NASA

https://ntrs.nasa.gov/search.jsp?R=19830008006 2020-03-21T05:47:40+00:00Z

Aeronautical Engineering A Continuing Bibliography with Indexes NASA SP-7037(154) November 1982

National Aeronautics and Space Administration

(NASA-SP-7037(154))AERONAUTICALN83-16277ENGINEERING:A CONTINUING BIBLIOGEAPHY WITHINDEXES, SUPPLEMENT 154 (National
Aeronautics and Space Administration)143 pUnclas
08355HC A07CSCL 01A 00/0108355

-8 au e 2 0 eer ronautical ee

ACCESSION NUMBER RANGES

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

STAR (N-10000 Series)	N82-28243 - N82-30281
IAA (A-10000 Series)	A82-38103 - A82-41587

2

This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by PRC Government Information Systems.

AERONAUTICAL ENGINEERING

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 154)

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 October 1982 in

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



This supplement is available as NTISUB/141/093 from the National Technical Information Service (NTIS), Springfield, Virginia 22161 at the price of \$5.00 domestic; \$10.00 foreign

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.

This supplement to Aeronautical Engineering -- A Continuing Bibliography (NASA SP-7037) lists 511 reports, journal articles, and other documents originally announced in October 1982 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* and *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.

10

An annual cumulative index will be published.

AVAILABILITY OF CITED PUBLICATIONS

IAA ENTRIES (A82-10000 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 of accessions are available at \$8.00 per document. Microfiche⁽¹⁾ of documents announced in *IAA* are available at the rate of \$4.00 per microfiche on demand, and at the rate of \$1.35 per microfiche for standing orders for all *IAA* microfiche.

Minimum air-mail postage to foreign countries is \$2.50 and all foreign orders are shipped on payment of pro-forma invoices.

All inquiries and requests should be addressed to AIAA Technical Information Service. Please refer to the accession number when requesting publications.

STAR ENTRIES (N82-10000 Series)

One or more sources from which a document announced in *STAR* is available to the public is ordinarily given on the last line of the citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

Avail: NTIS. Sold by the National Technical Information Service. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code preceded by the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page vii.

Documents on microfiche are designated by a pound sign (#) following the accession number. The pound sign is used without regard to the source or quality of the microfiche.

Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Section, Springfield, Va. 22161.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the * symbol), use the N accession number. NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number. Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

- Avail SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard \$4.00 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 Document 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 NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

⁽¹⁾ A microfiche is a transparent sheet of film, 105 by 148 mm in size containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 26.1 reduction)

- Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE 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) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.
- Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.
- 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 and mailing 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 the BLL.)
- Avail: Fachinformationszentrum, Karlsruhe. Sold by the Fachinformationszentrum Energie, Physik, Mathematik GMBH, Eggenstein Leopoldshafen, 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 and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of 50 cents 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.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics and Astronautics Technical Information Service 555 West 57th Street, 12th Floor New York, New York 10019

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

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

Department of Energy Technical Information Center P.O. Box 62 Oak Ridge, Tennessee 37830

ESA-Information Retrieval Service ESRIN Via Galileo Galilei 00044 Frascati (Rome) Italy

Fachinformationszentrum Energie, Physik, Mathematik GMBH 7514 Eggenstein Leopoldshafen Federal Republic of Germany

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

NASA Scientific and Technical Information Facility P O Box 8757 B W I Airport, Maryland 21240

National Aeronautics and Space Administration Scientific and Technical Information Branch (NST-41) Washington, D.C. 20546 National Technical Information Service 5285 Port Royal Road Springfield, Virginia 22161

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

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

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

University Microfilms, Ltd. Tylers Green London, England

U S Geological Survey 1033 General Services Administration Building Washington, D.C. 20242

U.S. Geological Survey 601 E Cedar Avenue Flagstaff, Arizona 86002

U.S. Geological Survey 345 Middlefield Road Menlo Park, California 94025

U S. Geological Survey Bldg 25, Denver Federal Center Denver, Colorado 80225

NTIS PRICE SCHEDULES

Schedule A

- -

STANDARD PAPER COPY PRICE SCHEDULE

(Effective January 1, 1982)

Price Code	Page Range	North Amerícan Price	Foreign Price
A01	Microfiche	\$ 4 00	\$ 8,00
A02	001-025	6 00	12 00
A03	026-050	7 50	15 00
A04	051-075	9 00	18 00
A05	076-100	10 50	21 00
A06	101-125	12 00	24 00
A07	126-150	13 50	27 00
A08	151-175	15 00	30 00
A09	176-200	16 50	33 00
A10	201-225	18 00	36 00
A11	226-250	19 50	39 00
A12	251-275	21 00	42 00
A13	276-300	22 50	45 00
A14	301-325	24 00	48 00
A15	326-350	25 50	51 00
A16	351-375	27 00	54 00
A17	376-400	28 50	57 00
A18	401-425	30 00	60 00
A19	426-450	31 50	63 00
A20	451-475	33 00	66 00
A21	476-500	34 50	69 00
A22	501-525	36 00	72 00
A23	526-550	37 50	75 00
A24	551-575	39 00	78 00
A25	576-600	40 50	81 00
	601-up	1/	2/

A99 - Write for guote

1/ Ådd \$1 50 for each additional 25 page increment or portion thereof for 601 pages up

2/ Add \$3 00 for each additional 25 page increment or portion thereof for 601 pages and more

Schedule E

EXCEPTION PRICE SCHEDULE

Paper Copy & Microfiche

.

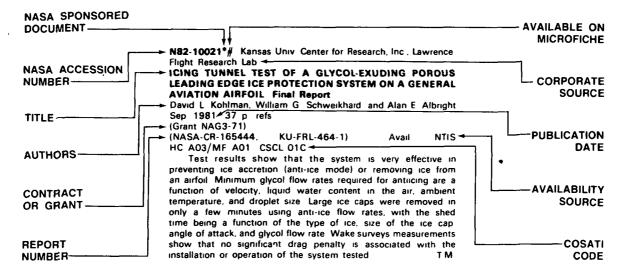
Price	North American	Foreign
Code	Price	Price
E01	\$ 6 50	\$ 13 50
E02	7 50	15 50
E03	9 50	19 50
E04	11 50	23 50
E05	13 50	27 50
E06	15 50	31 50
E07	17 50	35 50
E08	19 50	39 50
E09	21 50	43 50
E10	23 50	47 50
E11	25 50	51 50
E12	28 50	57 50
E13	31 50	63 50
E14	34 50	69 50
E15	37 50	75 50
E16	40 50	81 50
E17	43 50	88 50
E18	46 50	93 50
E19	51 50	102 50
E20	61 50	123 50
E-99 - Write for quote		
N01	30 00'	45 00

TABLE OF CONTENTS

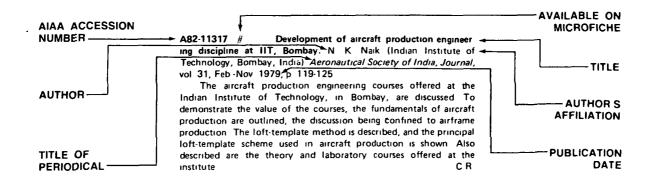
Page

IAA ENTRIES (A82-10000)	481
STAR ENTRIES (N82-10000)	521
	-
Subject Index	A_1
Personal Author Index	
Contract Number Index	C.1

TYPICAL CITATION AND ABSTRACT FROM STAR



TYPICAL CITATION AND ABSTRACT FROM IAA



AERONAUTICAL . ENGINEERING

A Continuing Bibliography (Suppl. 154)

IAA ENTRIES

A82-38146 Efficient optimum design of structures - Program DDDU. L -X Qian, W Zhong, Y Sui, and J Zhang (Dalian Institute of Technology, Dalian, People's Republic of China) Computer Methods in Applied Mechanics and Engineering, vol 30, May 1982, p 209-224 12 refs

An efficient optimization algorithm is developed for engineering structures subject to multiple constraints. This highly non-linear and implicit problem is reduced to a combination of a sequence of quasi-linear constraints and explicit problems of the statically determined structures. The method is based on the Kuhn-Tucker necessary conditions for optimality associated with a simple quadratic program designed simultaneously to determine the Lagrange multipliers and to delete non-active constraints. A number of examples including trusses and wing structures show that the method is efficient when compared with other competing techniques. (Author)

A82-38216 Forward-swept wings add supersonic zip. R DeMeis High Technology, vol 2, Jan -Feb 1982, p 33-40

A forward-swept wing aircraft is being built under an Air Force contract for test flying in late 1983 This design has many advantages over conventional aft-swept wing aircraft, including a naturally smoother area distribution, which lowers wave drag and allows a wider fuselage at the center of gravity and, thus, provides greater payload and fuel capacity. However, since twisting of the wings caused by airflow produces extreme shearing forces, the forward-swept wing design has only recently become possible by means of structural tailoring of the wing using graphite-epoxy composite material which compensates for the unstable wing twisting under standard fighter-type flying conditions. In addition, the design confers such a responsive, unstable configuration that computer control is necessary to augment pilot action. Detailed explanations of the main aerodynamic features of the forward-swept wing design are given.

A82-38222 # Composite use on helicopters. J Ray (United Technologies, Corp, Sikorsky Aircraft Div, Stratford, CT) Astronautics and Aeronautics, vol 20, July-Aug 1982, p 60, 61

Composite material used in components of the Sikorsky S-76 helicopter are reviewed Composite fiber reinforced with Nomex and an aluminum honeycomb is employed for the horizontal stabilizer. The spar is equipped with caps made of undirectional graphite-epoxy tape co-cured with Kevlar skin material. Two plies of woven Kevlar cover the caps in order to prevent galvanic corrosion. The inboard section of the spar possesses a precured torque tube of woven Kevlar cloth which is bonded to an aluminum core and provides the dominant load path for torsion and flexural shear. The composite materials are responsible for a 17.4% reduction in the artframe/gross weight ratio and an increase of 20% in the range due to the smooth flush contour of the stabilizer and consequent drag reduction. The fairings and doors of the S-76 are also made of laminated structures, and sandwich panels serve for the windshield support posts, internal frames, longitudinal elements and door jamb

A82-38223 # Toward all-composite helicopter fuselage. L. Marchinski (Boeing Vertol Co., Philadelphia, PA) Astronautics and Aeronautics, vol 20, July-Aug 1982, p 61, 62

The construction and benefits of using all-composite material for helicopter fuselages, particularly on the Boeing Vertol 234, are outlined. The cabin floor of the 234 is made of four composite panels with fiber glass/Kevlar 49 face sheets and a Nomex honeycomb core. Molded-edge rubber seals bonded into the floor assembly during co-curing and machined 7050 aluminum fittings at each end of the lateral, Kevlar beams under the lower side of the floor panels have contributed to a vibration rate of less than 0.03 g. A 10% weight saving over that available with an all metal floor has been achieved, as well as greater impact resistance. The success with the floor indicates that replacement of all-metal fuselages with Nomex-honeycomb structures offers a potential weight savings of 33%. Further research is necessary into the effects of lightning strikes and electrical bonding.

NOVEMBER 1982

A82-38224 # Committing composites to the Boeing 767. R Hammer (Boeing Commercial Airplane Co , Renton, WA) Astronautics and Aeronautics, vol 20, July-Aug 1982, p 62

Applications of Kevlar/graphite composites in the Boeing 767 aircraft are reviewed, noting the higher weight savings which were achieved than were offered by metal or fiber glass/epoxy materials. Results from a NASA/Lockheed program testing the Kevlar composites in comparison with fiber glass parts proved the acceptability of using the Kevlar/graphite for 24 different aircraft components at a weight savings of over 2000 lb. It is concluded that the employment and techniques involving composite technologies are at the same stage as aluminum technology was in the 1930s. MS K

A82-38249 Mirage 2000 - Towards possible high series production aircraft (Mirage 2000 - Vers l'avion de série). J Morisset and N Beauclair Air et Cosmos, vol 20, July 10, 1982, p 26-42 In French

Design and performance characteristics of the Mirage 2000 aircraft are presented, noting modifications available for different combat missions. The single-engined aircraft is equipped with multiple radar systems, can be used as an interceptor at high or low altitudes, is capable of carrying air-to-ground nuclear tipped missiles, and features two 30 mm cannons. Fly by wire control is standard, and, the aircraft is stable at high angles of attack with a top speed of Mach 22 while carrying a full load at 60,000 ft. The internal fuel stores are 3800 liters, and external stores can be added to extend the total range to 1500 km. By wind 1980 the Mirage 2000 had been flight tested in 1677 sorties, with tests being done on five configurations of the aircraft Details of the design process, the use of composites in the aircraft structure, the operational features of the missile stores, the laser guidance system, and the electronics are provided.

A82-38281 # Aerodynamic behavior of a stender slot in a wind tunnel wall. D B Biss (Princeton University, Princeton, NJ) AIAA Journal, vol 20, Sept 1982, p 1244-1252 8 refs Grant No AF-AFOSR-77-3337

A theoretical model for the flow through a single slot of finite length in a wall separating a uniform freestream and a quiescent fluid at different static pressures is constructed. This problem is relevant to understanding the aerodynamic behavior of slots which are used in the test sections of some ventilated wall transonic wind tunnels. The theoretical relationship which is obtained between the pressure differential across the slot and the flow through the slot shows both the linear and quadratic regimes observed in experiments. The linear behavior arises from the acceleration of the cross flow into the slot downstream of the leading edge and from the interaction of streamwise stations along the slot, as well as from the effect of slot taper. Analytical solutions are obtained for two slot planform shapes, and some other cases are solved numerically. The quantitative agreement with experimental data is very encouraging. (Author)

A82-38283 # Improved solutions to the Falkner-Skan boundary-layer equation. C A Forbrich, Jr (USAF, Armament Laboratory, Fort Walton Beach, FL) AIAA Journal, vol 20, Sept 1982, p 1306, 1307 11 refs USAF-supported research

The results of a state variable approach to computationally solve the Falkner-Skan equation over a wide range of boundary-layer acceleration parameters are presented. The Falkner-Skan equation is concerned with flow past an infinite wedge with a particular vertex angle, and solutions are presented which are accurate to eight places for third order differential equations. Iterative procedures for improving the order of accuracy are described, and an example is provided for the case of an initial wedge angle of 0.40 x pi. The method is considered acceptable for the analysis of slightly accelerating and decelerating flows encountered in low drag and supercritical airfoils.

A82-38405 VHF radio link for ground-air-ground communications using an integrated voice-data modulation. G Benelli (Firenze, Università, Florence, Italy) *Electronics Letters*, vol 18, June 24, 1982, p 555, 556 Consiglio Nazionale delle Richerche *Contract No* 81,00,202

A possible realization of a data channel between aircraft and ground station is presented, which utilizes a combined amplitude-phase modulation. Amplitude modulation is used to transmit a voice signal, while phase modulation is used for

data transmission Performance of this system is evaluated through a computer simulation (Author)

A82-38422 The need for a dedicated public service helicopter design. R Morrison (Airborne Law Enforcement Association, Inc., Huntington Beach Police Dept, Huntington Beach, CA) Vertiflite, vol 28, July-Aug 1982, p 28-32

A proposal is made for NASA to undertake a program to develop a technologically-advanced modular helicopter designed specifically for public service use, that is, for emergency medical services, fire fighting, wildlife management, law enforcement, etc. Public service helicopters currently in use have many unattractive-features, such as high noise and cost, as a result of their original designs to satisfy military requirements, and are unable to meet the varied needs of public service operators. The proposed helicopter would have a high speed (200-300 knots), combined with effective night, all-weather operation, and could yield national benefits of over \$90 billion per year, including a greater ability to compete with foreign-made helicopters, a reduced response time in emergency situations, a greater effectiveness in law enforcement, and expanded job opportunities in the helicopter industry.

A82-38423 JVX, what an opportunity. C C Crawford, Jr (US Army, Aviation Research and Development Command, St Louis, MO) Vertiflite, vol 28, July-Aug 1982, p 34-39

US military officials have proposed the creation of a Joint Services Advanced Vertical Lift Aircraft Program (JVX) to design a family of advanced technology vertical lift aircraft which could perform numerous, multi-service missions and achieve initial operating capability in the early 1990s. Six specific roles have been selected from the mission profiles to serve as a basis for molding requirements for a common multi-service air vehicle and the requirement for fulfilling worldwide self-deployment. The six roles - combat search and rescue, long range requirements, special electronics mission, signal intelligence, Marine Corps JVX, and self-deployment - are described in detail and schematics showing each of the mission profiles are included. A technical assessment group, which included representatives of the US Army Aviation Research and Development Command and NASA, reviewed possible configurations for the JVX and determined that tilt rotor configurations appear to offer the best possibility for a common multiservice design since they possess adequate hover efficiency, high-altitude and high speed capabilities as well as world-wide self-deployment. Other configurations studied, including lift/cruise fan configurations, conventional helicopters, and the auxiliary propulsion ABC/compound helicopter, all have serious drawbacks and are considered less attractive for the JVX NB

A82-38439 # Minimal order time sharing filters for INS in-flight alignment. I Y Bar-Itzhack (Technion - Israel Institute of Technology, Haifa, Israel) *Journal of Guidance, Control, and Dynamics*, vol 5, July-Aug 1982, p 396-402 19 refs Research supported by the Israel Aircraft Industries, Ltd, and Ministry of Defence

Very simple reduced order filters which operate in a time sharing mode are proposed for in-flight and transfer alignment of calibrated inertial navigation systems (INS) such as those in fighter aircraft. The coarsely aligned INS is flown for a short duration in a straight and level flight during which two second-(or third-) order time sharing filters estimate the level misalignment. After removing the estimated level misalignment angles a third-(or fourth-) order filter is switched in to estimate the azimuth misalignment as the aircraft starts to maneuver in the lateral plane. A true covariance simulation is carried out, which shows that the proposed filters successfully perform the fine alignment.

A82-38441 # Adaptive filtering for an aircraft flying in turbulent atmosphere. H Okubo (Osaka Prefecture University, Sakai, Japan) · Journal of Guidance, Control, and Dynamics, vol 5, July-Aug 1982, p 410-412 5 refs

On the basis of a sensitivity analysis for a simple scalar system, the deterioration of the Kalman filter performance resulting from incorrect noise covariance values is examined. It is found that the increase in the error covariance relative to the optimum value depends largely on the ratio of the process and the measurement noise covariance values. This is considered important in adaptive filtering problems when the system includes noises with extensively variable variance, such as the dynamics of aircraft flying through patches of atmospheric turbulence C R

A82-38442 * # Robust Kalman filter design for active flutter suppression systems. W L Garrard (Minnesota, University, Minneapolis, MN), J K Mahesh, C R Stone (Honeywell Systems and Research Center, Minneapolis, MN), and H J Dunn (NASA, Langley Research Center, Hampton, VA) *Journal* of *Guidance*, *Control*, and *Dynamics*, vol 5, July-Aug 1982, p 412-414 6 refs Contract No NAS1-15486

Additional insight is provided into the use of the Doyle-Stein (1979, 1981) technique in aeroelastic control problems by examining the application of the method to a flutter control problem. The system to be controlled consists of a full-size wind tunnel model of a wing, plus an aileron, an actuator, and an accele-

rometer used to sense the motion of the wing A full-state feedback controller was designed using linear optimal control theory, and a Kalman filter was used in the feedback loop for state estimation. The filter design procedure is explained along with that to improve closed-loop properties of the system. The locus of the poles of the filter is examined as a scalar design parameter is varied. The Doyle-Stein design procedure is shown to substantially improve the stability properties of an active flutter controller designed using the linear quadratic Gaussian control theory.

A82-38443 * # Aerodynamic characteristics of a large-scale, twin tiltnacelle V/STOL model. M D Falarski, M R Dudley (NASA, Ames Research Center, Molfett Field, CA), W Buchmann (Grumman Aerospace Corp, Bethpage, NY), and A Pisano (U S Naval Air Systems Command, Washington, DC) (American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 19th, St Louis, MO, Jan 12-15, 1981, Paper 81-0150) Journal of Aircraft, vol 19, Aug 1982, p 627-633 6 refs

A subsonic tilt-nacelle V/STOL aircraft configuration is described which is powered by two turbofan engines, mounted on a single carry-through structure that is designed to maintain the thrust axis close to the center of gravity at nacelle incidences of 5-95 deg Control during V/STOL operation, often from small ship platforms, is achieved by means of a vane assembly that is immersed in each turbofan's exhaust Wind tunnel test data have been obtained with an 11 2-m wing span model for the vertical-to-horizontal flight transition capability of the concept ti is found that the aircraft can operate over a broad transition corridor, with sufficient maneuver capability about the trim points. The control vane exhibited linear response characteristics over a large deflection range, with little influence from power, angle of attack or ground proximity in hover. The model induced a and strake angle increased OC C

A82-38445 * # Influence of unsteady aerodynamics on hingeless rotor ground resonance. W Johnson (NASA, Ames Research Center, Low Speed Aircraft Research Branch, Moffett Field, CA) Journal of Aircraft, vol 19, Aug 1982, p 668-673 16 refs

(Previously announced in STAR as N81-28056)

A82-38446 # U.S. Marine Corps AV-8A maintenance experience. L Scott and R W Morrissey (U S Naval Air Rework Facility, Cherry Point, NC) (American Institute of Aeronautics and Astronautics and NASA Armes Research Center, V/STOL Conference, Palo Alto, CA, Dec 7-9, 1981, Paper 81-2657) Journal of Aircraft, vol 19, Aug 1982, p 694-696

The basic structure of the AV-8A employs a 2014T6 aluminum alloy, with an epoxy primer and a polyurethane paint system, which have together been shown by U S Marine Corps maintenance experience to be proof against corrosion. The vectorable engine nozzles and their drive system have proven to be so strong and reliable that vectoring has been used in forward flight for air combat maneuvering. Only fatigue damage to the empennage primary structure has been experienced, and this problem is being addressed by a reduction of operational time at high power, together with a rebuilding of the ventral fin with solid rivets.

A82-38447 # Estimation of the peak count of actively controlled aircraft. N J Meyerhoff and J Garlitz (U S Department of Transportation, Office of Air and Marine Systems, Cambridge, MA) *Journal of Aircraft*, vol 19, Aug 1982, p 698-700 5 refs

It is suggested by an analysis of preliminary data that a regression of the peak number of actively controlled aircraft on total daily operations yields an economical estimate of the peak instantaneous air count (AIC) over various air route traffic control centers (ARTCCs). It is possible to have a single general regression model for the entire continental U S, or separate models for each ARTCC. In addition, peak models for terminal and en route centers appear possible, and improved estimates of peak ISC may be generated by regressing on component operations, consisting of departures, arrivals and overflights, rather than total daily operations. O C

A82-38461 Complete flexibility and realism in radar simulation. C Buttars (International Aeradio, Ltd., Southall, Middx., England) The Controller, vol. 21, May 1982, p. 22, 23

A digital air traffic radar simulator, developed for International Aeradio's air traffic control training school, achieves complete flexibility and realism in all aspects of radar training The simulator uses a model flight information region to provide radar training capable of being applied anywhere in the world. The system has the capability to operate up to seven studen controller displays, each allowing combined radar/procedural exercises to be run. Three aircraft control units are provided, each capable of controlling 16 aircraft by keyboard input. The electric data display shows full aircraft data, computer replies to keyboard injected demands, and aircraft reports either as a result of keyboard injection or automatically. The simulator is programmed with the performance envelopes of 96 aircraft types (including indicated cruising speeds, rate of climb, descent speeds between three levels, and angles of bank), and allows only realistic flight characteristics. Also programmed are international standard atmosphere, and

turn and indicated air speed data, which permit the aircraft to realistically simulate actual flying conditions $$\rm N\ B$$

A82-38462 Future terminal area systems P A Jorgensen (Selenia-Industrie Elettroniche Associate S p A , Rome, Italy) (International Federation of Air Traffic Controllers' Associations, West European Conference, Rome, Italy, Nov 12-14, 1981) The Controller, vol 21, May 1982, p 34, 35 6 refs

The development of a terminal area computer system able to interface with existing flight management systems is discussed, and this type of system is intended to provide greater fuel conservation and air space capacity, with improved safety during the descent phase of flights. The system must be able to forecast a suitable approach routing, which will allow for a continuous descent of each aircraft, while also providing optimal distribution. Utilizing such a system, a controller would concentrate on monitoring the separation between the aircraft and would only rarely need to intervene in the landing process. Studies are being conducted to determine optimum approach patterns for such a system with regard to fuel conservation, safety and airspace capacity. A graph of the actual measured fuel consumption found for three different patterns - the standard descent profile, the low drag/low power approach, and a low drag/delayed flaps approach - is presented.

A82-38463 The detection of low level wind shear. II. P D Simmons The Controller, vol. 21, May 1982, p. 36-38

The Low Level Wind Shear Alert System (LLWSAS), a real-time micro-computer-controlled, data acquisition, analysis and display system for detecting horizontal wind shear near airports, is discussed, and the system's performance since its introduction by the FAA beinning in 1977 is analyzed. The system collects wind direction and wind speed data from six anemometers located near approach and takeoff areas of the airport, computes the wind gusts, and alerts controllers to wind shears by visual and audible alarms, and the information is then relayed to pilots in the area. While proof of the effectiveness of a system of this nature is extremely difficult to establish, it is noted that there have been no wind shear accidents in the US since 1977. One incident attributed to wind shear which occurred in Atlanta in 1979, but did not result in an accident, is discussed in detail While the LLWSAS did not dectect wind shear conditions, it is shown that the wind shear occurred outside of the range of the system, but at a distance which allowed the pilot to recover and land safely. N B

A82-38464 Fuel conservation: The airline - ATC. P M Grundy The Controller, vol 21, May 1982, p 39, 40, 47

The air traffic control system has a greater impact on fuel conservation than any other factor in aviation, the most energy intensive industry in the world. The article discusses various measures that could be adopted by airlines and air traffic controllers to increase fuel conservation. These include reducing operating empty weights, flying at optimum altitude, direct routing, linear holding, speed control, flight planning, loading for favorable center of gravity to reduce trim drag, minimizing route mileage, and clearance priorities for more fuel demanding air craft during landing. N B

A82-38474 A simplified approach to the free wake analysis of a hovering rotor. R H Miller (MIT, Cambridge, MA) (Deutsche Gesellschaft fur Luft- und Raumfahrt, European Rotorcraft and Powered Lift Aircraft Forum, 7th, Garmisch-Partenkurchen, West Germany, Sept 8-11, 1981) Vertica, vol 6, no 2, 1982, p 89-95 19 refs

(Previously announced in STAR as N82-18121)

A82-38475 Calculation of the cross section properties and the shear stresses of composite rotor blades. R Worndle (Messerschmitt-Bolkow-Blohm GmbH, Munich, West Germany) (Deutsche Gesellschaft für Luftund Raumfahrt, European Rotorcraft and Powered Lift Aircraft Forum, 7th, Garmisch-Partenkurchen, West Germany, Sept 8-11, 1981) Vertica, vol 6, no 2, 1982, p 111-129 10 refs

(Previously announced in STAR as N82-25334)

A82-38500 # Wind shear - Its effect on an aircraft and ways to reduce the hazard. II (Uskok wiatru - Dzialanie na samolot, srodki zmniejszające zagrozenie. II). J M Morawski and T Smolicz (Instytut Lotnictwa, Warsaw, Poland) *Technika Lotnicza i Astronautyczna*, vol 37, May 1982, p 5-8 7 refs In Polish

A82-38722 [†] Numerical methods for solving boundary value problems for noncavitating and cavitating flow past wing profiles (Chislennye metody reshenina kraevykh zadach beskavitatsionnogo i kavitatsionnogo obtekanila kryi'evykh profilei) N lu Zavadovskii, S S Maslennikov, and A A Rusetskii (Tsentral'nyii Nauchno-Issledovatel'skii Institut, Leningrad, USSR) *Gidromekhanika*, no 45, 1982, p 3-12 6 refs In Russian

Algorithms are developed for the numerical solution of the following problems of the steady flow of an ideal incompressible fluid noncavitating flow past an airfoil section, noncavitating flow past a wing profile, and flow past a profile with partial cavitation An essential element of these algorithms is the computation of singular integrals and the solution of singular integral equations BJ

A82-38781: Symposium on Flows with Separation, Stuttgart, West Germany, November 23-25, 1981, Reports (Symposium über Strömungen mit Ablösung, Stuttgart, West Germany, November 23-25, 1981, Vorträge). Symposium sponsored by the Deutsche Gesellschaft fur Luft- und Raumfahrt Cologne, Deutsche Gesellschaft fur Luft- und Raumfahrt, 1982 147 p In German and English (For individual items see A82-38782 to A82-38786)

Aspects of viscous transonic airfoil flow simulation are considered along with investigations regarding vortex formation at wings with bent leading edges, leading edge separation at delta wings with curved leading edges in supersonic flow, and measurement and visualization of skin friction on the leeside of delta wings in supersonic flow. Attention is given to measurements of velocity distributions in the leading edge vortex of a delta wing by the laser-Doppler procedure, the topological structure of separated flows with three-dimensional boundary conditions, the calculation of boundary layers at fuselages, and a delta wing with a high vortex stability. Other topics investigated are related to an experimental study concerning two- and three-dimensional separated flows in G R

A82-38783 # Investigations regarding vortex formation at wings with bent leading edges (Untersuchungen über die Wirbelbildung an Flügeln mit geknickten Vorderkanten). U Brennenstuhl and D Hummel (Braunschweig, Technische Universität, Brunswick, West Germany) In Symposium on Flows with Separation, Stuttgart, West Germany, November 23-25, 1981, Reports (A82-38781 19-02) Cologne, Deutsche Gesellschaft für Luft- und Raumfahrt, 1982 4 p In German

It is pointed out that modern bomber aircraft employ presently almost exclusively wings with bent leading edges. There is currently a shortage of wind tunnel data which can provide detailed information regarding the characteristics of flows around such wings. For these reasons, an experimental program involving the study of a number of wings with the considered characteristics has been conducted in West Germany. The first results obtained in connection with this program have already been reported by Brennenstuhl and Hummel (1981). The present investigation is concerned with the remainder of the results obtained in the investigation. The effect of the angle by which the leading edge is bent on the flow characteristics is considered. Attention is given to measurements concerring the pressure distribution and the flowfield.

A82-38784 # Leading edge separation at delta wings with curve leading edges in supersonic flow (Vorderkantenablösung an Deltaflügeln mit gekrümmten Vorderkanten im Überschall). R Henke (Berlin, Technische Universität, Berlin, West Germany) In Symposium on Flows with separation, Stuttgart, West Germany, November 23-25, 1981, Reports (A82-38781 19-02) Cologne, Deutsche Gesellschaft für Luft- und Raumfahrt, 1982 14 p 6 refs In German

Leeside flow types for delta wings are considered, taking into account the boundary provided by the Stanbrook-Squire region which divides the separation forms 'leading edge separation' and 'shock induced separation' Basic information regarding the flow over wings with curved leading edges was obtained in studies conducted by Henke (1980) and by Ganzer and Henke (1981) An evaluation of oil film pictures provided an impression regarding the interference characteristics for the various wing components. A number of graphs are presented for the illustration of the obtained results. Some of the pictures were obtained by means of a vapor screen technique and a schlieren method.

A82-38785 * # Measurement and visualization of skin friction on the leeside of delta wings in supersonic flow (Messung und Sichtbarmachung der Wandschubspannungen auf der Leeseite von Deltaflügeln im Überschall). J Szodruch (Vereinigte Flugtechnische Werke-Fokker GmbH, Bremen, West Germany) and D J Monson (NASA, Ames Research Center, Moffett Field, CA) In Symposium on Flows with Separation, Stuttgart, West Germany, November 23-25, 1981, Reports (A82-38781 19-02) Cologne, Deutsche Gesellschaft fur Luft- und Raumfahrt, 1982 9 p 7 refs In German

The reported investigation was conducted with the aid of the NASA Ames High Reynolds Number Wind Tunnel. The flow conditions considered involved free stream Mach numbers of 2 and 3, and a Reynolds number of approximately 10,000,000 p m. The employed model was a delta wing with an angle of 70 deg A method reported by Tanner (1977) was used for the measurement of the skin friction. This method involves the use of a laser interferometer to determine the change in the thickness of an oil film. The procedure can also be employed for a visualization of skin friction in the form of interferograms. The investigation shows that skin friction measurements can provide a significant contribution to a physical understanding of the flow processes at the delta wing G.R.

A82-38786 # Measurements of velocity distributions in the leading edge vortex of a delta wing by the laser-Doppler procedure (Messungen

von Geschwindigkeitsverteilungen im Vorderkantenwirbel eines Deltaflugels mit dem Laser-Doppler-Verfahren). K Anders (Institut fur Thermodynamik der Luft- und Raumfahrt, Stuttgart, West Germany) and E Wederneyer (Institut von Karman de Dynamique des Fluides, Rhode-Sant-Genèse, Belgium) In Symposium on Flows with Separation, Stuttgart, West Germany, November 23-25, 1981, Reports (A82-38781 19-02) Cologne, Deutsche Gesellschaft fur Luft- und Raumfahrt, 1982 11 p In German

It is pointed out that there are significant differences between the flow around a delta wing and the flow observed in the case of a conventional wing with a large aspect ratio Vortex formation at the leading edges of delta wings produces nonlinear additional lift Under certain conditions, a complete change of the form of the flowfield will occur above a part of the wing, and the vortex will burst Pronounced turbulent mixing takes place, and the supersonic speed is significantly reduced. This reduction leads to a considerable decrease of the lift. Ludwieg (1960) has discussed a theory which explains the bursting process with an occurrence of instabilities. The present investigation is concerned with a study of leading edge vortices on the basis of Ludwieg's theory. Certain deviations of experimental data from results obtained on the basis of Ludwieg's theory can, perhaps, be explained by the unsymmetrical character of the vortex near the wall G.8

A82-38922 Calculation of level flow using radial grating (Berechnung der ebenen Strömung durch rotierende Radialgitter). E M Steck (Karlsruhe, Universität, Karlsruhe, West Germany) (Gesellschaft für angewandte Mathematik und Mechanik, Wissenschaftliche Jahrestagung, Würzburg, West Germany, Apr 21-24, 1981) Zeitschrift für angewandte Mathematik und Mechanik, vol 62, Apr 1982, p T 233-T 235 In German A theoretical study of level flow through a rotating radial grating is conducted

A theoretical study of level flow through a rotating radial grating is conducted for the special case of ideal flow as well as for laminar flow in a high-viscosity newtonian fluid A system of equations and correlative boundary conditions are developed in order to obtain the frictional and friction-free flow in the form of the integral values of the pressure and efficiency as functions of volume, blade number, Reynolds number, blade angle variation, and radian ratio CD

A82-38937 # A recursive terrain height correlation system using multiple model estimation techniques. G L Mealy and W Tang (Analytic Sciences Corp, Reading, MA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 105-112 •7 refs Grant No DAKK80-79-C-0268 (AIAA 82-1513)

This paper describes the results of an investigation of the performance capabilities of an extended Kalman filter (EKF) based recursive terrain correlation system proposed for low-altitude helicopter navigation. The major disadvantage of this concept is its sensitivity to initial position error. One method for reducing this sensitivity involves the use of multiple model estimation techniques. In the multiple model approach, a bank of identical EKFs, each of which is initialized at a different point in the a priori uncertainty basket, is employed to ensure that one filter is initialized near the true aircraft position. In this manner, the probability of filter convergence is increased substantially, leading to improved navigation performance. (Author)

A82-38938 # PNCS - A commercial flight management computer system. M W Bird (Lear Siegler, Inc, Instrument Div, Grand Rapids, MI) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 113-123 5 refs (AIAA 82-1515)

The Performance Navigation Computer System (PNCS), a system in which performance optimization, multisensor navigation, automatic guidance, and display techniques have been integrated to provide fuel-efficient operation and a lower workload for the crew is described. The PNCS guidance and flight planning capabilities derive from the integration of the optimum speed and altitude profiles computed by the performance management function with the lateral path and speed/altitude constraints of the flight plan. The performance management functions determine the climb, cruise, and descerit profile segments that minimize the total trip cost, while lateral, vertical, and speed commands are fed to the autopilot and autothrottle for automatic guidance to the optimized profile. The navigation data base of the PNCS, which contains airport, route, and navigation aid data, simplifies the selection and modification of flight plans. C R

A82-38939 # Air-to-air missile avoidance. G A Mandt and T L Neighbor (USAF, Wright Aeronautical Laboratories, Wright-Patterson AFB, OH) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 124-131 12 refs (AIAA 82-1516)

A methodology for developing real-time missile avoidance trajectories is presented. The steps are as follows analyzing missile systems for vulnerabilities, determining the factics to exploit these vulnerabilities, and testing the factics against missile simulations to determine the location and extent of maneuver effectiveness. It is noted that these maneuvers could then be placed into an on-board computer for real-time missile avoidance. Also presented is a table look-up approach. This approach permits maneuvering at longer ranges, appears better able to handle a multiple missile scenario as compared with an optimal control algorithms, and appears more feasible to implement

A82-38940 # Pilot models for discrete maneuvers. R K Heitfley (Systems Technology, Inc., Mountain View, CA) In Guidance and Control Conterence, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 132-142 17 refs (AIAA 82-1519)

Discrete maneuvers comprise a class of piloting tasks which can include fixedwing landing flare, gross change of heading, altitude, or airspeed, helicopter or VTOL transition to hover, and helicopter nap-of-the-earth dash and quick-stop While these maneuvers may appear to differ fundamentally from basic tracking tasks, pilot models can be constructed using the same mathematical forms Several examples of discrete-maneuver pilot models are presented along with accompanying flight and simulator data. The value of such models is discussed with regard to handling qualities, simulator fidelity, and pilot training. The man benefit is the ability to exploit pilot-in-the-loop analysis more effectively by formulating a complete pilot-vehicle-task context. (Author)

A82-38941 # Design and flight testing of digital direct side-force control laws. S L Grunwald (USAF, Washington, DC) and R F Stengel (Princeton University, Princeton, NJ) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p. 143-151, 15 refs Contract No. N00014-78-C-0257 (AIAA 82-1521)

Three-input/three-output command augmentation control laws designed and tested in flight using Princeton University's variable-response research aircraft are discussed. It is noted that the controllers were based on algebraic model-following, a fast and efficient method of direct digital synthesis for advanced control modes. Pilot opinions of several command modes and controller-to-command pairings are presented here. Flat turns, lateral translation, and roll control are investigated. Of the command modes tested, foot pedals-to yaw rate, lateral stick-to-roll rate, and thumb lever-to-sideslip angle are found to give the best overall ratings.

A82-38942 # Simulator investigations of various side-stick controller/stability and control augmentation systems for helicopter terrain flight. E W Alken (U S Army, Aeromechanics Laboratory, Molfett Field, CA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 152-164 15 refs (AIAA 82-1522)

Two piloted simulator experiments were conducted to assess the effects of side-stick-controller characteristics and level of stability and control augmentation on handling qualities for helicopter terrain flight A composite of several evaluation tasks was flown with the aid of a head-up display of flight-control symbology Variations in force-deflection characteristics and the number of axes controlled through a side-stick were investigated Satisfactory handling qualities for either a three- or four-axis rigid controller (Author)

A82-38943 * # The effects of the delays on systems subject to manual control. R A Hess (NASA, Ames Research Center, Moffett Field, CA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 165-172 13 refs

Results are presented of an experimental study to determine the effects of time delays in manual control systems A simple, fixed-base laboratory simulation facility is used for determining pilot dynamics and tracking performance in a series of single-axis, compensatory tracking tasks in these tasks, three time-delay values and three controlled-element dynamics are used. The delays are chosen to encompass values encountered in experimental and operational aircraft. It is noted that the controlled-element dynamics replicate those found in many previous manual control studies, that is, the classical displacement, rate, and acceleration control systems. The experimental effort is complemented with an analytical pilot modeling study where the parameters of a structural model of the human pilot are adjusted so as to provide excellent matches to the experimentally determined pilot dynamics. The experimental and analytical studies both indicate that time delays cause significant changes in pilot equalization requirements.

A82-38944 * # Modal control of relaxed static stability aircraft. R H Rooney, J C Chung, and E Y Shapiro (Lockheed-California Co, Burbank, CA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 173-176 Contract No NAS1-15326 (AIAA 82-1524) A method is developed that assigns a selected portion of a closed loop system eigenstructure in accordance with certain desirable critera. The method is applied there to a relaxed static stability aircraft, the goal being to synthesize a control ilaw that provides the unstable aircraft with handling qualities equal to or better than those of a comparable statically stable aircraft. It is shown that by using the unstable 'aircraft it is also shown that improved characteristics can be obtained by assigning an orthogonal eigenvector structure C R

A82-38954 # An X-Wing aircraft control system concept. A J Potthast (Lockheed-California Co, Burbank, CA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 257-265 13 refs (AIAA 82-1540)

X-Wing aircraft technology development has, as an ultimate goal, a Vertical "Take-Off and Landing (VTOL) aircraft with fast tactical response, long range, and high speed that can be operated from frigates and large destroyers. The proposed aircraft combines a circulation control air rotor/wing and control system, with a conventional aircraft fuselage and 'fan-in-fin' tail Cyclic and collective modulation of rotor/wing circulation control air combined with rotor/wing hub moment feedback and conventional feedback provides continuous stability and control during rotary, conversion, and fixed wing modes of flight. The control concept is described and test results from full and 1/4-scale models are compared with predicted data. Conclusions are drawn relative to concept application to the X-wing aircraft.

A82-38969 # A design criterion for highly augmented fly-by-wire aircraft. C R Abrams (U S Navy, Air Development Center, Warminster, PA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 410-419 8 refs (AIAA 82-1570)

The present investigation is concerned with a versatile control criterion for highly augmented fly-by-wire aircraft which can provide optimized mission-oriented performance Based on an optimization process for a second order system, a Time Response Parameter (TRP) has evolved which can be adapted to a variety of mission phases and new flight modes. The TRP approach has demonstrated definite trends with both Pilot Ratings and Pilot Induced Oscillation Ratings, and is also compatible with other transient response criteria. The TRP 'criterion can be readily applied to high order, nonlinear, and multivariable control systems, and is easily computerized for continuous evaluation of control system design. It is pointed out that the use of such criteria will promote the utilization of military aircraft as a weapons platform through more effective flight control of R G R

A82-38980 # Generic faults and design solutions for flight-critical systems. S S Osder (Sperry Flight Systems, Phoenix, AZ) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 509-518 17 refs (AIAA 82-1595)

A The term 'generic fault' is employed to describe design defects which elude the test and analysis procedures used to validate a redundant control system design Although the existence of such defects can be postulated in any type of system, the generic fault concept is especially significant in the flight-critical system application because it defeats the massive redundancy strategies which designers rely on to meet safety or reliability objectives. Various types of generic faults are examined, taking into account computation and scaling, timing, logical errors, hardware and firmware defects, latent failure effects, and aspects of real-time clock failure. A description is presented of solutions using decoupled, nonsynchronous architectures. It is found that dissimilar redundancy and brick-wall separation strategies are viable approaches to overcome generic-fault vulnerabilities. Their implementation requires unsynchronized channel operation.

A82-38981 * # The use of differential pressure feedback in an automatic flight control system. D W Levy, J Roskam, and P D Finn (Kansas University Center for Research, Inc., Flight Research Laboratory, Lawrence, KS) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 519-524 Grant No NAG4-5 (AIAA -82-1596)

A feasibility study has been performed to evaluate the performance of a system whereby a control surface is positioned with differential pressure as the feedback variable. Analogous to a position command system, the control surface is commanded to move until a certain differential pressure is achieved at a given point on the surface. Frequency response tests and theoretical considerations indicate that the pressure feedback transfer function is first order, with a break frequency up to 50 rad/sec. There exist applications to the outer loops of flight control systems as well. Stability augmentation, gust alleviation, and stall prevention appear to be possible by feeding back differential pressure across lifting and control surfaces.

A82-38982 # A preliminary laboratory evaluation of a reconfigurable integrated flight control concept. A P DeThomas (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, OH) and S C Goel (Systems Control Technology, Inc, West Palm Beach, FL) in Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 525-530 5 refs (AIAA 82-1597)

The present investigation is concerned with the concept of virtual redundancy as a means of maintaining the reliability of the flight control function within an integrated architecture. Virtual redundancy involves the reconfiguring of the system resources to create redundancy on demand. Virtual redundancy is invoked by the system executive by causing some known good processors to compute a solution which can break the tie between disagreeing processors. An implementation in software for the case of Virtual Flight Control redundancy is discussed. Attention is given to an examination of virtual redundancy as a means of fault isolation for cross-channel monitoring when only two signals are present, a general assessment of the feasibility of virtual redundancy and system reconfiguration to enhance coverage and recover function lost due to failures, redundancy management, and failure detection and isolation.

A82-38986 # The ideal controlled element for real airplanes is not K/s. C R Chalk (Caispan Corp., Buffalo, NY) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p. 556-560 (AIAA 82-1606)

The early experiments performed to generate data to support development of mathematical models of the human operator used simple controlled element transfer functions, including K, and K/s However, when the physical system being controlled has mass and the response state being controlled is position, the K and K/s transfer function forms are physically impossible because infinite acceleration capability would be required for abrupt commands. It is found that the roll angular accelerations in flying qualities. The angular and linear accelerations are the pilot station are important considerations in flying qualities. The angular and linear accelerations can become objectionably high when the roll damping is very high and the height above the X stability axis is large. It is pointed out that roll ratchet is best explained by a model that assumes the pilot is closing the alteron loop on angular acceleration response cues.

A82-38988 # An alternate method of specifying bandwidth for flying qualities. J Hodgkinson, J R Wood (McDonnell Aircraft Co, St Louis, MO), and R H Hoh (Systems Technology, Inc, Haxthorne, CA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 571-578 6 refs (AIAA 82-1609)

It is pointed out that the task of predicting the flying qualities of a modern fighter aircraft has been complicated by the use of highly augmented control systems. Control systems intended to improve flying qualities have often degraded them instead. These degradations were unexpected because the criteria used to predict the aircraft's flying qualities were invalid, or were incorrectly interpreted, for augmented aircraft. Therefore, in the 'Proposed MIL Standard/Handbook - Handling Qualities of Piloted Airplanes', criteria for augmented aircraft are emphasized. The bandwidth criterion specifies the quality of aircraft attitude dynamics. A refined version of the bandwidth criterion is proposed. The new version offers two specific advantages as compared with the original version. It deals with the bandwidth sensitivity problem and, by using a Nichols chart, it encourages the designer to view the entire open- and closed-loop frequency responses simultaneously.

A82-38989 # Investigation of low order lateral directional transfer function models for augmented aircraft. D E Bischoff and R E Palmer (U S Naval Material Command, Naval Air Development Center, Warminster, PA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 579-586 11 refs (AIAA 82-1610)

The high order transfer functions representing the lateral directional responses of augmented aircraft to pilot control inputs were matched in the frequency domain with two candidate low order equivalent forms (1) the complete three degree of freedom representation of roll and sideslip angle responses, and (2) the single degree of freedom roll mode and Dutch roll approximations. Accepta ble models were generally obtained for both forms. Simultaneous matching of sideslip and roll angle responses and/or a priori information for the roots was required to match the full three degree of freedom forms. The equivalent system models are discussed in terms of their match statistics and their modal parameters are compared against the requirements of the military flying qualities specification. (Author)

A82-38990 * # An analysis of a nonlinear instability in the implementation of a VTOL control system during hover. J M Weber (NASA, Ames Research Center, Moffett Field, CA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926

19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 587-596 7 refs (AIAA 82-1611) (Previously announced in STAR as N82-22281)

A82-38995 # Target acquisition system/air-to-surface weapon compatibility analysis. A R Mitchell (Analytic Sciences Corp., Reading, MA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 638-642 (AIAA 82-1618)

The paper presents a simple, closed form method which has been developed for compatibility analysis of an autonomous target acquisition system with an air-to-surface weapon. The output is a probability distribution for expected target location at the moment of potential weapon release. Compatibility is measured by the probability that the target lies in the footprint of the released weapon. The method uses statistical input data on terrain masking, atmospheric obscuration, and the acquisition system timeline from first target detection through classification, designation and weapon release. Generic results are presented for a hypothetical target acquisition system. (Author)

A82-38998 # The Shiryayev sequential probability ratio test for redundancy management. J L Speyer and J E White (Texas, University, Austin, TX) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 658-666 10 refs (AIAA 82-1623)

An essential aspect in the design of fault tolerant digital flight control systems is the design of failure detection and redundancy management systems. A decision rule, the Shiryayev sequential probability ratio test (SPRT), is used to detect failures between similar instruments, as well as between dissimilar instruments through analytic redundancy. Unlike the Wald SPRT, which tests for the presence of failure or no failure in all of the data sequence, the Shiryayev SPRT detects the occurrence of a fault in the data sequence in minimum time if certain conditions are met. The performance of the Shiryayev SPRT in detecting a failure between two rate gyrcs as compared to standard fixed interval schemes is presented, as is the performance for a single accelerometer failure using translational kinematic equations to form a party relation for analytic redundancy.

(Author)

A82-39003 # X-29A flight control system design experiences. J Chin, H Berman, and J Ellinwood (Grumman Aerospace Corp., Bethpage, NY) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 703-713 11 refs (AIAA 82-1538)

The X-29A aircraft is a technology demonstrator consisting of a structurally tailored forward swept wing, an automatic camber control concept to increase aerodynamic efficiency, a high level of aircraft relaxed static stability (RSS), and a digital fly-by-wire flight control system using control laws designed via modern optimal control techniques A description is presented of the considerations exercised during the design and development of the flight control system (FCS), and attention is given to the uniqueness of the X-29A aircraft which led to high levels of RSS for minimum FCS requirements. The advantages of RSS are discussed along with the longitudinal control requirements, the control modes, aspects of control law development, and questions of flight control system validation.

GR

A82-39009 * # The effects of atmospheric turbulence on a quadrotor heavy lift airship. M B Tischler and H R Jex (Systems Technology, Inc., Hawthorne, CA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 767-776 15 refs Contract No NAS2-10330 (AIAA 82-1542)

The response of a quadrotor heavy lift airship to atmospheric turbulence is evaluated using a four-point input model. Results show interaction between gust inputs and the characteristic modes of the vehicle's response. Example loop closures demonstrate tradeoffs between response regulation and structural loads. Vehicle responses to a tuned discrete wave front compare favorably with the linear results and illustrate characteristic HLA motion. (Author)

A82-39011 # Analyzing stable pad disturbances and design of a sensor vault to monitor pad stability. O D Starkey, J D Kerr, and L D Hall (Teledyne, inc, Teledyne Geotech, Garland, TX) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 785-788 (AIAA 82-1585)

Among disturbing environmental mechanisms are tidal variations in gravity, natural and cultural seismic activity, and acoustic excitation of components. An analysis is presented of these disturbances. Also described is the development of a vault that isolates the sensors from external disturbances yet provides close coupling to the test pad Initial tests carried out on a prototype vault installed in February 1982 show that a feedback-type seismometer can include a sustained oscillation within its housing. A possible analysis of this phenomenon is included $$\rm C\,R$$

A82-39013 # Avoiding the pitfalls in automatic landing control system design. A A Lambregts (Boeing Commercial Airplane Co, Seattle, WA) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 799-809 (AIAA 82-1599)

This paper relates recent experiences at Boeing with the development and flight testing of improved automatic landing flare control laws for the B-737 and B-747 aircraft. Some earlier designs and their limitations are reviewed Basic requirements for flare law initiation, command synchronization, feedback signal sources and characteristics, inner loop configurations, elevator control band width and throttle control are discussed Experiences and potential pitfalls in the development of integrated glide slope and flare control laws for improving an existing B-747-SP design and for a new B-737 SP-177 autopilot are described Analog computer design constraints are reviewed A 'variable tau' flare law concept, using groundspeed to reduce longitudinal dispersion and achieve a constant flare height are discussed as well as an 'explicit trajectory' flare control concept to achieve the same goals, along with flight test results. New design options using digital computers are pointed out (Author)

A82-39016 # Flight control synthesis using robust output observers. E G Rynaski (Calspan Advanced Technology Center, Buffalo, NY) In Guidance and Control Conference, San Diego, CA, August 9-11, 1982, Collection of Technical Papers (A82-38926 19-18) New York, American Institute of Aeronautics and Astronautics, 1982, p 825-831 (AIAA 82-1575)

A bref investigation is made of the application of robust output observer theory to the design of flight control systems for advanced aircraft configurations. Observer theory is seen as a natural design tool because the resulting observers are in themselves unobservable and do not increase the order of the closed-loop response, thereby more closely satisfying flying qualities requirements. Examples are adduced to show that the observer configuration is not unique in either the observer poles or the output sensors and that many different control system configurations using a variety of sensors can be designed to yield identical closed-loop dynamic behavior. In this way, it becomes possible to incorporate considerable analytic and physical redundancy into nearly any flight control system C R

A82-39081 # Handling qualities criteria for flight path control of V/STOL aircraft. M B Tischler and R H Hoh (Systems Technology, Inc., Hawthorne, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1292 10 p 14 refs Contract No N62269-80-C-0290

Tentative handling qualities criteria for V/STOL path control have been developed based on a study of bandwidth requirements and lower-order equivalent system representations. This work extends the equivalent system concept from singleloop to multiloop applications. Numerical results show the significant influence of inter-axis coupling on maximum attainable piloted bandwidth. Preliminary fixed-base simulation results verify the expected trends and correlate well with the analytically derived boundaries proposed in this paper. (Author)

A82-39082 * # Piloted simulator evaluation of a relaxed static stability fighter at high angle-of-attack. M Lapins, R W Klein, R P Martorella, J Cangelosi (Grumman Aerospace Corp, Bethpage, NY), and W R Neely, Jr (NASA, Langley Research Center, Hampton, VA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1295 19 p 10 refs

A piloted simulator evaluation of the stability and control characteristics of a relaxed static stability fighter aircraft was conducted using a differential maneuvering simulator. The primary purpose of the simulation was to evaluate the effectiveness of the limiters in preventing departure from controlled flight. The simulation was conducted in two phases, the first consisting of open-loop point stability evaluations over a range of subsonic flight conditions, the second concentrating on closed-loop tracking of a preprogrammed target in low speed, high angle-of-attack air combat maneuvering. The command limiters were effective in preventing departure from controlled flight while permitting competent levels of sustained maneuvering Parametric variations during the study included the effects of pitch control power and wing-body static margin. Stability and control issues were clearly shown to impact the configuration design C D

A82-39083 # In-Flight Investigation of large airplane flying qualities for approach and landing. N C Weingarten and C R Chalk (Calspan Advanced Technology Center, Buffalo, NY) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1296 13 p 9 refs Contract No F33615-79-C-3618

A study of the handling qualities of large airplanes in the approach and landing Flight Phase was performed utilizing the USAF-AFWAL/Calspan Total In-Flight Simulator A one-million pound statically unstable airplane model was used as a baseline about which variations were made. The primary variables were relative pilot position with respect to center of rotation, command path time delays and phase shifts, augmentation schemes and levels of augmentation. The results indicate that the approach and landing task with very large airplanes is a fairly low bandwidth task. I ow equivalent short-period frequencies and relatively long time delays can be tolerated. As the pilot position is moved aft towards and then behind the center of rotation, pilot ratings are degraded. (Author)

A82-39084 * # Development and flight test evaluation of a pitch stability augmentation system for a relaxed stability L-1011. J J Rising (Lockheed-California Co, Burbank, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1297 10 p 5 refs Contract No NAS1-15326

The L-1011 has been flight tested to demonstrate the relaxed static stability concept as a means of obtaining significant drag benefits to achieve a more energy efficient transport Satisfactory handling qualities were maintained with the design of an active control horizontal tail for stability and control augmentation to allow operation of the L-1011 at centers of gravity close to the neutral point Prior to flight test, a motion base visual flight simulator program was performed to optimize the augmentation system. The system was successfully demonstrated in a test program totaling forty-eight actual flight hours (Author)

A82-39085 # Supersonic missile aerodynamic and performance relationships for low observables mission profiles. R J Krieger (McDonnell Douglas Astronautics Co. St Louis, MO) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1298 11 p 8 refs

Closed-form analytical relationships are developed between supersonic missile aerodynamic characteristics such as lift, zero-lift drag and drag due-to-lift and performance parameters such as range, velocity, specific range, flight path angle and maneuver load factor. These relationships apply to low observable missile flight profiles for long range cruise and glide missions. The analytical relationships are developed for climb, cruise, glide, dive, and run-in segments. The results include equations for use in closed-form performance estimates and guiding configuration development. (Author)

A82-39090 * # Applications of parameter estimation in the study of spinning airplanes. L W Taylor, Jr (NASA, Langley Research Center, Hampton, VA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1309 7 p 12 refs

Spinning airplanes offer challenges to estimating dynamic parameters because of the nonlinear nature of the dynamics. In this paper, parameter estimation techniques are applied to spin flight test data for estimating the error in measuring post-stall angles of attack, deriving Euler angles from angular velocity data, and estimating nonlinear aerodynamic characteristics. The value of the scale factor for post-stall angles of attack agrees closely with that obtained from special wind-tunnel tests. The independently derived Euler angles are seen to be valid in spite of steep pitch angles. Estimates of flight derived nonlinear aerodynamic parameters are evaluate, in terms of the expected fit error (Author)

A82-39091 * # Analysis of general-aviation accidents using ATC radar records. R C Wingrove and R E Bach, Jr (NASA, Ames Research Center, Moffett Field, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1310 8 p 12 rets

It is pointed out that general aviation aircraft usually do not carry flight recorders, and in accident investigations the only available data may come from the Air Traffic Control (ATC) records A description is presented of a technique for deriving time-histories of aircraft motions from ATC radar records The employed procedure involves a smoothing of the raw radar data. The smoothed results, in combination with other available information (meteorological data and aircraft aerodynamic data) are used to derive the expanded set of motion time-histories Applications of the considered analytical methods are related to different types of aircraft, such as light piston-props, executive jets, and commuter turboprops as well as different accident situations, such as takeoff, climb-out, icing, and deep stall

A82-39092 * # An estimation of aerodynamic forces and moments on an airplane model under steady state spin conditions. B N Pamadi and L W Taylor, Jr (NASA, Langley Research Center, Hampton, VA) Amencan Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug. 9-11, 1982, Paper 82-1311 14 p. 21 refs

The problem of estimating the aerodynamic characteristics of a wing body configuration of a spinning airplane at extreme angles of attack and spin rates is approached by the application of strip theory. Semiempirical methods are used to estimate the aerodynamic force distributions over each component using static, nonrotational wind-tunnel test data. To these predictions, corrections are applied to account for the primary rotational flow effects which are significant at large spin rates The results of this modified strip theory are shown to be in good agreement with spin tunnel rotary balance test data (Author)

A82-39093 * # A simple, low cost application of a flight test parameter identification system. R Clarke and J Roskam (Kansas, University, Lawrence, KS) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1312 8 p 9 refs Grant No NsG-4019

The flight test system combines state-of-the-art microprocessor technology and high accuracy instrumentation with parameter identification technology which minimize data and flight time requirements. The system was designed to avoid permanent modifications of the test airplane and allow quick installation. It is capable of longitudinal and lateral-directional stability and control derivative estimation. This paper presents details of this system, calibration and flight test procedures, and the results of the Cessna 172 flight test program. The system has proven easy to install, simple to operate, and capable of accurate estimation of stability and control parameters in the Cessna 172 flight tests (Author)

A82-39094 # Parameter estimation applied to general avlation aircraft - A case study. W R Wells (Wright State University, Dayton, OH) and V Klein (George Washington University, Washington, DC, Joint Institute for Advancement of Flight Sciences, Hampton, VA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1313 12 p 27 refs

NASA is currently involved in extensive general aviation stall-spin studies in undertaking the stall-spin research, the aircraft dynamics in pre and post stall regimes must be understood A case study is presented of the application of parameter estimation methods to problems of general aviation aircraft. The research areas considered are related to control input selection, data compatibility, identification algorithms, unsteady aerodynamic modeling, and model structure determination. Several recent advances in the application of systems identification are summarized using the aircraft as subject. These advances are concerned with such techniques as stepwise regression algorithms, design of optimal control selection for parameter estimation, use of Kalman filtering in data compatibility checks, frequency domain identification algorithms, and high angle of attack formulation. It is shown that the discipline of systems identification can be quite effective in improving the knowledge of the flight mechanics of general aviation aircraft. G R

A82-39098 *# Dynamic load measurements with delta wings undergoing self-induced roll-oscillations. D Levin and J Katz (Technion-Israel Institute of Technology, Haifa, Israel) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1320 11 p 11 refs Grant No NAGW-00218

The aerodynamic forces acting on a delta wing, mounted on a free-to-roll sting-balance apparatus, were measured Two wing planforms having leading edge sweeps of 76 and 80 deg were tested, but only the wing with the 80 deg sweep would undergo periodic self-induced roll oscillation. The time dependent forces and roll angles for this wing were then recorded for various test conditions. In these tests a considerable drop in the average normal force of the free-to-roll wing was measured, relative to the normal force obtained in the static tests. Also, the helium-bubble flow visualization technique was used to gain some insight into the periodic motion of the separated leading edge vortices.

A82-39099 * # High angle-of-attack characteristics of a forward-swept wing fighter configuration. S B Grafton, W P Gilber, M A Croom, and D G Murri (NASA, Langley Research Center, Hampton, VA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1322 19 p 13 refs The NASA-Langley Research Center is currently investigating the high angle-

The NASA-Langley Research Center is currently investigating the high angleof-attack characteristics of a forward-swept wing fighter technology demonstrator in a cooperative program with the Defense Advanced Research Projects Agency The program includes static and dynamic wind-tunnel force tests, freeflight model tests, spin-tunnel tests, and piloted simulation Particular emphasis is placed on identifying the contributions of the forward-swept wing to the configuration aerodynamics at high angles of attack Results are presented to illustrate the wing contributions in terms of aerodynamic stability, flow visualization, and observation of free-flight characteristics (Author)

A82-39100 # The use of small strakes to reduce interference drag of a low wing, twin engine airplane. T E Wallis, D R Ellis (Cessna Aircraft Co, Wichita, KS), and W H Wentz, Jr (Wichita State University, Wichita, KS) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 8th, San Diego, CA, Aug 9-11, 1982, Paper 82-1323 13 p 5 refs

This paper discusses the effect of small strakes on the interference drag of a low wing, twin engine airplane. The strakes, highly swept delta wing semi-spans with a root chord 18 percent of the wing MAC, provide a strong streamwise vortex at high angles of attack. They are placed on the fuselage and nacelles at the wing leading edge. Both full scale and wind tunnel tests are discussed. The strakes, in the proper location, provide a reduction in interference drag, increases in maximum lift coefficient and lift to drag ratio at high angles of attack, a broader range of high lift coefficients, and less abrupt stall characteristics (Author)

A82-39102 * # Dynamic stability of flexible forward swept wing aircraft. T A Weisshaar and T A Zeiler (Purdue University, West Lafayette, IN) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1325 12 p 25 refs Grant No NAG1-157

This paper describes potential vehicle instability modes for forward swept wing aircraft and other divergence prone aircraft Examples show that either body-freedom flutter or aircraft aeroelastic divergence may occur depending upon the airplane planform geometry and mass distribution. These vehicle instabilities may occur at speeds very different than the clamped wing aeroelastic divergence speed. (Author)

A82-39103 # Optimal three-dimensional turning performance of supersonic aircraft. C -F Lin (Wisconsin, University, Madison, WI) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1326 10 p 17 refs

This paper discusses real-time, on-line three-dimensional turning maneuvers of supersonic aircraft with emphasis on the problems of minimum-time and minimum-fuel turns. The minimum-time problem is completely solved For the minimum-fuel case, the problem of minimum-fuel turn to a line is solved while suggestions for further research on minimum-fuel turn in three dimensions are presented. Two mathematical models of the aerodynamic and engine characteristics are designed to facilitate the application of the optimal control theory to analyze a wide range of flight programs. One such model is a typical lightweight, high thrust-to-weight ratio fighter used for the computation of minimum-fuel problem. (Author)

A82-39105 # The correlation of flight test and analytic M-on-N air combat exchange ratios. D S Hague (Aerophysics Research Corp., Bellevue, WA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1328 6 p Contract No F33615-80-C-3003

This paper compares analytic and flight test predictions of Many-on-Many air combat performance capability. It is shown that stochastic effects dominate air combat encounter outcomes and that air combat performance estimates should be based on a large sample of encounters. Overall exchange ratios, the number of red losses per blue loss, predicted by flight test and analysis are within 5% of each other. Trends in exchange ratio with force size obtained by the two methods are also similar. Finally, it is shown that air combat performance is sensitive to both force size ratio and the total number of aircraft engaged and that differences in performance between aircraft types may diminish with increasing aircraft numbers.

A82-39106 * # Unique flight characteristics of the AD-1 oblique-wing research airplane. R E Curry and A G Sim (NASA, Flight Research Center, Edwards, CA) American Institute of Aeronautics and Astronautics Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11 1982, Paper 82-1329 8 p 9 refs

Flight characteristics associated with an oblique-wing airplane have been studied with limited scope and complexity using the AD-1 research vehicle. The AD-1 is a low-speed, low-cost, manned airplane with an aeroelastically tailored wing that can be pivoted 0 to 60 deg asymmetrically. Results of the flight tests include aerodynamic parameter extraction, verification of the aeroelastic wing design criteria, trim requirements, stall characteristics, and an evaluation of the handling qualities and basic control system requirements. Some of the unique characteristics of these results that pertain to the oblique-wing design are presented

(Author)

A82-39107 * # Analysis of in-trail following dynamics of CDTIequipped aircraft. J A Sorensen and T Goka (Analytical Mechanics Associates, Inc, Mountain View, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1330 10 p 14 refs Contract No NAS1-16135

In connection with the necessity to provide greater terminal area capacity, attention is given to approaches in which the required increase in capacity will be obtained by making use of more automation and by involving the pilot to a larger degree in the air traffic control (ATC) process. It was recommended that NASA should make extensive use of its research aircraft and cockpit simulators to assist the FAA in examining the capabilities and limitations of cockpit displays of traffic information (CDTI). A program was organized which utilizes FAA ATC (ground-based) simulators and NASA aircraft and associated cockpit simulators in a research project which explores applications of the CDTI system. The present investigation is concerned with several questions related to the CDTI-based terminal area traffic tactical control concepts.

ration criteria, a longitudinal following model, longitudinal capture, combined longitudinal/vertical control, and lateral control G R

A82-39117 * # Flight dynamics of rotorcraft in steep high-g turns. R T N Chen (NASA, Ames Research Center, Moffett Field, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1345 16 p 21 refs

An analytici procedure developed to permit a systematic examination of rotorcraft flight dynamics in steep high-g turns is presented. The procedure is used in a numerical investigation of a tilt-rotor aircraft and three single-rotor helicopters that have different types of main rotor systems. The results indicate (1) that strong coupling in longitudinal and lateral-directional motions exists for these rotorcraft in high-g turns, (2) that for single-rotor helicopters, the direction of turn has a significant influence on flight dynamics, and (3) that a stability and control augmentation system that is designed on the basis of standard small-disturbance equations of motion from steady straight and level flight and that otherwise performs satisfactorily in operations near 1 g, becomes significantly degraded in steep turning flight. (Author)

A82-39118 * # A ground-simulation investigation of helicopter decelerating instrument approaches J V Lebacqz (NASA. Ames Research Center, Moffett Field, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1346 11 p 24 refs

In connection with the expansion of civil helicopter operations in the current era, the effect of helicopter flight and control characteristics on the flying qualities for instrument flight rules (IFR) flight have become a factor of concern, and a research program has been initiated to investigate IFR certification criteria A description is presented of an experiment which is the sixth in a series of groundand flight-simulation investigations. This piloted-simulator experiment was conducted to examine the influence of stability-control augmentation, display information format, and approach-task effects on helicopter flying qualities for terminal-area operations incorporating a deceleration in instrument meteorological conditions. Simulated test configurations were evaluated for precision approaches with an instrument deceleration from 60 to about 15 knots in both calm air and simulated moderate turbulence and wind shear.

A82-39119 # Maneuver stability of a vehicle with a towed body. B L Nagabhushan (Goodyear Aerospace Corp., Defense Systems Div., Akron, OH) and E M Cliff (Virginia Polytechnic Institute and State University, Blacksburg, VA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug. 9-11, 1982, Paper 82-1347.9 p 8 refs Research supported by the Virginia Polytechnic Institute and State University

Nonlinear equations of motion are derived and subsequently linearized to describe the coupled dynamics of a vehicle with a towed body. Using these stability of an aircraft with a sling load has been determined for simple maneuvers where the vehicle is maintaining a straight and level flight path or performing a steady turn. The effect of orienting the corresponding thrust vector of the aircraft on the system stability is examined by considering the thrust (1) fixed in inertial space, (2) fixed with respect to the vehicle relative wind. Typically, towing cable length, towed body to vehicle mass ratio, and load factor in a turn have been found to affect stability of the aircraft and its sling load. These results are illustrated here with an example of a maneuvering helicopter with a sling load. (Author)

A82-39120 # Application of multivariable model following method to flight controller. K Kanai (Defense Academy, Yokosuka, Japan), P N Nikiforuk (Saskatchewan, University, Saskatoon, Canada), S Uchikado, and N Hori American Institute of Aeronautics and Astronautics. Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1349 7 p

The present investigation is concerned with the problem of designing a model following control system for a multivariable linear plant, taking into account an application to the synthesis of a multivariable linear plant, taking into account an signer to a problem statement, the construction of a model following system via state feedback plus input dynamics, and the synthesis of a Control Configured Vehicle (CCV) controller. It is found that the construction of a model following system via state feedback with input dynamics compensator becomes possible even for the case of the singular control matrix. Using the proposed method, CCV modes, such as desirable precision maneuvers, independent velocity, and altitude changes, are achieved.

A82-39121 # Design and analysis of a multivariable control system for a CCV-type fighter aircraft. D B Ridgely, S S Banda (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, OH), and J T Silverthorn (USAF, Wright Aeronautical Laboratories and Institute of Technology, Wright-Patterson AFB, OH) American Institute of Aeronautics and Astronautics Atmospheric Flight Mechanics Conference, 9th, San Diego, CA Aug 9-11 1982 Paper 82-1350 8 p 10 refs

The theory of high-gain, error-actuated feedback control was applied to the design of a longitudinal decoupling flight control system for an advanced fighter aircraft Because of the structure of the system, measurement variables different from the outputs are necessary to apply this method. This paper describes how entire eigenstructure assignment can be used to determine appropriate measurement equations by assigning their corresponding transmission zeros. A singular value decomposition was used to choose the eigenvectors from their permissible subspaces. Proper selection of eigenvalues/eigenvectors was shown to be crucial to the successful application of this theory. (Author)

A82-39122 # An MLS with computer aided landing approach. M N Wagdi (Riyadh, University, Riyadh, Saudi Arabia) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1352 9 p 5 refs A computerized landing approach path definition that utilizes the MLS radio

A computerized landing approach path definition that utilizes the MLS radio navigational aid is presented An algorithm is developed which identifies the minimum time path that connects the initial MLS engage point to the touch down point. Such path is generally composed of two segments. The first segment begins at the MLS engage point and ends at the beginning of the straight glide slope. The second segment starts at the beginning of the straight glide slope and ends at the touch down point. The MLS azimuth and elevation and DME signals are processed by an on board computer that displays on a CRT the aircraft position relative to the ideal position of the optimal computed landing pattern. The present technique allows the initiation of landing approaches from wide range of headings and elevations, thus resulting into more efficient terminal area traffic control Also it is suitable for low visibility landing approaches (Author)

A82-39123 # Perspectives of the flying qualities specification. S G Fuller and D J Moorhouse (USAF, Wright Aeronautical Laboratories, Wright-Patterson AFB, OH) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1354 9 p 24 refs

A combined flying qualities and flight controls conference was held to discuss proposed changes to MIL-F-8785C and MIL-F-9490D These changes were primarily due to the new MIL-Standard and Handbook format being developed A summary is presented of the formal and informal presentations and the discussions related to flying qualities topics included are organization of the requirements, equivalent systems, alternate criteria, atmospheric disturbance effects and the relationship of the flying qualities and flight control system requirements In recent years the flying qualities specification has lost credibility Results of this credibility loss and the solutions for the future are discussed (Author)

A82-39124 # Guidance for the use of equivalent systems with MIL-F-8785C. T A Gentry (USAF, Flight Dynamic Laboratory, Wright-Patterson AFB, OH) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1355 11 p 20 refs

It is pointed out that handling qualities requirements for military conventional aircraft are specified in MIL-F-8785C, Military Specifications - Flying Qualities of Piloted Airplanes' This specification places requirements on the characteristics of the overall aircraft system as perceived by the pilot during piloted control An application of the specification in the case of conventional aircraft presents no difficulties. However, there may be problems with more complex flight control systems in order to compare future augmented aircraft systems to MIL-F-8785C the equivalent system approach has been suggested. The present investigation provides guidance in the application of the equivalent system approach to augmented aircraft longitudinal dynamics and similar application to lateral-directional dynamics where appropriate. The equivalent of an augmented system is actually produced by matching the actual high-order system with an equivalent low-order G R

A82-39125 * # A modern approach to pilot/vehicle analysis and the Neal-Smith criteria. B J Bacon and D K Schmidt (Purdue University, West Lafayette, IN) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1357 10 p Grant No NAG4-1

The present investigation is concerned with the development of a better pilot modelling technique via optimal control theory, taking into account concepts concerning 'pilot rating' considered by Neal and Smith (1970). The investigation conducted by Neal and Smith had the objective to provide data on the effects of Flight Control System dynamics and to develop a design criterion capable of pinpointing pilot problem areas encountered in performing a given task. Neal and Smith devised a 'pilot-in-the-loop' analysis capable of showing problem areas in pitch attitude tracking Unfortunately the employed method has some drawbacks. The current investigation attempts, therefore, to provide an alternate approach which makes use of an optimal-control pilot model. An optimal control model (OCM) had been discussed by Kleinman et al. (1970). It is shown that the alternate approach, based on the OCM, offers some distinct advantages.

A82-39128 # Analysis and wind tunnel tests of a probe used to sense altitude through measurement of static pressure. K D Tillotson (General

Dynamics Corp , Pomona, CA) and A E Fuhs (U S Naval Postgraduate School, Monterey, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1361 10 p 8 refs Navy-supported research

A static pressure probe was tested to determine the feasibility of using the probe, as an integral part of a missile nose, to sense missile altitude Experiments were conducted at Mach 2 0 and at Mach 1 51. At Mach 2 0, the static pressure probe will perform within altitude specifications of 25,000 feet + or - 2,000 feet at angles-of-attack ranging from - 8 to + 8 degrees. At Mach 2 0, within an angle-of-attack ranging from 0 to 6 degrees, the probe will measure free stream static pressure within 4 percent, a 4 percent error in measurement is equivalent to an altitude error of 900 feet. The missile nose shock will remain downstream of the probe pressure ports for flight Mach numbers above 1 5.

A82-39129 # Use of rotary balance and forced oscillation test data in six degrees of freedom simulation. J Kalviste (Northrop Corp., Hawthorne, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug. 9-11, 1982, Paper 82-1364 11 D

New analysis techniques are presented that will blend the data from the rotary balance test, forced oscillation test and computed dynamic derivatives for a nonlinear 6 DOF simulation. A component of the rotation vector about the velocity vector is used with the rotary balance test data. The other components of the rotation vector are used with the forced oscillation test data and computed derivatives. The problem of separating the pure rotational and acceleration terms of the forced oscillation test data is resolved. Recommendations are made in the data reduction procedure for forced oscillation testing to make the results more usable for aircraft motion simulation.

A82-39132 # Close-coupled canard-wing vortex interaction and Reynolds stress acquisition. W Calarese (USAF, Wright Aeronautical Laboratones, Wright-Patterson AFB, OH) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1368 12 p 7 refs

The present experiment investigates the interaction of canard and wing vortices and their effect on the lifting wing's flow field turbulence and Reynolds stresses Spanwise wing blowing was used to enhance the leading edge vortex and alter the vortex trajectory in an effort to keep it locked to the wing's leading edge for lift enhancement. The turbulence intensity and Reynolds stresses were obtained by using hot film anemometers. Air blowing enhances the circulation over the wing, preventing extensive flow separation. Reynolds stresses, mean velocity, and turbulence intensity values illustrate the vortex structure (Author).

A82-39134 # Analysis of an airplane windshield anti-icing system. P Ross (Ross Aviation Associates, Sedgwick, KS) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1372 8 p

This report documents the analysis methods developed to predict the performance of the windshield hot air anti-icing system on a business jet airplane. Flight data gathered from dry air and natural icing tests are used to develop and verify the accuracy of a procedure that will predict the windshield surface temperature for either wet or dry air. It is shown that windshield surface temperatures can be estimated to an accuracy of + or - 5% for a wide range of aircraft conditions. It is demonstrated that the method is somewhat conservative for all conditions (Author)

A82-39135 * # NASA Dryden's experience in parameter estimation and its uses in flight test. K W lliff and R E Maine (NASA, Flight Research Center, Edwards, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1373 16 p 17 refs

An explanation of the parameter estimation method used at the Dryden Flight Research Facility is presented, and an overview is provided of experience related to the employment of this method, taking into account the utilization of this experience in flight tests. According to a definition of the aircraft parameter estimation problem, the system investigated is asumed to be modeled by a set of dynamic equations containing unknown parameters. To determine the values of the unknown parameters, the system is excited by a suitable input, and the input and actual system response are measured. The values of the unknown parameters are then inferred, based on the requirement that the model response to the given input match the actual system response. Examples of parameter estimation in flight test are discussed, giving attention to the F-14 fighter, the HiMAT (high maneuverable aircraft technology) vehicle, and the Space Shuttle.

