NASA-CR-121252] N74-10729
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
TURBOFANS
Radially leaned outlet guide vanes for fan source noise reduction
[NASA-CR-134486] N74-11597
TURBOGENERATORS
Gas-lubricated foil bearings for high speed turboalternator - Construction and performance
[ASME PAPER 73-LUB-5] A74-12332
Gas generator design for a wide variety of APU applications
[AIAA PAPER 73-1169] A74-12916
Investigation of rotor dynamic and high speed bearing technology for a 3 KW turbo-alternator
[AD-765501] N74-10486
TURBOJET ENGINE CONTROL
Development of a turbine inlet gas temperature measurement and control system using a fluidic temperature sensor
[AIAA PAPER 73-1251] A74-11272
TURBOJET ENGINES
Noise generation and the design of bypass lift jet engines
A74-10984
Noise, an urgent problem with a slow solution --- aircraft noise reduction in airport vicinity
A74-11001
Chemical reactions calculations in turbulent flows - Application to a CO containing turbojet plume
[ONERA, TP NO. 1229] A74-11069
Certain problems in estimating the rundown time of an engine --- turbojet
A74-11075
Odor intensity and characterization studies of exhaust from a turbojet engine combustor
[AIAA PAPER 73-1278] A74-11290
Qualitative effects of cycle variables on turbine engine performance and stability
[AIAA PAPER 73-1315] A74-11310
The effect of inlet temperature and pressure distortion on turbojet performance
[AIAA PAPER 73-1316] A74-11311
A positive approach to the problems of aircraft noise
[AIAA PAPER 73-1157] A74-12227
Major Item Special Study (MISS). CH-54A turbine engine
[AD-766228] N74-10738
Use of an air-assisted fuel nozzle to reduce idle emissions of a jt8d engine combustor
[NASA-TM-X-2946] N74-11738
TURBOSHAFTS
Gas turbine engine mainshaft roller bearing-system analysis
[ASME PAPER 73-LUB-J] A74-12710
TURBULENCE
Turbulence measurements with a laser Doppler velocimeter
[AD-766781] N74-11129
TURBULENT BOUNDARY LAYER
The calculation of the buffeting limits of swept wings --- transonic flow regime
A74-10985
Prevention of transition over a backward step by suction --- laminar boundary layer control
A74-11339
Additional three-dimensional boundary-layer computations for a finite swept wing
[NASA-CR-132335] N74-10029
Investigation of the suction system and boundary-layer characteristics on a high-lift, BLC L-19 test aircraft
[AD-766305] N74-10063
Turbulent boundary layer growth at hypersonic speeds --- noting dependence on wall temperature ratio, pressure gradients, and viscous interaction parameter
[IC-AERO-73-04] N74-11112
TURBULENT FLOW
Annular slot and frontal slot flow --- turbulent flow resistance coefficients
A74-10033
Effect of anisotropic turbulence on aerodynamic noise --- Lighthill theory mathematical model for axisymmetric turbulence
A74-10798
Chemical reactions calculations in turbulent flows - Application to a CO containing turbojet plume
[ONERA, TP NO. 1229] A74-11069
Nonlinear stability theory of the boundary layer
A74-11155
On the theory of jet noise and its applications --- Lighthill theory
[AIAA PAPER 73-987] A74-12218
An investigation of a nonplanar vortex lattice method for wing calculations
[CRANFIELD-AERO-17] N74-10023
Drag of streamline solids of revolution (transition at nose)
[ESDU-BODIES-02.04.01-AMEND-A] N74-10311
Investigation of the effect of grids on the characteristics of a turbulent flow --- for wind tunnel applications
[AD-765999] N74-10328
TURBULENT HEAT TRANSFER
A simplified method for studying the aerodynamic heating of axisymmetric bodies at an angle of attack
A74-12441
TURBULENT JETS
Near-field trajectory of turbulent jets discharged at various inclinations into a uniform crossflow
A74-10568
TURBULENT MIXING
Supersonic mixing and combustion studies of ducted hydrogen-air flows at an inlet air Mach number of 2.6
[AIAA PAPER 73-1320] A74-11313

TURBULENT WAKES
Stability and decay of free vortices behind a wing A74-11805
Computation of vortex models for wings at high angle of attack in incompressible flow [FFA-AU-653] N74-10013
Some analyses of the chemistry and diffusion of SST exhaust materials during phase 3 of the wake period --- in lower stratosphere [NASA-CR-132323] N74-10863
Study of the electrostatic field and charge distribution in a vortex seeded with dust [AD-766815] N74-10941

TWO DIMENSIONAL BOUNDARY LAYER
Experimental study of shock-wave reflection upon boundary layer transition [ONERA, TP NO. 1284] A74-11072

TWO DIMENSIONAL FLOW
The behavior of axial compressor cascades in the case of deviations from purely cylindrical flow A74-10030
Boundary value problems of two-dimensional isentropic gas flow A74-11430
Aerodynamic centre in two dimensional flow [ESDU-AIRCRAFT-08.01.05-AMEND-A] N74-10010

TWO DIMENSIONAL JETS
Transmission of sound through a two-dimensional shielding jet [AIAA PAPER 73-1002] A74-12221

TWO STAGE TURBINES
Investigation of flow parameters in a turbine stage with a nonuniform inlet A74-10255

U

UH-1 HELICOPTER
Hydrofluidic servoactuator development [AD-766308] N74-10491

ULTRAHIGH FREQUENCIES
A first generation of L-Band avionics for AEROSAT --- experimentation and evaluation phase of aeronautical satellites A74-12192

ULTRAVIOLET SPECTRA
Ultraviolet and near-infrared spectral analysis of a burner-can burn-through flame [FAA-NA-73-86] N74-10866

UNSTEADY FLOW
Unsteady flow of power-law fluids A74-10573
Suitability of the finite element method for analysis of unsteady flow around oscillating airfoils A74-11439

URBAN PLANNING
Air transportation noise technology overview [AIAA PAPER 73-1152] A74-10506
Project/cost/benefit [PB-222339/4] N74-11801

URBAN RESEARCH
Transportation noise - It's measurement and evaluation A74-11198

URBAN TRANSPORTATION
Project/cost/benefit [PB-222339/4] N74-11801

USER MANUALS (COMPUTER PROGRAMS)
User's guide for a computer program to analyze the LRC 16 ft transonic dynamics tunnel cable mount system [NASA-CR-132313] N74-10297

UTAH
Terrain properties and topography from Skylab altimetry --- Oregon, Utah, Texas, and Nevada [E74-10043] N74-11164

V

V/STOL AIRCRAFT
V/STOL deflector aerodynamic design criteria --- geometric variations effects [AIAA PAPER 73-1181] A74-11226
Effect of exhaust deflectors on the design of lift plus lift/cruise V/STOL aircraft [SAE PAPER 730959] A74-11554
Evaluation of V/STOL research aircraft design --- landing approaches, propulsion/control, piloted moving base simulator [SAE PAPER 730947] A74-11557
The next step is straight up --- V/STOL fighter-attack aircraft for minicarriers A74-12129
One-dimensional analysis of compressible ejector flows applicable to V/STOL aircraft design [AIAA PAPER 73-1184] A74-12921
Small V/STOL aircraft analysis. Volume 2: Appendices --- to determine current and future general aviation missions and performance requirements [NASA-CR-114629] N74-10045
Remote lift fan study program, volume 4 [NASA-CR-121277] N74-10049
Meteorological information for vertical and short take-off and land (V/STOL) operations in built-up urban areas: An analysis [FAA-RD-72-135] N74-10920
V/STOL noise prediction and reduction [LG73ER0062] N74-10921
Selected problems regarding the formation of a simulation model --- dynamic structural analysis of V/STOL flight control system [NASA-TT-F-15173] N74-11095
Measurement of turbulence inputs for V/STOL approach paths in a simulated planetary boundary layer [UTIAS-189] N74-11661

VALLEYS
Wind conditions at the Cologne/Bonn airport and possibilities of forecasting them A74-11835

VARIABLE GEOMETRY STRUCTURES
The Garrett-AiResearch variable-cycle TPE731 turbofan engine [SAE PAPER 730918] A74-11577

VARIANCE (STATISTICS)
Reduced order filtering with applications in hybrid navigation --- minimum variance Kalman filter algorithm A74-12177

VELOCITY MEASUREMENT
Range-rate from DME-air data measurements --- for aircraft radial velocity estimation A74-12182

VERTICAL MOTION
Measuring the radiation of a vertical gas jet A74-11500

VERTICAL TAKEOFF AIRCRAFT
VTOL aircraft --- fibrous composites for structural weight reduction A74-10497
Deck heating effects due to VTOL jet exhaust impingement [AIAA PAPER 73-1182] A74-11227
VTOL recirculation and impingement model testing --- flow fields in ground effect test [AIAA PAPER 73-1183] A74-11228
Full-scale tests of an augmentor VTOL concept --- ejector-in-wing configuration [AIAA PAPER 73-1185] A74-11229
Advanced technology thrust vectoring exhaust systems [AIAA PAPER 73-1304] A74-11303
System evaluation as an objective for a research institute --- VTOL weapons systems A74-11606

VIBRATION EFFECTS
An investigation of the vibratory and acoustic benefits obtainable by the elimination of the blade tip vortex A74-11845
Vibration effects on helicopter reliability and maintainability [AD-766307] N74-10064
Symmetrical eigen forms of the vibrations of a supporting surface and of an elastic fuselage [AD-756285] N74-10067

VIBRATION ISOLATORS
The main rotor bifilar absorber and its effect on helicopter reliability/maintainability [SAE PAPER 730894] A74-11595
Nodalization applied to helicopters --- vibration isolation [SAE PAPER 730893] A74-11596

Control of helicopter vibration using the dynamic antiresonant vibration isolator
[SAE PAPER 730892] A74-11597
VIBRATION MEASUREMENT
Experimental investigation of the vibrations of a gas-turbine engine rotor
A74-12012
VISUAL AIDS
Helicopter visual aid system
N74-11691
VISUAL CONTROL
New concepts of visualization for aircraft --- instrument panel display integration
A74-12447
VISUAL DISCRIMINATION
Information content of different runway lighting patterns --- visual pattern discrimination of landing displays
[NASA-TT-F-15179] N74-11094
VISUAL FLIGHT
Visual landings in regional and local airports
[NASA-TT-F-15177] N74-11093
VOICE COMMUNICATION
Description and cost of a satellite-based oceanic ATC system --- voice and data communication channel capacity requirements
A74-12193
VORTEX BREAKDOWN
Stability and decay of free vortices behind a wing
A74-11805
VORTEX GENERATORS
Test of a supersonic compressor cascade, volume 2 --- effects of vortex generators mounted on blades
[AD-756871] N74-10750
VORTICES
The effects of wake splitter plates on the flow past a circular cylinder in the range of R from 10,000 to 50,000
A74-11041
An analytical and experimental study of inlet ground vortices
[AIAA PAPER 73-1313] A74-11309
Longitudinal response of an aircraft due to a trailing vortex pair
A74-11343
Finite element solution of the incompressible flow over an airfoil in a nonuniform stream
A74-11426
An investigation of the vibratory and acoustic benefits obtainable by the elimination of the blade tip vortex
A74-11845
Computation of vortex models for wings at high angle of attack in incompressible flow
[FFA-AU-653] N74-10013
An investigation of a nonplanar vortex lattice method for wing calculations
[CRANFIELD-AERO-17] N74-10023
Effect of geometry variations on lee-surface vortex-induced heating for flat-bottom three-dimensional bodies at Mach 6
[NASA-TN-D-7447] N74-10318

W

WAKES
The effects of wake splitter plates on the flow past a circular cylinder in the range of R from 10,000 to 50,000
A74-11041
The stability of helical vortex filaments in the wake of a hovering rotor
[AD-766828] N74-11128
WALL FLOW
Effect of blockage ratio on drag and pressure distributions for bodies of revolution at transonic speeds
[NASA-TN-D-7331] N74-10015
Optimization of wave cancellation in variable porosity transonic wind tunnel flows
[NASA-TN-D-7432] N74-11097
WALL JETS
Supersonic combustion of hydrogen injected perpendicular to a ducted vitiated airstream
[AIAA PAPER 73-1322] A74-11314
WARNING SYSTEMS
Technology forecasting - Aircraft hazard detection
A74-11499
WAVE EQUATIONS
Introduction to aerodynamic noise theory
A74-12207
WAVE REFLECTION
Experimental study of shock-wave reflection upon boundary layer transition
[ONERA, TP NO. 1284] A74-11072
WEAPON SYSTEMS
System evaluation as an objective for a research institute --- VTOL weapons systems
A74-11806
Mod-metric tested for bias
[AD-760081] N74-10904
WEAR
A thermal, thermoelastic, and wear simulation of a high-energy sliding contact problem
[ASME PAPER 73-LUB-6] A74-12333
WEAR TESTS
The friction and wear characteristics of plasma-sprayed NiO-CaF2 in rubbing contact with a ceramic matrix
[ASLE PREPRINT 73LC-1B-3] A74-12306
WEATHER
Objective determination of the noise level in Doppler spectra
[TR-32] N74-10155
WEATHER FORECASTING
Wind conditions at the Cologne/Bonn airport and possibilities of forecasting them
A74-11835
Thermal parameters as a predictor of precipitation type for Kincheloe AFB, Michigan
[AD-754927] N74-10611
WEATHER MODIFICATION
Project Foggy Cloud 4, phase 1. Evaluation of warm fog dissipation techniques --- and stratus cloud modification
[AD-766086] N74-10597
Thermal warm fog dissipation: Heat requirements and projected utilization of a system for Travis AFB, California
[AD-766247] N74-10605
WEIGHT ANALYSIS
Commercial aircraft --- weight reduction by composite materials
A74-10495
VTOL aircraft --- fibrous composites for structural weight reduction
A74-10497
Wing shear material --- structural weight formulas
A74-11175
An integrated approach to structural weight estimation
[SAE PAPER 730936] A74-11564
WETTABILITY
Microfog lubricant application system for advanced turbine engine components, phase 3 --- wetting characteristics and deposit forming tendencies of lubricants
[NASA-CR-121271] N74-10730
WHITE NOISE
Objective determination of the noise level in Doppler spectra
[TR-32] N74-10155
WIND DIRECTION
Wind conditions at the Cologne/Bonn airport and possibilities of forecasting them
A74-11835
WIND EFFECTS
Model studies of crosswind landing-gear configurations for STOL aircraft
N74-11680
WIND TUNNEL APPARATUS
User's guide for a computer program to analyze the LRC 16 ft transonic dynamics tunnel cable mount system
[NASA-CR-132313] N74-10297
WIND TUNNEL MODELS
Study of Moire measuring techniques for wind tunnel model deformation
[AD-766892] N74-11298
Model support roll balance and roll coupling --- design of wind tunnel model support mechanism
N74-11681
WIND TUNNEL STABILITY TESTS
Dynamic relaxation solution of three dimensional subsonic compressible oscillatory flow
A74-11428