A82-39141 * # Effects of vortex breakdown on longitudinal and lateraldirectional aerodynamics of slender wings by the suction analogy. C E Lan and C -H Hsu (Kansas, University, Lawrence, KS) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th,

San Diego, CA, Aug 9-11, 1982, Paper 82-1385 17 p 30 refs Grant No NAG1-134

A semi-empirical method based on the suction analogy is developed to predict longitudinal aerodynamics and lateral-directional characteristics of slender wings at high angles of attack, including effects of vortex breakdown The latter is based on a correlation parameter derived from the predicted leading-edge suction distribution in the attached flow Empirical formulas, derived from a least-square analysis of data, for the vortex-breakdown angle of attack at the trailing edge, the progression rate of breakdown points and the vortex lift recovery factor in the breakdown region are given Comparison of predicted results with data in longitudinal aerodynamics and lateral-directional characteristics for wings exhibiting attoring vortex flow shows that the present method is reasonably accurate Explanation for peculiar lateral-directional characteristics is given (Author)

A82-39142 * # Lateral aerodynamics of delta wings with leading edge separation. J Katz (Technion - Israel Institute of Technology, Haifa, Israel) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1386 12 p 23 refs Grant No NAGW-00218

An unsteady vortex lattice method is presented for the calculation of the aerodynamic forces acting on lifting surfaces undergoing complex three dimensional motion. For the present case the nonsymmetric motion of a slender delta wing was considered and the resulting lateral characteristics were calculated. The flow separation line was specified along the wing leading edge and the emanating vortex sheet shape and rollup was then calculated. Numerical results are presented for the combined high angle of attack and side slip condition and for the wing constant roll and coning motions. (Author)

A82-39143 # Analytic extrapolation to full scale aircraft dynamics. L E Ericsson and J P Reding (Lockheed Missiles and Space Co, Inc, Sunnyvale, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1387 13 p 57 refs

It is pointed out that the extrapolation from subscale wind tunnel data to full scale flight becomes an especially serious problem at subsonic speeds when stall is involved and at high subsonic and transonic speeds where shock-boundary layer interaction can dominate the aerodynamics in the case of dynamic testing, valid subscale simulation is often impossible. A description is presented of an approach which provides a solution to this preliminary design dilemma. The approach makes it possible to obtain a prediction of the full scale aircraft dynamics on the basis of an analytical extrapolation from subscale test data. The considered procedure establishes analytic relationships between dynamic and static aerodynamic characteristics induced by viscous flow effects. The veracity of the analytic method is proved by predicting dynamic test results using corresponding static test data at the same subscale flow conditions Finally, the procedure provides the input necessary for extrapolation to full scale.

A82-39190 Fixed pattern noise correction for staring arrays in guidance systems. D T Whinray (British Aerospace Public, Ltd, Co, Dynamics Group, Hatfield, Herts, England) In Advanced infrared detectors and systems, Proceedings of the Symposium, London, England, October 29, 30, 1981 (A82-39176 19-35) London, Institution of Electrical Engineers, 1981, p 97-101

Infrared guided missiles of the next generation are expected to show significant advances in performance over those in current service. These advances are partly related to an employment of focal plane arrays A size advantage is gained by the removal of the traditional scanning mirror and drive systems. The introduction of an electronic scanned array provides speed and reliability advantages and also the potential of increased sensitivity. On the other hand, focal plane arrays do present their own set of problems in the areas of testing and operation. The present investigation is concerned with some of the aspects of testing and operation arrays which operate in the long wavelength atmospheric IR window. A description is presented of the principles of operation, and hardware techniques, which have been successfully used to achieve fixed pattern noise compensation at the high speeds necessary for focal plane arrays working in the long infrared waveband. G R

A82-39191 Algorithm development for infra-red air-to-air guidance systems. P D Allen and J Northfield (British Aerospace Public, Ltd, Co, Dynamics Group, Hatfield, Herts, England) In Advanced infrared detectors and systems, Proceedings of the Symposium, London, England, October 29, 30, 1981 (A82-39176 19-35) London, Institution of Electrical Engineers, 1981, p 102-111

General algorithms for the overall guidance of air-to-air infra-red missiles through the acquisition, tracking and terminal phases are described Special attention is given to the vital area of initial target detection Two 3 x 3 spatial operators are described and their response against naturally occurring cluttered sky images is reported. An assessment of the performance of each of these operators as discriminators of simulated targets against cluttered backgrounds.

has been made and is reported. The surprising result that point enhancement operators give impressive results even against large targets is discussed and qualified (Author)

A82-39194 Target tracking using area correlation. R M B Jackson (EMI Electronics, Ltd , Hayes, Middx , England) (NATO, AGARD, Conference on Image and Sensor Data Processing for Target Acquisition and Recognition, Aalborg, Denmark, Sept 8-12, 1980) In Advanced infrared detectors and systems, Proceedings of the Symposium, London, England, October 29, 30, 1981 (A82-39176 19-35) London, Institution of Electrical Engineers, 1981, p 124-130

With the increasing use of electrooptical imagers in weapon systems for aircraft, there is a need to provide an automatic track of targets of interest to relieve the operation - who may be the pilot - of this task. A description is presented of a tracking system, based on the area correlator technique, which can provide a stable and accurate track of targets for use in airborne systems in conjunction with Forward Looking Infrared Radar (FLIR) or TV imagers. It is of small size and can be built into standard format packages for installation in military aircraft. The tracking system can handle targets with a wide range of characteristics, and it can adapt automatically to magnification and target aspect changes G R

A82-39245 The system of 'objective control' (Das System der 'Objektiven Kontrolie'). K -D Grätzsch (Interflug Gesellschaft fur Internationalen Flugverkehr mbH, Berlin, East Germany) Technisch-ökonomische Information der zivilen Luftfahrt, vol 18, no 1, 1982, p 1, 2 In German

The concept of 'objective control' was originally developed as a control procedure in connection with the failure of components and systems of aviation equipment. However, it was soon recognized that this control method could also be employed for an evaluation of flight activities which is independent of subjective considerations. This advantage and the possibility to analyze flights, on a routine basis and in a manner which cannot be foreseen by the involved persons, has considerable educational significance. The system of 'objective control' in the case of a supervision of flight activities is based on the collection of information regarding the flight with the aid of onboard and ground-based equipment. This system makes it possible to initiate corrective action as soon as shortcomings with respect to the activities of the flying personnel are recognized. G.R.

A82-39246 Rationalization of the maintenance process for helicopter Ka-26 (Rationalisierung des Instandhaltungsprozesses für Hubschrauber Ka-26). K Janeczek (Interflug Gesellschaft für Internationalen Flugverkehr mbH, Leipzig, East Germany) *Technisch-ökonomische Information der zwilen Luftfahrt*, vol 18, no 1, 1982, p 3-7 in German

Since 1970, the helicopter Ka-26 has been employed in the inountainous areas of the German Democratic Republic for agricultural applications. The maintenance program is a vital part of the utilization of the helicopter. The information obtained in connection with the use of the helicopter provided an indispensable basis for an efficient, cost-effective organization of the maintenance procedures. The enhancement of the efficiency of maintenance operations made it possible to increase the performance provided by the helicopter and to improve its reliability. Attention is given to the conventional maintenance procedures for the helicopter in agricultural applications, the development of an optimal maintenance system, and the introduction of suitable control procedures.

A82-39247 Minimization of the total costs incurred in the employment of passenger jet aircraft (Minimierung der Gesamtkosten beim Einsatz von Strahlverkehrsflugzeugen). J Wilde (Interflug Gesellschaft fur Internationalen Flugverkehr mbH, Leipzig, East Germany) *Technisch-okonomische Information der zivilen Luftfahrt*, vol 18, no 1, 1982, p 8-14 In German

A description is presented of a procedure which makes it possible to minimize the total costs for the flight of a jet airliner. The procedure makes use of an optimization method which attempts to take into consideration all factors that affect the costs of a flight. The optimization problem is discussed, taking into account the various factors which affect fuel consumption and flight time, the determination of the Mach number which will provide a cost minimum, the consideration of meteorological factors and flight path characteristics, and the computation of fuel consumption. An investigation regarding the accuracy of the optimization calculation is also conducted. After the completion of a calculation including an optimization, it is possible to determine fuel consumption, flight times, and total costs for arbitrary. Mach numbers by making use of the data stored in the computer as a result of the preceding calculation. Possible cost reductions for the operation of Interflug airliners are discussed, taking into account also the price for fuel at specific airports.

A82-39248 Instrument landing systems /ILS/ at airports of the German Democratic Republic (Instrumentenlandesysteme /ILS/ auf DDR-Flughäfen). W Trempler (Interflug Gesellschaft für Internationalen Flugverkehr mbH, Leipzig, East Germany) Technisch-ökonomische Information der zivilen Luftfahrt, vol 18, no 1, 1982, p. 15-20 In German

The introduction of a new generation of landing systems of the type ILS SP-70

(System Posadki-70), provided by the Soviet industry, began with the installation of the first system of the considered type at the airport Berlin-Schönefeld in 1978 Up to March 1981, three more ILS SP-70 were installed at airports of the German Democratic Republic The utilization of the new SP-70 systems in Berlin and Leipzig has led to an improvement of aspects of flight safety for all arriving aircraft particularly under conditions of bad weather. The SP-70 is suited for automatic approaches according to the standards of the ICAO. Details concerning the ILS principles are discussed along with the characteristics of the ILS SP-70. The ILS SP-70 utilizes the most modern technology to satisfy Category III requirements Attention is ground installations, functional descriptions of system com⁻¹ technology. G R

A82-39263 † The effect of hybrid composite materials on the dynamic characteristics of helicopter rotor blades (Vliianie gibridnykh kompozitnykh materialov na dinamicheskie kharakteristiki lopastei vertoletov). E G Pak, V N Stekol'nikov, lu P Ganiushkin, R V Ivannikova, and V N Kestel'man Mekhanika Kompozitnykh Materialov, May-June 1982, p 475-479 7 refs In Russian

It is shown that changes in the relationship between the rigidity and mass characteristics of helicopter rotor blades can be effected by varying the modulus of elasticity of the structural material of the spar. Hybrid composite materials make it possible to achieve this by combining in one matrix several reinforcing fillers with different physical and mechanical properties. The optimal combination is that of glass and carbon fibers. The carbon-and-glass-reinforced plastic makes it possible to increase the rigidity of the spar without changing the mass characteristics as well as to increase the fatigue strength.

A82-39275 Application of an optical data link in the airborne scanning system. M J Green (Wisconsin, University, Madison, WI) Review of Scientific Instruments, vol 53, Aug 1982, p 1278-1280

A scanning thermal IR radiometer has been used in the acquisition and digital processing of thermal imagery. In connection with plans for a study of oceanic thermal fronts, attention has been given to the possibility to employ the scanner in a system for mapping sea surface temperature which could be used with the Navy P-3 patrol aircraft. The main obstacle to such an employment is that, since the aircraft are to be used on an 'aircraft-of-opportunity' basis, no modifications to the aircraft would be permitted. The scanner is comprised of two principal subsystems, including the scanner head itself and a power supply/signal conditioning chassis. These two units are normally connected by a 39-conductor cable As the requirements regarding the Navy application do not permit an employment of the normal connection, an optical data link has been fabricated which can replace the hard-wired connections between scanner head and power supply G R

A82-39279 † Primary-data devices (Pribory pervichnoi informatsii). V A Bodner Moscow, Izdatel'stvo Mashinostroenie, 1981 344 p 29 refs in Russian

The work examines the theoretical principles, design, and analysis of primarydata devices, i.e., sensors that are used to acquire information necessary for the control and monitoring of flight vehicles. Particular consideration is given to advanced measurement techniques (pulse-time and frequency output devices, correlation devices, etc.), the computer-aided design of the devices with allowance for complex optimization, the use of microprocessors, and automatic error compensation. Attention is given to sensors for measuring pressure, temperature, fuel consumption, flight speed and altitude, and acceleration.

A82-39295 † The operation of aircraft and helicopters in difficult meteorological and environmental conditions (Ekspluatatsiia samoletov i vertoletov v uslozhnennykh prirodnykh usloviiakh). A M Volodko Moscow, izdatelistvo Transport, 1981 158 p 48 refs In Russian

The effects of such adverse phenomena as turbulence, ice formation and hail, wind shear, and lightning on the operation of aircraft are considered. Attention is also given to the effects of high and low air temperatures, dust in the air, and air moisture. Biological damage (from microorganisms, insects, and birds) is also considered along with conditions of helicopter flight in mountain areas and clouds B J.

A82-39321 Flight management computers (Calculateurs de gestion, du vol). J Grossin (Société Nationale Industrielle Aérospatiale, Toulouse, France) L'Onde Electrique, vol 62, June-July 1982, p 59-66 11 refs in French

Flight management computers (FMC) and their role in reducing fuel consumption in commercial aircraft are examined. Research to offset rising fuel costs is concentrating on improving engine efficiency and the aerodynamic performance of the aircraft, and in flight control computers which automate control of flight and systems to the most efficient levels implementation of FMC with the Airbus is described, including the retrofit to provide accurate navigation and economical ascent and descent Flight time at low speed and altitudes is minimized, and systems surveillance and fuel flow are automated Block diagrams are presented of the systems interconnections with the FMC and the control strategy. Flight plans fed into the FMC yield an optimized flight strategy based on a plan involving lowest cost. The flight is categorized into ascent, cruise, and descent phases. Constraints which can alter the plan consist of changes in altitude to maintain proper cruise speed, the tempo of the flight in reaching fixed ground reference points, and operational limits of the aircraft.

A82-39322 Electronic stabilization of an aircraft (Stabilisation d'un avion par l'électronique). A Chadeau (Ministère de la Défense, Service Technique des Télécommunications et des Equipements Aéronautiques, Paris, France) L'Onde Electrique, vol 62, June-July 1982, p 67-71 In French

The applications of electronic flight control systems (EFC) to the amelioration of engine troubles and to automatic pilot systems are reviewed Nominal instabilities are automatically corrected in-flight through commands implemented by electrohydraulic servocontrols responding to preset tolerances for the flight envelope parameters, including airspeed, altitude, pitch, route, and landing functions EFC systems permit the use of aircraft configurations which experience instabilities which could not be handled by a human pilot, but can be electronically altered so that control of the aircraft appears similar to simple mechanical linkage. Digitzed control of a modern aircraft is noted to require over 400,000 operations/sec, with control decisions being weighted toward safety through calculations of the probability of occurrence of destabilizing events and an assessment of the total effect a command decision will have on the aircraft It is order to maintain the accuracy and operability of preexisting systems. MS K

A82-39323 Air-air collision avoidance systems (Systèmes d'anticollision air-air). A Michel (Direction Generale de l'Aviation Civile, Service Technique de la Navigation Aérienne, Paris, France) L'Onde Electrique, vol 62, June-July 1982, p. 72-82. 10 refs. In French

Methods of improving air-to-air collision avoidance through ground based actions are asserted to reside in flow control, by restricting the number of flights to levels which can be handled by available controller personnel aided by computers and radar An on-board collision avoidance system is offered as a means to ameliorate the workload on the ground The systems tested thus far have operated between 1520-1620 MHz and work multilaterally, obtaining identification of nearby aircraft, their relative distance, altitudes, and characterizing their approach paths Attention is given to various systems developed as prototypes for operational systems, noting that the FAA is requiring that any system used be compatible with ATC Characteristics of the Discrete Address Beacon System introduced in 1980 are presented, including methods for the suppression of erroneous data Problems in perfecting the control logic for the detection systems are discussed MS K

A82-39358 # The unsteady motion of a wing traveling at subsonic speed above a plane (Neustanovivsheesia dvizhenie kryla s dozvukovoj skorost'iu nad ploskost'iu). E A Krasil'shchikova Revue Roumaine de Mathématiques Pures et Appliquées, vol 27, no 3, 1982, p 363-370 In Russian

An analysis is presented of the plane-parallel flow of a compressible fluid excited by a thin wing moving at subsonic speed above a plane, the motion of the wing taken to begin from a state of rest. The aerodynamic problem is viewed as a combination of boundary value problems with a moving boundary for the twodimensional wave equation. Each of these problems is solved by the method of integral equations in characteristic coordinates. The velocity potential is represented in recursive formulas, which make it possible to analyze the interaction of the wing and plane for arbitrary moments of time.

A82-39359 # The rectangular wing with semiinfinite span in nonlinear theory (Der rechteckige flugel halbunendlicher spannweite in der nichtlinearen theorie). S Turbatu (Bucuresti, Universitatea, Bucharest, Rumania) Revue Roumaine de Mathématiques Pures et Appliquées, vol. 27, no. 3, 1982, p. 419-422. 10 refs. In German

In an investigation of unsteady flow, use is made of an approach considered by Teipel (1964), Hosokawa (1964), and Ruo (1974) It is assumed that unsteady effects are superimposed on steady flow, taking into account a consideration of these effects in the first order. The concepts employed in connection with the solution of the nonlinear differential equation are similar to those used by Os-watitsch and Keune (1955) for the steady flowfield. A boundary-value problem in two parts regarding the potential of a rectangular wing with semiinfinite span in a state of harmonic oscillations is also solved, taking into consideration the case of unsteady transonic flow in a nonlinearized treatment.

A82-39374 Optimal control application in supersonic aircraft performance. C -F Lin (Michigan, University, Ann Arbor, MI) IEE Proceedings, Part D - Control Theory and Applications, vol 129, pt D, no 4, July 1982, p 113-117 In the present investigation, the aerodynamic and engine characteristics of a typical lightweight high thrust/weight ratio fighter are modelled as continuous functions of a state variable, the Mach number This approach provides the possibility for a smooth application of optimal control theory By introducing a set of dimensionless variables, general results are obtained for an entire class of vehicles with similar physical characteristics. Numerical solutions are presented to show the characteristics of the optimal trajectory, taking into account the optimal control features for guiding the aircraft along a particular trajectory A description is presented of the general properties of optimal trajectories. These properties are used to solve any particular optimal trajectory which depends on the terminal conditions and the physical constraints.

A82-39399 † Application of the sequential optimization method to the tuning of the natural frequencies of gas-turbine engine compressor blades (Primenenie metoda posledovateľ noi optimizatsii k ostroike chastot sobstvennykh kolebanii lopatok kompressora GTD). A B Roitman, V P Afanas'ev, T F Mikhailova, and S P Omel'chenko Problemy Prochnosti, July 1982, p. 86-89 5 refs In Russian

The optimum tuning of the natural frequencies away from the dangerous resonance range is carried out for laterally oscillating turbine blades using the maximum blade profile thickness as the control function. The control range is limited by the tolerance on the blade geometry. A quality functional is obtained which provides a way to tune the natural frequencies with allowance for the constraints involved.

A82-39403 † Problems in the simulation of correlation-extremal navigation systems (Problemy modellirovanila korreliatsionno-ekstremal'nykh sistem navigatsii). V I Alekseev and V P Tarasenko (Tomski Institut Avtomatizirovannykh Sistem Upravlenila i Radioelektroniki, Tomsk, USSR) *Elektronnoe Modellirovanie*, vol 4, July-Aug 1982, p 80-83 9 refs in Russian

A general scheme for the simulation of correlation-extremal navigation systems is described, and problems of the synthesis and analysis of these systems which can be implemented through hybrid computers are examined. Applied programs developed for the simulation of correlation-extremal navigation systems are briefly characterized.

A82-39404 † Simulation of correlation-extremal receivers of signals from sampling-phase radio-navigation systems (Modelirovanie korreliatsionno-ekstremal'nogo priemnika signalov impul'sno-fazovykh radionavigatsionnykh sistem). I M Egorov and A M Korikov (Tomskii Gosudarstvennyi Universitet, Tomsk, USSR) Elektronnoe Modelirovanie, vol 4, July-Aug 1982, p 84-89 6 refs in Russian

The paper examines the simulation of correlation-extremal navigation systems according to radio fields created by sampling-phase radio-navigation systems Particular attention is given to the simulation software, and the synthesis of a correlation-extremal receiver is considered for a Loran-C type system BJ

A82-39467 1 The use of analog computers in solutions of inverse problems of heat conduction for the identification of boundary conditions on the surfaces of gas-turbine-engine parts on the basis of temperaturemeasurement results (Ispol'zovanie AVM v reshenilakh obratnykh zadach teploprovodnosti dlia identifikatsii granichnykh uslovii na poverkhnostiakh detalei GTU po rezul'tatam ikh termometrirovanila). B D Bileka, V N Klimenko, and S M Chepaskina (Akademiia Nauk Ukrainskoi SSR, Institut Tekhnicheskoi Teplofiziki, Kiev, Ukrainian SSR) *Promyshlennaia Teplotekhnika*, vol 4, July-Aug 1982, p 53-59 5 refs In Russian

Methodological features and computational results are considered for two types of inverse problems of heat conduction without heat removal in the inner zone and with heat removal. The first case is illustrated by the nonstationary problem of determining convective heat transfer from the gas to the stator above moving blades and to noncooled moving blades, while the second case is illustrated by the stationary problem of determining convective heat transfer from the gas to cooled nozzle blades. These two problems are treated by analog computation on the basis of the finite difference method, an implicit scheme using the Liebman method is applied to the nonstationary problem. Errors arising in the use of this approach to solve inverse heat-conduction problems are examined. B J

A82-39482 † Turbulent boundary layer on a porous surface with injection at various angles to the wall (Turbulentnyi pogranichnyi sloi na poristykh poverkhnostiakh pri vduvakh pod raznymi uglami k stenke). V M Eroshenko, A A Klimov, and L S lanovskii *Akademiia Nauk SSSR, Izvestiia, Mekhanika Zhidkosti i Gaza*, May-June 1982, p 59-64 13 refs In Russian

Experimental results are presented on turbulent boundary layers on porous plates in the case of uniform injection directed at various angles to the wall (15, 25, 40, 75, and 90 deg). The data disclose the influence of the intensity and angle of injection on the profiles of averaged and fluctuating velocities, characteristic thicknesses, surface friction, and turbulent shear stresses in the boundary layer. It is shown that moderate injections at angles to the flow are more effective in terms of protecting the surface than the commonly used normal-incidence injection B J

A82-39539 'Listening' systems to increase aircraft structural safety and reduce costs. C D Bailey and W M Pless (Lockheed-Georgia Co, Marietta, GA) Lockheed Horizons, Summer 1982, p 17-22

Applications of acoustic emissions (AE) techniques to in-flight monitoring of

fatigue stresses leading to parts failure is discussed. Due to inherent difficulties in designing all flows out of an aircraft, the deficiencies present in visual inspection, and the existence of many hard-to-reach critical areas, the use of AE for lifetime surveillance of potential fatigue-prone components of aircraft is offered as an effective means to prevent failure. Piezoelectric or capacitive devices are employed to detect AE originating from corrosion, stress-corrosion cracking, and crystal dislocation movements. The sensors are tuned to ranges outside of normal structural vibration and situated in areas known for potential flaws, sometimes in arrays which serve to locate a flaw through triangulation. Performance on board the KC-135 aircraft is cited as evidence for the cost-effectiveness of AE stress monitoring. MS K

A82-39540 The fourth dimension. R L Heimbold and M F Leffler (Lockheed-California Co , Burbank, CA) Lockheed Horizons, Summer 1982, p 24-30

Problems and solutions for introduction of the Lockheed four-dimensional (4-D) flight management system (FMS) into regular airline traffic are explored. The 4-D system is operated totally by the flight management computer, which directs the plane to appropriate altitudes and speeds for minimum fuel consumption over the entire flight. The altitude is increased as fuel is consumed and the aircraft becomes lighter integration of the system into current air traffic involves including accurate wind data, initial estimates of arrival time and options for the flight path, a sufficient capacity for ATC control metering and spacing procedures, and accuracy of high enough order to reduce ATC workloads Flow integration proceeds 100 mi from the airport and the necessity for a holding pattern results in a revectoring for approach once a go-around has been completed it is noted that NWS forecasts are inadequate in terms of accuracy of available wind data MSK

A82-39718 The technological aspects of titanium application in the TU-144 aircraft structure. S A Vigdortchik and A N Tupolev In Titanium and titanium alloys Scientific and technological aspects Volume 3 (A82-39626 19-26) New York, Plenum Press, 1982, p 2181-2193

The development of techniques leading to the construction of significant portions of the TU-144 aircraft with titanium alloys is reviewed. Statistical data from experiments indicated that hydrogenation of the structural material and subsequent slow-rate failures could be controlled by vacuum low-temperature annealing, in addition to chemical milling combined with refining. The relationship of introgen and oxygen surface content introduced by heating, cutting, and multilayer welding to fatigue, slow-rate failure, and creep were also established statistically Automatic inert-gas welding in sealed chambers was found to control the failure-producing elemental contents. Carbon contamination of surface layers was reduced by chemically etching and removing 0.2-0.5 mm of the surface finally, salt-stress corrosion was determined to be minimal in the expected operating temperatures of the titanium materials. MS K

A82-39727 Remotely piloted vehicles; International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers and Supplementary Papers. Conference sponsored by the Royal Aeronautical Society-and University of Bristol Bristol, England, University of Bristol, 1982 Conference papers, 172 p, Supplementary papers, 57 p (For individual items see A82-39750)

Advances in system components, performance, and sensor systems of remotely piloted vehicles and unmanned vehicles are reported The impacts and applications of RPV's on combat situations and costs are discussed, along with the vanous configurations of fixed wing and helicopter platforms, and Canadian, Britsh, and U S efforts in RPV developmental programs Attention is given to the vanous sensors which an RPV may carry, including radar, TV cameras, IR scanners, radiometers, and dead reckoning guidance systems The design of algorithms for terrain following systems is described, as are sensor stabilization requirements and images received from remote sensors Attention is given to the use of radio controlled aircraft in pollution studies, propulsion systems for RPVs, and mage orientation for RPV ground station crew members MSK

A82-39728 # Unmanned aircraft in future combat. W D Simpson (British Aerospace Public, Ltd, Co, Dynamics Group, Stevenage, Herts, England) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p. 2.1-2.5

An assessment of the total effect of unmanned vehicles on armed forces is presented The U S Army Aquila is noted to provide reconnaissance capability in a fixed wing aircraft form, while tethered helicopter platforms and drone dirigbles show promise of fulfilling the same needs at lower cost Explosives delivery to targets at a distance have reached the level of cruise missiles, which are completely dependent on internal sensors and processors once launched Similar autonomous vehicles, piston engined, can be used to jam radar, dispense chaff, and are called harassment drones Production costs increase with the degree of sophistication of the system, including addition of IR sensors, jam-free radio, and personnel training required for control and retrieval. systems are nominally used in large numbers and fly at high altitudes to retain line-of-sight communications MSK

- -

A82-39729 # Horses for courses in RPV operations. R G Austin and C J Roberts (ML Aviation Co , Ltd , Bristol, England) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 3.1-3 18

Different configurations and capacities, the increase of cost with complexity, and examples of RPVs are examined. The highest cost savings engendered by use of RPVs is noted to be the stationing of the pilot in a relatively benign environment, while additional benefits are gained from civilian applications such as crop spraying and pollution monitoring, a smaller target in combat stuations, and the reduction in support crew necessary for military applications. Although the range is generally limited to a quarter mile from the controller, repeated flights may be made for photographic purposes. Operation and components of a minimal system are described, and means of extending the range, addition of a TV camera, uses of helicopter-type vehicles, and retrieval by netting are reviewed Attention is also given to equipping RPVs for flight in severe weather, reduction of noise, shielding the RPV IR emissions, and standards for the production of RPVs.

A82-39730 # Short range tactical RPH system. M J Breward (Westland Helicopters, Ltd., Yeovil, Somerset, England) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 4 1-4 12 5 refs

Design features of a remotely piloted helicopter (RPH) for use in surveillance and as an observation post are discussed. The RPH is intended for use in the forward combat zone and needs high mobility, rapid deployment, flexibility of response, and rapid response. Performance requirements include all weather operation, 24-hr capability, a 10-km radius of action, a response time less than 10 min, and real time data flow. Attention is given to the sensor system with look-up ability, using low-light TV or IR scanner. The characteristics of the Wisp and Wideye RPHs are described, including payloads of 30 and 25 kg, respectively, and all up weights of 125 and 85 kg. Command links are achieved with low frequency transmissions lasting short periods, with 30-60 sec intervals of silence. Dead reckoning with meteorological input alone is recommended for overcoming the dangers of ECM.

A82-39731 # Canadair rotary wing technology development. A S Clark (Canadair, Ltd , Montreal, Canada) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 5 1-5 13

Design, performance, and operational features of the Canadair CL-227 rotary wing RPV are detailed The CL-227 is intended as a surveillance and target acquisition system transmitting in real time, operating in the short-to-medium range battlefield locations, and controlled by mobile units. A rotary winged configuration permits take-off from unprepared ground and hovering over target careas. The vehicle is modular in design, comprising power, rotor, and control sunits. A Wankel engine has been successfully employed during testing, and rotor blades are made of Kevlar with a foam core. The control module contains sensor and telemetry equipment for microwave relay and operation with four degrees of freedom. Attention is given to the development of a transfer function suitable for maintaining the aerodynamic stability of the vehicle. A total of 300 flights had been performed by 1980, and test procedures are described.

A82-39732 # U.S. Army remotely piloted vehicle program. J K Marstiller (U S Army, Aviation Research and Development Command, St Louis, MO) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 61-65

The U S Army full scale engineering development program for the Aquila RPV is described Aquila is intended as an artillery aid to provide target acquisition, permit first round fire for effect, allow artillery adjustment, and provide designation for laser guided projectiles out to maximum artillery range. The entire system comprises the air vehicle, a ground control station, remote ground terminal, a hydraulic catapult launcher, a net type recovery subsystem, and support equipment. Aquila is launched 10-15 km on the friendly side of combat lines and flight is governed by preprogrammed internal commands covering waypoints, with lotter or jinking modes available by remote control, received in burst form. The vehicle carries a stabilized TV sensor with laser rangefinder/designator, and is constructed to survive in nuclear, ballistic, and chemical environments, and in worldwide climatic conditions. Operational testing is scheduled for 1982.

A82-39733 # Stabileye. R Stephenson (British Aerospace Public, Ltd, Co, Dynamics Group, Bristol, England) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p. 7 1-7 12 6 refs Performance, design, and materials characteristics of the Stabileye RPV, which is used to define applications of RPVs, are detailed The Stabileye has progressed through three versions, each featuring a twin-boom pusher engine layout, with the most recent, the MK 3, carrying a maximum payload of 25 kg, a 50 m/sec or less top speed, and flight duration of one hour. The MK 3 was constructed to examine the effectiveness of glass reinforced plastics and honeycomb core material for the fuselage, bulkheads, nose and rear body fairings, and the top lid, which conceals the payload and recovery parachute. The wing is a NACA 4415 profile made of hot-wire cut polystyrene foam with multiple hardwood spars and wood veneer/glass reinforced plastic skins. A two-cylinder, 7-hp power plant is interfaced with a pulse code modulated system. The primary sensor is a vertical gyroscope, with flight control electronics, a yaw rate gyro, and a telemetry encoder.

A82-39734 # The national dynamics 'observer' mini-RPV for tropical operation. M Reed (Natal, University, Durban, Republic of South Africa) in Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 9 1-9 9 7 refs

Results of testing program of a mini-RPV for civil and military applications in South Africa are reported. The airframe was fabricated using epoxy resin/fiberglass and fire-retard low density styrofoam. A two-stroke engine was chosen, developing 22.6 hp at 7200 rpm and a four-bladed propeller for reasons of maintaining engine speed. Launch is from the roof of a car and power for servounits is derived from nickel-cadmium battery packs. Program goals for additional development of a rhombic-wing mini-RPV are outlined. MS K

A82-39735 # MACHAN - A unmanned aircraft flight research facility. T G Hamill (Marconi Avionics, Ltd., Rochester, Kent, England) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 10 1-10 8 Research supported by the Ministry of Defence (Procurement Executive)

The purpose of this paper is to introduce the MACHAN programme, or to give it it's full name, 'the provision of an unmanned aircraft flight research facility' This programme is funded by MOD(PE) with a substantial PV input from Marconi Avionics The 3 aspects of the programme covered are the aircraft itself, the supporting facilities and, here, specifically the ground station, and the programme of experimental flying and payload trials as it is currently envisaged (Author)

A82-39736 # Mini-RPV propulsion. L A Kolbo (Kolbo Corp., Anaheim, CA) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 13 1-13 4

Mini-RPV propulsion systems which can deliver flight durations of four hours at speeds between 100 and 200 kn are reviewed. The reciprocating internal combustion engine is the favored choice because of fuel density, noise, heat signature, and fuel consumption characteristics. A two-cylinder configuration is the most satisfactory choice due to lightness, carburation, and simplicity. The engine components are preferably made of aluminum, chromium, and aluminummagnesium alloys to preserve weight-saving design goals and heat-tolerant properties. It is recommended that mini-RPVs have a specific fuel consumption of 0.8, with an aneroid barometer-equipped carburetor in order to adjust fuel-air mixtures for height automatically. An ignition system which delivers 40,000 V open circuit is described, and features of propellers are discussed in terms of MS K

A82-39737 # The application of small propellers to RPV propulsion. A C Roberts (British Aerospace Public, Ltd, Co, Dynamics Group, Bristol, England) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 14 1-14 10

Progress in the development of a data base for construction of propellers for increasing the range and performance of small unmanned aircraft is assessed Compromises are necessary in design of propellers due to different requirements during climb and dash flight modes, and options for areas to explore include diameter and number of blades. Restrictions include resulting size of the radar target produced, the effect on forward looking sensors, recovery method, and noise Small RPV propellers operate in the middle of the critical Reynolds number flow regime, encountering both laminar and turbulent flows while turning at 6000-8000 rpm A numerical model is developed for optimizing propeller efficiency and a computer program is outlined for predicting performance. Wind turnel tests of 0.5 m diam fixed-pitch 2-blade propellers showed that current predictions degrade in accuracy with increases in forward speed MS K

A82-39738 # The control and guidance unit for MACHAN. I F Cooper and J A Birkenshaw (Marconi Avionics, Ltd., Rochester, Kent, England) in Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April

6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 16 1-16 11 Research supported by the Ministry of Defence (Procurement Executive)

Details of the MACHAN development program for evaluating the unmanned aircraft guidance achievable by a dead reckoning system aided by other systems and sensors are presented. An attitude and heading reference (AHRS) system was concluded to require a vertical reference within 0.5 deg and a heading reference of not more than 4 deg/hr, provide pitch, roll, and yaw rates for the autopilot, operate digitally, possess navigation capability and update, operate within various mission profiles, and be amenable to mass production. The AHRS system constructed featured three single axis gyros, three accelerometers, a dedicated real time microprocessor, and attitude recognition by reference to gravity and initial data supplementary sensors, such as a single degree of freedom rate integrating gyro and accelerometer, pass data through the microprocessor where magnetic heading and Doppler velocity data are also considered.

A82-39739 # U.S. Army remotely piloted vehicle supporting technology program. T D Gossett (U.S. Army, Research and Technology Laboratory, Moffett Field, CA) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 18 1-18 10 10 refs

Details of the U S Army full scale engineering development program for the RPV Aquila are described. The system includes the air vehicle, a recovery system, an air vehicle handler, a remote ground terminal, a ground control station, a launcher subsystem, and a maintenance shelter. With attention focused on the propulsion and antijam data link developments, it is noted that the data link includes a command uplink, telemetry downlink, video downlink, and navigation of the air vehicle relative to the remote ground terminal. Components of the antijam modular integrated communication and navigation system comprise an analog null steerer, moderns with chopped chirp waveforms, a direct pseudonoise spread modem, and a phased array. Ducted propellers were determined to offer higher takeoff, and quieter performance and efficiency than open propellers Finally, operational features of the 20 hp test engines and the FLIR sensor are provided.

A82-39740 # A terrain following system, an algorithm and a sensor. E Skarman (Saab-Scana AB, Linkoping, Sweden) and U Rehammar (Telefonaktiebolaget L M Ericsson, Molndal, Sweden) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 19 1-19 15

The development of a control logic for terrain following RPVs using radar and laser sensors to detect possible obstacles at least 1300 m in advance is described analytically Limitations in the theory of linear dyn ic systems are discussed in terms of filtering an input command with a low pass filter to avoid exceeding the mechanical environment stress limits of all vehicle subsystems. The odeling of a dynamic system comprises two states of the kinematics, vertical speed and altitude, the two states pitch of the vehicle dynamics, the flight control system, which is an acceleration feedback system, and the low pass filter. The system is shown to have one input and seven functions with simple asymptotes and control is confined to operating at height to height from time to time. Inputs to the command filter are developed along with decision rules, and two- and three-dimensional simulation algorithms are outlined.

A82-39741 # Sensor stabilisation requirements of RPV's - A simulation study. K G Narayanan, M Madhuranath, S K Bhat, and G Elangovan (Aeronautical Development Establishment, Bangalore, India) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p. 21 1-21 8 6 refs

The application of pilot simulator video displays to the development of sensors for the stabilization of TV carrying RPVs is described. Either films with servoinduced roll, yaw, and jitter or numerically generated images can be displayed to the RPV TV sensor. Particular attention is given to scaled geometric presentations which produce out-the-window views to pilots. Requirements for the simulation include accurate representations of objects, reflectance/radiance and contrast, RPV sensor accounting for resolution, sensitivity, FOV, look angle, slewing rate, image smear/lag, platform speed, direction, altitude, attitude, and maneuvers. The data link is limited by the range of operation, bandwidth, and noise, and terrains are chosen for the appropriate mission. Block diagrams are provided of the RPV sensor simulator and improvements necessary for the system to be operational.

A82-39742 # Radars for UMA. M Scorer unarconi Avionics, Ltd, Research Laboratory, Rochester, Kent, England) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 22 1-22 6

The implementation of lightweight radar systems in unmanned aircraft (UMA) is discussed. Attention is given to the application of UMA to air defense as a passive receiver system, carrying radiometers as a passive detector, and micro-

wave, millimeter wave, and laser radars for target detection and ranging. The necessity of developing laser radars which operate at eyesafe wavelengths, such as 10 micron CO2 lasers, which are currently too heavy for UMA, is noted Data gathered by a UMA radar system is gained by means of a transmitter and a receiver, then relayed along a ground link. Millimeter wave radars permit the use of 20 cm antennas on UMAs while maintaining an image resolution of 25 m at 1.5 km, operating at 100 GHz. Flat plate printed circuit antennas several millimeters thick have been fabricated, permitting placement of the receiver on the same substrate as the antenna. Employing magnetrons for high power gain is outlined M S K.

A82-39744 # Electric propulsion for a mini RPV system. G R Seemann and G L Harris (Developmental Sciences, Inc, City of Industry, CA) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Supplementary Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 12 1-12 6 Contract No F33657-79-C-0508

The advantages of electric propulsion, such as reliable instant-start, enhanced survivac.ihty, possible higher performance and improved storability, have merited further investigation Advances in the development of the lithium battery have increased the payload performance to 200-300 Wh/Ib with the battery being the prime factor of the propulsion system concept A point design system of the mini-RPV is described based on predictions after a strawman mission, and studies of current and advanced concepts of an electric propulsion system are discussed in terms of the components of the system Temperature control is studied, and performance estimates of the mini-RPV are outlined such as a speed range of 60-150 kts, a climb rate of 600 ft/min and an endurance of five hours. The system's potential use as an expendable vehicle to conduct surveillance, jamming or kamikaze missions is foreseen.

A82-39745 # Flight control systems for aerial targets. A W Bargery and K W Rosenberg (Marconi Avionics, Ltd., Rochester, England) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Supplementary Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 17 1-17 18 Research supported by the Ministry of Defence (Procurement Executive)

Aerai targets, a class of unmanned aircraft (UMA), present constraints different from other classes of UMA. The control system design is partially determined by data link, tracking facilities, and range location. The flight control systems of two targets, the Jindivik, in operation for 25 years, and the Sea Vixen, soon to be in operation, are described. The Advanced Subsonic Aerail Target (ASAT) flight control system is under development, and its design approach, which anticipates a more expendable target vehicle, is described. The ground station for the ASAT requires a high initial investment, but the air vehicle requires a minimal cost. A comparison of each of these three systems is presented. The Jindivik has high operating skills, the Sea Vixen has medium skills, and the ASAT has low skills, while the Jindivik and the Sea Vixen require large crews and the ASAT requires a small crew. Block diagrams of each UMA are included R K R

A82-39746 The design of a viewing system for near real time stereo images from a UMA borne linescan sensor J A C Beattle (Royal Aircraft Establishment, Farnborough, Hants, England) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Supplementary Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 20 1-20 3

Laboratory trials demonstrate a display of stereoscopic images, received in data streams with a bandwidth of 512 kHz (-3 dB) The sensing and presentation of the data are described. An optical system consisting of a German television lens of 102 mm focal length and an F number of 18 is used. The image plane is divided in two by a right angle splitting prism with each half falling on a separate linear array angled 7.5 degrees from the optical axis. The two linear arrays provide data alternately, which is converted to form a pair of visible images. The demultiplexing system is explained, as well as various methods of storing the data The effect of cardboarding is less severe with this system as it has an effective back drop. The viewing system is described with its main problem being that a 90 degree twist in the image path is necessary for correct viewing. The proposed air vehicle BAe (Filton) Stabileye Mkil is discussed. In addition, it is shown that excessive movement may cause severe blurring, leading to difficulties in the fusion of the stereo pairs. Fifty lines of horizontal disparity and 12 lines of vertical disparity can be tolerated with a good stereo viewing facility. Two 4-bit images have been successfully stored and extracted using look up table methods

A82-39747 # Opto-electronical push-broom scanners for navigation, reconnaissance and generation of digital data bases. O Hofmann and P M W Navé (Messerschmitt-Bolkow-Blohm GmbH, Munich, West Germany) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Supplementary Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p. 20A 1-20A 3 A82-39750 # The design of a RPV ground station simulator. J Ford and P G Thomasson (Cranfield Institute of Technology, Cranfield, Beds, England) In Remotely piloted vehicles, International Conference, 2nd, Bristol, England, April 6-8, 1981, Supplementary Papers (A82-39727 19-01) Bristol, England, University of Bristol, 1982, p 26 1-26 7 Research supported by the Ministry of Defence (Procurement Executive)

A simulator complex has been designed representing the ground station environment of a remotely piloted vehicle (RPV) system, in order to evaluate the human factors of a ground control station such as the work load of the crew. The design requirements of the simulator are described, and the reasons for using a multicomputer design are explained. The primary requirement of the simulator is that it operate in real time, and a second requirement is that it be flexible in order to accommodate specification changes in the system. An example of the flexibility of the system is that the memory requirement of the system has increased from 24 K bytes to 128 K bytes with no need to modify the framework or computing capacity. The goals in creating a ground control station are that it be able to preplan missions for the RPV, to control and replan missions while the RPV is airborne, and to interpret real time imagery. Various diagrams are included

RKR

A82-39836 # Aerodynamic aspects of aircraft dynamics at high angles of attack /AGARD Lecture/. K J Orlik-Ruckemann (National Aeronautical Establishment, Ottawa, Canada) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1363 22 p 37 refs

This paper presents a review of some of the fluid dynamics phenomena that are associated with the oscillatory flight at high angles of attack, with particular emphasis on asymmetric shedding of forebody vortices, asymmetric breakdown of leading edge vortices, the oscillatory motion of such vortices, and the time lag between the motion of the vortices and that of the aircraft These phenomena cause a number of important effects on the dynamic stability parameters at high angles of attack (high alpha), such as strong nonlinearities with alpha, significant, static and dynamic aerodynamic cross-coupling, large time-dependent and hysteresis effects, and a strong configuration dependence. The need to consider all the aerodynamic reactions in their vectorial form is emphasized, and the importance of the abovementioned effects on our prediction capabilities of aircraft behavior at high alpha is discussed. Development of adequate mathematical models is advocated and requirements for advanced wind tunnel techniques for performing the necessary oscillatory experiments are described. The oral presentation is illustrated by movie films showing flow visualization on oscillating models (Author)

A82-39882 On the state of technology and trends in composite materials in the United States. J R Vinson (Delaware, University, Newark, DE) In Composite materials Mechanics, mechanical properties and fabrication, Proceedings of the Japan-U S Conference, Tokyo, Japan, January 12-14, 1981 (A82-39851 19-39) Barking, Essex, England, Applied Science Publishers, 1982, p 353-361 16 refs

In connection with the ongoing NASA Aircraft Energy Efficiency Composite Primary Aircraft Program a number of composite material structural components have been installed on commercial aircraft and are in service today. The composite components involved include rudder, vertical fin, ailerons, elevators, and horzontal tail. Attention is given to the use of graphite composites in commercial and military aircraft, F100 afterburner nozzle flaps made of carbon-polyimide composite, the graphite-epoxy airframe of the Learfan 2100, the use of Keviar in helicopters, the employment of Kevlar composites in sailplanes, the fabrication of the fifty foot long booms of the Space Shuttle from graphite epoxy, and the use of Kevlar-epoxy in the design of many rocket motor cases. Unfortunately, cost and confidence are still major obstacles toward more use of composites in the auto industry GR

A82-39890 Tests of CFRP spar/rib models with corrugated web. Y Tada, T Ishikawa, and E Nakai (National Aerospace Laboratory, Chofu, Tokyo, Japan) In Composite materials Mechanics, mechanical properties and fabrication, Proceedings of the Japan-U S Conference, Tokyo, Japan, January 12-14, 1981 (A82-39851 19-39) Barking, Essex, England, Applied Science Publishers, 1982, p. 461-470 5 refs

Static strength tests are conducted on cantilever beams with corrugated web, models of spars and ribs used in aircraft structures, which are fabricated from carbon fiber reinforced plastics. The shear strength of the corrugated web, the strain distributions, and the failure modes are evaluated for three types of models having different corrugation depths and laminate constructions. Results show that the ultimate strengths of the webs are approximately equivalent to the shear strength of flat specimens of the same laminate construction. In addition, the depth of the corrugation does not crucially change the strain distribution and the static bending strengths, but does effect the failure mode. Strengthened layers of the flange-web connections have little effect on the web strength. The critical state of the webs can be identified by observing the magnitude of the surface strains, not by the displacements.

A82-39892 Evaluation of CFRP prototype structures for aircraft. Y Noritake, T Kohda, Y Abe, F Yamauchi, S Toyohira, K Mogami, H Arai, and N Arata (Japan Defense Agency, Technical Research and Development Institute, Tachikawa, Tokyo, Japan) in Composite materials Mechanics, mechanical properties and fabrication, Proceedings of the Japan-U S Conference, Tokyo, Japan, January 12-14, 1981 (A82-39851 19-39) Barking, Essex, England, Appiled Science Publishers, 1982, p 478-486

The results of flight test programs to test the suitability of CFRP advanced composites for aircraft structures are presented. The CFRP components tested included a rudder and rear nose landing gear door of a supersonic trainer, ground spoilers of a C-1 transport, and the outer leading edge slat rails of an antisubmarine patrol séaboat. Proof load tests were performed on the ground to affirm that the CFRP parts were as strong as conventional materials. The flight tests covered stresses from velocity, altitude, angle of attack, and load factor of the aircraft and stress on the composite components. Two and one-half years of flight data, with inspections every 200 hours and 9 months, were combined with coin tapping tests for external structural elements. No rigidity degradations were observed on the spoilers or the slat rais and all test components were evaluated as remaining in satisfactory condition.

A82-39893 Developments on graphite/epoxy T-2 nose landing gear door. K Mogami, F Yamauchi (Japan Defense Agency, Technical Research and Development Institute, Tachikawa, Tokyo, Japan), Y Sakatani, and Y Yamaguchi (Mitsubishi Heavy Industries, Ltd., Nagoya Aircraft Works, Nagoya, Japan) in Composite materials Mechanics, mechanical properties and fabrication, Proceedings of the Japan-U S Conference, Tokyo, Japan, January 12-14, 1981 (A82-39851 19-39) Barking, Essex, England, Applied Science Publishers, 1982, p 487-493

Attention is given to the material systems and processing specially developed for the graphite/epoxy composite door, among them unidirectional tapes, fabrics, chopped fiber materials, and semi-cocuring techniques. To evaluate the durability of the graphite/epoxy skin laminates, water absorption tests and fatigue tests are performed at low, high, and room temperatures for the design required. The all-graphite/epoxy beam-fittings were fabricated using the hot-pressing technique and tested to verify the bearing and bending strength according to design requirements. The saving in weight came to 25% C R

A82-39894 Design, fabrication and qualification of the T-2 composite rudder. F Yamauchi, K Mogami (Japan Defense Agency, Technical Research and Development Institute, Tachikawa, Tokyo, Japan), T Fukui, and T Sato (Fuji Heavy Industries, Ltd, Aircraft Engineering Div, Utsunomiya, Tochigi, Japan) In Composite materials Mechanics, mechanical properties and fabrication, Proceedings of the Japan-U S Conference, Tokyo, Japan, January 12-14, 1981 (A82-39851 19-39) Barking, Essex, England, Applied Science Publishers, 1982, p 494-503

It is pointed out that this is the first primary control surface to be flight tested in Japan. The rudder has a span of 1 53 m, a 0 71-m chord at the midspan, and an area of 1 05 sq m. The design involves a single-spar, full depth honeycomb sandwich structure. Graphite/epoxy is used for the skins, spar, upper and lower closure ribs, and leading edge ribs. The graphite/epoxy parts make up approximately 40% of the total weight. The spar and closure ribs are precured and bonded to the sandwich assembly after the skins are cured. Nine precured leading edge ribs are attached with cherry-lock fasteners in addition to normal adhesive bonding. It is noted that a conservative design approach was used and that the primary objectives were to obtain actual production experience and in-service operational experience for a composite primary control surface C. B.

A82-39895 Development of the advanced composite ground spoiler for C-1 medium transport aircraft. F Yamauchi, K Mogami (Japan Defense Agency, Technical Research and Development Institute, Tachikawa, Tokyo, Japan), H Masaeda, and T Shirata (Kawasaki Heavy Industries, Ltd., Aircraft Div, Kagamihara, Gifu, Japan) In Composite materials Mechanics, mechanical properties and fabrication, Proceedings of the Japan-U S Conference, Tokyo, Japan, January 12-14, 1981 (A82-39851 19-39) Barking, Essex, England, Applied Science Publishers, 1982, p 504-512

The research and development program for the graphite/epoxy ground spoiler for the C-1 medium transport aircraft is discussed. The design requirement was that the spoiler provide strength and rigidity not less than the baseline spoiler in addition to interchangeability. The design analysis was done by finite element method and the detail design configurations of major structural components were evaluated by trade-off tests in the initial design phase, showing that the components met design requirements. Successful environmental characteristic tests were also conducted. The scattering characteristic of the Gr/E for static and fatigue strength were obtained and found to be significantly superior to that of aluminum alloy. Full scale verification tests were also passed. C D

A82-39896 Fabrication of CFRP prototype structure for aircraft horizontal tail leading edge slat rail F Yamauchi, K Mogami (Japan Defense Agency, Technical Research and Development Institute, Tochikawa, Tokyo, Japan), K Suzuki, T Kiho, and T Ikuyama (Shin Meiwa Industry Co, Ltd, Kobe,

Japan) In Composite materials Mechanics, mechanical properties and fabrication, Proceedings of the Japan-U S Conference, Tokyo, Japan, January 12-14, 1981 (A82-39851 19-39) Barking, Essex, England, Applied Science Publishers, 1982, p 513-520

Results of a fabrication study and materials properties tests of an advanced composite horizontal tail leading edge slat rail for the Japanese PS-1 STOL antisubmanne warfare seaplane are presented. The slat rail was fabricated of carbon fiber satin cloth and a bisphenolic epoxy resin matrix, with co-curing by vacuum injection. Static tests were performed to 100 and 180% of the design load limit and satisfactory results were obtained. Coating the slat rail with silicon grease resulted in good resistance to salt spray, although stiffness was reduced 5% after 24,000 cycles. High and low temperature environmental tests produced no degradation in the material. The composite slat rails had been flown for 1000 hr in flight tests by 1978 and performed to specification.

A82-39897 Development status of a composite vertical stabilizer for a jet trainer. K Takagi and S Idei (Fuji Heavy Industries, Ltd, Aircraft Engineering Div, Utsunomiya, Tochigi, Japan) In Composite materials Mechanics, mechanical properties and fabrication, Proceedings of the Japan-U.S Conference, Tokyo, Japan, January 12-14, 1981 (A82-39851 19-39) Barking, Essex, England, Applied Science Publishers, 1982, p 521-528

Progress in a program to develop a composite materials vertical stabilizer for the next generation Japanese transonic military jet trainer is described. Focusing on graphite/epoxy materials, the tests to date cover small elements, components, and full scale main box trials. The stabilizer is about 2.4 m long with an area of 1.0 sq m, containing a two-spar multirib structure. All component parts are graphite/epoxy except the ribs and root fittings, which are aluminum. Tests have been run to examine the moisture temperature effects, rigidity, strain, and static loading to failure. Results have indicated no inherent difficulty in accepting a composite stabilizer on the trainer. M S K.

A82-39929 Fasteners for composite structures. R T Cole, E J Bateh (Lockheed-Georgia, Co, Marietta, GA), and J Potter (USAF, Wright Aeronautical Laboratories, Wright-Patterson AFB, OH) (Symposium on Jointing in Fibre-Reinforced Plastics, London, England, July 13, 14, 1982) Composites, vol 13, July 1982, p 233-240 16 refs

The four basic problems with fasteners for composites - galvanic corrosion, galling, installation damage, and low pull-through strength - are identified Seven special fastener systems for use in composites - bigfoots, semi-tubular rivets, Cherry Buck rivets, stress-wave rivet systems, groove proportioned lockbolts, composite fasteners, and self-tapping screws are described Survey results are shown indicating that flush, low-load transfer, composite-to-composite joints are the most common in current composite structures. The rationale for selecting the flush head configuration as the modification considered is presented. Test results indicate that 100 deg tension countersink fasteners are the best for sheet thicknesses in excess of the head height (Author)

A82-39930 On the bearing strengths of CFRP laminates. T A Collings (Royal Aircraft Establishment, Structures Dept, Farnborough, Hants, England) (Symposium on Jointing in Fibre-Reinforced Plastics, London, England, July 13, 14, 1982) Composites, vol 13, July 1982, p 241-252 12 refs

Bearing strength measurements have been made on zero, + and - 45, zero, 90 deg and 90 + and - 45 deg carbon fiber reinforced plastic (CFRP) laminates made from three different fibre/resin systems, HTS/914, XAS/914 and HTS/HC 3501 Equations have been derived for predicting the ultimate bearing strengths of constrained pin-loaded holes using a semiempirical approach, and considering the physical conditions governing failure at the hole edge Experimental results are presented and these show good agreement with those predicted for each of the laminate configurations and fibre/resin systems used (Author)

A82-39996 [†] Numerical solution of a problem concerning transonic flow past a wing-fuselage configuration (Chislennoe reshenie zadachi ob okolozvukovom obtekanii kryla s fiuzeliazhem). V | Savitskii (Tsentral'nyi Aerogidrodinamicheskii Institut, Moscow, USSR) *Gidromekhanika*, no 46, 1982, p 41-47 8 refs In Russian

Nonviscous transonic flow past an arbitrary wing-fuselage configuration is analyzed within the framework of the small-perturbation theory. A relaxation method is used in conjunction with a finite-difference scheme Finite-difference approximations for the relaxation equation and boundary conditions are selected by using nonstationary analogy. To illustrate the method, calculations are carried out for several different wing-fuselage configurations.

A82-40051 Noise pollution and airport regulation. J L Helms (FAA, Washington, DC) Journal of Air Law and Commerce, vol 47, Spring 1982, p 405-412

Methods are proposed of reversing the trend of curfews and other limitations on airport use that have been adopted across the U.S. in the name of noise reduction or environmental protection. The economic problems caused by airport restrictions are discussed along with the drawbacks of various types of restrictions The situation in White Plains, New York is used as an example of the progress that can be made by holding litigation against restrictions in abeyance and cooperating with the FAA to bring about quick improvements. An example of a beneficial rule is allowing the quietest planes to operate at night rather than banning night flights altogether, as was the case in White Plains. The litigation route is briefly discussed, and the remedy of seeking systematic solutions is proposed, one combining legislation with FAA review C D

A82-40052 O'Hare International Airport - Impervious to proposed state efforts to limit airport noise. M J Pavlicek (Schaffenegger, Watson and Peterson, Ltd, Chicago, IL) Journal of Air Law and Commerce, vol 47, Spring 1982, p 413-448 199 refs

The complexity of formulating a legally valid, technologically feasible, and economically reasonable state regulation that effectively abates noise at O'Hare International Airport is demonstrated. The federal responsibility for airport noise, federal preemption and the role of the airport proprietor, and the Illinois Pollution Control Board's jurisdiction over the airport noise proposal before it is briefly discussed, while the proposal itself is dealt with in detail. Particular attention is given to the variance procedure which mandates that the airport proprietor consider certain noise abatement methods which are under the control of another authority. Noise abatement activities that can be directly implemented by the proprietor, those that require federal approval, and those that are controlled by local zoning authorities are discussed.

A82-40057 Touchdown technology. J Moxon Flight International, vol 122, July 24, 1982, p 215-217

The introduction of widebodied jets brought on a need for modifications in tires, brakes, and wheels to accommodate for weight Radial tires are being tested as they offer a 15-20% weight reduction Also, tires made of Guayule, a wild desert plant found in the southern United States and Mexico, are being tested. The evolution of brakes is discussed, with the most recent development being the use of carbon disks as they absorb more kinetic energy than steel without overheating Carbon also offers weight reduction and long life, but a more cost efficient production method is being investigated. Variations in wheel production have been minimal and the current focus is on safety improvements and the use of titanium and aluminum alloys. NASA is studying a new landing method which involves the active control of landing gear so that forces transmitted to the airframe are reduced. R K R

A82-40124 Two-dimensional model studies of the impact of aircraft exhaust emissions on tropospheric ozone. R G Derwent (Atomic Energy Research Establishment, Harwell, Oxon, England) Atmospheric Environment, vol 16, no 8, 1982, p 1997-2007 38 refs Research sponsored by the Department of Environment

The potential effects of aircraft operations in the troposphere were investigated with a two-dimensional (latitude-altitude) transport-kinetics model. There appears to be reasonable agreement between the present and previous studies that aircraft operations may have already increased ozone concentrations in the upper troposphere by up to a few per cent or so. The corresponding increases in the total ozone column amount to a few tenths of a per cent and may well have partially offset any decrease due to the release of chlorofluorocarbons 11 and 12 (Author)

A82-40276 # Flying quality requirements for V/STOL transition. C G Carpenter, J Hodgkinson (McDonnell Aircraft Co, St Louis, MO), R H Hoh (Systems Technology, Inc, Hawthorne, CA), and J W Clark, Jr (US Naval Material Command, Naval Air Development Center, Warminster, PA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1293 8 p 7 refs

A landing approach criterion showed excellent correlation of heave damping and pitch-to-path coupling effects Blending schemes for transition from approach dynamics to hover dynamics, and vice versa, correlated well with earlier NASA results A time response criterion discriminated well between attitude and rate systems in low speed and hover. Pilot's command gain has a strong effect on piloting charactersitics in all phases of transition. (Author)

A82-40287 # Flying qualities requirements for roll CAS systems. D G Mitchell and R H Hoh (Systems Technology, Inc., Hawthorne, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug. 9-11, 1982, Paper 82-1356 9 p 8 refs Contract No, F33615-80-C-3604

Command augmentation systems (CAS) are becoming essential components for modern fighters A toll rate CAS utilizes an effective feedforward so that pilot control inputs are compared directly to actual roll response Such CASs, as they are used today, can be limited in authority with parallel direct links, or fullauthority with high command gains. The latter are the more interesting from a handling qualities standpoint. Attention is given to gradient shaping, roll responses for conventional aircraft, roll CAS gradients, roll ratcheting, implications for the handling qualities standard, roll performance, linearity, the roll mode time constant, and aspects of sensitivity GR A82-40290 * # Flight-determined correction terms for angle of attack and sideslip. M F Shafer (NASA, Flight Research Center, Edwards, CA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechan-

ics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1374 11 p The effects of local flow, upwash, and sidewash on angle of attack and sideslip (measured with boom-mounted vanes) were determined for subsonic, transonic, and supersonic flight using a maximum likelihood estimator. The correction terms accounting for these effects were determined using a series of maneuvers flown at a large number of flight conditions in both augmented and unaugmented control modes The correction terms provide improved angle-of-attack and sideslip values for use in the estimation of stability and control derivatives. In addition to detailing the procedure used to determine these correction terms, this paper discusses various effects, such as those related to Mach number, on the correction terms. The use of maneuvers flown in augmented and unaugmented control modes is also discussed (Author)

A82-40294 * # The use of linearized-aerodynamics and vortex-flow methods in aircraft design /invited paper/. J E Lamar (NASA, Langley Research Center, Transonic Aerodynamics Div , Hampton, VA) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1384 17 p 41 refs

This paper deals with selected linearized-aerodynamic and vortex-flow methods as applied to aircraft design problems at high subsonic speeds. In particular, the NASA Vortex Lattice and Modified Multhopp methods are the linearized techniques employed, and the suction analogy is used to provide estimates associated with vortex-flow aerodynamics. Many examples are given as to how researchers at Langley have used these methods to design the high subsonic, wing-mean-camber shapes for various configurations such as a supersonic transport, high-aspect-ratio transport, trapezoidal fighter wing, strake wing, tandem wing, joined wing, delta wing, and slender cranked wing. Many of these have been built, tested, and have had their data compared with theory in addition, a technique for defining efficiently performing strake planforms for use in strake-wing combinations is discussed, and further improvements in wing design are outlined The latter may be obtained by using higher-ordered linear panel methods as well as nonlinear-transonic methods (Author)

A82-40348 Boeing's new 767 eases crew workload. R R Ropelew-ski Aviation Week and Space Technology, vol 117, Aug 23, 1982, p, 40, 41, 43 (3 ff)

Details of the cockpit avionics and control switches and their operations in the Boeing 767 aircraft are described Automation of the control and monitoring of most aircraft functions has permitted elimination of the flight engineer's station, and all controls are now within reach of the pilot and copilot Each pilot is furnished electronic attitude director and horizontal situation indicators and flight management system control display units, in addition to sharing two centrally located 6 x 7 in electronic displays giving engine indication and crew alerts Standard electromechanical gages remain as a redundant feature, while checklist procedures are reduced to a short time. Flight paths and travel times are currently being programmed for easy access loading into the flight computer for automated guidance, with the computer tuning to navigations aids stationed along the flight path MSK

A82-40395 # Summary of sting interference effects for cone, missile, and aircraft configurations as determined by dynamic and static measurements. B L Uselton and D R Haberman (Calspan Field Services, Inc , Arnold Air Force Station, TN) American Institute of Aeronautics and Astronautics, Atmospheric Flight Mechanics Conference, 9th, San Diego, CA, Aug 9-11, 1982, Paper 82-1366 16 p 21 refs

A summary of an AEDC technology program of sting effects on aerodynamic measurements is presented. Four different configurations - a 7-deg cone, 6-deg sliced-base cone, missile and an aircraft - were tested in the wind tunnel Interference effects were obtained by measurements of damping derivatives, static data, surface pressures, and base pressures from subsonic to hypersonic Mach numbers The critical sting limits were investigated as a function of frequency of oscillation, model boundary layer, type of measurement, angle of attack, Mach number, and configuration. Comparisons of wind tunnel and ballistic range data are presented for the missile and aircraft configurations. Critical sting length was found to be dependent on the parameter selected as the interference indicator (Author)

A82-40417 * # NASA research in supersonic propulsion - A decade of progress. L H Fishbach, L E Stitt, J R Stone, and J B Whitlow, Jr (NASA, Lewis Research Center, Cleveland, OH) AIAA, SAE, and ASME, Joint Propulsion Conference, 18th, Cleveland, OH, June 21-23, 1982, AIAA Paper 82-1048 23 p

(Previously announced in STAR as N82-26300)

A82-40418 * # Propulsion opportunities for future commuter aircraft. W C Strack (NASA, Lewis Research Center, Cleveland, OH) AIAA, SAE, and ASME, Joint Propulsion Conference, 18th, Cleveland, OH, June 21-23, 1982, AIAA Paper 82-1049 26 p 9 refs (Previously announced in STAR as N82-26298)

A82-40419 * # Summary and recent results from the NASA advanced high-speed propeller research program. G A Mitcheil and D C Mikkelson (NASA, Lewis Research Center, Cleveland, OH) AIAA, SAE, and ASME, Joint Propulsion Conference, 18th, Cleveland, OH, June 21-23, 1982, AIAA Paper 82-1119 34 p 37 refs

(Previously announced in STAR as N82-26219)

A82-40420 * # Performance of a 2D-CD nonaxisymmetric exhaust nozzle on a turbojet engine at altitude. D M Straight and R R Cullom (NASA, Lewis Research Center, Cleveland, OH) AIAA, SAE, and ASME, Joint Propulsion Conference, 18th, Cleveland, OH, June 21-23, 1982, AIAA Paper 82-1137 27 p 14 refs

(Previously announced in STAR as N82-26241)

A82-40422 * # Comparison of experimental and analytic performance for contoured endwall stators. R J Boyle (NASA, Lewis Research Center, Cleveland, OH) and J E Haas (US Army, Propulsion Laboratory, Cleveland, OH) AIAA, SAE, and ASME, Joint Propulsion Conference, 18th, Cleveland, OH, June 21-23, 1982, AIAA Paper 82-1286 14 p 18 refs (Previously announced in STAR as N82-26299)

A82-40428 # Terrain following/terrain avoidance system concept development. G D Young, Jr, W W Harrington, R L Overdorf, and E Ra-chovitsky (USAF, Wright Aeronautical Laboratories, Wright-Patterson AFB, OH) American Institute of Aeronautics and Astronautics, Guidance and Control Conference, San Diego, CA, Aug 9-11, 1982, Paper 82-1518 8 p 6 refs Grant No F33615-80-C-3617

The development of a real-time simulation of a terrain following/terrain avoidance (TF/TA) system algorithm for use with an operating AFTI/F-16 simulator is described The simulator is equippped with a control feel system, a single seat cockpit, an earth/sky and a target/terrain projection system, and motion and g-force provisions A 5000 1 scale scenario of western Europe was chosen with night, dusk, and daylight capability in addition to cloud cover and weather configurations The TF/TA control system is considered in terms of a preplanned ground track, with the mission proceeding from waypoint to waypoint, a computed flight path, for optimized aircraft performance on trajectories within the mission path, and aircraft control to follow the actual flight path. A feasible directions algorithm for obtaining the computed flight path is presented and operations are described Further developments to complete the pilot-in-the loop strategies are discussed MSK

Flight experience with a backup flight-control system A82-40429 * # for the HiMAT research vehicle. R W Kempel (NASA, Flight Research Center, Edwards, CA) American Institute of Aeronautics and Astronautics, Guidance and Control Conference, San Diego, CA, Aug 9-11, 1982, Paper 82-1541 20 p

The NASA Dryden Flight Research Facility is conducting flight tests of two remotely piloted, subscale, advanced fighter configurations, the tests are part of the Highly Maneuverable Aircraft Technology (HiMAT) project Closed-loop primary flight control is performed from a ground-based cockpit and digital computer in conjunction with an up/down telemetry link. A significant feature of these vehicles is an on-board, digitally active, backup control system designed to recover the vehicle in the event of a transfer from primary control Automatic transfers occur upon certain critical ground or airborne system malfunctions Control modes are provided that enable a ground or airborne controller to guide the vehicle to a safe landing. This paper describes the features, operational development, and flight evaluation of the HiMAT backup flight control system

(Author)

Analytical design and validation of digital flight control A82-40434 # system structure. D B Mulcare, W G Ness, and R M Davis (Lockheed-Georgia Co, Marietta, GA) American Institute of Aeronautics and Astronautics, Guidance and Control Conference, San Diego, CA, Aug 9-11, 1982, Paper 82-1626 11 p 17 refs

Flight controls applications continue to be a dominant driver of applied digital technology, especially in the areas of fault-tolerant computer subsystems and flight-critical assurance methods The present investigation is concerned with two of the major digital flight system technology needs, taking into account system validation technology and integrated methodology. Attention is given to the integration of assurance activities or provisions into the design process. The problem at hand is to formulate, develop, and validate an analytically based methodology which can dependably yield a readily validatable and maintainable digital flight control system Questions of basic strategy are considered along with the technical approach, the control of complexity, a design description, aspects of system validation, and questions of development methodology GR

A82-40483 † Sport aircraft (Sportivnye samolety). S A lakovlev Moscow, Izdatel'stvo DOSAAF SSSR, 1981 72 p In Russian

The development and character of sport aviation in the Soviet Union are discussed, with attention given to the historical background and the line of Yak light aircraft Non-Soviet sport aircraft are also considered Many color drawings of sport aircraft are presented B J

A82-40505 American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings. Washington, DC, American Helicopter Society, 1982 537 p. (For individual items see A82-40506 to A82-40556)

Among the topics discussed are the aerodynamics, structural dynamics, propulsion, design, avionics, product assurance, structures and materials, testing, and acoustics of helicopters. The papers presented cover optimum airloads of rotors in hover and forward flight, the evaluation of vertical drag and ground effect, helicopter vibration reduction by rotor blade modal shaping, the finite element analysis of bearingless rotor blade aeroelasticity, adaptive fuel controls, digital full authority engine controls, helicopter autorotation assist concepts, and the conceptual design of an integrated cockpit. Also presented are papers on the demonstration of radar reflector detection, avionics systems for helicopter integration, the adaptation of pultrusion to the manufacture of helicopter components, composite main rotor blades, optimum structural design, the in-plane shear testing of thin panels, error minimization in ground vibration testing, and the prediction of helicopter rotor discrete frequency noise.

A82-40506 # Theory and application of optimum airloads to rotors in hover and forward flight. R C Moffitt and J R Bissell (United Technologies Corp., Sikorsky Aircraft Div., Stratford, CT) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 1-12 (For individual items see A82-40506 to A82-40556)

A method is derived and applied that predicts optimum lift distribution for rotors in hover and forward flight A key feature of the method is that it is formulated in terms of a matrix equation that gives a direct solution when wake geometry is fixed An evaluation of the Theodorsen optimum static propeller theory, conducted with the analysis, indicates that the theory is not rigorous. It is shown that the torque differential term omitted in that analysis is both finite and significant. With this term included, the optimum static propeller wake displacement velocity is not constant. An optimized Black Hawk twist distribution in hover is shown to closely approximate the classic inverse radius pitch distribution predicted by strip momentum theory. The resulting downwash, however, is constant only over the inner 75% of the radius and substantial reductions occur in the tip region. Predicted improvements in Black Hawk forward flight performance with optimized azimuthally varying twist are significant but the associated variable twist is complex. (Author)

A82-40507 # A new Transonic Airfoll Design Method and its application to helicopter rotor airfoil design. J C Narramore and J G Yen (Bell Helicopter Textron, Fort Worth, TX) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 13-23 28 refs

A new Transonic Airfoil Design Method has recently been developed which can produce airfoils with desired aerodynamic, dynamic, and geometric characteristics. This new method is based on fundamental principles and ullizes efficient techniques to provide a practical airfoil design tool. Compressibility and shock wave terms are included in the method which evaluates families of velocity distributions and selects the best one which will satisfy the design objectives. This pressure distribution is used as input to a transonic inverse routine which calculates the coordinates of the section that will produce the desired velocity. Using this approach, sections can be produced that will provide desired levels of lift, drag, and pitching moment at the design operating conditions. This technology is applied to the design of an aeroelastically compliant rotor (ACR) by designing airfoils which produce favorable pitching moment and performance at design Mach number and Reynolds number conditions.

A82-40508 # Recent advances in rotor technology at Boeing Vertol. M A McVeigh and F J McHugh (Boeing Vertol Co, Philadelphia, PA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 24-33

Results of a wind tunnel test on advanced rotor configurations present an assessment of the benefits of advanced airfoils, tip shape, blade chord, and blade number A CH-47D model rotor with VR-7/8 airfoils was tested as a reference rotor. The advanced rotors, incorporating recently-developed VR-12/15 high speed airfoils, were tested to 231 knots in the wind tunnel and demonstrated an improvement of 6 0% in figure of ment and 25% in cruise lift-to-effective-drag ratio over a rotor with VR-7/8 airfoils. The advanced airfoils show significant improvements in stall inception limits, flying qualities boundaries and rotor noise improved blade tip shapes provide additional benefits in rotor noise and do not reduce the stall inception boundary (Author)

A82-40509 * # Evaluation of an asymptotic method for helicopter rotor airloads. A R Vaidyanathan and G A Pierce (Georgia Institute of Technology, Atlanta, GA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 34-42 21 refs Contracts No NAS1-16222, No NAS1-16817

(Previously announced in STAR as N82-21156)

A82-40510 * # An evaluation of vertical drag and ground effect using the RSRA rotor balance system. R J Flemming (United Technologies Corp , Sikorsky Aircraft Div , Stratford, CT) and R E Erickson (NASA, Ames Research Center, Moffett Field, CA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 43-54 12 refs

A flight test program utilizing the Rotor Systems Research Aircraft (RSRA) main rotor balance system was conducted to obtain data for the helicopter configuration. The test program is discussed along with the employed data reduction methods, and the results NASA 740, the RSRA used for the vertical drag test, was in the standard helicopter configuration. The 31-foot radius blades have a linear twist of eight degrees and NACA 0012 airfoil sections. Aspects of instrumentation are considered, taking into account the data recording system, the static calibration facility, and aspects of data calibration and processing Attention is given to the test procedure, data analysis methods, balance measurements, the ground effect, and vertical drag it is found that the RSRA rotor balance system is capable of providing high quality performance data. The vertical drag of the RSRA is 4%, compared to 2.9% predicted GR

A82-40511 * # Effect of tip vanes on the performance and flow field of a rotor in hover. H R Velkoff and T W Parker (Ohio State University, Columbus, OH) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 55-64. 7 refs NASA-sponsored research

Tests run with a single bladed model rotor with a vane located at the tip of the blade indicated significantly increased performance under certain test conditions. Data reveal that a figure of ment increase of over one third occurred in hover Flow visualization using smoke revealed that a pair of vortices sprung from the blade tip and the vane tip. The vane tip vortex tended to roll up and over the primary vortex. The vortices in the wake became much less well defined with the tip vane configurations. (Author)

A82-40512 # An experimental investigation of a bearingless model rotor in hover. S Dawson (U S Army, Aeromechanics Laboratory, Moffett Field, CA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 65-79 6 refs

A 1 79-m diameter model rotor was used to investigate the aeroelastic stability of an isolated bearingless rotor blade in hover, and the results were compared with theory Configurations tested included (1) an uncoupled configuration with a leading and trailing edge pitch link, (2) a cantilever pitch arm configuration with a single pitch link on the trailing edge of the blade (three pitch link radial locations were studied), (3) a cantilever pitch arm configuration with a single trailing edge pitch link (again three radial locations were studied), (4) a trailing edge pitch link location with -2 5 deg droop, and (5) a trailing edge pitch link location with 2 5 deg precone Lead-lag damping was heavily dependent on pitch link radial location at higher pitch angles for the cantilever pitch arm configurations studied Theoretical predictions show stability trends quite well in almost all cases but show discernible differences in damping at higher pitch angles (Author)

A82-40513 # Whirl mode stability of the main rotor of the YAH-64 Advanced Attack Helicopter. L J Silverthorn (Hughes Helicopters, Inc, Culver City, CA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 80-89

The selection of the main rotor configuration for the YAH-64 helicopter was based on the very favorable experience with the combat-proven rotor system of the OH-6A Light Observation Helicopter Results of an analysis conducted to investigate the main rotor cyclic modes have shown an instability at the advancing whirl mode frequency of 15 hertz. The whirl mode instability as eliminated in connection with design changes. It is pointed out that the whirl mode instability is an aeroelastic phenomenon strongly dependent on coupling between hub motion and blade pitch change motion. Rotor support structure stiffening proved to be effective in increasing whirl model stability boundaries. G R

A82-40514 # Helicopter vibration reduction by rotor blade modal shaping. R B Taylor (United Technologies Research Center, East Hartford, CT) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 90-101 The general vibration design criteria currently used in helicopter rotor blade design is placement of natural frequencies removed from integer frequencies of rotor rotation. In this paper, a theoretical approach is presented which demonstrates that design consideration of blade mode shapes can be as important as consideration of natural frequencies for vibration transmitted to the helicopter fuselage. A Modal Shaping Parameter is derived from the theoretical approach that is a measure of blade modal vibration susceptibility. A baseline blade design is then revised in accordance with minimizing the value of the Modal Shaping Parameter A comparison of hub vibration predicted by a fully coupled aeroelastic analysis for the baseline and revised blade design shows a 70 percent reduction in the contribution of the flatwise modes to vertical hub vibration as well as a 20-30 percent reduction in blade fatigue loading It is demonstrated that the large reductions in vibration resulted by the modal shaping approach

A82-40515 # Correlation of predicted vibrations and test data for a wind tunnel helicopter model. R Sopher and S B R Kottapalli (United Technologies Corp., Sikorsky Aircraft Div., Stratford, CT) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p. 102-113 9 refs

The desirability to reduce helicopter vibrations has motivated the development of a substructure vibration analysis. The computer program involved is designed to serve as a predictive and design tool for designing helicopters for low vibrations. The substructure analysis, (SIMVIB - Simplified Vibration Analysis) embodies features which are necessary for vibration prediction. Little is known about the validity and sensitivity of the conducted analysis. A description is presented of the results of a limited correlation study performed at model scale to examine the method. The correlations of fuselage vibrations and blade moments are presented and discussed. Sensitivities of analytical predictions to changes in dynamic properties of the fuselage are shown. In addition, a study is conducted to the rotor to minimize fuselage vibrations. G R

A82-40516 # Wind tunnel modeling of rotor vibratory loads. R Gabel, M Sheffler, F Tarzanin, and D Hodder (Boeing Vertol Co, Philadelphia, PA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p. 114-124

A tandem rotor dynamic model has been designed, manufactured and tested at the Boeing Vertol 20 x 20 ft V/STOL Wind Tunnel. The model measures vibratory hub loads with five independent measuring systems on each rotor. This four-bladed model was flown at full scale tip speeds through a wide envelope of airspeeds and thrusts, achieving a maximum speed of 200 knots. The various measurement systems are discussed, calibration activities are reviewed and test results are presented. (Author)

A82-40517 * # Finite element analysis for bearingless rotor blade aeroelasticity. N T Sivaneri and I Chopra (NASA, Stanford Joint Institute for Aeronautics and Acoustics, Stanford, CA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 125-139 18 refs Grant No NCC2-13

A conventional articulated rotor blade has mechanical flap and lag hinges, a lag damper, and a pitch bearing In connection with an interest in designs of greater mechanical simplicity and increased maintainability, hingeless and bearingless rotors have been developed. A hingeless blade lacks the hinges and is cantilevered at the hub It does have a pitch bearing for pitch control. A bearing-less design eliminates the hinges and the pitch bearing as well in the present investigation of bearingless rotor blade characteristics, finite element analysis has been successfully applied to determine the solutions of the nonlinear trim equations and the linearized flutter equations of multiple-load-path blades. The employed formulation is based on Hamilton's principle. The spatial dependence of the equations of motion is discretized by dividing the flexbeams, the torque tube, and the outboard into a number of elements.

A82-40518 * # Civil helicopter propulsion system reliability and engine monitoring technology assessments. J A Murphy (Bell Helicopter Textron, Fort Worth, TX) and J Zuk (NASA, Ames Research Center, Moffett Field, CA) in American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 140-149 16 refs NASA-supported research

A study to reduce operating costs of helicopters, particularly directed at the maintenance of the propulsion subsystem, is presented. The tasks of the study consisted of problem definition refinement, technology solutions, diagnostic system concepts, and emergency power augmentation. Quantifiable benefits (reduced fuel consumption, on-condition engine maintenance, extended drive system overhaul periods, and longer oil change intervals) would increase the initial cost by \$43,000, but the benefit of \$24.46 per hour would result in breakeven at 1758 hours. Other benefits not capable of being quantified but perhaps.

more important include improved aircraft avilability due to reduced maintenance time, potential for increased operating limits due to continuous automatic monitoring of gages, and less time and fuel required to make engine power checks. The most important improvement is the on-condition maintenance program, which will require the development of algorithms, equipment, and procedures compatible with all operating environments. B K R

A82-40519 # Adaptive fuel control feasibility investigation. R L Bolton (U S Army, Applied Technology Laboratory, Fort Eustis, VA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 150-155

Responsive, stable power control has been an important design objective since the advent of the helicopter. Many helicopters flying today, however, suffer from less than desirable power response because of the difficulty in designing a system which is rapid in rotor speed control over the entire operating envelope. An optimization regarding the response of engine power for all flight regimes would be particularly important in the case of a combat helicopter. A description is presented of an on-going program of investigation of adaptive fuel control concepts utilizing existing full authority electronic systems capability. The concepts developed in this program are being analyzed by use of a full dynamic computer simulation of the engine/fuel control/airframe. It was found that fuel consumption can be reduced as much as 10% by variation of rotor speed for very specific cruise conditions, i.e., high speed, high altitude, and heavy load.

A82-40520 # 800 Shaft Horsepower Advanced Technology Demonstrator Engine (ATDE) status update. D 8 Cale (U S Army, Applied Technology Laboratory, Fort Eustis, VA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 156-162

The objectives, engine design features, accomplishments and current status of the ATDE program are presented More than 1000 hours of engine and gas generator testing have been accumulated, including performance, environmental and durability testing, and objectives are being demonstrated and problems discovered More than 1500 hours of aerodynamic component testing and 4000 hours of fuel system and mechanical component testing have also been done in particular, the durability demonstration was considered successful, but certain redesign efforts, such as inlet separator performance and producibility, compressor durability, and bearing durability, are necessary and are being considered R K R

A82-40521 * # TF34 Convertible Engine System Technology Program. K L Abdalla (NASA, Lewis Research Center, Cleveland, OH) and A Brooks (General Electric Co , Lynn, MA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 163-165 8 refs

The ability of the helicopter to function efficiently at zero flight speed is counterbalanced by a limitation to rather low forward flight speeds. An ability to fly efficiently at high speed would provide very significant improvements in rotorcraft productivity and economics. The implementation of such improvements would require the development of a suitable integrated power plant for both the vertical and horizontal flight modes. The engine should be a shaft output engine in the vertical flight mode. In the horizontal mode, the propulsor can be fan or propeller A description is presented of a program concerned with the demonstration of a convertible turbofan/turboshaft engine. The program is nominally directed toward the demonstration of a propulsion system for an X-wing aircraft However, the principles being investigated are applicable to any convertible turbofan/turboshaft engine application. At the current early stage of the program, no barrier problems have become apparent, and interesting possibilities for high speed totorcraft flight are envisaged. G R

A82-40522 # Digital full authority controls for helicopter engines. E S Eccles (Dowty and Smiths Industries Controls, Ltd., Cheltenham, Glos, England) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 170-180 5 refs Research supported by the Ministry of Defence /Procurement Executive/

The paper reviews the benefits that accrue to the aircraft, the operator and the crew from using full authority digital electronic engine controls. They are discussed as performance benefits, mission effectiveness benefits, cost benefits and maintainability benefits. The paper discusses the use of redundancy and its effects on the operation of aircraft, particularly commercial operation. The paper concludes that digital controls, and particularly dual redundant controls ofter some very significant cost benefits to many helicopter operators.

A82-40523 # Tandem rotor helicopter characteristics in a continuous icing environment. P J Dunford (Boeing Vertol Co., Philadelphia, PA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 181-193 9 refs

In connection with the growing need for Instrument Flight Rule (IFR) operations in both military and commercial applications, considerable emphasis has been placed on helicopter utilization in adverse weather conditions As a corollary to this requirement, investigations have been conducted with the aim to permit the operation of helicopters under icing conditions Attention is given to test results, a natural icing performance analysis, the need for a deicing system, and icing certification criteria. It is found that the impracticality and expense involved in testing helicopters to the full extent of the requirements of FAR Part 25 makes the need for LIMITED icing releases a real one. Recognition of specific helicopter attributes and shortcomings is highly desirable for this type of, certification

A82-40524 # An evaluation of helicopter autorotation assist concepts. G T White (U S Army, Applied Technology Laboratory, Fort Eustis, VA), A H Logan, and J D Graves (Hughes Helicopters, Inc, Culver City, CA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 194-216 11 refs Grant No DAAK51-80-C-0011

GR

The unique autorotation capability of the helicopter is an inherent safety feature which is heavily relied upon during power failure emergencies. However, the autorotation maneuver places great demands on pilot skill. An analytical study was conducted of autorotation improvement devices. These devices were evaluated using both weight and preliminary performance analyses. The three most promising concepts were carried through preliminary design. It was found that no significant gain in autorotation performance can be achieved by only the management of available baseline energy. Supplemental energy must be supplied. The use of a simple Autorotative Index is a good tool for the initial determination of the auxiliary power level required for good autorotative characteristics. The autorotative characteristics of a single-engine scout helicopter can be substantially improved with the combination of a MIL-STD-1290 type landing gear and either a Tip Jet, Flywheel or Auxiliary Turbine system.

A82-40525 # Predesign study for an advanced flight research rotor. R H Blackwell, T G Campbell (United Technologies Corp., Sikorsky Aircraft Div, Stratford, CT), and R B Taylor (United Technologies Research Center, East Hartford, CT) in American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 217-234 11 refs

A flight research rotor program aimed at demonstrating significant improvements in aerodynamic performance and reductions in vibration and noise is outlined. The benefits and practical design considerations of approximately a dozen advanced rotor concepts were considered and three concepts were chosen for inclusion in the flight research program. Detailed design of a blade permitting experimental study of tip shape, a tuned trailing edge tab system and blade mass distribution is presented. The design issues addressed in connection with the research blade are shown to have general applicability. Finally the total program required to develop these concepts including further analysis, model test, ground tests and flight test is outlined. (Author)

A82-40526 # Sikorsky ACAP preliminary design. B F Kay (United Technologies Corp, Sikorsky Aircraft Div., Stratford, CT). In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-4050520-01) Washington, DC, American Helicopter Society, 1982, p 235-238A

Sikorsky Aircraft is currently under contract to the U S Army to conduct an Advanced Composite Airframe Program (ACAP) The basic objectives of the ACAP are to demonstrate the weight and cost saving potential of advanced composite materials when used to the maximum extent possible in an airframe designed to meet stringent military requirements. This paper will describe Sikorsky's ACAP helicopter and the approaches used to minimize weight, reduce manufacturing costs and achieve high levels of crashworthiness, survivability, reliability, and maintainability.

A82-40527 # Conceptual design of the LHX integrated cockpit. R R Pruyn and R E Domenic (Boeing Vertol Co, Philadelphia, PA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 239-246 9 refs

The present investigation is concerned with the application of computer-based technology to the next generation of Army tactical aircraft Attention is given to missions which drive cockpit design, the potential benefits of improved displays, developments in automation, questions regarding the merits of displays versus windows, mockups to develop design, aspects of display capability and flight safety, concepts in image processing, crew workload studies, assumptions for workload analysis, workload methodology, and the results of workload analysis it is concluded that with the anticipated automation, controls, and displays, one crewman can efficiently perform all of the desired tactical scout and attack tasks For next-generation aircraft a wide-field-of-view panel or helmet-mounted display is needed since it reduces pilot workload and improves mission performance and flight safety G R

A82-40528 # The YAH-64 empennage and tail rotor - A technical history. R W Prouty and K B Amer (Hughes Helicopters, Inc., Culver City, CA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p. 247-261

The development of a helicopter from drawing board to production line is still very much a learning process. The lessons learned in connection with the development of the Army YAH-64 Advanced Attack Helicopter should, therefore, be sufficiently valuable to future designers to warrant a detailed review. Attention is given to the changes to the empennage and tail rotor as the designers sought the best compromise between good performance and flying qualities on the one hand and low weight, low cost, and simplicity on the other. The considered helicopter has been developed primarily as a tank hunter and killer capable of flying and fighting at night or in bad weather. The primary weapons are wingmounted Hellfire guided missiles. The work discussed primarily deals with solutions to problems in the basic aircraft as they were discovered during its flight test.

A82-40529 # Future helicopter cockpit design. S D Roy (Westland Helicopters, Ltd., Yeovil, Somerset, England) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 262-273 5 refs

The influence of the use of electronic display systems on the helicopter cockpit is examined. Color CRT's are decidedly essential when proposed as complete replacements for conventional instruments, and two sizes of display are being considered (5 inches x 5 inches and 8 inches x 8 inches). Lighter displays, using flat panel technology, should be considered for the long term, but with careful consideration of pilot error due to misselection. Other technologies considered are data entry and extraction techniques, and direct voice control systems. The data technique is considered in terms of class of task, access, time constraints, and space availability, and a design approach for a voice system capable of continuous speech recognition is presented. The cockpit design implications of these modifications are considered. R K R

A82-40530 # Concept demonstration of automatic subsystem parameter monitoring. M S Randolph (General Electric Co., Aerospace Control Systems Dept , Binghamton, NY) and R V Kurowsky (U S Army, Fort Monmouth, NY) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 274-286 Grant No DAAK80-79-C-0270

A feasibility demonstration model of an Electronic Master Monitor and Advisory Display System (EMMADS) has been developed as part of the Army's efforts to reduce aircrew workload, integrate cockpit instrumentation, and enhance aircraft maintenance capability. The feasibility demonstration hardware is considered along with aspects of system operation, taking into account the philosophy of operation, the types of operation, manually commanded operations, and fault commanded operations. Under a follow on development effort currently in progress, the capabilities of the current feasibility hardware will be expanded to include fault logic for all CH-47D model subsystems.

A82-40531 * # Flight test evaluation of a video tracker for enhanced offshore airborne radar approach capability. G R Clary (NASA, Ames Research Center, Moffett Field, CA) and P G Cooper (Cooper Avionics, Inc., Montara, CA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p. 287-297 7 refs

As a part of NASA's Rotorcraft All-Weather Operations Research Program, advanced airborne radar approach (ARA) concepts are being investigated Since data from previous NASA/FAA flight tests showed significant ARA limitations, a research program was initiated at NASA Ames Research Center to determine the benefit that could be derived by automating certain radar functions and superimposing course display data on the radar display. To evaluate these concepts, a newly developed video tracking system which interfaces with weather radar was acquired After the pilot designates a destination target, the system tracks the target video as it moves on the radar indicator. Using a small, efficient microprocessor, the autotracker presents valuable approach data on the radar screen and automatically adjusts the radar gain and tilt. Results of a limited flight test evaluation of the autotracker show that the course display concept, combined with automated gain and tilt functions, is effective for improving ARA's and reducing radar operator workload (Author)

A82-40532 * # Demonstration of radar reflector detection and ground clutter suppression using airborne weather and mapping radar. D J Anderson, J S Bull (NASA, Ames Research Center, Moffett Field, CA), and J P Chisholm (Nevada, University, Reno, NV) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 298-305

A navigation system which utilizes minimum ground-based equipment is especially advantageous to helicopters, which can make off-airport landings Research has been conducted in the use of weather and mapping radar to detect large radar reflectors overland for navigation purposes. As initial studies have not been successful, investigations were conducted regarding a new concept for the detection of ground-based radar reflectors and eliminating ground clutter, using a device called an echo processor (EP) A description is presented of the problems associated with detecting radar reflectors overland, taking into account the EP concept and the results of ground- and flight-test investigations. The echo processor concept was successfully demonstrated in detecting radar reflectors overland in a high-clutter environment. A radar reflector target size of 55 dBsm was found to be adequate for detection in an urban environment.

A82-40533 # Micro-heads-up display. J R Goodman and H W Upton (Bell Helicopter Textron, Fort Worth, TX) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 306-311

A revolutionary microsized heads-up display (micro-HUD), which weighs only a few ounces and can be worn as a pair of conventional eyeglasses, is described A microsize optical system makes the display possible. An advanced state-ofthe-art visible light-emitting diode (VLED) array and a vibrating fiber ribbon generate the image. The system uses a microprocessor display generator that produces a dynamic image with 128 x 128 elements of resolution. This gives the micro-HUD the capability of presenting the same information as a standard heads-up display. Development of the custom-designed linear array of lightemitting diodes along with the specially fabricated fiber-optic scanner is also described Results of laboratory and flight tests are discussed. Potential improvements such as higher resolution and multicolor versions of the display are described Finally, the possible applications and future of the system is discussed (Author).

A82-40534 # Avionics systems for helicopter integration. D R Nelson (Rockwell International Corp., Collins Government Avionics Div., Cedar Rapids, IA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 312-321

Attention is given to a 'core system' which provides a common set of equipments that is, with appropriate software, applicable to a wide variety of helicopter missions. The basic core system is the core of the Coast Guard (USCG) HH-65A system. It has been proposed for civil and military helicopter programs with requirements ranging from covert 'behind-the-lines' operations to resupply of oil rigs. Particular elements of the core avionics systems include the Cockpit Management System (CMS), the Multi-purpose Video Display System, the Mission Computer, a dual redundant multiplex data bus control system, and a four-axis autopilot/flight director capable of hands-off flight in all regimes including transition to hover. Attention is given to system capability requirements, aspects of system functional allocation, the automatic flight control system, and the mission processor.

A82-40535 * # NASA/FAA Helicopter ATC simulation investigation of RNAV/MLS instrument approaches. L L Peach, Jr, L Tobias, and H Q Lee (NASA, Ames Research Center, Moffett Field, CA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 322-336 6 refs

The NASA/FAA Helicopter Air Traffic Control (ATC) simulation investigations to determine the feasibility of simultaneous, independent instrument approach procedures for helicopters at major terminal areas, using Area Navigation/Microwave Landing System (RNAV/MLS) guidance, was conducted at several levels of helicopter display sophistication, up to that of a Cockpit Display of Traffic Information (CDTI) system Test objectives included the determination of pilot acceptability and the tracking performance of the RNAV/MLS's noninterfering rotorcraft approach path structure, along with the evaluation of the effect on controller workload of multiroute structures combining conventional and rotor-craft approaches at various arrival rates and traffic separations. The utility of electronic area maps and CDTI displays was also investigated Participating pilots flew 127 simulated instrument approaches in an ATC simulation laboratory OC

A82-40537 # Adaptation of pultrusion to the manufacture of helicopter components. E E Blake (Bell Helicopter Textron, Fort Worth, TX) and N J Tessier (U S Army, Army Materials and Mechanics Research Center, Watertown, MA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 346-351

A fabrication technique is described in which pultruded epoxy/glass stock with a complex crossection is postformed and cured to produce a curved UH-1 helicopter door track. During pultrusion, prepreg roving is overwrapped with adhesive prepreg glass cloth for transverse strength. The 'B' stage stock is postformed and autoclave cured in a glass/epoxy tool. The resulting door track retains the crossection of the pultrusion after developing the sweep and twist designed into the present aluminum part. Wear and load testing were performed on the composite door track along with an economic analysis comparing it with hand layup and the present aluminum track. The results demonstrate that it is feasible to produce complex helicopter components from pultrusions by means of postforming (Author)

A82-40538 # In-motion radiography of titanium spar tube welds. R J Milne (United Technologies Corp., Sikorsky Aircraft Div., Stratford, CT) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 352-358

The application of titanium to a helicopter rotor blade spar was developed during the 1960's However, the initially contemplated manfacturing method did not prove to be economical, and a new manufacturing procedure involving the use of a plasma arc welding technique was developed. The verification of weld integrity by means of a typical static X-ray test was found to be too time consuming, and the employment of in-motion radiography was considered. By using an in-motion radiographic system, it was possible to reduce significantly the time required to radiograph spar tube welds without sacrificing detail sensitivity.

A82-40539 # Development of the Sea King composite main rotor blade. R Sanders (Westland Helicopters, Ltd., Yeovil, Somerset, England) in American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 359-370

The Sea King composite main rotor blade has been designed to satisfy ruggedness requirements for the 1980's, and will soon be ready for flight testing. Composite materials with a replacable metal erosion shield have been chosen to improve the life of the blade, and a carbon and glass fiber mixture satisfies stiffness and weight requirements. A bolted root end design was chosen for this retrofit blade in order to ease automation, without degrading fatigue advantages of the composite construction. Technical problems and achievements encountered in the development process are discussed in terms of materials used, blade root design, manufacturing process, serviceability, and quality and safety control A plant has been constructed to satisfy future production requirements, with an anticipated product availability date of late 1984. R K R

A82-40540 # Computer aided coordinate measuring systems. J W Nastri (United Technologies Corp., Sikorsky Aircraft Div., Stratford, CT) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p. 371-376

Sikorsky's computer-aided inspection system and equipment utilized to assure that manufactured parts meet drawing tolerance specifications are discussed. An overview of the system is given, and the software is described, including the monitor console routine and commands and the language commands. The system's three coordinate measuring machines are discussed, and the part inspection methods are described in stepwise fashion. System benefits and time savings items are detailed, including quick and accurate measurement of parts difficult to inspect by conventional methods, significant reduction in inspection time, a consistent baseline that highlights variances, and the use of personnel with lower skill levels to effectively inspect critical parts. C D

A82-40541 # Support of the HH-65A - The impact of advanced technology of VTOL systems upon existing product support. R E Walkup (Aerospatiale Helicopter Corp., Grand Praine, TX) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 377-382

The Coast Guard (USCG) will begin to replace the HH-52 Helicopters with the HH-65A in 1982 The HH-65A is equipped with a state-of-the-art digital avionics system As the HH-52 has only vacuum tube avionics equipment, the new establishment of a complete support capability for solid state digital avionics will be necessary in connection with the introduction of the HH-65A. Other technological advances utilized in the HH-65A are related to turbine engines of modular design and the employment of composite materials in the aircraft structure. The HH-52 will continue in operation until all USCG stations will have received their HH-65A's. To provide support for simultaneous operation of both helicopters without an increase in support personnel will necessitate careful planing during the transitional period. Attention is given to the HH-65A avionics system, modular engine maintenance, aspects of corrosion control and the USCG mission, and the allocation and repair of spare components.

A82-40542 **#** A roadmap toward a fatigue qualification process for modern technology helicopters. S T-T Chiu and R W Arden (U S Army, Directorate for Development and Qualification, St Louis, MO) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 383-397 30 refs

The helicopter fatigue qualification process is critically reviewed to establish a roadmap, providing specific directions for a more efficient and unified qualification process. Specific improvements, various alternatives, and suggested unified approaches are discussed in terms of supporing rationales in the areas of coupon S-N data utilization, S-N curve reduction factor and curve shape, cycle counting method, structure classification, fatigue test requirement and in-service monitoring Current status and an overview are presented of a parallel AGARD effort to compile a 'Helicopter Fatigue Design Guide' (Author)

A82-40543 # Optimum structural design. R L Bennett (Bell Helicopter Textron, Fort Worth, TX) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 398-407 12 refs

Four typical helicopter engineering analyses have been combined with a nonlinear programming (NLP) algorithm to produce closed loop design-oriented analyses. The resulting models are shown to be very effective in supporting detailed design by eliminating the existing external man-in-the-loop iterative process. The nonlinear programming problem and how it relates to the engineering design process is described, along with typical NLP algorithms and how they are combined with conventional engineering analyses.

A82-40544 # Design and fabrication of a composite rear fuselage for the UH-60 /Black Hawk/. D G Orlino (U S Army, Applied Technology Laboratory, Fort Eustis, VA) and B F Kay (United Technologies Corp., Sikorsky Aircraft Div , Stratford, CT) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 408-416

The primary objective of the program to design a composite rear fuselage (CRF) is fabrication cost reduction, and other concerns are a 10% weight savings, improved reliability and maintainability, and increased ballistic survivability. The CRF design comprises a stiffened skin, with five major panels, bulkheads, and frames A modular repair concept resulted in reduced life-cycle cost, introducing reliability and maintainability into the design. In order to prevent fuel fires on impact with high explosive incendiary projectiles, rigid ballistic foam was used to fill the fuel cell. Visual inspection as well as destructive tests were completed, and necessary tooling changes were implemented. Objectives being met, a full-scale static test article is being produced.

A82-40545 # In-plane shear test of thin panels. G L Farley and D J Baker (U S Army, Structures Laboratory, Hampton, VA) in American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 417-425 5 refs

Efficient application of thin gage composite materials to helicopter fuselage structures necessitates that the materials be designed to operate at loads several times higher than initial buckling load. Methods are required to accurately measure and predict the response of thin gage composites when subjected to these loads. This paper presents the results of an analytical and experimental study of the behavior of thin gage composite panels subjected to in-plane shear loads. Finite element stress analyses were used to ad in the design of an improved shear fixture that minimizes adverse corner stresses and tearing and crimping failure modes characteristic of commonly used shear fixtures. Tests of thick buckle resistant aluminum panels and thin aluminum and composite panels were conducted to verify the fixture design. Results of finite element stress and buckling analyses and diagonal tension theory predictions are presented. Correlation of experimental data with analysis indicated that diagonal tension theory can be used to predict the load-strain response of thin composite panels. (Author)

A82-40546 # A summary of weight savings data for composite VSTOL structure. R L Foye (U S Army, Research and Technology Laboratory, Moffett Field, CA) and R Arden (U S Army, Aviation Research and Development Command, St Louis, MO) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p. 426-437 96 refs

This paper summarizes the weight savings that have been obtained over the last ten years through the application of advanced composite materials to each of the major structural weight groups of a VSTOL artirame. The data has been drawn from journal articles, published papers, R&D reports, and personal communications. Helicopter, VSTOL, and fixed wing applications of composites have been included. The data is not comprehensive but represents a significant sampling of all recent composite airframe designs. (Author)

A82-40547 # Structural design of a crashworthy landing gear for the AH-64 Attack Helicopter. J M McDermott (Hughes Helicopters, Inc, Culver City, CA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 438-450

Requirements for the design of a landing gear for helicopters are considered in the case of the AH-64 Attack Helicopter, an additional consideration is related to air transportability requirements of the helicopter, necessitating a kneeling requirement in the landing gear configuration in order to reduce the height of the helicopter to fit into the cabin of the cargo aircraft transporting it. This kneeling requirement was also utilized to provide a high degree of crash protection. According to specification, protection of the crew has to be provided for conditions involving a vertical impact velocity of as high as 42 ft/sec. In order to meet this requirement, it was necessary to use the landing gear to absorb as high a proportion of the vertical kinetic energy as was feasible before the fuselage contacted the ground Attention is given to the configuration of the landing gear for the AH-64, the design criteria, details of impact energy absorption, the integration of the landing gear into the airframe, and static structural testing GR

A82-40548 # Ringfin augmentation effects. H E Lemont (Bell Hellcopter Textron, Fort Worth, TX) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 451-460

The ringfin concept has been developed since 1975 as a potential remedy for a number of concerns experienced in connection with the operation of single main totor/tail rotor helicopters. This concept involves the use of a thrust ring around the tail rotor. The ring acts as fin, and generates lift force (antitorque). The present investigation is concerned with the measured augmentation effects in ground running, in hover and side flight, in forward translation, and mixing of the rotor wakes. The investigation shows that under static thrust conditions the tail rotor flow generates an induced positive force on the ring. The rotor tip vortices are dissipated with downstream flow motion, and an expanding slowed-velocity wake is created.

A82-40549 * # Performance of the Rotor Systems Research Aircraft calibrated rotor loads measurement system. C W Acree, Jr (NASA, Ames Research Center, Moffett Field, CA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p. 461-473 6 refs

The compound Rotor Systems Research Aircraft (RSRA) is designed to make high accuracy, simultaneous measurements of all rotor forces and moments in flight Physical calibration of the rotor force- and moment-measurement system when installed in the aircraft is required to account for any errors and to ensure that measurement system accuracy is traceable to the National Bureau of Standards. The first static calibration and associated analysis has been completed with good results. Hysteresis was a potential cause of static calibration errors, but was found to be negligible in flight, and analytical methods have been devised to eliminate its effects on calibration data. Flight tests confirmed that the calibrated rotor loads measurement system performs as expected in flight, and that it can dependably make direct measurements of fuselage vertical drag in hover (Author)

A82-40550 # Error minimization in ground vibration testing. E J Nagy (Kaman Aerospace Corp, Bloomfield, CT) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 474-480 5 refs The Ground Vibration Testing (GVT) of a U S Army AH-1G helicopter airframe

The Ground Vibration Testing (GVT) of a U S Army AH-1G helicopter airframe has been successfully completed. New methods have been developed to identify and minimize the errors in GVT. These methods can be utilized in future programs. The new approaches make effective use of a digital signal analyzer as a 'working tool' Examples are presented to demonstrate the use of the digital signal analyzer in connection with a number of applications. Attention is given to methods for the determination of the linear range, the location and identification of structural modes, the selection of narrow band sweeps, the selection of driving points, the local mode effect, driving point acceleration mobility checks for positive imaginary components, strain mobilities, the power method, and the number of averages.

A82-40551 # Results of the AH-64 Structural Demonstration. K R Spreuer (Hughes Helicopters, Inc., Carlsbad, CA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p. 481-489

This paper presents the results of the Structural Demonstration of the AH-64 Attack Helicopter The paper presents graphical data that shows the techniques used to attain the extreme points that define the flight envelope. The areas of the flight envelope that most challenge the various components of the helicopter are discussed. The methods used to assure flight safety during the program are also presented. Finally, the most highly loaded components are identified and the conditions and causes of the loads are presented. The Structural Demonstration was conducted successfully and all required maneuvers were performed without exceeding limit loads on any components. (Author)

A82-40552 # Evaluation of an automatic subsystem parameter monitor. R V Kurowsky and A S Santanelli (U S Army, Fort Monmouth, NJ) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 490-496

It is pointed out that the workload of the pilot of an aircraft is not necessarily reduced by making available to the pilot a new type of avionics system architecture, if the pilot is still required to perform all the tasks he has traditionally

. .

performed To achieve such a reduction in workload, the pilot should be used primarily as a decision maker with the ability to reprogram and command his machine in flight. The Electronic Master Monitor and Advisory Display System (EMMADS) is an information transfer system which will relieve the pilot of certain functions he has traditionally performed, such as monitoring aircraft subsystems A description is presented of the test procedures which will be used to evaluate the operator/control/display interface of the EMMADS Advanced Development Model G R

A82-40553 * # The prediction of helicopter rotor discrete frequency noise. F Farassat (NASA, Langley Research Center, Hampton, VA) and G P Succi (Bolt Beranek and Newman, Inc., Cambridge, MA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 497-507 23 refs

An accurate prediction of the noise produced by helicopters requires a good understanding of the noise generating mechanisms involved Such an understanding can lead to controlling the noise of existing helicopters by avoiding noisy regimes of flight or by redesigning the main and tail rotors. The present investigation is concerned with approaches which are suitable for the calculation of discrete frequency noise of helicopter rotors. The governing differential equation of acoustics used in a consideration of acoustic formulations is the Flowcs Williams-Hawkings (FW-H) equation Attention is given to a method reported by Farassat (1981), a method developed by Succi (1979), and a procedure discussed by Woan and Gregorek (1978).

A82-40554 # A semiempirical high-speed rotor noise prediction technique. K R Shenoy (Bell Helicopter Textron, Fort Worth, TX) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 508-516 14 refs

A semiempirical technique to predict high-speed noise of helicopter main rotors is discussed. This technique uses an existing data base, the properties of the equations governing the flow field, and empirical relationships to account for the changes in gross weight, blade chord and the blade rotational tip Mach number. The technique is verified through an application to full-scale flyover noise data and full-scale in-flight noise data. Hover test results for a model rotor are used to predict the noise levels for forward flight and are compared with wind tunnel test data. In addition, results of flow field investigations to study the effects of blade design parameters on high-speed noise and to extend the prediction technique are presented. These results are based on the flow field calculations made by using a three-dimensional, quasi-steady, full potential transonic analysis developed by NASA. (Author)

A82-40555 * # Dynamic surface measurements on a model helicopter rotor during blade slap at high angles of attack. J E Hubbard, Jr and W L Harris (MIT, Cambridge, MA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 517-527 16 refs Research supported by the Massachusetts Institute of Technology, Grant No NsG-1583

The modern helicopter offers a unique operational capability to both the public and private sectors. However, the use of the helicopter may become severely limited due to the radiated noise generated by the rotor system A description is presented of some of the experimental results obtained with a model helicopter rotor in an anechoic wind tunnel with regard to blade stall as a source mechanism of blade stap. Attention is given to dynamic rotor blade surface phenomena and the resulting far field impulsive noise from the model helicopter rotor at high angles of attack and low tip speed. The results of the investigation strongly implicates the boundary layer as playing an important role in blade slap due to blade/vortex interaction (BVI) in a highly loaded rotor. Intermittent stall cannot be ruled out as a possible source mechanism for blade slap. This implies that blade surface characteristics, airfoil shape and local Reynolds number may now be used as tools to reduce the resultant far-field sound pressure levels in helicopter G R

A82-40556 # Helicopter model scale results of blade-vortex interaction impulsive noise as affected by blade planform. D A Conner and D R Hoad (U S Army, Structures Laboratory, Hampton, VA) In American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings. (A82-40505 20-01) Washington, DC, American Helicopter Society, 1982, p 528-537 21 refs

An experimental investigation of the blade-vortex interaction impulsive noise characteristics of an advanced main rotor system for the UH-1 helicopter has been conducted Models of both the advanced main rotor system and the standard UH-1 main rotor system were tested at one-quarter scale in the Langley 4by 7-Meter (V/STOL) Tunnel using the General Rotor Model System (GRMS) Tests were conducted over a range of descent angles which bracketed the blade-vortex interaction phenomenon at a range of simulated flight speeds The tunnel was operated in the open-throat configuration with acoustic treatment to Improve the acoustic characteristics of the test chamber. The model data indicated that the advanced rotor system has increased the flight-scaled, LA noise produced by the UH-1 at all descent angles except where the blade-vortex interaction phenomenon was most intense for the standard UH-1 main rotor system (Author)

A82-40561 # Research on the behavior of a turbojet engine during internal and external disturbances with respect to early recognition of damage (Untersuchungen über das Verhalten eines Turbostrahltriebwerks bei Inneren und äusseren Störungen im Hinblick auf die Schadensfrüherkennung). H Tönskötter Aachen, Rheinisch-Westfälische Technische Hochschule, Fakultät fur Maschinenwesen, Dr -Ing Dissertation, 1980 215 p 41 refs In German

The results of a theoretical and experimental study on the behavior of a singlewave turbojet engine during disturbances are presented. The simulated disturbances are categorized as either external or internal. The former influence flow relationships in the engine and vary their behavior, but entail no consequences for the engine parts. Damage and structural changes in the engine components are called internal disturbances. Experimentally obtained thermodynamic parameter changes are presented as volume divisions and average values. A program to calculate the stationary and dynamic operating behavior in turbojet engines is used to determine the extent to which the experimental results coincide with a one-dimensional computational procedure, and whether monitoring of operating behavior can be useful for early detection of damage.

A82-40562 # Research on an adaptive Kalman filter for solving the radar tracking problem (Untersuchung adaptiver Kalman-Filter zur Lösung des Radar-Zielverfolgungsproblems). W Schumacher Berlin, Technische Universität, Fachberich Verfahrenstechnik, Dr. Ing Dissertation, 1979 126 p 44 refs In German Research supported by the Deutsche Forschungsgemeinschaft

The use of Kalman filters in automated air traffic control for failsafe measurement of local coordinates and speeds is discussed. Continuous and time-discrete models are constructed and an optimal filter is investigated. A sensitivity analysis is presented, followed by the design and simulation of an adaptive filter. Tracking at a one-level trajectory is discussed, and the design of an adaptive procedure is analyzed for different filter levels.

A82-40569 # Design and construction of a flexible autonomic electronic display device (Entwurf und Aufbau eines flexiblen autonomen elektronischen Anzeigegerätes). R Frieling Braunschweig, Technische Universität, Fakultät für Maschinenbau und Elektrotechnik, Dr -Ing Dissertation, 1980 166 p 40 refs In German

A compact, autonomic display device for presenting synthetic graphic images is needed for research work in the area of flight control. The device should also be suited for the presentation of dynamic processes. A device with the desired characteristics is currently not commercially available. The present investigation is concerned with the essential design criteria for the development and the construction of a display device which satisfies the considered requirements. The envisaged device consists of a microcomputer and an image element generator which contains digital differential analyzer (DDA) circuits. A detailed mathematical description of the generation of conic sections as image elements and the linear transformation of the elements provides the basis for universal employment possibilities of the device. The performance characteristics of the display device are illustrated with the aid of two examples, including an interpolation problem, and the display of data for flight control applications.

A82-40876 International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings. Volumes 1 & 2. Edited by B Laschka and R Staufenbiel, New York, American Institute of Aeronautics and Astronautics, 1982 Vol 1, 821 p, vol 2, 721 p Members, \$75, nonmembers, \$90 In English and French (For individual items see A82-40877 to A82-41025)

Topics in aeronautical and aerodynamics research, development, implementation, and future directions are considered. The development and applications of Space Transportation Systems are described, and attention is also given to development programs for transport aircraft and military combat aircraft Theoretical studies in flowfields, crew station design, and power plant materials and design are presented, along with investigations of aerodynamics, computational aerodynamics, control systems, and materials fatigue and tolerance. The uses of simulators for Orbiter pilot training, swept wings for efficient flight, and computer-controlled flight management systems are described, and examinations of vortex flows, structural dynamics, applications of composite structures, and canards are reported.

A82-40878 # Engineering aspects of international collaboration on Tornado. B O Heath (British Aerospace Public, Ltd , Co , Aircraft Group, Preston, Lancs , England) In International Council of the Aeronautical Sciences, Congreze, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York,

American Institute of Aeronautics and Astronautics, 1982, p 8-22 11 refs Design features, engineering goals, and the performance envelope of the Tornado combat aircraft are described. The fighter was developed to perform air-toground, interdictor/strike, naval strike, reconnaissance, air superiority, interception, and training missions. The distribution of responsibilities and management authority among the organizations of the three nations which participated in the development program are outlined, along with decisions in the evolution of the design. A new engine was developed as a cost-saving measure, and the aircraft was built to ensure that no single failure would endanger flightworthiness Easy access was also added to the Tornado systems in order to hold down repair time and costs.

A82-40879 # Advanced aerodynamic design for future combat aircraft. B R A Burns (British Aerospace Public, Ltd., Co., Preston, Lancs, England) In: International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 23-33

Progress in aerodynamic design features to enhance the effectiveness and performance of combat aircraft are reviewed. Higher turning performance at subsonic and transonic speeds has been achieved through improvements in the lift/drag ratio by providing for attached flow on the upper part of the wings. The effects of wing root leading edge strakes and aeroelastic tailoring on flight performance are discussed, and methods of augmenting the turning performance by adding wing interference to the jet exhaust are considered. Pilot workload has been lowered by active flight controls, which allow full exploitation of modern aircraft flight and maneuvering envelopes, while gust alleviation has ensured stable flight during high speed, low altitude flight. Intake duct geometry has been configured to permit operation at high angles of attack and in sideslip, while an underfuselage carriage scheme has been developed which greatly reduces interference drag compared with conventional underwing carriage. MS K

A82-40880 # Some aerodynamic/flightmechanic aspects for the design of future combat aircraft. P Mangold (Dornier GmbH, Friedrichshafen, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 34-43 6 refs

At an early project state of a future combat aircraft, designed with negative static stability, it is necessary to go through an optimization process in order to minimize the complexity and cost for the control system by avoiding undesirable aerodynamic characteristics. A careful refinement of certain parts of the configuration gives the chance to stay within the limits and to meet the criteria and goals for the desired longitudinal and lateral basic behavior. General trends, evaluated from many wind tunnel tests, are presented which show the influence of changing LEX size, shape of fuselage nose, slats, vertical tails etc. Concerning maximum attainable negative static margin one limit is set by the time to double amplitude after a gust disturbance. Looking at some typical existing and projected combat aircraft the paper discusses the fact and the consequences that the same Time. To Double leads to different (attainable) static margins.

A82-40681 # Gust load alleviation on Airbus A 300. O Sensburg, J Becker, H Lusebrink, and F Weiss (Messerschmitt-Bölkow-Blohm GmbH, Munich and Hamburg, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 44-58 15 refs

An active gust load alleviation system for an Airbus A 300 with a 10% wing span increase is described, along with passive maneuver load alleviation. The introduction of active control systems is intended to minimize the incremental structural dynamic loads caused by span expansion or increased wing loading, especially due to gusts. The gust magnitude is assayed by a vane or differential pressure sensor in the front fuselage, weighted with a time delay for the vane to wing transit. Actuator transfer functions are introduced into the existing active flight controls to compensate fo, unsteady aerodynamic effects. A block diagram of the closed loop gust alleviation system is provided, along with linearized equations of motion of elastic aircraft with closed or open loop systems. Finally, further studies are indicated in unsteady effects in order to implement passive maneuver load alleviation. M S K

A82-40882 # Calculations of transonic steady state aeroelastic effects for a canard airplane. N Agrell and S G Hedman (Flygtekniska Forsoksanstalten, Bromma, Sweden) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 59-66 5 refs Forsvare: Materielverk *Contracts No AU-1540*, No AU-1691

A transonic small perturbation potential method for calculation of the aeroelastic effects on aircraft with a canard is presented, and comparisons are made with results of earlier calculations. The equation for the disturbance potential is defined and the velocity potential is transformed into a finite difference form. Boundary conditions are formulated for subsonic and supersonic regimes and methods of treating steady state aeroelastic effects are discussed. A numerical mesh is devised using the SAAB 37 Viggen as an example and solution procedures at sub- and supersonic speeds are presented, covering the speed range of Mach 0.9-1.1. Aeroelastic deformation is calculated by balancing aerodynamic loads against interior forces. M S K

A82-40883 # Computer-aided derivation of equations of motion for rotary-wing aeroelastic problems. F Kiessling (Deutsche Forschungs- und Versuchsanstalt fur Luft- und Raumfahrt, Institut fur Aeroelastik, Göttingen, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 67-77 13 refs

A general computer-algebra system has been applied to derive literal equations of motion for the aeroelastic behavior of rotary-wings Inertia, elastic, structural damping, aerodynamic, and gravitational contributions are considered Modal degrees of freedom are provided to represent elastic rotor blades The program input comprises mainly a kinematic description of the system A weighting scheme is used to obtain the most important terms in a consistent manner Multiblade coordinate transformation is applied to reduce or to eliminate periodic coefficients As output, matrices are written in FORTRAN code, which reflect the mathematical model and can be used for further numerical calculations As an example, the suggested procedure is applied to a model of a two-bladed wind turbine mounted on an elastic tower (Author)

A82-40884 # HAJIF-II - A program system for the dynamic analysis of aeronautical structures. G -G Liu and J -J Li (Chinese Aeronautical Establishment, Beijing, People's Republic of China) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 78-82 17 refs

HAJIF-II is a program system developed for the calculation of modal parameters of aircraft structures as well as flutter and gust response analyses with active control systems taken into consideration. Ninety-nine substructures, each with 7000 degrees of freedom, can be used in the calculation of modal parameters and 50 modes for the flutter and gust response analyses. Some new techniques, such as a revised hypermatrix technique, an improved algorithm of simultaneous iteration, and new methods of modal synthesis etc., were developed to improve the efficiency of the system. Typical aircraft structures were analyzed and good results were obtained. (Author)

A82-40886 # A practical approach to the incorporation of technical advances in avionics. J D Bannister and D Roughton (British Aerospace Public, Ltd, Co, Aircraft Group, Brough, North Humberside, England) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 97-107

Features of a program to design, develop, and construct an avionic system demonstrator rig for the next generation of tactical combat aircraft while taking advantage of advances in VLSI hardware are described. The VLSI-based architecture permits shared communication and displays, in addition to sensor-dedicated microprocessors Military standard data busses can currently handle up to 31 subsystems through a common transmission line, and further determinations are needed to identify the effects of common mode failures, limitations on the amount of traffic on a bus, the effects of transmission delays, and particular links which cannot be routed through a data bus Details of the functional aspects of pilot, system control, mission, navaids, and aircraft groups to define problem areas, goals, and method to allow an acceptable transition to VLSI-based avionics are discussed.

A82-40887 # Applying advanced technology to flight station design. W R Paden, Jr and G A Sexton (Lockheed-Georgia Co., Marietta, GA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982. Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 108-117

Efforts by Lockheed to develop a flight simulation research facility are described, including the construction of a functional pilot's desk flight station, aircraft systems, and controls expected to be in use in the 1990s Simulators are being constructed to accommodate high resolution CRT color graphics, flat panel displays, touch panel controls, voice command and response systems, head-up displays, and electronic flight and thrust controllers. Stages in the realization process are outlined, noting current status in the design and fabrication of the simulator hardware and software. Systems under study are an appropriate color format, display formats, and advisory, caution, and warning system and cockpit display of traffic information format. Further research on the effects of introduction of the new equipment on pilot performance and on air traffic control are indicated MSK

A82-40888 # The evolution of display formats for advanced fighters using multimode color CRT displays. N M Lefritz, J H Tuttle, Jr (Rockwell International Corp, El Segundo, CA), and M J Forte (Bendix Corp, Teterboro, NJ) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 118-131 Research supported by the Rockwell Independent Research and Development Fund

Efforts to combine electromechanical indicators, instruments, and displays onto multimode, time-shared CRT displays (MMD) in advanced cockpit configurations for military aircraft are described. A cockpit configuration is presented in which the stick controller is situated to the right of the pilot, while the center console contains three MMDs. Color formatting was guided by goals to minimize electromechanical displays, provide the pilot with information relevant solely to a given mode of operation, have all data available at the pilot's option, use color and formats already implemented by the military, replace symbolic information with pictorial information, and employ the CRT for checklists Procedures for completing an electronic preflight checklist are detailed, in addition to take-off, climb to cruise, emergency conditions, and landing sequences.

A82-40889 # Application of advanced exhaust nozzles for tactical aircraft. D L Bowers and J A Laughrey (USAF, Wright Aeronautical Laboratories, Wright-Patterson AFB, OH) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 132-141 39 refs

Advanced exhaust nozzles play an important role in the system design for advanced tactical aircraft and offer attractive design options which contribute to total aircraft performance. These exhaust nozzles can improve aircraft cruise performance if integrated carefully. Thrust vectoring attainable with these exhaust nozzles adds significantly to aircraft maneuver performance. STOL performance is obtained by thrust reversing or a combination of thrust reversing and thrust vectoring. The significant aircraft performance improvements which lie in advanced exhaust nozzle technology will be determined by past, ongoing and future programs investigating the best application of advanced exhaust nozzles for tactical aircraft. (Author)

A82-40890 # Optimized 10 ton class commercial aircraft engine. R Laurens (SNECMA, Moissy-Cramayel, Seine-et-Marne, France) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 142-145

The development program goals and methods for the CFM56 series engines for powering aircraft of 110 to 200 passengers into the 1990s are reviewed. The CFM56, in the 20,000 lb class, began with the F101 core. Derivatives of the engine are currently used in the DC8-60, the KC-135 tanker, and the 737. Compression ratios have been raised from 25-30.1 to 35-40.1, and the core features a low clearance compressor with rotor temperature control, variable stators on the first four stages, a high speed HP turbine, active clearance cooling in the turbine, and close turning clearances. High energy X rays are being employed to improve the clearances and survey the temperature map and cooling system. A commonality of 60% has been maintained between generations of the engine M S K

A82-40891 # Recent advances in the performance of high bypass ratio fans. D J Nicholas and C Freeman (Rolls-Royce, Ltd, Derby, England) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 146-158 7 refs Research supported by the Ministry of Defence (Procurement Executive)

Theoretical and experimental techniques employed to improve the efficiency of the high tip speed fan jet engine are reviewed, Design features of high bypass ratio fans, including arrangement of the fan diffusion factors induced by the placement of the outlet guide vanes and the splitter are discussed Overall design parameters of the RB211-22 fan are described, including factors influencing the spanwise work distribution, the outlet guide configuration, and techniques for characterizing the airflow It was found that an optimum tip speed existed for each level of design pressure ratio. Performance tests on scale model rigs to determine the spanwise distribution, the blade element performance, and airfoil losses, were compared with actual engine operation. It is noted that laser holography, anemometry, and two- and three-dimensional numerical models were employed to identify and define the flow in test rig conditions.

A82-40892 # Axisymmetric approach and landing thrust reverser impacts on usage and LCC. J P Blackman, P B Stumbo (USAF, Aero Propulsion Laboratory, Wright-Patterson AFB, OH), and M F Eigenmann (McDonnell Aircraft Co, St Louis, MO) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 159-167 7 refs

The effects on the performance of the F15-C and advanced fighters by the installation of three different types of approach and landing thrust reversers (ALTR) are reported, including projected impacts on thy life cycle costs (LCC) The aircraft were tested in mission configurations comprising a 350 nm subsonic cruise and 200 nm supersonic dash at high altitude, along with appropriate defensive maneuvers. The ALTR concepts examined included a rotating vane upstream of the nozzle throat, a translating shroud ALTR downstream of the throat, and a three-door ALTR downstream of the nozzle throat of the advanced air-to-surface vehicle Effects were evaluated in terms of the resultant engine hot time, and cycles of use of the ALTRs in a variety of mission modes. The F15-C LCC was estimated to cost 3.8% more using the ALTR, while advanced vehicle LCCs increased 2.4-3.8%, with smallest increases occurring with downstream ALTR placement.

A82-40893 * # Observations and implications of natural laminar flow on practical airplane surfaces. B J Holmes (NASA, Langley Research Center, Hampton, VA) and C J Obara (Kentron Technical Center, Hampton, VA) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 168-181 48 refs

The results of natural laminar flow (NLF) experiments conducted by NASA to determine if modern aircraft structures can benefit from NLF as do sailplanes are presented Seven aircraft, ranging from a Cessna 210 to a Learjet 28/29, with relatively stiff skins were flown in production configurations with no modifications Measurements were made of the boundary-layer laminar to turbulent transition locations on various aerodynamic surfaces, the effect of a total loss of laminar flow, the effect of the propeller slipstream on the wing boundary-layer transition and the boundary-layer profiles, the wing section profile drag, the effect of flight through clouds, and insect debris contamination effects Favorable pressure gradients for NLF were concluded to be feasible up to a transition Reynolds number of 11 million Laminar flows were observed in propeller slipstreams, and insects were found to cause transition 1/4 of the time M S K

A82-40894 # Aerodynamic development of laminar flow control on swept wings using distributed suction through porous surfaces. J A Thelander, J B Allen, and H R Welge (Douglas Aircraft Co, Long Beach, CA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 182-189 8 refs

Development of a laminar flow control system utilizing distributed suction through porous strips is reviewed. Recent improvements in electron beam performation technology have greatly enhanced the potential for practical LFC application. The design of airfoil shapes compatible with LFC on swept wings is outlined Boundary layer stability analysis results and determination of suction distributions are reviewed. Considerations for an operational system for protection from ice and insect contamination are noted. Results of a swept wing model test and plans for a LFC leading edge glove flight test program are reviewed. (Author)

A82-40895 # External aerodynamic design for a laminar flow control glove on a Lockheed JetStar wing. J A Bennett and L B Brandt (Lockheed-Georgia Co , Marietta, GA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 190-202 34 refs

A recent study contract for a subsonic laminar flow control (LFC) transport with a supercritical wing and recent Lockheed research are discussed as background information leading to the design of a JetStar part-span LFC glove to be flighttested The special design requirements needed to develop the glove and some of the problems encountered during the process are presented. The following topics are discussed a method of simulating the interference effects of the body/pylons/nacelles on wing pressures when using an isolated-wing code, wind-tunnel testing of a JetStar model with a wing glove and correlation with theoretical glove pressures, and suction requirements for maintaining a laminar boundary layer (Author)

A82-40896 * # NASA research on viscous drag reduction. R H Petersen and D V Maddalon (NASA, Langley Research Center, Hampton, VA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982. Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 203-213 42 refs

Current NASA research points toward exciting opportunities for large reductions in viscous drag. Research is underway on natural laminar flow, laminar flow control by suction, and turbulent drag reduction. Preliminary results suggest that a significant amount of natural laminar flow can be achieved on small, straightwing airplanes. On larger, swept-wing aircraft, laminar flow control by distributed suction is expected to result in significant fuel savings. The area over which laminar flow control is applied depends on tradeoffs involving structural complexity, maintenance, and cost. Several methods of reducing turbulent skin friction by altering the turbulence structure itself have shown promise in exploratory testing. This paper reviews the status of these technologies and indicates the benefits of applying them to future aircraft. (Author)

A82-40897 # Viscous transonic airfoil flow simulation. J Longo, W Schmidt (Dornier GmbH, Friedrichshafen, West Germany), and A Jameson (Dornier GmbH, Friedrichshafen, West Germany, Princeton, University, Princeton, NJ) in international Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 214-223 19 refs

The present paper describes a method for the calculation of subsonic and transonic viscous flow over airfoils using the displacement surface concept. This modelling technique uses a fast multigrid solver for the full potential equation and laminar and turbulent boundary layer integral methods in addition, special models for transition, laminar or turbulent separation bubbles and trailing edge treatment have been selected. However, the flow is limited to small parts of trailing edge-type separation. The present paper deals with some theoretical features in a short description and shows computed results compared with experimental data and other methods. (Author)

A82-40898 # Computation of supersonic flow around three-dimensional wings. B G Arlinger (Saab-Scania AB, Linkoping, Sweden) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 224-232 16 refs

As part of the development of a program for supersonic flow around realistic aircraft configurations a method is presented for the computation of strictly supersonic flow around single wings or two-wing configurations of arbitrary shape. The method is based on the steady Euler equations which are solved in a streamwise marching procedure using a shock-capturing finite volume formulation. As solution algorithm an explicit predictor-corrector scheme of MacCormack type is used A variety of numerical applications of the method is presented including canard configuration cases, and comparisons are made with other theories and test data confirming versatility and reliability of the method (Author)

A82-40899 # Transonic small disturbance code for body-wing configuration coupled with full potential code for wing alone. A Luntz (Israel Aircraft Industries, Ltd, Lod, Israel) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 233-237 7 refs

A transonic small disturbance approximation code TSD was designed, for potential flow around a body-wing configuration This code is based on the embedded fine grid concept elaborated by Ch. Boppe Improvements are introduced into the boundary condition representation, including the body boundary condition and the interface between the fine grid box and the coarse grid computation. Only cartesian coordinate grids are used. The code provides good prediction of the position of the shock on the wing surface, using a comparatively small number (about 20) of grid points along the wing section cord. The TSD code is coupled with a modified (no crossflow at the wing root plane) in FL022, is replaced with the crossflow values computation of the body influence needed for the wing pressure computation. The coupling allows detailed analysis of the body-wing interference effects in the flow (Author).

A82-40900 # Advanced fighter technology integration program AFT-I/F-16. A J Bianco and F R Swortzel (USAF, Wright Aeronautical Laboratories, Wright-Patterson AFB, OH) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 238-246

The AFTI/F-16 Advanced Development Program is developing and flight validating advanced technologies which improve fighter lethality and survivability. The capability is achieved by the integration of mission task-tailored, digital flight controls with a director-type fire control system, and advanced target sensor/trackers. The Digital Flight Control System is the core technology. Integration of the systems forms the capability for automated maneuvering attack. Evaluation of automation, with respect to the weapon delivery task, is a key program thrust Use is made of nonconventional aircraft control modes to achieve improved maneuverability and weapon line pointing Careful attention is given to pilot/vehicle interface provisions. The AFTI/F-16 is now undergoing an extensive test program to provide the confidence necessary to transition the technologies for use on current and future fighter aircraft. (Author)

A82-40901 # Tail versus canard configuration - An aerodynamic comparison with regard to the suitability for future tactical combat aircraft. G Wedekind (Dornier GmbH, Friedrichshafen, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 247-254

Extensive experimental and theoretical research work on tail and canard configurations has recently been done at Dornier, considering the requirements for a future tactical combat aircraft Tail and canard configurations, which were designed for the same tactical requirements, are compared This comparison leads to the conclusion that the canard configuration cannot be regarded superior to the tail configuration, neither with regard to zero-lift drag at supersonic speeds nor with regard to lift-dependent drag at subsonic and supersonic speeds Furthermore, severe problems must be expected regarding lateral and directional stability at high angles-of-attack for a canard configuration. It turns out that those problems do not occur or are easier to handle with tail configurations. (Author)

A82-40902 # Material and process developments on the Boeing 767. J T Quinlivan and D T Lovell (Boeing Commercial Airplane Co, Seattle, WA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 255-261

The design goal of the 767 is an economic service life of 20 years with minimum unscheduled maintenance. Materials, material processing, and assembly methods employed on the 767 play a key role in the achievement of this design goal Materials and processes also are key in maintaining weight within design limits for fuel efficiency. The 767 uses a wealth of new and improved materials, processing methods, and assembly techniques. Some of the innovations are subtle and involve minor changes to previous technology, such as the reduction of certain fastener head diameters. Others are more dramatic, such as the use of new aluminum alloys for wing skins or advanced composites for primary flightcontrol surfaces Corrosion resistance is achieved through material selection, attention to design details, and proper finishing and sealing methods. For the most part, the materials selected for the passenger cabin interior are new and are selected for their flame resistance and lack of smoke and toxicant emission during combustion. A review of major structural and nonstructural material and process developments on the 767 will be summarized in this paper (Author)

A82-40903 # The promise of laminated metals in aircraft design. D H Petersen, L E Sloter, II, W A Poindexter, J L Maris, and G E Kuhn (Vought Corp, Dallas, TX) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, Amenican Institute of Aeronautics and Astronautics, 1982, p 262-269 8 refs

The relative merits of monolithic metals, adhesively bonded sheet metal and a new family of metallurgically bonded laminated alloys are presented and discussed in light of the U S. Air Force's laminated metal technology demonstration Advanced Technology Wing program A wing section was designed and constructed whose lower skin consisted of adhesively bonded aluminum layers having no fastener penetrations. The elimination of lower wing skin fasteners precludes both corrosion intrusion sites and locations for structural cracking, and in addition reduces manufacturing and assembly costs. The wing suffered no damage during two lifetimes of spectrum fatigue testing, as well as an additional 18 lifetimes of damage tolerance testing which included exposure to sump water and JP-4 fuel O C

A82-40904 # Design of compensated flutter suppression systems. M Lanz and P Mantegazza (Milano, Politecnico, Milan, Italy) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 270-279 37 refs Consiglio Nazionale delle Ricerche Contract No 81.02536.07

The paper presents a method to design compensated flutter suppression systems by eigenvalue assignment. The compensator is designed as a state observer by paralleling the Luenberger approach. The eigenvalues of the aeroelastic system and compensator are obtained by imposing a stationary value to a suitable norm of the gains, under the constraint of satisfying the aeroelastic eigensystem for assigned stable eigensolutions, and without any problem on the modelling of the unsteady aerodynamic forces. The compensator can be used not only to reconstruct lacking states, but also to insure insensitivity to different flight conditions A method is presented to mechanize, and possibly to reduce in order, the aeroelastic observer. Some simple examples illustrate the use of the method along with comments on the stabilization of an aeroelastic system by eigenvalue assignment techniques (Author)

A82-40905 # Design and experience with a low-cost digital fly-bywire system in the SAAB JA37 Viggen A/C. K Folkesson, P O Elgerona, and R Haglund (Saab-Scania AB, Linkoping, Sweden) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 280-288 Research supported by the Forsvaret Materielverk

A digital Fly-By-Wire system has been designed built and evaluated as a rig system and as a flight system installed in a JA37 Viggen test aircraft Headlines for definition of the system have been low complexity and low production cost, met by trading off complexity against safety and reliability margins. System characteristics are minimized servo hardware, minimized channel interconnections and maximum replacement of hardware by software including servo loop closures. Functional development areas are application of optimal control technique for multimode laws and for servo loop computations. The paper will present system definition, system mechanization in test aircraft, ground test and flight test information. (Author)

A82-40906 * # Design and flight testing of a digital optimal control general aviation autopilot. J R Broussard (Information and Control Systems, Inc., Hampton, VA), D R Downing (Kansas, University, Lawrence, KS), and W H Bryant (NASA, Langley Research Center, Flight Control Systems Div., Hampton, VA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 289-298 12 refs Contract No NAS1-16303

This paper presents the designs of Proportional-Integral-Filter (PIF) autopilots for a General Aviation (NAVION) aircraft The PIF autopilots use modern control theory to determine heading select and altitude select and hold autopilot modes The PIF control law uses typical General Aviation sensors for state feedback, command error integration for command tracking, digital complimentary filtering and analog prefiltering for sensor noise suppression, a control filter for computation delay accommodation, and the incremental form to eliminate trim values in implementation. Theoretical developments' for the control law are described which combine the sampled-data regulator with command generator tracking for use as a digital flight control system. The digital PIF autopilots are evaluated using closed-loop eigenvalues and simulations. Successful flight test results for the PIF autopilots are presented for different turbulence conditions and quadratic weights. (Author)

A82-40907 # Preliminary design of an advanced integrated power and avionics information system. G L Dunn, P Leong (Boeing Military Airplane Co., Seattle, WA), and D Fox (USAF, Aero Propulsion Laboratory, Wright-Patterson AFB, OH) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 299-305 Contract No F33615-80-C-2004

An advanced aircraft electrical system is described which meets the requirements for a 1990 time frame two-engine tactical aircraft with multimission capability. It features modular design and use of intelligent electrical load management centers with solid state power controllers, resulting in a greatly enhanced aircraft electrical system over that currently available. The power generation and distribution, electrical power control, multiplex data bus characteristics, power system processor, electrical load management center, generator control unit, and electrical system software are discussed and diagrammed.

A82-40908 * # Inlet and airframe compatibility for a V/STOL fighter/attack aircraft with top-mounted inlets. D A Durston and D B Smeltzer (NASA, Ames Research Center, Moffett Field, CA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 305/a-305/i 9 refs

Ae odynamic force and inlet-pressure data were obtained for 95% force and pressure models of a V/STOL fighter/attack aircraft configuration with topmounted twin inlets. Data are presented from wind tunnel tests conducted at Mach numbers of 0 6, 0 9, and 1 2 at angles of attack up to 27-deg and angles of sideslip up to 12-deg. Trimmed aerodynamic characteristics and inlet performance were compared for three different leading-edge extension (LEX) configurations. The effects of wing leading- and trailing-edge flaps on the inlet were also determined. Maneuver performance was calculated from combined force and inlet-pressure data. The largest of the three LEX sizes tested gave the best airplane maneuver performance Wing flap deflections improved inlet recovery at all Mach numbers (Author)

A82-40909 # Investigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps, at transonic speed and high Reynolds numbers. H Triebstein (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Gottingen, West Germany), R Destuynder (ONERA, Châtilion-sous-Bagneux, Hauts-de-Seine, France), and H Hansen (Messerschmitt-Bölkow-Blohm GmbH, Hamburg, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 306-315 8 refs Research supported by the Bundesministerium für Forschung und Technologie

Investigations in unsteady aerodynamics were conducted in order to study the potential of active control technology for transport aircraft wings. Wind tunnel tests were carried out using a large two-dimensional model with two interchangeable, fast moving, trailing edge control surfaces of different relative chord. The subsonic and supercritical pressure distributions were studied, and the unsteady aerodynamic coefficients were analyzed. It is found that in subsonic flow trailing edge separation causes considerable reduction in steady lift, but there is far less influence on the magnitude of the unsteady lift generated by an oscillating control surface. Only the corresponding phase angle changes dramatically. In transonic flow the development of the supersonic region and the shock strength and location demonstrate a predominant influence on steady as well as unsteady pressure distributions. The properties of the supersonic regions and the shocks change considerably with all parameters investigated.

A82-40910 # Determination of the efficiency of a trailing edge flap in unsteady three-dimensional flow (Determination de l'efficacité d'un volet de bord de fuite en écoulement tridimensionnel instationnaire). H Consigny (ONERA, Châtillon-sous-Bagneux, Hauts-de-Seine, France) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 316-328 18 refs In French Research supported by the Direction des Recherches, Etudes et Techniques and Ministère de la Défense

A study was carried out in order to improve understanding of the three-dimensional unsteady effects of an oscillating part-span trailing-edge flap. The experiments were performed on a constant chord and constant thickness supercritical wing mounted on the sidewall of a transonic wind tunnel. The model was fitted with some 238 static pressure taps and 136 small unsteady pressure transducers located on several spanwise stations. The measurements made for different geometric configurations provided extensive information on the influence of various parameters on both steady and unsteady chordwise pressure distributions and aerodynamic coefficients. The experimental results were compared with those obtained by theoretical methods based on the solution of the full potential equation in steady flow Quasi-steady pressure distributions were also compared to preliminary computational results, including viscous effects.

A82-40911 * # An Investigation of scale model testing of VTOL aircraft in hover. W G Hill, Jr, R C Jenkins (Grumman Aerospace Corp, Bethpage, NY), and M R Dudley (NASA, Ames Research Center, Moffett Field, CA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 329-335 6 refs Contract No NAS2-10645

Utilizing the unique opportunity created by full scale hover testing of the twin-jet Grumman Design 698 VTOL aircraft in the NASA-Ames Hover Facility, a series of experiments was conducted to evaluate the effectivness of scale model testing in predicting full scale behavior. Interference forces were found to be sensitive to aircraft lower surface geometry, but when the geometry was modeled accurately the small scale results matched full scale forces guite well. The interference forces were found to be insensitive to core nozzle temperature and fan nozzle pressure ratio. The results clearly demonstrate that small scale models can be reliably utilized for aircraft and technology development when the appropriate sensitivities are recognized. (Author)

A82-40912 # Optimization of flight with tilt wings (Optimisation du vol à aile battante. P Contensou (ONERA, Châtillon-sous-Bagneux, Hauts-de-Seine, France) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 336-341 In French

Within a structure of simplifying assumptions, a complete solution is presented for the problem of optimizing a tilted flying surface by establishing the law of motion relative to a mobile wing and determining the functions of lift and propulsion for a heavy and inertial body. The solutions are compared both with bird flight and mechanical flight $$\rm C\ D$$

A82-40915 * # Advanced technologies applied to reduce the operating costs of small commuter transport aircraft. O Masefield, A Turi, and M Reinicke (Pilatus Aircraft, Ltd., Stans, Switzerland) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 352-358 NASA-supported research

The application of new aerodynamic, structural, and propulsion technologies to a specified baseline commuter aircraft is studied. The assessment models can be used on a desktop calculator and include a sizing program, operating cost program, and passenger ride qualities model. Evaluation is done with a step-by-step approach and is applied to range, number and type of engines, structure, wing selection, and configuration. A 40 percent direct operating cost saving is anticipated compared to current well established commuter aircraft.

A82-40917 # Design and experimental verification of the USB-flap structucture for NAL STOL aircraft. M Sano (National Aerospace Laboratory, Tokyo, Japan), Y Fujimori (National Space Development Agency, Tokyo, Japan), and S Maekawa (Kawasaki, Heavy Industries, Ltd, Gifu, Japan) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 370-375 6 refs

In order to verify the safety of the USB flap structure of the NAL STOL experimental aircraft, tests were carried out on structural models, including a test to detect thermal buckling temperature, vibration tests, and an acoustic fatigue test at elevated and room temperature. The USB flap structure, the acoustic fatigue design, the structure and static and dynamic characteristics of the test panel are discussed, including the resonant frequency, mode shape and damping coefficient, static thermal response, and dynamic response. It was found that thermal buckling occurred on test panels, that resonant frequencies of the flat test panels fail in the range between those of clamped and those of simply supported plates, and that through the prescribed fatigue test period, all structural models proved themselvés to be strong enough to resist both acoustic and thermal loading C.D.

A82-40921 * # A summary of V/STOL inlet analysis methods. D P Hwang and J M Abbott (NASA, Lewis Research Center, Cleveland, OH) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 402-409 24 refs

The methods used to analyze the aerodynamic performance of V/STOL inlets at the NASA Lewis Research Center are briefly described Recent extensions and applications of the method are emphasized They include the specification of the Kutta condition for a slotted inlet, the calculation of suction and tangential blowing for boundary layer control, and the analysis of auxiliary inlet geometries A comparison is made with experiment for the slotted inlet and also for tangential blowing Finally, an optimum inlet diffuser velocity distribution is developed

(Author)

A82-40925 * # A unique flight test facility - Description and results. R R Meyer, Jr (NASA, Flight Research Center, Edwards, CA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 433-448 13 refs

The Dryden Flight Research Facility has developed a unique research facility for conducting aerodynamic and fluid mechanics experiments in flight A low aspect ratio fin, referred to as the flight test fixture (FTF), is mounted on the underside of the fuselage of an F-104G arcraft The F-104/FTF facility is described, and the capabilities are discussed. The capabilities include (1) a large Mach number envelope (0 4 to 2 0), including the region through Mach 1 0, (2) the potential ability to test articles larger than those that can be tested in wind tunnels, (3) the large chord Reynolds number envelope (greater than 40 million), and (4) the ability to define small increments in friction drag between two test surfaces. Data are presented from experiments that demonstrate some of the capabilities of the FTF, including the shuttle thermal protection system airload tests, instrument development, and base drag studies. Proposed skin friction?

A82-40928 * # Determination of airplane aerodynamic parameters from flight data at high angles of attack. V Klein (Joint Institute for Advancement of Flight Sciences, Hampton, VA) and J G Batterson (NASA, Langley Research Center, Hampton, VA) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 467-474 8 refs

The problem of determining airplane aerodynamic model equations and estimating the associated parameters from flight data taken at high angles of attack is addressed Two representations of the aerodynamic function based on the polynomial and spline representations are given. Then the technique of building an adequate model using a stepwise regression is presented with examples demonstrating the construction of the model and various approaches to model verification. (Author)

A82-40930 * # Computational and experimental studies of light twin aerodynamic interference. W G Thomson, W H Wentz, Jr, and C Ostowari (Wichila State University, Wichita, KS) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1, (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 489-495 Research supported by the Beech Aircraft Co and NASA

The results of an analytical and experimental study of aerodynamic interference effects for a light twin aircraft are presented. Both the influence of a body (either fuselage or nacelle) on a wing and the influence of a wing on a body are studied. The wing studied uses a new natural laminar flow airfoil with variable camber movable trailing edge. A three-dimensional panel method program utilizing surface source and surface doublet singularities was used to design wingnacelle and wing-fuselage fairings. Experiments were conducted using a 1/6 scale reflection plane model. Forces, pressures, and surface flow visualization results are presented. Results indicate that potential flow analysis is useful to guide the design of intersection fairings, but experimental tuning is still required. While the study specifically addressed a light twin aircraft, the methods are applicable to a wide variety of aircraft. (Author)

A82-40931 * # Dual wing, swept forward swept rearward wing, and single wing design optimization for high performance business airplanes. M D Rhodes and B P Selberg (Missouri-Rolla, University, Rolla, MO) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 496-511 32 refs Grant No NAG1-26

An investigation was performed to compare closely coupled dual wing and swept forward swept rearward wing aircraft to corresponding single wing baseline' designs to judge the advantages offered by aircraft designed with multiple wing systems. The optimum multiple wing geometry used on the multiple wing designs was determined in an analytic study which investigated the two- and three-dimensional aerodynamic behavior of a wide range of multiple wing configurations in order to find the wing geometry that created the minimum cruise drag. This analysis used a multi-element inviscid vortex panel program coupled to a momentum integral boundary layer analysis program to account for the aerodynamic coupling between the wings and to provide the two-dimensional aerodynamic data, which was then used as input for a three-dimensional vortex lattice program, which calculated the three-dimensional aerodynamic data. The low drag of the multiple wing configurations is due to a combination of two dimensional drag reductions, tailoring the three dimensional drag for the swept forward swept rearward design, and the structural advantages of the two wings that because of the structural connections permitted higher aspect ratios (Author)

A82-40932 * # Assessment of advanced technologies for high performance single-engine business airplanes. D L Kohlman (Kohlman Aviation Corp., Lawrence, KS) and B J Holmes (NASA, Langley Research Center, Hampton, VA) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 512-563 24 refs

The prospects for significantly increasing the fuel efficiency and mission capability of single engine business aircraft through the incorporation of advanced propulsion, aerodynamics and materials technologies are explored. It is found that turbine engines cannot match the fuel economy of the heavier rotary, dissel and advanced spark reciprocating engines. The rotary engine yields the lightest and smallest aircraft for a given mission requirement, and also offers greater simplicity and a multifuel capability. Great promise is also seen in the use of composite material primary structures in conjunction with laminar flow wing surfaces, a pusher propeller and conventional wing-tail configuration. This study was conducted with the General Aviation Synthesis Program, which can furnish the most accurate mission performance calculations yet obtained.

A82-40933 * # The design integration of wingtip devices for light general aviation aircraft. R V Gifford (NASA, Langley Research Center, Hampton, VA) and C P van Dam (Kansas, University, Lawrence, KS) In International Council of the Aeronautical Sciences, Congress, 13th and AlAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 564-569 21 refs

An investigation was conducted to determine the load carrying capabilities and structural design requirements for wingtip devices on general aviation aircraft Winglets were designed and analyzed as part of a research program involving a typical agricultural aircraft. This effort involved analytical load prediction for the winglets, structural design for both the winglets and aircraft installation, structural load testing and flight test verification. Conclusions from this program are believed to be applicable to the use of wingtip devices on light-weight general aviation aircraft (Author)

A82-40934 # Operation V10F - Development of a composite material wing. G Hellard (Société Nationale Industrielle Aérospatiale, Toulouse, France) and D Chaumette (Avions Marcel Dassault - Breguet Aviation, Vaucresson, Hauts-de-Seine, France) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 570-578

The design development and detailed structural and fabrication method features of the Falcon 10 business jet aircraft carbon fiber reinforced plastic composite wing are described, with emphasis on the design and testing of individual wing structure components such as stiffened ribs and integrally stiffened upper and lower surface panels. The testing of laminate composite wing structure element properties included transverse loading, thermal and mechanical fatigue, shear, combined shear and bending, fuel pressure, tension, and compression The delamination and lightning strike behavior of the wing components were also assessed Finally, all structural elements were assembled and tested for static loads and fatigue. The composite wing represents a 20 3 percent weight saving over the metallic wing it-replaces.

A82-40935 # A one-shot autoclave manufacturing process for carbon epoxy components. M Kaitatzidis, R Renz (Dornier GmbH, Friedrichshafen, West Germany), and D Wurzel (Deutsche Forschungs- und Versuchsanstalt fur Luft- und Raumfahrt, Stuttgart, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 579-585

For the Alpha-Jet aircraft Dornier has developed and fabricated a carbon-/epoxy horizontal stabilizer, which has already successfully completed its qualification tests. This paper presents the requirements and goals of this development and describes the structural design of the horizontal stabilizer. For its leading and trailing edges a new one-shot manufacturing technique has been developed. The toolings are described, weight and cost savings are reported. This technique is now being applied for series production of ailerons for the Do 228 Commuter Aircraft A brief presentation of the results of the qualification tests under various environmental conditions (humidity and temperature) is given. (Author)

A82-40936 # Non-honeycomb F-16 horizontal stabilizer structural design. D N Butcher (General Dynamics Corp., Fort Worth, TX) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 586-592

A description is given of the F-16 fighter's horizontal stabilizer structural design and fabrication methods. The primary components of the stabilizer are graphite/epoxy composite skins, which are mechanically fastened with countersunk rivets to a one-piece sheet aluminum corrugated substructure and a machined aluminum pivot fitting. The skins and substructure are tooled to a common inside mold-line surface to facilitate assembly. Weight, construction and maintenance costs comparisons are made with the full depth-bonded honeycomb stabilizer design which the present one will replace. Despite a weight of 165.9 lb, by comparison to 157.8, the new stabilizer represents a 50% fabrication cost reduction at the 600th stabilizer produced. Lower maintenance costs are expected, in view of the long-term service problems associated with the honeycomb fabrication alternative. OC

A82-40937 # Material identification for the design of composite rotary wings. V Giavotto, C Caprile, M De Capitani, L Salvioni (Milano, Politecnico, Milan, Italy), V Caramaschi, G C Maffioli, and F Mussi (Costruzioni Aeronautiche Giovanni Agusta S p A, Gallarate, Italy) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 593-606 15 refs

Among the developments that appear to be absolutely needed for the design of advanced composite rotary wings there are material models, to be supported by substantial experimentation and to be capable of an accurate modeling of the behavior of multilayer FRPs, complete of failure criteria regarding all possible failure modes. This paper reports an experimental activity carried on by Aerospace Department of Politecnico of Milano in cooperation with Costruzioni Aeronautiche G Augusta The most relevant part of such activity has been a fairly large campaign on tubular specimens in biaxial stress states and plane specimens in uniaxial stress states All tests have been run statically, measuring stresses and strains up to failure. The results of such measurements have been so far worked out to verify existing material models and failure criteria. No one existing failure criteria seems to be completely adequate to the whose stress domain explored (Author)

A82-40939 # Dynamic energy transfer between wind and aircraft. G Schänzer (Braunschweig, Technische Universität, Brunswick, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 615-621 6 refs

The energy effect of vertical wind on glider aircraft is studied. The theoretical basis of maximum dynamic energy transfer is discussed, and the energy transfer problem is investigated using a glider with up and downdrafts varying in space. The response of the aircraft is calculated with a nonlinear simulation program on a digital computer. Maneuvering that produces optimal energy transfer is connected with a high kinetic energy level of the aircraft and high load factors which depend on vertical wind velocities. Energy-optimal flight maneuvers significantly increase the average groundspeed of a glider aircraft compared to the procedure described by Nickel and McCready (1949).

A82-40940 # Digital computer simulation of modern aeronautical digital communication systems. S Chow (Nanjing Aeronautical Institute, Nanjing, People's Republic of China) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 622-629 11 refs

A Monte Carlo simulation method for modern aeronautical digital communication systems is described. Its relationship to various parameters is studied, including filtering, limiting, carrier frequency offset, bit time jitter, and multipath effects in A/G and A/A communications (Author)

A82-40941 # Flight simulation studies on the feasibility of laterally segmented approaches in an MLS environment. L J J Erkelens (Nationaal Lucht- en Ruimtevaartlaboratorium, Amsterdam, Netherlands) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 630-641 5 refs

On the moving base flight simulator of the NLR an investigation was carried out to establish a number of minimum approach parameters concerning laterally segmented approach paths, assuming that guidance was provided by an MLS facility Seven laterally segmented approach paths with different turn angles and final intercept altitudes were flown manually with a simulated heavy transport aircraft in the final approach configuration. Results were obtained in terms of tracking accuracy, pilot effort ratings and pilot responses to a questionnaire. A subsequent simulation program was carried out recently, in which as new items were introduced a more realistic simulation of the MLS environment (MLS coverage affaas, landing gear). A third simulation program is prepared in which the interaction is emphasized between the air traffic controller and the flight crew. The pilot is vectored to a point within MLS coverage, from which he is expected to intercept a laterally segmented approach path using MLS-guided intercept procedures (Author).

A82-40942 # A concept for 4D-guidance of transport aircraft in the TMA. V Adam and W Lechner (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Brunswick, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 642-653 18 refs

The four dimensional (4D) guidance of aircraft in the TMA allows for precise control of the minimum separation and thus efficient use of the available approach capacity of the airport A concept for the 4D-guidance of transport aircraft has been developed and a corresponding control mode has been integrated in an automatic flight control system for transport aircraft. The 4D mode is based on the usual radar vector guidance technique of air traffic control and, therefore, is characterized by a succession of flight sections with constant values for indicated airspeed, heading and descent rate. The time of arrival is controlled by altering the path via a delay fan. The algorithm for the calculation of the commanded 4D flight path takes into account suitable wind models updated by actual wind data in the paper the 4D mode is described and first flight test results are discussed (Author).

A82-40943

A82-40943 # Optimal open-loop aircraft control for go-around maneuvers under wind shear influence. H G Jacob (Braunschweig, Technische Universität, Brunswick, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 654-664 24 refs

The optimization procedure is based on the representation of time dependent command inputs by analytical functions. The coefficients of these functions are iterated by a static search algorithm to values optimizing the behavior of the process. The longitudinal motion in heavy tail wind shear of the Airbus A 300 aircraft is described by a system of nonlinear equations of 4th order bounded by numerous design, safety and comfort constraints. The quality criterion is defined in a way to maximize the minimal distance between aircraft and ground as well as the area between flight path and ground. For these studies a very simple optimization program has been used which allows to consider boundaries and which comprises less than 100 FORTRAN-statements. The optimal input functions and other interesting variables are shown and discussed for the particular case that full power is available and for half power.

A82-40944 # The nonsynchronous whirls of the turbine rotor in aerojet engines. J -L Gu and P -Z Ren (Northwestern Polytechnical University, Xian, Shaanxi, People's Republic of China) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 665-673 12 refs

Several factors involved in the stability analyses of the supercritical overhungrotor-bearing system of a specific type of aircraft engine are discussed. The phenomenon of 1/2 order subharmonic vibration within aerojet engines and its causes are assessed, and mathematical expressions for destabilizing forces are worked out. The latter include the unbalanced torque force due to circumferential variations of blade tip clearances, the frictional moment within splined coupling, and the aeroelasticity of labyrinth seals. Mathematical expressions for parametric excitation are found for the nonlinear stiffness of single-row deep-grooved ball bearings and for the nonlinear stiffness of the back support Equations of motion of the high-speed overhung turbine rotor are derived.

A82-40945 # Fluctuating forces and rotor noise due to distorted inflow. G Neuwerth, R Staufenbiel, A Kellner, and J Schreier (Aachen, Rheinisch-Westfälische Technische Hochschule, Aachen, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 674-688 14 refs

The influence of inflow distortions on the rotor blade forces and on their increased radiated noise is theoretically and experimentally investigated. Two types of distortions are considered, one involving a ducted rotor whose inflow is distorted by wakes, the other involving a helicopter tail rotor cutting the tip vortices of the main rotor. Fluctuations in the direction and magnitude of the flow relative to the blades is Fourier analyzed and the unsteady blade forces and pressures are computed on the basis of two and three-dimensional theories. The Fourier coefficients of these forces are used to compute the additional rotor noise emission due to the inflow distortions. Measurements of the unsteady blade pressures and the radiated noise power spectrum are in reasonable agreement with the theoretical results.