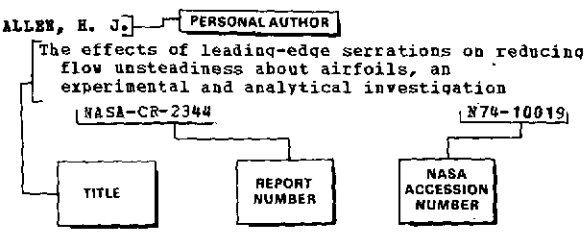
WIND TUNNEL TESTS
Exploitation of spectral density curves in the case of wind tunnel flutter measurement A74-11000
The effects of wake splitter plates on the flow past a circular cylinder in the range of R from 10,000 to 50,000 A74-11041
Wind tunnel tests of a 20 inch diameter 1.15 pressure ratio fan engine model [AIAA PAPER 73-1216] A74-11245
New airfoil sections for general aviation aircraft --- cruising and flap development tests [SAE PAPER 730876] A74-11606
Ten years transonic wind tunnel of the AVA Goettingen --- design and measurement objectives A74-11808
Magnetic balance and suspension systems for use with wind tunnels A74-12204
Wind tunnel and field investigations of shapes for balloon shelters [NCAR-TN/EDD-82] N74-10016
The effects of leading-edge serrations on reducing flow unsteadiness about airfoils, an experimental and analytical investigation [NASA-CR-2344] N74-10019
Transonic aerodynamic characteristics associated with variations in the geometry of the forward portion of irregular planform wings [NASA-CR-128781] N74-10028
Research on the sonic boom problem. Part 2: Flow field measurement in wind tunnel and calculation of second order F-function [NASA-CR-2340] N74-10031
Two-dimensional wind tunnel test on a variable-camber airfoil with distributed suction boundary-layer control [AD-766304] N74-10033
Experimental investigation of two-dimensional cascade performance with blunt trailing edge blade sections at transonic inlet Mach number range [NAL-TR-313] N74-10322
WIND TUNNELS
Effect of blockage ratio on drag and pressure distributions for bodies of revolution at transonic speeds [NASA-TN-D-7331] N74-10015
Investigation of the effect of grids on the characteristics of a turbulent flow --- for wind tunnel applications [AD-765999] N74-10328
Optimization of wave cancellation in variable porosity transonic wind tunnel flows [NASA-TN-D-7432] N74-11097
Interest and feasibility study of atmospheric turbulence and thermal gradients simulation --- application to air pollution and meteorology N74-11380
AEDC Fiscal Year 1974 Air Force technical objective document --- facility improvements, test techniques, instrumentation, gas properties, and wind tunnel and flight test data comparisons [AD-766719] N74-11803
WINDOWS (APERTURES)
The experimental response of simple structures to simulated sonic booms A74-11814
WINDSHIELDS
Differential method for testing the optical standards of cockpit windshields A74-10937
WING FLAPS
Flap noise prediction method for a powered lift system [AIAA PAPER 73-1028] A74-11051
Conversion factor for profile drag increment for part-span flaps [ESDU-FLAPS-02.01.07-AMEND-A] N74-10002
WING OSCILLATIONS
The lifting surface theory applied to fixed wings and propellers A74-10999
Dynamic relaxation solution of three dimensional subsonic compressible oscillatory flow A74-11426
Calculation of instationary pressure distributions and generalized aerodynamic forces with the doublet-lattice method --- on thin wings oscillating harmonically in subsonic flow [NLR-TR-72037-U] N74-10906
WING PLANFORMS
Computation of vortex models for wings at high angle of attack in incompressible flow [FFA-AU-653] N74-10013
An investigation of a nonplanar vortex lattice method for wing calculations [CRANFIELD-ABRO-17] N74-10023
Transonic aerodynamic characteristics associated with variations in the geometry of the forward portion of irregular planform wings [NASA-CR-128781] N74-10028
WINGED VEHICLES
Model support roll balance and roll coupling --- design of wind tunnel model support mechanism N74-11681
WINGS
Wing shear material --- structural weight formulas A74-11175

Y

YIELD STRENGTH
A mathematical theory of plasticity for strain hardening materials exhibiting initial anistoropy [NLR-TR-72117-U] N74-11719

PERSONAL AUTHOR INDEX

Typical Personal Author Index Listing



Listings in this index are arranged alphabetically by personal author. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The accession number is located beneath and to the right of the title, e.g., N74-10019. Under any one author's name the accession numbers are arranged in sequence with the *IAA* accession numbers appearing first.

A

ABELE, M.
Study of Moire measuring techniques for wind tunnel model deformation
[AD-766892] N74-11298

ABERNETHY, R. B.
Uncertainty in gas turbine measurements
[AIAA PAPER 73-1230] A74-11255

ADAMCZYK, J. J.
Unsteady fluid dynamic response of an axial-flow compressor stage with distorted inflow
[AD-766084] N74-10736

AHUJA, K. K.
An experimental study of subsonic jet noise and comparison with theory
A74-10271

AKIMOV, V. M.
The economic efficiency of raising the flying life and reliability of gas-turbine engines
[AD-767027] N74-11601

AKSENOV, A. P.
Study of elastoplastic deformation with friction in hydrocarbon media
[AD-765997] N74-10717

ALBERS, J. A.
Comparison of predicted and measured low-speed performance of two 51 centimeter-diameter inlets at incidence angle
[NASA-TM-X-2937] N74-10026

ALEXANDER, T.
A new outbreak of Zeppelin fever
A74-12911

ALLEN, H. J.
The effects of leading-edge serrations on reducing flow unsteadiness about airfoils, an experimental and analytical investigation
[NASA-CR-2344] N74-10019

ALSWORTH, C. C.
Study of small turbofan engines applicable to general-aviation aircraft
[NASA-CR-114630] N74-10725

AMLIE, T. S.
A synchronized discrete-address beacon system
[FAA-EM-74-3] N74-10622

ANDERSON, L. C.
Emergency air start system for the F-14B flight test aircraft
[AIAA PAPER 73-1252] A74-11273

ANDERSON, W. J.
Aerospace fluidics applications and circuit manufacture
[SAE PAPER 730880] A74-11604

Gas-lubricated foil bearings for high speed turboalternator - Construction and performance
[ASME PAPER 73-LUB-5] A74-12332

ANSCHUTZ, R. H.
Further development of the JT15D turbofan
[SAE PAPER 730919] A74-11576

ANTL, E. J.
The effect of noise constraints on engine cycle optimization for long-haul transports
[AIAA PAPER 73-1292] A74-11298

ANTOINE, B.
Damage threshold determination of light walls submitted to single or repeated bangs, part 1
[ISL-35/72-PT-1] N74-10846

APELT, C. J.
The effects of wake splitter plates on the flow past a circular cylinder in the range of R from 10,000 to 50,000
A74-11041

ARCIDIACONO, P. J.
Helicopter rotor loads predictions
N74-10912

ARENDELL, R. W.
Mod-metric tested for bias
[AD-760081] N74-10904

ARMEN, H., JR.
Nonlinear crack analysis with finite elements
[AD-766558] N74-11722

ARNETT, G. D.
Cockpit air filtration requirements of the B-1 in a nuclear dust environment
[AD-766711] N74-10065

ARON, I.
Blind landing
A74-11552

ASCANI, L.
An integrated approach to structural weight estimation
[SAE PAPER 730936] A74-11564

ATTIYEH, R. S.
U.S. aerospace industry at the crossroads
A74-11610

AUSTEN, H.-J.
Remote sensing of the earth's resources - Applications, benefits, methods
A74-11204

B

BABURIN, V. I.
Effect of differences between the antennas of a Doppler velocity meter on its operational accuracy
A74-11994

BAILEY, C. L., JR.
Solid state controller three axes controller
[NASA-CASE-MSC-12394-1] N74-10942

BAILEY, W. K.
Influence of prototype concept and cost ceilings on airframe design and manufacture of the YF-16 lightweight fighter
[SAE PAPER 730888] A74-11600

BAISLEY, R. L.
Helicopter visual aid system
N74-11691

BALES, S. L.
Response predictions of helicopter landing platform for the USS BELKNAP (DLG-26) and USS GARCIA (DE-1040)-Class destroyers
[AD-766450] N74-10072

BANDY, J. M.
Maintainability concepts used in the design and operation of Douglas commercial jet aircraft
[SAE PAPER 730881] A74-11603

BARBARISI, M. J.
Evaluation of the adhesive bonding processes used in helicopter manufacture. Part 4: Nondestructive inspection of adhesive bonds using holographic techniques
[AD-765455] N74-10480
BARBERO, P.
User's guide for a computer program to analyze the LRC 16 ft transonic dynamics tunnel cable mount system
[NASA-CR-132313] N74-10297
BARTLEY, J. B.
Advanced flutter design techniques
[SAE PAPER 730935] A74-11565
BATES, K. S., JR.
Aircraft fuel tank entry wall-projectile interaction studies
[AD-765667] N74-10066
BAUMANN, R.
The application of the vertical gyroscope for the artificial horizon
A74-10825
BAVEL'SKII, D. M.
Selection of cutting conditions in the machining axial-flow compressor blades on an assembled rotor
A74-12424
BECKMAN, J.
Eclipse flight of Concorde 001
A74-12515
BECKWITH, I. E.
Control of supersonic wind-tunnel noise by laminarization of nozzle-wall boundary layer
[NASA-TM-X-2879] N74-11119
BEGOT, J.
Eclipse flight of Concorde 001
A74-12515
BELINA, F. W.
Small V/STOL aircraft analysis. Volume 2: Appendices
[NASA-CR-114629] N74-10045
BELOV, A. V.
Selection of cutting conditions in the machining axial-flow compressor blades on an assembled rotor
A74-12424
BELOZEROV, A. F.
Hologram study of gas flow in a ballistic wind tunnel
A74-11414
BENCZE, D. P.
Possibilities for improved supersonic inlet performance
[AIAA PAPER 73-1271] A74-11284
BENEFIEL, R. L.
Designing for noise and emission control in general aviation
[AIAA PAPER 73-1158] A74-10509
BENNETT, R. L.
Rotor system design and evaluation using a general purpose helicopter flight simulation program
N74-10913
BEREZKIN, A. N.
Hologram study of gas flow in a ballistic wind tunnel
A74-11414
BERT, C. W.
Buckling of orthotropic, curved, sandwich panels in shear and axial compression
A74-11340
BESSE, G.
The air transport of tomorrow - Economic obstacles to surmount
A74-11096
BHARTIA, P.
Scattering by a conducting aerofoil
A74-11908
BIPPES, H.
Stability and decay of free vortices behind a wing
A74-11805
BLACKWELL, F.
Bird strike and the radar properties of birds
A74-12389
BLAKNEY, D. F.
V/STOL noise prediction and reduction
[LG73ER0062] N74-10921
BLANCHFIELD, D. E.
A simplified approach for estimating manufacturing cost at the part level
[SAE PAPER 730908] A74-11584
BLAZOWSKI, W. S.
Prediction of aircraft gas turbine NO/x/ emission dependence on engine operating parameters and ambient conditions
[AIAA PAPER 73-1275] A74-11287
BLOCK, D. B.
Stability and dynamic behavior of two tethered balloon systems
[AD-766439] N74-10070
BLOCK, J.
Airports from 1963 to 1983 - Evolution or revolution
A74-11095
BLUMENTHAL, V. L.
A positive approach to the problems of aircraft noise
[AIAA PAPER 73-1157] A74-12227
BOCK, O. H.
Photographic pyrometry in an aeroballistic range
A74-12752
BOEGEL, W.
Investigation and application of two methods of determining co-efficients of transfer functions of longitudinal motion of aircraft from measured input and output data
[ESRO-TT-2] N74-10053
BOEHRET, H.
Comparison of simulation and flight testing at automatic STOL landing
[NASA-TT-F-15171] N74-10923
BOESE, P.
Remote sensing of the earth's resources - Applications, benefits, methods
A74-11204
BOFFEY, D. A.
The whirl instability of a rigid rotor in a flexibly supported gas lubricated journal bearing
A74-11441
BOHMANN, G. A.
The influence of design to cost and prototyping on the A-10 aircraft
[SAE PAPER 730890] A74-11598
BONDLEY, R. J.
High sensitivity 1000F gas multiplication UV flame detector for aircraft
[AD-766960] N74-11296
BONWIT, R.
In place of congestion: Some observations on the transport of freight
[TT-7308] N74-10890
BOONE, D. H.
Effect of several metallurgical variables on the thermal fatigue behavior of superalloys
A74-10622
BOREN, H. E., JR.
Cost comparisons of advanced air traffic management systems
[R-1319-DOT] N74-11436
BORGHI, R.
Chemical reactions calculations in turbulent flows - Application to a CO containing turbojet plume
[ONERA, TP NO. 1229] A74-11069
BOSCHER, R.
The technical evolution of aircraft
A74-11092
BOWDITCH, D. N.
Some design considerations for supersonic cruise mixed compression inlets
[AIAA PAPER 73-1269] A74-12496
Some design considerations for supersonic cruise mixed compression inlets
[NASA-TM-X-71460] N74-10021
BOYD, E. A.
An investigation of a nonplanar vortex lattice method for wing calculations
[CRANFIELD-AERO-17] N74-10023
BOYLAN, D. E.
Laminar heat transfer on sharp and blunt ten-degree cones in conical and parallel low-density flow
[AD-765546] N74-10869
BRACKA, B.
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
BRAGDON, E. L.
Propulsion technology advances needed for a quiet supersonic transport
[SAE PAPER 730898] A74-11591

BRAITHWAITE, W. M.
The effect of inlet temperature and pressure distortion on turbojet performance
[AIAA PAPER 73-1316] A74-11311
Experimental evaluation of a TF30-P-3 turbofan engine in an altitude facility: Effect of steady-state temperature distortion
[NASA-TM-X-2921] N74-10722
BRANGER, H.
Gas-lubricated foil bearings for high speed turboalternator - Construction and performance
[ASME PAPER 73-LUB-5] A74-12332
BRATANOW, T.
Suitability of the finite element method for analysis of unsteady flow around oscillating airfoils
A74-11439
BRESNAHAN, D. L.
Refan program. Phase 1: Summary report
[NASA-TM-X-71456] N74-10043
BRESSOWAR, G. B.
Measurement of gas turbine exhaust pollutants by Raman spectroscopy
[AIAA PAPER 73-1276] A74-11288
BREWER, G. D.
The case for hydrogen fueled transport aircraft
[AIAA PAPER 73-1323] A74-11315
BRITT, C. L., JR.
Radar backscattering as a means for measuring ocean surface parameters using S193 altimetry and S190B photography
[E74-10092] N74-11202
BRIX, C. W., JR.
A study of supersonic flow past vibrating shells and cascades
[AD-765735] N74-10335
BROOK-FOOTITT, E.
Equipment for suppressing reflected secondary radar signals
A74-12359
BROOKS, C. W., JR.
Effect of blockage ratio on drag and pressure distributions for bodies of revolution at transonic speeds
[NASA-TN-D-7331] N74-10015
BROWN, D. W.
Lateral distribution of aircraft traffic
[AD-765435] N74-10304
BROWN, S. C.
Preliminary assessment of the microwave landing system requirements for STOL operations
[NASA-TM-X-62310] N74-11431
BRUNER, D. B.
High level container
[AD-766306] N74-10899
BRYAN, C. J.
Test of LOX compatibility for asphalt and concrete runway materials
[NASA-TM-X-64086] N74-11091
BULDOVSKII, G. S.
Turbulence near the tropopause in the presence of mountain waves
[AD-766577] N74-11274
BURAKOV, G. M.
Simulating the system of automatic correction of aircraft coordinates on an analog computer
[AD-765991] N74-10058
BURCHAM, F. W., JR.
Preliminary results of flight tests of the propulsion system of the YF-12 airplane at Mach numbers to 3.0
[AIAA PAPER 73-1314] A74-12951
BURMAN, Z. I.
Symmetrical eigen forms of the vibrations of a supporting surface and of an elastic fuselage
[AD-756285] N74-10067
BURNETT, G. A.
Study of small turbofan engines applicable to general-aviation aircraft
[NASA-CR-114630] N74-10725
BURROUS, C. N.
Preliminary assessment of the microwave landing system requirements for STOL operations
[NASA-TM-X-62310] N74-11431
BURT, S.
Investigation of the suction system and boundary-layer characteristics on a high-lift, BLC L-19 test aircraft
[AD-766305] N74-10063
BUSHELL, K. W.
An experimental study of subsonic jet noise and comparison with theory
A74-10271
BUTLER, S. F. J.
Technical evaluation report on Fluid Dynamics Panel Specialists' Meeting on Aerodynamic Drag
[AGARD-AR-58] N74-10905
BUTZE, H. F.
Odor intensity and characterization studies of exhaust from a turbojet engine combustor
[AIAA PAPER 73-1278] A74-11290
BUXBAUM, O.
Service loads on nose landing gears of the F-104 airplane
[LBF-TB-103/1972] N74-10924
BYATT, D. W. G.
Present and future radar display techniques
A74-12382
BYRDSONG, T. A.
Model studies of crosswind landing-gear configurations for STOL aircraft
N74-11680