A82-40946 # An experimental and numerical study of 3-D rotor wakes in hovering flight. M Nsi Mba, D Favier, and C Maresca (Aix-Marseille I, Université, Marseille, France) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 689-699 12 refs Direction des Recherches, Etudes et Techniques *Contract No* 78-456

Results of comparison between experimental and numerical studies on the 3-D wake of a hovening rotor are presented. The wind-tunnel investigation is conducted by means of X-hot wires and laser Doppler anemometry procedures to measure the 3-D velocity field under the rotor and to determine the tip vortex paths for several rotor configurations. Additional flow visualizations and rotor airloads coefficients are also carried out. The prediction model is based on the classical vortex theory with an empirically prescribed geometry of the wake From the blade circulation distribution the rotor wake is represented by vortex lines which are allowed to freely adapt until a converged wake geometry is obtained Then a new estimate of the blade circulation repartition can be deduced The procedure is repeated, iterating until the compatibility between the adapted wake geometry and the blade circulation repartition is obtained. The validity range of the calculation model is deduced from comparison with experimental data obtained on instantaneous velocities and tip vortex paths, for different rotor parameters including solidy, number of blades, pitch angle, blade twist, and tip shape (Author)

A82-40947 * # Aerodynamic interactions between a 1/6-scale helicopter rotor and a body of revolution. M D Betzina (NASA, Ames Research Center, Moffett Field, CA) and P Shinoda (U S Army, Aeromechanics Laboratory, Moffett Field, CA) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattie, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 700-711 6 refs

A wind-tunnel investigation was conducted in which independent, steady-state aerodynamic forces and moments were measured on a 2.24-m-dam, two-bladed helicopter rotor and a body of revolution. The objective was to determine the interaction of the body on the rotor performance and the effect of the rotor on the body aerodynamics for variations in velocity, thrust, tip path-plane angle of attack, rotor/body position, and body nose geometry. Results show that a body of revolution near the rotor can produce significant favorable or unfavorable effects on rotor performance, depending on the operating condition. Body longitudinal aerodynamic characteristics are significantly modified by the presence of an operating rotor and hub. (Author)

A82-40948 # The prediction of propeller/wing interaction effects. A S Aljabri (Lockheed-Georgia Co , Marietta, GA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 712-719

An analytical technique has been developed which predicts the influence of a propeller slipstream on a nacelle/wing combination. This is achieved by coupling a slipstream code with a complex configuration potential flow analysis code. The slipstream code is based on the vortex theory of propellers and predicts the slipstream in terms of its shape induced velocities and swirl angle. To verify the slipstream code two experiments with different model propellers were carried out. The wake immediately behind these propellers was surveyed and results compared with predictions. Good correlation is obtained. The coupling of the slipstream code with the panel code allows analysis of propeller slipstream/-nacelle/wing combinations. Results comparing the wing spanwise loading with and without slipstream are presented. The computational results are found to be in good agreement with experimental data.

A82-40949 # Wind-tunnel testing of V/STOL configurations at high lift. W R Sears (Arizona, University, Tucson, AZ) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 720-730, 12 refs Contract No N00014-79-C-0010

The results of a study of the problem of the large airstream deflections involved in wind-tunnel testing of V/STOL configurations are reported. The concept of adaptive wind-tunnel walls is utilized to eliminate, along with boundary interference, the inaccuracies of the usual tunnel calibration. Some numerical models of adaptive-wall tunnels are described and it is shown that the undisturbed stream direction and magnitude, arbitrarily chosen, are achieved by the iterative process of such a tunnel. The use of this type of tunnel in an extreme case is demonstrated by constructing and model testing an approximate panel representation of a jet-flap wing of finite span. The demonstration is completely successful, suggesting that the new tunnel would solve the recurring problem of V/STOL testing C D

A82-40950 # Estimation of simulation errors in the European Transonic Wind Tunnel /ETW/. B Wagner (Dornier GmbH, Friedrichshafen, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 731-740 22 refs Bundesministerium fur Forschung und Technologie *Contract No LVW-7901, European Transonic Wind Tunnel* Contract No 79/01/68730/143963

Simulation errors in cryogenic wind tunnels caused by real gas effects, changes in viscosity and heat conductivity characteristics at low temperatures, heat transfer, and local condensation are estimated theoretically. For this purpose viscous effects and heat transfer influences in transonic high Reynolds number turbulent flows are calculated by solving numerically the full Navier-Stokes equations for shock wave boundary layer interactions and by calculating boundary layers on airfoils, real gas equations of state and non-adiabatic walls being included in both procedures. Equilibrium condensation approximating the case of heterogeneous nucleation is investigated in transonic airfoil flows by means of numerical solutions of the full inviscid Euler equations. The separation behavior is shown not to be sensitive to real gas effects and small amounts of heat transfer. The condensation influence is primarily seen by a considerable drag increase.

A82-40953 # Prediction of high alpha flight characteristics utilizing rotary balance data. W Bihrle, Jr (Bihrle Applied Research, Inc., Jericho, NY) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 761-768

Rotational flow aerodynamic data, as measured by a rotary balance at low Reynolds number, are used to analytically predict steady spin modes and poststall motions. The excellent agreement obtained between predicted and full-scale flight results would indicate that use of low Reynolds number rotary balance data is sufficient for calculating steady-spin modes for military configurations and general aviation configurations not having large wing leading-edge radii. Considerations, however, in the application of these low Reynolds number data to steady-state spin analysis, as well as large angle, six degree-of-freedom high alpha studies, are discussed Also, the procedure for developing a configuration highly resistant to spins is illustrated. (Author)

A82-40955 # Experimental and theoretical studies of three-dimensional turbulent boundary layers on an empennage of a typical transport airplane. H C Seetharam, N J Pfeiffer, M Ohmura, and J D McLean (Boeing Commercial Airplane Co, Seattle, WA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 1 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 784-795 6 refs

This paper describes experiments conducted to measure the three-dimensional incompressible turbulent boundary layers on the horizontal and vertical tails of a 1/5 scale model of a transport airplane empennage. The boundary layer measurements were made with a V-shaped anemometer with a high precision traversing mechanism. Variations of angle of attack and Reynolds number were included in the tests. Measurements were also made with small elevator and rudder deflections. The data includes extensive pressure distributions, and detailed analyses of three-dimensional boundary layer data. Comparison of the experimental data with a three-dimensional boundary layer code taking into account viscous-inviscid interaction is shown. Details of the test theory comparison and the need for a better turbulence model are discussed. (Author)

A82-40956 # Requirements and trends in fuel consumption in transport mission with aircraft and surface vehicles. G Gabrielli In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 796-799

A discussion is presented of the energy utilization factor, f, which relates the payload product of a vehicle, yielded by weight and route distance, to the mechanical energy used Values of f are presented which have been derived from several hundred sea, land and air vehicles of 15 different types in view of their customary missions. It is demonstrated that turboprop aircraft, and to an even greater degree turbojet aircraft, are the only types of vehicles which offer higher transport speeds without a corresponding reduction in the energy utilization factor.

A82-40957 # Aerodynamic concepts for fuel-efficient transport aircraft. G Krenz and R Hilbig (Vereinigte Flugtechnische Werke GmbH, Bremen, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 800-810 8 refs

The rapid inflation of jet fuel prices in the last decade contributes largely to the growing operating expenses of the airlines and to a disproportionate share of the Direct Operating Costs (D O C) as well, wherein the fuel share is already dominant. This report describes the influence of the increasing fuel costs on the aircraft design and explains the manner in which the lift/drag ratio as design parameter is steadily increasing in importance compared to the weight. The evaluation of the fundamentals for a new fuel efficient aircraft is a challenge for both, designer and aeronautical research. On the other hand there still exist potentials for performance improvements in terms of L/D for most of the current aircraft in service, as they were generally designed for minimum weight performance. This paper gives examples for aircraft modifications for performance improvement and shows potentials for future designs in the field of aerodynamics. (Author)

A82-40958 # Progress at Douglas on laminar flow control applied to commercial transport aircraft. W E Pearce (Douglas Aircraft Co, Long Beach, CA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 811-817

Design studies, development efforts and testing related to laminar flow control for subsonic commercial transport aircraft are described in this paper. The paper covers selection of a suitable suction surface, integration of the suction system, and results of LFC aircraft design studies. Current programs which include wind tunnel testing and flight testing are discussed as well as proposed future LFC activities. (Author) A82-40959 # Cracks interacting with contact forces - A finite element study on loaded holes. H Ansell and B Fredriksson (Saab-Scania AB, Linkoping, Sweden) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 818-825 17 refs Research supported by the Forsvaret Materielverk

A computerized method for the simultaneous solution of the contact and stress intensity factor problem has been developed. The solution is based upon the finite element method using virtual crack extension method for stress intensity factor calculations. The method is generally applicable to both two- and three-dimensional problems and both through- and part-through cracks could be studied. The method has been applied to a lug with pressfitted sleeve and shaft. Both singleand doublesided cracks are studied. Contact pressures and stress intensity factors during crack propagating are presented. The stress intensity factors are compared with experimental results. The importance of the simultaneous solution of the contact and crack problem is demonstrated. (Author)

A82-40951 # A crack growth model under spectrum loading. B -X Yang (Beijing Institute of Aeronautics and Astronautics, Beijing, People's Republic of China) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 837-843 12 refs

In the present study, based on the mechanisms of delayed retardation of overload retardation effect, an analytical equation for predicting the delayed retardation parameter is presented Further, a model for predicting the retardation under tensile overloads and tensile-compressive overloads is proposed, and it can be used to predict the fatigue crack growth rate and fatigue life under complex spectrum loading And as an example, the retardation effects of some materials under different loading conditions are predicted. The fatigue life of stiffened panel of wing and landing gear of aircraft under complex spectrum loadings are predicted. Predictions agree very well with experimental results (Author)

A82-40962 # Age exploration in naval aviation. A D Williams (U S Navy, Naval Aviation Logistics Center, Patuxent River, MD) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1962, p. 844-850

In this paper, an overview of the United States Navy's newly developed aviation age exploration process is given As age exploration is a subset of the Reliability-Centered Maintenance (RCM) program, the underlying concepts of age exploration, RCM, and their relationship to each other, are explored Age exploration is depicted as a multi-faceted analyzation, marrying diverse types of information with maintenance engineering logic and statistical formulation. Specific applications of the age exploration process, in the Navy's aviation community are presented. It is shown how the knowledge gained from age exploration enables the designer of the RCM requirements to effect maximum uptime of the equipment at the lowest cost within the bounds of safety.

A82-40963 # Logistics research program in the United States Air Force. J C Reynolds and P E Davidson (USAF, Coordinating Office for Logistics Research, Wright-Patterson AFB, OH) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 851-853

An assessment is given of the factors which contribute to the lack of interest and investment of resources in logistics research and development, with emphasis on the need to integrate the consideration of logistics into research and development activities, and attention to the program developed toward that end by the U S Air Force USAF program results demonstrate that any agency with logistics responsibilities can improve its technical capabilities and operational methods through management attention and the cooperation of the logistics and research and development communities O C C

A82-40964 # Third generation turbo fans. J F Coplin (Rolls-Royce, Ltd, Derby, England) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 867-878

The modular design concept of the RB211 family of turbofan aircraft engines has allowed the progressive improvement of fuel efficiency through refinement of the design of individual components, resulting in gradual increases of optimum pressure and bypass and temperature ratios. The RB211-535E4, which is the latest engine derived from the basic RB211 design and is destined for use by the 757 airliner, incorporates inherent precision tip clearance control, thermal barrier coatings, creep-resistant titanium alloys, supercritical airfoil designs, a single

A82-40965

nozzle exhaust, a single stage, wide chord clapperless fan, and three-dimensional core compressor and core turbine designs. Attention is given to the basic research conducted on component efficiency, which involved the use of laser holography and laser anemometry techniques for observing and measuring aerodynamic flow O C

A82-40965 # Turboprop design - Now and the future. B S Gatzen (United Technologies Corp., Hamilton Standard Div., Windsor Locks, CT) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 879-903 92 refs

After an account of the development history of turboprop rotor technology during the 1960s for V/STOL applications, the development status and design and performance characteristics of commuter aircraft turboprop and high speed propeller fan rotor technologies are considered. The commuter aircraft propeller family incorporates composite shell and aluminum spar blades with a double-acting pitch change system and a pitch-lock feature, resulting in weight reduction, greater safety, improved durability, and a near-ideal aerodynamic performance in the Mach 0 4-0 65 range that assures low cabin noise levels and meets far field noise certification requirements. The propeller fan incorporates 8-10 blades with swept blade tips for the Mach 0 65-0 8 range cruse speeds of 80-160 passenger transports and military cargo and ASW aircraft. The propeller fan will result in fuel consumption reductions of 20% and 40% for commercial and military aircraft, respectively.

A82-40966 # Inflated wings. A Roselli In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 904-910

The design principles and possible uses of both statically and dynamically inflated wings are considered, on the basis of their inherently high strength/weight ratios, economy of construction, and ease of storage and deployment. It is noted that the upper surface of a large statically inflated wing acts as a greenhouse-effect solar trap which may be harnessed to provide both static buoyancy, as in a hot air balloon, and energy for propulsion. Attractive uses of these large, kite-like wings include auxiliary power for ships, seed, fertilizer and insecticade spraying platforms for agriculture, and military parachutes.

A82-40967 # Design and tests of airfoils for sailplanes with an application to the ASW-19B. L M M Boermans and H J W Selen (Delft, Technische Hogeschool, Delft, Netherlands) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 911-921 14 refs

The paper describes the considerations, tests and results of an investigation aimed at designing some improved airfoils for sailplane applications. The following preliminary studies are discussed Windtunnel experiments on two actual wing segments of a Standard Class sailplane ASW-19B are described The characteristics of some modern airfoils for sailplanes are analyzed. Results of flight and windtunnel experiments with respect to leading edge contamination by insects are presented. The effectiveness of pneumatic turbulators, applied to decrease the airfoil drag by avoiding laminar separation bubbles, is demonstrated. Based on the experience gained in these studies, some airfoils were designed and, after windtunnel verification, applied to the wing of an ASW-19B. Flight performance measurements before and after the wing modification showed an improvement of 5% in glide ratio over the entire practical flight speed range.

A82-40968 # Variable geometry aerofoils as applied to the Beatty B-5 and B-6 sailplanes. R A Streather (Atlas Aircraft Corp., Johannesburg, Republic of South Africa) in International Council of the Aeronautical Sciences, Congress, 13th and AlAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 922-930 11 refs

Two variable-geometry aerofoils using flexible surfaces have been developed by Beatty for his B-5 and B-6 sailplanes. The B-5 has a basic Eppler 1001 section with a flexible upper surface which is raised to form a thick, high-camber profile for thermalling. The B-6 uses a Wortman FX 05-H-126 section with flexible upper and lower surfaces over the rear 40% of the chord. Predictions for the polars of the two sections using the Eppler and NASA viscous, two-dimensional computer programs are presented. Predictions for the overall aircraft polars are compared with flight-test measurements obtained by conventional methods and by using a prototype glide-angle indicator. (Author)

A82-40969 # Development of the Circulation Control Wing-Upper Surface Blowing powered-lift system for STOL aircraft. M J Harris, J H Nichols, Jr, R J Englar, and G G Huson (David W Taylor Naval Ship Research and Development Center, Bethesda, MD) In international Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Tech nology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 931-939, 10 refs.

The design characteristics and performance levels attained in static, wind tunnel and test aircraft operation of the Circulation Control Wing/Upper Surface Blowing (CCW/USB) powered lift system for STOL aircraft are described. The configuration of the system places turbofan engine exhausts above the upper surface of a Coanda-effect trailing edge circulation-control wing, so that the exhaust gases scrub the wing upper surface. In addition to controlling effective wing camber with circulation control blowing, propulsion-induced lift is generated through the downward deflection of turbofan exhaust over the trailing edge of the wing to a degree which is controlled pneumatically by the momentum of the circulation-control jet sheet. It is experimentally demostrated that the mechanically simple CCW/USB pneumatic system can generate high lift as effectively as OCC.

A82-40970 # Ejector powered propulsion and high lift subsonic wing. R A Squyers, J L Porter (Vought Advanced Technology Center, Dallas, TX), K S Nagaraja (USAF, Wright Aeronautical Laboratories, Wright-Patterson AFB, OH), and G F Cudahy (Fairchild Republic Co, Farmingdale, NY) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 940-950 8 refs Contract No F33615-79-C-3017

A high performance ejector wing is designed by means of methodologies based on three-dimensional vortex lattice and lifting line theories and two-dimensional analog techniques, in conjunction with viscous flow predictions and empirically based ejector augmentor design and performance procedures. The initial analytical consideration of various ejector wing configurations established the superior lift and thrust performance at high angles of attack of a configuration consisting of a constant pressure mixing ejector with a wing lower surface inlet and an upper wing trailing edge exhaust flow. Test results for a swept planform, four-ejector bay wing configuration indicate maximum lift/drag ratio improvements over a conventional wing of up to 27%, and an angle of attack increase of more than 10 deg without stall. A thrust augmentation factor of 1.06 was achieved at a freestream Mach number of 0.294, in keeping with predictions.

A82-40971 # Development of an advanced no-moving-parts high-lift airfoil. R J Englar (David W Taylor Naval Ship Research and Development Center, Bethesda, MD) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 951-959 15 refs

An advanced Circulation Control Wing (CCW) airfoil has been developed by incorporating a very small radius blown trailing edge into the aft profile of an existing supercritical airfoil. This combined no-moving-parts configuration generates the same high lift as the already flight-proven large-radius CCW airfoils (section lift coefficient near 7), yet produces negligible unblown drag penalty due to leaving the device deployed for cruise flight. The large leading edge radius of the supercritical airfoil allows high-lift operation without mechanical deflection Experimental results presented by the paper imply the feasibility of an efficient mono-element cruise and high-lift airfoil, with transition between the two modes accomplished by merely initiating blowing from the fixed trailing edge slot. Comparisons to existing blown and unblown high lift systems are made, and possible applications are discussed (Author).

A82-40972 # Design integration of CCW/USB for a sea-based aircraft. H S D Yang (Lockheed-California Co, Burbank, CA) and J H Nichols. Jr (David W Taylor Naval Ship Research and Development Center, Bethesda, MD) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 960-968 8 refs

A design study is being conducted to apply the technologies of Circulation Control Wing with Upper Surface Blowing (CCW/USB) engine installation to a Navy/Lockheed sea based aircraft Research and development in the CCW and USB concepts indicate that the application of the combined technologies may achieve a goal of operating the S-3 type aircraft from a ship deck without the catapult. The design emphasizes the integration of the propulsion system with a simple installation to obtain high lift or drag when required. Attention is also being directed to the cruise efficiency and the optimum design approach for stability and control. (Author)

A82-40973 # Aircraft design for fuel efficiency. L O Lehman, D Woll, and C Lampart (U S Naval Material Command, Naval Air Development Center Warminster, PA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle WA August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York American Institute of Aeronautics and Astronautics, 1982, p 969-979 6 refs U S Navy Aircraft Energy Conservation Research, Development Test and Evaluation Program recommendations to date are presented, with emphasis on those aircraft design approaches which promise the greatest fuel savings for a given level of investment in addition to design modifications which reduce aero-dynamic drag or aircraft weight, attention is given to efficiency-enhancing propulsion system concepts, Flight Performance Advisory/Management Systems which improve mission fuel utilization, and mission planning and training techniques which improve operational effectiveness. The study results cover fighter, attencies as nuclear aircraft and advanced lighter-than-air vehicles OC

A82-40974 * # Performance characteristics of a buoyant quad-rotor research aircraft. B L Nagabhushan, P P Jacobs, C E Belknap (Goodyear Aerospace Corp, Defense Systems Div, Akron, OH), and D A Euler (Hughes Helicopters, Inc, Commercial Engineering Div, Culver City, CA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 980-989 Contract No NAS2-10777

Performance characteristics of a buoyant, quadrotor research aircraft, which represents a hybrid airship concept for heavy lift application, are described Ceiling altitude and endurance for hovering at typical power levels, including partial power failure, are predicted Climb performance at various altitude and gross weight conditions have been examined. Forward flight performance of this vehicle is illustrated in terms of typical performance, over the full range of its payload capability. Optimum payload weights have been identified which result in maximum range at sea level density altitude and constant endurance at various altitudes, both during hover and cruise flights (Author)

A82-40975 # Application of a new hybrid material /ARALL/ in aircraft structures. J W Gunnink, L B Vogelesang, and J Schijve (Delft, Technische Hogeschool, Delft, Netherlands) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 990-1000 18 refs

An aircraft structural material produced by the bonding of thin aluminum alloy sheets with an aramid fiber-reinforced adhesive, designated Aramid-Reinforced Aluminum Laminate (ARALL), is described ARALL exhibits superior fatigue crack growth properties, and has a high tensile strength which may be maximized through the introduction of suitable residual stresses into laminates having optimized aluminum sheet thicknesses Monolithic material test results are used as reference in comparative tensile strength and fatigue tests for notched and centrally cracked ARALL specimens, bolted and riveted joints, and lugs Buckling test results are compared with calculations for both aluminum alloy and ARALL compression panels Attention is given to the weight savings obtainable in pressurzed cabins representative of various existing aircraft through the use of ARALL

ОC

A82-40976 # The behavior of composite thin-walled structures in dynamic buckling under impact. J Ari-Gur, J Singer (Technion-Israel Institute of Technology, Haifa, Israel), and H Röhrle (Dornier GmbH, Friedrichshafen, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1001-1010 12 refs

The influence of material properties, and in particular those of composites, on response and behavior of columns under axial impact is studied. An extensive experimental investigation has been carried out on specimens made of graphite/epoxy, glass/epoxy and Kevlar/epoxy laminates with different layups Dynamic buckling and failure are compared with those of metal columns and the relative advantages and disadvantages of the composite materials are discussed in general, composite columns show improved dynamic buckling properties, and, with several exceptions, they may replace metal ones efficiently and reliably

(Author)

A82-40977 # Nondestructive testing in aircraft construction using holographic methods. K Wanders (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Cologne, West Germany) and H Steinbichler (Laboratory Dr H Steinbichler, Endorf, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1011-1017 10 refs

The application of high power laser-based holographic interferometry to aircraft structure nondestructive testing is described. The techniques covered include real time holography, which denotes structural deformation through the dark bands of destructive interference, the double exposure method, in which structural stresses applied between exposures are manifested as interference finges among odd multiples of one-half wavelength, and time-average holography, which reconstructs wavefront interference between two virtual images of a vibrating structure. The concrete examples given are of a glass fiber-reinforced plastic tube, a helicopter rotor blade, the running surface of a tire, a turbine rotor, and a thermally deformed antenna, as well as exhaust nozzle jets. O C

A82-40978 # Design and fabrication of cocured composite hat-stiffened panels. G D Peddle and E E Spier (General Dynamics Corp., Convair Div, San Diego, CA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 1018-1031. 7 refs

Design/analysis study established cocured graphite-epoxy hat-stiffened panels of high compressive structural integrity for development and demonstration by mechanized methods Both flat and curved-crown hats were involved in the design/analysis study, but only the flat-crown concept was included in the manufacturing study it was found that manufacture of the curved-crown hat would not result in added complexity Post-buckling structural integrity was assumed to be directly related to the summation of classical local bifurcation buckling strengths of panel elements Parts were built in stages with the final panel being 18 feet long Mechanization and tooling procedures were proven to be valid for the manufactury of long panels. Test panels were not fabricated in time for correlation with analysis, but testing will be performed in the near future (Author)

A82-40979 # Spin behaviour of the Pilatus PC-7 Turbor Trainer. P Wittwer and O Masefield (Pilatus Flugzeugwerke AG, Stans, Switzerland) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1032-1039

Experience gained during the development of the PC-7 Turbo Trainer aircraft suggests that while spin tunnel tests are helpful in determining the critical points of a design's spin characteristics, an exhaustive and accurate forecast of spin behavior is not attainable. The spin tunnel test model used for the PC-7 had a generally steeper nose-down attitude, and was faster turning, than the prototype aircraft. Recovery turns were, however, accurately represented. Attention is given to the differences in spin behavior resulting from a series of modifications to the prototype aircraft in the course of its spin test program.

A82-40982 # Models for the motor state of VSCF aircraft electrical power system. X Qiu, Y Yan, and Y Hu (Nanjing Aeronautical Institute, Nanjing, People's Republic of China) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1061-1071

Mathematical models for the motor state of an AC-AC variable speed constant frequency (VSCF) power system are established in this paper. Two computing methods, of which the first is a method for finding the analytic solution of the state transition matrix with a computer and the second is a combination of the 0.618-optimization method and the Runge-Kutta method, are proposed. These methods reduce computation time (Author)

A82-40983 # The effect of intake flow disturbances on APU compressor blade high cycle fatigue in the Airbus A300. K W Lotter and J Jörg (Messerschmitt-Bölkow-Blohm GmbH, Munich, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1072-1081 7 refs

Premature compressor failures of the APU in the Airbus A300, related to high cycle fatigue, led to a detailed investigation of the relevant intake/engine parameters Relatively high total pressure distortion and excessive flow angularity have been determined to be the cause of high alternating blade loads and, in combination with the chosen material of the compressor disk and blades, surface fretting in systematic test steps intake modifications were developed to improve the intake flow quality. It is shown that only relatively minor intake modifications were required to achieve a substantial improvement in total pressure distortion and swirl. In addition, a suitable modification at the compressor blade dove-tails was initiated to increase the blades' fatigue strength.

A82-40984 # Engine controls for the 1980s and 1990s. V A Fisher (Rolls-Royce, Ltd, Bristol, England) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1082-1087

After a brief developmental history of full-authority electronic engine control systems, with attention to that employed by the Olympus 593 engines of the Concorde SST, consideration is given to the developmental prospects for such systems in the near future in view of the increasing power of microprocessors

A82-40985

The fault tolerance characteristics, transducer systems, high integrity software and reliability/maintainability of the projected full authority digital electronic control (FADEC) system are described, with attention to fault identification and flight crew notification procedures. The RB211-535C turbofan engine will be equipped with such a FADEC system.

A82-40985 # Advanced aerodynamic wing design for commercial transports - Review of a technology program in the Netherlands. N Voogt (Fokker, Amsterdam, Netherlands) and J W Slooff (National Lucht- en Ruim-tevaartlaboratorium, Amsterdam, Netherlands) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1088-1098 16 refs

An aerodynamic technology development program is described, whose main objectives are the formulation and validation of a computational procedure for the aerodynamic design of high aspect ratio wings for the transonic regime of short/medium range commercial aircraft, as well as the establishment of a transonic technology base. An inverse procedure has been formulated for the wing design task which allows the excercise of explicit control over wing geometry while approaching the target pressure distribution as closely as possible. Experience has been gained in relating target pressure distributions to off-design conditions through two-dimensional airfoil and three-dimensional wing studies, together with wind tunnel verifications that included the assessment of high Reynolds number characteristics. A wing-body configuration computational analysis capability for drag minimization studies has also been achieved by the program.

A82-40986 # Recent airfoil developments at DFVLR. H Körner and G Redeker (Deutsche Forschungs- und Versuchsanstalt fur Luft- und Raumfahrt, Institut fur Entwurfs-Aerodynamik, Brunswick, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aurcraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1099-1114 37 refs

New airfoils may bring a substantial improvement in the aerodynamic efficiency of airborne vehicles. A number of new airfoils based on transonic and laminar concept have been designed and investigated at DFVLR. With theoretical design methods and facilities for experimental verification at hand, airfoils for subsonic transports, sail-planes, propellers, helicopter rotors and combat aircraft have been developed. (Author)

A82-40987 # Wing-tip jets aerodynamic performance. J M Wu, A Vakılı, and Z. L. Chen (Tennessee, University, Tullahoma, TN) In. International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2. (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1115-1121 32 refs. Contract No F33615-81-K-3034

This paper presents the preliminary study of wing-tip jets blowing techniques to achieve improvements in the wings aerodynamics performance. The feasibility of utilizing wing-tip jets to reduce the currently popular winglets has been conducted. The idea is to study the potential of replacing solid winglets by more flexible wing-tip jets to suit changing flight conditions. The wing-tip jets modify the flow-field near the wing tip and could achieve better aerodynamic performance of the wing A first order calculation has been made to check the air-jet advantage versus the disadvantage in degrading the jet-engine performance by bleed-off of compressed air. The result indicate that the power (or thrust) saved is significant enough to encourage us to explore this new concept. Munk's minimum induced drag criterion has been extended to formulate the split branched wing-tips by utilizing multi-ports jet. Moreover, it is also conceived that an added jet swirling effect may induce a circulatory motion. The induced local downwash could alter the new wing-tip flow and thus suppress the main wing-tip-roll-up vortex. For this purpose, wind-tunnel tests with a half-wing model have been conducted to verify this concept This is done by controlling the jet blowing direction and magnitude

(Author)

A82-40988 # An experimental investigation of leading-edge spanwise blowing. W Su, M Liu, B Zhou, C Qiu, and S Xiong (Beijing Institute of Aeronautics and Astronautics, Beijing, People's Republic of China) In International Council of the Aeronautical Sciences, Congress, 13th and AlAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1122-1132 13 refs

Oil flow visualizations and pressure measurements on a 30-deg swept trapezoidal wing were conducted to investigate leading edge spanwise blowing (LE SWB), which is very near the leading edge and along it The LE SWB can provide a higher maximum lift coefficient than conventional SWB It can generate a more stable jet leading edge vortex above the inboard wing, and the outboard wing leading edge vortex can also be enhanced. The flow patterns of the wing with LE SWB are similar to those of a strake-wing configuration (Author)

A82-40989 # Vortex formation over double-delta wings. U Brennenstuhl and D Hummel (Braunschweig, Technische Univeristät, Brunswick, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1133-1146 20 refs

Low speed wind tunnel tests have been carried out on a series of double-delta wings The effects of variations in leading edge kink angle and in kink position have been investigated by mens of three-component pressure distribution and flow-field measurements, as well as by flow visualization at a Reynolds number value of 1 3 million At small angles of attack two primary vortices exist on each side of the wing, originating from the apex and from the leading-edge kink. At moderate kink angles these two vortices join each other with increasing angle of attack. The junction process is analysed in detail and is intrepreted as a 'potential flow effect' At very large angles of attack vortex breakdown occurs within the jointed vortices, which leads to the limitation of the aerodynamic coefficients (Author)

A92-40990 # CATIA - A computer aided design and manufacturing tridimensional system. F Bernard (Avions Marcel Dassault-Breguet Aviation, Suresnes, Hauts-de-Seine, France) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1147-1154

A properietary computer graphics-aided, three-dimensional interactive application (CATIA) design system is described CATIA employs approximately 100 graphics displays, which are used by some 500 persons engaged in the definition of aircraft structures, structural strength analyses, the kinematic analysis of mobile elements, aerodynamic calculations, the choice of tooling in the machining of aircraft elements, and the programming of robotics CATIA covers these diverse fields with a single data base. After a description of salient aspects of the system's hardware and software, graphics examples are given of the definition of curves, surfaces, complex volumes, and analytical tasks. O C

A82-40991 # CDS-the designer's media, the analyst's model. D P Raymer (Rockwell International Corp., Los Angeles, CA) and S K Albrecht (Rockwell International Corp., Space Transportation and Systems Group, Downey, CA) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1155-1163 6 refs

A proprietary Configuration Development System (CDS) is described which incorporates both a flexible interactive graphics program for the conceptual design of aerospace vehicles and a three-dimensional geometric data base which may be used by analysis programs Experience to date with the CDS has demonstrated substantial productivity improvements, although, as noted by Sandusky' (1978), such gains are more pronounced in the conduct of iteration procedures than in the reduction of throughtime. Nevertheless, optimal results are reached at an earlier stage of the design process. Graphics examples are given from CDS work on the FDL-5 and FDL-8 lifting body manned orbital vehicles.

A82-40992 * # Aircraft geometry verification with enhanced computergenerated displays. J V Cozzolongo (NASA, Ames Research Center, Moffett Field, CA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1163/a-1163/j 11 refs

A method for visual verification of aerodynamic geometries using computergenerated, color-shaded images is described. The mathematical models representing aircraft geometries are created for use in theoretical aerodynamic analyses and in computer-aided manufacturing. The aerodynamic shapes are defined using parametric bi-cubic splined patches. This mathematical representation is then used as input to an algorithm that generates a color-shaded image of the geometry. A discussion of the techniques used in the mathematical representation of the geometry and in the rendering of the color-shaded display is presented. The results include examples of color-shaded displays, which are contrasted with wire-frame-type displays. The examples also show the use of mapped surface pressures in terms of color-shaded images of V/STOL fighter-/attack aircraft and advanced turboprop aircraft.

A82-40993 # Technical and economic comparison of carbon fiber tape and woven fabric applications. G Hilaire and G Briens (Société Nationale Industrielle Aérospatiale, Laboratoire Central, Suresnes, Hauts-de-Seine, France) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1164-1172

A comparative study is made of the structural performance characteristics of various types of carbon fiber fabrics and unidirectional filament prepreg tapes, in view of the relative equality of the importance, in recent applications of carbon

fiber composites, of weight reduction, strength maximization, and reductions in manufacturing costs. The comparisons are between a 3000-filament (3 K) tow, T 300 carbon fiber, 5 H satin weave cloth weighing 285 g/sq m when dry, and a 3 K T 300 tape. Both are impregnated with 5208 resin and in that state represent 60 percent fiber volume composites. The performance characteristics considered are interlaminar shear, notched and unnotched tensile strength, and compressive strength. The consequences of each alternative for manufacturing are assessed for the cases of manual and automated lay-up, machining and cut trimming.

A82-40994 # Application of composite materials and new design concepts for future transport aircraft. R H Lange and J W Moore (Lockheed-Georgia Co., Marietta, GA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1173-1181 30 refs

The application of advanced technologies and the use of innovative aircraft design concepts show the potential for significant improvement in the fuel efficiency of future transport aircraft envisioned for operation in the mid to late-1990s. This paper reviews recent preliminary design system studies of transport aircraft featuring cost/benefit analyses of advanced technology and new vehicle design concepts. Emphasis is directed toward the use of graphite epoxy composite materials in the primary and secondary structures of transport aircraft. The data on aircraft design concepts include preliminary design studies of Advanced Civil/Military Aircraft (ACMA) aircraft and innovative configurations. The aircraft design parameters include cruise Mach numbers of 0.75 to 0.80, design payloads from 330,000 to 772,000 lbs, and range from 3,500 to 4,000 nautical miles.

(Author)

A82-40995 # Sliced disc design - A composite conform concept for a turbo engine axial compressor. R Kochendorfer (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Bauweisen- und Konstruktionsforschung, Stuttgart, West Germany) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1182-1191 5 refs

For an 800 kW turbo engine demonstrator an axial compressor concept in composite technology was developed. The aim was a reduction of mass and moment of inertia compared to a titanium design. The geometry and the blade spacing required a single-blade attachment concept. To minimize the problems in the shear loading area, the 'compressor rotor' was divided into individual segments, made of aluminum alloy. Each of the AI-segments represents the root part of a B/AI blade. In the teading and trailing edge areas these segments are shrunk together by composite hoops, which also sustain the centrifugal loads. As long as the shrinkage pressure is present, the segmented disk exhibits a similar behavior as an unsliced disk. This sliced disk concept was successfully prooftested in cold spin tests up to the design level of 47,600 rpm, corresponding to a maximum blade tip speed of 420 m/sec.

A82-40996 # Comparison of HP turbine 'deep blade design' effects in turbofan engine gas generators with different bearing structure configurations. D. Rist (Munchen, Technische Universität, Munich, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 1192-1202 5 refs

Two different types of gas generator bearing structure configurations have been investigated for a projected turbofan engine based on the deep blade design concept. Mechanical analyses are carried out for defined operation and load cases to estimate the required mass increase for the main components. It is shown that when the HP turbine rotor blade chord length is increased by 50%, the mass of the turbofan engine core increases by about 7 and 11% for the two configurations investigated.

A82-40998 # Redundant control unit for an advanced multispool engine. G Dahl (Bodenseewerk Gerätetechnik GmbH, Uberlingen, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1214-1221

The advantages and disadvantages of the use of digital technology for the control of modern multispool engines are discussed with reference to a newly developed redundant digital engine control unit. The controller structure is discussed with emphasis on software design and software verification methods. It is shown that the many advantages resulting from the introduction of digital technology, such as increased reliability, improved maintainability, and internal controller intelligence, make up for the inevitable disadvantages associated with the sampling process and computer delay time.

A82-40999 # Test results of chordwise and spanwise blowing for low-speed lift augmentation. G A Howell (General Dynamics Corp. Fort Worth, TX) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1222-1234 11 refs

Low-speed wind tunnel tests were conducted on a large-scale and a smallscale powered model of a STOL wing/canard concept with engines mounted over the wing in a basic configuration, both models exhausted the entire nozzleflow momentum over vectoring flaps in an alternate configuration, both models exhausted a portion of the flow from spanwise nozzles in the outer nacelle wall to obtain wing-leading-edge vortex augmentation. Force and pressure data were obtained for the small-scale model powered by compressed air. Pressure and thermal data were obtained for the large-scale model powered by two turbojet tengines. Chordwise blowing decreased the pressures over the entire wing upper surface and even on the canard at high angles of attack. The power-induced lift coefficients were moderate for chordwise blowing. Spanwise blowing increased the strength of the wing leading-edge vortex and reduced the pressure on the wing upper surface beneath the path of the vortex. (Author)

A82-41000 # Aerodynamic research applications at Boeing. A L Nagel (Boeing Commercial Airplane Co., Seattle, WA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 1235-1242 24 refs

This paper shows by several recent examples how aerodynamic research tools and methods have been applied to the design of subsonic commercial transport airplanes Examples include wing modifications, nacelle integration, vortex generators, and cab design. Some recent high Reynolds number tests in the NASA 0.3-meter Transonic Cryogenic Tunnel are also described (Author)

A82-41001 # Wind tunnel test and aerodynamic analysis of three aeroelastically tailored wings. W W Braymen, W A Rogers (General Dynamics Corp, Fort Worth, TX), and M H Shirk (USAF, Flight Dynamics Laboratory, Wright-Patterson AFB, OH) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1243-1255 11 refs USAF-sponsored research

Aeroelastic tailoring of composite lifting surfaces was validated in a program that involved design, fabrication, and transonic wind tunnel testing of three states aeroelastic wings in addition to a set of steel wings. Each aeroelastic wing had unique design objectives. The test featured aeroelastic shape documentation through the use of photogrammetry along with the simultaneous acquisition of forces and pressures. Highlights of the aerodynamic test results are presented, with emphasis placed on test-to-theory comparisons. The strong points as well as areas of needed improvement in the aerodynamic design methods are discussed. The investigation demonstrates that the design of composite lifting surfaces should include consideration of aerodynamic benefits available through through (Author)

A82-41002 * # Upper Vortex Flap - A versatile surface for highly swept wings. D M Rao (Vigyan Research Associates, Inc., Hampton, VA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1256-1266 9 refs NASA-supported research

The Upper Vortex Flap (UVF) is a multipurpose surface concept to improve the subsonic aerodynamics of highly swept delta wings. Hinged along the leading edges and deployed from the wing upper surface, the UVF generates a vortex inboard on the wing in addition to the leading-edge vortex acting on the flap. The relative suction levels on the wing and on the flap surface, governed by the flap angle and angle of attack, lead to a variety of functional applications viz lift increment, drag modulation, lift/drag improvement and roll augmentation. This paper presents wind tunnel force and pressure measurements on a 74-deg flat plate delta to define the UVF-related vortex reflects and to assess its potential as a versatile control surface in different angle-of-attack regimes.

A82-41003 * # Analytical study of vortex flaps on highly swept delta wings. N T Frink (NASA, Langley Research Center, Hampton, VA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1267-1275 25 refs

This paper highlights some current results from ongoing analytical studies of vortex flaps on highly swept delta wings A brief discussion of the vortex flow analysis tools is given along with comparisons of the theories to vortex flap force and pressure data. Theoretical trends in surface pressure distribution for both angle-of-attack variation and flap deflection are correctly predicted by Free Vor-

A82-41004

tex Sheet theory Also shown are some interesting calculations for attached-flow and vortex-flow flap hinge moments that indicate flaps utilizing vortex flow may generate less hinge moment than attached flow flaps Finally, trailing-edge flap effects on leading-edge flap thrust potential are investigated and theory-experiment comparisons made (Author)

A82-41004 * # Wind-tunnel investigation of vortex flaps on a highly swept interceptor configuration. W E Schoonover, Jr (NASA, Langley Research Center, Hampton, VA) and W E Ohlson (Boeing Military Airplane Co, Seattle, WA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1276-1290 15 refs

A subsonic wind-tunnel investigation of the application of vortex flaps to a supersonic interceptor configuration is described Experimental results are presented which indicate the aerodynamic effects of vortex-flap deflection, trailing-edge flap deflection, vortex flap chord and span, vertical stabilizers, and a highly cambered leading edge designed for attached flow Data presented include longitudinal forces and moments, upper-surface pressure distributions, and oil- and smoke-flow visualization photographs. It is concluded that a full-span deployable vortex flap can provide a substantial performance improvement for this and other similar configurations. (Author)

A82-41005 # Spanwise distribution of vortex drag and leading-edge suction in subsonic flow. S N Wagner (München, Hochschule der Bundeswehr, Neubiberg, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1291-1301 12 refs

The spanwise distribution of the leading-edge suction force of wings with arbitrary planforms is calculated on the basis of a linear subsonic thin-wing theory and a study by Carlson and Mack (1980) on two-dimensional airfoil sections. The approach makes it possible to account for the effects of Mach number, Reynolds number, and wing parameters, including local thickness to chord ratio, location of the maximum wing section thickness, local leading-edge radius, and leading-edge sweep. Results obtained by the proposed method are found to be in good agreement with experimental data.

A82-41006 # Fuselage effects in leading edge vortex flap aerodynamics. J F Marchman, III and M L Hollins (Virginia Polytechnic Institute and State University, Blacksburg, VA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1302-1309 8 refs

Wind tunnel tests were conducted to determine the influence of a fuselage on the aerodynamic behavior of a 60 deg delta wing with leading edge vortex flaps. The results showed that at some combinations of angle of attack and yaw, the fuselage had a stabilizing effect on the leading edge vortices and that maximum lift is increased due to fuselage lift and added vortex stability. The fuselage did not affect the ability of vortex flaps to significantly increase the L/D of the wings (Author).

A82-41007 # New technology for the next generation of commercial transports - Real or imaginary. I S Macdonald In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1310-1320

Economical, technical, financial, and legal implications associated with the needed replacement of technically and economically obsolete fleets of old commercial aircraft are examined. The discussion includes a brief review of the factors necessitating changes in aircraft fleets, a review of what aircraft and engine manufacturers have done to respond to the needs of the airlines to upgrade their fleets, new developments which will make it possible to increase the safety, efficiency, and profitability of commercial aircraft, and possible deterrents to the successful and useful implementation of new technology. V L

A82-41008 * # An initial look at the supersonic aerodynamics of twinfuselage aircraft concepts. R M Wood, S M Dollyhigh, and D S Miller (NASA, Langley Research Center, Hampton, VA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1320/a-1320/h 15 refs

Results of two studies into the supersonic aerodynamics of twin-fuselage aircraft configurations are summarized. In the first study, a set of experimental data was obtained on a simple rectangular-wing twin-fuselage wind-tunnel model, this data was then used to evaluate prediction methods, assess favorable interference effects, and identify any unexpected or unpredictable aerodynamic phenomena Results are presented which show that significant reductions in wave drag are possible through optimum body positioning and that existing aerodynamic prediction methods are adequate for making preliminary aerodynamic estimates Several configuration concepts were theoretically explored in the second study, and results are presented which indicate the sensitivity of the twinfuselage concept to various methods of integrating the aircraft components (Author)

A82-41009 # Reduced nonlinear flight dynamic model of elastic structure aircraft. J Jankovic (Beograd, Univerzitet, Belgrade, Yugoslavia) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1321-1329 11 refs

A flight dynamics model defined by equations of motion for the case of an unconstrained deformable body subjected to aerodynamic forces, thrust load and aircraft weight is presented, with a deformable structure represented by the finite element method. A reducing method based on the small energy and large damping characteristics of very fast modes is introduced which involves the determination of the generalized coordinate nonlinear vector transformation which can turn the basic nonlinear model to a linear one. The method of decoupling linear systems to subsystems of slow and fast models makes it possible to extract fast structural modes and find a linear dependence between generalized, transformed coordinates A criterion for neglecting these modes is also presented. It is, finally, necessary to find the nonlinear dependence between basic generalized coordinates which leads to the reduced nonlinear model of the system. O C

A82-41010 # Determination of load spectra and their application for keeping the operational life proof of sporting airplanes. H J Kossira (Braunschweig, Technische Universität, Brunswick, West Germany) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1330-1338

Modern load spectrum determination techniques are applied to glass fiberreinforced plastic (GFRP) sailplanes, with attention to the estimation of aircraft structure service life. The use of such methods in the case of saiplanes is demanded by their combined gust and maneuver load environments. The preparation of data gathered during a limited time interval by means of computers, using Markov transition matrix storage and extrapolation to the total lifetime of the sailplanes, is demonstrated.

A82-41011 # The role of the scale parameter in service load assessment and simulation. J Gedeon (Budapesti Muszaki Egyetem, Budapest, Hungary) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1339-1349 23 refs

The integral scale L, which is a universal parameter for stationary stochastic processes and complementary to the standard deviation, sigma, must be used in conjunction with sigma and one or two other parameters which are unique to the process being described in order to compose autocorrelation and power-spectral density functions. The conversion from measured to theoretical standard deviation and vice versa in the case of atmospheric turbulence measurement and evaluation, which is restricted to a finite frequency bandwidth, is feasible by means of the dimensionless parameter comprising L and the low frequency cutoff wavenumber L may also be used for the direct calculation of time spectra from space spectra, and it facilitates the accurate treatment of stochastic transients O C C

A82-41013 # Theoretical and experimental investigation of jointstructural damping interaction for airplane construction. I N Krivosic (Beograd, Univerzitet, Belgrade, Yugoslavia) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 1358-1367 14 refs

After considering previously published joint structural damping interaction studies and possible physical models for this phenomenon, experimental results for the case of typical aircraft structures are treated by employing the same geometrical model with different types of joints between the skin, stringers and transverse elements. Separate analyses are given for rivet, bolt and adhesive joints, and the corresponding mutual influence of the amplitude on structural damping is analyzed in light of the experimental results.

A82-41014 # Optimizing aerospace structures for manufacturing cost. B R Noton (Battelle Memorial Institute, Columbus, OH) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1368-1385

The evolution of design/manufacturing interaction reveals the need for design methodologies to reduce aerospace systems cost. Cost-driver identification related to performance, design, materials, and manufacturing emphasizes the importance of the preliminary design phase. Data are required on designer-influenced cost elements, for example, with composites these are, hybrids, ply count, curing method, and quality requirements. A 'Manufacturing Cost/Design Guide' (MC/DG) for composite and metallic airframes, and also electronics, is discussed. Using examples of components and fuselage panels, the utilization of designer-oriented formats for relative and quantitative costs of manufacturing processes in trade-studies involving structural performance is shown. The MC/DC will also indicate potential cost savings of emerging technologies which accelerate technology transfer.

A82-41015 # Composite structures repair. H Wicker (Grumman Aerospace Corp., Bethpage, NY) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1386-1392

This paper concerns itself with the repair of composite materials on modern aircraft with particular emphasis on repair techniques and equipment for field use. The high strength to weight ratio of composites make them ideal to meet the demand for increasing the performance of military aircraft. However, with the increasing use of composite materials, a need has been created for unique repair methods. To meet the need to simultaneously apply pressure and a uniform temperature to the patch, a composite repair console and integral vacuum/ heater blanket was developed by Grumman. (Author)

A82-41016 # Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft. J Hall and U G Goranson (Boeing Commercial Airplane Co., Seattle, WA) in International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 1393-1405

Boeing has developed new technology and procedures for determining flexible structural maintenance programs that meet damage tolerance regulations Rating systems, based on past maintenance, are used to develop inspection programs to ensure timely detection of structural damage from environmental deterioration (EDR), accident (ADR), or fatigue (DTR) The inspection program consists of two phases initially, the program is based on evaluations for detecting corrosion, stress corrosion, and accidental damage using the EDR and ADR systems As the fleet matures, inspection tasks for detecting fatigue damage, based on the DTR evaluations are incorporated into the program (Author)

A82-41018 # Intake swirl - A major disturbance parameter in engine/intake compatibility. F Aulehla (Messerschmitt-Bölkow-Blohm GmbH, Munich, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1415-1424 10 refs

Based on theoretical considerations and primarily on experiment it is shown that all supersonic intakes of present combat aircraft produce essentially two types of swirl components of varying magnitude i e bulk and twin swirl Depending on the sensitivity of the engine towards such disturbances serious engine/intake compatibility problems may arise, as for example engine surge and fan vibration. The remedial measures to overcome this problem are described and the solution of fenced intakes selected for Tornado is discussed. It is expected that this intake modification may also be of advantage for other high performance combat aircraft having similar intake configurations. Finally the relevance of dynamic total pressure distortion as prime compatibility parameter is questioned and a proposal for an improved intake disturbance simulation in engine bench tests is made.

A82-41019 . # An improved propulsion system simulation technique for scaled wind tunnel model testing of advanced fighters. M F Eigenmann, P A Devereaux (McDonnell Aircraft Co, St Louis, MO), and C D Wagenknecht (General Electric Co, Cincinnati, OH) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1425-1436 10 refs

In the interest of accurately evaluating interactions between inlet and nozzle flowfields and between a propulsion system and aerodynamic surfaces, in advanced fighter aircraft having highly integrated and closely coupled propulsion systems, a supersonic propulsion simulator for wind tunnel models has been developed A digital control console system was also developed in order to match model engine operational and control requirements that approximate those of a full scale engine Attention is given to simulator engine components and wind tunnel model installation details, along with the efficient use of the simulator test technique in the various phases of a supersonic aircraft configuration's development program. The thrust/drag accounting system employing the simulator model for studies of basic aerodynamic performance and throttle-dependent effects is flowcharted, and the corrections necessary in each case are assessed O C

A82-41020 # Low-speed characteristics of a fighter-type configuration at high angles-of-attack and sideslip. K Huenecke (Vereinigte Flugtechnische Werke GmbH, Bremen, West Germany) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1437-1444

Force measurements and flow observations were conducted on a fighter-type configuration as an aid to understanding the complex flow phenomena occuring at high angles-of-attack, with an, without sideslip. The configuration typically was provided with a cranked delta wing of aspect ratio 2 5, leading-edge sweep of 56 deg, wing-mounted vertical tails, and all-moving canard surfaces. The results indicate that certain configurational changes, such as vertical tailplane strakes, are sufficient to eliminate an otherwise unstable roll and yaw behavior occuring at around 22 deg angle-of-attack (Author)

A82-41021 # Wing design for supersonic cruise/transonic maneuver aircraft. P B Gingrich and E Bonner (Rockwell International Corp., El Segundo, CA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1445-1453 9 refs

An approach to multiple-design-point tactical aircraft wing development is discussed Requirements for proposed tactical aircraft include both efficient supersonic cruise an, acceleration and enhanced transonic maneuvering performance A computational approach was developed to address the conflicting requirements of these conditions. The approach consists of developing two point designs a transonic maneuver configuration with weak shocks and nearly attached flow and an optimum supersonic cruise design. A compromise is then developed in an iterative cycle which seeks to approach the point design flow quality through the use of variable camber. Computational results for representative tactical aircraft are presented to illustrate the process. Test experience is discussed to indicate the performance achieved with compromise designs relative to point design configurations. (Author)

A82-41022 # "Analysis of jet transport wings with deflected control surfaces by using a combination of 2- and 3-D methods. N J Pfeiffer (Boeing Commercial Airplane Co., Seattle, WA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1454-1458 6 refs

A computational technique has been developed which analyzes transport wings with deflected spoilers or ailerons. It uses 2-D separated flow analysis results in a 'strip theory' fashion to provide inputs for a 3-D lifting surface method Wing body lift and pitching moments are quantitatively predicted and calculated spanloads qualitatively match experimental results. The method is accurate and economical enough to be useful in the basic design of control systems.

(Author)

A82-41023 # Optimization of canard configurations - An integrated approach and practical drag estimation method. I M Kroo and T McGeer (Stanford University, Stanford, CA) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1459-1469 16 refs

A fundamental analysis of subsonic canard configurations illustrates some of the problems associated with such designs and difficulties encountered in their optimization. A general solution for minimum induced drag as a function of span ratio, vertical gap, and relative surface lifts is presented. Stability and trim requirements, together with the system geometry then determine the total induced drag and practical conclusions follow when structural weight and stalling speed constrains are added. Required chord and twist distributions are determined, illustrating the problems associated with multiple design points. Unlike conventional configurations, the canards' geometric variables associated with optimal solutions to each of the above problems vary widely, showing great sensitivity to constraints and off-design operation. (Author)

A82-41024 * # Wind-tunnel investigation of a full-scale canard-configured general aviation aircraft. L P Yip and P F Coy (NASA, Langley Research Center, Hampton, VA) In International Council of the Aeronautical

A82-41025

Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 22 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p 1470-1488 11 refs

As part of a broad research program to provide a data base on advanced airplane configurations, a wind-tunnel investigation was conducted in the Langley 30-by 60-Foot Wind Tunnel to determine the aerodynamic cha5 axeristics of an advanced canard-configured general aviation airplane. The investigation included measurements of forces and moments of the complete configuratio, isolated canard loads, and pressure distributions on the wing, winglet, and canard Flow visualization was obtained by using surface tufts to determine regions of flow separation and by using a chemical sublimation technique to determine boundary-layer transition locations. Additionally, other tests were conducted to determine simulated rain effects on boundary layer transition investigation of configuration effects included variations of canard locations, canard airfoil sec on, winglet size, and use of a leading-edge droop on the out-board section of the wing. (Author)

A82-41025 # Wind tunnel measurements of longitudinal stability and control characteristics of primary and secondary wing configurations. H L Chevalier (Texas A & M University, College Station, TX) In International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings Volume 2 (A82-40876 20-01) New York, American Institute of Aeronautics and Astronautics, 1982, p. 1489-1494

Low speed wind tunnel measurements of the variations in pitching moment coefficient with angle of attack are described for primary and secondary wing configurations, wing-canard combinations Experimental results are shown for various vertical and horizontal distances between the surfaces, canard incidence angles and canard flap angles. These experimental results show that the stability is nonlinear with both angle of attack and incidence angle and as a consequence the pitching moment coefficient at zero lift is an important parameter affecting the stability at trim conditions. At high angles of attack, above canard stall, the change in pitching moment coefficients with canard incidence angle and flap angle is reduced and for some configurations the change is reversed. Results also show that wind tunnel tests, at the appropriate Reynolds Number, are needed to determine longitudinal stability and control characteristics of wing-canard combinations.

A82-41055 Monopole antenna patterns on finite size composite ground planes. C A Balanis (West Virginia University, Morgantown, WV) and D DeCarlo (Naval Air Systems Command, Naval Air Test Center, Patuxent River, MD) *IEEE Transactions on Antennas and Propagation*, vol AP-30, July 1982, p 764-768 9 refs

The geometrical theory of diffraction methods is used to develop models and to predict the patterns of communications, navigation, and identification (CNI) blade antennas mounted on finite size composite ground planes. The computed patterns are found to agree extremely well with measurements. It is shown, both analytically and experimentally, that very minor differences between patterns of antennas mounted on perfectly conducting and composite ground planes appear for conductivities equal to 10,000 s/m. The anisotropy effect of the composite material on the antenna patterns is thought to be undetectable, at least within the system measuring accuracy. Therefore, perfectly conducting models can be used to analytically investigate the electromagnetic scattering properties of composite materials with conductivities equal to or greater than 10,000 s/m. C R

A82-41075 Heat release rate calorimetry of engineering plastics. A L Bridgman and G L Nelson (General Electric Co, Pittsfield, MA) *Journal* of Fire and Flammability, vol 13, Apr 1982, p 114-134 27 refs

The Ohio State University Heat Release Rate Calorimeter (OSUHRRC) is examined as a means of defining the fire characteristics of engineering plastics under closely controlled and defined conditions of exposure to incident thermal radiation. The principles and operation of the OSUHRRC are described, and examples of tests are presented utilizing engineering thermographics. A typical test is described in detail, and the factors affecting the results, including reproducibility, external heat flux, and sample thickness, are examined. The improvement in fire retardancy resulting from the incorporation of flame retardants into test specimens is documented for polycarbonates. Comparisons of the results with large-scale foam box tests show the same relative rankings with respect to both temperature and smoke performance.

A82-41114 # Design of a longitudinal ride-control system by Zakian's method of inequalities. T R Crossley (Salford, University, Salford, England) and A M Dahshan (Military Technical College, Cairo, Egypt) Journal of Aircraft, vol 19, Sept 1982, p 730-738 36 refs

In this paper, Zakian's method of inequalities is applied to the design of a ride-control system for a STOL aircraft. The purpose of the controller is to reduce the normal acceleration experienced by both passengers and crew. The method is based on the synthesis of a controller such that a set of performance specifications and constraints is satisfied. Controllers are designed on the basis of the characteristics of both the closed-loop step response and the closed-loop error.

response It is shown that the design of a single-input, single-output controller by the method of inequalities is straightforward, and can be achieved by using a sequence of formulations until the designer is satisfied that no further improvement is necessary (Author)

A82-41115 # Fatigue behavior of weldbonded joints. G V Scarich and G R Chanani (Northrop Corp , Aircraft Div , Hawthorne, CA) Journal of Aircraft, vol 19, Sept 1982, p 773-780 7 refs Contract No F33615-76-C-5412

The effects of material and process variables on fatigue behavior were determined for a newly developed, low-cost weldbonding process for the assembly of durable aircraft structures. The weldbonding process involves spot-welding components through a previously applied adhesive, and then oven-curing the assembly to achieve a bonded structure. Both low-load and high-load transfer specimen geometries with each of two alloy combinations (7075-T6/7075-T6 and 2024-T3 alclad/7075-T6) were evaluated. Fatigue behavior of weldbonded specimens with different nugget sizes and different manufacturing defects was compared with that of riveted and adhesive-bonded specimens. In low-load transfer fatigue, weldbonding was better than riveting, but not as good as adhesive bonding, while in high-load transfer fatigue, weldbonding was equal to or better than riveting and adhesive bonding. (Author)

A82-41116 # Minimum induced drag of canard configurations. | M Kroo Journal of Aircraft, vol 19, Sept 1982, p 792-794 10 refs

Drag estimations are made for an elliptically loaded wing on an aircraft equipped with canards An analysis of Prandtl's biplane equation, along with Monk's stagger theorem (1921), shows that a minimum induced drag occurs when the total loading is elliptical over the wing span, with lift transferred toward the outboard section of the wings The section lift of the wing is represented as a Fourier series and a resulting lift distribution defines a minimum induced drag Prandtl's interference factor is calculated and a nonelliptic interference factor is defined and is used to demonstrate that a substantial reduction in induced drag is possible in comparison with the elliptically loaded case MSK

A82-41117 # Estimation of the number of in-flight aircraft on instrument flight rules. N Myerhoff and J Garlitz (U S Department of Transportation, Office of Air and Marine Systems, Cambridge, MA) *Journal of Aircraft*, vol 19, Sept 1982, p 794-796 FAA-supported research

Mathematical models for estimating the instantaneous aircount (IAC) of aircraft on instrument flight rules flying over the U S at any moment are described. The data is gathered from the Official Airline Guide for scheduled great circle paths and projections are made for the location of aircraft at any time of day. The estimates are made independent of radar target reports and cover the regions monitored by each of the 20 air route traffic control centers on the continent. Noting that arrivals and departures are approximately equal from individual centers' jurisdiction at any moment, probabilities are generated for the presence of an aircraft in any given time interval, and a standard profile is employed in regions where a specific flight profile is unknown. Accuracy has been shown to be within 10% during peak hours.

A82-41140 Recommended practice for a demonstration of Nondestructive Evaluation /NDE/ reliability on aircraft production parts - Introduction to the guidelines. W D Rummel (Martin Marietta Aerospace, Denver, CO) Materials Evaluation, vol 40, Aug 1982, p 922-932

Guidelines for a demonstration of Nondestructive Evaluation (NDE) reliability on aircraft production parts have been compiled in order to promulgate recommended practices for the development of repeatable data in fracture mechanics applications. Such practices are designed to demonstrate the capabilities of various NDE methods for the detection of flaws in specific materials or parts under routine production inspection conditions. The intent of the guidelines is to define the limiting flaw size which can be detected within a given probability of detection and with a given percent of confidence in that probability. The outline presented encompasses operational requirements, the acquisition and reduction of data, and requalification procedures.

A82-41141 Evaluation of heat damage to aluminum aircraft structures. D J Hagemaier (Douglas Aircraft Co , Long Beach, CA) Materials Evaluation, vol 40, Aug 1982, p 962-969 15 refs

Examinations of heated surface discoloration or distortion, eddy current conductivity comparison tests and hardness tests are used to evaluate the degree of heat damage incurred by aluminum alloy aircraft structures. Data from articles and reports on the exposure of 7075-T6 and 2024-T3/T4 aluminum alloy sheet materials to elevated temperatures for extended periods of time are considered, and portable hardness and eddy current test equipment for damage assessment are described with attention to significant variables affecting conductivity readings. The data presented suffice for the substantiation of a direct relationship between conductivity, hardness and strength which will allow the evaluation of heat or fire damage in heat-treatable aluminum alloys. O C A82-41447 # Visual scene simulation concerning the landing of sporting aircraft in connection with investigations regarding the control and learning behavior of the pilot (Sichtsimulation der Landung von Sportflugzeugen im Hinblick auf Untersuchungen zum Regler- und Lernverhalten des Piloten). W Heumann Darmstadt, Technische Hochschule, Fachbereich Regelungs- und Datentechnik, Dr.-Ing Dissertation, 1980 268 p. 89 refs In German Research supported by the Deutsche Forschungsgemeinschaft

The present investigation is concerned with the behavior of man as controller in a technical system. The object of the studies, which were conducted with the aid of a simulator providing a visual scene presentation, is the control of the longitudinal motion of a sporting aircraft during the last phases of a landing under visual flight conditions. Attention is given to the behavior of flying students, taking into account differences in the behavior of students and experienced pilots. Changes in the behavior of the student in connection with advances related to the learning process are examined. The landing simulation system employed provides a presentation of the visual environment of the pilot during the landing procedure, and, in addition, also a lateral view of the landing aircraft. This approach has certain advantages for the student from a didactic point of view. The analysis of the flight path with the aid of the simulator makes it possible to develop a basic model which is typical for a landing performed by an experienced pilot G R

A82-41453 # Investigations concerned with shifting pilot activities to a higher hierarchical stage of flight control (Untersuchungen zur Verlagerung der Pilotentätigkeit auf eine höhere hierarchische Stufe der Flugführung). P Sundermeyer Braunschweig, Technische Universität, Fakultät für Maschinenbau und Elektrotechnik, Dr -Ing Dissertation, 1980 120 p 26 refs In German

Advantages and drawbacks of the automation of flight control systems are discussed, taking into account various hierarchical planes. The result of this system analysis is the concept of an aircraft guidance computer for the onboard four-dimensional flight path calculation and generation. The developed computer system becomes a component of an integrated flight guidance system. The computer makes it possible to conduct studies by which the activities to be performed by the pilot are raised to a higher level, involving the solution of coordination problems. The computer in addition to performing a calculation of the flight path for the aircraft. The pilot makes the final decision on the basis of the flight path, the computer provides a representation of the flight path, the control information, and flight guidance activities (four-dimensional) with respect to different stages of automatization.

A82-41575 [†] High-sensitivity holographic plates PL-3M (Vysokochuvstitel'nye golograficheskie plastinki PL-3M). L la Kaplun, E F Klimzo, and E N Sergeeva (Vsesoiuznyi Gosudarstvennyi Nauchno-Issledovatel'skii i Proektnyi Institut Khimiko-Fotograficheskoi Promyshlennosti, Moscow, USSR) Zhurnal Nauchnoi i Prikladnoi Fotografii i Kinematografii, vol 27, July-Aug 1982, p 293-295 8 refs In Russian

High-sensitivity holographic plates have been obtained by using spectrally sensitized ultratine-grained emulsion with pAg = 6.8 The plates, designated PL-3M, have a light sensitivity of 100 erg/sq cm and a diffraction efficiency of 4.3% The high-sensitivity holographic plates are currently used in research concerned with holographic interferometry of aircraft structures, development of holographic memory devices, stress and strain analysis of structures and materials, lens testing, and optical recording of analog information V L

Page Intentionally Left Blank

STAR ENTRIES

N82-28243*# Lockheed-California Co., Burbank ELECTRONIC/ELECTRIC TECHNOLOGY BENEFITS STUDY Report, Aug. 1980 - Jan. 1982 W W Howison and M J Cronin May 1982 226 p

(Contract NAS1-16199)

(NASA-CR-165890, NAS 1 26 165890, LR-30079) Avail NTIS HC A11/MF A01 CSCL 01B

The benefits and payoffs of advanced electronic/electric technologies were investigated for three types of aircraft. The technologies, evaluated in each of the three airplanes, included advanced flight controls, advanced secondary power advanced avionic complements, new cockpit displays, and advanced air traffic control techniques. For the advanced flight controls, the near term considered relaxed static stability (RSS) with mechanical backup. The far term considered an advanced fly by wire system for a longitudinally unstable airplane. In the case of the secondary power systems, trades were made in two steps in the near term, engine bleed was eliminated, in the far term bleed air, air plus hydraulics were eliminated. Using three commercial aircraft, in the 150, 350, and 700 passenger range, the technology value and pay-offs were quantified, with emphasis on the fiscal benefits Weight reductions deriving from fuel saving and other system improvements were identified and the weight savings were cycled for their impact on TOGW (takeoff gross weight) and upon the performance of the airframes/engines Maintenance, reliability and logistic support were the other criteria Author

N82-28244# Federal Aviation Administration, Washington, D.C. Office of Management Systems

GENERAL AVIATION ACTIVITY AND AVIONICS SURVEY Annual Report

Judith C Schwenk Dec 1981 205 p refs

(AD-A112924, FAA-MS-81-5) Avail NTIS HC A10/MF A01 CSCL 01/2

This report presents the results and a description of the 1980 General Aviation Activity and Avionics Survey The survey was conducted during 1981 by the FAA to obtain information on the activity and avionics of the United States registered general aviation aircraft fleet, the dominant component of civil aviation in the U.S. The survey was based on statistically selected sample of about 140 percent of the general aviation fleet and obtained a response rate of 65 percent Survey results are based upon responses but are expanded upward to represent the total population Survey results revealed that during 1980 an estimated 410 million hours of flying time were logged by the 211,045 active general aviation aircraft in the U.S. fleet, yielding a mean annual flight time per aircraft of 1905 hours. The active aircraft represented about 83 percent of the registered general aviation fleet. The report contains breakdowns of these and other statistics by manufacturer/model group, aircraft type, state and region of based aircraft, and primary use Also included are fuel consumption, lifetime airframe hours, avionics, and engine hours estimates Author (GRA)

N82-28245# Air Force Systems Command, Wright-Patterson AFB, Ohio Foreign Technology Div AFB, Ohio Foreign Technology Div INTERNATIONAL AVIATION (SELECTED ARTICLES)

12 Apr 1982 23 p Transl into ENGLISH from Guoji Hangkong (Communist China), no 224, Oct 1981 p 2-9, 49 (AD-A114422, FTD-ID(RS)T-0027-82) Av HC A02/MF A01 CSCL 21/5 NTIS Avail

Chinese made goods were exhibited, including aeronautical forgings, castings, forging dies, casting molds, powder metallurgical products, and titanium alloys and products. These goods symbolize China's production capability and technical level of aeronautical forgings and castings, with excellent qualities of these products SL

N82-28249*# National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio

A SUMMARY OF V/STOL INLET ANALYSIS METHODS Danny P Hwang and John M Abbott 1982 17 p refs To be presented at the 13th Congr of the Intern Council of the Aeronautical Sci and Aircraft Systems and Technol Conf., Seattle, 22-27 Aug 1982, sponsored by the American Inst. of Aeronautics and Astronautics Previously announced in IAA as A82-16902 (NASA-TM-82885 E-1263, NAS 1 15 82885) Avail NTIS HC A02/MF A01 CSCL 01A

For abstract see A82-16902

N82-28252*# National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif

AERODYNAMIC INTERACTIONS BETWEEN A 1/6 SCALE HELICOPTER ROTOR AND A BODY OF REVOLUTION Mark D Betzina and Patrick Shinoda Jun 1982 15 p refs

Prepared in cooperation with Army Research and Technology Labs , Moffett Field, Calif

(NASA-TM-84247 A-8940 NAS 1 15 84247) Avail NTIS HC A02/MF A01 CSCL 01A

A wind-tunnel investigation was conducted in which independent, steady state aerodynamic forces and moments were measured on a 2 24-m-diam, two bladed helicopter rotor and a body of revolution. The objective was to determine the interaction of the body on the rotor performance and the effect of the rotor on the body aerodynamics for variations in velocity thrust. tip-path-plane angle of attack, body angle of attack, rotor/body position, and body nose geometry. Results show that a body of revolution near the rotor can produce significant favorable or unfavorable effects on rotor performance, depending on the operating condition. Body longitudinal aerodynamic characteristics are significantly modified by the presence of an operating rotor and hub Author

N82-28260# Systems Research Labs, Inc. Dayton, Ohio WIND TUNNEL EVALUATION OF AN AEROELASTICALLY CONFORMABLE ROTOR Final Report

Lawrence R Sutton Richard P White, Jr, and Robert L Marker Mar 1982 87 p refs

(DA Proj 1L2-62209-AH-76)

(AD-A114384, USAAVRADCOM-TR-81-D-43) Avail NTIS HC A05/MF A01 CSCL 01/3

This report summarizes the theoretical and experimental investigations that were conducted to evaluate the potential of aeroelastic and mass-elastic couplings in an aerolastic conformable rotor (ACR) that will improve the performance and vibratory characteristics of helicopter rotor systems without creating instabilities ACR parameters were identified and a baseline rotor system was selected An ACR blade concept was investigated by altering the characteristics of the baseline and using auto-GRA mated analysis techniques

N82-28261# Army Aviation Research and Development Command, St. Louis Mo. Applied Technology Lab NATIONAL TRANSONIC FACILITY (NTF) PROTOTYPE FAN BLADE FATIGUE TEST Progress Report, Jan. - Mar 1981 E H Dean, A J Gustafson and D M Saylor Mar 1982 18 p

(DA Proj 1L1-62209-AH-76)

(AD-A114405 USAAVRADCOM-TR-82-D-5) Avail NTIS HC A02/MF A01 CSCL 14/2

The Applied Technology Laboratory conducted fatigue tests on a composite fan blade designed for use in the new NTF wind tunnel being constructed at NASA-Langley. The tests were performed by the Structures Technical Area using the root end fatigue machine (REFM) which was modified for ground air ground testing. Simulated centrifugal and aerodynamic (bending) load tests were performed. The fan blade successfully withstood 6000 cycles at 360 rpm and 600 rpm load conditions for the cyclic rate tests. These tests simulated the starting and stopping cycles of the fan Static load tests to 57 000 pounds design load were also successfully performed on the blade specimen

Author (GRA)

N82-28262# National Aerospace Lab Amsterdam (Netherlands) Fluid Dynamics Div

EVALUATION OF AN EXPERIMENTAL TECHNIQUE TO INVESTIGATE THE EFFECTS OF THE ENGINE POSITION ON ENGINE/PYLON/WING INTERFERENCE

J A J vanEngelen B Munniksma, and A Elsenaar 28 Apr 1981 16 p refs Presented at AGARD Symp on Aerodyn of Power Plant Installation Toulouse 11-14 May 1981 (NLR-MP-81020-U) Avail NTIS HC A02 MF A01

Free flow and blown nacelle wind tunnel testing of engine airframe integration are compared and the magnitude of the parasitic interference of an additional strut and engine inlet fairing

N82-28263

is examined A semispan model, typical of a transport aircraft with a supercritical wing was tested A 3/4 fan cowl high bypass engine was located at six positions underneath the wing Measurements included pressure and balance force. It is shown that while accurate simulation of engine nozzle geometry is of prime importance, tests on free flow nacelles are useful for selecting engine position. Interference forces derived from pressure integration are only useful for determining trends in interference effects for flexible initial tests. Author (ESA)

N82-28263# National Aerospace Lab , Amsterdam (Netherlands) Informatics Div

A FINITE DIFFERENCE METHOD FOR THE CALCULATION OF TRANSONIC FLOW ABOUT A WING, BASED ON SMALL PERTURBATION THEORY

J vanderVooren, G H Huizing and A vanEssen 5 Mar 1981 103 p refs

(Contract NIVR-1739) (NLR-TR-81031-U) Avail NTIS HC A06/MF A01

A calculation method for the transonic flow about a

A calculation method for the transonic how about a semiwing based on transonic small perturbation theory, is presented The influence of a body can be simulated by prescribing appropriate transverse velocities in a vertical plane through the wing root. The wing should be thin and have little dihedral, camber and twist and a not too blunt leading edge. The body should be slender. The angle of incidence must be small. However, highly swept wings are allowed. A fully finite difference scheme is implemented for a correct shock capture. Line relaxation is used to solve the corresponding nonlinear equations. It is indicated that too much artificial viscosity leads to an unrepresentative calculation, and too little can lead to instabilities. Author (ESA)

N82-28264# General Accounting Office, Washington, D C Accounting and Financial Management Div

COMPUTER OUTAGES AT AIR TERMINAL FACILITIES AND THEIR CORRELATION TO NEAR MISS MID-AIR COLLI-SIONS (AFMD-82-43)

16 Feb 1982 17 p refs

(B-206064) HC A02/MF A01

The frequency of computer failures at terminal facilities and the extent of correlation between these failures and near mid-at collisions were investigated in a survey of nine terminal facilities. No direct correlation between the computer outages and reported mid-air collisions or the safety related incidents was found R J F

N82-28265# Aeronautical Research Labs , Melbourne (Australia) A STUDY OF WIND SHEAR EFFECTS ON AIRCRAFT OPERATIONS AND SAFETY IN AUSTRALIA

K W Anderson and B A J Clark Mar 1981 84 p refs (ARL-Sys-Rept-24 AR-002-271) Avail NTIS HC A05/MF A01

The ergonomics aspects of aircraft operation in conditions of local variations of wind were studied Questionnaires were analyzed for subject understanding, detection of wind difficulties, frequency of wind shear and downdraft situations, pilot techniques, and forewarning methods Pilots often found terrain-induced downdrafts and thunderstorm wind shears troublesome Operations in irregular terrain away from major aerodromes were frequently cited for wind shear hazards. Pilot judgements on the most susceptible aircraft types were not readily explicable in terms of size, landing speed or wing loading Pilots and ATCs indicated that currently used cues in wind shear conditions include visual estimates of glideslope departures precision approach radar observations and aircraft-based measurements of wind or ground speed. Ground-based remote sensing equipment for detecting stable wind shear is considered A synopsis of wind-involved airliner crashes and a summary of meteorological conditions for the occurrence of local wind variations are included Author

N82-28266*# Villanova Univ Pa

GUST RESPONSE OF COMMERCIAL JET AIRCRAFT INCLUDING EFFECTS OF AUTOPILOT OPERATION Final Report

Joseph H Goldberg Jun 1982 125 p refs (Contract NAS1-16095)

(NASA-CR-165919) Avail NTIS HC A06/MF A01 CSCL 01C

A simplified theory of aircraft vertical acceleration gust

response based on a model including pitch, vertical displacement and control motions due to autopilot operation is presented High-order autopilot transfer functions are utilized for improved accuracy in the determination of the overall response characteristics Four representative commercial jet aircraft were studied over a wide range of operating conditions and comparisons of individual responses are given. It is shown that autopilot operation relative to the controls fixed case causes response attenuation of from 10 percent to approximately 25 percent depending on flight condition and increases in crossing number up to 30 percent. with variations between aircraft of from 5 percent to 10 percent. in general, reflecting the differences in autopilot design. A detailed computer program description and listing of the calculation procedure suitable for the general application of the theory to any airplane autopilot combination is also included Author

N82-28267# Aerospace Medical Research Labs, Wright-Patterson AFB, Ohio Biomechanical Protection Branch COMPARATIVE VERTICAL IMPACT TESTING OF THE F/FB-111 CREW RESTRAINT SYSTEM AND A PROPOSED MODIFICATION

Bernard F Hearon, James W Brinkley James H Raddin Jr., Lawrence A McGowan and Joseph M Powers Mar 1982 312 p refs

(AF Proj 7231)

(AD-A113957 AFAMRL-TR-82-13) Avail NTIS HC A13/MF A01 CSCL 01/3

An impact test program was conducted to evaluate the operational F/FB-111 crew seat and restraint system and a proposed modification. A primary objective of the program was to compare human response to vertical impacts in the two restraint harnessess A total of 67 human impact tests were performed on the Vertical Deceleration Tower up to 10 G peak 26 ft/sec Subjects were exposed to comparable impacts at different seat elevations in both harnesses to allow parametric analysis of the test results. Measured data included seat acceleration and velocity. head and chest translational acceleration components, triaxial forces acting on the seat and footrest, forces acting at the restraint harness, attachment and deplacements of various body segments The resultant head and chest accelerations were significantly greater in the modified harness than in the operational harness. regardless of seat elevation. On the basis of this comparison, the proposed modification to the F/FB-111 crew seat and restraint is not recommended for implementation. Future restraint harness modification proposals should be based on careful evaluation of all unconventional design features of the operational harness and should address all mechanisms by which adverse loads may be imposed on the seat occupant. In addition, future redesign efforts of the F/FB-111 escape system should provide improved landing impact attenuation GRA

 N82-28268#
 Air Force Engineering and Services Center Tyndall

 AFB, Fla
 Engineering and Services Lab

 SMOKE ABATEMENT SYSTEM FOR CRASH RESCUE/FIRE

SMOKE ABATEMENT SYSTEM FOR CRASH RESCUE/FIRE TRAINING FACILITIES Final Report, Sep. 1979 - Sep. 1981

Anthony J Kwan and John A Hamre Sep 1981 33 p (AF Proj 2505)

(AD-A114380 AFESC/ESL-TR-81-43) Avail NTIS HC A03/MF A01 CSCL 13/2

This report provides the design for a smoke-abated aircraft crash/rescue trainer. The design is for a 75-ft diameter fire area suitable for operation in freezing and nonfreezing climates. With this system liquid petroleum fuels can be burned with little or no smoke by injecting a fine water spray near the surface of the burning fuel. This method of smoke abatement is being applied at military fire fighting training facilities. The report includes all equipment necessary for the smoke abatement function and provides detailed step-by-step operating procedures.