C

CAGLE, L. F.
Some performance characteristics of the Bell 100 ton surface effect ship
[AD-765689] N74-10062
CAMPBELL, D. R.
Full-scale tests of an augmentor VTOL concept
[AIAA PAPER 73-1185] A74-11229
CAMPBELL, G. F.
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
CAMPBELL, W. J.
Nasa remote sensing of sea ice in AIDJEX
N74-11223
CARLSON, H. G.
Helicopter rotor loads predictions
N74-10912
CARLSON, H. M.
Integrated rotor/body loads prediction
N74-10916
CARR, F. S.
AEROSAT ground environment and test plan
A74-12191
CARR, R. W.
Crashworthy landing gear study
[AD-765489] N74-10060
CARRIERE, P.
Progress in aerospace sciences. Volume 14
A74-12203
CARROLL, H. H.
STOL tactical aircraft investigation. Volume 1: Configuration definition (medium STOL transport with vectored thrust/mechanical flaps)
[AD-766637] N74-10925
CARROLL, W. J.
Model support roll balance and roll coupling
N74-11681
CARTA, F. O.
Unsteady fluid dynamic response of an axial-flow compressor stage with distorted inflow
[AD-766084] N74-10736
CASTELLS, O. T.
Deck heating effects due to VTOL jet exhaust impingement
[AIAA PAPER 73-1182] A74-11227
CASWELL, G.
External burning assisted projectile - Theory and experiment
[AIAA PAPER 73-1193] A74-11234
CERESUELA, R. J.
Aerodynamic problems of STOL aircraft
[NASA-TT-F-15182] N74-10918
CHACHAKIS, S.
Spring overriding aircraft clutch
[AD-766309] N74-10073
CHAHAL, J. S.
Bilinear surface representation of radar scattering for aircraft
[AD-766320] N74-10169
CHAMMINGS, M. B.
Design and evaluation of aircraft pavements - 1971
A74-11874

CHAO, K.-L.
Prediction of unsteady airloads for the solution of the panel flutter problem of nosecones and conical shell structures
A74-12804
CHARVIN, P.
Eclipse flight of Concorde 001
A74-12515
CHASE, V. A.
Low cost, fiber glass reinforced plastic fuel tank, volume 1
[AD-766361] N74-10929
Low cost, fiber glass reinforced plastic fuel tank, volume 2
[AD-766400] N74-10931
CHERENISIN, F. G.
Solution of the plane problem of the aerodynamics of a rarefied gas on the basis of Boltzmann's kinetic equation
A74-10976
CHERNYKH, V. V.
Investigation of the effect of grids on the characteristics of a turbulent flow
[AD-765999] N74-10328
CHESTNUTT, D.
Air transportation noise technology overview
[AIAA PAPER 73-1152] A74-10506
CHIN, J.
User's guide for a computer program to analyze the LRC 16 ft transonic dynamics tunnel cable mount system
[NASA-CR-132313] N74-10297
CHISHOLM, B. R.
Evaluation of the adhesive bonding processes used in helicopter manufacture. Part 4: Nondestructive inspection of adhesive bonds using holographic techniques
[AD-765455] N74-10480
CHIU, H. H.
Noise generation by ducted combustion systems
[AIAA PAPER 73-1024] A74-12223
CHOU, Y. T.
The behavior of flexible airfield pavements under loads: Theory and experiments
[AD-766480] N74-11102
CHU, W. T.
Theoretical studies of tone noise from a fan rotor
[NASA-CR-2354] N74-10735
CICCI, F.
It's quiet in front
[AIAA PAPER 73-1159] A74-10510
CLARK, B.
Flap noise prediction method for a powered lift system
[AIAA PAPER 73-1028] A74-11051
CLARK, R. S.
Project Foggy Cloud 4, phase 1. Evaluation of warm fog dissipation techniques
[AD-766086] N74-10597
COALSON, M. S.
Qualitative effects of cycle variables on turbine engine performance and stability
[AIAA PAPER 73-1315] A74-11310
COCKBURN, R. N.
Estimation of an aeronautical equipment mission reliability
[AD-766886] N74-10935
CODER, D. W.
Hydrodynamic forces on oscillating and nonoscillating smooth circular cylinders in crossflow
[AD-767022] N74-11125
COFFEY, G. A.
Sea level side loads in high-area-ratio rocket engines
[AIAA PAPER 73-1284] A74-12940
COHEN, R. B.
U.S. aerospace industry at the crossroads
A74-11610
COLLINS, T. P.
The planar pressure pulse generator - A new dynamic distortion generator
[AIAA PAPER 73-1317] A74-11312
COMPTON, W. A.
Turbine inlet gas temperature sensor for engine control
[AD-765193] N74-10461
CONINE, P. A.
Cost comparisons of advanced air traffic management systems
[R-1319-DOT] N74-11436
CONTENSOU, P.
Prospects for aerospace research
A74-11098
CONTILIANO, R.
Some analyses of the chemistry and diffusion of SST exhaust materials during phase 3 of the wake period
[NASA-CR-132323] N74-10863
COOK, D. L.
Further development of the JT15D turbofan
[SAE PAPER 730919] A74-11576
CORDINER, D. C.
The improvement in performance of an S-band surveillance radar operating in conditions of rain clutter
A74-12396
COUCH, L. M.
Effect of blockage ratio on drag and pressure distributions for bodies of revolution at transonic speeds
[NASA-TN-D-7331] N74-10015
COUCH, R. P.
Sensing jet engine performance and incipient failure with electrostatic probes
[AD-766653] N74-11606
COUSSEDIERE, M.
New concepts of visualization for aircraft
A74-12447
COVERT, E. E.
Magnetic balance and suspension systems for use with wind tunnels
A74-12204
COWAN, S. J.
Transmission of sound through a two-dimensional shielding jet
[AIAA PAPER 73-1002] A74-12221
CRANCIOLO, M. P.
Thermal parameters as a predictor of precipitation type for Kincheloe AFB, Michigan
[AD-754927] N74-10611
CRAWFORD, W. J.
A unique method for monitoring cabin air pollution from engine oil in the EB-57 D aircraft
[AD-766701] N74-10932
CRIBBINS, P. D.
The energy dilemma and its impact on air transportation
[NASA-CR-135993] N74-11743
CROCKER, M. J.
The experimental response of simple structures to simulated sonic booms
A74-11814
Investigation of the characteristics of tubular microphone windscreens for in-duct fan sound power measurements
A74-12126
CRONK, A. E.
Longitudinal response of an aircraft due to a trailing vortex pair
A74-11343
CROUCH, E. W.
Transmission of sound through a two-dimensional shielding jet
[AIAA PAPER 73-1002] A74-12221
CRUTZEN, P. J.
Gas-phase nitrogen and methane chemistry in the atmosphere
A74-11513
CUMMINGS, B. T.
The next step is straight up
A74-12129

D

D'APPOLITO, J. A.
Reduced order filtering with applications in hybrid navigation
A74-12177
Error model identification and performance predictions for airborne direct ranging Loran
A74-12178

DASH, S.
Analysis and design of three dimensional supersonic nozzles. Volume 1: Nozzle-exhaust flow field analysis by a reference plane characteristics technique
[NASA-CR-132350] N74-11113

DAT, R.
The lifting surface theory applied to fixed wings and propellers
A74-10999

DAUGHERTY, J. W.
Study of the electrostatic field and charge distribution in a vortex seeded with dust
[AD-766815] N74-10941

DAVENPORT, F. J.
STOL tactical aircraft investigation. Volume 2, part 2: A lifting line analysis method for jet-flapped wings
[AD-766877] N74-10937
STOL tactical aircraft investigation. Volume 3: Takeoff and landing performance ground rules for powered lift STOL transport aircraft
[AD-766640] N74-10938

DAVENPORT, O. B.
Buckling of orthotropic, curved, sandwich panels in shear and axial compression
A74-11340

DAVENPORT, W. E.
The Garrett-AiResearch variable-cycle TFE731 turbofan engine
[SAE PAPER 730918] A74-11577

DAVID, L. J.
An experimental investigation of an acoustic method for measuring gas mass flow
[AD-766419] N74-10340

DAVIDSON, D. L.
Emission measurements of a J93 turbojet engine
[AD-766648] N74-11605

DAVIS, J. W.
Optimization of wave cancellation in variable porosity transonic wind tunnel flows
[NASA-TN-D-7432] N74-11097

DAY, J. B.
Qualitative effects of cycle variables on turbine engine performance and stability
[AIAA PAPER 73-1315] A74-11310

DECKERT, W. H.
Evaluation of V/STOL research aircraft design
[SAE PAPER 730947] A74-11557

DEKONING, A. U.
A mathematical theory of plasticity for strain hardening materials exhibiting initial anistoropy
[NLR-TR-72117-U] N74-11719

DELANEY, C. L.
Technology forecasting - Aircraft hazard detection
A74-11499

DELERY, J.
Experimental study of shock-wave reflection upon boundary layer transition
[ONERA, TP NO. 1284] A74-11072

DELGUIDICE, P.
Analysis and design of three dimensional supersonic nozzles. Volume 1: Nozzle-exhaust flow field analysis by a reference plane characteristics technique
[NASA-CR-132350] N74-11113

DEMETRI, E. P.
Low NOx emission combustor for automobile gas turbine engines
[PB-222349/2] N74-10746

DESTUYNDER, R.
Exploitation of spectral density curves in the case of wind tunnel flutter measurement
A74-11000

DEVANNA, L. R.
Human factors experiments for data link
[AD-760401] N74-10625

DEY, S.
Two-dimensional wind tunnel test on a variable-camber airfoil with distributed suction boundary-layer control
[AD-766304] N74-10033

DIETZ, W. C.
Influence of prototype concept and cost ceilings on airframe design and manufacture of the YF-16 lightweight fighter
[SAE PAPER 730888] A74-11600

DIEUDONNE, J. E.
Motion software for a synergistic six-degree-of-freedom motion base
[NASA-TN-D-7350] N74-11096

DIGUMARTHI, R. V.
Theoretical studies of tone noise from a fan rotor
[NASA-CR-2354] N74-10735

DIXON, G. J.
The Garrett-AiResearch variable-cycle TFE731 turbofan engine
[SAE PAPER 730918] A74-11577

DOMAL, A. F.
Emission measurements of a J93 turbojet engine
[AD-766648] N74-11605

DONALDSON, C. D.
Some analyses of the chemistry and diffusion of SST exhaust materials during phase 3 of the wake period
[NASA-CR-132323] N74-10863

DONOHUE, J.
Introduction to advanced systems monitor
[SAE PAPER 730953] A74-11556

DONOVAN, J.
Transportation noise - It's measurement and evaluation
A74-11198

DORSCH, R.
Flap noise prediction method for a powered lift system
[AIAA PAPER 73-1028] A74-11051

DOUGHERTY, J. D.
Application of military human factors techniques to general aviation accident prevention
A74-10880

DOWELL, E. H.
Derivation of aerodynamic kernel functions
A74-10572

DOYLE, G. B., JR.
Stability and dynamic behavior of two tethered balloon systems
[AD-766439] N74-10070

DRAPER, G. T.
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 1: Takeoff and landing ground rules
[AD-766942] N74-10928

DREWRY, J. E.
Supersonic mixing and combustion studies of ducted hydrogen-air flows at an inlet air Mach number of 2.6
[AIAA PAPER 73-1320] A74-11313

DREYFUSS, D. J.
Cost comparisons of advanced air traffic management systems
[R-1319-DOT] N74-11436

DROUILHET, P.
Provisional signal formats for the discrete address beacon system
[ATC-30] N74-10620

DUGGER, P. H.
Photographic pyrometry in an aeroballistic range
A74-12752

DYER, C. R.
The energy dilemma and its impact on air transportation
[NASA-CR-135993] N74-11743

DYSON, R. B.
Cost impact of mission requirements on future engine design selection
[AIAA PAPER 73-1186] A74-12922

E

EATOCK, H. C.
Designing small gas turbine engines for low noise and clean exhaust
[AIAA PAPER 73-1154] A74-10507
Low NOx emission combustor for automobile
[PB-222075/4] N74-10745

EBERT, H.
Aviation turbine fuel and its lubricating qualities
A74-11739

ECER, A.
Suitability of the finite element method for analysis of unsteady flow around oscillating airfoils
A74-11439

EGGERS, J. M.
Supersonic combustion of hydrogen injected perpendicular to a ducted vitiated airstream [AIAA PAPER 73-1322] A74-11314

ELON, E. E.
A helicopter flight performance system using an LSI microprocessor [AD-765680] N74-10054

ELSASSER, T. E.
Low cost supersonic expendable turbine engines [SAE PAPER 730910] A74-11583

ENGELHARN, W. H.
Emergency air start system for the F-14B flight test aircraft [AIAA PAPER 73-1252] A74-11273

ENIS, C. P.
Photographic pyrometry in an aeroballistic range A74-12752

ERLICH, E.
Methods of visualization of the leading edge separation bubble and analysis of results A74-10997

ETKIN, B.
Progress in aerospace sciences. Volume 14 A74-12203

Measurement of turbulence inputs for V/STOL approach paths in a simulated planetary boundary layer [UTIAS-189] N74-11661

F

FALARSKI, M. D.
Acoustic characteristics of a large-scale augmentor wing model at forward speed [NASA-TM-X-2940] N74-10052

FANIWACCI, A. L.
High level container [AD-766306] N74-10899

FASKE, A. J.
Digital computer simulation of the dynamic response of a twin-spool turbofan with mixed exhausts A74-11617

FELDMAN, H. E.
Cost comparisons of advanced air traffic management systems [R-1319-DOT] N74-11436

FERLET, G.
Application to zone navigation /R/Nav/ of hybrid navigation systems A74-12446

FERRARI, E.
A first generation of L-Band avionics for AEROSAT A74-12192

FERRI, A.
Sonic boom analysis for high altitude flight at high Mach number [AIAA PAPER 73-1034] A74-12224

Analysis and design of three dimensional supersonic nozzles. Volume 3: A design technique for multiple nozzle configurations [NASA-CR-132352] N74-11115

Analysis and design of three dimensional supersonic nozzles. Volume 4: Similarity laws for nozzle flows [NASA-CR-132353] N74-11116

FILETTI, E. G.
Gas turbine engine mainshaft roller bearing-system analysis [ASME PAPER 73-LUB-3] A74-12710

FINSTON, M.
Magnetic balance and suspension systems for use with wind tunnels A74-12204

FISHER, A. V.
Selection of cutting conditions in the machining axial-flow compressor blades on an assembled rotor A74-12424

FISZDON, W.
Progress in aerospace sciences. Volume 14 A74-12203

FITZSIMMONS, E. D.
AST - A fifth engine for environmental consideration [SAE PAPER 730899] A74-11590

FOERSCHING, H.
Prediction of unsteady airloads for the solution of the panel flutter problem of nosecones and conical shell structures A74-12804

FORTER, L. E., JR.
Thermal parameters as a predictor of precipitation type for Kincheloe AFB, Michigan [AD-754927] N74-10611

FOSS, R. L.
Propulsion technology advances needed for a quiet supersonic transport [SAE PAPER 730898] A74-11591

FREDERICK, D. K.
Analysis and design of a capsule landing system and surface vehicle control system for Mars exploration [NASA-CR-136069] N74-11077

FREIESLEBEN, H. C.
Aerosat and Marsat: Satellites for mobile services N74-11018

FRIBERG, E. G.
U.S. aerospace industry at the crossroads A74-11610

FRIEDMANN, P.
Some conclusions regarding the aeroelastic stability of bingeless helicopter blades in hover and in forward flight A74-11844

FRIEDRICH, L. A.
Impact resistance of fiber composite blades used in aircraft turbine engines [NASA-CR-134502] N74-10726

FRINT, H. K.
Dynamic test of gears manufactured by advanced forging techniques [AD-765491] N74-10484

FUBARA, D. H. J.
Geodetic analysis of Skylab altimetry preliminary data - SL/2 EREP pass 9 [E74-10086] N74-11197

FUCHS, H. V.
Introduction to aerodynamic noise theory A74-12207

FUHS, A. E.
External burning assisted projectile - Theory and experiment [AIAA PAPER 73-1193] A74-11234

FULCHER, R. W.
Low speed phaselock speed control system [NASA-CASE-GSC-11127-1] N74-10202

G

GABEL, R.
Current loads technology for helicopter rotors N74-10910

GALLAGHER, J. T.
Use of simulators in the design and development of flight control systems [SAE PAPER 730933] A74-11567

GALLOT, J.
Prediction of helicopter rotor loads N74-10911

GALVAS, M. R.
FORTRAN program for predicting off-design performance of centrifugal compressors [NASA-TN-D-7487] N74-10024

GANS, G.
Status and development tendencies of titanium processing N74-11339

GARCIA, F., JR.
Shuttle sonic boom - Technology and predictions [AIAA PAPER 73-1039] A74-12225

GARDNER, L. H.
STOL tactical aircraft investigation. Volume 6: Air cushion landing system study [AD-766644] N74-10940

GASPAROVIC, M.
Calculation of the characteristics of multistage axial turbomachines A74-10029

GAUTHREAUX, S. A., JR.
Radar techniques for Air Force applications in avoidance of bird-aircraft collisions and improvement of flight safety [AD-754981] N74-10068

GEDNEY, R.
Airborne profiling of ice thickness using a short pulse radar
[NASA-TM-X-71487] N74-11204
GENZEL, J.-P.
Remote sensing of the earth's resources - Applications, benefits, methods
A74-11204
GIANNINI, R. J.
A cylindrical phased-array antenna for ATC interrogation
A74-10018
GIBSON, J. S.
V/STOL noise prediction and reduction
[LG73ER0062] N74-10921
GILL, F. L.
A corrosion inhibiting coating for structural airframe fasteners
[SAE PAPER 730902] A74-11588
GILL, J. C.
Advanced technology thrust vectoring exhaust systems
[AIAA PAPER 73-1304] A74-11303
GILLEY, B. W.
Photographic pyrometry in an aeroballistic range
A74-12752
GILTINAN, T. L.
An experimental investigation of an acoustic method for measuring gas mass flow
[AD-766419] N74-10340
GINAUD, M.
Transonic flow around slender bodies
N74-10440
GIVENS, R. B.
A low cost telemetry system
[PB-222403/8] N74-10165
GLADSTONE, R. J.
Some user benefits achievable from an advanced air traffic management system
[R-1320-DOT] N74-11435
GLASGOW, E. R.
Integrated airframe-nozzle performance for designing twin-engine fighters
[AIAA PAPER 73-1303] A74-11302
GOKA, T.
Preliminary assessment of the microwave landing system requirements for STOL operations
[NASA-TM-X-62310] N74-11431
GOLD, H.
A simplified fuel control approach for low-cost aircraft gas turbines
[SAE PAPER 730388] A74-10802
GOLDMAN, E. G.
Highly noise suppressed bypass 6 engine for STOL application
[AIAA PAPER 73-1031] A74-11799
GOLDSTEIN, M.
Effect of anisotropic turbulence on aerodynamic noise
A74-10798
GONOR, A. L.
Theory of hypersonic flow about a wing
A74-12205
GORCHAKOV, G. I.
The light-scattering matrix and types of optical weather
A74-10783
GOUET, M.
Ground lighting equipment
[NASA-TT-F-15176] N74-11092
GRABER, E. J., JR.
The effect of inlet temperature and pressure distortion on turbojet performance
[AIAA PAPER 73-1316] A74-11311
GRAETCH, J. E.
One-dimensional analysis of compressible ejector flows applicable to V/STOL aircraft design
[AIAA PAPER 73-1184] A74-12921
GRANT, F. C.
A buoyant tornado-probe concept incorporating an inverted lifting device
[NASA-TN-D-7335] N74-10584
GRAY, V. H.
Assessment of jets as acoustic shields by comparison of single- and multitube suppressor nozzle data
[AIAA PAPER 73-1001] A74-11050
GROBER, K. W.
Wind conditions at the Cologne/Bonn airport and possibilities of forecasting them
A74-11835
GROOTHOFF, C. C.
The application of fracture mechanics to the design of the barrel and driver tube of a hypersonic gun tunnel
A74-10484
GUBERNICK, D.
Gas turbine engine mainshaft roller bearing-system analysis
[ASME PAPER 73-LUB-3] A74-12710
GUENTHER, U.
Operational problems with the aircraft type Tu-134 in the case of a use of the aircraft turbine fuel TS-1
A74-11740
GUINN, W. A.
V/STOL noise prediction and reduction
[LG73ER0062] N74-10921
GUTIERREZ, O. A.
Assessment of jets as acoustic shields by comparison of single- and multitube suppressor nozzle data
[AIAA PAPER 73-1001] A74-11050
Noise tests of a high-aspect-ratio slot nozzle with various V-gutter target thrust reversers
[NASA-TM-X-71470] N74-10037
GUTMAN, J. H.
A cylindrical phased-array antenna for ATC interrogation
A74-10018
GUTWEIN, J.
A first generation of L-Band avionics for AEROSAT
A74-12192

H

HABIB, I. S.
Unsteady flow of power-law fluids
A74-10573
HACKER, P. T.
An evaluation of the relative fire hazards of jet A and jet B for commercial flight
[NASA-TM-X-71437] N74-10709
HACKMAN, L. E.
Military aircraft
A74-10496
HAEPNER, K. B.
Fluidic emergency roll control system
[NASA-CR-114588] N74-10048
HAHN, M.
Prevention of transition over a backward step by suction
A74-11339
HAHNEMANN, H. W.
Annular slot and frontal slot flow
A74-10033
HALL, D.
Eclipse flight of Concorde 001
A74-12515
HAMMOND, D. L.
One-dimensional analysis of compressible ejector flows applicable to V/STOL aircraft design
[AIAA PAPER 73-1184] A74-12921
HANNAN, P. W.
A cylindrical phased-array antenna for ATC interrogation
A74-10018
HANSFORD, R. E.
Torsion-flap-lag coupling on helicopter rotor blades
A74-11843
HANSON, D. B.
Noise and wake structure measurements in a subsonic tip speed fan
[NASA-CR-2323] N74-10020
HARDIN, B. O.
Effects of strain amplitude on the shear modulus of soils
[AD-757516] N74-10404
HARRIS, J. E.
Control of supersonic wind-tunnel noise by laminarization of nozzle-wall boundary layer
[NASA-TM-X-2879] N74-11119
HARVEY, W. D.
Control of supersonic wind-tunnel noise by laminarization of nozzle-wall boundary layer
[NASA-TM-X-2879] N74-11119

HASHIGUCHI, K.
Dynamical pressure distribution in aerodynamic bearing
A74-11899
HAUGHNEY, L. C.
Study of airborne science experiment management concepts for application to space shuttle. Volume 3: Appendixes
[NASA-TM-X-62289] N74-10783
HAYASE, G.
An integrated approach to structural weight estimation
[SAE PAPER 730936] A74-11564
HEALD, E. E.
External blowing flap technology on the USAF/McDonnell Douglas YC-15 /AMST/ program
[SAE PAPER 730915] A74-11579
HEATH, R. E., II
Optimal incomplete feedback control of linear stochastic systems
[AD-766440] N74-10071
Optimal incomplete feedback control of linear stochastic systems
[AD-766878] N74-11378
HEBERT, J.
STOL tactical aircraft investigation
[SAE PAPER 730913] A74-11581
HEBERT, J., JR.
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 1: Takeoff and landing ground rules
[AD-766942] N74-10928
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 2: Takeoff and landing digital computer program
[AD-766943] N74-10936
HEDMAN, S. G.
Computation of vortex models for wings at high angle of attack in incompressible flow
[FFA-AU-653] N74-10013
HEFNER, J. N.
Effect of geometry variations on lee-surface vortex-induced heating for flat-bottom three-dimensional bodies at Mach 6
[NASA-TN-D-7447] N74-10318
HEIDELBERG, L. J.
Highly noise suppressed bypass 6 engine for STOL application
[AIAA PAPER 73-1031] A74-11799
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[AIAA PAPER 73-1217] A74-12495
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[NASA-TM-X-71466] N74-10042
HEIGHWAY, J.
Airborne profiling of ice thickness using a short pulse radar
[NASA-TM-X-71481] N74-11204
HENDER, D. R.
The ablation performance of foams in a low heat flux
N74-10263
HENDERSON, C. M.
Lithium soap dispersions as drag-reducing hydraulic fluids
[ASLE PREPRINT 73LC-5B-2] A74-12316
HENDERSON, L. S., JR.
Mod-metric tested for bias
[AD-760081] N74-10904
HENRICH, J. E.
Continental Land Mass Air Traffic Control (COLM ATC)
[NASA-CR-132831] N74-10619
HENRY, C. J.
Control failure simulations of the PHM hydrofoil craft using a 1/20-scale dynamic model with automatic control
[AD-766098] N74-10338
HIBBARD, R. R.
An evaluation of the relative fire hazards of jet A and jet B for commercial flight
[NASA-TM-X-71437] N74-10709
HICKEY, D. H.
Aspects of large-scale, subsonic, wind-tunnel design for propulsion noise research
[AIAA PAPER 73-1279] A74-11291
HICKS, R. M.
Shuttle sonic boom - Technology and predictions
[AIAA PAPER 73-1039] A74-12225
HILBORN, E. H.
Human factors experiments for data link
[AD-760401] N74-10625
HILDEBRAND, P. H.
Objective determination of the noise level in Doppler spectra
[TR-32] N74-10155
HILDING, L.
Research on the sonic boom problem. Part 2: Flow field measurement in wind tunnel and calculation of second order F-function
[NASA-CR-2340] N74-10031
HILL, R.
Ultraviolet and near-infrared spectral analysis of a burner-can burn-through flame
[FAA-NA-73-86] N74-10866
HILST, G. R.
Some analyses of the chemistry and diffusion of SST exhaust materials during phase 3 of the wake period
[NASA-CR-132323] N74-10863
HINDMAN, E. E., II
Project Foggy Cloud 4, phase 1. Evaluation of warm fog dissipation techniques
[AD-766086] N74-10597
HINES, R. W.
Benefits of advanced propulsion technology for the advanced supersonic transport
[SAE PAPER 730896] A74-11593
Influence of noise constraints on supersonic transport engine design
[AIAA PAPER 73-1295] A74-12943
HIXSON, W. C.
Orientation-error accidents in regular Army aircraft during fiscal year 1970: Relative incidence and cost
[AD-767028] N74-10930
HODGE, C. G.
The effect of inlet-noise suppression on propulsion system design
[AIAA PAPER 73-1294] A74-12942
HOLDEMAN, J. D.
Mixing of multiple dilution jets with a hot primary airstream for gas turbine combustors
[AIAA PAPER 73-1249] A74-11270
HOLISTER, G. S.
Applications of composite materials
A74-10494
HOLLEY, B. B.
Control of supersonic wind-tunnel noise by laminarization of nozzle-wall boundary layer
[NASA-TM-X-2879] N74-11119
HOLLOWAY, P. F.
Shuttle sonic boom - Technology and predictions
[AIAA PAPER 73-1039] A74-12225
HOLTMAN, R. L.
Test of a supersonic compressor cascade, volume 1
[AD-756870] N74-10749
Test of a supersonic compressor cascade, volume 2
[AD-756871] N74-10750
HOLZHAUSEN, C. A.
Evaluation of V/STOL research aircraft design
[SAE PAPER 730947] A74-11557
HOLZMAN, J. K.
Preliminary results of flight tests of the propulsion system of the YF-12 airplane at Mach numbers to 3.0
[AIAA PAPER 73-1314] A74-12951
HONDA, T. S.
Fluidic emergency roll control system
[NASA-CR-114588] N74-10048
HOOGERHEIDE, J.
Information content of different runway lighting patterns
[NASA-TT-F-15179] N74-11094
HOOVER, W. C.
AST - A fifth engine for environmental consideration
[SAE PAPER 730899] A74-11590
HORIKAWA, Y.
Simulation study on flare control system by optimization theory
[NAL-TR-312] N74-10046

HOUGHTON, E. W.
Bird strike and the radar properties of birds
A74-12389

HOURMOUZIADIS, J.
The behavior of axial compressor cascades in the case of deviations from purely cylindrical flow
A74-10030

HOWELL, D. A. S.
The prediction of loading actions on high speed semi-rigid helicopters
N74-10914

HOWICK, R. E.
A primary radar automatic track extractor
A74-12402

HUDSON, R. L.
A low cost telemetry system
[PB-222403/8] N74-10165

HUDSON, R. R.
The experimental response of simple structures to simulated sonic booms
A74-11814

HUFFMAN, G. D.
Airfoil design for high tip speed compressors
[AIAA PAPER 73-1248] A74-11269
Test of a supersonic compressor cascade, volume 1
[AD-756870] N74-10749
Test of a supersonic compressor cascade, volume 2
[AD-756871] N74-10750

HUGON, P.
Integrated navigation in the air and on the sea
A74-12449

HUNT, R. E.
Truck noise via diesel exhaust and air intake noise
[PB-222624/9] N74-10742

HUNTER, I. M.
Properties of air-derived and ground-derived aircraft landing guidance concepts
A74-11102

HURD, R. L.
Improved fastener systems for fatigue and sealing redundancy of low shear transfer joints
[SAE PAPER 730901] A74-11589

I

IMIG, L. A.
Fatigue of supersonic transport materials using simulated flight-by-flight loading
A74-10616

ISRAEL, D. R.
AEROSAT overview
A74-12189

IVANOV, V. L.
High temperature cooled gas turbines (analysis and design)
[AD-766031] N74-10740

IWASHITA, K.
Experimental investigation of two-dimensional cascade performance with blunt trailing edge blade sections at transonic inlet Mach number range
[NAL-TR-313] N74-10322

J

JANTS, J. W.
STOL tactical aircraft investigation. Volume 1: Configuration definition (medium STOL transport with vectored thrust/mechanical flaps)
[AD-766637] N74-10925

JOHE, C.
Damage threshold determination of light walls submitted to single or repeated bangs, part 1
[ISL-35/72-PT-1] N74-10846

JOHNSON, B. V.
Noise and wake structure measurements in a subsonic tip speed fan
[NASA-CR-2323] N74-10020

JOHNSTON, G. W.
Measurement of turbulence inputs for V/STOL approach paths in a simulated planetary boundary layer
[UTIAS-189] N74-11661

JOHNSTON, R. E.
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927

JONES, J. H.
Shuttle sonic boom - Technology and predictions
[AIAA PAPER 73-1039] A74-12225

JONES, R.
Control of helicopter vibration using the dynamic antiresonant vibration isolator
[SAE PAPER 730892] A74-11597

JONES, R. E.
Use of an air-assisted fuel nozzle to reduce idle emissions of a jt8d engine combustor
[NASA-TM-X-2946] N74-11738

JONES, W. L.
Highly noise suppressed bypass 6 engine for STOL application
[AIAA PAPER 73-1031] A74-11799
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[AIAA PAPER 73-1217] A74-12495
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[NASA-TM-X-71466] N74-10042

JONES, W. P.
Research on aircraft dynamics for subsonic flight
[AD-765657] N74-10061

JORDEN, D. K.
Cost - The emerging aerospace technology
[AIAA PAPER 73-1327] A74-11318

JUDGE, R. F. A.
Design and evaluation of aircraft pavements - 1971
A74-11874

JUNE, R. E.
Commercial aircraft
A74-10495

K

KAISER, J. E.
The acoustics of aircraft engine-duct systems
[AIAA PAPER 73-1153] A74-12215

KALASHNIKOV, N. I.
Satellite communications systems
[JPRS-54505] N74-10153

KALBER, P.
Analysis and design of three dimensional supersonic nozzles. Volume 2: Numerical program for analysis of nozzle-exhaust flow fields
[NASA-CR-132351] N74-11114

KAMINSKY, A. D.
Interrogation scheduling algorithms for a discrete address beacon system
[ATC-19] N74-11432

KANTZ, E. F.
Test plan report for catapult fatigue. Test of the model E-2 A/B airplane
[AD-765708] N74-10059

KAVRAK, I.
Flow noise spectra from cylinders and aerofoils
A74-12127

KAZIN, S. B.
NASA/GE quiet engine A acoustic test results
[NASA-CR-121175] N74-10732
Radially leaned outlet guide vanes for fan source noise reduction
[NASA-CR-134486] N74-11597

KEILBACH, J. E.
Low NOx emission combustor for automobile
[PB-222075/4] N74-10745

KELLERER, H.
status and development tendencies of titanium processing
N74-11339

KELLY, D. L.
Multistage aerospace craft
[NASA-CASE-XMF-02263] N74-10907

KELLY, M. W.
Aspects of large-scale, subsonic, wind-tunnel design for propulsion noise research
[AIAA PAPER 73-1279] A74-11291

KENDALL, D. A.
Odor intensity and characterization studies of exhaust from a turbojet engine combustor
[AIAA PAPER 73-1278] A74-11290

KENNEDY, F. E., JR.
A thermal, thermoelastic, and wear simulation of a high-energy sliding contact problem
[ASME PAPER 73-LUB-6] A74-12333

KENNEDY, L. A.
Modeling of gas turbine combustors
A74-11434

KENT, H. C.
Hydrofluidic servoactuator development
[AD-766308] N74-10491

KERR, A. W.
Integrated rotor/body loads prediction
N74-10916

KETCHAM, T.
Transportation noise - It's measurement and evaluation
A74-11198

KIKUCHI, T.
Some effects of cneter of gravity locations of added mass on transonic flutter characteristics of low aspect ratio and sweptback thin cantilever wing
[NAL-TR-314] N74-10047

KING, A. E.
Spray cooled generators and design-to-cost at Westinghouse
[SAE PAPER 730878] A74-11605