Author (GRA)

N82-28269*# Analytical Mechanics Associates, Inc., Hampton, Va

TERMINAL AREA AUTOMATIC NAVIGATION, GUIDANCE, AND CONTROL RESEARCH USING THE MICROWAVE LANDING SYSTEM (MLS). PART 4 TRANSITION PATH RECONSTRUCTION ALONG A STRAIGHT LINE PATH CONTAINING A GLIDESLOPE CHANGE WAYPOINT Final Report

Samuel Pines Washington NASA Jun 1982 40 p refs (Contract NAS1-15116) (NASA-CR-3574-Pt-4 NAS 1 26 3574 AMA-81-37) Avail NTIS HC A03/MF A01 CSCL 17G

The necessary algorithms to reconstruct the glideslope change waypoint along a straight line in the event the aircraft encounters a valid MLS update and transition in the terminal approach area are presented Results of a simulation of the Langley 8737 aircraft utilizing these algorithms are presented The method is shown to reconstruct the necessary flight path during MLS transition resulting in zero cross track error, zero track angle error, and zero altitude error, thus requiring minimal aircraft mesonse T M

N82-28270# Radio Technical Commission for Aeronautics, Washington, D C

MINIMUM OPERATIONAL PERFORMANCE STANDARDS FOR AUTOMATIC DIRECTION FINDING (ADF) EQUIP-MENT

13 May 1982 53 p Supersedes RTCA/DO-137 (RTCA/DO-179 RTCA/DO-137) Avail NTIS HC A04/MF A01

Minimum operational performance standards are set forth for automatic direction finding equipment Incorporated in these standards are system characteristics that will benefit users of the system as well as designers, manufacturers, and installers Compliance with these standards is recommended as a means of assuring that the equipment will satisfactorily perform its intended function under all conditions normally encountered

LFM

N82-28274# Arinc Research Corp., Annapolis, Md COST ANALYSIS OF THE DISCRETE ADDRESS BEACON SYSTEM FOR THE LOW-PERFORMANCE GENERAL AVIATION AIRCRAFT COMMUNITY Final Report

S Kowalski, K Peter, A Schust, D Swann, and \dot{P} Young Sep 1981 364 p

(Contract DOT-FA76WA-3788)

(AD-A112957, Rept-1326-01-15-2529, FAA-RD-81-61) Avail NTIS HC A16/MF A01 CSCL 17/7

This report presents the results of cost analysis of various Discrete Address Beacon System (DABS) configurations that may be implemented for the low-performance general aviation aircraft community The DABS designs considered in this analysis were developed by ARINC Research Corporation using state-of-the-art technology GRA

N82-28276# National Aerospace Lab , Amsterdam (Netherlands) Informatics Div

IMPROVED 243 MHz HOMING ANTENNA SYSTEM FOR USE ON HELICOPTERS

F Klinker 23 Apr 1981 24 p refs Presented at Intern IEEE/AP-s Symp, Los Angeles, 16-19 Jun 1981

(NLR-MP-81022-U) Avail NTIS HC A02/MF A01 The principles of azimuthal homing systems used in SAR

The principles of azimutnal noming systems used in SAR search and rescue helicopters are outlined. In current SAR systems the homing signal is represented by the intersection of the radiation from two vertical dipoles. Intersections at 0 and 180 deg with respect to a center line are desired, but those at 120, 140, and 200 deg must be eliminated. Pattern distortion, which results in spurious intersections, is caused by mutual coupling between antennas, electromagnetic interaction coupling through the beam forming network, and attenuation and reflection of the received signal by the helicopter fuselage. The design uses reflectors on the antennas to reduce fuselage influence, and increases separation between radiation patterns to prevent intersections arising from mutual coupling. No homing ambiguities are reported in flight tests of a helicopter using the redesigned system. Author (ESA)

N82-28277# National Transportation Safety Board, Washington, D C Bureau of Accident Investigation

SPECIAL INVESTIGATION REPORT: AIR TRAFFIC CONTROL SYSTEM

8 Dec 1981 60 p

(PB82-136276, NTSB-SIR-81-7) Avail NTIS HC A04/MF A01 CSCL 05A

The air traffic control system was investigated following a strike of the air traffic controllers which resulted in the walkout of about 11,400 of the 17,275 controller workforce. The investigation included an analysis of ATC data, the ability of the FAA to meet staffing requirements, the qualifications of the controller workforce, training for new controllers, the effect of

stress and fatigue, facility supervision and management, the control of the capacity of the system, and computer and equipment reliability. No basic ATC procedures were changed or compromised in order to keep the ATC system in operation, and the high level of ATC safety required is possible within the present system. GRA

N82-28278*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va FLIGHT EVALUATION OF LORAN-C IN THE STATE OF

VERMONT Final Report, Jul. 1979 - May 1981

F D Mackenzie (Transportation Systems Center, Cambridge, Mass) and C D Lytle Sep 1981 162 p refs

(NASA-TM-84711, NAS 115 84711, PB82-138603,

DOT-TSC-RSPA-81-10) Avail NTIS HC A08/MF A01 CSCL 17G

A flight evaluation of LORAN C as a supplement to existing navigation aids for general aviation aircraft, particularly in mountainous regions of the United States and where VOR coverage is limited was conducted Flights, initiated in the summer months, extend through four seasons and practically all weather conditions typical of northeastern U S operations Assessment of all the data available indicates that LORAN C signals are suitable as a means of navigation during enroute terminal and nonprecision approach operations and the performance exceeds the minimum accuracy criteria GRA

N82-28279* National Aeronautics and Space Administration Langley Research Center, Hampton, Va

MEANS FOR CONTROLLING AERODYNAMICALLY IN-DUCED TWIST Patent

Wolf Elber, inventor (to NASA) Issued 18 May 1982 4 p Filed 28 Sep 1979 Supersedes N80-16055 (18 - 07, p 0821)

(NASA-Case-LAR-12175-1, US-Patent-4,330,100

US-Patent-Appl-SN-079913, US-Patent-Class-244-48) Avail US Patent and Trademark Office CSCL 01C

A control mechanism which provides active compensation for aerodynamically induced twist deformation of high aspect ratio wings consists of a torque tube, internal to each wing and rigidly attached near the tip of each wing, which is moved by an actuator located in the aircraft fuselage. As changes in the aerodynamic loads on the wings occur the torque tube is rotated to compensate for the induced wing twist.

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

N82-28280*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va

DESIGN CONSIDERATIONS AND EXPERIENCES IN THE USE OF COMPOSITE MATERIAL FOR AN AEROELASTIC RESEARCH WING

Clinton V Eckstrom and Charles V Spain (Kentron International, Inc, Hampton, Va) May 1982 11 p refs Presented at 23rd AIAA/ASME/ASCH/AHS Structures, Structural Dyn and Mater Conf, New Orleans, 10-12 May 1982

(NASA-TM-83291, NAS 115 83291, AIAA-82-0678) Avail NTIS HC A02/MF A01 CSCL 01C

Experiences in using composite skin material on an aeroelastic research wing used in flight flutter testing are described. Significant variations in skin shear modulus due to stress and temperature were encountered with the original fiberglass' laminate skin designed to minimize wing torsional stiffness. These variations along with the sensitivity of wing torsional stiffness to the skin-to-frame attachment method complicated the structural model vibration mode predictions. A wing skin redesign with different fiber orientation and a reduction in the amount of skin-to-frame bonding resulted in more predictable model characteristics without sacrificing design objectives. Design and modeling considerations for future applications are discussed.

N82-28282*# Georgia Inst of Tech , Atlanta School of Aerospace Engineering

HELICOPTER VIBRATION SUPPRESSION USING SIMPLE PENDULUM ABSORBERS ON THE ROTOR BLADE Final Report

G Alvin Pierce and M Nabil H Hanouva [1982] 140 p refs (Grant NsG-1592)

(NASA-CR-169131, NAS 1 26 169131) Avail NTIS HC A07/MF A01 CSCL 01C

A comprehensive analytical design procedure for the installa-

N82-28283

tion of simple pendulums on the blades of a helicopter rotor to suppress the root reactions is presented. A frequency response analysis is conducted of typical rotor blades excited by a harmonic variation of spanwise airload distributions as well as a concentrated load at the tip. The results presented included the effect of pendulum tuning on the minimization of the hub reactions. It is found that a properly designed flapping pendulum attenuates the root out-of-plane force and moment whereas the optimum designed lead-lag pendulum attenuates the root in-plane reactions For optimum pendulum tuning the parameters to be determined are the pendulum uncoupled natural frequency, the pendulum spanwise location and its mass. It is found that the optimum pendulum frequency is in the vicinity of the excitation frequency For the optimum pendulum a parametric study is conducted The parameters varied include prepitch, pretwist, precone and pendulum hinge offset Author

N82-28283# Rockwell International Corp., Cedar Rapids, Iowa DELTA ELECTRICAL LOAD ANALYSIS C-141B JACC/CP AIRCRAFT

G R Taylor 10 Mar 1982 9 p

(Contracts F09603-80-C-0602 F09603-81-C-1953)

(AD-A113761) Avail NTIS HC A02/MF A01 CSCL 01/3 The installation of the provisions to accept the JACC/CP Capsule in the C -141B Aircraft causes a change to the electrical loads within the present aircraft power distribution system. The purpose of this report is to furnish a tabulation of the changes to the aircraft power system caused by this installation GRA

N82-28284# Boeing Military Airplane Development, Seattle, Wash

ADVANCED AIRCRAFT ELECTRICAL SYSTEM CONTROL TECHNOLOGY DEMONSTRATOR PHASE 1. ANALYSIS AND PRELIMINARY DESIGN Interim Report, 1 Mar 30 Sep. 1981

T R Boldt, G L Dunn D E Hankins, P J Leong, and I S Mehdi Wright-Patterson AFB, Ohio AFWAL Jan 1982 134 p refs

(Contract F33615-80-C-2004, AF Proj. 3145)

(AD-A113633 D180-25927-3 AFWAL-TR-81-2128) Avail NTIS HC A07/MF A01 CSCL 10/2

This report summarizes Task 1-Requirements Analysis and Task 2-Conceptual Design and documents the results of Task 3, Phase I of this two-phase program Task 3 is the preliminary design of an advanced aircraft electrical system (AAES) The AAES is designed to meet the requirements of a 1990 time frame two-engine tactical aircraft with multi-mission capability The AAES performs the functions of power generation distribution and control of power to loads, system protection, and load management Key characteristics of the AAES are Integrated avionics and power data bus configuration consisting of Digital Avionics Information System (DAIS) standard elements (MIL-STD-1750 processor, MIL-STD-1553B data bus, controls and displays, and remote terminals (RT)) Intelligent Electrical Load Management Centers (ELMC) capable of controlling power to loads, Built-intest (BIT) capability to isolate faults to the module level BIT includes both circuit and data monitoring checks. Solid State Power Controllers (SSPC) to replace circuit breakers and power control switches SSPCs are turned on/off via computer control Generator control, protection and status monitoring by a Generator Control Unit (GCU) compatible with DAIS hardware and software. Multimission data information system through programmable system processors, ELMCs and standard DAIS elements Automatic load management for increased aircraft survivability and probability of mission completion GRA

N82-28285# National Research Council of Canada Ottawa Flight Research Lab (Ontario) EVALUATIONS OF HELICOPTER INSTRUMENT-FLIGHT

HANDLING QUALITIES

S R M Sinclair and S Kereliuk Jan 1982 49 p refs In ENGLISH FRENCH summary

(AD-A114004 NRCC-LR-608) Avail NTIS HC A03/MF A01 CSCL 01/2

The NAE Airborne Simulator, a modified and suitably equipped Bell 205A helicopter, was used in experiments to provide background information on the handling qualities requirements for helicopter instrument flight. This investigation was in support of a regulatory review undertaken by the U.S. Federal Aviation Administration as part of an overall assessment of the helicopter certification process. The results illustrate the inter-dependence

of the various stability and control characteristics which contribute to safe instrument flight handling qualities, and underline the importance of good mission simulation in conducting Author (GRA) certification-related experiments

N82-28286# McDonnell Aircraft Co., St. Louis, Mo. ADVANCED TRENDING ANALYSIS/EDS DATA PROGRAM Final Report, May 1979 - Sep. 1981

David C Perryman Wright-Patterson AFB, Ohio AFWAL Jan 1982 181 p refs

(Contract F33615-78-C-2070, AF Proj 3066)

NTIS (AD-A113511. AFWAL-TR-81-2125) **Avail** HC A09/MF A01 CSCL 09/2

Ground, flight, and maintenance data was collected during the F-15/F100 Engine Diagnostic System (EDS) Flight Evaluation and provided to the Air Force Aero-Propulsion Laboratory (AFWAL/POTC) This data was used by the Air Force, in a concurrent program, to verify a gas turbine engine fault detection/isolation and health trending algorithm employing gas path analysis In addition, the EDS Flight Evaluation served as a demonstration vehicle for a prototype Maintenance Information Management System (MIMS) Independent assessments of the gas path analysis algorithm and of the prototype MIMS were performed and the results are presented. Several lessons learned about the automatic recording of in-flight trending data for high performance gas turbine engines in modern tactical aircraft are Author (GRA) also presented

N82-28287# Ballistic Research Labs , Aberdeen Proving Ground, Md

KINEMATIC INVESTIGATION HUGHES HELICOPTER 7.62mm CHAIN GUN

R P Kaste Feb 1982 48 p refs

(DA Proj 1L1-62617-AH-19)

(AD-A113114 AD-F300017, ARBRL-MR-03157) Avail NTIS HC A03/MF A01 CSCL 19/6

A kinematic study of the Hughes Helicopter 7 62mm Chain Gun was performed to determine the power required to operate the weapon and loads on the stud roller due to the various components of the weapon. Using a 24-volt battery system the gun drew up to 60 amperes to start and operated on 22 amperes The stud roller carries a load up to 497 Newtons GRA

N82-28288# General Dynamics/Fort Worth, Tex **RESEARCH MODEL WING/TAIL FABRICATION** Technical Report, 17 Aug. 1981 - 18 Jan. 1982 Ronald A Cox Mar 1982 9 p

(Contract N00014-81-C-0680)

(AD-A114101, FZA-535) Avail NTIS HC A02/MF A01 CSCL

14/2 The design and construction of a transonic wind-tunnel model has been completed The 1/7 5-scale model can be equipped with an all-flying low- mid-, or T-tail A baseline, linear element wing and an alternate wing of identical planform, but with chordwise airfoil sections optimized for transonic cruise, have been manufactured. One row of pressures is located on each wing and on the horizontal tail Author (GRA)

N82-28289# Army Aviation Engineering Flight Activity, Edwards AFB, Calif Directorate for Development and Qualification HISS CALIBRATION, ICE PHOBICS AND FAA R/D

EVALUATIONS Final Report, Jan. - Mar. 1981 John C Henderson, Ralph Woratschek, and Loran A Haworth

Aug 1981 62 p refs (AD-A114435, USAAEFA-80-13) Avail NTIS HC A04/MF A01 CSCL 01/3

Artificial and natural icing tests of a JUH-1H helicopter were flown in the vicinity of St Paul, Minnesota, during the three month period of January through March 1981 Productive flight time totaled 15.4 hours in the artificial icing environment behind the Helicopter Icing Spray System (HISS) and 3.2 hours in natural icing Test conditions ranged from -5 C to -20 C and 0 25 to 10 gram per cubic meter liquid water content (LWC) for the artificial testing and -6 C to -9 C and 01 to 05 gram per cubic meter LWC for the natural testing. Tests in the artificial icing environment behind the HISS were flown to define the nature of the HISS cloud in terms of LWC, cloud particle size and distribution, and to quantitatively determine the effects of an ice phobic coating on the capability of the UH-1H to fly in

icing conditions. The ice phobic coating did not significantly affect the capability of the UH-1H to fly in icing conditions GRA

N82-28290# Army Aviation Research and Development Command, St. Louis, Mo

HISTORICAL RESEARCH AND DEVELOPMENT INFLATION INDICES FOR ARMY FIXED AND ROTOR WINGED AIRCRAFT Annual Report

Charles W Lines, Jr and William J Waymire Jan 1982 37 p refs

(AD-A114368, USAAVRADCOM-TR-82-F-3) Avail NTIS HC A03/MF A01 CSCL 05/1

This Technical Memorandum is a continuation of previous efforts to develop the necessary rationale and methodology needed in order to construct historical inflation indices, in the Research and Development (R&D) area, relative to Army aircraft The R&D historical indices, and the sub-indices from which they are derived, are presented in the appendices to this report for the period FY68 through FY81 These indices are appropriate for updating statistical reports that formerly utilized the OSD forecasting indices, for initial use in bringing a cost in prior years to a present-year dollar value, and for evaluating inflation actually experienced. A computer program is utilized to make the necessary mathematical calculations. Data sources for this report were the Office of Personnel Management (OPM) and the Bureau of Labor Statistics (BLS) OPM supplied data on government salaries BLS furnished data on industry salaries and thirteen different materials. The computer program prints the R&D historical inflation indices and subindices by fiscal year as shown in Appendices C through G of this report GRA

N82-28291# INCOSYM, Inc., Westlake Village, Calif LOW COST DEVELOPMENT OF INS SENSORS FOR EXPENDABLE RPV CONTROL AND NAVIGATION Final Report, Apr 1979 - May 1981

D G Kim and James G Russell Wright-Patterson AFB, Ohio AFWAL Aug 1981 71 p

(Contract F33615-79-C-3616)

(AD-A112691, AFWAL-TR-81-3086) NTIS Avail HC A04/MF A01 CSCL 01/3

A two year development effort has resulted in the design, fabrication and test of a feasibility model 3-axis vibrating beam accelerometer and a brassboard cycloidal magnetic vector sensor The cycloidal magnetic vector sensor is based on a rotating coil technique which eliminates slip rings. It performed as expected, and demonstrated an accuracy of approximately 0.25 degrees The 3-axis vibrating beam accelerometer is based on the principle that a vibrating beam will change its frequency as a function of the applied tension. Using six beams, two per sensing axis, connected to a common mass, a 3-axis accelerometer can be designed Such a design measures acceleration, by a change in beam vibration frequency, as a function of applied acceleration to the mass. The accelerometer, at first, demonstrated an insensitivity due to frequency lock between the beams. This effect was eliminated, but the necessary change in design caused an unstable bias and non-linearity of the scale factor A solution to these problems was also conceived, and hardware changes made However, to fully demonstrate the concept requires a computer and software, which is outside the scope of this program

Author (GRA)

N82-28292# Environmental Research Inst of Michigan, Ann Arbor Radar and Optics Div

DESIGN STUDY FOR A LOW-DISTORTION HOLOGRAPHIC HUD Final Technical Report, Jul. 1980 - Aug. 1981

W S Colburn and R C Fairchild Wright-Patterson AFB, Ohio AFWAL Jan 1982 104 p refs

(Contract F33615-80-C-1077)

(AD-A113982 AFWAL-TR-81-1263, ERIM-150800-29-F) Avail NTIS HC A06/MF A01 CSCL 14/5

A low distortion holographic HUD optical system was examined Distortion correction was based on the use of a holographic combiner made with analytically defined construction wavefronts, wavefronts for which the phase at the hologram is described by mathematical expressions. Such wavefronts are designed subsequent to the hologram design, and offer great design flexibility as their realization is based in part on the use of computer generated holograms. A method for designing the construction wavefronts of a holographic optical element based on minimizing the mean squared wavefront error while satisfying

the Bragg condition is described A holographic HUD optical system was designed for the F-16 cockpit in which distortion was corrected optically through simultaneous optimization of combiner and relay lens parameters. Both construction wavefronts of the combiner were described in terms of Legendre polynomial series. The implementation of construction beams required to form the combiner construction wavefronts is discussed Author (GRA)

N82-28293# Federal Aviation Administration Atlantic City NJ A COMPENDIUM OF LIGHTNING EFFECTS ON FUTURE AIRCRAFT ELECTRONIC SYSTEMS Final Report

Nickolus O Rasch Feb 1982 257 p refs Proc of Conf held at Hampton, Va , 4-6 Nov 1981 DOT-FAA-CT-82-30) (AD-A114117 NTIS Avail HC A12/MF A01 CSCL 01/3

This publication is a composite of presentations given at the NASA-Langley Research Center/FAA Technical Center Lightning Effects on Future Aircraft Systems Workshop held on November 4-6, 1981, at the NASA-Langley Research Center Facility The presentations encompassed the full spectrum of lightning research from lightning phenomonology lightning modeling, electromagnetic issues associated with composite materials, to the lightning/aircraft electromagnetic interaction analysis Also included are a total of five presentations assessing the Digital System upset phenomena Author (GRA)

N82-28294# Grumman Aerospace Corp., Bethpage, NY HYDRAULIC UNIVERSAL DISPLAY PROCESSOR SYSTEM (HUDPS) Final Report, 1 Apr. - 1 Sep. 1981

John J. Duzich and Herman L. Dreksler, Warminster, Pa. Naval Air Development Center 21 Nov 1981 66 p refs

(Contract N62269-81-C-0243) NADC-82053-60) NTIS (AD-A114428, Avail HC A04/MF A01 CSCL 01/3

This six month study effort explored methods of display fault indication to ground support personnel and optimize microprocession circuitry for universal aircraft application. Task I was established the maximum number of sensors required for a complex, comprehensive diagnostic system for the F14A as 150 Inputs could be either analog or digital For comparison purposes, an A6E system was considered. Fault display methods were investigated with emphasis on smart alphanumeric devices in Task II Volatile and non-volatile memory components were utilized along with the Intel 8748 microprocessor and associated EPROMS The use of National Semiconductor ADCO816 data acquisition chips consisting of a 16 input multiplexer, an 8 bit A/D converter and an 8 bit tri-state buffered output facilitates the many inputs Power consumption for a complete system was estimated as 5 watts while airborne. On the ground, 15 watts at 5 volts is required for display requirements. Display envelope would measure 8x7x6 and would contain approximately 6 circuit boards. In Task III a universal display processor system was formulated A Block Diagram and several flow diagrams were generated Multiplexer schematics were established for analog and discrete inputs. An electrical component parts list was generated for a typical system Author (GRA)

N82-28295*# National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif STATIC NOISE TESTS ON MODIFIED AUGMENTOR WING

JET STOL RESEARCH AIRCRAFT G R Cook and B F Lilley (deHavilland Aircraft of Canada,

Ltd., Downsview, Ontario) Feb 1981 58 p refs (NASA-TM-81231, NAS 1 15 81231) Avail NTIS

HC A04/MF A01 CSCL 21E

Noise measurements were made to determine if recent modifications made to the bifurcated jetpipe to increase engine thrust had at the same time reduced the noise level. The noise field was measured by a 6-microphone array positioned on a 30 5m (100 ft) sideline between 90 and 150 degrees from the left engine inlet. Noise levels were recorded at three flap angles over a range of engine thrust settings from flight idle to emergency power and plotted in one-third octave band spectra Little attenuation was observed at maximum power, but significant attenuation was achieved at approach and cruise power levels

ΤM

N82-28296*# Pratt and Whitney Aircraft Group, East Hartford Conn Commercial Products Div 8747/JT9D FLIGHT LOADS AND THEIR EFFECT ON

ENGINE RUNNING CLEARANCES AND PERFORMANCE DETERIORATION; BCAC NAIL/P AND WA JT9D ENGINE DIAGNOSTICS PROGRAMS

W J Olsson and R L Martin 19 Feb 1982 74 p refs Prepared in cooperation with Boeing Commercial Airplane Co. Seattle

(Contracts NAS3-20632 NAS1-15325)

(NASA-CR-165573, NAS 1 26 165573 PWA-5512-88) Avail NTIS HC A04/MF A01 CSCL 21E

Flight loads on the 747 propulsion system and resulting JT9D blade to outer airseal running clearances during representative acceptance flight and revenue flight sequences were measured. The resulting rub induced clearance changes, and engine performance changes were then analyzed to validate and refine the JT9D-7A short term performance deterioration model Author

N82-28297*# General Electric Co., Cincinnati, Ohio Aircraft Engine Group

CF6 JET ENGINE PERFORMANCE IMPROVEMENT: HIGH PRESSURE TURBINE ACTIVE CLEARANCE CONTROL

S E Rich and W A Fasching Jun 1982 136 p refs (Contract NAS3-20629)

(NASA-CR-165556, NAS 1 26 165556, R82AEB198) Avail NTIS HC A07/MF A01 CSCL 21E

An active clearance control system was developed which reduces fuel consumption and performance degradation. This system utilizes compressor discharge air during takeoff and fan discharge air during cruise to impinge on the shroud structure to improve the thermal response. The system was evaluated in component and engine tests. The test results demonstrated a performance improvement of 0.7 percent in cruise SFC

N82-28298*# Bolt, Beranek and Newman, Inc., Cambridge, Mass

ANALYTICAL AND SIMULATOR STUDY OF ADVANCED TRANSPORT Final Report

William H Levison and William W Rickard (Douglas Aircraft Co, Long Beach Calif) Washington NASA Jun 1982 86 p refs

(Contract NAS1-16410)

(NASA-CR-3572, NAS 1 26 3572, Rept-4778) Avail NTIS HC A05/MF A01 CSCL 01C

An analytic methodology, based on the optimal-control pilot model was demonstrated for assessing longitudinal-axis handling qualities of transport aircraft in final approach. Calibration of the methodology is largely in terms of closed-loop performance requirements, rather than specific vehicle response characteristics, and is based on a combination of published criteria, pilot preferences, physical limitations, and engineering judgment. Six longitudinal-axis approach configurations were studied covering a range of handling qualities problems, including the presence of flexible aircraft modes. The analytical procedure was used to obtain predictions of Cooper-Harper ratings, a solar quadratic performance index, and rms excursions of important system variables тм

N82-28299*# National Aeronautics and Space Administration

Langley Research Center, Hampton, Va METHODOLOGY FOR DETERMINING ELEVON DEFLEC-TIONS TO TRIM AND MANEUVER THE DAST VEHICLE WITH NEGATIVE STATIC MARGIN

Boyd Perry, III May 1982 50 p refs HC A03/MF A01 CSCL 01C NTIS Avail

The relationships between elevon deflection and static margin using elements from static and dynamic stability and control and from classical control theory are emphasized Expressions are derived and presented for calculating elevon deflections required to trim the vehicle in Ig straight-and-level flight and to perform specified longitudinal and lateral maneuvers. Applications of this methodology are made at several flight conditions for the ARW-2 wing On the basis of these applications it appears possible to trim and maneuver the vehicle with the existing elevons at -15% static margin Author

N82-28301# Virginia Univ , Charlottesville Dept of Mechanical and Aerospace Engineering

LIMITING PERFORMANCE OF NONLINEAR SYSTEMS WITH APPLICATIONS TO HELICOPTER VIBRATION

CONTROL PROBLEMS Final Report Walter D Pilkey 1982 26 p refs (Grant DAAG29-79-G-0015)

(AD-A113239, UVA/525098-MAE-82/10, ARO-16091 5-E) Avail NTIS HC A03/MF A01 CSCL 20/11

This report summarizes the accomplishments of a study exploring new methods for the vibration control of helicopters Reanalysis methodology permits a variety of vibration control problems to be solved efficiently Both analytical and experimental studies have been conducted Author (GRA)

N82-28302# Air Force Human Resources Lab, Brooks AFB, Tex

MANUAL REVERSION FLIGHT CONTROL SYSTEM FOR A-10 AIRCRAFT PILOT PERFORMANCE AND SIMULATOR **CUE EFFECTS** Final Report

Thomas H Gray Mar 1982 31 p refs

(AF Proj 1123) (AD-A113463, AFHRL-TR-81-53) NTIS Avail HC A03/MF A01 CSCL 14/2

The A-10 aircraft incorporates an emergency backup control mode, the Manual Reversion Flight Control System (MRFCS) Maintaining effective control in this mode is a demanding pilot task, but it is not practiced in the flying training syllabus Because current plans call for training this skill using simulation, information was needed on simulator cue requirements Accordingly, the research objective was to determine the effectiveness of selected simulator visual and force cues used by experienced A-10 pilots to maintain aircraft control and to land when in the MRFCS mode. The study found that (1) a large field of view enhanced the pilot's control of the aircraft, (2) platform motion had no influence upon aircraft control, (3) aircraft control was more difficult in the MRFCS mode than in the simple single engine failure state, (4) point of failure was a significant variable reliably affecting pilot control of the aircraft, and (5) pilot performance improved as a function of practice (trials) Author (GRA)

N82-28303# National Aerospace Lab , Amsterdam (Netherlands) Structures and Materials Div

THE DETERMINATION OF GUST LOADS ON NONLINEAR AIRCRAFT USING A POWER SPECTRAL DENSITY APPROACH

R Noback and C Laauboder 17 Dec 1980 80 p refs (Contract NIVR-RB-1854)

(NLR-TR-80123-U) Avail NTIS HC A05/MF A01

Since the power spectral density method cannot determine the exceedance of the output over the input in the nonlinear equations which describe an aircraft subjected to atmospheric turbulence, methods which approximate the exceedance curve were developed. One method is analogous to the classical expression for the equivalent gain. Another is analogous to the equivalent gain based on minimum error in energy. In both, the maximum value (mu zy) of the cross correlation function between output and input to the nonlinearity is used. A reasonable estimate of the exceedance curve, for systems for which mu zy is not known, can be obtained if the correlation between the input to the nonlinearity (z) and the system output (y) is high. The ratio of the standard deviations of z and y can then be used. Design loads based on mission analysis can be established once the load exceedance curve due to constant standard deviation of the input is known. A definition for the design load of nonlinear aircraft using the design envelope method is proposed

Author (ESA)

N82-28306# Seville Research Corp., Pensacola, Fla **OPERATIONAL TEST AND EVALUATION HANDBOOK FOR** AIRCREW TRAINING DEVICES. VOLUME 3: ATIONAL SUITABILITY EVALUATION Final Report

William V Hagin, Stephen R Osborne, Roik L Hockenberger, James P Smith, and Thomas H Gray (Operations Training Div., Williams AFB, Ariz) AFHRL Brooks AFB, Tex Feb 1982 128 p refs

(Contract F33615-78-C-0063, AF Proj 1123)

(AD-A112569, AFHRL-TR-81-44-Vol-3) NTIS Avail HC A07/MF A01 CSCL 05/9

The Handbook is comprised of three volumes and is intended to provide guidelines and procedures appropriate for Air Force Operational Test and Evaluation (OT&E) personnel to use in planning, conducting and reporting the results of simulator assessment efforts. Although of value to all test personnel, it is

primarily for the typical novice test manager/director - a person who has subject matter expertise (e g , a qualified pilot or operator), but who may have little or no previous OT&E experience. The Handbook provides detailed coverage on OT&E planning and management with special emphasis on measuring device operational effectiveness and suitability in accord with its objectives, the Handbook was prepared to serve as a supplement to Air Force Manual 55-43 'Management of Operational Test and Evaluation, but providing those specific additional evaluation concepts and techniques mecessary for aircrew training device test and evaluation GRA

N82-28307# Strategic Air Command, Offutt AFB, Nebr Aircraft Engineering Div

ALERT AIRCRAFT ROLL OVER CHOCKS Final Engineering Report

John M Connolly 14 Aug 1981 53 p

SAC/LGME-ER-P-372) (AD-A107456, Avail NTIS HC A04/MF A01 CSCL 01/5

The feasibility of restraining a parked alert aircraft with chocks which could be safely taxied over was studied. Chocks were designed and then evaluated during SAC Giant Match II exercise The chocks successfully restrained a parked aircraft and allowed a heavy weight aircraft to safely taxi over when the chocks were placed on a rough surface Roll-over chock use was expanded command wide for B-52G and KC-135 alert aircraft except on icy surfaces. Three ice gripping surface designs were evaluated All three designs performed successfully Author

N82-28309# Naval Training Equipment Center, Orlando, Fla Advanced Simulation Concepts Lab

COMPUTER PROGRAM FOR ANALYSIS OF SPHERICAL SCREEN DISTORTION Technical Report, Oct. 1980 - Feb. 1981

Richard C Hebb Mar 1982 71 p refs (AD-A113136, NAVTRAEQUIPC-IH-332) Avail

HC A04/MF A01 CSCL 05/9 In visual simulation, the distortion of imagery in wide-angle display systems is a major concern. Effective flight training requires that the imagery presented to a trainee provide a proper perspective view of his simulated environment without distortion Use of spherical screens (domes) introduces perspective and geometrical distortion into these wide-angle displays. Use of video projection systems with Computer Image Generation (CIG) offers the options of raster shaping or computer remapping for distortion correction. The method is to correct the imagery before projection in order to provide a non-distorted scene to a trainee This report is documentation of a computer program for analysis of the required raster correction for specific projector/ viewpoint positioning within a spherical screen. The programs and report were initiated to provide input to the F-18 simulator (Device 2E7) being developed by Hughes Aircraft Author (GRA)

N82-28310# Aeronautical Research Labs , Melbourne (Australia) PROGRAM'S FOR THE TRANSONIC WIND TUNNEL DATA PROCESSING INSTALLATION. PART 8. PROGRAMS FOR PROCESSING DATA ON THE CENTRAL SITE COMPUTER

B D Fairlie Sep 1980 32 p refs (AD-A112900, ARL/AERO-TM-324-Pt-8) Avail NTIS HC A03/MF A01 CSCL 09/2

Three programs which run on the central site computer (PDP-10) are described. The first, PLT8 complements and extends the tunnel installation six-component force data plotting system The second, INTEG integrates aerofoil surface pressure measurements The third, PLTALL plots these surface pressure data

Author (GRA)

NTIS

N82-28311# Aeronautical Research Labs , Melbourne (Australia) DESIGN BASIS FOR A NEW TRANSONIC WIND TUNNEL J B Willis and N Pollock Jan 1982 27 p refs (AD-A112899, ARL/Aero-TM-335, AR-002-326) Avail NTIS

HC A03/MF A01 CSCL 14/2

The existing ARL Transonic Wind Tunnel, which is the largest such tunnel in Australia, has severely limited testing capabilities due to a low test Reynolds number and an inadequate test section size. These deficiencies are becoming more acute as military aircraft performance capabilities increase. For current fighter aircraft, the ratio of tunnel test to flight Reynolds number is about 1 100 and the extrapolation of tunnel data to flight carries a high risk of serious error and for some conditions is not possible at all. The small test section size limits the scale

of the models which can be tested. The difficulty of machining small models to the required accuracy produces excessive manufacturing times. Moreover, it is not possible to incorporate remotely adjusted control surfaces. These two factors severely restrict tunnel productivity. Given adequate support, it should be possible to build and commission a suitable new wind tunnel in about five years, at a cost substantially less than that of a GRA single military fighter aircraft

N82-28364# Messerschmitt-Boelkow-Blohm G m b H, Ottobrunn (West Germany) Information und Dokumentation

CARBON FIBER REINFORCED COMPOSITE STRUCTURES PROTECTED WITH METAL SURFACES AGAINST LIGHT-NING STRIKE DAMAGE

C M Heckert, H P Wentzel (Vereinigte Flugtechnische Werke GmbH), and G Boes (Tech Univ , Hanover) 1982 9 p Presented at Intern Aerospace Conf on Lightning and Static Elec., Culham, England, 23-25 Mar 1982

(MBB-UD-340-82-O/E) Avail Issuing Activity

Lightning protection for carbon fiber reinforced composite (CFC) structures, typical of parts mainly located on the surface of aircraft, was investigated. Only direct structural, effects of a lightning strike on a component were considered. As protective materials, flame sprayed aluminum, aluminum mesh, aluminum foil, and aluminum/glass hybrid fabrics were tested. Three specimen geometries were studied (1) solid CFC plates 2 and 3 mm thick, (2) sandwich plates with CFC facing of different thickness and with different core material (aluminum and Nomex) 10 mm through, and (3) electrically bonded test specimen composed of a solid CFC plate and metal substructure. The test rig for simulating lightning discharges is described. Results consist of damage diagrams showing specimen type, applied electrical discharge, and damaged area on protective surface and composite Author (ESA) structure

N82-28365# Messerschmitt-Boelkow-Blohm G m b H , Ottobrunn (West Germany) Information und Dokumentation

DEVELOPMENT OF MATERIALS AND MANUFACTURING TECHNOLOGY OVER THE NEXT 20 YEARS: COMPOSITE MATERIALS [ENTWICKLUNG DER WERKSTOFF- UND FERTIGUNGSTECHNIK IN DEN NAECHSTEN 20 JAH-**REN - VERBUNDWERKSTOFFE**]

C M Heckert 1982 17 p In GERMAN Presented at Wehrtech Symp Entwicklung der Werkstoffe- u Fertigungstech in den naechsten 20 Jahren, Mannheim, West Germany, 17 Dec 1981. sponsored by Bundesakademie fuer Wehrverwaltung und Wehrtechnik, Mannheim, West Germany

(MBB-UD-341-82-O) Avail Issuing Activity

The development of reinforced plastics and their application in various manufacturing processes are reviewed. The choice of CFRP or glass fiber reinforced plastic in military and commercial aircraft design is justified by higher specific strength and stiffness properties than alternative metals. Other applications are found in automobiles, railway cars, and helicopters Size and mass reduction in parts as well as production cost savings are mentioned. Influence on manufacturing of component geometry (rod, plate, complex) is considered. The interrelationship of manufacturing capability with composite materials development is stressed through examples from industry Author (ESA)

N82-28462# Suntech, Inc Marcus Hook, Pa AN EXPLORATORY RESEARCH AND DEVELOPMENT **PROGRAM LEADING TO SPECIFICATIONS FOR AVIATION** TURBINE FUEL FROM WHOLE CRUDE SHALE OIL PART 1 PRELIMINARY PROCESS ANALYSES Interim Report, 2 Jan - 1 Jul. 1979 H E Reif, J P Schwedock and A Schneider Wright-Patterson

AFB, Ohio AFWAL Sep 1981 48 p refs 3 Vol

(Contract F33615-78-C-2024, AF Proj 3048)

AFWAL-TR-81-2087-Pt-1) (AD-A112681 NTIS Avail HC A03/MF A01 CSCL 21/4

Preliminary process analyses of three different technically feasible processing schemes proposed by SUN TECH, INC for converting 100,000 BPCD of raw Paraho shale oil into military turbine fuels was investigated. Each processing scheme is based on very limited, but pertinent, data generated by SUN TECH plus literature sources. The base processing scheme consists of severe hydrotreating followed by sulfuric acid extraction, the two alternate cases utilize moderate hydrotreating plus extraction for nitrogen, removal and hydrocracking. Screening-type process designs and costs estimates were prepared for each case using

the economic basis specified Results indicate that shale oil fuels refineries are more capital intensive than a comparable size petroleum refinery. No attempt was made at optimization Author (GRA)

N82-28463# Suntech, Inc., Marcus Hook, Pa AN EXPLORATORY RESEARCH AND DEVELOPMENT **PROGRAM LEADING TO SPECIFICATIONS FOR AVIATION** TURBINE FUEL FROM WHOLE CRUDE SHALE OIL. PART 2 PROCESS VARIABLE ANALYSES AND LABORA-TORY SAMPLE PRODUCTION Interim Report, Jul 1979 -1 Nov. 1980

H E Reif, J P Schwedock, and A Schneider Wright-Patterson AFB, Ohio AFWAL Sep 1981 61 p refs 3 Vol (Contract F33615-78-C-2024, AF Proj 2480)

(AD-A112682 AFWAL-TR-81-2087-Pt-2) NTIS Avail HC A04/MF A01 CSCL 21/4

Pilot plant process data have been incorporated in three design bases for manufacturing military fuels from raw Occidental shale oil Processing schemes for 90,000 BPCD refineries to maximize either JP-4 JP-8 or to produce JP-4 plus other military fuels are presented. The processing sequence comprises moderate severity hydrotreating, fractionation, anhydrous HCI extraction and hydrocarcking. Plant capacities and product yields were not optimized Investments for the three refinery options considered are 1.5 to 2.0 times as much as a comparable size petroleum fuels refinery At maximum JP-4 or JP-8 production the yields are about 87 and 53 volume % of total refinery energy input, respectively. Overall, refinery thermal efficiency is > or = 75% Inspection data are presented for five samples of specification aviation turbine fuels prepared from pilot plant operations GRA

N82-28464# Suntech, Inc Marcus Hook Pa

AN EXPLORATORY RESEARCH AND DEVELOPMENT **PROGRAM LEADING TO SPECIFICATIONS FOR AVIATION** TURBINE FUEL FROM WHOLE CRUDE SHALE OIL. PART 3: PRODUCTION OF SPECIFICATION OF JP-4 FUEL FROM GEOKINETICS SHALE OIL Interim Report, 1 Jan -1 Apr 1980

H E Reif, J P Schwedock, and A Schneider Wright-Patterson AFB Ohio AFWAL Oct 1981 45 p refs 3 Vol (Contract F33615-78-C-2024, AF Proj 2480)

(AD-A112683 AFWAL-TR-81-2087-Pt-3) NTIS Avail HC A03/MF A01 CSCL 21/4

270 Barrels of specification JP-4 jet fuel were produced by hydrorefining 890 barrels of raw Geokinetics shale oil under severe operating conditions in a continuous process development unit. On a once thru basis the yield of JP-4 off the hydrotreater was about 35 volume % of the feed Preliminary estimates of plant investments and economics indicate that for the combination severe hydrorefining and hydrocracking an 85 volume % yield can be attained based on total refinery energy input Capital investments and manufacturing costs do not appear to be excessive for a shale oil refinery GRA

N82-28470# California Univ., Livermore Lawrence Livermore Lab

LABORATORY-SCALE SIMULATION OF UNDERGROUND COAL GASIFICATION EXPERIMENT AND THEORY

J R Creighton and C B Thorsness 28 Aug 1981 26 p Presented at the Western States Sect Meeting of the Combust Inst Tempe, Ariz, 19-20 Oct 1981

(Contract W-7405-eng-48)

(DE82-001063, UCRL-86473, CONF-811041-2) Avail NTIS HC A03/MF A01

Laboratory-scale experiments simulating underground coal casification are described A 1 cm borehole is drilled through a block of coal which is cut to fit in a 55 gallon oil drum Inlet gas may be air or oxygen/steam mixture at various ratios. The blocks are burned for a period of several hours at a prescribed flow schedule, with appropriate instrumentation. Gas quality is found to be relatively independent of coal type for the range of sub-bituminous coals tested. After the burn the blocks of coal are cut open to examine the cavity. A mathematical modeling effort supports these experiments. The models are restricted to pure carbon, to simplify the chemistry in the model. When plug flow is assumed in the cavity the model predicts reasonable cavity shape downstream, but an incorrect shape upstream. When aerodynamic flow including viscosity and vortex formation, is calculated in the cavity reasonable cavity shapes are obtained DOE N82-28486# Vereinigte Flugtechnische Werke G m b H , Bremen (West Germany) Materials and Processes Development Dept ADVANCED CASTING: TODAY AND TOMORROW Dietmar Mietrach 1982 20 p refs Presented at AGARD

Meeting on Adv Casting Technol, Brussels 4-9 Apr 1982 Avail NTIS HC A02/MF A01

The state of aluminum casting technology in terms of processes, component sizes design and material-scientific data as well as mechanical characteristics was established during visits to foundries in the USA, Canada, France Italy, Great Britain and the Federal Republic of Germany. Components of the primary structure of Tornado and ALPHA aircraft, (pylon, intake floor) classified according to the degree of difficulty during casting, were used to compare existing designs (riveted sheet metal and machined parts) and cast versions with regard to cost reduction and technical reliability. Visual inspection, dimensional checks, chemical composition analysis, penetrant tests X-ray tests, metallographic investigations, and tensile tests were carried out Cost savings of 25% and weight savings of 20% can be achieved by using castings Author (ESA)

N82-28523# TRW Defense and Space Systems Group, Redondo Beach, Calif

MULTIFUNCTION MULTIBAND AIRBORNE RADIO AR-CHITECTURE STUDY Final Report, Apr. 1978 - Jan 1980 L N Ma, S K Ogi, M Y Huang, L L Bodnar, and P Martin Wright-Patterson AFB, Ohio AFWAL Jan 1982 379 p refs (Contract F33615-77-C-1172, AF Proj 2003) AFWAL-TR-81-1113) (AD-A114427, Avail NTIS HC A17/MF A01 CSCL 17/2

The demands of modern military avionic communication, radio navigation, and cooperative identification (CNI) equipment has been greatly expanded as the result of the need for antijam (AJ), low probability of intercept (LPI), higher navigation accuracy, and increased volume of information transfer. These demands are verified in programs such as GPS, JTIDS, SEEK TALK, SINCGARS and AFSAT I and II The cost of this additional capability has severely hampered the ability of the Government to procure new CNI systems and equipment with desired performance capabilities. The problem is further compounded by the lack of available space in the tactical aircraft, the transition of new equipment into the inventory, and the retention of many current systems. The multifunction multiband airborne radio system. (MFBARS) program is formulated to explore the feasibility of producing a modern CNI system at an affordable life cycle cost (LCC) and within real estate requirements A cost effective system approach was developed that revolved around high technology RF-LSI analog components that are in the development stage high speed digital pre-processor elements and a programmable signal processor all under control of a host processor configuration This design trades the ultimate gain in volume, weight and life cycle cost against a reasonable risk for the mid 1980's development Author (GRA)

N82-28552# Boeing Aerospace Co., Seattle, Wash FEASIBILITY STUDY OF A 270V dc FLAT CABLE AIRCRAFT ELECTRICAL POWER DISTRIBUTED SYSTEM Final Report, Dec. 1980 - Jan. 1982

M J Musga and R J Rinehart Jan 1982 272 p refs (Contract N62269-81-C-0231)

(AD-A114026, D182-10816-1, NADC-82023-60) Avail NTIS HC A12/MF A01 CSCL 10/2

This report documents the efforts of a one man-year feasibility study to evaluate the usage of flat conductors in place of conventional round wires for a 270 volt direct current aircraft power distribution system. This study consisted of designing electrically equivalent power distribution harnesses in flat conductor configurations for a currently operational military aircraft Harness designs were established for installation in aircraft airframes which are (1) All metal, or (2) All composite, or (3) a mixture of both Flat cables have greater surface areas for heat transfer allowing higher current densities and therefore lighter weight conductors, than with round wires. Flat cables are less susceptible to electromagnetic effects. However, these positive factors are partially offset by installation and maintenance difficulties. This study concludes that the extent of these difficulties can be adequately limited with appropriate modification to present installation and maintenance practices A comparative analysis of the flat and the round conductor power distribution harnesses was made for weight, cost, maintenance and reliability. The knowledge gained from the design and comparative analysis

phases was used to generate design criteria for flat power cable harnesses and to identify and prioritize flat cable harness components and associated production tooling which require GRA development

N82-28571# Aeronautical Research Inst of Sweden, Stockholm MEASURING THE FLOW PROPERTIES OF SLOTTED TEST-SECTION WALLS

Sune B Berndt May 1982 15 p refs (FFA-135) Avail NTIS HC A02/MF A01

By measuring pressure distributions at two levels near a slotted wall it is possible to deduce simultaneous values of normal and longitudinal velocities Such measurements require, for their proper interpretation, a basic understanding of the flow in the neighborhood of the wall. An analysis of the problems involved Author is provided

N82-28624# Rose Engineering and Research, Inc., Incline Village. Nev

NEARFIELD AERODYNAMICS AND OPTICAL PROPAGA-TION CHARACTERISTICS OF A LARGE-SCALE TURRET **MODEL Final Report**

William C Rose, James E Craig (Spectron Development Lab. Inc.), and K. R. Raman (Raman Aeronautics, Inc.) Kirtland AFB, N Mex AFWL Feb 1982 100 p refs (Contract F29601-79-C-0011, AF Proj 317J)

(AD-A113910. AFWL-TR-81-28) Avail NTIS HC A05/MF A01 CSCL 20/6

Measurements of the unsteady flow field affecting optical propagation quality have been made with both aerodynamic and direct optical instrumentation Properties affecting degradation of coherent radiation beams propagated from within the turret have been investigated. These properties include both the magnitude and scale sizes of the fluctuating index-of-refraction field present in the turbulent shear layers and separation regions of the turret flow field. Direct optical degradation information was obtained by holographic interferometry and quantified through techniques presented here Aerodynamic measurements were made with hot-wire anemometry and multiple-port probes Comparisons between the aerodynamically and optically deduced data are presented. These data can be used directly to estimate trends in expected loss of optical quality of a coherent beam for various flight speeds, altitudes, wavelengths and azimuthal turret angles. More data are now available for estimating the effects of unsteady aerodynamic flow fields on optical propagation quality Data were obtained for Reynolds numbers near those occurring at full-scale flight conditions over a range of Mach number from 0.55 to 0.75 Investigation results generally agree with those obtained previously on smaller scale models and indicate that severe optical degradation can be present at aft-looking azimuth angles Author (GRA)

N82-28643*# National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio

RELIABILITY MODEL FOR PLANETARY GEAR

Michael Savage (Akron Univ.), Charles A. Paridon (Hewlett Packard Co., Sunnyvale, California), and John J. Coy (Army Aviation Research and Development Command, Cleveland Ohio) 1982 22 p refs Proposed for Presentation at Design Engr Tech Conf Washington D.C., 12-15 Sep 1982 sponsored by ASME Prepared in cooperation with Army Aviation Research and **Development Command**

(NASA-TM-82859 NAS 1 15 82859 AVRADCOM TR-82 C-6) Avail NTIS HC A02/MF A01 CSCL 131

A reliability model is presented for planetary gear trains in which the ring gear is fixed, the Sun gear is the input, and the planet arm is the output. The input and output shafts are coaxial and the input and output torques are assumed to be coaxial with these shafts Thrust and side loading are neglected This type of gear train is commonly used in main rotor transmissions for helicopters and in other applications which require high reductions in speed. The reliability model is based on the Weibull distribution of the individual reliabilities of the transmission components. The transmission's basic dynamic capacity is defined as the input torque which may be applied for one million input rotations of the Sun gear Load and life are related by a power law The load life exponent and basic dynamic capacity are developed as functions of the component capacities Author

N82-28644*# National Aeronautics and Space Administration Lewis Research Center Cleveland Ohio

ADVANCES IN HIGH-SPEED ROLLING-ELEMENT BEAR-INGS

.

Erwin V Zaretsky 1982 29 p refs Presented at the 16th Ann Israel Conf on Mechan Engr Haifa Israel 12-14 Jul 1982 sponsored by Technion - Israel Inst of Tech (NA SA-TM-82910 E-1295 NAS 1 15 82910) Avail NTIS

HC A03/MF A01 CSCL 131

Aircraft engine and transmission rolling-element bearing state-of-the-art is summarized Author

N82-28676# Alabama Univ Huntsville Dept of Mechanical Engineering

RECENT DEVELOPMENTS IN HYGROTHERMOVISCOELAS-TIC ANALYSIS OF COMPOSITES

T J Chung In Shock and Vibration Information Center The Shock and Vibration Digest Vol 14, No 4 Apr 1982 p 33-40 refs (For primary document see N82-28673 19-39)

SVIC, Code 5804, Naval Research Lab Washington Avail DC 20375. \$20 00/set CSCL 20/11

Constitutive theories of hygrothermomechanical behavior of viscoelastic composites are reviewed Author

N82-28685# National Aerospace Lab Amsterdam (Netherlands) Structures and Materials Div

PREDICTION OF FATIGUE CRACK GROWTH RATES UNDER VARIABLE LOADING USING A SIMPLE CRACK CLOSURE MODEL

A U deKoning and H H vanderLinden Apr 1980 45 p refs Presented at 11th ICAF Symp Noordwijkerhout, Netherlands 20-22 May 1981

(Contracts NIVR-1777 NIVR-1822, NIVR-1823)

(NLR-MP-81023-U) Avail NTIS HC A03/MF A01

A model which predicts fatigue crack growth rates in aluminum alloys subjected to flight service loading is presented The model is based on an approximate description of the crack opening behavior and was applied successfully in an analysis of effects of crack growth acceleration and retardation observed experimentally under variable amplitude loading. The model describes effects of the plane strain to plane stress transition and of relatively high overloads on crack growth rate of the crack Author (ESA)

N82-28690*# National Aeronautics and Space Administration Wallops Flight Center, Wallops Island Va BASELINE MONITORING USING AIRCRAFT LASER

RANGING

W B Krabill, F E Hoge and C F Martin Jun 1982 28 p refs

(NASA-TM-73298 NAS 1 15 73298) Avail NTIS HC A03/MF A01 CSCL 08B

The use of aircraft laser ranging for the determination of baselines between ground based retroreflectors was investigated via simulations and with tests at Wallops Flight Center using the Airborne Oceanographic Lidar (AOL) on the Wallops C-54 aircraft ranging to a reflector array deployed around one of the Wallops runways The aircraft altitude and reflector spacing were chosen on the basis of scaled down modeling of spacecraft tracking from 1000 km of reflectors separated by some 52 km or of high altitude (10 km) aircraft tracking of reflectors separated by some 500 m Aircraft altitudes flown for different passes across the runway reflector array varied from 800 m to 1350 m, with 32 reflectors deployed over an approximately 300 m x 500 m ground pattern The AOL transmitted 400 pulses/sec with a scan rate of 5/sec in a near circular pattern so that the majority of the pulses were reflected by the runway surface or its environs rather than by retroreflectors. The return pulse characteristics clearly showed the high reflectivity of portions of the runway with several returns indistinguishable in amplitude from reflector returns For each pass across the reflector field typically six to ten reflector hits were identified consistent with that predicted by simulations and the observed transmitted elliptical pulse size Author

N82-28715*# National Aeronautics and Space Administration Goddard Space Flight Center Greenbelt Md

SCANNER IMAGING SYSTEMS, AIRCRAFT

Stephen G Ungar In JPL Proc of the NASA Workshop on Registration and Rectification 1 Jun 1982 p 138-152 (For primary document see N82-28699 19-43) Avail NTIS HC A23/MF A01 CSCL 08B

N82-28841

The causes and effects of distortion in aircraft scanner data are reviewed and an approach to reduce distortions by modelling the effect of aircraft motion on the scanner scene is discussed With the advent of advanced satellite borne scanner systems, the geometric and radiometric correction of aircraft scanner data has become increasingly important. Corrections are needed to reliably simulate observations obtained by such systems for purposes of evaluation. It is found that if sufficient navigational information is available, aircraft scanner coordinates may be related very precisely to planimetric ground coordinates. However, the potential for a multivalue remapping transformation (i.e., scan lines crossing each other) adds an inherent uncertainty, to any radiometric resampling scheme which is dependent on the precise geometry of the scan and ground pattern EAK

Aerospace Medical Research Labs, Wright-N82-28841# Patterson AFB Ohio Biodynamics and Bioengineering Div FIELD STUDIES OF THE AIR FORCE PROCEDURES (NOISECHECK) FOR MEASURING COMMUNITY NOISE EXPOSURE FROM AIRCRAFT OPERATIONS Final Report R A Lee Mar 1982 130 p

(AF Proj 7231)

(AD-A113672, AFAMRL-TR-82-12) Avail NTIS HC A07/MF A01 CSCL 20/1

This report describes the results of noise measurements at Laughlin AFB and Homestead AFB to field test the NOISECHECK equipment and procedures developed under contract by Bolt, Beranek and Newman, Inc and Digital Acoustics Inc NOISE-CHECK is the equipment and procedures used by the Air Force to spot check or validate the long term noise exposure predicted by NOISEMAP the Air Force computer program for predicting community noise exposure from aircraft operations. The total noise exposure level at a specified location has an uncertainty associated with it whether the level is predicted or measured The purpose of NOISECHECK is to determine the total noise exposure in terms of the Day-Night Level (DNL) metric for a specified ground location from direct measurements NOISEMAP predicts DNL values for yearly-averaged 'busy days' aircraft operations Therefore, the direct DNL measurements need to be normalized to this busy day DNL The NOISECHECK Procedures lead you through these normalizations in a straightforward step-by-step method The results of the Laughlin and Homestead tests show that, with the proper data collection, the NOISECHECK procedures can validate the long-term noise exposure and explain any differences between the NOISEMAP predicted DNL values and the short term measurement DNL values Author (GRA)

N82-28842# California Univ , Riverside Statewide Air Pollution Research Center

ATMOSPHERIC CHEMISTRY OF HYDROCARBON FUELS. VOLUME 2 OUTDOOR CHAMBER DATA TABULATIONS,

VILLE A CONSTRUCT CHAMBER DATA TABULATIONS, PART 1 Final Report, Mar 1980 - Sep 1981 William P L Carter, Paul S Ripley, Cecil G Smith, and James N Pitts, Jr Tyndall AFB, Fla AF Engineering and Services Center Nov 1981 336 p 2 Vol

(Contract F08635-80-C-0086, AF Proj 1900)

(AD-A113665 AFESC/ESL-TR-81-53-V-2-P-1) Avail NTIS HC A15/MF A01 CSCL 04/1

A total of 132 single- and multi-day outdoor environmental chamber experiments were conducted, involving nine different aviation and automotive fuels. These included the petroleumderived JP-4 and JP-8 military aviation fuels, their shale-oil derived analogues, unleaded gasoline, diesel No 2 fuel, and the experimental high-energy cruise-missile fuels JP-10 RJ-4, and RJ-5 The program was conducted to assess the potential of these fuels to adversely affect air quality Author

N82-28881*# Tennessee Univ Space Inst Tullahoma ANALYSIS OF VIBRATION INDUCED ERROR IN TURBU-LENCE VELOCITY MEASUREMENTS FROM AN AIRCRAFT WING TIP BOOM Final Report

Safwan H Akkarı and Walter Frost Washington NASA Jun 1982 77 p refs

(Contract NAS8-34627)

(NASA-CR-3571 NAS 1 26 3571) Avail NTIS HC A05/MF A01 CSCL 04B

The effect of rolling motion of a wing on the magnitude of error induced due to the wing vibration when measuring atmospheric turbulence with a wind probe mounted on the wing tip was investigated. The wing considered had characteristics similar to that of a B-57 Cambera aircraft and Von Karman s

cross spectrum function was used to estimate the crosscorrelation of atmospheric turbulence Although the error calculated was found to be less than that calculated when only elastic bendings and vertical motions of the wing are considered, it is still relatively large in the frequency's range close to the natural frequencies of the wing Therefore it is concluded that accelerometers mounted on the wing tip are needed to correct for this error, or the atmospheric velocity data must be appropriately filtered Author

N82-29022*# Research Triangle Inst , Research Triangle Park, N C Systems and Measurements Div PROBLEMS RELATED TO THE INTEGRATION OF FAULT

TOLERANT AIRCRAFT ELECTRONIC SYSTEMS

J A Bannister, V Adlakha, K Triyedi, and T A Alspaugh, Jr Jun 1982 167 p refs

(Contract NAS1-16489)

(NASA-CR-165926, NAS 126 165926, RTI/2094/02-02F) Avail NTIS HC A08/MF A01 CSCL 09B

Problems related to the design of the hardware for an integrated aircraft electronic system are considered Taxonomies of concurrent systems are reviewed and a new taxonomy is proposed An informal methodology intended to identify feasible regions of the taxonomic design space is described. Specific tools are recommended for use in the methodology Based on the methodology, a preliminary strawman integrated fault tolerant aircraft electronic system is proposed. Next, problems related to the programming and control of inegrated aircraft electronic systems are discussed lssues of system resource management, including the scheduling and allocation of real time periodic tasks in a multiprocessor environment, are treated in detail. The role of software design in integrated fault tolerant aircraft electronic systems is discussed. Conclusions and recommendations for further work are included MG

N82-29111*# Stanford Univ, Calif Joint Inst for Aeronautics and Acoustics

THE EFFECT OF BARRIERS ON WAVE PROPAGATION PHENOMENA WITH APPLICATION FOR AIRCRAFT NOISE SHIELDING

C V M Mgana and I-Dee Chang May 1982 142 p refs (Contract NCC2-76)

NTIS (NASA-CR-169128, NAS 126 169128) Avail HC A07/MF A01 CSCL 20A

The frequency spectrum was divided into high and low frequency regimes and two separate methods were developed and applied to account for physical factors associated with flight conditions For long wave propagation the acoustic filed due to a point source near a solid obstacle was treated in terms of an inner region which where the fluid motion is essentially incompressible, and an outer region which is a linear acoustic field generated by hydrodynamic disturbances in the inner region. This method was applied to a case of a finite slotted plate modelled to represent a wing extended flap for both stationary and moving media Ray acoustics, the Kirchhoff integral formulation, and the stationary phase approximation were combined to study short wave length propagation in many limiting cases as well as in the case of a semi-infinite plate in a uniform flow velocity with a point source above the plate and embedded in a different flow velocity to simulate an engine exhaust jet stream surround-ARH ing the source

N82-29116# Technische Physische Dienst TNO-TH, Delft (Netherlands)

USE OF THE CAVITATION TUNNEL AT THE DUTCH NAVAL EXPERIMENT STATION (NSP), WAGENINGEN FOR THE **DETERMINATION OF THE ACOUSTIC SOURCE STRENGTH** OF PROPELLER CAVITATION [HET GEBRUIK VAN DE CAVITATIETUNNEL VAN HET NSP TE WAGENINGEN VOOR **DE BEPALING VAN DE AKOESTISCHE BRONSTERKTE VAN** SCHROEFCAVITATIE]

K Verhulst 18 Aug 1981 44 p refs In DUTCH (Contract A72/KM/007)

(TPD-908-720 TDCK-75536) Avail NTIS HC A03/MF A01 Experiments were performed using a five blade model propeller in order to investigate the possibilities of using the large NSP cavitation tunnel in the acoustical study of propeller cavitation. The influence of the hydrodynamic characteristics in the tunnel on the sound transmission to the tunnel wall was investigated. The transfer functions fluctuate strongly, even at a given water velocity or static pressure, probably due to poor acoustic damping in the tunnel circuit. For a turning propeller the acoustic response of the tunnel wall due to propeller cavitation is very stable since the degree of turbulence in the water and thus the absorption, are very high Author (ESA)

N82-29118# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany)

SOME COMMENTS ON THE PREDICTION OF FORWARD FLIGHT EFFECTS ON JET NOISE

Frank Obermeier Dec 1981 37 p refs (MPIS-20/1981 ISSN-0436-1199)

NTIS ISSN-0436-1199) Avail HC A03/MF A01 Fachinformationszentrum, Karlsruhe, West Germany DM 8,55

How aeroacoustic sound generation in turbulent jet flow is affected by a coflowing stream is considered. Experiment shows that simply allowing for Doppler effects, applied to the sound field of a static jet which is assumed to be known, does not yield convincing results. The effects of a coaxial stream on the aerodynamics of jet flow, i.e., the effects on its characteristic length and velocity, found experimentally, are critically reviewed through the literature Results lead to a prediction scheme for in-flight effects on jet noise A comparison of this method with test data exhibits good agreement Author (ESA)

N82-29261# Federal Aviation Administration Washington D C Planning Analysis Div

FAA AVIATION FORECASTS-FISCAL YEARS 1982-1993 Feb 1982 72 p

(AD-A114696 FAA-APO-82-2) Avail NTIS HC A04/MF A01 CSCL 01/2

This report contains the Fiscal Years 1982 to 1993 Federal Aviation Administration (FAA) forecasts of aviation activity at FAA facilities These include airports with FAA control towers air route traffic control centers, and flight service stations Detailed forecasts were made for the four major users of the national aviation system air carriers, air taxi/commuters, general aviation and the military. The forecasts have been prepared to meet the budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities by the aviation industry and the general public GRA

N82-29263# Aeronautical Research Inst of Sweden Stockholm Aerodynamics Dept

ON EMBEDDED FLOW CHARACTERISTICS OF SHARP EDGED RECTANGULAR WINGS

Erik S Larson 21 Apr 1982 19 p refs Backup Document for AIAA Synoptic scheduled for publication in the Journal of Aircraft Feb or Mar 1983

(Log-C4712) Avail NTIS HC A02/MF A01

The semiempirical analytic expressions for steady, symmetric flow characteristics on thin rectangular wings at transonic speed are investigated. Semiempirical expressions representing aerodynamic characteristics of sharp edged rectangular wings are reported The basic coefficients correlated very well with panel method results for Mach number of the free stream < or = 1 the intended domain of applicability S L

N82-29267*# National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif

AERODYNAMICS OF AN AIRFOIL WITH A JET ISSUING FROM ITS SURFACE

D A Tavella and K Karamcheti May 1982 93 p refs (Contract NCC2-74)

(NASA-TM-84825 NAS 1 15 84825 SU-JIAA-TR-44) Avail NTIS HC A05/MF A01 CSCL 01A

A simple, two dimensional, incompressible and inviscid model for the problem posed by a two dimensional wing with a jet issuing from its lower surface is considered and a parametric analysis is carried out to observe how the aerodynamic characteristics depend on the different parameter*. The mathematical problem constitutes a boundary value problem where the position of part of the boundary is not known a priori. A nonlinear optimization approach was used to solve the problem, and the analysis reveals interesting characteristics that may help to better understand the physics involved in more complex situations in connection with high lift systems Author

N82-29268*# National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif

AIRCRAFT GEOMETRY VERIFICATION WITH ENHANCED COMPUTER GENERATED DISPLAYS

J V Cozzolongo Jun 1982	13 p refs		
(NASA-TM-84254, NAS	1 15 84254)	Avail	NTIS
HC A02/MF A01 CSCL 01/	4		

A method for visual verification of aerodynamic geometries using computer generated, color shaded images is described The mathematical models representing aircraft geometries are created for use in theoretical aerodynamic analyses and in computer aided manufacturing. The aerodynamic shapes are defined using parametric bi-cubic splined patches. This mathematical representation is then used as input to an algorithm that generates a color shaded image of the geometry. A discussion of the techniques used in the mathematical representation of the geometry and in the rendering of the color shaded display is presented. The results include examples of color shaded displays, which are contrasted with wire frame type displays. The examples also show the use of mapped surface pressures in terms of color shaded images of V/STOL fighter/attack aircraft and advanced turboprop aircraft Author

N82-29271*# Boeing Vertol Co , Philadelphia, Pa INVESTIGATION OF A ROTOR SYSTEM INCORPORATING A CONSTANT LIFT TIP Final Contractor Report

M A McVeigh, H Rosenstein, K Bartie and F J McHugh Oct 1981 326 p refs

(Contract NAS2-10769)

(NASA-CR-166261, NAS 1 26 166261) NTIS Avail HC A15/MF A01 CSCL 01A

A wind tunnel test of a 168 ft model of a rotor having passively controlled pivotable tips is described. Performance and vibratory hub load data are presented which compare the performance of the rotor with the tips free and fixed. A brief analysis of the experimental findings is included SL

N82-29274# Federal Aviation Administration Washington, D.C. Office of Aviation Medicine

FLIGHT ATTENDANT INJURIES 1971-1976

Donell W Pollard, Earl D Folk, and Richard F Chandler Jan 1982 60 p refs

(AD-A114909 FAA-AM-82-8) Avail NTIS HC A04/MF A01 CSCL 01/2

Data from 206 reports of 377 flight attendant injuries occurring from 1971 through 1976 are summarized These data were obtained from the Cabin Safety Data Bank of the Civil Aeromedical Institute, and are based on Federal Aviation Administration and National Transportation Safety Board accident/incident reports Information relating to the severity and location of the injury is provided when available from original reports Data relating to the flight condition and location in the aircraft where the injury occurred are provided. Summaries of each reported injury are included in the appendices

Author (GRA)

N82-29275# Federal Aviation Administration, Washington, D.C. Office of Aviation Medicine

CRASHWORTHINESS STUDIES CABIN, SEAT, RE-STRAINT, AND INJURY FINDINGS IN SELECTED GENERAL AVIATION ACCIDENTS

William R Kirkham, S Marlene Wicks and Donald Lee Lowrey Mar 1982 24 p refs

(AD-A114878, FAA-AM-82-7) Avail NTIS HC A02/MF A01 CSCL 01/2

This report reviews 47 survivable or partly survivable accidents investigated since 1973 by personnel from the Civil Aeromedical Institute The accidents were reviewed for a number of features of crashworthiness and, in particular for injuries to occupants in relation to the severity of the impact and the performance of cabin and restraint systems. Opinions were rendered by trained crash injury investigators as to the role or expected role in seats and upper torso restraints in adding to or lessening the injuries. The data support the general concepts that nonoccupiable portions of the aircraft receive greater physical damage than occupiable areas. The greatest damage to the occupiable area is to the forward portion of cockpit/cabin and the occupants have a greater chance of survival if the cockpit/cabin remains reasonably intact Occupants seated forward in the cockpit/cabin receive greater injuries than those seated more rearward Further the findings suggest tha seat placement or seat failure to one degree or another intensified injuries (as compared to more optimum crashworthy seats) to occupants in at least

N82-29276

30 percent of the accidents reviewed. Upper torso restraints, in the few instances used, were beneficial, and had they been used by all occupants, would have significantly reduced the injuries The report discusses the relation of the occupant to the seat and restraint system and the apparent benefit to be derived from a well-designed impact attenuating seat and, in particular, use of an upper torso restraint Author (GRA)

N82-29276# Federal Aviation Administration Atlantic City N.J. **REDUCTION AND ANALYSIS OF MODE C ALTITUDE DATA** COLLECTED AT HIGH ALTITUDES OVER THE CONTINEN-TAL UNITED STATES Final Report, Sep. 1977 - Apr. 1978Robert Rigolizzo Mar 1982 101 p refs(AD-A114655, DOT/FAA/CT-81/53, DOT/FAA/EM-82/9)Avail NTIS HC A06/MF A01 CSCL 01/2

This report describes the reduction and analysis of mode C altitude data collected over the en route centers of Cleveland, Ohio, Memphis, Tennessee, and Albuquerque, New Mexico. The data were gathered under the aegis of the separation standards program primarily for the study of lateral navigation performance over the continental United States at high altitudes This study provides a procedure for estimating the vertical flight technical error as evidenced from mode C altitude data recorded at the en route centers. It does not account for basic altimeter system error or flight technical error biases and/or fluctuations that are not observable in the ground-derived mode C reported altitude The data are fitted to six different analytical distributional forms The effect that data quantization has on the estimation of the parameters of the distributions is examined. Then statistical tests are performed to evaluate the appropriateness of each distributional model in representing the histogram of the mode C deviations A preliminary analysis is conducted to investigate the association between mode C altitude and aircraft environmental performance characteristics commonly utilized in evaluating separation criteria as well as identifying aircraft attributes that are of major interest when evaluating vertical flight technical Author (GRA) error

N82-29277# Clemson Univ, SC Dept of Industrial Management

MAXIMIZING SOUTH CAROLINA'S AVIATION RE-SOURCES IDENTIFYING POTENTIALLY PROFITABLE COMMUTER AIRLINE ROUTES, VOLUME 2

Clinton H Whitehurst, Jr., Mark A McKnew, Michael W Broadway, and Gayle H Taylor Oct 1981 168 p refs (Grant EDA-04-06-03042-40)

(PB82-139353 EDA-81-0132) Avail NTIS HC A08/MF A01 CSCL 01B

The commuter airline routes within South Carolina were analyzed. It is concluded there are, in fact, a number of potentially profitable commuter airline routes between communities within South Carolina and interstate routes tying some communities in the State to medium and large hub airports. There is however, still work to be done. As communities grow in size and should air service to the State by trunk carriers decline further, it would be well worth it for a community to reevaluate its potential to support commuter service in terms of the profitability criteria outlined in this study GRA

N82-29278# National Transportation Safety Board, Washington, D C Bureau of Technology

ANNUAL REVIEW OF AIRCRAFT ACCIDENT DATA. US **GENERAL AVIATION CALENDAR YEAR 1979** 5 Nov 1981 213 p

(PB82-136250 NTSB-ARG-81-1) NTIS Avail HC A10/MF A01 CSCL 01B

Aircraft accidents which occurred in U.S. general aviation operations during the calendar year 1979 are summarized. It includes an analysis of accident data involving an overview, types of accidents, accidental causal factors, kind of flying, and conclusions a statistical compilation of accident information presented in the form of accident and rate tables, analytic tables, injury tables and cause/factor tables These statistical data are divided into sections pertaining to all operations, small fixed-wing aircraft, large fixed-wing aircraft, rotorcraft, gliders, and collisions between aircraft In 1979, there were 4,023 total general aviation accidents, 678 of which were fatal Included in the total number of accidents are 40 collisions between aircraft Author

N82-29279# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France)

AIRCRAFT FIRE SAFETY

May 1982 174 p refs Presented at AGARD Lecture Series, Oslo, 7-8 Jun 1982 and London, 10-11 Jun 1982 and Washington, 15-16 Jun 1982

ISBN-92-835-1424-6) Avail NTIS (AGABD-15-123 HC A09/MF A01

Progress in aerospace science and technology, especially pertaining to aircraft safety was reported. The goals of the international organization are to strengthen common defense posture, improve international cooperation in research and development, provide scientific and technical advance to NATO in aerospace R&D, increase scientific and technical potential and recommend effective use of R&D capabilities. The following topics are discussed aircraft fire mishap experience/crash fire scenario quantitation, human response to fire aviation fuels, future outlook and impact on aircraft fire threat, fuel system protection methods. fireworthiness of transport aircraft interior systems, the development and application of a full scale wide body test article to study the behavior of interior materials during a postcrash fuel fire, aircraft postcrash fire reduction/survivability enhancement from a manufacturer's viewpoint, and aircraft postcrash fire fighting/rescue For individual titles, see N82-29280 through N82-29287

N82-29280# Federal Aviation Administration, Washington, D.C. Engineering Analysis Branch

AIRCRAFT FIRE MISHAP EXPERIENCE/CRASH FIRE SCENARIO QUANTITATION

Thomas G Horeff /n AGARD Aircraft Fire Safety May 1982 6 p refs (For primary document see N82-29279 20-03) Avail NTIS HC A09/MF A01

Civil and military turbine aircraft accidents were reviewed It was confirmed that the major postcrash fire hazard was caused by ignition of fuel released from wing separation failured during impact survivable accidents. General scenarios for postcrash fire hazards are described and heat flux levels and cabin airflow rates based on fuselage postcrash fire tests are suggested. Fire fatalities to fire tests are suggested. Fire fatalities to fire scenarios and fire experience data base through 1979 are related. It is concluded that the reduction of postcrash fire gives the greatest potential for improved crashworthiness and increased occupant survivability EAK

N82-29281# Army Aeromedical Research Lab, Fort Rucker, Ala

HUMAN RESPONSE TO FIRE

Stanley C Knapp and Francis S Knox, III In AGARD Aircraft Fire Safety May 1982 19 p (For primary document see N82-29279 20-03)

Avail NTIS HC A09/MF A01

Human survival in aircraft fire was investigated. Aircraft fires and human survival in thermophysical dimensions and aircraft fire properties, chemical and toxic nature of fibres, the concept of worst credible environment, and survival time dimension derived from ground and airborne fire suppression are discussed. The epidemiology of human fire morbidity and mortality are divided into (1) no personal protection, no prevention of fire, (2) inadequate protection, no prevention of fire and (3) prevention of fire and good protection. Assessment techniques to select fabric for protective clothing are examined. Physical and biomedical bases to formulated strategies for the development of aircraft fire prevention and personal protection which leads to increased human survival is constructed EAK

N82-29282# Air Force Wright Aeronautical Labs, Wright-Patterson AFB, Ohio Aero Propulsion Lab AVIATION FUELS-FUTURE OUTLOOK AND IMPACT ON

AIRCRAFT FIRE THREAT A V Churchill In AGARD Aircraft Fire Safety May 1982

17 p refs (For primary document see N82-29279 20-03) Avail NTIS HC A09/MF A01

The properties of aviation turbine fuels with respect to aircraft fire safety are described. It is indicated that projections of the availability of petroleum crudes specifications for aviation turbine fuels may have to be modified to use fuels produced from shale oil, heavy oils and coal. Projections of the chemical and physical properties of future aviation fuels produced from these alternative sources are discussed and compared with present fuels. Progress on programs to develop fire safe fuels through the use of antimisting additives is also described EAK

N82-29283# Royal Aircraft Establishment Farnborough (England) Engineering Physics Dept

FUEL SYSTEM PROTECTION METHODS

H W G Wyeth In AGARD Aircraft Fire Safety May 1982 16 p refs (For primary document see N82-29279 20-03) Avail NTIS HC A09/MF A01

A fuel system protection equipment for military aircraft and helicopters, to reduce fires and explosions which occur under combat conditions was developed. Equipments are available for fitment to civil transport for survivability enhancement. It is recommended that aircraft fire safety and crash resistance in the initial design and appropriate safety precautions taken to minimize the risk of fire and explosion both in flight and on the ground should be considered. It is concluded that fuel containment systems and antimisting fuels can reduce dynamic fuel spillage and improve occupant survivability in postcrash fire EAK

N82-29284*# National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif FIREWORTHINESS OF TRANSPORT AIRCRAFT INTERIOR

SYSTEMS

John A Parker and D A Kourtides In AGARD Aircraft Fire Safety May 1982 17 p refs (For primary document see N82-29279 20-03)

Avail NTIS HC A09/MF A01

The fire worthiness of air transport interiors was evaluated The effect of interior systems on the survival of passengers and crew in an uncontrolled transport aircraft fire is addressed Modification of aircraft interior subsystem components which provide improvements in aircraft fire safety are examined. Three specific subsystem components, interior panels, seats and windows offer the most immediate and highest payoff by modifying interior materials of existing aircrafts. It is shown that the new materials modifications reduce the fire hazards because of significant reduction in their characteristic flame spread, heat release, and smoke and toxic gas emissions. EAK

N82-29285# Federal Aviation Administration, Atlantic City, NJ Fire Safety Branch

THE DEVELOPMENT AND APPLICATIONS OF A FULL-SCALE WIDE BODY TEST ARTICLE TO STUDY THE BEHAVIOR OF INTERIOR MATERIALS DURING A POST-CRASH FUEL FIRE

Constantine P Sarkos, Richard G Hill, and Wayne D Howell In AGARD Aircraft Fire Safety May 1982 21 p refs (For primary document see N82-29279 20-03)

Avail NTIS HC A09/MF A01

The full scale, wide body test article was developed to study postcrash cabin fires Applications of the C-133 article are described as follows (1) capabilities and instrumentation (2) derivation of fuel fire test conditions based on physical modeling and fire tests. (3) characterization of cabin fire hazards which result from exposure of wide body interior materials to external fuel fire, and (5) evaluation of effectiveness of urethane seat cushion fire blocking layers and improved cushioning materials It is shown that cabin hazards and parameters associated with postcrash fire can be realized by use of improved materials EAK

N82-29286# British Aerospace Aircraft Group Bristol (England) Fire Precautions Engineering Dept

AIRCRAFT POST CRASH FIRE REDUCTION/ SURVIVABILITY ENHANCEMENT FROM A MANUFACTUR-ER'S VIEWPOINT

T Madgwick /n AGARD Aircraft Fire Safety May 1982 23 p refs (For primary document see N82-29279 20-03) Avail NTIS HC A09/MF A01

The importance of achieving a balanced level of overall safety for flight and crash situations are outlined Research and development in the area of external fire effects and occupant escape is evaluated The crashworthiness requirements developed for the SST and the means of compliance are outlined Cabin interior material combustion hazards are discussed Visibility tests in a smoke filled cabin and the relative importance of toxicity effects in hindering escape are assessed EAK

N82-29287# Deutsche Forschungs- und Versuchsanstalt füer Luft- und Raumfahrt Cologne (West Germany) Inst fuer Antriebstechnik

AIRCRAFT POST-CRASH FIRE FIGHTING/RESCUE

R Fiala In AGARD Aircraft Fire Safety May 1982 27 p refs (For primary document see N82-29279 20-03)

Avail NTIS HC A09/MF A01

The correlation between specific extinguishing time and the size of the burning fuel area was calculated. The influence of fuel properties the boiling temperature and viscosity on extinguishing efficiency of foams is described. An extinguishing efficiency on the foarm properties is presented. The requirements for foam monitors are shown. The break up of foam jets produced by foam monitors is discussed. The extinguishing efficiency with the combined application of dry powder halon and foam and fire are outlined.