KIRAN, M. S.
Two-dimensional wind tunnel test on a variable-camber airfoil with distributed suction boundary-layer control
[AD-766304] N74-10033

KIRKLAND, K. C.
Truck noise via diesel exhaust and air intake noise
[PB-222624/9] N74-10742

KIRKWOOD, T. F.
Some user benefits achievable from an advanced air traffic management system
[R-1320-DOT] N74-11435

KISATSKY, P. J.
Evaluation of the adhesive bonding processes used in helicopter manufacture. Part 4: Nondestructive inspection of adhesive bonds using holographic techniques
[AD-765455] N74-10480

KLECKNER, H. F.
Propulsion requirements for powered-lift aircraft
[AIAA PAPER 73-1214] A74-12928

KLEIN, L.
A first generation of L-Band avionics for AEROSAT
A74-12192

KLONOWSKA, M. E.
Inverting the mapping function
A74-10070

KNIGHT, C. J.
Throughflow theory for turbomachines
[AD-766537] N74-11602

KNORR, W.
Manufacture of titanium and titanium alloy semifinished products
N74-11338

KOELLER, E. G.
Computer-aided design and drafting /CADD/ - An advanced designer's tool
[SAE PAPER 730934] A74-11566

KOENIG, D. G.
Acoustic characteristics of a large-scale augmentor wing model at forward speed
[NASA-TM-X-2940] N74-10052

KOHLER, H.
Differential method for testing the optical standards of cockpit windshields
A74-10937

KONDO, H.
Experimental investigation of two-dimensional cascade performance with blunt trailing edge blade sections at transonic inlet Mach number range
[NAL-TR-313] N74-10322

KONTROVICH, F.
Cost comparisons of advanced air traffic management systems
[R-1319-DOT] N74-11436

KORS, D. L.
Mixing of multiple dilution jets with a hot primary airstream for gas turbine combustors
[AIAA PAPER 73-1249] A74-11270

KOVICH, G.
Performance of transonic fan stage with weight flow per unit annulus area of 208 kilograms per second per square meter (42.6 (lb/sec)/sq ft)
[NASA-TM-X-2903] N74-10022

Performance of transonic fan stage with weight flow per unit annulus area of 198 kilograms per second per square meter (40.6(lb/sec)/sq ft)
[NASA-TM-X-2905] N74-10027

KOZACHENKO, A. I.
Study of elastoplastic deformation with friction in hydrocarbon media
[AD-765997] N74-10717

KOZIOL, J. S., JR.
Evaluation of ILS localizer signal specification during ground rollout
[AD-765761] N74-10623

KUECHEMANN, D.
Progress in aerospace sciences. Volume 14
A74-12203

KULKARNI, P. A.
Instability of rotors in MHD journal bearings
A74-11445

KUROCHKA, G. F.
Analysis of the longitudinal disturbed motion of a surface skimmer
[AD-765992] N74-10326

KURZKE, J.
Noise generation and the design of bypass lift jet engines
A74-10984

KUTSCHENREUTER, P. H., JR.
The planar pressure pulse generator - A new dynamic distortion generator
[AIAA PAPER 73-1317] A74-11312

KYLSTRA, J.
Information content of different runway lighting patterns
[NASA-TT-F-15179] N74-11094

L

LABOURDETTE, R.
Exploitation of spectral density curves in the case of wind tunnel flutter measurement
A74-11000

LABRUJERE, T. E.
Finite element solution of the incompressible flow over an airfoil in a nonuniform stream
A74-11426

LAGER, J. R.
Commercial aircraft
A74-10495

LAKTIONOV, A. G.
Measuring the radiation of a vertical gas jet
A74-11500

LANDAHL, H.
Research on the sonic boom problem. Part 2: Flow field measurement in wind tunnel and calculation of second order F-function
[NASA-CR-2340] N74-10031

LANDERS, E. R. A.
The improvement in Mach number distribution and reduction of pressure fluctuations in the transonic working section of wind tunnel S.1
[WRE-TN-925] N74-10303

LANE, S. R.
Measured jet noise compared to California noise codes and health criteria
A74-11424

LANGE, R. H.
Advanced structural materials application for high-subsonic-speed transports
[SAE PAPER 730887] A74-11601

LASHMET, P. K.
Analysis and design of a capsule landing system and surface vehicle control system for Mars exploration
[NASA-CR-136069] N74-11077

LASSITER, L. W.
Advanced structural materials application for high-subsonic-speed transports
[SAE PAPER 730887] A74-11601

LAUDEMAN, E. C.
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927

STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 1: Takeoff and landing ground rules
[AD-766942] N74-10928
LE BALLEUR, J. C.
Experimental study of shock-wave reflection upon boundary layer transition
[ONERA, TP NO. 1284] A74-11072
LEBIGA, V. A.
Investigation of the effect of grids on the characteristics of a turbulent flow
[AD-765999] N74-10328
LEDBETTER, R. H.
The behavior of flexible airfield pavements under loads: Theory and experiments
[AD-766480] N74-11102
LEE, B.
Range-rate from DME-air data measurements A74-12182
LEHR, H. F.
Reaction modes occurring at detonation of explosive gas mixture due to detached shock front from a blunt nockup at supersonic speeds
[ISL-28/72] N74-11740
LEMANSKII, A. A.
Effect of differences between the antennas of a Doppler velocity meter on its operational accuracy A74-11994
LEMNIOS, A. Z.
Rotary wing design methodology N74-10909
LENA, P.
Eclipse flight of Concorde 001 A74-12515
LEONARD, D. A.
Measurement of gas turbine exhaust pollutants by Raman spectroscopy
[AIAA PAPER 73-1276] A74-11288
LEONARDI, S. J.
Microfog lubricant application system for advanced turbine engine components, phase 3
[NASA-CR-121271] N74-10730
LETSINGER, G. R.
STOL tactical aircraft investigation. Volume 2, part 1: Aerodynamic technology (design compendium, vectored thrust/mechanical flaps)
[AD-766639] N74-10926
LEVINE, H.
Nonlinear crack analysis with finite elements
[AD-766558] N74-11722
LEVINTAN, R. M.
The Q-Fan Demonstrator Engine
[AIAA PAPER 73-1215] A74-12929
LEWIS, D. E.
A simplified approach for estimating manufacturing cost at the part level
[SAE PAPER 730908] A74-11584
LEWIS, G. D.
Swirling flow combustion - Fundamentals and application
[AIAA PAPER 73-1250] A74-11271
LICHT, L.
Gas-lubricated foil bearings for high speed turboalternator - Construction and performance
[ASME PAPER 73-LUB-5] A74-12332
LIEBENBERG, D.
Eclipse flight of Concorde 001 A74-12515
LILLEY, G. M.
On the theory of jet noise and its applications
[AIAA PAPER 73-987] A74-12218
LIND, J. R.
Cost comparisons of advanced air traffic management systems
[R-1319-DOT] N74-11436
LING, F. F.
A thermal, thermoelastic, and wear simulation of a high-energy sliding contact problem
[ASME PAPER 73-LUB-6] A74-12333
LITTLE, B. C.
Lithium soap dispersions as drag-reducing hydraulic fluids
[ASLE PREPRINT 73LC-5B-2] A74-12316
LOCKHART, B. J.
Test of LOX compatibility for asphalt and concrete runway materials
[NASA-TM-X-64086] N74-11091
LOKAI, V. I.
High temperature cooled gas turbines (analysis and design)
[AD-766031] N74-10740
LOKAY, V. I.
Aviation gas turbine engines (selected portions)
[AD-756810] N74-10751
LORENZ-MEYER, W.
Ten years transonic wind tunnel of the AVA Goettingen A74-11808
LUSANNICK, S.
Test characteristics of a welded rotor in a 36,000-rpm Lundell alternator
[NASA-TM-X-2944] N74-11304
LUNDSTROEM, G.
Ice and landing surface demoulding: Replica fabrication
[FFA-MEMO-90] N74-10541
LUR'E, A. I.
Measuring the radiation of a vertical gas jet A74-11500
LYNN, N.
AMST - The approach to the STOL transport of the US A74-11776
LYNWANDER, P.
Spring overriding aircraft clutch
[AD-766309] N74-10073

M

MACH, H.
Study of condensation phenomena in the ISL laser wind tunnel using light diffusion
[ISL-RT-19/72] N74-11099
MACH, K. D.
Prediction of aircraft gas turbine NO/x/ emission dependence on engine operating parameters and ambient conditions
[AIAA PAPER 73-1275] A74-11287
MACK, R. J.
A study of methods which predict supersonic flow fields from body geometry, distance, and Mach number
[NASA-TN-D-7387] N74-10030
MAGGIN, B.
Air transportation noise technology overview
[AIAA PAPER 73-1152] A74-10506
MAGLIOZZI, B.
Noise and wake structure measurements in a subsonic tip speed fan
[NASA-CR-2323] N74-10020
MAGNO, P.
Air and space hi-jacking A74-12878
MAKSUTOVA, M. K.
Aviation gas turbine engines (selected portions)
[AD-756810] N74-10751
MARCY, R. D.
Gas generator design for a wide variety of APU applications
[AIAA PAPER 73-1169] A74-12916
MARINELLI, J. L.
Designing for noise and emission control in general aviation
[AIAA PAPER 73-1158] A74-10509
MARSHALL, R. L.
Impact of emission regulations on gas turbine combustor design
[AIAA PAPER 73-1155] A74-10508
MARSHALLSAY, P. G.
The improvement in Mach number distribution and reduction of pressure fluctuations in the transonic working section of wind tunnel S.1
[WRE-TN-925] N74-10303
MARTIN, C.
Simplified assembly of F-15 stressed A74-10546
MARTIN, D. J., JR.
Motion software for a synergistic six-degree-of-freedom motion base
[NASA-TN-D-7350] N74-11096
MARTIN, F. R.
Design and evaluation of aircraft pavements - 1971 A74-11874
MARTINEZ CABEZA, J. A.
Noise, an urgent problem with a slow solution A74-11001

MATTHEWS, F. B., JR.
Lightweight, variable solidity knitted parachute fabric
[NASA-CASE-LAR-10776-1] N74-10034
MATTIA, A.
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
MATZ, R. J.
Turbine engine exhaust nozzle performance
[AIAA PAPER 73-1302] A74-12947
MAY, F. W.
STOL tactical aircraft investigation. Volume 2, part 1: Aerodynamic technology (design compendium, vectored thrust/mechanical flaps)
[AD-766639] N74-10926
MCAULAY, R. J.
An optimum interference detector for DABS monopulse data editing
[ESD-TR-73-253] N74-10621
MCCLURE, R. B.
Test of a supersonic compressor cascade, volume 1
[AD-756870] N74-10749
Test of a supersonic compressor cascade, volume 2
[AD-756871] N74-10750
MCGARTY, T. P.
An optimum interference detector for DABS monopulse data editing
[ESD-TR-73-253] N74-10621
MCKENZIE, K. T.
The prediction of loading actions on high speed semi-rigid helicopters
N74-10914
MEDWID, D. W.
Test characteristics of a welded rotor in a 36,000-rpm Lundell alternator
[NASA-TM-X-2944] N74-11304
MEHALIC, C. M.
The effect of inlet temperature and pressure distortion on turbojet performance
[AIAA PAPER 73-1316] A74-11311
MEISSNER, C. W., JR.
A roll-pitch interaction simulator and a control position command encoder for remote piloting of spin-entry research models
[NASA-TN-D-7361] N74-11059
MELLBERG, K.
Use of synthetic radar information - Operational and technical aspects
A74-12403
MELLOR, A. M.
Simplified physical model of spray combustion in a gas turbine engine
A74-11451
MERREN, L. F.
Advanced enroute air traffic control radar system /ARSR-3/
A74-12198
MERONEY, R. N.
Wind tunnel and field investigations of shapes for balloon shelters
[NCAR-TN/EDD-82] N74-10016
MERRILL, G. L.
Study of small turbofan engines applicable to general-aviation aircraft
[NASA-CR-114630] N74-10725
MERTAUGH, L. J.
Two-dimensional wind tunnel test on a variable-camber airfoil with distributed suction boundary-layer control
[AD-766304] N74-10033
Investigation of the suction system and boundary-layer characteristics on a high-lift, BLC L-19 test aircraft
[AD-766305] N74-10063
MERY, P.
Interest and feasibility study of atmospheric turbulence and thermal gradients simulation
N74-11380
METZGER, F. B.
Noise and wake structure measurements in a subsonic tip speed fan
[NASA-CR-2323] N74-10020
MEYER, A. G.
Spring overriding aircraft clutch
[AD-766309] N74-10073
MEYERS, H. G.
Response predictions of helicopter landing platform for the USS BELKNAP (DLG-26) and USS GARCIA (DE-1040)-Class destroyers
[AD-766450] N74-10072
MICHALKE, A.
Introduction to aerodynamic noise theory
A74-12207
MIGDAL, D.
Effect of exhaust deflectors on the design of lift plus lift/cruise V/STOL aircraft
[SAE PAPER 730959] A74-11554
MILNS, P.
STOL tactical aircraft investigation. Volume 1: Configuration definition (medium STOL transport with vectored thrust/mechanical flaps)
[AD-766637] N74-10925
STOL tactical aircraft investigation. Volume 6: Air cushion landing system study
[AD-766644] N74-10940
MINHAS, F. U.
Boundary value problems of two-dimensional isentropic gas flow
A74-11430
MISHLER, R. B.
Deck heating effects due to VTOL jet exhaust impingement
[AIAA PAPER 73-1182] A74-11227
MITCHELL, J. G.
A new test capability for propulsion system testing
[AIAA PAPER 73-1283] A74-12939
MITCHELL, W.
Dynamic simulation of CONFLOW - A facility to provide hot-gas ground testing of air-breathing missiles under simulated flight conditions
[AIAA PAPER 73-1281] A74-11292
MOORE, G. D.
The friction and wear characteristics of plasma-sprayed NiO-CaF2 in rubbing contact with a ceramic matrix
[ASLE PREPRINT 73LC-1B-3] A74-12306
MOORE, R. D.
Performance of transonic fan stage with weight flow per unit annulus area of 208 kilograms per second per square meter (42.6 (lb/sec)/sq ft)
[NASA-TM-X-2903] N74-10022
Performance of transonic fan stage with weight flow per unit annulus area of 198 kilograms per second per square meter (40.6 (lb/sec)/sq ft)
[NASA-TM-X-2905] N74-10027
Performance of a single-stage transonic compressor with a blade-tip solidity of 1.5 and comparison with 1.3 and 1.7 solidity stages
[NASA-TM-X-2926] N74-10734
MOOZ, W. E.
Energy trends and their future effects upon transportation
[P-5046] N74-11791
MORISSET, J.
Tupolev 144 and Concorde - The official performances are compared for the first time
A74-11348
MORITA, T.
Some effects of cneter of gravity locations of added mass on transonic flutter characteristics of low aspect ratio and sweptback thin cantilever wing
[NAL-TR-314] N74-10047
MORRIS, P.
On the theory of jet noise and its applications
[AIAA PAPER 73-987] A74-12218
MORTON, H. L.
Impact of emission regulations on gas turbine combustor design
[AIAA PAPER 73-1155] A74-10508
MOSIER, S. A.
An experimental investigation of techniques for reducing objectionable exhaust emissions
[AIAA PAPER 73-1324] A74-11316
MOSKO, J. D.
Speech intelligibility testing with the modified rhyme test in aviation type noise
[AD-765470] N74-10159
MOTYCKA, D. L.
An analytical and experimental study of inlet ground vortices
[AIAA PAPER 73-1313] A74-11309

MOUILLE, R.
Progress in France in the last ten years in the field of helicopters - Prospects for the ten years to come
A74-11097
MOURAD, A. G.
Geodetic analysis of Skylab altimetry preliminary data - SL/2 ERBP pass 9
[E74-10086] N74-11197
MOYERS, C. V.
Test of LOx compatibility for asphalt and concrete runway materials
[NASA-TM-X-64086] N74-11091
MULHOLLAND, D. R.
A cost-effective approach for flight experiments - Application of Airborne Science aircraft experience to the Shuttle Sortie Lab
A74-12829
Study of airborne science experiment management concepts for application to space shuttle. Volume 3: Appendixes
[NASA-TM-X-62289] N74-10783
MULLER, G. L.
An analytical and experimental study of inlet ground vortices
[AIAA PAPER 73-1313] A74-11309
MUHAD, R. J.
Low NOx emission combustor for automobile gas turbine engines
[PB-222340/2] N74-10746
MYERS, A.
Lycomings LTS 101 - Low cost turbine power in the 600 hp class
[SAE PAPER 730911] A74-11582

N

NA, T. Y.
Unsteady flow of power-law fluids
A74-10573
NABER, H.
External burning assisted projectile - Theory and experiment
[AIAA PAPER 73-1193] A74-11234
NAGARAJA, K. S.
One-dimensional analysis of compressible ejector flows applicable to V/STOL aircraft design
[AIAA PAPER 73-1184] A74-12921
NAKAI, E.
Some effects of cneter of gravity locations of added mass on transonic flutter characteristics of low aspect ratio and sweptback thin cantilever wing
[NAL-TR-314] N74-10047
NARVESON, P. L.
Electronic display mechanization for monitoring aircraft parameters
[SAE PAPER 730956] A74-11555
NASH-WEBBER, J. L.
Motorless flight research, 1972
[NASA-CR-2315] N74-10051
NASH, J. F.
Additional three-dimensional boundary-layer computations for a finite swept wing
[NASA-CR-132335] N74-10029
NAVE, L. H.
Sea level side loads in high-area-ratio rocket engines
[AIAA PAPER 73-1284] A74-12940
NAYFEH, A. H.
The acoustics of aircraft engine-duct systems
[AIAA PAPER 73-1153] A74-12215
NAZARENKO, P. V.
Study of elastoplastic deformation with friction in hydrocarbon media
[AD-765997] N74-10717
NEEL, C. B.
Study of airborne science experiment management concepts for application to space shuttle. Volume 3: Appendixes
[NASA-TM-X-62289] N74-10783
NEER, M. E.
Supersonic mixing and combustion studies of ducted hydrogen-air flows at an inlet air Mach number of 2.6
[AIAA PAPER 73-1320] A74-11313
NELSON, W.
Use of simulators in the design and development of flight control systems
[SAE PAPER 730933] A74-11567
NEUMANN, H. E.
Minimizing boundary layer bleed for a mixed compression inlet
[AIAA PAPER 73-1270] A74-12497
Minimizing boundary layer bleed for a mixed compression inlet
[NASA-TM-X-71461] N74-10321
NICOLOFF, G. B.
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
NIVEN, J. I.
Orientation-error accidents in regular Army aircraft during fiscal year 1970: Relative incidence and cost
[AD-767028] N74-10930

O

O'CONNOR, W. M.
Evaluation of advanced air vehicle designs in the USAF
[SAE PAPER 730945] A74-11558
OATES, G. C.
Throughflow theory for turbomachines
[AD-766537] N74-11602
OCKERT, R.
Remote sensing of the earth's resources - Applications, benefits, methods
A74-11204
OGORKIEWICZ, R. M.
Deflection of carbon fibre/acrylic foam sandwich beams
A74-10322
OLSSON, W. J.
Cost impact of mission requirements on future engine design selection
[AIAA PAPER 73-1186] A74-12922
OLSTAD, W. B.
Developing a technology base in planetary entry aerothermodynamics
A74-12799
ORMISTON, R. A.
The effects of second order blade bending on the angle of attack of hingeless rotor blades
A74-11846
OSBORN, W. M.
Performance of a single-stage transonic compressor with a blade-tip solidity of 1.5 and comparison with 1.3 and 1.7 solidity stages
[NASA-TM-X-2926] N74-10734

P

PAAS, J. E.
NASA/GE quiet engine A acoustic test results
[NASA-CR-121175] N74-10732
PALAYRET, B.
Civil air navigation equipment, on the ground and in the air
A74-11094
PAPATHAKOS, L. C.
Use of an air-assisted fuel nozzle to reduce idle emissions of a jt8d engine combustor
[NASA-TM-X-2946] N74-11738
PARK, K. E.
Preliminary assessment of the microwave landing system requirements for STOL operations
[NASA-TM-X-62310] N74-11431
PARRISH, R. V.
Motion software for a synergistic six-degree-of-freedom motion base
[NASA-TN-D-7350] N74-11096
PATRICK, E. P.
Cockpit air filtration requirements of the B-1 in a nuclear dust environment
[AD-766711] N74-10065
PAYNE, J. C.
Lauching of small inflated balloons from cargo aircraft
[AD-766428] N74-10069
PEACH, J. W.
A modular turbofan design for high availability and low life cycle cost
[AIAA PAPER 73-1189] A74-11231

PEASE, E.
Lycoming LTS 101 - Low cost turbine power in the 600 hp class
[SAE PAPER 730911] A74-11582
PECAR, J. A.
Continental Land Mass Air Traffic Control (COLM ATC)
[NASA-CR-132831] N74-10619
PETERS, D. A.
The effects of second order blade bending on the angle of attack of hingeless rotor blades
A74-11846
PETRUCCO, R. J.
Microfog lubricant application system for advanced turbine engine components, phase 3
[NASA-CR-121271] N74-10730
PFENNINGER, W.
Prevention of transition over a backward step by suction
A74-11339
PHILLIPS, N. S.
Crashworthy landing gear study
[AD-765489] N74-10060
PIERCE, R. H.
An experimental investigation of techniques for reducing objectionable exhaust emissions
[AIAA PAPER 73-1324] A74-11316
PIPKO, A.
Nonlinear crack analysis with finite elements
[AD-766558] N74-11722
PINCKNEY, R. L.
Helicopter rotor blades
A74-10498
PIZZICHEMI, C. J.
STOL tactical aircraft investigation. Volume 6: Air cushion landing system study
[AD-766644] N74-10940
PLATE, E. J.
Wind tunnel and field investigations of shapes for balloon shelters
[NCAR-TN/EDD-82] N74-10016
PLETT, E. G.
Noise generation by ducted combustion systems
[AIAA PAPER 73-1024] A74-12223
PLUCINSKY, J. C.
Designing small gas turbine engines for low noise and clean exhaust
[AIAA PAPER 73-1154] A74-10507
PLUMER, J. A.
Lightning effects on general aviation aircraft
[FAA-NA-73-32(2)] N74-10040
POLEBICHEK, E. P.
Calculating pressure in combustion chamber of pulsejet engine during filling process
[AD-766045] N74-10737
POWELL, D. C.
Meteorological information for vertical and short take-off and land (V/STOL) operations in built-up urban areas: An analysis
[FAA-RD-72-135] N74-10920
PRESTON, J. L., JR.
Impact resistance of fiber composite blades used in aircraft turbine engines
[NASA-CR-134502] N74-10726
PRIOR, R. G.
Flexibility in computer-assisted radar - Controlled interceptions
A74-12406
PRUDNIKOV, A. G.
Mixing and combustion processes in jet engines
[AD-766030] N74-10741
PULS, J.
Study of unconventional gyroscopic apparatus. I
A74-12444
PURSEL, R. H.
A feasibility study and preliminary evaluation of the use of a biased glide slope technique for noise abatement approach
[FAA-RD-73-153] N74-10618
PUTNAM, L. E.
Exploratory investigation at Mach numbers from 0.40 to 0.95 of the effects of jets blown over a wing
[NASA-TN-D-7367] N74-10014

Q

QUINN, B.
Full-scale tests of an augmentor VTOL concept
[AIAA PAPER 73-1185] A74-11229

R

RAMIREZ, A., JR.
Longitudinal response of an aircraft due to a trailing vortex pair
A74-11343
RAMSDELL, J. V.
Meteorological information for vertical and short take-off and land (V/STOL) operations in built-up urban areas: An analysis
[FAA-RD-72-135] N74-10920
RAO, B. M.
Longitudinal response of an aircraft due to a trailing vortex pair
A74-11343
RAO, B. V. A.
Instability of rotors in MHD journal bearings
A74-11445
RAO, G. V. R.
Theoretical studies of tone noise from a fan rotor
[NASA-CR-2354] N74-10735
RATCLIFFE, S.
Collision avoidance and the future of air traffic control
A74-11101
RATLIFF, P. C.
Advanced enroute air traffic control radar system /ARSR-3/
A74-12198
RAVAUD, E. R.
Aircraft engines - Progress made in France over ten years, and possibilities for the ten years to come
A74-11093
RAY, B. F.
STOL tactical aircraft investigation. Volume 2, part 1: Aerodynamic technology (design compendium, vectored thrust/mechanical flaps)
[AD-766639] N74-10926
RAZUMOVSKAIA, A. I.
Hologram study of gas flow in a ballistic wind tunnel
A74-11414
REDEKER, G.
The calculation of the buffeting limits of swept wings
A74-10985
REICHERT, G.
Loads prediction methods for hingeless rotor helicopters
N74-10915
REID, L.
Effects of increased leading-edge thickness on performance of a transonic rotor blade
[NASA-TN-D-7489] N74-10025
RELLER, J. O., JR.
Study of airborne science experiment management concepts for application to space shuttle. Volume 3: Appendixes
[NASA-TM-X-62289] N74-10783
RENGSTORFF, A. E.
STOL tactical aircraft investigation. Volume 3: Takeoff and landing performance ground rules for powered lift STOL transport aircraft
[AD-766640] N74-10938
RESHOTKO, M.
Flap noise prediction method for a powered lift system
[AIAA PAPER 73-1028] A74-11051
REUKAUF, P. J.
Development of a turbine inlet gas temperature measurement and control system using a fluidic temperature sensor
[AIAA PAPER 73-1251] A74-11272
Preliminary results of flight tests of the propulsion system of the YF-12 airplane at Mach numbers to 3.0
[AIAA PAPER 73-1314] A74-12951
REYLE, S. P.
Truck noise via diesel exhaust and air intake noise
[PB-222624/9] N74-10742
RHOADES, W. W.
A semi-empirical method for predicting subsonic diffuser performance
[AIAA PAPER 73-1272] A74-11285

RICE, C.
Lauching of small inflated balloons from cargo aircraft
[AD-766428] N74-10069
RICE, J. L.
Keyed joint performance under heavy load aircraft
[AD-766706] N74-11101
RICHTER, T. J.
Design considerations for the calculator, altitude ML-646 (XE-1/UM)
[AD-766699] N74-11295
RITTER, J. E., JR.
The friction and wear characteristics of plasma-sprayed NiO-CaF2 in rubbing contact with a ceramic matrix
[ASLE PREPRINT 73LC-1B-3] A74-12306
ROE, M. H.
Air Force STOL tactical aircraft investigation - Evaluation of externally blown flaps
[SAE PAPER 730914] A74-11580
ROFFE, G.
Analysis and design of three dimensional supersonic nozzles. Volume 4: Similarity laws for nozzle flows
[NASA-CR-132353] N74-11116
ROGACHEV, G. V.
Computation of the aerodynamic characteristics of a rectangular wing with plates moving at low subsonic speed near a screen
[JPRS-60353] N74-10036
ROGER, C.
Study of Moire measuring techniques for wind tunnel model deformation
[AD-766892] N74-11298
ROGERS, D. G.
Thermal parameters as a predictor of precipitation type for Kincheloe AFB, Michigan
[AD-754927] N74-10611
ROGERS, E. C.
Supersonic combustion of hydrogen injected perpendicular to a ducted vitiated airstream
[AIAA PAPER 73-1322] A74-11314
ROGOZIN, Y. A.
Computation of the aerodynamic characteristics of a rectangular wing with plates moving at low subsonic speed near a screen
[JPRS-60353] N74-10036
ROHY, D. A.
Turbine inlet gas temperature sensor for engine control
[AD-765193] N74-10461
ROOS, R.
Calculation of instationary pressure distributions and generalized aerodynamic forces with the doublet-lattice method
[NLR-TR-72037-U] N74-10906
ROSENBAUM, B.
Effect of anisotropic turbulence on aerodynamic noise
A74-10798
ROSSBACH, D. H.
Sensing jet engine performance and incipient failure with electrostatic probes
[AD-766653] N74-11606
ROSSIGNOL, G. A.
Response predictions of helicopter landing platform for the USS BELKNAP (DLG-26) and USS GARCIA (DE-1040)-Class destroyers
[AD-766450] N74-10072
ROTT, N.
Progress in aerospace sciences. Volume 14
A74-12203
ROY, K. J.
Reduced order filtering with applications in hybrid navigation
A74-12177
RUHL, J. H.
Improved fastener systems for fatigue and sealing redundancy of low shear transfer joints
[SAE PAPER 730901] A74-11589
RULIS, E. J.
Influence of noise requirements on STOL propulsion system designs
A74-10148
RUMBARGER, J. H.
Gas turbine engine mainshaft roller bearing-system analysis
[ASME PAPER 73-LUB-3] A74-12710
RUNCIMAN, W. J.
STOL tactical aircraft investigation. Volume 2, part 1: Aerodynamic technology (design compendium, vectored thrust/mechanical flaps)
[AD-766639] N74-10926
RUSHTON, K. R.
Dynamic relaxation solution of three dimensional subsonic compressible oscillatory flow
A74-11428
RUSSELL, R. E.
A positive approach to the problems of aircraft noise
[AIAA PAPER 73-1157] A74-12227
RUSSKIKH, A.
The quality of the fuel
A74-11741

S

SABATELLA, J. A.
Benefits of advanced propulsion technology for the advanced supersonic transport
[SAE PAPER 730896] A74-11593
Influence of noise constraints on supersonic transport engine design
[AIAA PAPER 73-1295] A74-12943
SABLMAN, B.
Wing shear material
A74-11175
SAFEER, H. B.
Aircraft noise reduction - Alternatives versus cost
A74-11199
SAGALOVICH, V. N.
Mixing and combustion processes in jet engines
[AD-766030] N74-10741
SAINTSBURY, J. A.
Designing small gas turbine engines for low noise and clean exhaust
[AIAA PAPER 73-1154] A74-10507
Low NOx emission combustor for automobile
[PB-222075/4] N74-10745
SAKAGUCHI, H.
Experimental investigation of two-dimensional cascade performance with blunt trailing edge blade sections at transonic inlet Mach number range
[NAL-TR-313] N74-10322
SALEME, E.
Nonlinear crack analysis with finite elements
[AD-766558] N74-11722
SALKIND, M. J.
Applications of composite materials
A74-10494
VTOL aircraft
A74-10497
SAMANICH, N. E.
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[AIAA PAPER 73-1217] A74-12495
Effect of exhaust nozzle configuration on aerodynamic and acoustic performance of an externally blown flap system with a quiet 6:1 bypass ratio engine
[NASA-TM-X-71466] N74-10042
SAMPATH, P.
Low NOx emission combustor for automobile
[PB-222075/4] N74-10745
SAMS, E. W.
Refan program. Phase 1: Summary report
[NASA-TM-X-71456] N74-10043
SANDOR, G. N.
Analysis and design of a capsule landing system and surface vehicle control system for Mars exploration
[NASA-CR-136069] N74-11077
SANLORENZO, E.
Study of Moire measuring techniques for wind tunnel model deformation
[AD-766892] N74-11298
SARAVANAMUTTOO, H. I. H.
Digital computer simulation of the dynamic response of a twin-spool turbofan with mixed exhausts
A74-11617