N82-29288*# Princeton Univ N J Flight Research Lab DEVELOPMENT OF FLYING QUALITIES CRITERIA FOR SINGLE PILOT INSTRUMENT FLIGHT OPERATIONS Interim Report, Sep. 1979 - May 1981

Aharon Bar-Gill, W Barry Nixon and George E Miller Jun 1982 167 p refs

(Contract NAS1-15764)

(NASA-CR-165932, NAS 1 26 165932 MAE-1528) Avail NTIS HC A08/MF A01 CSCL 17G

Flying qualities criteria for Single Pilot Instrument Flight Rule (SPIFR) operations were investigated The ARA aircraft was modified and adapted for SPIFR operations Aircraft configurations to be flight-tested were chosen and matched on the ARA in-flight simulator, implementing modern control theory algorithms Mission planning and experimental matrix design were completed[®] Microprocessor software for the onboard data acquisition system was debugged and flight-tested Flight-path reconstruction nrocedure and the associated FORTRAN program were developed Algorithms associated with the statistical analysis of flight test results and the SPIFR flying qualities criteria deduction are discussed NW

N82-29290# Federal Aviation Administration, Washington D C Office of Aviation Medicine

EFFECTS OF APPROACH LIGHTING AND VARIATION IN VISIBLE RUNWAY LENGTH ON PERCEPTION OF AP-PROACH ANGLE IN SIMULATED NIGHT LANDINGS

Henry W Mertens and Mark F Lewis Feb 1982 21 p refs (AD-A114742 FAA-AM-82-6) Avail NTIS HC A02/MF A01 CSCL 01/2

Previous experiments have demonstrated illusions due to variations in both length and width of runways in nighttime black hole approaches. Even though approach lighting is not designed to provide vertical guidance, it is possible that cues from approach lights could interact with cues from runway lighting to reduce illusions due to variation in runway size. Two experiments were conducted to evaluate the effect of approach lighting on perception of approach angle in simulated night approaches. In the first experiment, 40 pilots made simulated visual approaches to a 150- by 6,000-ft runway with and without a 3,000-ft approach light system (ALSF-2) Pilots controlled a moving runway model to produce a constant 'normal' angle of approach over the distance range of 23,000 ft to 8,000 ft from threshold In the second experiment 24 pilots made simulated approaches to a 150- by 6,000-ft runway which was either fully visible or which had lights of the upwind half occluded. In addition, a 1,400-ft abbreviated approach light system (SSALS) was used at three intensities. Decreasing the visible length of the runway by occulting lights of the far half increased mean generated approach angles from 2.2 deg to 2.7 deg in agreement with results of a previous experiment involving similar lengths of runways Neither the presence of equal intensity approach lights nor uncomfortable glare from approach lights 20 times brighter than runway lights had an effect of practical significance on responses These findings reinforce previous experimental demonstrations of the importance of runway size cues related to varying runway length, and also show that potential size cues provided by approach lights do not prevent illusions due to GRA variations in runway size

N82-29291# SRI International Corp Menio Park, Calif TERMINAL INFORMATION DISPLAY SYSTEM BENEFITS AND COSTS Final Report

Waheed Siddiqee, Janet Tornow, and Mina Chan Washington FAA Mar 1982 79 p refs (Contract DOT-FA-79-WA-4344)

(AD-A114937.	FAA-APO-82-4)	Avail	NTIS
HC A05/MF A01	CSCL 17/7		

Benefits and costs expected to accrue from a terminal information display system (TIDS) are analyzed TIDS is an electronic data processing system intended to replace (1) present flight data entry and printing equipment and (2) several devices currently used to display meteorological and operational information within towers and terminal radar control facilities A description of the terminal information display system is presented Major sources of both quantifiable and nonquantifiable benefits are discussed. It is shown that the installation of TIDS would improve terminal controller productivity by ten to fifteen percent and would result in a substantial reduction in maintenance costs Information in present value (1981) dollars for the equipment life cycle is presented Over the twenty year service life of TIDS, the analysis indicates that the benefit/cost ratio is 1.74 and the net present value of savings by installing TIDS at thirty major terminal facilities is about \$26 million GRA

N82-29292# Applied Geophysics, Inc., Salt Lake City, Utah GEOPHYSICAL FLIGHT LINE FLYING AND FLIGHT PATH RECOVERY UTILIZING THE LITTON LTN-76 INERTIAL NAVIGATION SYSTEM

A F Mitkus, Dwight Cater, Patrick F Farmer, and S Parker Gay, Jr Nov 1981 177 p refs Prepared for High Life Helicopter, Inc

(Contract DE-AC13-79GJ-01692)

(DE82-005555, GJBX-363-81) Avail NTIS HC A09/MF A01

The Litton LTN-76 Inertial Navigation Systems (INS) with Inertial Track guidance system software is geared toward the airborne survey industry This report is a summary of tests performed with the LTN-76 designed to fly an airborne geophysical survey as well as to recover the subsequent flight path utilizing INS defived coordinates DOE

N82-29293# Advisory Group for Aerospace Research and Development, Neully-Sur-Seine (France)

HUMAN FACTORS IN AIR TRAFFIC CONTROL V David Hopkin (Royal Air Force Inst of Aviation Medicine) Apr 1982 187 p refs

(AGARD-AG-275, ISBN-92-835-1421-1) Avail NTIS HC A09/MF A01

Human factors are related to air traffic control, air traffic control systems the physical surroundings, equipment, and operation of the system, and the selection, development, training and evaluation of air traffic controllers For individual titles, see N82-29294 through N82-29310

N82-29294# Advisory Group for Aerospace Research and Development Neuilly-Sur-Seine (France) THE AIR TRAFFIC CONTROL SYSTEM

In its Human Factors in Air Traffic Control Apr 1982 p 3-9 (For primary document see N82-29293 20-04)

Avail NTIS HC A09/MF A01

Principles and practices of air traffic control are described The information influencing the air traffic control system and the information available to the controller are summarized and defined The users of air traffic control, whether commercial, military, or general aviation traffic is considered, are categorized, and their responsibilities discussed Interactions between air traffic control and the pilot are considered National and regional variations in the problems and practices of air traffic control are described J D

N82-29295# Advisory Group for Aerospace Research and Development Neuilly-Sur-Seine (France) HUMAN FACTORS CONTRIBUTIONS TO AIR TRAFFIC

CONTROL SYSTEMS In its Human Factors in Air Traffic Control Apr 1982 p 10-21

(For primary document see N82-29293 20-04) Avail NTIS HC A09/MF A01

The role of the human factors specialist in air traffic control systems operations and planning is analyzed Man-machine interactions the contribution of human factors engineering to system design the implementation and testing of air traffic control systems and tasks, and the evolution of air traffic control systems and the educational role of human factors specialists as applied to air traffic control are considered JD

N82-29296# Advisory Group for Aerospace Research and Development Neuilly-Sur-Seine (France)

MAN AS A SYSTEM COMPONENT

In its Human Factors in Air Traffic Control Apr 1982 p 22-30 (For primary document see N82-29293 20-04) Avail NTIS HC A09/MF A01

The air traffic controller is considered as a component of a man-machine system Limitations of this approach are considered The allocation of functions the effects of automation and computer assistance, the man-machine interface and human reliability are discussed J D

N82-29297# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France)

HUMAN CAPABILITIES AND LIMITATIONS IN SYSTEMS In its Human Factors in Air Traffic Control Apr 1982 p 31-46 (For primary document see N82-29293 20-04) Avail NTIS HC A09/MF A01

Human capabilities and limitations which restrict the development of air traffic control systems are discussed Sensory factors, perception, learning, memory, capacity for attention, information processing, understanding, problem solving, decision making, and motivation are considered Common mismatches of system requirements with human capabilities are described J D

N82-29298# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France)

JOBS AND TASKS IN AIR TRAFFIC CONTROL

In its Human Factors in Air Traffic Control Apr 1982 p 47-52 (For primary document see N82-29293 20-04)

Avail NTIS HC A09/MF A01

Jobs and tasks are discussed. The required content of job descriptions and their application to allocation of jobs is considered Task analysis and task synthesis, task grouping interactions between tasks, and workloads are described. J.D.

N82-29299# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France)

THE WORK ENVIRONMENT

In its Human Factors in Air Traffic Control Apr 1982 p 53-62 (For primary document see N82-29293 20-04) Avail NTIS HC A09/MF A01

The work environment for all traffic control tasks is considered Principles of workspace design are discussed. The physical environment, suites and consoles, air traffic control centers and control rooms, and air traffic control towers are described. J.D.

N82-29300# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France) DISPLAYS

In its Human Factors in Air Traffic Control Apr 1982 p 63-78 (For primary document see N82-29293 20-04) Avail NTIS HC A09/MF A01

Factors affecting interactions between visual displays and their users are discussed. The physical dimensions of the display, the layout of the display and of information within the display, the information content of the display, visual codings and color codings, the legibility and readability of displays, the relation between displays, and the quality of displayed information are considered. New display technology is summarized. J.D.

N82-29301# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France) CONTROLS

In its Human Factors in Air Traffic Control Apr 1982 p 79-84 (For primary document see N82-29293 20-04) Avail NTIS HC A09/MF A01

The location, type, sensitivity, and interactions of the controls used by the human to convey information to the air traffic control system are discussed. The relationships between controls and visual displays are considered. J D

N82-29302# Advisory Group for Aerospace Research and Development, Neurlly-Sur-Seine (France) COMMUNICATIONS

In its Human Factors in Air Traffic Control Apr 1982 p 85-93 (For primary document see N82-29293 20-04) Avail NTIS HC A09/MF A01

The human factor terms of communication in air traffic control are examined. The effects of known specified variables in communications on controller performance or system efficiency were measured. The importance of speech and the use of computers in the man machine systems as a means of dialogue and information transmission is emphasized. The following topics are discussed transmission of information between air and ground, speech as a medium of communication qualitative attributes of speech, automated speech recognition and automated speech synthesis, coordination and liaison, language and terminology of air traffic control, air traffic phrasing and message formats, information quantification and redundancy in air traffic control messages EA K

N82-29309# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France) ADDITIONAL FUNCTIONS WITHIN THE AIR TRAFFIC

ADDITIONAL FUNCTIONS WITHIN THE AIR TRAFFIC CONTROL SYSTEM

In its Human Factors in Air Traffic Control Apr 1982 p 150-153 (For primary document see N82-29293 20-04) Avail NTIS HC A09/MF A01

The application of human factors engineering to other job functions existing within the air traffic control system is discussed Personnel involved in data gathering, maintenance of system integrity, fault finding, supervision, and traffic control assistance are considered JD

N82-29310# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France) FUTURE TRENDS AND PROBLEMS

In its Human Factors in Air Traffic Control Apr 1982 p 154-155 (For primary document see N82-29293 20-04) Avail NTIS HC A09/MF A01

Anticipated developments and problems occurring in the application of human factors engineering to air traffic control systems, particularly in the light of technological advances in hardware and software, are summarized J D

N82-29311*# National Aeronautics and Space Administration Ames Research Center, Moffett Field, Calif

ESTABLISHMENT OF A ROTOR MODEL BASIS R E McFarland Jun 1982 93 p refs Prepared in cooperation

with Army Aviation Research and Development Command, Moffett Field, Calif

(NASA-TP-2026, A-8605, NAS 1 60 2026,

AVRADCOM-TR-81-A-14) Avail NTIS HC A05/MF A01 CSCL 01C

Radial-dimension computations in the RSRA's blade-element model are modified for both the acquisition of extensive baseline data and for real-time simulation use. The baseline data, which are for the evaluation of model changes, use very small increments and are of high quality. The modifications to the real-time simulation model are for accuracy improvement, especially when a minimal number of blade segments is required for real-time synchronization. An accurate technique for handling tip loss in discrete blade models is developed. The mathematical consistency and convergence properties of summation algorithms for blade forces and moments are examined and generalized integration coefficients are applied to equal-annuli midpoint spacing Rotor conditions identified as 'constrained' and balanced' are used and the propagation of error is analyzed.

N82-29312*# Cincinnati Univ, Ohio Dept of Aerospace Engineering and Applied Mechanics

FLAP-LAG-TORSIONAL DYNAMICS OF EXTENSIONAL AND INEXTENSIONAL ROTOR BLADES IN HOVER AND IN FORWARD FLIGHT Semiannual Progress Report, Jan - Jun. 1982

Crespo DaSilva Jun 1982 72 p refs

(Grant NAG2-38)

(NASA-CR-169159, NAS 1 26 169159) Avail NTIS HC A04/MF A01 CSCL 01C

The reduction of the O(cu epsilon) integro differential equations to ordinary differential equations using a set of orthogonal functions is described Attention was focused on the hover flight condition. The set of Galerkin integrals that appear in the reduced equations was evaluated by making use of nonrotating beam modes. Although a large amount of computer time was needed to accomplish this task, the Galerkin integrals so evaluated were stored on tape on a permanent basis. Several of the coefficients were also obtained in closed form in order to check the accuracy of the numerical computations. The equilibrium solution to the set of 3n equations obtained was determined as the solution to a minimization problem.

N82-29313*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va

THE FEASIBILITY OF A HIGH-ALTITUDE AIRCRAFT PLATFORM WITH CONSIDERATION OF TECHNOLOGICAL AND SOCIETAL CONSTRAINTS Thesis - Kansas Univ

Ernald B Graves Jun 1982 250 p refs (NASA-TM-84508 NAS 1 15 84508) Avail NTIS HC A15/MF A01 CSCL 01C

The feasibility of remotely piloted aircraft performing year around missions at an altitude of 70 000 feet is determined Blimp and airplane type vehicles employing solar-voltaic, microwave, or nuclear propulsion systems were considered A payload weighing 100 pounds and requiring 1000 watts of continuous power was assumed for analysis purposes Results indicate that a solar powered aircraft requires more solar cell area than is available on conventional aircraft configurations if designed for the short days and high wind speeds associated with the winter season A conventionally shaped blimp that uses solar power appears feasible if maximum airspeed is limited to about 100 ft/s. No viable airplane configuration that uses solar power and designed to withstand the winter environment was found Both a conventionally shaped blimp and airplane appear feasible using microwave power. Nuclear powered aircraft of these type are also feasible. Societal attitudes toward the use of solar power in high altitude aircraft appear favorable. The use of microwave power for this purpose is controversial, even though the ground station required would transmit power at levels comparable to existing satellite communications stations SL

N82-29315*# Bell Helicopter Co, Fort Worth, Tex INVESTIGATION OF CORRELATION BETWEEN FULL-SCALE AND FIFTH-SCALE WIND TUNNEL TESTS OF A BELL HELICOPTER TEXTRON MODEL 222 Final Report Patrick K Squires Jun 1982 401 p refs

(Contract NAS2-10773)

(NASA-CR-166362, NAS 1 26 166362) Avail NTIS HC A18/MF A01 CSCL 01C

Reasons for lack of correlation between data from a fifth-scale wind tunnel test of the Bell Helicopter Textron Model 222 and a full-scale test of the model 222 prototype in the NASA Ames 40-by 80-foot tunnel were investigated This investigation centered around a carefully designed fifth-scale wind tunnel test of an accurately contoured model of the Model 222 prototype mounted on a replica of the full-scale mounting system. The improvement in correlation for drag characteristics in pitch and yaw with the fifth-scale model mounted on the replica system is shown. Interference between the model and mounting system was identified as a significant effect and was concluded to be a primary cause of the lack of correlation in the earlier tests.

Author

N82-29316*# Massachusetts Inst of Tech , Cambridge Flight Transportation Lab

THE COST OF NOISE REDUCTION FOR DEPARTURE AND ARRIVAL OPERATIONS OF COMMERCIAL TILT ROTOR AIRCRAFT

Henry B Faulkner and William M Swan Jun 1976 118 \ensuremath{p} refs

(Contract NAS2-7620)

(NASA-CR-137803 NAS 1 26 137803) Avail NTIS HC A06/MF A01 CSCL 01C

The relationship between direct operating cost (DOC) and noise annoyance due to a departure and an arrival operation was developed for commercial tilt rotor aircraft. This was accomplished by generating a series of tilt rotor aircraft designs to meet various noise goals at minimum DOC. These vehicles ranged across the spectrum of possible noise levels from completely unconstrained to the quietest vehicles that could be designed within the study ground rules. Optimization parameters were varied to find the minimum DOC. This basic variation was then extended to different aircraft sizes and technology time frames. Author

N82-29317*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va

AUTOMATED OPTIMUM DESIGN OF WING STRUCTURES DETERMINISTIC AND PROBABILISTIC APPROACHES S. S. Bao, Aug. 1987, 47 p. refs

S S Rao Aug 1982 47 p refs (NASA-TM-84475, L-15169, NAS 1 15 84475) Avail NTIS HC A03/MF A01 CSCL 01C

The automated optimum design of airplane wing structures subjected to multiple behavior constraints is described. The structural mass of the wing is considered the objective function. The maximum stress, wing tip deflection, root angle of attack, and flutter velocity during the pull up maneuver (static load), the natural frequencies of the wing structure and the stresses induced in the wing structure due to landing and gust loads are suitably constrained Both deterministic and probabilistic approaches are used for finding the stresses induced in the airplane wing structure due to landing and gust loads A wing design is represented by a uniform beam with a cross section in the form of a hollow symmetric double wedge. The airfoil thickness and chord length are the design variables, and a graphical procedure is used to find the optimum solutions. A supersonic wing design is represented by finite elements. The thicknesses of the skin and the web and the cross sectional areas of the flanges are the design variables, and nonlinear programming techniques are used to find the optimum solution

N82-29318# Aeronautical Research Labs , Melbourne (Australia) A DISCUSSION OF THE FLYING QUALITY REQUIREMENTS OF A BASIC TRAINING AIRCRAFT

C A Martin Mar 1982 16 p refs (AD-A114805, ARL/AERO-TM-337) NTIS Avail HC A02/MF A01 CSCL 01/3

This Memo aims to identify flying qualities of importance in a basic training aircraft and also to suggest interpretations of particular military specifications The proposition is developed that flying qualities which are considered good for an operational aircraft are not necessarily desirable for a training aircraft GRA

N82-29319*# National Aeronautics and Space Administration Langley Research Center Hampton, Va

HEADS UP DISPLAY Patent Application

H Douglas Garner and William E Howell, inventors (to NASA) Filed 28 May 1982 12 p (NASA-Case-LAR-12630-1 US-Patent-Appl-SN-383384) Avail

NTIS HC A02/MF A01 CSCL 01D

A heads up aircraft display which allows the pilot to view the display without diverting his attention from the scene ahead is disclosed. The display is designed for use on propeller driven aircraft comprised of a radially disposed row of lamps embedded in the rear surface of a propeller. Measurements of flight data are made by conventional means and converted into digital signals These digital signals are applied to graphic generators which control lamp drivers which in turn control lamps through slip rings The lamps are lit at the appropriate times during each revolution of the propeller to display the flight data in graphic form to the pilot. The combination of graphic generators and radially disposed lamps embedded in an aircraft propeller enables the pilot to view the display without diverting his attention from the scene ahead NASA

N82-29321# National Center for Atmospheric Research, Boulder, Colo Atmospheric Technology Div

AN EVALUATION OF THE ROSEMOUNT ICE DETECTOR FOR CLOUD WATER CONTENT MEASUREMENTS E N Brown Oct 1981 19 p refs

(Grant NSF ATM-77-23757)

(PB82-158833, NCAR/TN-183) NTIS Avail HC A02/MF A01 CSCL 14B

A Rosemount ice detector was installed on a Research Aviation Facility Queen Air for evaluation. It was used during a winter stratus cloud experiment at Muskegon Michigan (1978) and also during a cumulus cloud experiment (HIPLEX) in 1980 at Big Spring, Texas Results indicate that the detector is an extremely sensitive instrument with a reasonable dynamic range The instrument provides a measurement of icing severity and valid computed water content values only for conditions of small water content and/or low temperature GRA

N82-29322# Aeronautical Research Labs , Melbourne (Australia) **RESULTS OF T56 ENGINE PERFORMANCE MONITORING** TRIAL IN HERCULES AIRCRAFT, FEBRUARY - JULY 1977 D E Glenny Apr 1981 37 p refs

(ARL-MECH-Eng-TECH-MEMO-409 AR-002-277) Avail NTIS HC A03/MF A01

An éngine performance monitoring trial was carried out on the Hercules aircraft. The engine monitoring procedures were developed as an aid to the flight engineer and the maintenance section so that the performance of the Allison T56 engines were monitored more closely than was specified in operating procedures, thus enabling engine operation and maintenance

action to be carried out more effectively. The trial was conducted on Hercules aircraft, and the initial analysis of results was carried out by personnel who are responsible for maintenance of these aircrafts Operating instructions for aircrew and maintenance personnel and the results of the trial are presented Details of the rationale behind the monitoring procedures and overall conclusions on the trial are given SL

N82-29323*# Teledyne CAE, Toledo, Ohio COOLED VARIABLE NOZZLE RADIAL TURBINE FOR ROTOR CRAFT APPLICATIONS

C Rogo Mar 1981 205 p refs

(Contract NAS3-22005, DA Proj 1L1-62209-AH-76) (NASA-CR-165397 NAS 1 26 165397 Rept-1759)

Avail NTIS HC A10/MF A01 CSCL 21E

An advanced, small 2 27 kb/sec (5 lbs/sec), high temperature. variable area radial turbine was studied for a rotor craft application Variable capacity cycles including single-shaft and free-turbine engine configurations were analyzed to define an optimum engine design configuration Parametric optimizations were made on cooled and uncooled rotor configurations. A detailed structural and heat transfer analysis was conducted to provide a 4000-hour life HP turbine with material properties of the 1988 time frame A pivoted vane and a moveable sidewall geometry were analyzed Cooling and variable geometry penalties were included in the cycle analysis A variable geometry free-turbine engine configuration with a design 1477 K (2200 F) inlet temperature and a compressor pressure ratio of 16.1 was selected. An uncooled HP radial turbine rotor with a moveable sidewall nozzle showed the highest performance potential for a time weighted duty Author cycle

N82-29324*# National Aeronautics and Space Administration Lewis Research Center, Cleveland, Ohio

QCSEE OVER-THE-WING ENGINE ACOUSTIC DATA

Harry E Bloomer and Irvin J Loeffler May 1982 28 p refs (NASA-TM-82708 E-990 NAS 1 15 82708) Avail NTIS HC A03/MF A01 CSCL 21E

The over the wing (OTW) Quiet, Clean, Short Haul Experimental Engine (QCSEE) was tested at the NASA Lewis Engine Noise Test Facility A boilerplate (nonflight weight), high throat Mach number acoustically treated inlet and a D shaped OTW exhaust nozzle with variable position side doors were used in the tests along with wing and flap segments to simulate an installation on a short haul transport aircraft All of the acoustic test data from 10 configurations are documented in tabular form. Some selected narrowband and 1/3 octave band plots of sound pressure level are presented Author

N82-29325# Exotech Proprietary Ltd , Monterey, Calif MULTISTAGE AXIAL COMPRESSOR PROGRAM ON TIP CLEARANCE EFFECTS Contractor Report, May 1979 - Aug. 1981

I Moyle Aug 198 (Contract N62271-			
(AD-A107445, HC A03/MF A01	NPS67-81-01CR) CSCL 21/5	Avail	NTIS

Tip clearance has long been known to be a source of losses in axial compressors with cantilevered blades. The reasons for the losses, however, are not well understood and current practice in engine design still requires extensive effort to maintain constant minimal operating clearances over a wide range of conditions The emphasis on clearance control may be appreciated by the typical observation that a ten percent change in peak static pressure rise in a compressor stage may occur for a fifty percent change in clearance. Clearances are typically in the one to five percent of major passage dimension range, and thus a small change in passage dimensions represents a large change in clearance. It is clear that, in general, it would be desirable that blading performance be less sensitive to changes in clearance Less sensitivity would allow a general relaxation of the mechanical tolerances on a compressor assembly and provide more consistent transient performance. The aerodynamics of achieving such a situation are a challenge as the underlying requirement is improved performance at larger clearances. Work toward understanding the basic mechanisms of tip clearance effects with an emphasis on designing for clearance has been commenced at the Naval Postgraduate School Turbopropulsion Laboratory (NPS/TPL) This report summarizes the preliminary work on the Multistage Compressor (MSC) facility at the Laboratory GRA

N82-29326# Purdue Univ , Lafayette, Ind School of Mechanical Engineering

WATER INGESTION INTO AXIAL FLOW COMPRESSORS. PART 3: EXPERIMENTAL RESULTS AND DISCUSSION Final Report, 15 Dec. 1977 - 30 Jun. 1981

T Tsuchiya, S N B Murthy, C M Ehresman, and D Richards Wright-Patterson AFB Ohio AFWAL Oct 1981 268 p refs (Contract F33615-78-C-2401, AF Proj 3066) (AD-A114830, AFWAL-TR-80-2090-Pt-3) Avail NTIS

HC A13/MF A01 CSCL 21/5 The subject of air-water mixture flow in axial compressors

of jet engines is of practical interest in two contexts of water ingestion during take-off from rough runways with puddles of water and during flight through rain storms. The change in the compressor performance in turn produces changes in the performance of other components and of the engine as a whole During the current investigation, (1) an analysis of the effects of water ingestion into a compressor has been carried out leading to the development of a predictive code, the PURDU-WICSTK program and (2) a series of tests have been carried out on a small test compressor with mixtures of gases (containing methane gas to simulate steam) and with air-water droplet mixtures. The experimental results have been compared with predictions. It is concluded that the basic effects of water ingestion into compressors arise through (1) blockage, (2) distortion and (3) heat and mass transfer processes, the changes in blade aerodynamic performance being relatively small. In the case of a compressor of small mass flow and pressure ratio and high operating speed, increased quantities of water ingestion give rise to large quantities of water in the tip region GRA

N82-29327# Purdue Univ, Lafavette, Ind School of Mechanical Engineering

EFFECT OF WATER ON AXIAL FLOW COMPRESSORS. PART 2: COMPUTATIONAL PROGRAM Final Report,

15 Dec. 1977 - 30 Sep. 1980 T Tsuchiya and S N B Murthy Wright-Patterson AFB, Ohio AFWAL Jun 1981 425 p refs

(Contract F33615-78-C-2401, AF Proj 3066)

(AD-A114831, AFWAL-TR-80-2090-Pt-2) Avail NTIS HC A18/MF A01 CSCL 21/5

An analysis of the performance of an axial flow compressor operating with mixtures of gases and air-water droplet mixtures was performed. In the case of mixtures of gases, account was taken of the changes in molecular weight and ratio of specific heats in the case of two phase flow, the major processes of interest are (1) droplet blade interaction. (2) droplet heating, (3) droplet centrifuging, and (4) droplet break up. The PURDU-WICSTK program developed for the prediction of compressor performance was utilized to obtain the performance of a test compressor A three dimensional stream line computer code the UD-0300, was also modified and exercised in the case of compressor operation with mixtures of gases. Water ingestion into the compressor of an aircraft gas turbine engine affects the performance of the engine, and a preliminary analysis of the nature of the effects was also conducted MG

N82-29328# Iowa State Univ of Science and Technology, Ames Turbomachinery Components Research Lab AERODYNAMICS OF ADVANCED AXIAL FLOW TURBO-MACHINERY Annual Report, 1 Oct. 1980 - 30 Sep. 1981

George K Serovy, Patrick Kavanagh, and Theodore H Okushi Dec 1981 82 p refs (Grant AF-AFOSR-0004-80, AF Proj 2307)

(AD-A114911 ISU-ERI-AMES-82108 TCRL-22,

AFOSR-82-0201TR) Avail NTIS HC A05/MF A01 CSCL 21/5

A multi-task research program on the aerodynamics of advanced axial-flow turbomachinery is continuing at lowa State University Program components are intended to result in direct contributions to the improvement of axial-flow fan, compressor, and turbine design procedures. A detailed experimental investigation of intrapassage flow in a large-scale, curved, rectangular cross section channel representative of turbomachinery passages is in progress Author (GRA)

N82-29329*# National Aeronautics and Space Administration Langley Research Center, Hampton, Va AGRICULTURAL AIRPLANE MISSION TIME STRUCTURE

CHARACTERISTICS

Joseph W Jewel, Jr Jul 1982 44 p refs (NASA-TM-84470, L-15125, NAS 1 15 84470) Avail NTIS

HC A03/MF A01 CSCL 01C

The time structure characteristics of agricultural airplane missions were studied by using records from NASA VGH flight recorders Flight times varied from less than 3 minutes to more than 103 minutes. There was a significant reduction in turning time between spreading runs as pilot experience in the airplane type increased. Spreading runs accounted for only 25 to 29 percent of the flight time of an agricultural airplane. Lowering the longitudinal stick force appeared to reduce both the turning time between spreading runs and pilot fatigue at the end of a working day Author

N82-29330* National Aeronautics and Space Administration John F Kennedy Space Center, Cocoa Beach, Fla METHOD FOR REFURBISHING AND PROCESSING

PARACHUTES Patent

Russell T Crowell, inventor (to NASA) Issued 2 Feb 1982 7 p Filed 30 May 1980 Supersedes N81-14967 (19 - 06, p 0706) Division of US Patent Appl SN-862878, filed 12 Dec 1977, US Patent-4,244,810

(NASA-Case-KSC-11042-1, US-Patent-4,313,291, US-Patent-4,244 810 US-Patent-Appl-SN-154663

US-Patent-Appl-SN-862878 US-Patent-Class-53-429,

US Patent and Trademark US-Patent-Class-8-150) Avail Office CSCL 14B

A system and method for refurbishing and processing parachutes is discussed including an overhead monorail conveyor system on which the parachute is suspended for horizontal conveyance The parachute is first suspended in partially open tented configuration wherein open inspection of the canopy is permitted to remove debris and inspect all areas. Following inspection, the parachute is transported by the monorail conveyor to a washing and drying station with the parachute canopy mounted on the conveyor ina systematic arrangement which permits water and air to pass through the ribbonlike material of the canopy Following drying of the parachute the parachute is conveyed into an interior space where it is finally inspected and removed from the monoral conveyor and laid upon a table for folding Official Gazette of the U.S. Patent and Trademark Office

N82-29331*# National Aeronautics and Space Administration John F Kennedy Space Center Cocoa Beach, Fla

INFLIGHT IFR PROCEDURES SIMULATOR Patent Applica-, tion

Lloyd C Parker inventor (to NASA) Filed 11 Jun 1982 22 p (NASA-Case-KSC-11218-1 US-Patent-Appl-SN-387649) Avail NTIS HC A02/MF A01 CSCL 14B

An in-flight trainer designed to train students in a conventional aircraft is disclosed. The trainer generates simulated signals and commands to conventional instruments provided in the aircraft that correspond to the normal signals a pilot receives during instrument flight rule (IFR) flights and landing and departure procedures Results of studies conducted using apparatus which demonstrated the concept indicate that the concept is feasible Also students trained using only the In-flight IFR Simulator were more proficient in skills development than those trained using table-top simulators and in aircraft in the conventional manner JMS

N82-29332# Seville Research Corp Pensacola Fla **OPERATIONAL TEST AND EVALUATION HANDBOOK FOR** AIRCRAFT TRAINING DEVICES VOLUME 1 PLANNING AND MANAGEMENT Final Report

Thomas H Gray, Stephen R Osborne Rolk I Hockenberger and James P Smith Williams AFB Ariz Air Force Human Resources Lab Feb 1982 72 p refs

(Contract F33615-78-C-0063 AF Proj 1123)

(AD-A112498 AFHRL-TR-81-44-Vol-1) HC A04/MF A01 CSCL 05/9 Avail NTIS

The handbook comprised of three volumes is intended to provide guidelines and procedures appropriate for Air Force Operational Test and Evaluation (OT/E) personnel to use in planning conducting and reporting the results of simulator assessment efforts. Although of value of all test personnel it is primarily for the typical novice test manager/director-a person who has subject matter expertise (e.g. a qualified pilot or operator) but who may have little or no previous OT/E experience. The handbook provides detailed coverage on OT/E planning and management with special emphasis on measuring device operational effectiveness and suitability. In accord with its objectives the handbook was prepared to serve as a supplement to Air Force Manual 55 43 Management of Operational Test

N82-29333

and Evaluation', by providing those specific additional evaluation concepts and techniques necessary for aircrew training device (ATD) test and evaluation Volume 1 is concerned first with describing both general and specific ATD OT/E planning and management considerations and links those events which occur early in the ATD acquisition process to later ATD OT/E planning and management activities. It defines the various evaluation concepts germane to understanding ATD OT/E, and describes the two major ATD OT/E matters of ATD OT/E, and describes the two major ATD OT/E matters of ATD value and worth to the Air Force. The acquisition and life cycle costs associated with modern ATDs make such concerns important.

N82-29333# Calspan Field Services Inc., Arnold Air Force Station, Tenn

THE USE OF A MULTI-DEGREE-OF-FREEDOM DUAL BALANCE SYSTEM TO MEASURE CROSS AND CROSS-COUPLING DERIVATIVES Final Report, 1 Oct. - 1 Nov. 1981

D R Haberman AEDC Apr 1982 92 p refs Sponsored by Air Force (AD-A114813 AEDC-TR-81-34) Avail NTIS

(AD-A114813, AEDC-TR-81-34) Avail NTIS HC A05/MF A01 CSCL 12/1

The equations of motion are derived for two existing dual balance systems used at the Arnold Engineering Development Center (AEDC) to obtain measurements of aerodynamic cross and cross-coupling derivatives The complete equations of motion presented include the effects of sting motion Each system incorporates a dynamic cross flexure balance and a five-component static balance. The primary deflection modes of the balances were confirmed using a holographic interferometry measurement technique Both laboratory and wind tunnel data are presented or illustrate dynamic effects.

N82-29334# Advisory Group for Aerospace Research and Development Neuilly-Sur-Seine (France) Fluid Dynamics Panel

WINDTUNNEL CAPABILITY RELATED TO TEST SECTIONS, CRYOGENICS, AND COMPUTER-WINDTUNNEL INTEGRA-TION

Apr 1982 64 p refs

using kinetic theory

(AGARD-AR-174, ISBN-92-835-1420-3) Avail NTIS HC A04/MF A01

The roles of computational fluid dynamics and wind tunnels, and their growing interdependence are considered. Transonic test sections, cryogenic testing technology, and integration of computer and wind tunnel testing are discussed.

N82-29343# Sandia Labs , Albuquerque, N Mex Aerodynamic Simulation Div

USER'S MANUAL FOR THE AMEER FLIGHT PATH-TRAJECTORY SIMULATION CODE Eugene J Meyer Oct 1981 187 p refs

(Contract DE0AC04-76DP-00789) (DE82-007004 SAND-80-2056) Avail NTIS HC A09/MF A01

A guide to the use of the AMEER (Aero-Mechanical Equations Evaluation Routines) flight path-trajectory simulation code is presented The input data requirements, computed output data available, code control features, and code flow logic are described for a rigid-body six-degree-of-freedom or point mass simulation DOE

N82-29347# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil)

PRELAUNCH ESTIMATES OF NEAR EARTH SATELLITE LIFETIMES USING QUASI-DYNAMIC ATMOSPHERE MODELS - APPLICATION TO A PROPOSED BRAZILIAN SATELLITE

Nellore S Venkataraman and Kondapallı Rama Rao Feb 1982 22 p refs Submitted for publication

(INPE-2325-PRE/080) Avail NTIS HC A02/MF A01 A rapid prelaunch estimate of near Earth satellite lifetimes using the small perturbation theory is calculated A quasi-dynamic atmospheric model is used employing a different exospheric temperature every three months The drag coefficient is calculated

N82-29393# Ellis (George S), Chardon, Ohio ETHANOL PRODUCTION BY VAPOR COMPRESSION
 DISTILLATION
 Final
 Report

 George
 S
 Ellis
 1981
 9 p

 (Contract DE-FG02-80R5-10240)
 (DE82-004892, DOE/R5-10240/2)
 Avail
 NTIS

 HC
 A02/MF
 A01
 Avail
 NTIS

It was the goal of the project to develop and demonstrate a one (1) gallon per hour vapor compression distillation unit for fuel ethanol production that could be profitably manufactured and economically operated by individual family units. The unit constructed was originally built for strictly ambient temperature operation, but later modified to permit elevated temperature operation. It successfully separated ethanol from a dilute solution, but only at a very low production rate. The initial configuration had the compressor located outside of the distillation vessel and was losing excessive energy to the environment Therefore, it would not be possible to operate that design at elevated temperature. Thus, the compressor was moved inside the distillation vessel.

N82-29464# Brookhaven National Lab Upton, N Y WATER-COMPATIBLE POLYMER CONCRETE MATERIALS FOR USE IN RAPID REPAIR SYSTEMS FOR AIRPORT RUNWAYS Final Report, Mar. 1980 - Feb. 1981 T Sugama and L E Kukacka Mar 1981 128 p refs (Contracts AFOSR ISSA 80-00027, DE-AC02-76CH-00016,

AF Proj 2307) (DE82-010994, BNL-51390, AFOSR-81-0589TR) Avail NTIS HC A07/MF A01

Water-compatible polymer concrete (PC) formulations were developed which appear to have potential for use in all-weather rapid repair procedures for bomb-damaged runways. Formulations consisting of furfuryl alcohol, water-saturated aggregate, dry silica flour, promoters, and catalysts produced composites with properties suitable for repair purposes when mixed and polymerized at temperatures from -200 to 300 C Calcium-unsaturated polyester complexed PC also produced excellent properties However, the early strength criteria [2000 psi (13 78 MPa) at 1 h] and other requirements such as compatibility of the formulation with water and practical working times could be attained only at temperatures > 200 C This system can be polymerized under water Studies of the polymerization reaction mechanisms, materials properties, costs, and potential placement methods were performed DOE

N82-29476# UOP Inc , Des Plaines, III

UNITED STATES AIR FORCE SHALE OIL TO FUELS, PHASE 2 Interim Technical Report, 1 Apr. 1979 - 30 Sep. 1980

J R Wilcox, J G Sikonia, T G Board, and F J Riedl Wright-Patterson AFB, Ohio AFWAL Nov 1981 295 p refs (Contract F33615-78-C-2079)

(AD-A114531, AFWAL-TR-81-2116) Avail NTIS HC A13/MF A01 CSCL 21/4

Phase II of this project was conducted to demonstrate innovative technology to reduce the cost of converting shale oil to high yields of aviation turbine fuels. To carry out this program, UOP selected a processing scheme involving hydrocracking as the primary conversion unit. The Phase II program included pilot plant processing, fouling studies and economic analysis. The pilot plant operations performed during Phase II involved four specific processing steps feed preparation, low pressure hydrotreating. high pressure hydrotreating, and hydrocracking Two shale oil feedstocks were utilized for each processing step shale oil derived from Occidental Modified In-Situ retort and shale oil obtained from the Paraho direct-heated retort. Using data generated from the pilot plant operations and the study basis provided by the USAF, economic analyses were performed to find the cost of production of jet fuel, and total liquid product at a 15% discounted cash flow rate of return (DCFRR) on investment GRA

N82-29510*# Draper (Charles Stark) Lab , Inc , Cambridge, Mass

SYSTEM DATA COMMUNICATION STRUCTURES FOR ACTIVE-CONTROL TRANSPORT AIRCRAFT, VOLUME 1 Final Report

A L Hopkins, J H Martin, L D Brock, D G Jansson, S Serben, T B Smith, and L D Hanley Jun 1981 236 p refs 2 Vol

(Contract NAS1-15359)

(NASA-CR-165773-Vol-1, NAS 1 26 165773-Vol-1,

R-1469-Vol-1) Avail NTIS HC A11/MF A01 CSCL 17B

Candidate data communication techniques are identified, including dedicated links, local buses, broadcast buses, multiplex buses, and mesh networks The design methodology for mesh networks is then discussed, including network topology and node architecture Several concepts of power distribution are reviewed, including current limiting and mesh networks for power. The technology issues of packaging, transmission media, and lightning are addressed, and, finally, the analysis tools developed to aid in the communication design process are described. There are special tools to analyze the reliability and connectivity of networks and more general reliability analysis tools for all types of SL systems

N82-29511*# Draper (Charles Stark) Lab , Inc, Cambridge, Mass

SYSTEM DATA COMMUNICATION STRUCTURES FOR ACTIVE-CONTROL TRANSPORT AIRCRAFT, VOLUME 2 Final Report

A L Hopkins, J H Martin, L D Brock, D G Jansson, S Serben, T B Smith, and L D Hanley Jun 1981 156 p refs 2 Vol

(Contract NAS1-15359)

(NASA-CR-165773-Vol-2, NAS 1 26 165773-Vol-2,

R-1469-Vol-2) Avail NTIS HC A08/MF A01 CSCL 17B

The application of communication structures to advanced transport aircraft are addressed. First, a set of avionic functional requirements is established, and a baseline set of avionics equipment is defined that will meet the requirements. Three alternative configurations for this equipment are then identified that represent the evolution toward more dispersed systems Candidate communication structures are proposed for each system configuration, and these are compared using trade off analyses, these analyses emphasize reliability but also address complexity Multiplex buses are recognized as the likely near term choice with mesh networks being desirable for advanced, highly dispersed systems S1

N82-29520# Lincoln Lab , Mass Inst of Tech , Lexington **MOVING TARGET DETECTOR (MOD 2)**

David Karp and John R Anderson 3 Nov 1981 159 p refs (Contracts DOT-FATQ-WAI-679, F19628-80-C-0002) (AD-A114709, ATC-95, FAA-RD-80-77) Avail NTIS HC A08/MF A01 CSCL 17/9

Under FAA sponsorship, MIT/Lincoln Laboratory has developed a second generation, field operable Moving Target Detection System (MTD-II) which has been tested at operational FAA terminal and enroute radar sites, and serves as the basis for the ASR-9 MTD technical performance specifications This summary report covers the period October, 1976 through September, 1979 in which design, development, field testing and system performance evaluation were carried out Report No FAA-RD-76-190, ATC-69, Description and Performance Evaluation of the Moving Target Detector' dated 8 March 1977, serves as the technical foundation of this work MTD-processing design modifications were effected to handle conditions of excessive ground clutter and moving ground traffic. The rationale for the modified algorithms is provided, and measured performance characteristics at several FAA field sites are discussed Author (GRA)

N82-29527# Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine (France)

ELECTROMAGNETIC PROPAGATION PROBLEMS IN THE TACTICAL ENVIRONMENT

Apr 1982 155 p refs Lecture Series held in Munich, 3-4 May 1982 and Paris, 6-7 May 1982

(AGARD-LS-120, ISBN-92-835-1419-X) NTIS Avail HC A08/MF A01

Propagation criteria affecting the performance of electronic equipment under battlefield conditions are discussed. For individual titles, see N82-29528 through N82-29537

N82-29535# Royal Aircraft Establishment, Farnborough (England)

PROPAGATION PROBLEMS ASSOCIATED WITH AIR-CRAFT COMMUNICATIONS SYSTEMS

B Burgess In AGARD Electromagnetic Propagation Probl in the Tactical Environ Apr 1982 10 p refs (For primary document see N82-29527 20-32) Avail NTIS HC A08/MF A01

Communications with mobiles is assuming increasing importance in a military context, with the advances in technology enabling not only greater amounts of information to be transferred. but also fostering a much harsher electromagnetic environment The trend towards digital communications systems coupled with the possible demand for the wider bandwidths means that the propagation medium characteristics that influence the performance of these links are somewhat different from those that need to be addressed for narrowband analogue modulation transmissions The various types of communications systems that are used with aeromobile platforms are reviewed and the various propagation problems that arise in achieving systems with good overall performance discussed. The links are conveniently divided into two types beyond line of sight and line of sight systems, and span the frequency range from LF through to microwaves Author

N82-29555# Syracuse Univ N Y Dept of Physics COMPUTER ENHANCED ANALYSIS OF A JET IN A CROSS-STREAM

John W Trischka and Nancy J Birkenheuer (Midwest Research Inst, Golden, Colo) 22 Feb 1982 41 p refs Backup document for AIAA synoptic scheduled for publication in the AIAA Journal, Feb 1983

Avail NTIS HC A03/MF A01

Previously analyzed velocity data for a jet in a wind tunnel cross stream was used in a computer analysis which, through interpolation and extrapolation, produced velocity and vorticity fields on a uniform three dimensional grid Microfilm output from the computer displayed isopleths on sets of planes in three orthogonal directions. Improved determinations were made of the jet center line of the center lines of the bound vortices and of the jet boundaries. Stationary waves were discovered in the mixing region on the upstream side of the jet. An explanation for these waves is proposed. The angle between vorticity and velocity is used to compare the flow with complex lamellar and Beltrami flows A convergence feature in the jet wake is noted Author

N82-29556*# National Aeronautics and Space Administration Ames Research Center, Molfett Field, Calif CORRELATION OF PRESTON-TUBE DATA WITH LAMINAR

SKIN FRICTION (LOG NO. J12984)

T D Reed (Oklahoma State Univ., Stillwater), A Abu-Mostafa (Oklahoma State Univ , Stillwater), and F. W. Steinle, Jr. 18 Jan 1982 37 p refs Backup document for AIAA Synoptic scheduled for publication in AIAA Journal in Feb 1983

(Grants NSG-2396, NAG2-76)

(NASA-TM-84827 NAS 1 15 84827, Log-J12984) Avail NTIS HC A03/MF A01 CSCL 20D

Preston tube data within laminar boundary layers obtained on a sharp ten-degree cone in the NASA Ames eleven-foot transonic wind tunnel are correlated with the corresponding values of theoretical skin friction Data were obtained over a Mach number range of 0.30 to 0.95 and unit Reynolds numbers of 984, 131, and 164 million per meter. The rms scatter of skin friction coefficient about the correlation is of the order of one percent, which is comparable to the reported accuracy for calibrations of Preston tubes in incompressible pipe flows. In contrast to previous works on Preston tube/skin friction correlations, which are based on the physical height of the probe's face, this satisfactory correlation for compressible boundary layer flows is achieved by accounting for the effects of a variable effective height of the probe The coefficients, which appear in the correlation, are dependent on the particular tunnel environment The general procedure can be used to define correlations for other wind tunnels Author

N82-29800# Electro Magnetic Applications, Inc., Denver, Colo ATMOSPHERIC ELECTRICITY HAZARDS ANALYTICAL MODEL DEVELOPMENT AND APPLICATION. VOLUME 1. LIGHTNING ENVIRONMENT MODELING Final Report, Aug. 1979 - Jun. 1982

Martin A. Uman (Lightning Location and Protection. Inc.) and E. Philip Krider (Lightning Location and Protection, Inc.) Wright-Patterson AFB, Ohio AFWAL Aug 1981 172 p refs 3 Vol (Contract F33615-79-C-3412, AF Proj 2402) (AD-A114015, EMA-81-R-21-Vol-1,

AFWAL-TR-81-3084-Vol-1) Avail NTIS HC A08/MF A01 CSCL 04/1

The state of the art of lightning phenomenology and its

electromagnetic environment is reviewed. All aspects and phases are discussed A model is chosen for each phase which best describes what is currently known and understood. Computer models for predicting the electromagnetic environment for several of the processes are given, along with numerical predictions A comprehensive bibliography is also provided Author

N82-29801# Lightning and Transients Research Inst , Melbourne, Fla

ATMOSPHERIC ELECTRICITY HAZARDS ANALYTICAL MODEL DEVELOPMENT AND APPLICATION. VOLUME 2: SIMULATION OF THE LIGHTNING/AIRCRAFT INTERAC-TION EVENT Final Report, Aug. 1979 - Jun. 1981

John D Robb Wright-Patterson AFB, Ohio AFWAL Jun 1981 59 p refs 3 Vol

(Contract F33615-79-C-3412, AF Proj 2402)

(AD-A114016, EMA-81-R-21-Vol-2,

AFWAL-TR-81-3084-Vol-2) Avail NTIS HC A04/MF A01 CSCL 04/1

A review of currently used lightning test techniques for aircraft is given The requirements for lightning simulation are given and discussed Finally, a new approch for simulating the lightning/aircraft interaction is presented, and is based on nuclear electromagnetic pulse (NEMP) technology GRA

N82-29802# Electro Magnetic Applications, Inc., Denver, Colo. ATMOSPHERIC ELECTRICITY HAZARDS ANALYTICAL MODEL DEVELOPMENT AND APPLICATION. VOLUME 3: ELECTROMAGNETIC COUPLING MODELING OF THE LIGHTNING/AIRCRAFT INTERACTION EVENT Final Report, Aug. 1979 - Jun 1981 F J Eriksen, T H Rudolph, and Rodney Perala Wright-Patterson

AFB, Ohio AFWAL Jun 1981 330 p refs 3 Vol (Contract F33615-79-C-3412, AF Proj 2402)

(AD-A114017, EMA-81-R-21-Vol-3,

AFWAL-TR-81-3084-Vol-3) Avail NTIS HC A15/MF A01 CSCL 04/1

The state of the art of coupling of electromagnetic fields to aircraft is reviewed. Assessing the electromagnetic interaction of lightning with aircraft is considered. The coupling process is explained and the modeling requirements implied by the lightning environment are discussed. The description of models selected and implemented is given Author

N82-29996# Systems Control, Inc., Palo Alto, Calif SYSTEM IDENTIFICATION OF NONLINEAR AERODYNAM-IC MODELS

T L Trankle, J H Vincent, and S N Franklin In AGARD Advan in the Tech and Technol of the Appl of Nonlinear Filters and Kalman Filters Mar 1982 26 p refs (For primary document see N82-29989 20-64)

Avail NTIS HC A23/MF A01

System identification, a technology for determining a mathematical model of a dynamic system from observations of its response to inputs is discussed. Identification technology is used for the determination of nonlinear aerodynamic models for aircraft maneuvering at high angles of attack. The method outlined here (equation error, output error, and maximum likelihood algorithms) can directly nonlinear aerodynamic coefficients in table look-up or multivariable spline formats. For application to nonlinear problems, the basic algorithms are enhanced by recent techniques for evaluation of partial derivatives of the likelihood function, calculation of parameter estimation uncertainties, and by the use of multidimensional splines as a generic model structure An example application of these methods to the identification of F-4S fighter aircraft high angle of attack aerodynamics is illustrated B W

N82-30013*# National Aeronautics and Space Administration Ames Research Center, Moffett Field Calif

APPLICATIONS TO AERONAUTICS OF THE THEORY OF TRANSFORMATIONS OF NONLINEAR SYSTEMS

George Meyer, Renjeng Su, and L R Hunt May 1982 13 p refs

(Contract N00014-76-C-1136)

(NASA-TM-84249, NAS 1 15 84249 A-8943) Avail NTIS HC A02/MF A01 CSCL 12B

The development of the transformation theory is discussed Results and applications concerning the use of this design technique for automatic flight control of aircraft are presented The theory examines the transformation of nonlinear systems to

linear systems. The tracking of linear models by nonlinear plants is discussed. Results of manned simulation are also presented вw

N82-30029# Federal Aviation Administration, Washington, D C ESTIMATED AIRPLANE NOISE LEVELS IN A-WEIGHED DECIBELS

11 Feb 1981 19 p refs

(AC-36-3B) Avail NTIS HC A02/MF A01 Listings of estimated airplane noise levels in units of A-Weighted Sound Level in decibels (dBA) are provided NW

N82-30030*# General Electric Co., Cincinnati, Ohio Aircraft Engine Group

FORWARD VELOCITY EFFECTS ON FAN NOISE AND THE SUPPRESSION CHARACTERISTICS OF ADVANCED INLETS AS MEASURED IN THE NASA-AMES 40 BY 80 FOOT WIND TUNNEL Final Report

Michael T Moore May 1980 161 p refs

(Contract NAS2-8675)

(NASA-CR-152328, NAS 1 26 152328, R79AEG626) Avail NTIS HC A08/MF A01 CSCL 20A

Forward velocity effects on the forward radiated fan noise and on the suppression characteristics of three advanced inlets relative to a baseline cylindrical inlet were measured in the NASA Ames Research Center 40 x 80 foot Wind Tunnel A modified JT15D turbofan engine in a quiet nacelle was the source of fan noise, the advanced inlets were a Conventional Takeoff/Landing (CTOL) hybrid inlet, a Short Takeoff/Landing (STOL) hybrid inlet, and a treated deflector inlet Also measured were the static to flight effects on the fan noise of canting the baseline inlet 4 deg downward to simulate typical wing mounted turbofan engines The CTOL hybrid inlet suppressed the high tip speed fan noise as much as 18 PNdB on a 61 m (200 ft) sideline scaled to a CF6 size engine while the STOL hybrid inlet suppressed the low tip speed fan noise as much as 13 PNdB on a 61 m (200 ft) sideline scaled to a OCSEE size engine The deflector inlet suppressed the high tip speed fan noise as much as 13 PNdB at 61 m (200 ft) overhead scaled to a CF6 size engine. No significant changes in fan noise suppression for the CTOL and STOL hybrid inlets occurred for forward velocity changes above 21 m/s (68 ft/s) or for angle of attack changes up to 15 deg However, changes in both forward velocity and angle of attack changed the deflector inlet noise unpredictably due to the asymmetry of the inlet flow field into the fan Author

Aerospace Medical Research Labs, Wright-N82-30031# Patterson AFB, Ohio

USAF BIOENVIRONMENTAL NOISE DATA HANDBOOK. VOLUME 148 T-37B IN-FLIGHT CREW NOISE

Harald K Hille Nov 1981 15 p (AF Proj 7231)

(AD-A114943 AMRL-TR-75-50-Vol-148) NTIS Avail HC A02/MF A01 CSCL 01/2

The T-37B is a USAF two-seat primary trainer aircraft. This report provides measured data defining the bioacoustic environments at flight crew/passenger locations inside this aircraft during normal flight operations. Data are reported at one location for 19 different flight conditions and psychoacoustic measures overall and band sound pressure levels. C-weighted and A-weighted sound levels, preferred speech interference level, perceived noise level, and limiting times for total daily exposure of personnel , GRA with and without standard Air Force ear protectors

N82-30032# Aerospace Medical Research Labs, Wright-Patterson AFB, Ohio

FAR-FIELD ACOUSTIC DATA FOR THE TEXAS ASE, INC HUSH HOUSE

Robert A Lee Apr 1982 287 p refs (AF Proj 7231)

AFAMRL-TR-81-148) (AD-A114564, NTIS Avail HC A13/MF A01 CSCL 01/2

This' report supplements AFAMRL-TR-73-110, which describes the data base (NOISEFILE) used in the computer program (NOISEMAP) to predict the community noise exposure resulting from military aircraft operations. The results of field test measurements to define the single-event noise produced on the ground by military aircraft/engines operating in the Texas ASE Inc. hush-house are presented as a function of angle (O deg to 180 deg from the front of the hush-house) and distance (200 ft to 2500 ft) in various acoustic metrics. All the data are normalized to standard acoustic reférence conditions of 59 F

temperature and 70% relative humidity Refer to Volume I of the AFAMRL-TR-73-110 report for discussion of the scope limitations, and definitions needed to understand and use the data in this report GRA

N82-30261# Office National d'Etudes et de Recherches Aerospatiales, Paris (France)

WIND TUNNEL STUDIES OF STORE SEPARATION WITH LOAD FACTOR. FREEDROPS AND CAPTIVE TRAJECTOR-IES ______ CO2

J Coste and J Leynaert *In its* La Rech Aerospatiale, Bi-monthly Bull no 1982-1, Jan -Feb 1982 (ESA-TT-755) May 1982 p 1-9 refs Transl into ENGLISH from La Rech Aerospatiale, Bull Bimestriel (Paris), No 1982-1, Jan -Feb 1982 (For primary document see N82-30260 20-99)

Avail NTIS HC A02/MF A01, original report in FRENCH available at ONERA, Paris FF 55

Techniques used to study separation trajectories of stores dropped from under an aircraft are described. In dropping tests, light, heavy and intermediate scaling laws which respect the Mach number are studied. The captive trajectory tests use a six degrees of freedom system which moves the model step by step in the aerodynamic field of the aircraft Aerodynamic forces acting on the store are measured by an internal balance This method does not take into account the relative speed of store and aircraft Arrangements used to compensate for this defect are shown. When the stores are inert, have perturbed trajectories, high initial separation speeds, or are incompatible with an external mount and an internal balance, the freedrop method is preferable, particularly for short trajectories. In the contrary cases, or when the store is propelled, the captive trajectory method is essential For long trajectories, with several phases, the two methods are used in conjunction Author (ESA)

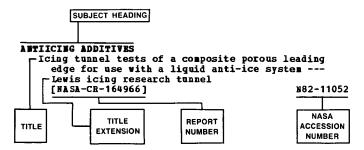
SUBJECT INDEX

AERONAUTICAL ENGINEERING / A Continuing Bibliography (Suppl. 154)

- - -

NOVEMBER 1982

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 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 \sim o included as an aid in identifying the document.

Α

~ ~	
A-10 AIRCRAFT Manual reversion flight control system for aircraft: Pilot performance and simulat effects	
[AD-A113463] A-300 AIBCRAFT	N82-28302
Gust load alleviation on Airbus A 300	A82-40881
The effect of intake flow disturbances on compressor blade hıga cycle fatıgue ın t Airbus A300	he
ABILITIES	A82-40983
Human capabilities and limitations in syst	ens N82-29297
ABLATIVE MATEBIALS Fireworthiness of transport aircraft inter systems	ior
AC GENERATORS	N82-29284
Models for the motor state of VSCF aircraf electrical power system Variable Spe Constant Prequency	t ed
ACCELEROMETERS	A82-40982
Low cost development of INS sensors for ex	pendable
BPV control and navigaticn [AD-A112691]	N 82-28291
ACCIDENT PREVENTION A study of wind shear effects on aircraft	
operations and safety in Australia [ARL-SYS-REPI-24] ACCIDENTS	N82-28265
Fuel system protection methods	N82-29283
ACOUSTIC ATTENUATION The effect of barriers on wave propagation	
phenomena: With application for aircraf shielding	t noise
[NASA-CR-169128]	N82-29111
ACOUSTIC EMISSION 'Listening' systems to increase aircraft	
structural safety and reduce costs	A82-39539
ACOUSTIC SINULATION	X02-39339
QCSEE over-the-wing enjine acoustic data [NASA-TM-82708] ACROBATICS	N82-29324
Sport aircraft Russian book	A82-40483

ACTIVE CONTROL	
Estimation of the peak count of actively	
controlled arrcraft	
CF6 jet engine performance improvement: Hi	A82-38447
pressure turbine active clearance control	
[NASA-CR-165556]	N82-28297
ADAPTIVE CONTROL	
Adaptive fuel control feasibility investiga	A82-40519
ADAPTIVE FILTERS	102 10313
Adaptive filtering for an aircraft flying i	n
turbulent atmosphere	A 8 2 - 38 44 1
Research on an adaptive Kalman filter for s	
the radar tracking problem German the	
	A82-40562
ABRIAL BECONNAISSANCE Opto-electronical push-broom scanners for	
navigation, reconnaissance and generation	of
dıgital data bases	
	A82-39747
Geophysical flight line flying and flight p recovery utilizing the Litton LTN-76 iner	
navigation system	
	N82-29292
ABRIAL BUDDERS Design, fabrication and qualification of th	o
composite rudder	6 1-2
-	A82-39894
ABROACOUSTICS	
The prediction of helicopter rotor discrete frequency noise	
	A 82-40553
helicopter model scale results of blade-vor	
interaction impulsive noise as affected b planform	y blade
	A82-40556
The effect of barriers on wave propagation	
phenomena: With application for aircraft	noise
phenomena: With application for aircraft shielding	
phenomena: With application for aircraft shielding [NASA-CR-169128]	N82-29111
phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise	N82-29111 flight
phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981]	N82-29111
phenomena: With application for aircraft shielding [NASA-CK-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODINAMIC BALANCE	N82-29111 flight N82-29118
phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981]	N82-29111 flight N82-29118 alance
phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODINAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives	N82-29111 flight N82-29118 alance g
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] ABRODINANIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813]</pre>	N82-29111 flight N82-29118 alance
phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODINAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODINAMIC CHARACTERISTICS	N82-29111 flight N82-29118 alance g N82-29333
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODINANIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODINAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin
phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] ABRODYNAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] ABRODYNAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150]	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODYNAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODYNAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt;
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODYNAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODYNAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt;
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] ABRODYNAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] ABRODYNAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODINAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODINAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce profiles
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] ABRODYNAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] ABRODYNAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission [AIAA PAPER 82-1298]</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce profiles A82-39085
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] BEROIMANIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] BERODYNAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission [AIAA PAPER 82-1298] An estimation of aerodynamic forces and mom an airplane model under steady state spin</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce profiles A82-39085 ents on
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODINAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODINAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission [AIAA PAPER 82-1298] An estimation of aerodynamic forces and mom an airplane model under steady state spin conditions</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce profiles A82-39085 ents on
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODYNAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODYNAMIC CHARACTERISTICS Aerodynamic Characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission [AIAA PAPER 82-1298] An estimation of aerodynamic forces and mom an airplane model under steady state spin conditions [AIAA PAPER 82-1311]</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce profiles A82-39085 ents on
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODINAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODINAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission [AIAA PAPER 82-1298] An estimation of aerodynamic forces and mom an airplane model under steady state spin conditions</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce profiles A82-39085 ents on
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODYNAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODYNAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission [AIAA PAPER 82-1298] An estimation of aerodynamic forces and mom an airplane model under steady state spin conditions [AIAA PAPER 82-1311] High angle-of-attack characteristics of a forward-swept wing fighter configuration [AIAA PAPER 82-1322]</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce profiles A82-39085 ents on A82-39092 A82-39099
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODYNAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODYNAMIC CHARACTERISTICS Aerodynamic Characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission [AIAA PAPER 82-1298] An estimation of aerodynamic forces and mom an airplane model under steady state spin conditions [AIAA PAPER 82-1311] High angle-of-attack characteristics of a forward-swept wing fighter configuration [AIAA PAPER 82-1322] Optimal three-dimensional turning performan</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce profiles A82-39085 ents on A82-39092 A82-39099
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] ABRODYNAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODYNAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission [AIAA PAPER 82-1298] An estimation of aerodynamic forces and mom an airplane model under steady state spin conditions [AIAA PAPER 82-1311] High angle=of-attack characteristics of a forward-swept wing fighter configuration [AIAA PAPER 82-1322] Optimal three-dimensional turning performan supersonic aircraft</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce profiles A82-39085 ents on A82-39092 A82-39099
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODYNAMIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODYNAMIC CHARACTERISTICS Aerodynamic Characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission [AIAA PAPER 82-1298] An estimation of aerodynamic forces and mom an airplane model under steady state spin conditions [AIAA PAPER 82-1311] High angle-of-attack characteristics of a forward-swept wing fighter configuration [AIAA PAPER 82-1322] Optimal three-dimensional turning performan supersonic aircraft [AIAA PAPER 82-1326] Unique flight characteristics of the AD-1</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce profiles A82-39085 ents on A82-39092 A82-39099 ce of
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODIMANIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODIMAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal thit-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission [AIAA PAPER 82-1298] An estimation of aerodynamic forces and mom an airplane model under steady state spin conditions [AIAA PAPER 82-1311] High angle-of-attack characteristics of a forward-swept wing fighter configuration [AIAA PAPER 82-1322] Optimal three-dimensional turning performan supersonic aircraft [AIAA PAPER 82-1326] Unique flight characteristics of the AD-1 obligue-wing research airplane</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rts A82-38781 nce profiles A82-39085 ents on A82-39092 A82-39099 ce of A82-39103
<pre>phenomena: With application for aircraft shielding [NASA-CR-169128] Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] AERODIMANIC BALANCE The use of a multi-degree-of-freedom dual b system to measure cross and cross-couplin derivatives [AD-A114813] AERODIMAMIC CHARACTERISTICS Aerodynamic characteristics of a large-scal thit-nacelle V/STOL model [AIAA PAPER 81-0150] Symposium on Flows with Separation, Stuttga West Germany, November 23-25, 1981, Repor Supersonic missile aerodynamic and performa relationships for low observables mission [AIAA PAPER 82-1298] An estimation of aerodynamic forces and mom an airplane model under steady state spin conditions [AIAA PAPER 82-1311] High angle-of-attack characteristics of a forward-swept wing fighter configuration [AIAA PAPER 82-1322] Optimal three-dimensional turning performan supersonic aircraft [AIAA PAPER 82-1326] Unique flight characteristics of the AD-1 obligue-wing research airplane</pre>	N82-29111 flight N82-29118 alance g N82-29333 e, twin A82-38443 rt; ts A82-38781 nce profiles A82-39085 ents on A82-39092 A82-39099 ce of

ABRODYNAMIC COEFFICIENTS

Use of rotary balance and forced oscillation test data in six degrees of freedom simulation [AIAA PAPES 82-1364] A82-39129 NASA Dryden's experience in parameter estimation and its uses in flight test [AIAA PAPES 82-1373] A82-39135 Effects of vortex breakdown on longitudinal and lateral-directional aerodynamics of slender wings by the suction analogy [AIAA PAPEE 82-1385] A82-39141 The unsteady motion of a wing traveling at subsonic speed above a plane A82-39358 The rectangular wing with semiinfinite span in nonlinear theory A82-39359 Optimal control application in supersonic aircraft performance A82-39374 Aerodynamic aspects of aircraft dynamics at high angles of attack /AGARD Lecture/ [AIAA PAPEE 82-1363] A82-39836 Advanced aerodynamic design for future combat aircraft A82-40879 Some aerodynamic/flightmechanic aspects for the design of future concat aircraft A82-40880 Recent advances in the performance of high bypass ratio fans A82-40891 Aerodynamic development of laminar flow control on swept wings using distributed suction through porous surfaces A82-40894 Viscous transonic airfoll flow simulation A82-40897 Determination of airplane aerodynamic parameters from flight data at high angles of attack A82-40928 Aerodynamic concepts for fuel-efficient transport aircraft A82-40957 Variable geometry aerofoils as applied to the Beatty B-5 and B-6 sallplanes A82-40968 Aircraft design for fuel efficiency A82-40973 Advanced aerodynamic wing design for commercial transports - Review cf a technology program in the Netherlands A82-40985 Recent airfoil developments at DFVLR A82-40986 Wing-tip jets aerodynamic performance A82-40987 An experimental investigation of leading-edge spanwise blowing A82-40988 Vortex formation over double-delta wings A82-40989 Wind tunnel test and aerodynamic analysis of three aeroelastically tailored wings A82-41001 Upper Vortex Flap - A versatile surface for highly swept wings A82-41002 An initial look at the supersonic aerodynamics of twin-fuselage aircraft concepts A82-41008 Low-speed characteristics of a fighter-type configuration at higs angles-of-attack and sideslip A82-41020 Wind-tunnel investigation of a full-scale canard-configured general aviation aircraft A82-41024 A summary of V/STOL inlet analysis methods [NASA-TH-82885] N82-28249 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-28624 Aerodynamics of an airfoil with a jet issuing from its surface [NA SA-TH-84825] N82-29267 ABRODYNAMIC COEFFICIENTS Analytical study of vortex flaps on highly swept delta wings

∆82-41003

SUBJECT INDEX

Fuselage effects in leading edge vortex flap aerodynamics A82-41006 Prelaunch estimates of near Earth satellite lifetimes using quasi-dynamic atmosphere models - application to a proposed Brazilian satellite [INFE-2325-PRE/080] N82-293 N82-29347 ABRODYNAMIC CONFIGURATIONS An experimental investigation of a bearingless model rotor in hover A82-40512 Computer enhanced analysis of a jet in a cross-stream N82-29555 AERODYNAMIC DRAG An evaluation of vertical drag and ground effect using the BSRA rotor balance system --- Rotor Systems Research Aircraft A82-40510 Development of an advanced no-moving-parts high-lift airfoil A82-40971 Spanwise distribution of wortex drag and leading-edge suction in subsonic flow A82-41005 Optimization of canard configurations - An integrated approach and practical drag estimation method A82-41023 Minimum induced drag of canard configurations A82-41116 ABRODYNAMIC FORCES An estimation of aerodynamic forces and moments on an airplane model under steady state spin conditions **FAIAA PAPER 82-13111** A82-39092 Lateral aerodynamics of delta wings with leading edge separation [AIAA PAPER 82-1386] A82-39142 Inlet and airframe compatibility for a V/STOL fighter/attack aircraft with top-mounted inlets A82-40908 herodynamic interactions between a 1/6-scale helicopter rotor and a body of revolution A82-40947 Reduced nonlinear flight dynamic model of elastic structure aircraft A82-41009 Aerodynamic interactions between a 1/6 scale helicopter rotor and a body of revolution [NASA-TM-84247] N82-28252 ABRODYNAMIC INTERPERENCE The use of small strakes to reduce interference drag of a low wing, twin engine airplane [AIAA FAPER 82-1323] A82-39100 Summary of sting interference effects for cone, missile, and aircraft configurations as determined by dynamic and static measurements [AIAA PAPER 82-1366] A82-40395 External aerodynamic design for a laminar flow control glove on a Lockheed JetStar wing A82-40895 Computational and experimental studies of light twin aerodynamic interference A82-40930 Evaluation of an experimental technique to investigate the effects of the engine position on engine/pylon/wing interference --- wind tunnel tests [NLR-MP-81020-U] N82-28262 AEBODYNAMIC LOADS Supersonic missile aerodynamic and performance relationships for low observables mission profiles [AIAA PAPER 82-1298] A82-39085 Dynamic load measurements with delta wings undergoing self-induced roll-oscillations [AIAA PAPER 82-1320] A82-39098 Maneuver stability of a vehicle with a towed body [AIAA FAPEE 82-1347] A82-39 A82-39119 The use of linearized-aerodynamics and vortex-flow methods in aircraft design /invited paper/ [AIAA PAPER 82-1384] A82-40294 Theory and application of optimum airloads to rotors in hower and forward flight A82-40506 Performance of the Rotor Systems Research Aircraft calibrated rotor loads measurement system A82-40549

AIR TO AIR MISSILES

Results of the AH-64 Structural Demonstration A82-40551 Gust load alleviation on Airbus A 300 A82-40881 Investigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps, at transonic speed and high Reynolds numbers A82-40909 A crack growth model under spectrum loading A82-40961 Determination of load spectra and their application for keeping the operational life proof of sporting airplanes A82-41010 The role of the scale parameter in service load assessment and simulation --- of aircraft flight A82-41011 Means for controlling aerodynamically induced twist [NASA-CASE-LAE-12175-1] N82-2827 B747/JT9D flight loads and their effect on engine running clearances and performance deterioration; BCAC NAIL/P and WA JI9D engine N82-28279 diagnostics programs [NASA-CR-165573] N82-28296 AEBODYNAMIC NOISE The effect of barriers on wave propagation phenomena: With application for aircraft noise shielding [NASA-CR-169128] N82-29111 ABBODYNAMIC STABILITY Plight-determined correction terms for angle of attack and sideslip [AIAA PAPER 82-1374] A82-40290 ABRODYNAMIC STALLING Analytic extrapolation to full scale aircraft dynamics [AIAA PAPER 82-1387] A82-39143 Dynamic surface measurements on a model helicopter rotor during blade slap at high angles of attack 182-40555 Prediction of high alpha flight characteristics utilizing rotary balance data A82-40953 ABRODYNAMICS International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings. Volumes 11 & A82-40876 Aerodynamic research applications at Boeing A82-41000 General aviation activity and avionics survey N82-28244 [AD-A112924] Aerodynamics of advanced axial-flow turbomachinery [AD-A114911] N82-29328 ABROBLASTICITY Robust Kalman filter design for active flutter suppression systems A82-38442 Dynamic stability of flexible forward swept wing aircraft [AIAA PAPER 82-1325] A82-39102 Summary and recent results from the NASA advanced high-speed propeller research program [AIAA PAPER 82-1119] A82-404 A82-40419 An experimental investigation of a bearingless model rotor in hover A82-40512 Helicopter vibration reduction by rotor blade modal shaping A82-40514 Finite element analysis for bearingless rotor blade aeroelasticity A82-40517 Calculations of transonic steady state aeroelastic effects for a canard airplane A82-40882 Computer-aided derivation of equations of motion for rotary-wing aeroelastic problems A82-40883 Design of compensated flutter suppression systems A82-40904 Wind tunnel test and aerodynamic analysis of three aeroelastically tailored wings A82-41001 Wind-tunnel evaluation of an aeroelastically conformable rotor [AD-A114384] N82-28260

Design considerations and experiences in the use of composite material for an aeroelastic research wing [NASA-TH-83291] N82-28280 ABRONAUTICS International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Proceedings. Volumes 11 & 2 A82-40876 ABROSPACE ENGINEERING International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA August 22-27, 1982, Proceedings. Volumes 11 & 2 A82-40876 AEROSPACE SYSTEMS CDS-the designer's media, the analyst's model ---Configuration Development System for aircraft A82-40991 Optimizing aerospace structures for manufacturing cost A82-41014 **ABBOS PACEPLANES** Inflated wings A82-40966 AGRICULTURAL AIRCRAFT Rationalization of the maintenance process for helicopter Ka-26 A82-39246 The design integration of wingtip devices for light general aviation aircraft A82-40933 Agricultural airplane mission time structure characteristics [NASA-TM-84470] N82-29329 AH-16 HELICOPTER Error minimization in ground vibration testing ---of helicopter structures A82-40550 AB-64 BELICOPTER Structural design of a crashworthy landing gear for the AH-64 Attack Helicopter A82-40547 Results of the AH-64 Structural Demonstration A82-40551 ATR DEPENSE Logistics research program in the United States Air Force 182-40963 ATR FLOW Fluctuating forces and rotor noise due to distorted inflow A82-40945 Wind-tunnel testing of V/STOL configurations at hıgh lift A82-40949 ATR LAW Noise pollution and airport regulation A82-40051 O'Hare International Airport - Impervious to proposed state efforts to limit airport noise A82-40052 AIR NAVIGATION Opto-electronical push-broom scanners for navigation, reconnaissance and generation of digital data bases A82-39747 Low cost development of INS sensors for expendable RPV control and navigation [AD-A112691] N82-28291 AIR POLLUTION Smoke abatement system for crash rescue/fire training facilities [AD-A114380] N82-28268 AIB QUALITY Atmospheric chemistry of hydrocarbon fuels. Volume 2: Outdoor chamber data tabulations, Part 1 [AD-A113665] N82-28842 AIR TO AIB MISSILES Air-to-air missile avoidance [AIAA 82-1516] A82-38939 Algorithm development for infra-red air-to-air guidance systems A82-39191

AIR TO SUBPACE MISSILES

AIR TO SURFACE MISSILES	
Target acquisition system/air-to-surface weapon compatibility analysis	
[AIAA 82-1618] A82-38995 AIR TRAFFIC CONTROL	
Complete flexibility and realism in radar simulation , A82-38461 Puture terminal area systems	
A82-38462 Fuel conservation: The arrline - ATC	
A82-38464 Analysis of general-aviation accidents using ATC	
radar records [AIAA PAPER 82-1310] A62-39091	
Apalysis of in-trail fcilcwing dynamics of CDTI-equipped aircraft Cockpit Displays of	
Traffic Information [AIAA PAPER 82-1330] A82-39107	
NASA/FAA Helicopter ATC simulation investigation of BNAV/MLS instrument approaches	
A82-40535 A concept for 4D-guidance of transfort aircraft in	
the TMA Terminal Maneuvering Area A82-40942	
Estimation of the number of in-flight aircraft on instrument flight rules	
A82-41117 Electronic/electric technclogy benefits study avionics	
[NASA-CR-165890] 'N82-28243 Computer outages at air terminal facilities and	
their correlation to near miss mid-air collisions (AFMD-82-43)	
[B-206064] A study of wind shear effects on aircraft	
operations and safety in Australia [ARL-SYS-REPI-24] N82-28265	
Special investigation report: Air traffic control system	
[PB82-136276] N82-28277 FAN aviation forecasts-fiscal years 1982-1993	
[AD-A114696] N82-29261 Terminal information display system tenefits and	
costs [AD-A114937] N82-29291	
Human factors in air traffic contrcl [AGARD-AG-275] N82-29293	
The air traffic control system N82-29294	
Human factors contributions to air traffic control systems N82-29295	
Man as a system component N82-29295	
Human capabilities and insitations in systems N82-29297	
Jobs and tasks in air traffic control N82-29298	
The work environment N82-29299	
Displays ,	
Controls N82-29301	
Communications N82-29302	
Additional functions within the air traffic , control system	
Future trends and problems	
N82-29310 Moving target detector (Mod 2)	
[AD-A114709] N82-29520 AIR TRAFFIC CONTROLLERS (FRESONNEL) Human factors in air traffic control	
[AGARD-AG-275] N82-29293 The air traffic control system	
Man as a system component N82-29294	
Jobs and tasks in air traffic control	
AIRBORNE EQUIPHENT	
Application of an optical data link in the airborne scanning system	
A82-39275 Multifunction multiband airborne radio	
architecture study [AD-A114427] N82-28523	

Baseline monitoring using aircraft laser r spaceborne laser simulation and airc	anging raft
laser tracking [NASA-TH-73298]	N82-28690
AIRBORNE RADAR APPROACH Flight test evaluation of a video tracker enhanced offshore airborne radar approac capability	
AIRBOBNE/SPACEBORNE COMPUTERS	<u>182-40531</u>
Estimation of the peak count of actively controlled aircraft	
PNCS - A commercial flight management comp system	
 [AIAA 82-1515] A preliminary laboratory evaluation of a 	A82-38938
reconfigurable integrated flight control [AIBA 82-1597]	A82-38982
An MLS with computer aided landing approac [AIAA PAPER 82-1352]	ь 182-39122
Flight management computers The fourth dimension flight management for arrline operations	A82-39321 system
-	A82-39540
The control and guidance unit for MACHAN Boeing's new 767 eases crew workload	A82-39738
-	▲82-40348
Aircraft design for fuel efficiency	A82-40973
Investigations concerned with shifting pil activities to a higher hierarchical stag	
flight control German thesis	A82-41453
Advanced arrcraft electrical system contro technology demonstrator. Phase 1: Anal	
preliminary design [AD-A113633]	N82-28284
Problems related to the integration of fau tolerant aircraft electronic systems	
[NASA-CR-165926] AIRCRAFT	N82-29022
Fuel system protection methods	N 82-29283
Fuel system protection methods AIRCRAFT ACCIDENTS Analysis of general-aviation accidents usi:	
Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents usi: radar records [AIAA PAPER 82-1310] Smoke abatement system for crash rescue/fi	ng ATC A82-39091
Fuel system protection methods AIRCRAFT ACCIDENTS Analysis of general-aviation accidents usi: radar records [AIAA PAPEB 82-1310] Smoke abatement system for crash rescue/fi: training facilities [AD-A114380]	ng ATC A82-39091
Fuel system protection methods AIRCRAFT ACCIDENTS Analysis of general-aviation accidents usi: radar records [AIAA PAPEB 82-1310] Smoke abatement system for crash rescue/fi: training facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909]	ng ATC A82-39091 re N82-28268 N82-29274
Fuel system protection methods AIRCRAFT ACCIDENTS Analysis of general-aviation accidents usi: radar records [AIAA PAPEB 82-1310] Smoke abatement system for crash rescue/fi: training facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, resaand injury findings in selected general	ng ATC A82-39091 re N82-28268 N82-29274 traint,
Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents using radar records [AIAA PAPER 82-1310] Smoke abatement system for crash rescue/fintraining facilities [AD-A114380] Plight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, restand injury findings in selected general accidents [AD-A114878]	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275
Fuel system protection methods AIRCRAFT ACCIDENTS Analysis of general-aviation accidents using radar records [AIAA PAPER 82-1310] Smoke abatement system for crash rescue/fintraining facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashworthiness studies: Cabin, seat, restand injury findings in selected general accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US
Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents using radar records [AIAA PAPER 82-1310] Smoke abatement system for crash rescue/fintraining facilities [AD-A114380] Plight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, restand injury findings in selected general accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post crash fire reduction/survival	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 bility
Fuel system protection methods AIRCRAFT ACCIDENTS Analysis of general-aviation accidents using radar records [AIAA PAPER 82-1310] Smoke abatement system for crash rescue/fintraining facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashworthiness studies: Cabin, seat, restand injury findings in selected general accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post crash fire reduction/survival	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 bility
<pre>Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents usi radar records [AIAA PAPER 82-1310] Smoke abatement system for crash rescue/fi training facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, res and injury findings in selected general a accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post-crash fire fighting/rescue </pre>	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 bility Int
Fuel system protection methods AIRCRAFT ACCIDENTS Analysis of general-aviation accidents using radar records [AIAA PAPEB 82-1310] Smoke abatement system for crash rescue/fintraining facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashworthiness studies: Cabin, seat, restand injury findings in selected general accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post-crash fire fighting/rescue AIRCRAFT ANTENNAS Monopole antenna patterns on finite size comparison	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 bility Int N82-29286 N82-29286
<pre>Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents usi: radar records [AIAA PAPEB 82-1310] Smoke abatement system for crash rescue/fi. training facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, res: and injury findings in selected general accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post crash fire reduction/surviva. enhancement from a manufacturer's viewpo. Aircraft post-crash fire fighting/rescue AIRCRAPT ANTENNAS</pre>	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 bility N82-29286 N82-29287 omposite A82-41055
<pre>Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents usi radar records [AIAA PAPEB 82-1310] Smoke abatement system for crash rescue/fi training facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, res and injury findings in selected general a accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post-crash fire reduction/surviva. enhancement from a manufacturer's viewpo Aircraft post-crash fire fighting/rescue AIECRAPT ANTENNAS Monopole antenna patterns on finite size c ground planes in aircraft</pre>	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 bility N82-29286 N82-29287 omposite A82-41055
<pre>Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents usi: radar records [AIAA PAPER 82-1310] Smoke abatement system for crash rescue/fi. training facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, res: and injury findings in selected general accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post-crash fire reduction/surviva. enhancement from a manufacturer's viewpo. Aircraft post-crash fire fighting/rescue AIRCRAPT ANTENNAS Monopole antenna patterns on finite size c ground planes in aircraft Delta electrical load analysis C-141B JACC, aircraft [AD-A113761] AIRCRAPT APPROACH SPACING Analysis of in-trail following dynamics of</pre>	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 billty N82-29286 N82-29287 omposite A82-41055 /CP N82-28283
<pre>Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents usi radar records [AIAA PAPEB 82-1310] Smoke abatement system for crash rescue/fi training facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, ress and injury findings in selected general a accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post-crash fire reduction/surviva. enhancement from a manufacturer's viewpo Aircraft post-crash fire fighting/rescue AIRCRAPT ANTENNAS Monopole antenna patterns on finite size c ground planes in aircraft Delta electrical load analysis C-141B JACC, aircraft [AD-A113761] AIRCRAPT APROACH SPACING</pre>	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 billty N82-29286 N82-29287 omposite A82-41055 /CP N82-28283
<pre>Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents usi radar records [AIAA PAPEB 82-1310] Smoke abatement system for crash rescue/fi training facilities [AD-A114380] Plight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, rest and injury findings in selected general i accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post crash fire reduction/survival enhancement from a manufacturer's viewpo. Aircraft post-crash fire fighting/rescue AIRCRAPT AFTENHAS Monopole antenna patterns on finite size cr ground planes in aircraft Delta electrical load analysis C-141B JACC, aircraft [AD-A113761] AIRCRAPT APPROACH SPACING Analysis of in-trail following dynamics of CDTI-equipped aircraft Cockpit Displa.</pre>	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 billty N82-29286 N82-29287 omposite A82-41055 /CP N82-28283
<pre>Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents usi radar records [AIAA PAPEB 82-1310] Smoke abatement system for crash rescue/fi training facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, ress and injury findings in selected general a accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post-crash fire reduction/surviva. enhancement from a manufacturer's viewpo Aircraft post-crash fire fighting/rescue AIRCRAPT ANTENNAS Monopole antenna patterns on finite size c ground planes in aircraft Delta electrical load analysis C-141B JACC, aircraft [AD-A113761] AIRCRAPT APPROACH SPACING Analysis of in-trail following dynamics of CDTI-equipped aircraft Cockpit Displa Traffic Information [AIAA PAPEB 82-1330]</pre>	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 bility N82-29286 N82-29286 N82-29287 omposite A82-41055 /CP N82-28283 ays of
<pre>Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents usi radar records [AIAA PAPEB 82-1310] Smoke abatement system for crash rescue/fi training facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, res: and injury findings in selected general i accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post crash fire reduction/surviva, enhancement from a manufacturer's viewpo. Aircraft post-crash fire fighting/rescue AIRCRAPT ANTENNAS Monopole antenna patterns on finite size c ground planes in aircraft Delta electrical load analysis C-141B JACC, aircraft [AD-A113761] AIRCRAPT APPROACH SPACING Analysis of in-trail following dynamics of CDTI-equipped aircraft Cockpit Displit Traffic Information [AIAA FAPEB 82-1330] AIRCRAPT DENKES Alert aircraft roll over chocks [AD-A107456] AIRCRAPT COMUNICATION</pre>	ng ATC A82-39091 re N82-28268 N82-29274 traint, N82-29275 US N82-29275 US N82-29278 billty N82-29286 N82-29287 omposite A82-41055 /CP N82-28283 ays of A82-39107 N82-28307
<pre>Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents usi radar records [AIRA PAPEB 82-1310] Smoke abatement system for crash rescue/fi training facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, res and injury findings in selected general a accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post-crash fire reduction/surviva. enhancement from a manufacturer's viewpo Aircraft post-crash fire fighting/rescue AIECRAPT AMTENNAS Monopole antenna patterns on finite size c ground planes in aircraft Delta electrical load analysis C-141B JACC, aircraft [AD-A113761] AIECRAPT APPROACH SPACING Analysis of in-trail following dynamics of CDTI-equipped aircraft Cockpit Displa Traffic Information [AIA PAPEB 82-1330] AIECRAPT COMMUNICATION Digital computer simulation of modern aeror digital communication systems</pre>	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 bilty N82-29286 N82-29286 N82-29287 omposite A82-41055 /CP N82-28283 ays of A82-39107 N82-28307 nautical A82-40940
<pre>Fuel system protection methods AIRCRAPT ACCIDENTS Analysis of general-aviation accidents usi radar records [AIAA PAPEB 82-1310] Smoke abatement system for crash rescue/fi training facilities [AD-A114380] Flight attendant injuries: 1971-1976 [AD-A114909] Crashwortniness studies: Cabin, seat, res: and injury findings in selected general i accidents [AD-A114878] Annual review of aircraft accident data: general aviation calendar year 1979 [PB82-136250] Aircraft post crash fire reduction/surviva. enhancement from a manufacturer's viewpo. Aircraft post-crash fire fighting/rescue AIRCRAPT ANTENNAS Monopole antenna patterns on finite size cr ground planes in aircraft Delta electrical load analysis C-141B JACC, aircraft [AD-A113761] AIRCRAPT APROACH SPACING Analysis of in-trail following dynamics of CDTI-equipped aircraft Cockpit DisplitTraffic Information [AIA PAPEB 82-1330] AIRCRAPT BENKES Alert aircraft roll over chocks [AD-A107456] AIRCRAPT COMMUNICATION Digital computer simulation of modern aero</pre>	ng ATC A82-39091 re N82-28268 N82-29274 traint, aviation N82-29275 US N82-29278 bilty N82-29286 N82-29286 N82-29287 omposite A82-41055 /CP N82-28283 ays of A82-39107 N82-28307 nautical A82-40940

AIRCRAFT COSTROL

AIRCRAFT COMPARIMENTS Crashworthiness studies: Cabin, seat, restraint, and injury findings in selected general aviation accidents [AD-A114878] N82-29275 Pireworthiness of transport aircraft interior systems N82-29284 USAF bioenvironmental noise data handbook. Volume 148. T-37B in-flight crew noise [AD-A114943] N82-30031 AIBCRAFT CONFIGUEATIONS High angle-of-attack characteristics of a forward-swept wing fighter configuration [AIAA PAPER 82-1322] A82-39099 Stabileye. R. Stephenson --- BPV performance, design and materials characteristics A82-39733 Summary of sting interference effects for cone, missile, and aircraft configurations as determined by dynamic and static measurements [AIAA PAPER 82-1366] A82-A82-40395 An evaluation of vertical drag and ground effect using the ESRA rotor balance system --- Rotor Systems Research Aircraft A82-40510 The NAH-64 empennage and tail rotor - A technical history A82-40528 **Ringfin augmentation effects** A82-40548 Tail versus canard configuration - An aerodynamic comparison with regard to the suitability for future tactical combat aircraft A82-40901 Assessment of advanced technologies for high performance single-engine business airplanes A82-40932 Wind-tunnel testing of V/SIOL configurations at high lift A82-40949 Design integration of CC1/USB for a sea-based aircraft A82-40972 Performance characteristics of a buoyant guad-rotor research aircraft A82-40974 CDS-the designer's media, the analyst's model -Configuration Development System for aircraft A82-40991 Aircraft geometry verification with enhanced computer-generated displays A82-40992 An initial lock at the supersonic acrodynamics of twin-fuselage aircraft concepts A82-41008 Low-speed characteristics of a fighter-type configuration at high angles-of-attack and sídesĺip A82-41020 Aircraft geometry verification with enhanced computer generated displays [NASA-TM-84254] N82-29268 Annual review of aircraft accident data: US general aviation calendar year 1979 [PB82-136250] N82-29278 Development of flying qualities criteria for single pilot instrument flight operations [NASA-CR-165932] N82-29288 AIRCRAFT CONSTRUCTION MATERIALS Composite use on helicopters A82-38222 Toward all-composite helicopter fuselage A82-38223 Committing composites to the Boeing 767 A82-38224 The effect of hybrid composite materials on the dynamic characteristics of helicopter rotor blades A82-39263 The technological aspects of titanium application in the TU-144 aircraft structure A82-39718 Stabileye. R. Stephenson --- RPV performance, design and materials characteristics 182-39733 The national dynamics 'observer' mini-RPV for tropical operation A82-39734

On the state of technology and trends in composite materials in the United States A82-39882 Tests of CFRP spar/rib models with corrugated web A82-39890 Evaluation of CFRP prototype structures for aircraft A 82-39892 Developments on graphite/epoxy T-2 nose landing dear door A82-39893 Fabrication of CFBP prototype structure for aurcraft horizontal tail leading edge slat rail A82-39896 Development status of a composite vertical stabilizer for a jet trainer A82-39897 In-plane shear test of thin panels A82-40545 A summary of weight savings data for composite V310L structure A82-40546 Material and process developments on the Boeing 767 A82-40902 The promise of laminated metals in aircraft design A82-40903 Material identification for the design of composite rotary wings A82-40937 Application of a new hybrid material /ARALL/ in aircraft structures A82-40975 Design and fabrication of cocured composite hat-stiffened panels A82-40978 Technical and economic comparison of carbon fiber tape and woven fabric applications 182-40993 Application of composite materials and new design concepts for future transport aircraft A82-40994 Composite structures repair A82-41015 Monopole antenna patterns on finite size composite ground planes --- in aircraft A82-41055 AIRCRAFT CONTROL Adaptive filtering for an aircraft flying in turbulent atmosphere A82-38441 Estimation of the peak count of actively controlled aircraft A82-38447 Pilot models for discrete maneuvers [AIAA 82-1519] A82-38940 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 The effects of the delays on systems subject to manual control A82-38943 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 An X-Wing aircraft control system concept [AIAA 82-1540] A82-38954 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 The use of differential pressure feedback in an automatic flight control system [AIAA 82-1596] A82-38981 The ideal controlled element for real airplanes is not K/s [AIAA 82-1606] A82-38986 An alternate method of specifying bandwidth for flying qualities [(AIAA 82-1609] A82-38988 Investigation of low order lateral directional transfer function models for augmented aircraft [AIAA 82-1610] A82-38989 An analysis of a nonlinear instability in the implementation of a VTOL control system during hover [AIAA 82-1611] A82-38990 X-29A flight control system design experiences [AIAA 82-1538] A82 A82-39003 The effects of atmospheric turbulence on a quadrotor heavy lift airship [AIAA 82-1542] A82-39009

AIRCRAFT DESIGN

AI)

SUBJECT INDEX

Flight control synthesis using robust outp observers	
observers	ut
	200 20046
[(AIAA 82-1575] Handling qualties criteria for flight pat	A82-39016 h
control of V/STOL aircraft	-
[AIAA PAPER 82-1292]	A82-39081
Piloted simulator evaluation of a relaxed	
stability fighter at nigh angle-cf-attac. [AIAA PAPEB 82-1295]	A82-39082
In-Flight investigation of large airplane	
qualities for approach and landing	
[AIAA PAPEE 82-1296]	A82-39083
Parameter estimation applied to general av	iation
AIRCRAFT - A CASE STUJY [AIAA PAPER 82-1313]	A82-39094
Flight dynamics of rotorcraft in steep high	
[AIAA PAPER 82-1345]	A82-39117
Guidance for the use of equivalent systems HIL-F-8785C for aircraft flight cont.	
systems	101
[AIAA PAPES 82-1355]	A82-39124
A modern approach to pilot/vehicle analysi	s and
the Neal-Swith criteria	100 20105
[AINA PAPER 82-1357] Electronic stabilization of an aircraft	A82-39125
	A82-39322
Optimal control application in supersonic	aircraft
performance	100 20270
Flying qualities requirements for roll CAS	A82-39374
[AIAA PAPER 82-1356]	A82-40287
Terrain following/terrain avoidance system	
development	
[AIAA PAPEE 82-1518] Flight experience with a backup flight-con	A82-40428
system for the HiMAT research vehicle	LUL
[AIAA PAPER 82-1541]	A82-40429
Optimal open-loop aircraft control for go-	around
maneuvers under wind shear influence	A82-40943
Wind tunnel measurements of longitudinal s	
and control characteristics of primary as	ng
secondary wing configurations	
A study of wind shear effects on aircraft	A82-41025
operations and safet; in Australia [ARL-SYS-RIPI-24]	N82-28265
operations and safet; in Australia [ARL-SYS-REPT-24] Evaluations of helicopter instrument-fligh	
operations and safet; in Australia [ARL-SYS-RFFI-24] Evaluations of helicopter instrument-fligh- handling qualities	t
operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-fligh handling gualities [AD-A114004]	t N82-28285
operations and safet; in Australia [ARL-SYS-RFFI-24] Evaluations of helicopter instrument-fligh- handling qualities	t N82-28285
operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-fligh- handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for	t N82-28285 transport N82-28298 A-10
operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-fligh handling gualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator	t N82-28285 transport N82-28298 A-10
operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling gualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects	t N82-28285 transport N82-28298 A-10 or cue
operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-fligh handling gualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator	t N82-28285 transport N82-28298 A-10
operations and safet; in Australia [ARL-SYS-RIFT-24] Evaluations of helicopter instrument-fligh- handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulat, effects [AD-A113463]	t N82-28285 transport N82-28298 A-10 or cue N82-28302
operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-fligh- handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulato effects [AD-A113463] ECEMPT DESIGN Forward-swept wings add supersonic zip	t N82-28285 transport N82-28298 A-10 or cue
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulato effects [AD-A113463] RCENFT DESIGN Porward-swept wings add supersonic zip Mirage 2000 - Towards possible high series</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302
operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling gualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] BCENFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulato effects [AD-A113463] RCENFT DESIGN Porward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service;</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249
operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling gualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] BCENFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Hanual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] RCBAFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Fregram</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulato effects [AD-A113463] RCENFT DESIGN Porward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Frogram Aerodynamic characteristics of a large-scat tilt-nacelle V/STOL model</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] RCRAFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Fregram Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [ALAA PAPEE 81-0150]</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Hanual reversion flight control system for aircraft: Pilot performance and simulato effects [AD-A113463] RCBAFT DESIGN Porward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Fregram Aerodynamic characteristics of a large-scat tilt-nacelle V/STOL model [AIAA PAPEF 81-0150] The use of small strakes to reduce interfet</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443
<pre>operations and safet; in Australia [ARL-SYS-RIFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulat, effects [AD-A113463] RCBAFT DESIGN Porward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Frogram Aerodynamic characteristics of a large-scattilt-nacelle V/STOL model [AIAA PAPEE 81-0150] The use of small strakes to reduce interferd are of a low wing, twin engine airplane</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 cence
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Hanual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] RCBAFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Fregram Aerodynamic characteristics of a large-scattilt-nacelle V/STOL model [ATLA PAPEF 81-0150] The use of small strakes to reduce interfered [ATLA PAPEF 82-1323] Use of rotary balance and forced oscillated</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 rence A82-39100 on test
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Hanual reversion flight control system for aircraft: Pilot performance and simulato effects [AD-A113463] RCBAFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Fregram Aerodynamic characteristics of a large-scattilt-nacelle V/STOL model [AIAA PAPEE 81-0150] The use of small strakes to reduce interfered drag of a low wing, twin engine airplane [AIAA PAPEB 82-1323] Use of rotary balance and forced oscillation </pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 s A82-38423 le, twin A82-38443 rence A82-39100 on test
<pre>operations and safet; in Australia [ARL-SYS-RPFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] BCENFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Frogram Aerodynamic characteristics of a large-scat tilt-nacelle V/STOL model [AIAA PAPEE 81-0150] The use of small strakes to reduce interfet drag of a low wing, twin engine airplane [AIAA PAPEE 82-1323] Use of rotary balance and forced oscillator data in six degrees of freedom simulation [AIAA PAPEE 82-1364]</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 rence A82-39100 on test
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] BCENFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Fregram Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPEF 81-0150] The use of small strakes to reduce interfei drag of a low wing, twin engine airplane [AIAA PAPEF 82-1323] Use of rotary balance and forced oscillator data in six degrees of freedom simulation [AIAA PAPEF 82-1364] Remotely piloted wehicles; International</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 rence A82-39100 on test A82-39129
<pre>operations and safet; in Australia [ARL-SYS-RPFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] BCENFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Frogram Aerodynamic characteristics of a large-scat tilt-nacelle V/STOL model [AIAA PAPEE 81-0150] The use of small strakes to reduce interfet drag of a low wing, twin engine airplane [AIAA PAPEE 82-1323] Use of rotary balance and forced oscillator data in six degrees of freedom simulation [AIAA PAPEE 82-1364]</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 cence A82-39100 on test A82-39129 6-8,
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] BCENFT DESIGN Porward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Frogram Aerodynamic characteristics of a large-scat tilt-nacelle V/STOL model [AIAA PAPEE 81-0150] The use of small strakes to reduce interfet drag of a low wing, twin engine airplane [AIAA PAPEE 82-1323] Use of rotary balance and forced oscillator data in six degrees of freedom simulation [AIAA PAPEE 82-1364] Remotely piloted vehicles; International Conference, 2nd, Bristol, England, April 1981, Conference Papers and Supplementar;</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 rence A82-39100 on test A82-39129 6-8, y Papers A82-39727
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] BCENFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Fregram Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPEF 81-0150] The use of small strakes to reduce interfer drag of a low wing, twin engine airplane [AIAA PAPEF 82-1323] Use of rotary balance ind forced oscillation data in six degrees of freedom simulation [AIAA PAPEF 82-1364] Remotely piloted wehicles; International Conference, 2nd, Bristol, England, April 1981, Conference Papers and Supplementar; Horses for ccurses in EPV operations 5</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 cence A82-39100 on test A82-39129 6-8, y Papers A82-39727 ystem
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] RCRAFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Services Advanced Vertical Lift Aircraft Fregram Aerodynamic characteristics of a large-scat tilt-nacelle V/STOL model [ATAA PAPEF 81-0150] The use of small strakes to reduce interfer drag of a low wing, twin engine airplane [ATAA PAPEF 82-1323] Use of rotary balance and forced oscillator data in six degrees of freedom simulation [ATAA PAPEB 82-1364] Remotely piloted vehicles; International Conference, 2nd, Bristol, England, April 1981, Conference Papers and Supplementar; Horses for ccurses in &PV operations si components design and development in term</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 cence A82-39100 on test A82-39129 6-8, y Papers A82-39727 ystem
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] BCENFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Fregram Aerodynamic characteristics of a large-scal tilt-nacelle V/STOL model [AIAA PAPEF 81-0150] The use of small strakes to reduce interfer drag of a low wing, twin engine airplane [AIAA PAPEF 82-1323] Use of rotary balance ind forced oscillation data in six degrees of freedom simulation [AIAA PAPEF 82-1364] Remotely piloted wehicles; International Conference, 2nd, Bristol, England, April 1981, Conference Papers and Supplementar; Horses for ccurses in EPV operations 5</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 cence A82-39100 on test A82-39129 6-8, y Papers A82-39727 ystem
<pre>operations and safet; in Australia [ARL-SYS-RFFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] RCRAFT DESIGN Forward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Services Advanced Vertical Lift Aircraft Fregram Aerodynamic characteristics of a large-scat tilt-nacelle V/STOL model [ATAA PAPEF 81-0150] The use of small strakes to reduce interfer drag of a low wing, twin engine airplane [ATAA PAPEF 82-1323] Use of rotary balance and forced oscillator data in six degrees of freedom simulation [ATAA PAPEB 82-1364] Remotely piloted vehicles; International Conference, 2nd, Bristol, England, April 1981, Conference Papers and Supplementar; Horses for ccurses in &PV operations si components design and development in term</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 A82-38249 A82-38423 le, twin A82-38443 rence A82-39100 on test A82-39129 6-8, y Papers A82-39727 ystem a of A82-39729 t
<pre>operations and safet; in Australia [ARL-SYS-RIFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulative effects [AD-A113463] BCEBFT DESIGN Porward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Services Advanced Vertical Lift Aircraft Frogram Aerodynamic characteristics of a large-scat tilt-nacelle V/STOL model [ATAA PAPEE 81-0150] The use of small strakes to reduce interfeid drag of a low wing, twin engine airplane [ATAA PAPEE 82-1323] Use of rotary balance and forced oscillation (ATAA PAPEE 82-1364] Remotely piloted vehicles; International Conference, 2nd, Bristol, England, April 1981, Conference Papers and Supplementar; Horses for ccurses in EFV operations Si components design and development in term performance and cost Canadair rotary wing technology development</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 rence A82-39100 on test A82-39129 6-8, y Papers A82-39727 ystem ns of A82-39729 tage - 39731
<pre>operations and safet; in Australia [ARL-SYS-RPFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulator effects [AD-A113463] BCENFT DESIGN Porward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVY, what an opportunity Joint Service: Advanced Vertical Lift Aircraft Frogram Aerodynamic characteristics of a large-scat tilt-nacelle V/STOL model [ATAA PAPEE 81-0150] The use of small strakes to reduce interfet drag of a low wing, twin engine airplane [AIAA PAPEE 82-1323] Use of rotary balance and forced oscillator data in six degrees of freedom simulation [ATAA PAPEE 82-1364] Remotely piloted vehicles; International Conference, 2nd, Bristol, England, April 1981, Conference Papers and Supplementar; Horses for ccurses in APV operations s; components design and development in term performance and cost Canadair rotary wing technology development Stabileye. R. Stephenson RPV performance</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 rence A82-39100 on test A82-39129 6-8, y Papers A82-39727 ystem ns of A82-39729 tage - 39731
<pre>operations and safet; in Australia [ARL-SYS-RIFT-24] Evaluations of helicopter instrument-flight handling qualities [AD-A114004] Analytical and simulator study of advanced [NASA-CR-3572] Manual reversion flight control system for aircraft: Pilot performance and simulative effects [AD-A113463] BCEBFT DESIGN Porward-swept wings add supersonic zip Mirage 2000 - Towards possible high series production aircraft JVX, what an opportunity Joint Services Advanced Vertical Lift Aircraft Frogram Aerodynamic characteristics of a large-scat tilt-nacelle V/STOL model [ATAA PAPEE 81-0150] The use of small strakes to reduce interfeid drag of a low wing, twin engine airplane [ATAA PAPEE 82-1323] Use of rotary balance and forced oscillation (ATAA PAPEE 82-1364] Remotely piloted vehicles; International Conference, 2nd, Bristol, England, April 1981, Conference Papers and Supplementar; Horses for ccurses in EFV operations Si components design and development in term performance and cost Canadair rotary wing technology development</pre>	t N82-28285 transport N82-28298 A-10 or cue N82-28302 A82-38216 A82-38249 S A82-38423 le, twin A82-38443 rence A82-39100 on test A82-39129 6-8, y Papers A82-39727 ystem ns of A82-39729 tage - 39731

MACHAN - A unmanned aircraft flight research facility A82-39735 Electric propulsion for a mini RPV system A82-39744 Development of the advanced composite ground spoiler for C-1 medium transport aircraft A82-39895 The use of linearized-aerodynamics and vortex-flow methods in aircraft design /invited paper/ [AIAA PAPEE 82-1384] A82-40294 Analytical design and validation of digital flight control system structure [AIAA PAPEB 82-1626] A82-40434 Predesign study for an advanced flight research rotor A82-40525 A summary of weight savings data for composite **VSTOL** structure A82-40546 Engineering aspects of international collaboration on Tornado A82-40878 Advanced aerodynamic design for future combat aircraft A82-40879 Some aerodynamic/flightmechanic aspects for the design of future combat aircraft A82-40880 Application of advanced exhaust nozzles for . tactical aircraft A82-40889 Observations and implications of natural laminar flow on practical airplane surfaces A82-40893 External aerodynamic design for a laminar flow control glove on a Lockheed JetStar wing A82-40895 Material and process developments on the Boeing 767 A82-40902 The promise of laminated metals in aircraft design A82-40903 Design of compensated flutter suppression systems A82-40904 Dual wing, swept forward swept rearward wing, and single wing design optimization for high performance business airplanes A82-40931 The design integration of wingtip devices for light general aviation aircraft A82-40933 Operation V10F - Development of a composite material wing A82-40934 Non-honeycomb F-16 horizontal stabilizer structural design A82-40936 Progress at Douglas on laminar flow control applied to commercial transport aircraft A82-40958 Design and tests of airfoils for sailplanes with an application to the ASW-19B A82-40967 Bjector powered propulsion and high lift subsonic Wind A82-40970 Design integration of CCW/USB for a sea-based aircraft A82-40972 Aircraft design for fuel efficiency A82-40973 Advanced aerodynamic wing design for commercial transports - Review of a technology program in the Netherlands A82-40985 Recent airfoil developments at DFVLR A82-40986 CATLA - A computer aided design and manufacturing tridimensional system A82-40990 CDS-the designer's media, the analyst's model ---Configuration Development System for aircraft A82-40991 Aircraft geometry verification with enhanced computer-generated displays 182-40992 Application of composite materials and new design concepts for future transport aircraft

A82-40994

Wind tunnel test and accodynamic analysis of three aeroelastically tailored wings A82-41001 Optimizing aerospace structures for manufacturing cost 182-41014 Wing design for supersonic cruise/transonic maneuver aircraft 182-41021 Analysis of jet transport wings with deflected control surfaces by using a combination of 2and 3-D methods A82-41022 Optimization of canard configurations - An integrated approach and practical drag estimation method A82-41023 The determination of gust loads on nonlinear aircraft using a power spectral density approach [NLE-TE-80123-U] N82-28303 Aircraft geometry verification with enhanced computer generated displays [NASA-TH-84254] N Automated optimum design of wing structures. N82-29268 Deterministic and probabilistic approaches [NASA-TM-84475] N82-29317 AIRCRAPT BNGINES The national dynamics 'observer' mini-RPV for tropical oreration A82-39734 NASA research in supersonic propulsicn - A decade of progress [AIAA PAPER 82-1048] A82-40417 Optimized 10 ton class commercial aircraft engine A82-40890 Preliminary design of an advanced integrated power and avionics information system A82-40907 Assessment of advanced technologies for high performance single-engine business airplanes A82-40932 The nonsynchronous whichs of the turbine rotor in aerojet engines A82-40944 Third generation turbo fans ' A82-40964 Design integration of CCW/USB for a sea-based aircraft A82-40972 The effect of intake flow disturbances on APU compressor blade high cycle fatigue in the Airbus A300 A82-40983 Engine controls for the 1980s and 1990s A82-40984 Advances in high-speed rolling-element bearings [NASA-TM-82910] N 82-28644 QCSEE over-the-wing engine acoustic data [NASA-TM-82708] N82-29324 Estimated airplane noise levels in A-weighed decibels [AC-36-3B] N82-30029 AIRCRAFT BOUIPMENT Analysis of an airglane windshield anti-icing system [AIAA PAPEE 82-1372] A82-39134 Concept demonstration of automatic subsystem parameter monitoring --- military helicopter cockpit instrumentation A82-40530 Support of the HH-65A - The impact of advanced technology of VTOL systems upon existing product support A82-40541 Models for the motor state of VSCF aircraft electrical power system --- Variable Speed Constant Frequency A82-40982 A compendium of lightning effects on future aircraft electronic systems [AD-A114117] N82-28293 Feasibility study of a 270V dc flat cable aircraft electrical rover distributed system [AD-A114026] N82-28552 AIRCRAFT FUELS Fuel conservation: The airline - AIC A82-38464

Requirements and trends in fuel consumption in transport mission with aircraft and surface vehicles A82-40956 Aerodynamic concepts for fuel-efficient transport aircraft A82-40957 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 1: Preliminary process analyses [AD-A112681] N82-28462 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 2: Process variable analyses and laboratory sample production [AD-A112682] N82-28463 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 3: Production of specification of JP-4 fuel from geokinetics shale oil [AD-A112683] N82-28464 Aircraft fire safety [AGARD-LS-123] N82-29279 Allcraft fire mishap experience/crash fire scenario quantitation N82-29280 Aviation fuels-future outlook and impact on allcraft fire threat N82-29282 The development and applications of a full-scale wide body test article to study the behavior of interior materials during a postcrash fuel fire N82-29285 The feasibility of a high-altitude aircraft platform with consideration of technological and societal constraints [NASA-TM-84508] N82-29313 AIRCRAPT GUIDANCE PNCS - A commercial flight management computer system [AIAA 82-1515] A82-38938 The control and guidance unit for MACHAN A82-39738 A terrain following system, an algorithm and a sensor A82-39740 Flight simulation studies on the feasibility of laterally segmented approaches in an MLS environment A82-40941 A concept for 4D-guidance of transport aircraft in the IMA --- Terminal Maneuvering Area A82-40942 Investigations concerned with shifting pilot activities to a higher hierarchical stage of flight control --- German thesis A82-41453 AIRCRAFT HAZARDS The operation of aircraft and helicopters in difficult meteorological and environmental conditions --- Russian book A82-39295 AIRCRAFT HYDRAULIC SYSTEMS Hydraulic Universal Display Processor System (HUDPS) [AD-A114428] N82-28294 AIRCRAFT INSTRUMENTS Evaluation of an automatic subsystem parameter monitor --- for aircraft A82-40552 AIRCRAFT LANDING In-Flight investigation of large airplane flying qualities for approach and landing [AIAA PAPEE 82-1296] An MIS with computer aided landing approach A82-39083 A82-39122 [AIAA PAPER 82-1352] Instrument landing systems /ILS/ at airports of the German Democratic Republic A82-39248 Touchdown technology --- large aircraft landing gear stress A82-40057 Flying quality requirements for V/STOL transition [AIAA PAPER 82-1293] A82-40 A82-40276

≜-7

AIRCRAFT MAINTENANCE

Visual scene simulation concerning the landing of sporting aircraft in connection with investigations regarding the control and learning behavior of the pilot --- German thesis A82-41447 Effects of approach lighting and variation in visible runway length on perception of approach angle in simulated night landings [AD-A114742] N82-29290 AIRCRAFT MAINTENANCE U.S. Marine Corps AV-8A maintenance experience [AIAA PAPES 81-2657] A82-38446 Rationalization of the maintenance process for helicopter Ka-26 A82-39246 Civil helicopter propulsion system reliability and engine monitoring technology assessments A82-40518 Age excloration in naval aviation --- Reliability Centered Maintenance program A82-40962 Composite structures repair A82-41015 Principles of achieving camage tolerance with flexible maintenance programs for new and aging aircraft A82-41016 AIRCRAFT MANEUVERS Air-to-air missile avoidance [AIAA 82-1516] A82-38939 Pilot models for discrete maneuvers [AIAA 82-1519] A82-38940 Optimal three-dimensional turning performance of supersonic aircraft [AÎAA PAPEE 82-1326] A82-39103 Maneuver stability of a vehicle with a towed body [AIAA PAPER 82-1347] A82-39 A82-39119 Flight-determined correction terms for angle of attack and sideslip [AIAA PAPER 82-1374] A82-40290 Determination of airplane aerodynamic parameters from flight data at high angles of attack A82-40928 Optimal open-loop aircraft control for go-around maneuvers under wind shear influence A82-40943 Wing design for supersonic cruise/transonic maneuver aircraft 182-41021 AIRCRAFT MODELS Aerodynamic characteristics of a large-scale, twin tilt-macelle V/STOL model [AIAA PAPER 81-0150] A82-38443 An X-Wing aircraft control system concept [AIAA 82-1540] A82-Investigation of low order lateral directional A82-38954 transfer function models for augmented aircraft [AIAA 82-1610] A82-38989 An estimation of aerodynamic forces and moments on an airplane model under steady state spin conditions [AIAA PAPER 82-1311] **282-3909**2 An investigation of scale model testing of VTOL aircraft in hover A82-40911 Reduced nonlinear flight dynamic model of elastic structure aircraft A82-41009 An improved propulsion system simulation technique for scaled wind tunnel mcdel testing of advanced fighters A82-41019 Wind-tunnel investigation cf a full-scale canard-configured general aviation aircraft A82-41024 System identification of nonlinear aerodynamic models N82-29996 ATECEAFT NOISE Noise pollution and airport regulation A82-40051 O'Hare International Airport - Impervious to proposed state efforts to limit airport noise A82-40052 Helicopter model scale results of flade-vortex interaction impulsive noise as affected by blade planform

SUBJECT INDEX

Fluctuating forces and rotor noise due to distorted inflow A82-40945 Field studies of the Air Force procedures (NOISECHECK) for measuring community noise exposure from aircraft operations N82-28841 FAD-A1136721 Estimated airplane noise levels in A-weighed decibels [AC-36-3B] N82-30029 Far-field acoustic data for the Texas ASE, Inc. hush house FAD-A1145641 N82-30032 AIRCRAFT PARTS The technological aspects of titanium application in the TU-144 aircraft structure A82-39718 Horses for courses in RPV operations --- system components design and development in terms of performance and cost A82-39729 AIRCBAFT PERFORMANCE Mirage 2000 - Towards possible high series production aircraft A82-38249 Optimal three-dimensional turning performance of supersonic aircraft [AIAA PAPER 82-1326] A 82-39103 Analytic extrapolation to full scale aircraft dynamics [AIAA PAPES 82-1387] A82-39143 Remotely puloted vehicles; International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers and Supplementary Papers A82-39727 Horses for courses in RPV operations --- system components design and development in terms of performance and cost A82-39729 Canadair rotary wing technology development A82-39731 Stabileye. R. Stephenson --- BPV performance, design and materials characteristics A82-39733 Aerodynamic aspects of aircraft dynamics at high angles of attack /AGARD Lecture/ [AIAA PAPER 82-1363] A82-39836 Axisymmetric approach and landing thrust reverser impacts on usage and LCC --- life cycle cost A82-40892 Assessment of advanced technologies for high performance single-engine business airplanes A82-40932 Performance characteristics of a buoyant quad-rotor research aircraft A82-40974 The role of the scale parameter in service load assessment and simulation --- of aircraft flight A82-41011 AIRCRAFT PILOTS The system of 'objective control' A82-39245 Boeing's new 767 eases crew workload A82-40348 A study of wind shear effects on aircraft operations and safety in Australia [ARL-SYS-REFT-24] N82-28265 AIRCRAFT PRODUCTION Adaptation of pultrusion to the manufacture of helicopter components A82-40537 Design and fabrication of a composite rear fuselage for the UH-60 /Black Havk/ A82-40544 A one-shot autoclave manufacturing process for carbon epoxy components A82-40935 Fatigue behavior of weldbonded joints A82-41115 International aviation (selected articles) [AD-A114422] N82-28245 AIRCRAFT PRODUCTION COSTS Optimizing aerospace structures for manufacturing cost A82-41014 AIRCRAFT RELIABILITY Rationalization of the maintenance process for helicopter Ka-26

A82-39246

A82-40556

Civil helicopter propuision system reliabil engine monitoring technology assessments	
Age exploration in naval aviation Relia Centered Maintenance program	A82-40518 bility
	A82-40962
Recommended practice for a demonstration of Nondestructive Evaluation /NDE/ reliabili aircraft production parts - Introduction quidelines	ty on
AIRCRAFT SAFETY	A82-41140
Complete flexibility and realism in radar s The detection of low level wind shear. II	anulaticn 182-38461
Wind shear - Its effect on an aircraft and	A82-38463 ways to
reduce the hazard. II 'Listening' systems to increase aircraft	A82-38500
structural safety and reduce costs	A82-39539
Touchdown technology large aircraft lar gear stress	ding A82-40057
An evaluation of helicopter autorotation as concepts	sist
Flight attendant injuries: 1971-1576	A82-40524
[AD-A114905] Aircraft fire safety	N82-29274
[AGARD-LS-123] Aircraft fire mishar experience/crash fire scenario quantitation	N82-29279
Human response to fire	N 82-29280
Aviation fuels-future outlook and impact on	N82-29281
aircraft fire threat	
Fireworthiness of transport aircraft interi systems	N82-29282 .or
AIRCRAFT SPECIFICATIONS	N 82-29284
Perspectives of the flying gualities specif	
[AIAA PAPER 82-1354] Flying qualities requirements for rcll CAS	
[AIAA PAPEE 82-1356] Sport aircraft Russian book	A82-40287
AIRCRAFT SPIN	A82-40483
Applications of parameter estimation in the of spinning airplanes	-
[AIAA PAPEE 82-1309] AIRCRAFT STABILITY	A82-390 90
Simulator investigations of various side-st controller/stability and control augmenta	
systems for helicopter terrain flight	
[AIAA 82-1522] Modal control of relaxed static stability a	
[AIAA 82-1524] An X-Wing aircraft control system concept	A82-38944
[AIAA 82-1540] An alternate method of specifying kandwidth flying qualities	182-38954 for
[(AIAA 82-1609]	A82-38988
X-29A flight control system design experien [AIAA 82-1538]	A82-39003
Piloted simulator evaluation of a relaxed s stability fighter at high angle-of-attack	
[AIAA PAPER 82-1295] Development and flight test evaluation of a	A82-39082 pitch
stability augmentation system for a relax stability L-1011	ed
[AIAA PAPER 82-1297] Dynamic stability of flexible forward swept aircraft	A82-39084 Wing
[AIAA PAPER 82-1325] A ground-simulation investigation of helico	A82-39102 pter
decelerating instrument approaches	A82-39118
Maneuver stability of a vehicle with a towe [AIAA PAPER 82-1347]	
Sensor stabilisation requirements of BPV's Simulation study	
Aerodynamic aspects of aircraft dynamics at	A82-39741 high
angles of attack /AGARD lecture/	

AIBCRAFT STRUCTURES	
Composite use on helicopters	22
'Listening' systems to increase aircraft structural safety and reduce costs	
82-395 On the state of technology and trends in composite	
materials in the United States	
A82-398 Tests of CFRP spar/rib models with corrugated web	82
A 82- 398	
Evaluation of CFRP prototype structures for aircra 182-398	
Developments cn graphite/epoxy T-2 nose landing gear door	0.2
A82-398 Fabrication of CFRP prototype structure for	93
aırcraft horizontal tail leadıng edge slat rail A82-398	96
On the bearing strengths of CFRP laminates 182-399	30
In-motion radiography of titanium spar tube welds 182-405	
Results of the AH-64 Structural Demonstration	
A82-405 HAJIF-II - A program system for the dynamic	51
analysis of aeronautical structures 182-408	9/1
Design of compensated flutter suppression systems	
182-409 The behavior of composite thin-walled structures	04
in dynamic buckling under impact 182-409	76
Nondestructive testing in aircraft construction	
using hclographic methods A82-409	77
Determination of load spectra and their application for keeping the operational life	
proof of sporting airplanes	10
Theoretical and experimental investigation of	10
joint-structural damping interaction for airplane construction	
A82-410	
	13
Principles of achieving damage tolerance with flexible maintenance programs for new and aging	13
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft A82-410	
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft	16
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft A82-410 Fatigue behavior of weldbonded joints A82-411 Evaluation of heat damage to aluminum aircraft	16
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft Fatigue behavior of weldbonded joints A82-411 Evaluation of heat damage to aluminum aircraft structures A82-411	16 15
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft Fatigue behavior of weldbonded joints A82-411 Evaluation of heat damage to aluminum aircraft structures	16 15
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints A82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284	16 15 41
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints R82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model	16 15 41 86
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints N82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation	16 15 41 86
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints N82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N	16 15 41 86 24
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft A82-410 Fatigue behavior of weldbonded joints A82-411 Evaluation of heat damage to aluminum aircraft structures A82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Many [AIAA PAPER 82-1328] A82-391	16 15 41 86 24
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints A82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Nany [AIAA PAPER 82-1328] A82-391 AIRCRAFT TIRES	16 15 41 86 24
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints N82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Many [AIAA PAPER 82-1328] A82-391 AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress	16 15 41 86 24 05
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints A82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Nany [AIAA PAPER 82-1328] A82-391 AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress A82-400 Alert aircraft roll over chocks	16 15 41 86 24 05 57
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft A82-410 Fatigue behavior of weldbonded joints A82-411 Evaluation of heat damage to aluminum aircraft structures A82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Many [AIAA PAPER 82-1328] A82-391 AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress A82-400	16 15 41 86 24 05 57
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints A82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Many [AIAA PAPER 82-1328] A82-391 AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress A82-400 Alert aircraft roll over chocks [AD-A107456] N82-283 AIRFOIL PROFILES A new Transonic Airfoil Design Method and its	16 15 41 86 24 05 57
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints N82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Many [AIAA PAPER 82-1328] A82-391 AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress N82-400 Alert aircraft roll over chocks [AD-A107456] N82-283 AIRPOIL PROFILES A new Transonic Airfoil Design Method and its application to helicopter rotor airfoil design A82-405	16 15 41 86 24 05 57 07
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints A82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Nany [AIAA PAPER 82-1328] A82-391 AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress A82-400 Alert aircraft roll over chocks [AD-A107456] N82-283 AIRPOIL PROFILES A new Transonic Airfoil Design Method and its application to helicopter rotor airfoil design	16 15 41 86 24 05 57 07
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints N82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Many [AIAA PAPER 82-1328] A82-391 AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress N82-283 AIRFOIL PROFILES A new Transonic Airfoil Design Method and its application to helicopter rotor airfoil design A82-400 Viscous transonic airfoil flow simulation Investigation of the unsteady airloads on a	16 15 41 86 24 05 57 07
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft M82-410 Fatigue behavior of weldbonded joints M82-411 Evaluation of heat damage to aluminum aircraft structures M82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] M82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Many [AIAA PAPER 82-1328] AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress A82-400 Alert aircraft roll over chocks [AD-A107456] A new Transonic Airfoil Design Method and its application to helicopter rotor airfoil design A82-405 Viscous transonic airfoil flow simulation M82-408 Investigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps,	16 15 41 86 24 05 57 07
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft M82-410 Fatigue behavior of weldbonded joints M82-411 Evaluation of heat damage to aluminum aircraft structures M82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Many [AIAA PAPER 82-1328] AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress A82-400 Alert aircraft roll over chocks [AD-A107456] AIRFOIL PROFILES A new Transonic Airfoil Design Method and its application to helicopter rotor airfoil design A82-405 Viscous transonic airfoil flow simulation M82-408 Investigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps, at transonic speed and high Reynolds numbers	16 15 41 86 24 05 57 07 97
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints N82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Nany [AIAA PAPER 82-1328] A82-391 AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress N82-400 Alert aircraft roll over chocks [AD-A107456] N82-283 AIRPOIL PROFILES A new Transonic Airfoil Design Method and its application to helicopter rotor airfoil design A82-405 Viscous transonic airfoil flow simulation A82-405 Minvestigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps, at transonic speed and high Reynolds numbers A82-409 Design and tests of airfoils for sailplanes with	16 15 41 86 24 05 57 07 97
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft N82-410 Fatigue behavior of weldbonded joints N82-411 Evaluation of heat damage to aluminum aircraft structures N82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Many [AIAA PAPER 82-1328] A82-391 AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress N82-283 AIRFOIL PROFILES A82-400 Alert aircraft roll over chocks [AD-A107456] N82-283 AIRFOIL PROFILES A new Transonic Airfoil Design Method and its application to helicopter rotor airfoil design A82-400 Investigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps, at transonic speed and high Reynolds numbers A82-409 Design and tests of airfoils for sailplanes with an application to the ASW-198 A82-409	16 15 41 86 24 05 57 07 97 09
Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft A82-410 Fatigue behavior of weldbonded joints A82-411 Evaluation of heat damage to aluminum aircraft structures A82-411 Advanced casting: Today and tomorrow aerospace industry components casting N82-284 Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-286 AIRCRAFT SUBVIVABILITY The correlation of flight test and analytic M-on-N air combat exchange ratios Many-on-Many [AIAA PAPER 82-1328] A82-391 AIRCRAFT TIRES Touchdown technology large aircraft landing gear stress A82-400 Alert aircraft roll over chocks [AD-A107456] N82-283 AIRPOIL PROFILES A new Transonic Airfoil Design Method and its application to helicopter rotor airfoil design A82-400 Investigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps, at transonic speed and high Reynolds numbers A82-409 Design and tests of airfoils for sailplanes with an application to the ASW-198	16 15 41 86 24 05 57 07 97 09

- - - - -

A82-40968

Advanced aerodynamic wing design for commercial transports - Review of a technology program in the Netherlands A82-40985 Recent airfoil developments at DFVLR A82-40986 AIRFOILS Observations and implications of natural laminar flow on practical airplane surfaces A82-40893 AIRPRANE MATERIALS Sikorsky ACAP preliminary design --- Advanced Composite Airfrage Program A82-40526 AIRFRANES A summary of weight savings data for composite VSTOL structure A82-40546 Inlet and airframe compatibility for a V/STOL fighter/attack aircraft with top-mounted inlets A82-40908 AIRLINE OPERATIONS Complete flexibility and realism in radar simulation A82-38461 Fuel conservation: The airline - ATC A82-38464 Minimization of the total costs incurred in the employment of passenger jet aircraft A82-39247 The fourth dimension --- flight management system for airline operations A82-39540 FAA aviation forecasts-fiscal years 1982-1993 [AD-A114696] AIRPORT PLANNING N82-29261 Noise pollution and airport regulation A82-40051 O'Hare International Airport - Impervious to proposed state efforts to limit airport noise A82-40052 AIRPORTS Computer outages at air terminal facilities and their correlation to near miss mid-air collisions (AFMD-82-43) [B-206064] N82-28264 FAA aviation forecasts-fiscal years 1982-1993 [AD-A114696] N82-29261 AIRSHIPS The feasibility of a high-altitude aircraft platform with consideration of technological and societal constraints [NASA-TM-84508] N82-29313 ALGORITHMS A terrain following system, an algorithm and a sensor A82-39740 Establishment of a rotor model basis [NASA-TP-2026] N82-29311 ALIGNMENT Minimal order time sharing filters for INS in-flight alignment A82-38439 ALL-WRATHER AIR NAVIGATION Short range tactical RFA system A82-39730 ALPHA JET AIRCEAFT A one-shot autoclave manufacturing process for carbon epoxy components A82-40935 ALTITUDE CONTROL Reduction and analysis of mode C altitude data collected at high altitudes over the continental United States [AD-A114655] N82-29276 ALONINUN Fatigue behavior of veldbonded joints A82-41115 ALUMINUM ALLOYS Material and process developments on the Boeing 767 182-40902 Application of a new hybrid material /ARALL/ in aircraft structures A82-40975 Evaluation of heat damage to aluminum aircraft structures 182-41141 Advanced casting: Today and tomorrow --aerospace industry components casting N82-28486

SUBJECT INDEX

ANALOG COMPUTERS The use of analog computers in solutions of Inverse problems of heat conduction for the identification of boundary conditions on the surfaces of gas-turbine-engine parts on the basis of temperature-measurement results 182-39467 ANALOG TO DIGITAL CONVERTERS Heads up display [NASA-CASE-LAB-12630-1] N82-29319 ANGLE OF ATTACK Piloted simulator evaluation of a relaxed static stability fighter at high angle-of-attack [AIAA PAPER 82-1295] A82-39082 An estimation of aerodynamic forces and moments on an airplane model under steady state spin conditions [AIAA PAPER 82-1311] A82-39092 Analysis and wind tunnel tests of a probe used to sense altitude through measurement of static pressure AIAA PAPER 82-13617 A82-39128 Effects of vortex breakdown on longitudinal and lateral-directional aerodynamics of slender Wings by the suction analogy [AIAA PAPER 82-1385] A82-39141 Lateral aerodynamics of delta wings with leading edge separation [AIAA FAPER 82-1386] A82-3: Aerodynamic aspects of aircraft dynamics at high angles of attack /AGARD Lecture/ A82-39142 [AIAA PAPER 82-1363] A82-39836 Flight-determined correction terms for angle of attack and sideslip [AIAA FAPER 82-1374] A82-40290 Dynamic surface measurements on a model helicopter rotor during blade slap at high angles of attack A82-40555 Determination of airplane aerodynamic parameters from flight data at high angles of attack A82-40928 Prediction of high alpha flight characteristics utilizing rotary balance data A82-40953 Low-speed characteristics of a fighter-type configuration at high angles-of-attack and sideslip A82-41020 ANGLES (GEOMETRY) Turbulent boundary layer on a porous surface with injection at various angles to the wall A82-39482 ANGULAR ACCRURRATION The ideal controlled element for real airplanes is not K/s [AIAA 82-1606] A82-38986 ANTENNA DESIGN Improved 243 MHz homing antenna system for use on helicopters [NLE-MP-81022-0] N82-28276 ANTENNA RADIATION PATTERNS Monopole antenna patterns on finite size composite ground planes --- in aircraft A82-41055 ANTIMISTING FUELS Aviation fuels-future outlook and impact on aircraft fire threat N82-29282 APPROACH CONTROL In-Flight investigation of large airplane flying qualities for approach and landing [AIAA PAPER 82-1296] A82-39083 An MLS with computer aided landing approach [AIAA PAPER 82-1352] A 82-39122 Instrument landing systems /ILS/ at airports of the German Democratic Republic A82-39248 Terminal area automatic navigation, guidance, and Control research using the Horowave Landing System (MLS). Part 4: Transition path reconstruction along a straight line path containing a glideslope change waypoint [WASA-CR-3574-PT-4] N83 Bffects of approach lighting and variation in N82-28269 visible runway length on perception of approach angle in simulated night landings [AD-A114742] N82-29290

A82-40534

AREA NAVIGATION NASA/FAA Helicopter ATC simulation investigation of RNAV/MLS instrument approaches x82-40535 ARMED FORCES (UNITED STATES) \ U.S. Marine Corps AV-8A maintenance experience [AIAA PAPER 81-2657] ASYMPTOTIC METHODS A82-38446 Evaluation of an asymptotic method fcr helicopter fotor airloads A82-40509 ATMOSPHERIC CHEMISTRY Atmospheric chemistry of hydrocarbon fuels. Volume 2: Outdoor chamber data tabulations, Part 1 [AD-A113665] N82-28842 ATHOSPHERIC COMPOSITION Two-dimensional model studies of the impact of arcraft exhaust emissions on tropospheric ozone 182-40124 ATHOSPHERIC DENSITY Prelaunch estimates of near Earth satellite lifetimes using guasi-dynamic atmosphere models - application to a proposed Brazilian satellite [IN PE-2325-PRE/080] N82-29 ATHOSPHERIC BLECTRICITY N82-29347 Atmospheric electricity hazards analytical model development and application. Volume 1: Lightning environment modeling N82-29800 [AD-A114015] Atmospheric electricity hazards analytical model development and application. Volume 2: Simulation of the lightning/aircraft interaction event N82-29801 [AD-A114016] Atmospheric electricity hazards analytical model development and application. Volume 3: Electromagnetic coupling modeling of the lightning/aircraft interaction event [AD-A114017] N82-29802 ATHOSPHERIC MODELS Two-dimensional model studies of the impact of aircraft exhaust emissions on tropcspheric ozone A82-40124 ATHOSPHERIC TURBULENCE The effects of atmospheric turbulence on a quadrotor beavy lift airship [AIAA 82-1542] A82-390 The role of the scale parameter in service load assessment and simulaticn --- of alrcraft flight 182-39009 A82-41011 The determination of gust loads on nonlinear aircraft using a power spectral density approach [NLR-TR-80123-U] N82-283 พิ82-28303 Analysis of vibration induced error in turbulence velocity measurements from an aircraft wing tip boom [NASA-CR-3571] N82-28881 ATTACK AIRCRAFT Mirage 2000 - Towards possible high series production aircraft A82-38249 Inlet and airframe compatibility for a V/STOL fighter/attack aircraft with top-mounted inlets A82-40908 Advanced aircraft electrical system control technology demonstrator. Phase 1: Analysis and preliminary design [AD-A113633] N82-28284 AUTOCLAVING A one-shot autoclave manufacturing process for carbon epoxy components A82-40935 AUTOMATIC CONTROL Concept demonstration of automatic subsystem parameter monitoring --- military helicopter cockpit instrumentation A82-40530 AUTOBATIC FLIGHT CONTROL PNCS - A commercial flight management computer system [AIAA 82-1515] A82-38938 The use of differential pressure feedback in an automatic flight control system [AIAA 82-1596] A82-38981 Avoiding the pitfalls in automatic landing control system design [AIAA 82-1599] A82-39013

Primary-data devices --- Russian book A82-39279 Flight management computers A82-39321 Electronic stabilization of an aircraft A82-39322 The fourth dimension --- flight management system for airline operations 182-39540 A terrain following system, an algorithm and a sensor A82-39740 Flight control systems for aerial targets A82-39745 Boeing's new 767 eases crew workload A82-40348 Flight experience with a backup flight-control system for the HiMAT research vehicle [AIAA PAPEB 82-1541] A82-40429 A concept for 4D-guidance of transport aircraft in the TMA --- Terminal Maneuvering Area A82-40942 Reduced nonlinear flight dynamic model of elastic structure aircraft 182-41009 Investigations concerned with shifting pilot activities to a higher hierarchical stage of flight control --- German thesis A82-41453 Minimum operational performance standards for automatic direction finding (ADF) equipment [RTCA/DO-179] N82-28270 Applications to aeronautics of the theory of transformations of nonlinear systems [NASA-TM-84249] N82-30013 AUTOMATIC LANDING CONTROL Avoiding the pitfalls in automatic landing control system design [AIAA 82-1599] A82-39013 An MLS with computer aided landing approach [AIAA PAPER 82-1352] A82-39 Terminal area automatic navigation, guidance, and A82-39122 control research using the Microwave Landing System (MLS). Part 4: Transition path reconstruction along a straight line path containing a glideslope change waypoint [NASA-CR-3574-PT-4] N82-28269 AUTOMATIC PILOTS Electronic stabilization of an aircraft A82-39322 The control and guidance unit for MACHAN A82-39738 Design and flight testing of a digital optimal control general aviation autopilot A82-40906 Gust response of commercial jet aircraft including effects of autopilot operation [NASA-CR-165919] AUTOMATIC TEST EQUIPMENT N82-28266 A simple, low cost application of a flight test parameter identification system [AIAA PAPER 82-1312] A82-39093 AUTOMATIC TRAFFIC ADVISORY AND RESOLUTION Estimation of the number of in-flight aircraft on instrument flight rules A82-41117 AUTOBOTATION An evaluation of helicopter autorotation assist concepts A82-40524 AUXILIARY POWER SOURCES An evaluation of helicopter autorotation assist concepts A82-40524 AVIONICS A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 MACHAN - A unmanned aircraft flight research facility A82-39735 Future helicopter cockpit design A82-40529 Micro-heads-up display A82-40533 Avionics systems for helicopter integration

Support of the HH-65A - The impact of advanced technology of VTOL systems upon existing product support A82-40541 A practical approach to the incorporation of technical advances in avionics A82-40886 Preliminary design of an advanced integrated power and avionics information system A82-40907 Hodels for the motor state of VSCF aircraft electrical power system --- Variable Speed Constant Frequency A82-40982 Electronic/electric technology benefits study --avionics [NASA-CR-165890] N82-28243 General aviation activity and avionics survey [AD-A112924] N8 N82-28244 Advanced aircraft electrical system control technology demonstrator. Phase 1: Analysis and preliminary design [AD-A113633] N82-28284 Problems related to the integration of fault tolerant aircraft electronic systems [NASA-CR-165926] N82-29022 System data communication structures for active-control transport aircraft, volume 2 [NASA-CR-165773-VOL-2] N8 N82-29511 AXIAL PLON TURBINES Aerodynamics of advanced axial-flow turbomachinery [AD-A114911] N82-29328

В

BEACON COLLISION AVOIDANCE SYSTEM Air-air collision avoidance systems A82-39323 BBARINGLESS BOTORS An experimental investigation of a bearingless model rotor in hover A82-40512 Finite element analysis for bearingless rotor blade aeroelasticity A82-40517 BEARINGS Comparison of HP turbine 'deep blade design' effects in turbofan engine gas generators with different bearing structure configurations A82-40996 BLADE SLAP NOISE The prediction of helicopter rotor discrete frequency noise A82-40553 A semiempirical high-speed rotor noise prediction technique A82-40554 Dynamic surface measurements on a model helicopter rotor during blade slap at high angles of attack A82-40555 Helicopter model scale results of flade-vorter interaction impulsive ncise as affected by blade planform A82-40556 BLADE TIPS Effect of tip vanes on the performance and flow field of a rotor in nover A82-40511 Investigation of a rotor system incorporating a constant lift tip [NASA-CR-166261] N82-29271 Multistage axial compressor program on tip clearance effects [AD-A 107445] N82-29325 BLOWING Development cf an advanced no-moving-parts high-lift airfoil A82-40971 Wing-tip jets aerodynamic performance A82-40987 BODIES OF REVOLUTION Aerodynamic interactions between a 1/6-scale helicopter rotor and a body of revolution 182-40947 herodynamic interactions between a 1/6 scale helicopter rotor and a body of revolution [NASA-TM-84247] N 82-28252

SUBJECT INDEX

BODY-WING CONFIGURATIONS An estimation of aerodynamic forces and moments on an airplane model under steady state spin conditions [AIAA PAPER 82-1311] A82-39092 Numerical solution of a problem concerning transonic flow past a wing-fuselage configuration A 82-39996 Transonic small disturbance code for body-wing configuration coupled with full potential code for wing alone A82-40899 Computational and experimental studies of light twin aerodynamic interference A82-40930 Test results of chordwise and spanwise blowing for low-speed lift augmentation 182-40999 Wind tunnel test and aerodynamic analysis of three aeroelastically tailored wings A82-41001 Wind-tunnel investigation of vortex flaps on a highly swept interceptor configuration A82-41004 Wind tunnel measurements of longitudinal stability and control characteristics of primary and secondary wing configurations A 82-41025 Means for controlling aerodynamically induced twist N82-28279 [NASA-CASE-LAR-12175-1] Research model wing/tail fabrication --- transonic wind tunnel 1/7.5-scale model [AD-A114101] N82-2828 N82-28288 BOEING AIRCRAFT Recent advances in rotor technology at Boeing Vertol A82-40508 Aerodynamic research applications at Boeing A82-41000 BORING 747 AIRCRAFT B747/JT9D flight loads and their effect on engine running clearances and performance deterioration; BCAC NAIL/P and WA JT9D engine diagnostics programs [NASA-CR-165573] N82-28296 BOEING 767 AIRCRAFT Committing composites to the Boeing 767 A 82-38224 Boeing's new 767 eases crew workload A82-40348 Material and process developments on the Boeing 767 **▲**82-40902 BORBER AIRCRAFT Investigations regarding vortex formation at wings with bent leading edges 182-38783 BOOMS (ROUIPHENT) Analysis of vibration induced error in turbulence velocity measurements from an aircraft wing tip boom [NASA-CR-3571] N82-28881 BOUNDARY LAYER CONTROL External aerodynamic design for a laminar flow control glove on a Lockheed JetStar wing A82-40895 A summary of V/STOL inlet analysis methods [NASA-TH-82885] N82-28249 BOUNDARY LAYER BOUATIONS Symposium on Flows with Separation, Stuttgart, West Germany, November 23-25, 1981, Reports A82-38781 BOUNDARY LAYER FLOW Improved solutions to the Falkner-Skan boundary-layer equation A82-38283 Comparison of experimental and analytic performance for contoured endwall stators [AIAA PAPER 82-1286] A82-40422 Estimation of simulation errors in the European Transonic Wind Tunnel /ETW/ A82-40950 Aerodynamics of advanced axial-flow turbomachinery [AD-A114911] N82-29328 BOUNDARY LAYER SEPARATION Leading edge separation at delta wings with curved leading edges in supersonic flow A82-38784

BOUNDARY VALUE FROBLEMS Numerical methods for solving boundary value problems for noncavitating and cavitating flow past wing profiles A82-38722 The use of analog computers in solutions of inverse problems of neat conduction for the identification of boundary conditions on the surfaces of gas-turbine-engine parts on the basis of temperature-measurement results A82-39467 BUCKLING The behavior of composite thin-walled structures in dynamic buckling under impact A82-40976 BYPASS RATIO Recent advances in the performance of high bypass ratio fans A82-40891 С C-1A AIRCRAFT Development of the advanced composite ground spoiler for C-1 medium transport aircraft A82-39895 C-130 AIRCRAFT Results of T56 engine performance monitoring trial In Hercules aircraft, Felruary - July 1977 [ARL-MECH-ENG-TECH-MIMO-409] N82-29322 C-140 AIRCRAFT External aerodynamic design for a laminar flow control glove on a Lockbeed JetStar wing A82-40895 C-141 AIRCRAFT Delta electrical load analysis C-141E JACC/CP aircraft [AD-A113761] N82-28283 CANADAIB AIRCEAFT Canadair rotary wing technology development A82-39731 CANARD CONFIGURATIONS Close-coupled canard-wing wortex interaction and Reynolds stress acquisition [AIAA PAPER 82-1368] A82-39132 Calculations of transcenc steady state aeroelastic effects for a canard airplane A82-40882 Tail versus canard configuration - An aerodynamic comparison with regard to the suitability for future tactical combat aircraft A82-40901 Test results of chordwise and spanwise blowing for low-speed lift augmentation A82-40999 Optimization of canard configurations - An integrated approach and practical drag estimation method A82-41023 Wind-tunnel investigation of a full-scale canard-configured general aviation aircraft A82-41024 Wind tunnel measurements of longitudinal stability and control characteristics of primary and secondary wing configurations A82-41025 Minimum induced drag of canard configurations A82-41116 CAMOPIES Method for refurbishing and processing parachutes [NASA-CASE-KSC-11042-1] N82-29330 CANTILEVER BEAMS Tests of CFRP spar/rib models with corrugated web A82-39890 CARBON FIBER BEINFORCED PLASTICS Tests of CFRP spar/rib models with corrugated web A82-39890 Evaluation of CPRP prototype structures for aircraft A82-39892 Fabrication of CFRF prototype structure for aircraft horizontal tail leading edge slat rail A82-39896 On the bearing strengths of CFRP laminates A82-39930 Operation V10F - Development of a composite material wing A82-40934

A one-shot autoclave manufacturing process for carbon epoxy components A82-40935 Development of materials and manufacturing technology over the next 20 years: Composite materials [MBB-00-341-82-0] N82-28365 CARBON FIBERS Technical and economic comparison of carbon fiber tape and woven fabric applications A82~40993 Carbon fiber reinforced composite structures protected with metal surfaces against lightning strike damage [MBB-UD-340-82-0/E] N82-28364 CASTING International aviation (selected articles) [AD-A114422] N82-28245 Advanced casting: Today and tomorrow --aerospace industry components casting N82-28486 CATHODE RAY TUBES The evclution of display formats for advanced fighters using multimode color CRT displays A82-40888 CAVITATION PLON Numerical methods for solving boundary value problems for noncavitating and cavitating flow past wing profiles A82-38722 Use of the cavitation tunnel at the Dutch Naval Experiment station (NSP), Wageningen for the determination of the acoustic source strength of •propeller cavitation [TPD-908-720] N82-29116 CENTRAL PROCESSING UNITS Programs for the transonic wind tunnel data processing installation. Part 8: Programs for processing data on the central site computer [AD-A112900] N82-28310 CHARGE COUPLED DEVICES Fixed pattern noise correction for staring arrays in guidance systems A82-39190 CHINA (NAINLAND) International aviation (selected articles) [AD-A114422] N82-28245 CIRCULATION CONTROL AIRPOILS Development of the Circulation Control Wing-Upper Surface Blowing powered-lift system for STOL aircraft A82-40969 Development of an advanced no-moving-parts high-lift airfoil A82-40971 Design integration of CCW/USB for a sea-based aircraft A82-40972 CIVIL AVIATION The need for a dedicated public service helicopter design A82-38422 The national dynamics 'observer' mini-RPV for tropical operation A82-39734 New technology for the next generation of commercial transports - Real or imaginary A82-41007 General aviation activity and avionics survey [AD-A112924] N82-28244 Cost analysis of the discrete Address Beacon System for the low-performance general aviation aircraft community [AD-A112957] N82-28274 Maximizing South Carolina's aviation resources: Identifying potentially profitable commuter airline routes, volume 2 [PB82-139353] N82-29277 CLEARANCES CF6 jet engine performance improvement: High pressure turbine active clearance control [NASA-CR-165556] N82-28297 Multistage axial compressor program on tip clearance effects [AD-A107445] N82-29325 CLOUD PHYSICS An evaluation of the Rosemount ice detector for cloud water content measurements [PB82-158833] N82-29321

CLUTTER Demonstration of radar reflector detection	and
ground clutter suppression using airborn	
weather and mapping radar	
COAL GASIFICATION	A82-40532
Laboratory-scale simulatics of underground	coal
gasification: Experiment and theory [DE82-001063]	N97_79#70
COCKPIT SINULATORS	N82-2847,0
Applying advanced technolcgy to flight sta	tion
design	A82-40887
COCKPITS	A01 40007
Analysis of in-trail following dynamics of	
CDTI-eguipped aircraft Cockpit Displ Traffic Information	ays or
[AIAA PAPEE 82-1330]	A82-39107
Boeing's new 767 eases crew workload	A82-40348
Conceptual design of the LHX integrated co	
Puturo bollooptop cockast docson	A82-40527
Future helicopter cockfit design	A82-40529
Concept demonstration of automatic subsyst parameter monitoring military helico	
cockpit instrumentation	bret
-	A82-40530
The evolution of display formats for advan fighters using multimode color CRT displ	
	A82-40888
Electronic/electric tecnnclogy benefits st avionics	ud y
[NASA-CR-165890]	N82-28243
COLLISION AVOIDANCE	·
Air-air collision avoidance systems	A82-39323
COLOB	- ³
Aircraft geometry verification with enhanc computer generated displays	ea
[NASA-TM-84254]	N82-29268
COLUMNS (SUPPORTS) The behavior of composite thin-walled stru	ctures
in dynamic buckling under impact	
	A82-40976
COMBAT The correlation of flight test and analyti	c M-on-N
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H	c M-on-N any
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS	c M-on-N any A82-39105
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328]	с М-ол-N any A82-39105 g
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS	c M-on-N any A82-39105
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground	c M-on-N any A82-39105 g A82-40961
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION	c M-on-N any A82-39105 g A82-40961
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL	c M-on-N any A82-39105 g A82-40961 coal N82-28470
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support.	c M-on-N any A82-39105 g A82-40961 coal N82-28470
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DB82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support technology program	c M-on-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support. technology program Flying qualities requirements for roll CAS	c M-on-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely pilored vehicle support technology program Flying qualities requirements for roll CAS [AIAA PAPEB 82-1356] COMMERCIAL AIRCRAFT	c M-on-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely pilored vehicle support. technology program Flying qualities requirements for roll CAS [AIAA PAPEE 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow control	c M-on-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPEB 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support. technology program Plying qualities requirements for roll CAS [AIAA PAPEE 82-1356] COMMENCIAL AIRCEAFT Progress at Douglas on laminar flow control applied to commercial transport aircraft	c M-on-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40958
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely pilored vehicle support. technology program Flying qualities requirements for roll CAS [AIAA PAPEE 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow control	c M-on-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40958
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPEB 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support. technology program Plying qualities requirements for roll CAS [AIAA PAPEB 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow control applied to commercial transport aircraft Aerodynamic research applications at Boeine New technology for the next generation of	c M-on-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40287 l A82-40958 g A82-41000
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DB82-001063] COMMAND AND CONTROL U.S. Army remotely pilored vehicle support technology program Plying qualities requirements for rcll CAS [AIAA PAPEE 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow control applied to commercial transport aircraft Aerodynamic research applications at Boeing	c M-on-N any A82-39105 g A82-40961 coal N82-28470 ing A82-28470 ing A82-40287 l A82-40287 l A82-40958 g A82-41000 y
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPEB 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support. technology program Plying qualities requirements for roll CAS [AIAA PAPEB 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow control applied to commercial transport aircraft Aerodynamic research applications at Boeine New technology for the next generation of	c M-on-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40958 A82-41000 y A82-41007
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPEB 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support. technology program Flying qualities requirements for roll CAS [AIAA PAPEE 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow control applied to commercial transport aircraft Aerodynamic research applications at Boeing New technology for the nest generation of commercial transports - Beal or imaginar Gust response of commercial jet aircraft in effects of autopilot operation	c M-op-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40287 l A82-40958 g A82-41000 y A82-41007 ncluding
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPEB 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support technology program Flying qualities requirements for roll CAS [AIAA PAPEB 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow contro. applied to commercial transport aircraft Aerodynamic research applications at Boeing New technology for the next generation of commercial transports - Beal or imaginar Gust response of commercial jet aircraft in effects of autopilot operation [NASA-CR-165919]	C M-OD-N any A82-39105 G A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40958 A82-41000 Y A82-41007 ncluding N82-28266
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPEB 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support. technology program Plying qualities requirements for roll CAS [AIAA PAPEE 82-1356] COMMERCIAL AIRCENFT Progress at Douglas on laminar flow control applied to commercial transport aircraft Aerodynamic research applications at Boeine New technology for the nest generation of commercial transports - Beal or imaginar Gust response of commercial jet aircraft in effects of autopilot operation [NASA-CR-165919] PAA aviation forecasts-fiscal years 1982-11 [AD-A114696]	C M-OD-N any A82-39105 G A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40958 A82-41000 Y A82-41007 ncluding N82-28266
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPEB 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support technology program Flying qualities requirements for roll CAS [AIAA PAPEE 82-1356] COMMENCIAL AIRCEAFT Progress at Douglas on laminar flow control applied to commercial transport aircraft Aerodynamic research applications at Boeing New technology for the nest generation of commercial transports - Beal or imaginar Gust response of commercial jet aircraft in effects of autopilot operation [NASA-CR-165919] PAA aviation forecasts-fiscal years 1982-1 [AD-A114696] COMMENCIAL EMERGY	c M-op-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40287 l A82-40958 G A82-41000 y A82-41007 ncluding N82-28266 993 N82-29261
<pre>COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely pilored vehicle support. technology program Flying qualities requirements for roll CAS [AIAA PAPEB 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow contro. applied to commercial transport aircraft Aerodynamic research applications at Boeing New technology for the next generation of commercial transports - Beal or imaginar Gust response of commercial jet aircraft in effects of autopilot operation [NASA-CR-165919] FAA aviation forecasts-fiscal years 1982-11 [AD-A114696] COMMERCIAL ENERGY Maximizing South Carolina's aviation resource </pre>	C M-OD-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40958 g A82-41007 ncluding N82-28266 993 N82-29261 rces:
<pre>COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPEB 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support. technology program Plying qualities requirements for roll CAS [AIAA PAPEB 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow control applied to commercial transport aircraft Aerodynamic research applications at Boeine New technology for the next generation of commercial transports - Beal or imaginar Gust response of commercial jet aircraft in effects of autopilot operation [NASA-CR-165919] PAA aviation forecasts-fiscal years 1982-11 [AD-A114696] COMMERCIAL ENERGY Maximizing South Carolina's aviation resour Identifying potentially profitable commutairline routes, volume 2</pre>	c M-op-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40287 l A82-40287 l A82-40958 g A82-41000 y A82-41007 ncluding N82-28266 993 N82-29261 rccs: ter
<pre>COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely pilored vehicle support. technology program Flying qualities requirements for roll CAS [AIAA PAPEB 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow contro. applied to commercial transport aircraft Aerodynamic research applications at Boeing New technology for the next generation of commercial transports - Beal or imaginar Gust response of commercial jet aircraft in effects of autopilot operation [NASA-CR-165919] FAA aviation forecasts-fiscal years 1982-11 [AD-A114696] COMMERCIAL ENERGY Maximizing South Carolina's aviation resource </pre>	C M-OD-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40958 g A82-41007 ncluding N82-28266 993 N82-29261 rces:
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPEB 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support. technology program Plying gualities requirements for roll CAS [AIAA PAPEB 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow contro. applied to commercial transport aircraft Aerodynamic research applications at Boeins New technology for the nest generation of commercial transports - Beal or imaginar Gust response of commercial jet aircraft is effects of autopilot operation [NASA-CR-165919] PAA aviation forecasts-fiscal years 1982-11 [AD-A114696] COMMERCIAL EMERGY Maximizing South Carolina's aviation resourd Identifying rotentially profitable commu- airline routes, volume 2 [P862-139353]	C M-OD-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40287 l A82-40958 A82-41000 y A82-28266 993 N82-28261 rces: ter N82-29277
<pre>COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely pilored vehicle support. technology program Flying gualities requirements for roll CAS [AIAA PAPEB 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow contro. applied to commercial transport aircraft Aerodynamic research applications at Boeing New technology for the next generation of commercial transports - Beal or imaginar Gust response of commercial jet aircraft in effects of autopilot operation [NASA-CR-165919] FAA aviation forecasts-fiscal years 1982-11 [AD-A114696] COMMERCIAL ENERGY Maximizing South Carolina's aviation resour identifying potentially profitable commut airline routes, volume 2 [PB82-139353] COMMUNICATING</pre>	c M-op-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40287 l A82-40287 l A82-40958 g A82-41000 y A82-41007 ncluding N82-28266 993 N82-29261 rccs: ter
<pre>COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-M [AIAA PAPER 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTIOM Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely pilored vehicle support technology program Plying qualities requirements for roll CAS [AIAA PAPEB 82-1356] COMMERCIAL AIRCRAFT Progress at Douglas on laminar flow contro. applied to commercial transport aircraft Aerodynamic research applications at Boeine New technology for the next generation of commercial transports - Beal or imaginar Gust response of commercial jet aircraft in effects of autopilot operation [MASA-CR-165919] PAA aviation forecasts-fiscal years 1982-11 [AD-A114696] COMMERCIAL ENERGY Maximizing South Carolina's aviation resour identifying potentially profitable communications COMMUNICATION NETHORKS System data communication structures for </pre>	C M-OD-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40958 g A82-41000 y A82-41007 ncluding N82-28266 993 N82-29261 rccss: ter N82-29277 N82-29302
COMBAT The correlation of flight test and analyti air combat exchange ratios Many-on-H [AIAA PAPEB 82-1328] COMBINED STRESS A crack growth model under spectrum loadin COMBUSTION Laboratory-scale simulation of underground gasification: Experiment and theory [DE82-001063] COMMAND AND CONTROL U.S. Army remotely piloted vehicle support technology program Plying gualities requirements for roll CAS [AIAA PAPEB 82-1356] COMMERCIAL AIRCEAFT Progress at Douglas on laminar flow contro. applied to commercial transport aircraft Aerodynamic research applications at Boeine New technology for the next generation of commercial transports - Beal or imaginar Gust response of commercial jet aircraft in effects of autopilot operation [NASA-CR-165919] PAA aviation forecasts-fiscal years 1982-11 [AD-A114696] COMMENCIAL EMERGY Maximizing South Carolina's aviation resour Identifying potentially profitable commu- airline routes, volume 2 [P882-139353] COMMUNICATING Communications COMMUNICATING Sourcess	C M-OD-N any A82-39105 g A82-40961 coal N82-28470 ing A82-39739 systems A82-40287 l A82-40958 g A82-41000 y A82-41007 ncluding N82-28266 993 N82-29261 rccss: ter N82-29277 N82-29302