SATCHWELL, B. W.
Thermal parameters as a predictor of precipitation type for Kincheloe AFB, Michigan
[AD-754927] N74-10611
SAYIGH, A. A. M.
Deflection of carbon fibre/acrylic foam sandwich beams
A74-10322
SCACCIA, C.
Modeling of gas turbine combustors
A74-11434
SCAGGS, M. E.
Supersonic mixing and combustion studies of ducted hydrogen-air flows at an inlet air Mach number of 2.6
[AIAA PAPER 73-1320] A74-11313
SCARDINA, J. A.
Description and cost of a satellite-based oceanic ATC system
A74-12193
SCHAFFAR, M.
Strong and weak shock waves. Experiments and calculations
[ISL-NB-1/73] N74-11718
SCHELLENBERG, S.
Visual landings in regional and local airports
[NASA-TT-F-15177] N74-11093
SCHMIDT, W.
The Dolphin airship with undulating propulsion system - On-test-stand comparison with a helicopter
A74-11743
SCHRA, L.
The application of fracture mechanics to the design of the barrel and driver tube of a hypersonic gun tunnel
A74-10484
SCHULZ, H. J.
An analytical study of icing simulation for turbine engines in altitude test cells
[AIAA PAPER 73-1280] A74-12938
SCHULZ, U.
Views regarding the validity of results from simulation testing in comparison with the results from actual flight test
[NASA-TT-F-15172] N74-10922
SCHUREK, O.
An empirical model for calculating the critical conditions of flame stabilization
A74-11824
SCHWIND, R. G.
The effects of leading-edge serrations on reducing flow unsteadiness about airfoils, an experimental and analytical investigation
[NASA-CR-2344] N74-10019
SCICCHITANO, E.
Emergency air start system for the F-14B flight test aircraft
[AIAA PAPER 73-1252] A74-11273
SCOTT, R. T., JR.
A helicopter flight performance system using an LSI microprocessor
[AD-765680] N74-10054
SCRANTON, R. S.
Crashworthy landing gear study
[AD-765489] N74-10060
SCRUGGS, R. M.
Additional three-dimensional boundary-layer computations for a finite swept wing
[NASA-CR-132335] N74-10029
SEDDON, J.
Research and development for future air transports
A74-11615
SEEGALL, M. I.
Turbine inlet gas temperature sensor for engine control
[AD-765193] N74-10461
SEELMANN, H.
Views regarding the validity of results from simulation testing in comparison with the results from actual flight test
[NASA-TT-F-15172] N74-10922
SEIDLER, F.
Flight-mechanics analysis of various flight conditions of conventional aircraft. VIII/2 - Mechanical foundations: Dynamic equations of motion of the control systems
A74-11744
SEKHON
Objective determination of the noise level in Doppler spectra
[TR-32] N74-10155
SERVICE, W.
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
SHAFAI, L.
Scattering by a conducting aerofoil
A74-11908
SHAHADY, P. A.
Military aircraft noise
[AIAA PAPER 73-1291] A74-12941
SHAIDUKOV, K. M.
Symmetrical eigen forms of the vibrations of a supporting surface and of an elastic fuselage
[AD-756285] N74-10067
SHAN'KO, T. M.
Investigation of flow parameters in a turbine stage with a nonuniform inlet
A74-10255
SHANNON, R. H.
The influence of operational experience on aircraft escape system development
[AIAA PAPER 73-1340] A74-11387
SHAPIRO, A.
Terrain properties and topography from Skylab altimetry
[E74-10043] N74-11164
Adaptation of computer programming to output form of altimeter data
[E74-10087] N74-11198
SHARPES, R. E.
Model support roll balance and roll coupling
N74-11681
SHAW, R. J.
Minimizing boundary layer bleed for a mixed compression inlet
[AIAA PAPER 73-1270] A74-12497
Minimizing boundary layer bleed for a mixed compression inlet
[NASA-TM-X-71461] N74-10321
SHELTON, E. M.
Aviation turbine fuels, 1972
N74-11592
SHEN, C. N.
Analysis and design of a capsule landing system and surface vehicle control system for Mars exploration
[NASA-CR-136069] N74-11077
SHIPMAN, D.
Nodalization applied to helicopters
[SAE PAPER 730893] A74-11596
SHULTS, J. M.
Material selection procedures for advanced transport aircraft
[SAE PAPER 730884] A74-11602
SHVETS, IU. I.
Investigation of flow parameters in a turbine stage with a nonuniform inlet
A74-10255
SICLARI, M.
Sonic boom analysis for high altitude flight at high Mach number
[AIAA PAPER 73-1034] A74-12224
SIEGEL, M. A.
Cost - The emerging aerospace technology
[AIAA PAPER 73-1327] A74-11318
SIMCOX, C. D.
Jet noise suppression systems for high-speed aircraft
[SAE PAPER 730897] A74-11592
SIMMONS, W. F.
Current and future materials usage in aircraft gas turbine engines
[AD-766334] N74-11604
SIMONS, I. A.
Torsion-flap-lag coupling on helicopter rotor blades
A74-11843
SINAI, Y. L.
An investigation of a nonplanar vortex lattice method for wing calculations
[CRANFIELD-AERO-17] N74-10023
SINCOFF, M. Z.
The energy dilemma and its impact on air transportation
[NASA-CR-135993] N74-11743

SINGLETON, H. R.
Project/cost/benefit
[PB-222339/4] N74-11801
SINNET, G. T.
Test of a supersonic compressor cascade, volume 1
[AD-756870] N74-10749
Test of a supersonic compressor cascade, volume 2
[AD-756871] N74-10750
SIROTKIN, Y. A.
Aerodynamic calculation of blades in axial-flow turbomachines
[AD-765932] N74-10739
SJOLUND, J. E.
Hydrofluidic servoactuator development
[AD-766308] N74-10491
SKIBIN, V. A.
Experimental investigation of the vibrations of a gas-turbine engine rotor
A74-12012
SKUJINS, O.
The stability of helical vortex filaments in the wake of a hovering rotor
[AD-766828] N74-11128
SMITH, D. H.
The ablation performance of foams in a low heat flux
N74-10263
SMITH, E. V.
Analysis and design of a capsule landing system and surface vehicle control system for Mars exploration
[NASA-CR-136069] N74-11077
SMITH, G. K.
Some user benefits achievable from an advanced air traffic management system
[R-1320-DOT] N74-11435
SMITH, K. E., JR.
Small V/STOL aircraft analysis. Volume 2: Appendices
[NASA-CR-114629] N74-10045
SMITHEY, W.
External burning assisted projectile - Theory and experiment
[AIAA PAPER 73-1193] A74-11234
SMOLDEREN, S.
Progress in aerospace sciences. Volume 14
A74-12203
SNIDER, G.
A simplified method for studying the aerodynamic heating of axisymmetric bodies at an angle of attack
A74-12441
SORENSEN, H.
Research on the sonic boom problem. Part 2: Flow field measurement in wind tunnel and calculation of second order F-function
[NASA-CR-2340] N74-10031
SOKOLSKY, S.
Aircraft noise relief potential at major hub airports
[AIAA PAPER 73-1164] A74-12217
An economic assessment of STOL aircraft potential including terminal area environmental considerations. Volume 2: Appendices
[NASA-CR-114605] N74-10044
SOLOMON, H.
A simulation approach for studying the interactions of noise, patronage, and economic viability for air transportation systems
[AIAA PAPER 73-1161] A74-12216
SOLOMON, H. L.
An economic assessment of STOL aircraft potential including terminal area environmental considerations. Volume 2: Appendices
[NASA-CR-114605] N74-10044
SONNEBORN, W. G. O.
Current developments in main rotors at Bell Helicopter Company
[AIAA PAPER 73-1160] A74-10511
SORENSEN, N. E.
Possibilities for improved supersonic inlet performance
[AIAA PAPER 73-1271] A74-11284
SOUFFLOT, A.
Eclipse flight of Concorde 001
A74-12515
SPADACCINI, L. J.
Low NOx emission combustor for automobile
[PB-222075/4] N74-10745
SPENCER, B., JR.
Transonic aerodynamic characteristics associated with variations in the geometry of the forward portion of irregular planform wings
[NASA-CR-128781] N74-10028
SPEZIA, E.
Orientation-error accidents in regular Army aircraft during fiscal year 1970: Relative incidence and cost
[AD-767028] N74-10930
SPIRIDON, A.
Interrogation scheduling algorithms for a discrete address beacon system
[ATC-19] N74-11432
SPONNIK, N. N.
Hologram study of gas flow in a ballistic wind tunnel
A74-11414
ST.AMAND, P.
Project Foggy Cloud 4, phase 1. Evaluation of warm fog dissipation techniques
[AD-766086] N74-10597
STANLEY, W. L.
Some user benefits achievable from an advanced air traffic management system
[R-1320-DOT] N74-11435
STAPERSMA, D.
Calculation of the characteristics of multistage axial turbomachines
A74-10029
STARIK, D. E.
The economic efficiency of raising the flying life and reliability of gas-turbine engines
[AD-767027] N74-11601
STAUFFERT, E.
Modern beaconing in airports for bad weather flights
[NASA-TT-F-15178] N74-11433
STEFFEN, F. W.
Wind tunnel tests of a 20 inch diameter 1.15 pressure ratio fan engine model
[AIAA PAPER 73-1216] A74-11245
STEINER, J. E.
The technology and economics of commercial airplane design. I
A74-10144
The technology and economics of commercial airplane design. II
A74-10145
STEPHENS, T.
Magnetic balance and suspension systems for use with wind tunnels
A74-12204
STEVENS, M. C.
New developments in secondary surveillance radar
A74-12358
STEVENS, R. N.
The improvement in performance of an S-band surveillance radar operating in conditions of rain clutter
A74-12396
STEVENS, W. A.
Additional three-dimensional boundary-layer computations for a finite swept wing
[NASA-CR-132335] N74-10029
STOCKER, H.
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
STOLLERY, J. L.
Turbulent boundary layer growth at hypersonic speeds
[IC-AERO-73-04] N74-11112
STONE, D. R.
Transonic aerodynamic characteristics associated with variations in the geometry of the forward portion of irregular planform wings
[NASA-CR-128781] N74-10028
STONE, J. R.
Noise tests of a high-aspect-ratio slot nozzle with various V-gutter target thrust reversers
[NASA-TM-X-71470] N74-10037
STOW, R. C.
Tactical hybrid navigation scheme for mixed community coordination
A74-12179
STRECKENBACH, J. M.
A positive approach to the problems of aircraft noise
[AIAA PAPER 73-1157] A74-12227

STRUHINSKII, V. V.
Nonlinear stability theory of the boundary layer
A74-11155
STRUNKIN, V. A.
Aviation gas turbine engines (selected portions)
[AD-756810] N74-10751
STUBBS, S. M.
Model studies of crosswind landing-gear configurations for STOL aircraft
N74-11680
STUDWELL, V. E.
Prediction of airfoil shock location in transonic flow
A74-11342
STUECK, P. G.
LSO/pilot interaction simulator
[AD-765686] N74-10055
STYCZEK, I. A.
Inverting the mapping function
A74-10070
SUDEI, J.
Low speed phaselock speed control system
[NASA-CASE-GSC-11127-1] N74-10202
SULLIVAN, C. P.
Effect of several metallurgical variables on the thermal fatigue behavior of superalloys
A74-10622
SUMMERFIELD, M.
Noise generation by ducted combustion systems
[AIAA PAPER 73-1024] A74-12223
SUTTON, T. G., SR.
Aerospace fluidics applications and circuit manufacture
[SAE PAPER 730880] A74-11604
SZCZEPANIK, R.
Certain problems in estimating the rundown time of an engine
A74-11075
SZELIGA, R.
Development of parametricized computations for AST study engines
[SAE PAPER 730895] A74-11594
SZEWCZYK, A. A.
The effects of wake splitter plates on the flow past a circular cylinder in the range of R from 10,000 to 50,000
A74-11041
SZYSZKO, C. J.
V/STOL deflector aerodynamic design criteria
[AIAA PAPER 73-1181] A74-11226

T

TAKAHASHI, M.
Some effects of cneter of gravity locations of added mass on transonic flutter characteristics of low aspect ratio and sweptback thin cantilever wing
[NAL-TR-314] N74-10047
TAKAMORI, S.
Experimental investigation of two-dimensional cascade performance with blunt trailing edge blade sections at transonic inlet Mach number range
[NAL-TR-313] N74-10322
TAMURA, A.
Dynamical pressure distribution in aerodynamic bearing
A74-11899
TANI, I.
Progress in aerospace sciences. Volume 14
A74-12203
TEER, J. G.
Studies of the effects of sonic boom on birds
[FAA-RD-73-148] N74-10039
TELIONIS, D. P.
The acoustics of aircraft engine-duct systems
[AIAA PAPER 73-1153] A74-12215
TESTER, B. J.
On the theory of jet noise and its applications
[AIAA PAPER 73-987] A74-12218
TETERVIN, N.
An empirical equation for prediction of transition location on cones in super-or hypersonic flight
[AD-765692] N74-10032
TEUNISSEN, H. W.
Measurement of turbulence inputs for V/STOL approach paths in a simulated planetary boundary layer
[UTIAS-189] N74-11661
THOMAS, M. W.
Design competence - The mainspring to cost reduction
[AIAA PAPER 73-1187] A74-11230
THOMPSON, J. W., JR.
Uncertainty in gas turbine measurements
[AIAA PAPER 73-1230] A74-11255
THOMPSON, O. O.
Lateral distribution of aircraft traffic
[AD-765435] N74-10304
THYBAUT, J. P.
Damage threshold determination of light walls submitted to single or repeated bangs, part 1
[ISL-35/72-PT-1] N74-10846
TINDELL, R. W.
F-14 inlet maneuvering capability
[AIAA PAPER 73-1273] A74-11286
TING, L.
Sonic boom analysis for high altitude flight at high Mach number
[AIAA PAPER 73-1034] A74-12224
TIULENEV, V. N.
Experimental investigation of the vibrations of a gas-turbine engine rotor
A74-12012
TOKUBO, M.
Some effects of cneter of gravity locations of added mass on transonic flutter characteristics of low aspect ratio and sweptback thin cantilever wing
[NAL-TR-314] N74-10047
TOMLINSON, J. G.
Impact of emission regulations on future gas turbine engine combustors
[AIAA PAPER 73-1277] A74-11289
TOPLIS, A. P.
It's quiet in front
[AIAA PAPER 73-1159] A74-10510
TOWNSEND, D. P.
A life study of AISI M-50 and Super Nitralloy spur gears with and without tip relief
[ASME PAPER 73-LUB-38] A74-12352
TRAMM, P. C.
Airfoil design for high tip speed compressors
[AIAA PAPER 73-1248] A74-11269
TREMOUTH, J. M.
Sodium sulphate induced rapid oxidation of a chromium-titanium-silicon coating on niobium alloy B-66
A74-11459
TREPEL, W. B.
The influence of design to cost and prototyping on the A-10 aircraft
[SAE PAPER 730890] A74-11598
TRUETT, J. C.
Studies of the effects of sonic boom on birds
[FAA-RD-73-148] N74-10039
TULISIAK, G.
Test characteristics of a welded rotor in a 36,000-rpm Lundell alternator
[NASA-TM-X-2944] N74-11304
TURNER, M. J.
Advanced flutter design techniques
[SAE PAPER 730935] A74-11565

U

ULLYATT, C.
Secondary surveillance radar in ATC
A74-12357
UNTERREINER, K. M.
Selected problems regarding the formation of a simulation model
[NASA-TT-F-15173] N74-11095
URASEK, D. C.
Performance of transonic fan stage with weight flow per unit annulus area of 208 kilograms per second per square meter (42.6 (lb/sec)/sq ft)
[NASA-TM-X-2903] N74-10022
Effects of increased leading-edge thickness on performance of a transonic rotor blade
[NASA-TN-D-7489] N74-10025

Performance of transonic fan stage with weight flow per unit annulus area of 198 kilograms per second per square meter (40.6(lb/sec)/sq ft)
[NASA-TM-X-2905] N74-10027
Performance of a single-stage transonic compressor with a blade-tip solidity of 1.5 and comparison with 1.3 and 1.7 solidity stages
[NASA-TM-X-2926] N74-10734

UTTAM, B. J.
Error model identification and performance predictions for airborne direct ranging Loran
A74-12178

V

VACHASOV, E. P.
Analysis of the longitudinal disturbed motion of a surface skimmer
[AD-765992] N74-10326

VALLERANI, E.
A simplified method for studying the aerodynamic heating of axisymmetric bodies at an angle of attack
A74-12441

VAN LEEUWEN, H. P.
The application of fracture mechanics to the design of the barrel and driver tube of a hypersonic gun tunnel
A74-10484

VANAUKEN, E. L.
Manufacturing Methods Technology (MM/T) for ballistic-tolerant flight control components
[AD-766744] N74-10933

VANDESTEEN, G.
Study of heaving motion in air cushion vehicles
[NASA-TT-F-15106] N74-10038

VANHEYINGEN, V. F.
STOL tactical aircraft investigation. Volume 3: Takeoff and landing performance ground rules for powered lift STOL transport aircraft
[AD-766640] N74-10938

VANNUTELLI, R.
Transport vehicles - Weights and loads
A74-12442

VECA, A. C.
Vibration effects on helicopter reliability and maintainability
[AD-766307] N74-10064

VELKOFF, H. R.
Study of the electrostatic field and charge distribution in a vortex seeded with dust
[AD-766815] N74-10941

VENTRES, C. S.
Derivation of aerodynamic kernel functions
A74-10572

VERDACCHI, C.
Air and space hi-jacking
A74-12878

VERDOON, A. J.
Impact of emission regulations on future gas turbine engine combustors
[AIAA PAPER 73-1277] A74-11289

VERKAMP, F. J.
Impact of emission regulations on future gas turbine engine combustors
[AIAA PAPER 73-1277] A74-11289

VICKERS, R. S.
Airborne profiling of ice thickness using a short pulse radar
[NASA-TM-X-71481] N74-11204

VIER, W. P., III
The planar pressure pulse generator - A new dynamic distortion generator
[AIAA PAPER 73-1317] A74-11312

VILLIERS, J.
The aeronautical satellites: Deluxe gadgets or system of the future
A74-12448

VINCENT, J. H.
STOL tactical aircraft investigation. Volume 5, part 2: Flight control technology: Piloted simulation of a medium STOL transport with vectored thrust mechanical flaps
[AD-766643] N74-10939

VLAJINAC, M.
Magnetic balance and suspension systems for use with wind tunnels
A74-12204

VOLYNSKII, M. S.
Mixing and combustion processes in jet engines
[AD-766030] N74-10741

VON BONIN, L.
System evaluation as an objective for a research institute
A74-11806

VOOREN, J. V. D.
Finite element solution of the incompressible flow over an airfoil in a nonuniform stream
A74-11426

VORACHEK, J. J.
Stability and dynamic behavior of two tethered balloon systems
[AD-766439] N74-10070

W

WAAN, R. J.
Calculation of instationary pressure distributions and generalized aerodynamic forces with the doublet-lattice method
[NLR-TR-72037-U] N74-10906

WACHS, M. A.
The main rotor bifilar absorber and its effect on helicopter reliability/maintainability
[SAE PAPER 730894] A74-11595

WALDRON, W. D.
Investigation of rotor dynamic and high speed bearing technology for a 3 KW turbo-alternator
[AD-765501] N74-10486

WALKER, D. Q.
Assessment of jets as acoustic shields by comparison of single- and multitube suppressor nozzle data
[AIAA PAPER 73-1001] A74-11050

WALKER, R. E.
Mixing of multiple dilution jets with a hot primary airstream for gas turbine combustors
[AIAA PAPER 73-1249] A74-11270

WALKER, S. C.
Afterbody drag flight test of the A-7E airplane
[AIAA PAPER 73-1306] A74-12948

WALLACE, R. A.
Electronic display mechanization for monitoring aircraft parameters
[SAE PAPER 730956] A74-11555

WALSH, D. E.
Prediction of aircraft gas turbine NO/x/ emission dependence on engine operating parameters and ambient conditions
[AIAA PAPER 73-1275] A74-11287

WALTER, W. A.
An analytical and experimental study of inlet ground vortices
[AIAA PAPER 73-1313] A74-11309

WALTERS, R. E.
The stability of helical vortex filaments in the wake of a hovering rotor
[AD-766828] N74-11128

WANG, J. S.
Investigation of the characteristics of tubular microphone windscreens for in-duct fan sound power measurements
A74-12126

WARD, R. D.
Computer-aided design and drafting /CADD/ - An advanced designer's tool
[SAE PAPER 730934] A74-11566

WASSERBAUER, J. F.
Minimizing boundary layer bleed for a mixed compression inlet
[AIAA PAPER 73-1270] A74-12497
Minimizing boundary layer bleed for a mixed compression inlet
[NASA-TM-X-71461] N74-10321

WATANABE, A.
Simulation study on flare control system by optimization theory
[NAL-TR-312] N74-10046

WAY, W. W.
Advantages of aircraft system maturity
[SAE PAPER 730907] A74-11585

WEBB, W. L.
Development of a turbine inlet gas temperature measurement and control system using a fluidic temperature sensor
[AIAA PAPER 73-1251] A74-11272

WEBER, H. A.
VTOL recirculation and impingement model testing
[AIAA PAPER 73-1183] A74-11228
WEHOFER, S.
Turbine engine exhaust nozzle performance
[AIAA PAPER 73-1302] A74-12947
WEINSTEIN, A. I.
Thermal warm fog dissipation: Heat requirements and projected utilization of a system for Travis AFB, California
[AD-766247] N74-10605
WELLS, H. A.
A unique method for monitoring cabin air pollution from engine oil in the EB-57 D aircraft
[AD-766701] N74-10932
WENTZ, W. H., JR.
New airfoil sections for general aviation aircraft
[SAE PAPER 730876] A74-11606
WERLE, H.
On the flow around the leading edge of a lifting airfoil
A74-10996
WESOKY, H. L.
Wind tunnel tests of a 20 inch diameter 1.15 pressure ratio fan engine model
[AIAA PAPER 73-1216] A74-11245
WEST, G. S.
The effects of wake splitter plates on the flow past a circular cylinder in the range of R from 10,000 to 50,000
A74-11041
WHELAN, E. P.
Sodium sulphate induced rapid oxidation of a chromium-titanium-silicon coating on niobium alloy B-66
A74-11459
WHITE, E. C.
Lightweight, variable solidity knitted parachute fabric
[NASA-CASE-LAR-10776-1] N74-10034
WHITE, L. J.
Bilinear surface representation of radar scattering for aircraft
[AD-766320] N74-10169
WHITE, R. P., JR.
An investigation of the vibratory and acoustic benefits obtainable by the elimination of the blade tip vortex
A74-11845
WHITNEY, C. A.
STOL tactical aircraft investigation. Volume 1: Configuration definition
[AD-766941] N74-10927
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 1: Takeoff and landing ground rules
[AD-766942] N74-10928
STOL tactical aircraft investigation. Volume 3: Performance ground rules and methods. Book 2: Takeoff and landing digital computer program
[AD-766943] N74-10936
WILCOX, F. A.
Comparison of ground and flight test results using a modified F106B aircraft
[AIAA PAPER 73-1305] A74-11304
WILD, J.
Present and future radar display techniques
A74-12382
WILDHORN, S.
Some user benefits achievable from an advanced air traffic management system
[R-1320-DOT] N74-11435
WILHOLD, G. A.
Shuttle sonic boom - Technology and predictions
[AIAA PAPER 73-1039] A74-12225
WILKINSON, K. G.
RB 211 - The first eighteen months operating experience /Sholto Douglas Memorial Lecture/
A74-12300
WILLBANKS, C. E.
Recovery characteristics of a single-shielded self-aspirating thermocouple probe at low pressure levels and subsonic speeds
A74-12280
An analytical study of icing simulation for turbine engines in altitude test cells
[AIAA PAPER 73-1280] A74-12938
WILLIAMS, D. D.
Some aspects of inlet/engine flow compatibility
A74-11618
WILMOT, T. A.
Bird strike and the radar properties of birds
A74-12389
WILSON, R. N.
Creep fracture mechanisms in aluminum alloys
A74-11736
WIMPRESS, J. K.
Upper Surface Blowing technology as applied to the YC-14 airplane
[SAE PAPER 730916] A74-11578
WINSLOW, L. J.
The effect of inlet-noise suppression on propulsion system design
[AIAA PAPER 73-1294] A74-12942
WOLLAK, H. J.
Aerosat and Marsat: Satellites for mobile services
N74-11018
WOLLER, P. T.
Analysis of stratified and closely spaced jets exhausting into a crossflow
[NASA-CR-132297] N74-11118
WOMER, W. H.
Pollution in the ground support environment
[AD-764854] N74-10602
WOOD, S. K.
The effect of inlet-noise suppression on propulsion system design
[AIAA PAPER 73-1294] A74-12942
WOODBURY, M. G.
A simplified approach for estimating manufacturing cost at the part level
[SAE PAPER 730908] A74-11584
WOODFORD, J. B.
AEROSAT performance specifications
A74-12190
WRAIGHT, P.
Eclipse flight of Concorde 001
A74-12515
WU, J.
Near-field trajectory of turbulent jets discharged at various inclinations into a uniform crossflow
A74-10568
WU, J.-M.
Prediction of airfoil shock location in transonic flow
A74-11342
WUEST, W.
Progress in aerospace sciences. Volume 14
A74-12203
WYNOSKY, T. A.
V/STOL deflector aerodynamic design criteria
[AIAA PAPER 73-1181] A74-11226

Y

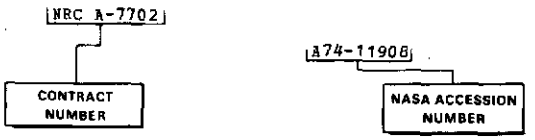
YANTA, W. J.
Turbulence measurements with a laser Doppler velocimeter
[AD-766781] N74-11129
YEOWART, N. S.
Noise design goals for the next generation of aircraft
A74-11816
YERAZUNIS, S. W.
Analysis and design of a capsule landing system and surface vehicle control system for Mars exploration
[NASA-CR-136069] N74-11077
YERMOLENKO, S. D.
Computation of the aerodynamic characteristics of a rectangular wing with plates moving at low subsonic speed near a screen
[JPRS-60353] N74-10036
YINGLING, W. A.
Cockpit air filtration requirements of the B-1 in a nuclear dust environment
[AD-766711] N74-10065
YOST, J. O.
Some aspects of inlet/engine flow compatibility
A74-11618
YOUNG, E.
Lanching of small inflated balloons from cargo aircraft
[AD-766428] N74-10069

Z

ZACHARKIN, P. B.
Pollution in the ground support environment
[AD-764854] N74-10602
ZAKHAR'EV, L. N.
Effect of differences between the antennas of a Doppler velocity meter on its operational accuracy
A74-11994
ZARETSKY, E. V.
A life study of AISI M-50 and Super Nitralloy spur gears with and without tip relief
[ASME PAPER 73-LUB-38] A74-12352
ZDORENKO, IU. N.
Investigation of flow parameters in a turbine stage with a nonuniform inlet
A74-10255
ZHBANOV, IU. K.
Solution of the equations of motion of a gyrohorizon compass at finite deviation angles from the meridian
A74-11685
ZHDANOV, V. V.
Calculating pressure in combustion chamber of pulsejet engine during filling process
[AD-766045] N74-10737
ZHIRITSKII, G. S.
Aviation gas turbine engines (selected portions)
[AD-756810] N74-10751
ZIEGLER, H.
Analysis of stratified and closely spaced jets exhausting into a crossflow
[NASA-CR-132297] N74-11118

CONTRACT NUMBER INDEX

Typical Contract Number Index Listing



Listings in this index are *arranged alphanumerically* by contract number. Under each contract number, the accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order with the IAA accession numbers appearing first. The accession number denotes the number by which the citation is identified in either the *IAA* or *STAR* section.

AF PROJ. 6101
N74-10326
N74-10328
AF PROJ. 643A
N74-10925
N74-10926
N74-10927
N74-10928
N74-10936
N74-10937
N74-10938
AF PROJ. 683M
N74-10404
N74-11102
AF PROJ. 1369
N74-10067
AF PROJ. 1987
N74-10461
AF PROJ 2567
A74-11342
AF PROJ. 3066
A74-11316
N74-11602
AF PROJ. 6665
N74-10069
N74-10070
AF PROJ. 7065
N74-10749
N74-10750
AF PROJ. 7360
N74-10932
AF PROJ. 7605
N74-10605
AF PROJ. 8219
N74-10071
AF PROJ. 8222
N74-11606
AF PROJ. 8809
N74-10065
AF PROJ. 9769
N74-10169
AF PROJ. 9777
N74-10068
AF-AFOSR-1710-69
N74-10169
AF-AFOSR-1974-71
N74-10068
ARO PROJ. PW5213
N74-10340
DA PROJ. 1F1-62203-A-529
N74-10060
DA PROJ. 1F1-62204-A-142
N74-10033
N74-10063
DA PROJ. 1F1-62208-A-170
N74-10933
DA PROJ. 1F1-63204-D-38B
N74-10064
DA PROJ. 1G1-62207-AA-72
N74-10484
DA PROJ. 1T0-61102-B-53A
N74-11295
DA PROJ. 200-10501-B-700
N74-10941
DA PROJ. 3A0-61102-B-71P
N74-10159
DA-31-124-ARO(D)-246
N74-10941
DAAG17-72-C-0075
N74-10899
DAAJ02-67-C-0016
N74-10033
N74-10063
DAAJ02-69-C-0060
N74-10484
DAAJ02-70-C-0055
N74-10060
DAAJ02-71-C-0035
N74-10073
DAAJ02-71-C-0037
N74-10064
DAAJ02-71-C-0062
N74-10933
DAAJ02-72-C-0017
N74-10491
DAAK02-72-C-0043
N74-10486
DAHC04-69-C-0015
N74-10061
DGRST-69-01-906
N74-11380
DI-14-16-0001-5351-FR
N74-10039
DOT-FA72NA-656
N74-10040
DOT-FA72WA-3099
N74-10921
DOT-FA72WAI-238
N74-10039
DOT-FA72WAI-261
N74-10620
N74-10621
N74-11432
DOT-FA72WAI-263
N74-10920
DOT-IA-FA-313
N74-10625
DOT-TSC-344 N74-11435
N74-11436
DOT-TSC-533 N74-10742
DRME-72/184 N74-10846
DRME-72/545 N74-11099
DSA900-73-C-0922
N74-11604
EPA-R-801284 A74-11451
EPA-68-04-0015
N74-10745
EPA-68-04-0017
N74-10746
FAA PROJ. 034-241-012
N74-11432
F19628-72-C-0219
N74-10070
F19628-73-C-0002
N74-10620
N74-10621
N74-11432
F29601-72-C-0027
N74-10404
F33615-61-C-1757
N74-10940
F33615-70-C-1636
N74-10929
N74-10931
F33615-70-C-1763
A74-12178
F33615-71-C-175
N74-10938
F33615-71-C-1510
N74-10461
F33615-71-C-1754
A74-11581
N74-10927
N74-10928
N74-10936
F33615-71-C-1757
N74-10925
N74-10926
N74-10937
N74-10939
F33615-71-C-1766
N74-10749
N74-10750
F33615-71-C-1870
A74-11316
F33615-72-C-1082
N74-11602
F33615-72-C-1185
A74-11602
F33615-72-C-1269
N74-11296
F33615-72-C-1748
A74-11302
F33615-72-C-1787
A74-12177
F33615-72-C-2149
A74-11602
F33615-73-C-3001
A74-11602
F33615-73-C-3013
N74-11661
F33657-70-C-0511
A74-11302
F40600-72-C-0009
N74-11298
F40600-73-C-0004
A74-12752
MP51524005 N74-10930
NASA ORDER T-4716-B
N74-11164
N74-11198
NASW-2481 N74-10922
N74-10923
N74-11094
N74-11095
NASW-2482 N74-10038
N74-11092
N74-11093
N74-11433
NASW-2483 N74-10918
NAS1-10327 N74-11113
N74-11114
N74-11115
N74-11116
NAS1-10635 N74-10297
NAS1-11524 N74-11118
NAS1-11670 N74-10020
NAS1-11873 N74-10863
NAS1-12153 N74-10029
NAS2-5467 N74-10048
NAS2-6010 N74-10019
NAS2-6175 A74-11844
NAS2-6401 N74-10735
NAS2-6473 N74-10044
N74-10045
NAS2-6799 N74-10725
NAS3-12430 N74-10732
N74-11597
NAS3-14406 N74-10049
NAS3-15568 N74-10726
NAS3-15703 A74-11270
NAS3-16729 N74-10730
NAS3-16814 N74-10729
NAS5-21656 N74-10619
NAS8-25156 A74-12940
NAS8-27980 A74-12940
NAS9-13247 N74-10028
NAS9-13276 N74-11197
NAS9-13304 N74-11202
NGL-33-016-119
A74-12224
NGL-33-018-091
N74-11077
NGR-22-009-731
N74-10051
NGR-31-001-241
A74-12223
NGR-33-018-152
A74-12333
NGR-47-004-109
A74-12215
NGR-52-120-001
N74-10031
NGT-47-003-028
N74-11743
NOW-62-0604-C
A74-10568
NR PROJ. 098-038
N74-10736
NR PROJ. 215-163
N74-11128
NRC A-7702 A74-11908
NSF GA-38109 N74-10155
NSF GT-34903 N74-11801
N00014-67-A-0151-0029
A74-12223
N00014-67-A-0202-0019
N74-10338
N00014-67-A-0226-0005
N74-10736
N00014-68-A-0512
N74-11128
N62269-72-C-0325
N74-11065
501-06-07-03 N74-11119
501-06-09-01 N74-10015
501-06-11-01 N74-10030
501-24 N74-10022
N74-10024
N74-10025
N74-10026
N74-10027
N74-10722
N74-10734
N74-11738
501-24-06-01 N74-10014
501-39-11-02 N74-11096
502-37-01-11 N74-10318
503-35 N74-11304
739-70 N74-10043
760-17-01-05 N74-11059
760-60-009-731
N74-10051
760-62-01 N74-10052
979-11-36-01 N74-10584
375-50-01-10 N74-10783