SUBJECT INDEX

0

System data communication structures for active-control transport aircraft, volume 2 [NASA-CR-165773-VOL-2] N8 N82-29511 Electromagnetic Propagation Problems in the Tactical Environment [AGARD-LS-120] N82-29527 COMMUNITIES Field studies of the Air Force procedures (NOISECHECK) for measuring community noise exposure from aircraft operations [AD-A113672] N82-28841 COMPENSATORY TRACKING The effects of the delays on systems subject to manual control A82-38943 COMPONENT RELIABILITY Reliability model for planetary gear [NASA-TM-82859] N82-28643 COMPOSITE MATEBIALS On the state of technology and trends in composite materials in the United States A82-39882 Fasteners for composite structures A82-39929 In-plane shear test of thin panels A82-40545 Application of composite materials and new design concepts for future transport aircraft A82-40994 Composite structures repair A82-41015 Recent development in hygrothermoviscoelastic analysis of composites N82-28676 COMPOSITE STRUCTURES Composite use on helicopters A82-38222 Toward all-composite helicopter fuselage A82-38223 Committing composites to the Boeing 767 A82-38224 Calculation of the cross section properties and the shear stresses of composite rotor blades A82-38475 Design, fabrication and gualification of the T-2 composite rudder A82-39894 Sikorsky ACAP preliminary design --- Advanced Composite Airframe Program A82-40526 Development of the Sea King composite main rotor blade A82-40539 Design and fabrication of a composite rear fuselage for the UH-60 /Black Hawk/ A82-40544 The behavior of composite thin-walled structures in dynamic buckling under impact A82-40976 Design and fabrication of cocured composite hat-stiffened panels A82-40978 Sliced disc design - A composite conform concept for a turbo engine axial compressor A82-40995 Monopole antenna patterns on finite size composite ground planes --- in aircraft A82-41055 National Transonic Facility (NTF) prototype fan blade fatigue test [AD-A114405] N82-28261 Carbon fiber reinforced composite structures protected with metal surfaces against lightning strike damage [MBB-UD-340-82-0/E] N82-28364 COMPRESSING COMPRESSION LOADS Cracks interacting with contact forces - A finite element study on loaded holes A82-40959 COMPRESSOR BLADES Application of the sequential optimization method to the tuning of the natural frequencies of gas-turbine engine compressor blades A82-39399

Sliced disc design - A composite conform concept for a turbo engine axial compressor 182-40995 B747/JT9D flight loads and their effect on engine running clearances and rerformance deterioration: BCAC BAIL/P and RA J19D engine diagnostics programs [NASA-CR-165573] N82-28296 COMPUTATIONAL PLUID DYNAMICS Improved solutions to the Falkner-Skan boundary-layer equation A82-38283 Numerical methods for solving boundary value problems for noncavitating and cavitating flow past wing profiles A82-38722 Calculation of level flow using radial grating A82-38922 Numerical solution of a problem concerning transonic flow past a wing-fuseLage configuration A82-39996 Viscous transonic airfoil flow simulation A82-40897 Computation of supersonic flow around three-dimensional wings A82-40898 Transonic small disturbance code for body-wing configuration coupled with full potential code for wing alone A82-40899 A summary of V/STOL inlet analysis methods 182-40921 Computational and experimental studies of light twin aerodynamic interference A82-40930 An experimental and numerical study of 3-D rotor wakes in hovering flight A82-40946 Estimation of simulation errors in the European Transonic Wind Tunnel / EIW/ A82-40950 Analytical study of vortex flaps on highly swept delta wings A82-41003 Analysis of jet transport wings with deflected control surfaces by using a combination of 2and 3-D methods A82-41022 A finite difference method for the calculation of transonic flow about a wing, based on small perturbation theory [NLR-TR-81031-0] N82-Windtunnel capability related to test sections, N82-28263 cryogenics, and computer-windtunnel integration [AGARD-AR-174] N82-29 N82-29334 COMPUTER AIDED CESIGN Efficient optimum design of structures - Program עססס A82-38146 Primary-data devices --- Russian book A82-39279 The application of small propellers to RPV propulsion A82-39737 The use of linearized-serodynamics and vorter-flow methods in aircraft design /invited paper/ A82-40294 [AIAA PAPER 82-1384] A new Transonic Airfoil Design Method and its application to helicopter rotor airfoil design A82-40507 Optimum structural design --- for helicopters A82-40543 Engineering aspects of international collaboration cn Tornado A82-40878 CATIA - A computer aided design and manufacturing tridimensional system A82-40990 CDS-the designer's media, the analyst's model --Configuration Development System for aircraft A82-40991 Aircraft geometry verification with enhanced computer-generated displays A82-40992 Automated optimum design of wing structures. Deterministic and probabilistic approaches [NASA-TM-84475] N82-29317

COMPUTER AIDED MANUPACTURING Computer aided coordinate measuring systems --- in engineering design of helicopter components A82-40540 CATIA - A computer aided design and manufacturing tridimensional system A82-40990 Aircraft geometry verification with enhanced computer-generated displays A82-40992 COMPUTER GRAPHICS Design and construction of a flexible autonomic electronic display device --- for flight control A82-40569 CAILA - A computer aided design and manufacturing tridimensional system 182-40990 Aircraft geometry verification with enhanced computer-generated displays 182-40992 Aircraft geometry verification with enhanced computer generated displays [NASA-TM-84254] N N82-29268 COMPUTER PROGRAMS HAJIF-II - A program system for the dynamic analysis of aeronautical structures A82-40884 Computer program for analysis of spherical screen distortion [AD-A113136] N82-28309 Programs for the transonic wind tunnel data processing installation. Part 8: Programs for processing data on the central site computer [AD-A112900] N82 N82-28310 Field studies of the Air Force procedures (NOISECHECK) for measuring community noise exposure from aircraft operations [AD-A113672] N82-Geophysical flight line flying and flight path recovery utilizing the Litton LTN-76 inertial navigation system N82-28841 [DE82-005555] N82-29292 Effect of water on axial flow compressors. Part 2: Computational program [AD-A114831] N82-293: User's manual for the AMEER flight path-trajectory N82-29327 simulation code [DE82-007004] N82-29343 COMPUTER SYSTEMS DESIGN Future terminal area systems A82-38462 Problems related to the integration of fault tolerant aircraft electronic systems [NASA-CR-165926] No N82-29022 COMPUTER TECHNIQUES Computer-aided derivation of equations of motion for rotary-wing aeroelastic problems A82-40883 Computer program for analysis of spherical screen distortion [AD-A113136] N82-28309 COMPUTERIZED SINULATION Problems in the simulation of correlation-extremal navigation systems A82-39403 Terrain following/terrain avoidance system concept development [AIAA PAPER 82-1518] A82-40428 Dynamic energy transfer between wind and aircraft A82-40939 Optimal open-loop aircraft control for go-around maneuvers under wind shear influence A82-40943 Inflight IFR procedures simulator [NASA-CASE-KSC-11218-11 N82-29331 User's manual for the AMBER flight path-trajectory simulation code [DE82-007004] N82-29343 COMPUTERS Computer outages at air terminal facilities and their correlation to near miss mid-air collisions (AFMD-82-43) [b-206064] N82-28264 Aerodynamics of advanced axial-flow turbomachinery [AD-A114911] N82-29328 CONCRETES Water-compatible polymer concrete materials for use in rapid repair systems for airport runways [DE82-010994] N82-29464

CONFERENCES

CONFERENCES Symposium on Plows with Separation, Stuttgart, West Germany, November 23-25, 1981, Beports A82-38781 Remotely piloted vehicles; International Conference, 2nd, Bristel, England, April 6-8, 1981, Conference Papers and Supplementary Papers A82-39727 American Helicopter Society, Annual Forum, 38th, Anabeim, CA, May 4-7, 1982, Proceedings A82-40505 International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1582, Froceedings. Volumes 11 & 2 A82-40876 CONICAL BODIES Summary of sting interference effects for cone, missile, and aircraft configurations as determined by dynamic and static measurements [AIAA PAPES 82-1366] A82-40395 CONSOLES Controls N82-29301 CONSTRAINTS Human capabilities and limitations in systems N82-29297 CONTOURS Comparison of experimental and analytic performance for contoured endwall stators [AIAA PAPEE 82-1286] A82-40422 CONTROL BOARDS Controls N82-29301 CONTROL CONFIGURED VEHICLES Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 X-29A flight control system design experiences [AIAA 82-1538] A82-A82-39003 Design and analysis of a multivariable control system for a CCV-type fighter aircraft [AINA PAPEE 82-1350] Progress at Douglas on laminar flow control A82-39121 applied to commercial transport aircraft A82-40958 CONTROL EQUIPHENT Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 Primary-data devices --- Russian book A82-39279 Flight experience with a backup flight-control system for the HiMAT research vehicle [AIAA PAPER 82-1541] A82-40429 Means for controlling aerodynamically induced twist [NASA-CASE-LAR-12175-1] N82-28279 CONTROL SIMULATION Piloted simulator evaluation of a relaxed static stability fighter at nigh angle-cf-attack [AIAA PAPER 82-1295] A82-39082 Sensor stabilisation requirements of BPV's - A simulation study A82-39741 The design of a RPV ground station simulator A82-39750 CONTROL STABILITY Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 CONTROL STICKS Simulator investigations of various side-stick controller/stability and control augmentation systems for helicopter terrain flight [AIAA 82-1522] A82-38942 CONTROL SURFACES The use of differential pressure feedback in an automatic flight control system [AIAA 82-1596] A82-38981 Analysis of jet transport wings with deflected

Analysis of jet transport wings with deflected control surfaces by using a combination of 2and 3-D methods A82-41022

CONTROL THEORY Application of multivariable model following method to flight controller [AIAA PAPER 82-1349] A modern approach to pilot/vehicle analysis and the Neal-Smith criteria [AIAA PAPEE 82-1357] A82-39125 SUBJECT INDEX

Applications to aeronautics of the theory of transformations of nonlinear systems [NASA-TH-84249] N82-30013 CONTROLLABILITY Pilot models for discrete maneuvers [AIAA 82-1519] A82-38940 Simulator investigations of various side-stick controller/stability and control augmentation systems for helicopter terrain flight [AIAA 82-1522] A82-38942 Handling qualities criteria for flight path control of V/STOL aircraft [AIAA PAPER 82-1292] A82-39081 In-Flight investigation of large airplane flying gualities for approach and landing [AIAA PAPEB 82-1296] A82-39083 Guidance for the use of equivalent systems with MIL-F-8785C --- for aircraft flight control systems [AIAA PAPER 82-1355] A 82-39124 [AIAA PAPER 82-1356] A82-402 A82-40287 Evaluations of helicopter instrument-flight handling gualities [AD-A114004] N82-28285 Analytical and simulator study of advanced transport [NASA-CR-3572] N82-28298 A discussion of the flying quality requirements of a tasic training aircraft [AD-A114805] N82-29318 CONTROLLERS Redundant control unit for an advanced multispool engine A82-40998 CONVECTIVE BEAT TRANSPER The use of analog computers in solutions of Inverse problems of heat conduction for the identification of boundary conditions on the surfaces of gas-turbine-engine parts on the basis of temperature-measurement results A82-39467 CONVERSATION Communications N82-29302 CONVEIOES Method for refurbishing and processing parachutes [NASA-CASE-KSC-11042-1] N82-29330 CORRELATION DETECTION Target tracking using area correlation A82-39194 Simulation of correlation-extremal receivers of signals from sampling-phase radio-navigation systems A82-39404 COBRUGATED PLATES Non-honeycomb F-16 horizontal stabilizer structural design A82-40936 COST AMALYSIS Minimization of the total costs incurred in the employment of passenger jet aircraft A82-39247 Cost analysis of the discrete Address Beacon System for the low-performance general aviation aircraft community [AD-A112957] N82-28274 COST REDUCTION 'Listening' systems to increase aircraft structural safety and reduce costs A82-39539 Unmanned aircraft in future combat A82-39728 Horses for courses in RPV operations --- system components design and development in terms of performance and cost **▲82-39729** Advanced technologies applied to reduce the operating costs of small commuter transport aircraft A82-40915 Technical and economic comparison of carbon fiber tape and woven fabric applications A82-40993 COVARIANCE Minimal order time sharing filters for INS in-flight alignment A82-38439

		-
CRACK PROPAGATION		Evalua
Cracks interacting with contact forces - element study on loajed holes	A finite	stru
	A82-40959	DATA ACQU
A crack growth model under spectrum load.	ing 182-40961	The de
Prediction of fatigue crack growth rates		Advanc
<pre>variable loading using a simple crack of model</pre>	closure	[AD-
[NLR-MP-81023-0]	N82-28685	Reduct coll
CRASH INJURIES		Unit
Crashworthiness studies: Cabin, seat, r		[A D-
and injury findings in selected general	l aviation	DATA BASI
accidents [AD-A 114878]	N82-29275	Opto-e na v i
CRASSES	102 23273	digi
Crashworthiness studies: Cabin, seat, r		
and injury findings in selected general	l aviation	DATA CORE
accidents [AD-A114878]	N82-29275	A recu usin
Aircraft fire safety	802-23213	[AII
[AGARD-LS-123]	N82-29279	Invest
Aircraft fire mishap experience/crash fi	re	and
scenario guantitation	****	heli
Human response to fire	N82-29280	[NAS Correl
nanda tenhoune co Tile	N82-29281	fric
Fuel system protecticn methods		[NAS
	N82-29283	DATA LINI
CRASHWORTHINESS Structural design of a crashworthy landi		Applic
for the AH-64 Attack Helicopter	uy year	airi
	A82-40547	U.S. #
Crashworthiness studies: Cabin, seat, r	estraint,	tech
and injury findings in selected general	1 aviation	
accidents [AD-A114878]	N82-29275	DATA MANA PNCS -
Alrcraft post crash fire reduction/survi		syst
enhancement from a manufacturer's view		[AI4
CROP DUSTING	N82-29286	DATA PROC
Agricultural airplane mission time struc	ture	Priman
Characteristics	Care	Hydr au
[NASA-TM-84470]	N82-29329	[AD-
CROSS COUPLING		Progra
The use of a multi-degree-cf-freedom dua. system to measure cross and cross-coup.		proc
derivatives	1109	proc [AD-
[AD-A114813]	N82-29333	DATA PROC
CRUDE OIL		Termin
Aviation fuels-future cutlcck and impact	on	cost
aircraft fire threat	N82-29282	[A D- DATA REDU
CRYOGENIC WIND TUNNELS	102 2J202	Reduct
Estimation of simulation errors in the E	uropean	coll
Transonic Wind Tunnel /EIW/		Unit
Windturnol canability rolated to test of	A82-40950	[AD-
Windtunnel capability related to test se Cryogenics, and computer-windtunnel in		DATA TRAN System
[AGARD-AR-174]	N82-29334	acti
CUES		[NAS
Manual reversion flight control system for		System
alrcraft: Pilot performance and simula effects	aror cue	acti [NAS
		[

effects [AD-A113463] N82-28302 CURRENT DISTRIBUTION Delta electrical load analysis C-141E JACC/CP aircraft [AD-A113761] N82-28283 CICLIC LOADS

Prediction of fatigue crack growth rates under variable loading using a simple crack closure model [NLR-MP-81023-U] 182-28685

D

DAMAGE ASSESSMENT

Research on the behavior of a turbojet engine during internal and external disturbances with respect to early recognition of damage ---German thesis 182-40561

Composite structures repair A82-41015

Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft

A82-41016

lation of heat damage to aluminum aircraft uctures A82-41141 DISITION letection of low level wind shear. II A82-38463 ced trending analysis/EDS data program - 113511] N82-28286 tion and analysis of mode C altitude data lected at high altitudes over the continental ted States - 114655] N82-29276 E BANAGEMENT SYSTEMS electronical push-broom scanners for igation, reconnaissance and generation of ital data bases A82-39747 RELATION ursive terrain height correlation system ng multiple model estimation techniques A82-38937 AA 82-1513] stigation of correlation between full-scale I fifth-scale wind tunnel tests of a Bell copter Textron Model 222 SA-CE-166362] N82-29315 elation of Preston-tube data with laminar skin ction (Log No. J12984) SA-TM-84827] N82-29556 KS cation of an optical data link in the borne scanning system A82-39275 Army remotely piloted vehicle supporting hnology program A82-39739 AGEMENT - A commercial flight management computer ten AA 82-1515] A82-38938 CESSING ary-data devices --- Russian book A82-39279 ulic Universal Display Processor System (HUDPS) -A114428] N82-28294 ans for the transonic wind tunnel data cessing installation. Part 8: Programs for cessing data on the central site computer -A112900] N82-28310 CESSING TERMINALS nal information display system benefits and ts -A114937] N82-29291 UCTION tion and analysis of mode C altitude data lected at high altitudes over the continental ted States - A1146551 N82-29276 NSMISSION em data communication structures for ive-control transport aircraft, volume SA-CR-165773-VOL-1] N82-29510 m data communication structures for active-control transport aircraft, volume 2 [NASA-CR-165773-VOL-2] N8 N82-29511 Propagation problems associated with aircraft communications systems N82-29535 DEAD RECKONING The control and guidance unit for MACHAN A82-39738 DEGREES OF FREEDOM Use of rotary balance and forced oscillation test data in six degrees of freedom simulation [AIAA PAPER 82-1364] A82-39129 The use of a multi-degree-of-freedom dual balance system to measure cross and cross-coupling derivatives [AD-A114813] N82-29333 DEICERS 21 An evaluation of the Rosemount ice detector for cloud water content measurements [PB82-158833] N82-29321 DELTA WINGS Leading edge separation at delta wings with curved leading edges in supersonic flow A82-38784 Measurement and visualization of skin friction on the leeside of delta wings in supersonic flow A82-38785

~`

Measurements of velocity distributions in the leading edge vortex of a delta wing by the laser-Doppler procedure A82-38786 Dynamic load measurements with delta wings undergoing self-induced roll-oscillations [AIAA PAPER 82-1320] A82-39098 Lateral aerodynamics of delta wings with leading edge separation [AIAA PAPES 82-1386] A82-39142 Vortex formation over jouble-delta wings A82-40989 Upper Vortex Flap - A versatile surface for highly swept wings A82-41002 Analytical study of vortex flaps on highly swept delta vings A82-41003 Spanwise distribution of vortex drag and leading-edge suction in subsonic flow A82-41005 Fuselage effects in leading edge vortex flap aerodynamics A82-41006 DESIGN ABALYSIS A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Avoiding the pitfalls in automatic landing control system design [AIAA 82-1599] A82-39013 Development of the advanced composite ground spoiler for C-1 medium transport aircraft A82-39895 Analytical design and validation of digital flight control system structure [AIAA PAPES 82-1626] A82-40434 CDS-the designer's media, the analyst's model -Configuration Development System for aircraft A82-40991 The determination of gust loads on nonlinear aircraft using a power spectral density approach [NLE-TR-80123-U] 882-283 ¥82-28303 Design basis for a new transonic wind tunnel [AD-A112899] Advanced casting: Today and tomorrow ---N82-28311 aerospace industry conconnets casting N82-28486 Problems related to the integration of fault tolerant aircraft electronic systems [NASA-CR-165926] N82-29022 DESIGN TO COST The promise of laminated metals in aircraft design 182-40903 Design and experience with a low-cost digital fly-by-wire system in the SAAB JA37 Viggen A/C A82-40905 Optimizing aerospace structures for manufacturing cost A82-41014 DIFFBRENTIAL PRESSURE The use of differential pressure feedback in an automatic flight control system [AIAA 82-1596] A82-38981 DIGITAL COMMAND SISTEMS Design and flight testing cf digital direct side-force control laws [AIAA 82-1521] A82-38941 DIGITÀL DATA Heads up display [NASA-CASE-LAE-12630-1] N82-29319 DIGITAL FILTERS Minimal order time sharing filters for INS in-flight alignment A82-38439 DIGITAL HAVIGATION PNCS - A commercial flight management computer system [AIAA 82-1515] A82-38938 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1623] A82-38998 Problems in the simulation of correlation-extremal navigation systems A82-39403 Simulation of correlation-extremal receivers of signals from sampling-phase radio-navigation systems

SUBJECT INDEX

The control and guidance unit for MACHAN	
A82-39738 DIGITAL PADAR SYSTEMS Radars for UMA	1
DIGITAL SINULATION	:
Digital computer simulation of modern aeronautical digital communication systems 882-40940	,
DIGITAL SISTERS Analytical design and validation of digital flight	
Control system structure [AIAA PAPER 82-1626] A82-40434	
Advanced fighter technology integration program AFTI/F-16 A82-40900	
Design and experience with a low-cost digital fly-by-wire system in the SAMB JA37 Viggen A/C A82-40905	
Design and flight testing of a digital optimal control general aviation autopilot	
A82-40906 Redundant control unit for an advanced multispool engine	
A82-40998 DIGITAL TECHNIQUES	
Digital full authority controls for helicopter engines	
A82-40522 DIRECT LIFT COFFECLS Design and analysis of a nultivariable control	
system for a CCV-type fighter aircraft	
[AIAA PAPER 82-1350] A82-39121 DISCRETE ADDRESS BEACON SYSTEM	
Cost analysis of the discrete Address Beacon System for the low-performance general aviation	
aircraft community [AD-A112957] N82-28274 DISPLAY DEVICES	
The detection of low level wind shear. II	
A82-38463 Analysis of in-trail following dynamics of	
CDTI-eguipped aircraft Cockpit Displays of Iraffic Information	
[ATAA PAPER 82-1330] A82-39107 Conceptual design of the LHX integrated cockpit A82-40527	
Future helicopter cockpit design A82-40529	
Evaluation of an automatic subsystem parameter monitor for aircraft A82-40552	
Design and construction of a flexible autonomic electronic display device for flight control	
A82-40569 The evolution of display formats for advanced	
fighters using multimode color CRT displays A82-40888	
Visual scene simulation concerning the landing of sporting aircraft in connection with	
investigations regarding the control and learning behavior of the pilot German thesis	
A82-41447 Electronic/electric technology benefits study	
avionics [NASA-CR-165890] N82-28243	
Hydraulic Universal Display Processor System (HUDPS) [AD-A114428] N82-28294	
Computer program for analysis of spherical screen distortion	
[AD-A113136] N82-28309 Terminal information display system benefits and costs	
[AD-A114937] N82-29291 Displays	
DISTILLATION N82-29300	
Ethanol production by vapor compression distillation [DE82-004892] N82-29393 DOMES (STRUCTURAL FORMS)	
Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model	
[AD-A113910] N82-28624	
Developments cn graphite/epoxy T-2 nose landing gear door	
A 62-39893	

A82-39404

N82-29279

DRAG BEDUCTION Development and flight test evaluation of a pitch stability augmentation system for a relaxed stability I-1011 [AIAA PAPES 82-1297] 182-39084 The use of small strakes to reduce interference drag of a low wing, twin engine airplane [AIAA PAPEE 82-1323] A82-39100 NASA research on viscous drag reduction A82-40896 Optimization of canard configurations - An integrated approach and practical drag estimation method A82-41023 Minimum induced drag of canard configurations A82-41116 DROP TRSTS Structural design of a crashworthy landing gear for the AH-64 Attack Helicopter A82-40547 DUAL HING CONFIGURATIONS Dual wing, swept forwara swept rearward wing, and single wing design optimization for high performance business airplanes A82-40931 DYNAMIC CHARACTERISTICS Flap-lag-torsional dynamics of extensional and inextensional rotor plades in hover and in forward flight N82-29312 [NASA-CR-169159] DYNAMIC MODELS Determination of airplane scrodynamic parameters from flight data at nigh angles cf attack A82-40928 Reduced nonlinear flight dynamic model of elastic structure aircraft 182-41009 DYNAMIC RESPONSE Dynamic energy transfer between wind and aircraft A82-40939 Limiting performance of nonlinear systems with applications to helicopter vibration control problems [AD-A113239] N82-28301 DYNAMIC STABILITY Analyzing stable pad disturbances and design of a sensor vault to monitor fad stability [AIAA 82-1565] A82-39011 Dynamic stability of flexible forward swept wing aircraft [AIAA PAPER 82-1325] A82-39102 Maneuver stability of a vehicle with a towed body [AIAA PAPER 82-1347] A82-39 182-39119 DYNAMIC STRUCTURAL ANALYSIS Whirl mode stability of the main rotor of the YAH-64 Advanced Attack Belicopter A82-40513 HAJIF-II - A program system for the dynamic analysis of aeronautical structures A82-40884 Theoretical and experimental investigation of joint-structural damping interaction for airplane construction A82-41013 DYNAMIC TESTS Dynamic load measurements with delta wings undergoing self-induced roll-oscillations [AIAA PAPER 82-1320] A82-39098 Analytic extrapolation to full scale aircraft dynamics [AIAA PAPER 82-1387] A82-39143 Ε BARTH TERMINALS U.S. Army remotely piloted vehicle supporting technology program A82-39739 ECONOMIC ANALYSIS Bistorical research and development inflation indices for Army fixed and rotor winged aircraft [AD-A114368] N82-28290

LAD-A113565] 802-20230 GOMPARATIVE VERTICAL impact testing of the P/PB-111 crew restraint system and a proposed modification [AD-A113957] N82-28267 EJECTORS Ejector powered propulsion and high lift subsonic wing 182-40970 REASTIC BODIES Reduced nonlinear flight dynamic model of elastic structure aircraft A82-41009 **ELASTODYNAMICS** The effect of hybrid composite materials on the dynamic characteristics of helicopter rotor blades A82-39263 BLECTRIC POWER SUPPLIES Preliminary design of an advanced integrated power and avionics information system A82-40907 Models for the motor state of VSCF aircraft electrical power system --- Variable Speed Constant Preguency A82-40982 Delta electrical load analysis C-141B JACC/CF aircraft [AD-A113761] N82-2826 BLECTRIC POWER TEANSMISSION Feasibility study of a 270V dc flat cable aircraft N82-28283 electrical power distributed system [AD-A114026] N82-28552 System data communication structures for active-control transport aircraft, volume 1 [NASA-CR-165773-VOL-1] N8 N82-29510 BLECTRIC PROPULSION Electric propulsion for a mini RPV system A82-39744 BLECTRO-OPTICAL PHOTOGRAPHY Target tracking using area dorrelation A82-39194 ELECTRCHAGNETIC FIELDS Atmospheric electricity hazards analytical model development and application. Volume 3: Electromagnetic coupling modeling of the lightning/aircraft interaction event [AD-A114017] BLECTBOHAGNETIC PROPERTIES N82-29802 Atmospheric electricity hazards analytical model development and application. Volume 1: Lightning environment modeling [AD-A114015] BLECTBONAGNETIC WAVE TRANSMISSION N82-29800 Electromagnetic Propagation Problems in the Tactical Environment [AGARD-LS-120] N82-29527 Propagation problems associated with aircraft communications systems N82-29535 ELECTRONIC CONTROL Electronic stabilization of an aircraft A82-39322 Adaptive fuel control feasibility investigation A82-40519 Digital full authority controls for helicopter engines A82-40522 Engine controls for the 1980s and 1990s A82-40984 BLECTRONIC BOUIPAENT Future belicopter cockpit design A82-40529 Design and construction of a flexible autonomic electronic display device --- for flight control A82-40569 A compendium of lightning effects on future aircraft electronic systems [AD-A114117] N82-28293 BLEVONS Methodology for determining elevon deflections to trim and maneuver the DAST vehicle with negative static margin [NASA-TM-84499] N82-28299 RNBEDDING On embedded flow characteristics of sharp edged rectangular wings [LCG-C4712] N82-29263 EMBRGENCIES An evaluation of helicopter autorotation assist concepts A82-40524 BHOTIONAL FACTORS Aircraft fire safety

[AGARD-LS-123]

ENERGY CONSERVATION

ENERGY CONSERVATION Fuel conservation: The airline - AIC A82-38464 Third generation turbo fans A82-40964 ENERGY REQUIREMENTS Requirements and trends in fuel consumption in transport mission with aircraft and surface vehicles A82-40956 ENERGY TRANSFER Dynamic energy transfer between wind and aircraft A82-40939 ENGINE AIRFRAME INTEGRATION Evaluation of an experimental technique to investigate the effects of the engine position on engine/pylon/wing interference --- wind tunnel tests [NLE-MP-81020-U] N82-28262 ENGINE CONTROL Optimal control application in supersonic aircraft performance A82-39374 Application of the sequential optimization method to the tuning of the natural frequencies of gas-turbine engine compressor blades A82-39399 Digital full authority controls for belicopter engines A82-40522 Engine controls for the 1980s and 1990s A82-40984 Redundant control unit for an advanced multispool engine A82-40998 ENGINE DESIGN Propulsion opportunities for future commuter aircraft [AIAA PAPER 82-1049] A82-40418 800 Shaft Horsepower Advanced Technology Demonstrator Engine : A82-40520 TF34 Convertible Engine System Technology Program A82-40521 Optimized 10 ton class commercial aircraft engine A82-40890 Recent advances in the performance of high bypass ratio fans 182-40891 Third generation turbo fans A82-40964 Sliced disc design - A composite conform concept for a turbc engine axial compressor A82-40995 Comparison of HP turbins 'deep blade design' different bearing structure configurations A82-40996 QCSEE over-the-wing enjine acoustic data [NASA-TM-82708] N82-29324 ENGINE PAILURE Electronic stabilization of an aircraft A82-39322 Results of T56 engine performance monitoring trial in Hercules aircraft, February - July 1977 [ARL-MECH-ENG-TECH-MEAO-409] N82-29322 ENGINE INLETS Forward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind tunnel [NASA-CR-152328] ENGINE MCNITORING INSTRUMENTS · N82-30030 Civil helicopter propulsion system reliability and engine monitoring technology assessments A82-40518 Research on the behavior of a turbojet engine during internal and external disturbances with respect to early recognition of damage ---German thesis A82-40561 ENGINE NOISE Static noise tests on modified augmentor wing jet STOL research aircraft [NASA-TM-81231] N82-28295 QCSEE over-the-wing enjine acoustic data [NASA-TH-82708]

SUBJECT INDEX

Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects on fan noise and suppression characteristics of advanced	N82-30029 the
as measured in the NASA-Ames 40 by 80 for tunnel	ot wind
[NASA-CB-152328] Far-field acoustic data for the Texas ASE, hush house	N82-30030 Inc.
(AD-A114564) Bugine parts	N82-30032
Propulsion opportunities for future commute aircraft	er
[AIAA PAPEB 82-1049] Third generation turbo fans	A82-40418
-	∆82-40964
BHGINE TRSIS 800 Shaft Horsepower Advanced Technology Demonstrator Engine	A82-40520
Research on the behavior of a turbojet eng during internal and external disturbances respect to early recognition of damage German thesis	s with
Axisymmetric approach and landing thrust re impacts on usage and LCC life cycle of	
The nonsynchronous whirls of the turbine re aerojet engines	
Intake swirl - A major disturbance paramete engine/intake compatibility	A82-40944 er in
Water ingestion into axial flow compressor: 3: Experimental results and discussion	A82-41018 s. Part
3: Experimental results and discussion [AD-A114830] ENVIRONMENT SINULATION	N82-29326
NASA/FAA Helicopter ATC simulation investig of RNAV/MLS instrument approaches	
Atmospheric electricity hazards analytical development and application. Volume 2:	A82-40535 model
Simulation of the lightning/aircraft into	eraction
event	
	N82-29801
event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulate	№82-29801
event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulator ENVIRONMENTAL TESTS Analyzing stable pad disturbances and design	N82-29801 Dr A82-39750
event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulato ENVIRONMENTAL TESTS Analyzing stable pad disturbances and desig sensor vault to monitor pad stability [AIAA 82-1585]	N82-29801 Dr A82-39750
event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulato ENVIRONMENTAL TESTS Analyzing stable pad disturbances and desig sensor vault to monitor pad stability [AIAA 82-1585] ENVIROMENTS The work environment	N82-29801 Dr A82-39750 gn of a
event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulato ENVIRONMENTAL TESTS Analyzing stable pad disturbances and design sensor vault to monitor pad stability [ATAA 82-1585] ENVIRONMENTS	N82-29801 Dr A82-39750 gn of a A82-39011 N82-29299
event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulato ENVIRONMENTAL TESTS Analyzing stable pad disturbances and design sensor valt to monitor pad stability [AIAA 82-1585] ENVIRONMENTS The work environment EPOXY MATRIX COMFOSITES A one-shot autoclave manufacturing process	N82-29801 Dr A82-39750 gn of a A82-39011 N82-29299
event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulato ENVIRONMENTAL TESTS Analyzing stable pad disturbances and design sensor vault to monitor pad stability [AIAA 82-1585] ENVIRONMENTS The work environment EPOXY MATRIX COMFOSITES A one-shot autoclave manufacturing process carbon epoxy components	N82-29801 A82-39750 gn of a A82-39011 N82-29299 for A82-40935 motion
event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulator ENVIRONMENTAL TESTS Analyzing stable pad disturbances and design sensor vault to monitor pad stability [AIAA 82-1585] ENVIRONMENTS The work environment EPOXY MATRIX COMFOSITES A one-shot autoclave manufacturing process carbon epoxy components EQUATIONS OF MOTION Computer-aided derivation of equations of m for rotary-wing aeroelastic problems The nonsynchronous whirls of the turbine ro	N82-29801 A82-39750 gn of a A82-39011 N82-29299 for A82-40935 motion A82-40883
event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulato ENVIRONMENTAL TESTS Analyzing stable pad disturbances and design sensor vault to monitor pad stability [AIAA 82-1585] ENVIRONMENTS The work environment EPOXY MATRIX COMFOSITES A one-shot autoclave manufacturing process carbon epoxy components EQUATIONS OF MOTION Computer-aided derivation of equations of m for rotary-wing aeroelastic problems	N82-29801 A82-39750 gn of a A82-39011 N82-29299 for A82-40935 motion A82-40883 otor in A82-40944
event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulator ENVIRONMENTAL TESTS Analyzing stable pad disturbances and design sensor vault to monitor pad stability [AIAA 82-1585] ENVIRONMENTS The work environment EPOXY MATRIX COMFOSITES A one-shot autoclave manufacturing process carbon epoxy components EQUATIONS OF MOTION Computer-aided derivation of equations of m for rotary-wing aeroelastic problems The nonsynchronous whirls of the turbine ro aerojet engines Reduced nonlinear flight dynamic model of o	N82-29801 A82-39750 gn of a A82-39011 N82-29299 for A82-40935 motion A82-40883 otor in A82-40944 elastic A82-4094
event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulate ENVIRONMENTAL TESTS Analyzing stable pad disturbances and design sensor vault to monitor pad stability [ATAA 82-1585] ENVIRONMENTS The work environment EPOXY MATELY COMFOSITES A one-shot autoclave manufacturing process carbon epoxy components EQUATIONS OF MOTION Computer-aided derivation of equations of m for rotary-wing aeroelastic problems The nonsynchronous whirls of the turbine real aerojet engines Reduced nonlinear flight dynamic model of e structure aircraft User's manual for the AMEER flight path-tra- simulation code [DE82-007004] ERROR AMALYSIS	N82-29801 A82-39750 gn of a A82-39011 N82-29299 for A82-40935 motion A82-40883 otor in A82-40944 elastic A82-40944 elastic A82-41009 ajectory N82-29343
<pre>event [AD-A114016] ENVIEONMENT SIMULATORS The design of a RPV ground station simulate ENVIEONMENTAL TESTS Analyzing stable pad disturbances and design sensor valit to monitor pad stability [ATAA 82-1585] ENVIEOMMENTS The work environment EPOXY MATRIX COMFOSITES A one-shot autoclave manufacturing process carbon epoxy components EQUATIONS OF MOTION Computer-aided derivation of equations of m for rotary-wing aeroelastic problems The nonsynchronous whirls of the turbine rot aerojet engines Reduced nonlinear flight dynamic model of of structure aircraft User's manual for the AMEER flight path-tra- simulation code [DE82-007004] ERHOR AMALYSIS Beduction and analysis of mode C altitude of collected at high altitudes over the condi- structure at high altitudes over the condi- structure at high altitudes over the condi- condition code</pre>	N82-29801 A82-39750 gn of a A82-39011 N82-29299 for A82-40935 motion A82-40935 motion A82-40883 otor in A82-40944 elastic A82-40944 elastic A82-40944 elastic
<pre>event [AD-A114016] ENVIRONMENT SIMULATORS The design of a RPV ground station simulate ENVIRONMENTAL TESTS Analyzing stable pad disturbances and design sensor vault to monitor pad stability [AIAA 82-1585] ENVIRONMENTS The work environment EPOXY MATHIX COMFOSITES A one-shot autoclave manufacturing process carbon epoxy components EQUATIONS OF MOTION Computer-aided derivation of equations of m for rotary-wing aeroelastic problems The nonsynchronous whirls of the turbine rot aerojet engines Reduced nonlinear flight dynamic model of of structure aircraft User's manual for the AMEEE flight path-tra- simulation code [DE82-007004] EREOR AMALYSIS Reduction and analysis of mode C altitude of collected at high altitudes over the cont United States [AD-A114655] Establishment of a rotor model basis</pre>	N82-29801 A82-39750 gn of a A82-39011 N82-29299 for A82-40935 motion A82-40935 motion A82-40883 otor in A82-40944 elastic A82-40944 elastic A82-40944 elastic A82-40944 elastic A82-29343 data tinental N82-29276
event [AD-A114016] ENVIEONMENT SIMULATORS The design of a RPV ground station simulate ENVIEONMENTAL TESTS Analyzing stable pad disturbances and design sensor vault to monitor pad stability [ATAA 82-1585] ENVIEONMENTS The work environment EPOXY MATRIX COMFOSITES A one-shot autoclave manufacturing process carbon epoxy components EQUATIONS OF MOTION Computer-aided derivation of equations of m for rotary-wing aeroelastic problems The nonsynchronous whirls of the turbine real aerojet engines Reduced nonlinear flight dynamic model of e structure aircraft User's manual for the AMEER flight path-tra- simulation code [DE82-007004] EREOR ANALYSIS Reduction and analysis of mode C altitude of collected at high altitudes over the cont United States [AD-A114655] Establishment of a rotor model basis [NASA-TP-2026] ETHYL ALCOHOL	N82-29801 A82-39750 gn of a A82-39011 N82-29299 for A82-40935 motion A82-40935 motion A82-40944 elastic A82-40944 elastic A82-40944 elastic A82-40944 elastic A82-29343 data linental N82-29276 N82-29311
<pre>event [AD-A114016] ENVIEONMENT SIMULATORS The design of a RPV ground station simulate ENVIEONMENTAL TESTS Analyzing stable pad disturbances and design sensor vault to monitor pad stability [ATAA 82-1585] ENVIEONMENTS The work environment EPOXY MATRIX COMFOSITES A one-shot autoclave manufacturing process carbon epoxy components EQUATIONS OF MOTION Computer-aided derivation of equations of m for rotary-wing aeroelastic problems The nonsynchronous whirls of the turbine rot aerojet engines Reduced nonlinear flight dynamic model of e structure aircraft User's manual for the AMEEE flight path-tra- simulation code [DE82-007004] ERROB ANALYSIS Reduction and analysis of mode C altitude of collected at high altitudes over the cont United States [AD-A114655] Establishment of a rotor model basis [NSA-TP-2026]</pre>	N82-29801 A82-39750 gn of a A82-39011 N82-29299 for A82-40935 motion A82-40935 motion A82-40944 elastic A82-40944 elastic A82-40944 elastic A82-40944 elastic A82-29343 data linental N82-29276 N82-29311

N82-29324

EXHAUST BRISSION Two-dimensional model studies of the impact of aircraft exhaust emissions on tropospheric ozone 182-40124 EXHAUST NOZZLES Performance of a 2D-CD nonaxisymmetric exhaust nozzle on a turbojet engine at altitude [AIAA PAPEE 82-1137] A82 A82-40420 Application of advanced exhaust nozzles for tactical aircraft 182-40889 EXPANDABLE STRUCTURES Flight control systems for aerial targets A82-39745 EXPERIMENTAL DESIGN Applying advanced technology to flight station design A82-40887 EXTERNAL STORE SEPARATION Wind tunnel studies of store separation with load factor. Preedrops and captive trajectories N82-30261 EXTRAPOLATION Analytic extrapolation to full scale aircraft dvnamics [AIAA PAPER 82-1387] A82-39143 F F-14 AIRCEAFT NASA Dryden's experience in parameter estimation and its uses in flight test [AIAA PAPES 82-1373] A82-39135 F-16 ATRCRAFT Terrain following/terrain avoidance system concept develogment [AIAA PAPES 82-1518] Non-honeycomb F-16 horizontal stabilizer A82-40428 structural design A 82-40936 F-111 AIBCRAFT Comparative vertical impact testing of the P/PB-111 crew restraint system and a proposed modification _ [AD-A113957] N82-28267 FABRICATION Design and fabrication of cocured composite hat-stiffened panels A82-40978 FABRICS Technical and economic comparison of carbon fiber tape and woven fabric applications A82-40993 PAIL-SAPE SYSTEMS Generic faults and design sclutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 PAILURE ANALYSIS Prediction of fatigue crack growth rates under variable loading using a simple crack closure model [NLE-MP-81023-U] N82-28685 FAILURE MODES Material identification for the design of composite rotary wings A82-40937 The effect of intake flow disturbances on APU compressor blade high cycle fatigue in the Airbus A300 A82-40983 FALKNER-SKAN EQUATION Improved solutions to the Falkner-Skan boundary-layer equation A82-38283 FAN BLADES National Transonic Facility (NTF) prototype fan blade fatigue test [AD-A114405] N82-28261 FASTENERS Fasteners for composite structures A82-39929 PATIGUE (BATERIALS) 'Listening' systems to increase aircraft structural safety and reduce costs A82-39539

The effect of intake flow disturbances on APU compressor blade high cycle fatigue in the Airbus A300 A82-40983 Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft A82-41016 PATIGUE LIPE A roadmap toward a fatigue gualification process for modern technology helicopters A82-40542 Design and experimental verification of the USB-flap structucture for NAL STOL aircraft ---**Upper Surface Blowing** A82-40917 A crack growth model under spectrum loading **▲**82-40961 PATIGUE TESTS Fasteners for composite structures A82-39929 A roadmap toward a fatigue gualification process for modern technology helicopters A82-40542 Application of a new hybrid material /ARALL/ in aircraft structures A82-40975 PAULT TOLERANCE Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A 82-38980 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1623] A82-3899 Analytical design and validation of digital flight A 82-38998 control system structure [AIAA PAPER 82-1626] A82-40434 Problems related to the integration of fault tolerant aircraft electronic systems [NASA-CR-165926] No N82-29022 PEASIBILITY ABALYSIS Adaptive fuel control feasibility investigation A82-40519 FEEDBACK CONTEOL [AIAA 82-1524] A82-389 A82-38944 The use of differential pressure feedback in an autonatic flight control system [AIAA 82-1596] A82-38981 Flight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 Application of multivariable model following method to flight controller [AIAA PAPER 82-1349] A82-39120 Design and analysis of a multivariable control system for a CCV-type fighter aircraft [AIAA PAPER 82-1350] A82-39121 Design of a longitudinal ride-control system by Zakian's method of inequalities A82-41114 FIBER COMPOSITES Technical and economic comparison of carbon fiber tape and woven fabric applications A82-40993 Design considerations and experiences in the use of composite material for an aeroelastic research wing [NASA-TM-83291] N82-28280 TIBER RELATIONCED COMPOSITES The effect of hybrid composite materials on the dynamic characteristics of helicopter rotor blades A82-39263 A summary of weight savings data for composite **VSTOL** structure A82-40546 Material and process developments on the Boeing 767 A82-40902 Material identification for the design of composite rotary wings 182-40937 Application of a new hybrid material /ARALL/ in aircraft structures A82-40975 Sliced disc design - A composite conform concept for a turbo engine axial compressor A82-40995

FIGHTER AIRCRAFT

Carbon fiber reinforce1 ccmposite structures protected with metal surfaces against lightning strike damage [MBB-UD-340-82-0/E] N82-28364 FIGHTER AIBCRAFT A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 An alternate method of specifying handwidth for flying qualities [(AIAA 82-1609] A82-38988 Piloted simulator evaluation of a relaxed static stability fighter at high angle-cf-attack [AIAA PAPEE 82-1295] A82-39082 High angle-of-attack characteristics of a forward-swept wing fighter configuration [AIAA PAPER 82-1322] A82-39099 The correlation of flight test and analytic M-on-N air combat exchange ratics --- Many-on-Many [AIAA PAPER 82-1328] A22-Design and analysis of a multivariable control 182-39105 system for a CCV-type fighter aircraft [AIAA PAPER 82-1350] A82-39121 Unmanned aircraft in future combat A82-39728 Short range tactical REd system A82-39730 Aerodynamic aspects of aircraft dynamics at high angles of attack /AGARD Lecture/ [AIAA PAPER 82-1363] A82-39836 Flying qualities requirements for roll CAS systems [AIAA PAPEE 82-1356] A82-4024 Flight experience with a backup flight-control A82-40287 system for the HiMAT research vehicle [AIAA PAPER 82-1541] A82-40429 Advanced aerodynamic design for future combat aircraft A82-40879 Some aerodynamic/flightmechanic aspects for the design of future compat aircraft A82-40880 A practical approach to the incorporation of technical advances in avicnics A82-40886 The evolution of display formats for advanced fighters using multimode color CET displays A82-40888 Application of advanced exhaust nozzles for tactical aircraft A82-40889 Advanced fighter technology integration program AFTI/F-16 182-40900 Tail versus canard configuration - An aerodynamic comparison with regard to the suitability for future tactical combat aircraft A82-40901 Spin behaviour of the Filatus PC-7 Turbor Trainer A82-40979 Analytical study of wortex flaps on highly swept delta wings A82-41003 #ind-tunnel investigation of vortex flaps on a highly swept interceptor configuration A82-41004 Intake swirl - A major disturbance parameter in engine/intake compatibility A82-41018 An improved propulsion system simulation technique for scaled wind tunnel mcdel testing of advanced fighters A82-41019 Low-speed characteristics of a fighter-type configuration at high angles-of-attack and sideslip A82-41020 Wing design for supersonic cruise/transonic maneuver aircraft A82-41021 Advanced trending analysis/EDS data program [AD-A113511] N82-282 discussion of the flying guality reguirements of N82-28286 a basic training aircraft . [AD-A114805] N82-29318 FINITE DIFFERENCE THEORY A finite difference method for the calculation of transonic flow about a wing, based on small perturbation theory [NLB-IR-81031-0]

SUBJECT INDEX

FINITE ELEMENT METHOD Development of the advanced composite ground spoiler for C-1 medium transport aircraft A 82-39895 Finite element analysis for bearingless rotor blade aeroelasticity A82-40517 Cracks interacting with contact forces - A finite element study on loaded holes A82-40959 FIRE CONTROL U.S. Army remotely piloted vehicle program A 82-39732 PIRE DAMAGE Evaluation of heat damage to aluminum aircraft structures A82-41141 Aircraft fire safety [AGARD-LS-123] N82-29279 Alfcraft fire mishap experience/crash fire scenario quantitation N82-29280 Aviation fuels-future outlook and impact on aircraft fire threat N82-29282 Fireworthiness of transport aircraft interior systems N82-29284 The development and applications of a full-scale wide body test article to study the behavior of interior materials during a postcrash fuel fire N82-29285 Aircraft post crash fire reduction/survivability enhancement from a manufacturer's viewpoint N82-29286 FIRE BATINGUISHERS Aircraft post-crash fire fighting/rescue N82-29287 FIRE FIGHTING Smoke abatement system for crash rescue/fire training facilities [AD-A114380] N82-28268 Aircraft fire safety [AGARD-LS-123] Alrcraft fire mishap experience/crash fire N 82-29279 scenario guantitation N82-29280 Aircraft post crash fire reduction/survivability enhancement from a manufacturer's viewpoint N82-29286 Aircraft post-crash fire fighting/rescue N82-29287 PIRE DREVENTION Fuel system protection methods N82-29283 Fireworthiness of transport aircraft interior systems N82-29284 The development and applications of a full-scale wide body test article to study the behavior of interior materials during a postcrash fuel fire N82-29285 FIREPEOOFING The development and applications of a full-scale wide body test article to study the behavior of interior materials during a postcrash fuel fire N82-29285 FLAME CALORIMETERS Heat release rate calorimetry of engineering plastics A82-41075 FLAMMABILITY Heat release rate calorimetry of engineering plastics A82-41075 FLAPS (CONTEOL SURFACES) Design and experimental verification of the USB-flap structucture for NAL STOL aircraft ---Upper Surface Blowing A82-40917 Plap-lag-torsional dynamics of extensional and inextensional rotor blades in hover and in forward flight [NASA-CE-169159] N82-29312 FLEXIBLE WINGS Inflated wings

182-40966

A-22

N82-28263

FLIGHT OPTIMIZATION

Variable geometry aerofoils as applied to the	
Beatty B-5 and E-6 sailglanes A82-40968	
FLIGHT CHARACTERISTICS	
An alternate method of specifying handwidth for	
flying qualities [(AIAA 82-1609] A82-38988	
Investigation of low order lateral directional	
transfer functics models for augmented aircraft	
[AIAA 82-1610] A82-38989 Handling qualities criteria for flight path	
control of V/STOL aircraft	
[AIAA PAPEE 82-1292] A82-39081	
In-Flight investigation of large airplane flying	
qualities for approach and landing [AIAA PAPER 82-1296] A82-39083	
Unique flight characteristics of the AD-1	
oblique-wing research airplane	
[AIAA PAPER 82-1329] A82-39106 A ground-simulation investigation of helicopter	
decelerating instrument approaches	
A82-39118	
Perspectives of the flying gualities specification [AIAA PAPEE 82-1354] A82-39123	
Ringfin augmentation effects	
A82-40548	
Prediction of high alpha flight characteristics	
utilizing rotary balance data 182-40953	
PLIGHT CONDITIONS	
Forward-swept wings add supersonic zip	
A82-38216	
The operation of aircraft and helicopters in difficult meteorclogical and environmental	
conditions Russian book	
A82-39295	
Tandem rotor helicopter characteristics in a continuous icing environment	
A82-40523	
FLIGHT CONTROL	
Adaptive filtering for an aircraft flying in	
turbulent atmosphere A82-38441	
Future terminal area systems	
A82-38462	
A82-38462 Design and flight testing of digital direct	
A82-38462	
A82-38462 Design and flight testing of digital direct side-force contrcl laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying gualities [(AIAA 82-1609] A82-38988	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systams [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1623] A62-38998 X-29A flight control system design experiences	
A82-38462Design and flight testing of digital directside-force control laws[AIAA 82-1521]Modal control of relaxed static stability aircraft[AIAA 82-1524]Adesign criterion for highly augmentedfly-by-wire aircraft[AIAA 82-1570]A82-38969Generic faults and design sclutions forflight-critical systems[AIAA 82-1595]Age-38980A preliminary laboratory evaluation of areconfigurable integrated flight control concept[AIAA 82-1597]A82-38982An alternate method of specifying landwidth forflying qualities[(AIAA 82-1609]A82-38988The Shiryayev sequential probability ratio testfor redundancy management[AIAA 82-1623]A62-38983A-294A82-38983A-294A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38933A82-38933A82-38933A82-38933A82-3833A82-3833A82-3833A82-3833A82-3833	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systams [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1533] A62-38998 X-29A flight control system design experiences [AIAA 82-1538] A62-39003 Plight control synthesis using robust output	
A82-38462Design and flight testing of digital directside-force control laws[AIAA 82-1521]Modal control of relaxed static stability aircraft[AIAA 82-1524]Adesign criterion for highly augmentedfly-by-wire aircraft[AIAA 82-1570]A82-38969Generic faults and design sclutions forflight-critical systems[AIAA 82-1595]Age-38980A preliminary laboratory evaluation of areconfigurable integrated flight control concept[AIAA 82-1597]A82-38982An alternate method of specifying landwidth forflying qualities[(AIAA 82-1609]A82-38988The Shiryayev sequential probability ratio testfor redundancy management[AIAA 82-1623]A62-38983A-294A82-38983A-294A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38983A82-38933	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1538] A82-38998 X-29A flight control system design experiences [AIAA 82-1538] A82-39003 Flight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 Handling qualities criteria for flight path	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft A82-38969 Generic faults and design sclutions for flight-critical systams [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1623] A62-38998 X-29A flight control system design experiences [AIAA 82-1575] A82-39003 Plight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 Handling qualities criteria for flight path control of V/STOL aircraft	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1597] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1533] A62-38998 X-293 flight control system design experiences [AIAA 82-1538] A82-39003 Flight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 Handling qualities criteria for flight path control of V/STOL aircraft [AIAA PAPEB 82-1292] A82-39081 Application of multivariable model following	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systams [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying gualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1623] A82-38988 X-29A flight control system design experiences [AIAA 82-1575] A82-39003 Plight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 Handling qualities criteria for flight path control of V/STOL aircraft [AIAA PAPEB 82-1292] A82-39081 Application of multivariable model fcllowing method to flight controller	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systams [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1623] A82-38998 X-29A flight control system design experiences [AIAA 82-1575] A82-39003 Flight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 Handling qualities criteria for flight path control of V/STOL aircraft [AIAA PAPBE 82-1292] A82-39081 Application of multivariable model following method to flight controller [AIAA PAPBE 82-1349] A82-39120	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A62-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1538] A82-38998 X-29A flight control system design experiences [AIAA 82-1575] A82-39003 Plight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 Handling qualities criteria for flight path control of V/STOL aircraft [AIAA PAPER 82-1292] A82-39081 Application of multivariable model following method to flight controller [AIAA PAPER 82-1349] A82-39120 Design and analysis of a multivariable control	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft A82-38969 Generic faults and design solutions for flight-critical systams [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38980 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1623] A82-38998 X-29A flight control system design experiences [(AIAA 82-1575] A82-39003 Plight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 Handling qualities criteria for flight path control of V/STOL aircraft [AIAA PAPEE 82-1349] A82-39120 Design and analysis of a multivariable control system for a CCV-type fighter aircraft [AIAA PAPEE 82-1350] A82-39121	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systams [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1533] A62-38998 X-29A flight control system design experiences [AIAA 82-1575] A82-39003 Flight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 Handling qualities criteria for flight path control of V/STOL aircraft [AIAA PAPER 82-1324] A82-39120 Design and analysis of a multivariable control system for a CCV-type fighter aircraft [AIAA PAPER 82-1350] A82-39121 Perspectives of the flying qualities specification	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A62-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1538] A82-38998 X-29A flight control system design experiences [AIAA 82-1575] A82-39003 Plight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 Handling qualities criteria for flight path control of V/STOL aircraft [AIAA PAPEB 82-1292] A82-39081 Application of multivariable model following method to flight controller [AIAA PAPEB 82-1349] A82-39120 Design and analysis of a multivariable control system for a CCV-type fighter aircraft [AIAA PAPEB 82-1354] A82-39123	
A82-38462 Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38988 An alternate method of specifying landwidth for flying qualities [(AIAA 82-1609] A82-38988 The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1538] A82-38988 X-294 flight control system design experiences [(AIAA 82-1575] A82-39003 Plight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 Handling qualities criteria for flight path control of V/STOL aircraft [AIAA PAPER 82-1349] A82-39120 Design and analysis of a multivariable control system for a CCV-type fighter aircraft [AIAA PAPER 82-1354] A82-39121 Perspectives of the flying qualities specification [AIAA PAPER 82-1354] A82-39123 Design and analysis of a multivariable specification [AIAA PAPER 82-1354] A82-39123 Design and analysis of a multivariable specification [AIAA PAPER 82-1354] A82-39123 Perspectives of the flying qualities specification [AIAA PAPER 82-1354] A82-39123 Budiance for the use of equivalent systems with	
A82-38462Design and flight testing of digital directside-force control laws[AIAA 82-1521]A82-38941Hodal control of relaxed static stability aircraft[AIAA 82-1524]A82-38944A design criterion for highly augmentedfly-by-wire aircraft[AIAA 82-1570]A82-38969Generic faults and design sclutions forflight-critical systams[AIAA 82-1595]A82-38980A preliminary laboratory evaluation of areconfigurable integrated flight control concept[AIAA 82-1597]A82-38982An alternate method of specifying handwidth forflying qualities[(AIAA 82-1609]A82-38988The Shiryayev sequential probability ratio testfor redundancy management[AIAA 82-1538]A82-38098I-29A flight control system design experiences[AIAA 82-1538]A82-39003Flight control synthesis using robust outputobservers[(AIAA 82-1575)][AIAA 82-1575]A82-39081Application of multivariable model fcllowingmethod to flight controller[AIAA 82-1575]A82-39120Design and analysis of a multivariable controlsystem for a CCV-type fighter aircraft[AIAA PAPEE 82-1350]A82-39121Perspectives of the flying qualities specification[AIAA PAPEE 82-1354]A82-39123Guidance for the use of equivalent systems withMIL-P-8785C for aircraft flight controlsystems	
A82-38462Design and flight testing of digital directside-force control laws[AIAA 82-1521]A82-38941Hodal control of relaxed static stability aircraft[AIAA 82-1524]A82-38944A design criterion for highly augmentedfly-by-wire aircraftA82-38969[Bight-critical systamsA82-38980[AIAA 82-1595]A82-38980A preliminary laboratory evaluation of areconfigurable integrated flight control concept[AIAA 82-1597]A82-38982An alternate method of specifying handwidth forflying qualities[(AIAA 82-1609]A82-38988The Shiryayev sequential probability ratio testfor redundancy management[AIAA 82-1538][AIAA 82-1538]K2-38998X-294 flight control system design experiences[[AIAA 82-1575][AIAA 82-1575]Bachaging qualities criteria for flight pathcontrol of V/STOL aircraft[AIAA 82-1575]Bachaging and analysis of a multivariable controlsystem for a CCV-type fighter aircraft[AIAA PAPEE 82-1349]A82-39120Design and analysis of a multivariable controlsystem for a CCV-type fighter aircraft[AIAA PAPEE 82-1355]A82-39123Guidance for the use of equivalent systems withMIL-F-8785C for aircraft flight controlsystems[AIAA PAPEE 82-1355]A82-39124	
A82-38462Design and flight testing of digital directside-force control laws[AIAA 82-1521]A82-38941Hodal control of relaxed static stability aircraft[AIAA 82-1524]A82-38944A design criterion for highly augmentedfly-by-wire aircraft[AIAA 82-1570]A82-38969Generic faults and design sclutions forflight-critical systams[AIAA 82-1595]A82-38980A preliminary laboratory evaluation of areconfigurable integrated flight control concept[AIAA 82-1597]A82-38982An alternate method of specifying landwidth forflying qualities[(AIAA 82-1609]A82-38988The Shiryayev sequential probability ratio testfor redundarcy management[AIAA 82-1538]A82-38998L-294 flight control system design experiences[AIAA 82-1575]A82-39003Flight control synthesis using robust outputobservers[(AIAA 82-1575][AIAA 82-1575][AIAA 82-1575]A82-39016Handling qualities criteria for flight pathcontrol of V/SIOL aircraft[AIAA PAPEB 82-1349]A82-39120Design and analysis of a multivariable controlsystem for a CCV-type fighter aircraft[AIAA PAPEB 82-1350]Perspectives of the flying gualities specification[AIAA PAPEB 82-1354]A82-39123Guidance for the use of equivalent systems withMIL-P-8785C for aircraft flight controlSystems[AIAA PAPEB 82-135	
A82-38462Design and flight testing of digital directside-force control laws[AIAA 82-1521]A82-38941Hodal control of relaxed static stability aircraft[AIAA 82-1524]A82-38944A design criterion for highly augmentedfly-by-wire aircraftA82-38969[Bight-critical systamsA82-38980[AIAA 82-1595]A82-38980A preliminary laboratory evaluation of areconfigurable integrated flight control concept[AIAA 82-1597]A82-38982An alternate method of specifying handwidth forflying qualities[(AIAA 82-1609]A82-38988The Shiryayev sequential probability ratio testfor redundancy management[AIAA 82-1538][AIAA 82-1538]K2-38998X-294 flight control system design experiences[[AIAA 82-1575][AIAA 82-1575]Bachaging qualities criteria for flight pathcontrol of V/STOL aircraft[AIAA 82-1575]Bachaging and analysis of a multivariable controlsystem for a CCV-type fighter aircraft[AIAA PAPEE 82-1349]A82-39120Design and analysis of a multivariable controlsystem for a CCV-type fighter aircraft[AIAA PAPEE 82-1355]A82-39123Guidance for the use of equivalent systems withMIL-F-8785C for aircraft flight controlsystems[AIAA PAPEE 82-1355]A82-39124	

The system of 'objective control' A82-39245 Flying quality requirements for V/STOL transition [AIAA PAPER 82-1293] A82-40 Flight-determined correction terms for angle of A82-40276 attack and sideslip [AIAA PAPER 82-1374] A82-40290 Analytical design and validation of digital flight control system structure [AIAA PAPER 82-1626] A82-40434 Design and construction of a flexible autonomic electronic display device --- for flight control A82-40569 Advanced fighter technology integration program AFTI/P-16 A82-40900 Optimal open-loop aircraft control for go-around maneuvers under wind shear influence A82-40943 Design integration of CCW/USB for a sea-based aircraft A82-40972 Electronic/electric technology benefits study --avionics [NASA-CR-165890] N82-28243 Low cost development of INS sensors for expendable RPV control and navigation [AD-A112691] N82-28291 Manual reversion flight control system for A-10 aircraft: Pilot performance and simulator cue effects [AD-A113463] N82-28302 Geophysical flight line flying and flight path recovery utilizing the Litton LTN-76 inertial navigation system [DE82-005555] N82-29292 FLIGHT CREWS Digital full authority controls for helicopter engines A82-40522 Flight attendant injuries: 1971-1976 [AD-A114909] N82-29274 Operational test and evaluation handbook for aircraft training devices. Volume 1: Planning and management [AD-A112498] N82-29332 PLIGHT HAZARDS Wind shear - Its effect on an aircraft and ways to reduce the hazard. II A82-38500 The operation of aircraft and helicopters in difficult meteorological and environmental conditions --- Russian book A82-39295 Flight attendant injuries: 1971-1976 [AD-A114909] N82-29274 Atmospheric electricity hazards analytical model development and application. Volume 1: Lightning environment modeling [AD-A114015] N82-29800 Atmospheric electricity hazards analytical model development and application. Volume 2: Simulation of the lightning/aircraft interaction event [AD-A114016] N82-29801 Atmospheric electricity hazards analytical model development and application. Volume 3: Electromagnetic coupling modeling of the lightning/aircraft interaction event [AD-A114017] N82-29802 PLIGHT INSTRUMENTS Heads up display [NASA-CASE-LAR-12630-1] N82-29319 System data communication structures for active-control transport aircraft, volume 2 [NASA-CR-165773-VOL-2] N82-29511 PLIGHT MECHANICS Some aerodynamic/flightmechanic aspects for the design of future combat aircraft A82-40880 PLIGHT OPTIMIZATION Flight management computers A82-39321 Optimal control application in supersonic aircraft performance A82-39374 The fourth dimension --- flight management system for airline operations A82-39540

Optimization of flight with tilt wings A82-40912 FLIGHT PATHS Handling qualities criteria for flight path Control of V/STOL aircraft [AIAA PAPER 82-1292] Analysis of in-trail following dynamics of A82-39081 CDTI-equipped aircraft --- Cockpit Displays of Traffic Information [AIAA PAPER 82-1330] A82-39107 An MLS with computer aided landing approach [AIAA PAPER 82-1352] A82-39 The fourth dimension --- flight management system A82-39122 for airline operations A82-39540 A concept for 4D-guidance of transport aircraft in the IMA --- Terminal Maneuvering Area A82-40942 Estimation of the number of in-flight aircraft on instrument flight rules A82-41117 Investigations concerned with shifting plot activities to a higher hierarchical stage of flight control --- German thesis A82-41453 Reduction and analysis of mode C altitude data collected at high altitudes over the continental United States [AD-A114655] N82-29276 Development of flying gualities criteria for single pilot instrument flight operations
[NASA-CR-165932] N82-29288 User's manual for the AMFIE flight path-trajectory simulation code [DE82-007004] N82-29343 PLIGET PLANS PNCS - A connercial flight management computer system [AIAA 82-1515] A82-38938 FLIGHT BECORDERS Analysis of general-aviation accidents using ATC radar records [AIAA PAPER 82-1310] A82-39091 Agricultural airplane mission time structure characteristics [NASA-TM-84470] N82-29329 FLIGHT SAFETY The system of 'objective control' A82-39245 Instrument landing systems /ILS/ at airports of the German Democratic Republic A82-39248 PLIGHT SIMULATION Complete flexibility and realism in radar simulation A82-38461 Pilot models for discrete maneuvers [AIAA 82-1519] A82-36 Development and flight test evaluation of a pitch A82-38940 stability augmentation system for a relaxed stability L-1011 [AIAA PAPEB 82-1297] A82-39084 A ground-simulation investigation of helicopter decelerating instrument approaches A82-39118 Use of rotary balance and forced oscillation test data in six degrees of freedom simulation [AIAA PAPER 82-1364] A82-1 Flight simulation studies on the feasibility of A82-39129 laterally segmented approaches in an MLS environment A82-40941 The role of the scale parameter in service load assessment and simulation --- of aircraft flight A82-41011 Visual scene simulation concerning the landing of sporting aircraft in connection with investigations regarding the control and learning behavior of the pilot --- German thesis A82-41447 Manual reversion flight control system for A-10 aircraft: Pilot performance and simulator cue effects [AD-A113463] N82-28302 Computer program for analysis of spherical screen distortion [AD-A113136] N82-28309

SUBJECT INDEX

.

PLIGHT SIMULATORS Simulator investigations of various side-stick controller/stability and control augmentation systems for helicopter terrain flight **∆82-38942** [AIAA 82-1522] Terrain following/terrain avoidance system concept development [AIAA PAPEB 82-1518] A82-40428 Operational test and evaluation handbook for aircrew training devices. Volume 3: Operational suitability evaluation [AD-A112569] N82-28306 Development of flying qualities criteria for single pilot instrument flight operations [NAŠA-CR-165932] N82-29288 operational test and evaluation handbook for aircraft training devices. Volume 1: Planning and management [AD-A112498] N82-29332 PLIGHT STABILITY TESTS Piloted simulator evaluation of a relaxed static stability fighter at high angle-of-attack [AIAA PAPER 82-1295] A82-39082 NASA Dryden's experience in parameter estimation and its uses in flight test [AIAA PAPER 82-1373] A82-PLIGHT TEST INSTRUMENTS A unique flight test facility - Description and A82-39135 results A82-40925 FLIGHT TEST VEHICLES A unique flight test facility - Description and results A82-40925 FLIGHT TESTS Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 The ideal controlled element for real airplanes is not K/s [AIAA 82-1606] A82-38986 Avoiding the pitfalls in automatic landing control system design [AIAA 82-1599] A82-39013 Development and flight test evaluation of a pitch stability augmentation system for a relaxed stability L-1011 [AIAA PAPER 82-1297] A82-39084 A simple, low cost application of a flight test parameter identification system [AIAA PAPEE 82-1312] A82-390 The correlation of flight test and analytic M-on-N A82-39093 air combat exchange ratios --- Many-on-Many [AIAA PAPEB 82-1328] A82-39105 Unique flight characteristics of the AD-1 obligue-wing research airplane [AIAA PAPER 82-1329] A 82-39106 Analysis of an airplane windshield anti-icing system [AIAA PAPES 82-1372] A82-39134 Evaluation of CFRP prototype structures for aircraft A82-39892 An evaluation of vertical drag and ground effect using the RSRA rotor balance system --- Rotor Systems Research Aircraft A82-40510 Flight test evaluation of a video tracker for enhanced offshore airborne radar approach capability A82-40531 Results of the AH-64 Structural Demonstration A82-40551 Design and flight testing of a digital optimal control general aviation autopilot A82-40906 A concept for 4D-guidance of transport aircraft in the IMA --- Terminal Maneuvering Area A82-40942 Advanced trending analysis/EDS data program N82-28286 [AD-A113511] Hethodology for determining elevon deflections to trim and maneuver the DAST vehicle with negative static margin [HASA-TH-84499] N82-28299 Geophysical flight line flying and flight path recovery utilizing the Litton LTN-76 inertial navigation system [DE82-005555]

N82-29292

PLIGHT TIME Agricultural airplane mission time structure characteristics N82-29329 ENASA-TM-844701 PLIGHT TRAINING Operational test and evaluation handbook for aircrew training devices. Volume 3: Operational suitability evaluation [AD-A112569] Inflight IPR procedures simulator [NASA-CASE-KSC-11218-1] N82-28306 N82-29331 Operational test and evaluation handbook for aircraft training devices. Volume 1: Planning and management [AD-A112498] N82-29332 FLIGHT VEHICLES Primary-data devices --- Russian book A82-39279 FLOW CHARACTERISTICS Symposium on Flows with Separation, Stuttgart, West Germany, November 23-25, 1981, Reports A82-38781 On embedded flow characteristics of sharp edged rectangular wings [LOG-C4712] N82-29263 FLOW DISTORTION Research on the behavior of a turbojet engine during internal and external disturbances with respect to early recognition of damage --German thesis A82-40561 Fluctuating forces and roter noise due to distorted inflow A82-40945 Intake swirl - A major disturbance parameter in engine/intake compatibility 182-41018 FLOW DISTRIBUTION Close-coupled canard-wing wortex interaction and Reynolds stress acquisition [AIAA PAPEB 82-1368] A82-39132 Effect of tip vanes on the performance and flow field of a rotor in mover A82-40511 herodynamic interactions between a 1/6-scale helicopter rotor and a body of revolution A82-40947 Spanwise distribution of vortex drag and leading-edge suction in subsonic flow A82-41005 PLOW MEASUREMENT Measuring the flow properties of slotted test-section walls [FFA-135] N82-28571 FLOW THEORY Calculation of level flow using radial grating A82-38922 The rectangular wing with semiinfinite span in nonlinear theory A82-39359 FLOW VELOCITY Measurements of velocity distributions in the leading edge vortex of a delta wing by the laser-Doppler procedure A82-38786 FLOW VISUALIZATION An experimental investigation of leading-edge spanwise blowing A82-40988 FLUID INJECTION Turbulent boundary layer on a porous surface with injection at various angles to the wall A82-39482 FLÜTTRR Robust Kalman filter design for active flutter suppression systems A82-38442 Design of compensated flutter suppression systems A82-40904 Design considerations and experiences in the use of composite material for an aercelastic research wing [NA 5A-TM-83291] N82-28280 PLUTTER ANALYSIS Dynamic stability of flexible forward swept wing aircraft [AIAA PAPER 82-1325] A82-39102

Finite element analysis for bearingless rotor blade aeroelasticity A82-40517 FLY BY WIRE CONTROL A design criterion for highly augmented fiy-by-wire aircraft [AllA 82-1570] A82-3896 Analytical design and validation of digital flight A82-38969 control system structure [AIAA PAPER 82-1626] ▲82-40434 Design and experience with a low-cost digital fly-by-wire system in the SAAB JA37 Viggen A/C A82-40905 FOARS Aircraft post-crash fire fighting/rescue N82-29287 FORCED VIBRATION Use of rotary balance and forced oscillation test data in six degrees of freedom simulation [AIAA PAPER 82-1364] A82-39129 Limiting performance of nonlinear systems with applications to helicopter vibration control problems ĨAD-A1132391 N82-28301 PORGING International aviation (selected articles) [AD-A114422] N82-28245 FORMING TECHNIQUÉS Adaptation of pultrusion to the manufacture of helicopter components 182-40537 FREE FLOW Aerodynamic behavior of a slender slot in a wind tunnel wall A82-38281 FUEL CONSUMPTION Fuel conservation: The airline - ATC A82-38464 Minimization of the total costs incurred in the employment of passenger jet aircraft A82-39247 **Flight** management computers A82-39321 The fourth dimension --- flight management system for airline operations A82-39540 Mini-RPV propulsion A82-39736 Requirements and trends in fuel consumption in transport mission with aircraft and surface vehicles A82-40956 Aerodynamic concepts for fuel-efficient transport aircraft A82-40957 Third generation turbo fans A82-40964 Aircraft design for fuel efficiency A82-40973 CF6 jet engine performance improvement: High pressure turbine active clearance control [NASA-CR-165556] N82-28297 FUEL CONTROL Adaptive fuel control feasibility investigation A82-40519 FUEL PRODUCTION An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 1: Preliminary process analyses [AD-A112681] N82-28462 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 2: Process variable analyses and laboratory sample production [AD-A112682] N82-28463 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 3: Production of specification of JP-4 fuel from geokinetics shale oil N82-28464 [AD-A112683] Ethancl production by vapor compression distillation [DE82-004892] N82-29393 United States Air Force shale oil to fuels, phase 2 N82-29476 [AD-A114531] ÷.

FUEL SYSTEMS Fuel system protection methods N82-29283 FUSELAGES Toward all-composite belicopter fuselage

A82-38223 Numerical solution of a problem concerning

- transonic flow past a wing-fuselage configuration A02-39996 Design and fantication of a composite rear
- fuselage for the UB-60 /Black Hawk/
- Fuselage effects in leading edge vortex flap aerodynamics
- A82-41006 An initial look at the supersonic aerodynamics of twin-fuselage aircraft concepts

A82-41008

G

GAS GENERATORS Comparison of HP turbine 'deep blade design' different bearing structure configurations A82-40996 GAS TURBINE BNGINES Application of the sequential optimization method to the tuning of the natural frequencies of gas-turbine engine compressor blades A82-39399 The use of analog computers in solutions of inverse problems of heat conduction for the identification of boundary conditions on the surfaces of gas-turbine-engine parts on the basis of temperature-measurement results A82-39467 GBARS Reliability model for franetary gear [NASA-TM-82859] N82-28643 GENERAL AVIATION AIECEAFT Analysis of general-aviation accidents using ATC radar records [AIAA PAPES 82-1310] A82-39091 Parameter estimation applied to general aviation alrcraft - A case stidy [AIAA PAPEE 82-1313] A82-39094 Analysis of an airplane windshield anti-icing system [AIAA PAPER 82-1372] A82-39134 Propulsion opportunities for future commuter aircraft A82-40418 [AIAA PAPER 82-1049] Sport aircraft --- Russian book A82-40483 Design and flight testing of a digital optimal control general aviation autopilot A82-40906 Dual wing, swept forward swept rearward wing, and single wing design optimization for high performance business airplanes A82-40931 Assessment of advanced technologies for high performance single-engine business airplanes A82-40932 Operation V10F - Development of a composite material wing A82-40934 Wind-tunnel investigation of a full-scale canard-configured general aviation aircraft A82-41024 Visual scene simulation concerning the landing of sporting aircraft in connection with investigations regarding the control and learning behavior of the filot --- German thesis A82-41447 General aviation activity and avionics survey N82-28244 [AD-A112924] Flight evaluation of LCBAN-C in the State of Vermont [NASA-TM-84711] N82-28278 FAA aviation forecasts-fiscal years 1982-1993 [AD-A114696] N82-29261 Crashworthiness studies: Cabin, seat, restraint, and injury findings in selected general aviation accidents [AD-A114878] N82-29275

SUBJECT INDEX

GEODYNAMICS Baseline monitoring using aircraft laser ranging --- spaceborne laser simulation and aircraft laser tracking [NASA-TH-73298] N82-28690 GEOLOGICAL SUBVEYS Geophysical flight line flying and flight path recovery utilizing the Litton LTN-76 inertial navigation system [DE82-005555] GEOMETRIC RECTIFICATION (IMAGERY) N82-29292 Scanner imaging systems, aircraft N82-28715 GEOPHYSICS Geophysical flight line flying and flight path recovery utilizing the Litton LTN-76 inertial navigation system [DE82-0055551 N82-29292 GLASS FIBER REINFORCED PLASTICS Adaptation of pultrusion to the manufacture of helicopter components A82-40537 Determination of load spectra and their application for keeping the operational life proof of sporting airplanes A82-41010 Development of materials and manufacturing technology over the next 20 years: Composite materials [MBB-UD-341-82-0] N82-28365 GLIDE PATHS Flight simulation studies on the feasibility of laterally segmented approaches in an MLS environment A82-40941 Terminal area automatic navigation, guidance, and control research using the Microwave Landing System (MLS). Part 4: Transition path reconstruction along a straight line path containing a glideslope change waypoint [NASA-CR-3574-PT-4] N82-28269 GLIDERS Dynamic energy transfer between wind and aircraft A82-40939 Design and tests of airfoils for sailplanes with an application to the ASW-19B A82-40967 Variable geometry aerofoils as applied to the Beatty E-5 and B-6 sailplanes A82-40968 Determination of load spectra and their application for keeping the operational life proof of sporting airplanes A82-41010 GRAPHITE-BPOXY COMPOSITES Developments on graphite/epoxy T-2 nose landing gear door A82-39893 Development of the advanced composite ground spoiler for C-1 medium transport aircraft A82-39895 Development status of a composite vertical stabilizer for a jet trainer A82-39897 Non-honeycomb F-16 horizontal stabilizer structural design A82-40936 Design and fabrication of cocured composite hat-stiffened panels A82-40978 Application of composite materials and new design concepts for future transport aircraft A82-40994 GROUND BASED CONTROL Flight control systems for aerial targets A82-39745 The design of a BPV ground station simulator A82-39750 GROUND REFERCT (ABBODYNAMICS) An evaluation of vertical drag and ground effect using the BSRA rotor balance system --- Rotor Systems Besearch Aircraft A82-40510 GROUND STATIONS Flight control systems for aerial targets A82-39745

The design of a RPV ground station simulator A82-39750

GROUND SUPPORT SYSTEMS U.S. Army remotely piloted vehicle support: technology program	ing
GROUND TESTS	∆82-39739
Error minimization in ground vibration test of helicopter structures	ting
GROUND WAVE PROPAGATICH	A82-40550
Electromagnetic Propagation Problems in the	e
Tactical Environment [AGARD-LS-120]	N82-29527
GROUND-AIR-GROUND COMMUNICATION	
VHF radio link for ground-air-ground communications using an integrated voice-	-data
modulation	uaca
Communications	A82-38405
COLLENIOUCIOND	N 82-29302
GUIDANCE SENSORS	
Analyzing stable pad disturbances and designation sensor vault to monitor fad stability	gn of a
[AIAA 82-1585]	A82-39011
Fixed pattern noise correction for staring in quidance systems	arrays
In gardance piptens	A82-39190
A terrain following system, an algorithm as sensor	
	A82-39740
Sensor stabilisation requirements of RPV's simulation study	- A
GUNS (ORDNANCE)	∆82-39741
Kinematic investigation Hughes Helicopter	7.62mm
chain gun	
[AD-A113114]	N82-28287
GUST ALLEVIATORS Gust load alleviation on Airbus A 300	
	A82-40881
GUST LOADS The effects of atmospheric turbulence on a	
quadrotor beavy lift airship	
[AIAA 82-1542]	A82-39009
Gust response of commercial jet aircraft 1	ncluding
effects of autopilot operation [NASA-CR-165919]	N82-28266
The determination of gust leads on nenline	
aircraft using a power spectral density a	approach
[NLB-TB-80123-U]	N82-28303
Prediction of fatigue crack growth rates un variable loading using a simple crack cl.	DUEL
model	1047 <u>6</u>
[NLE-MP-81023-U]	N82-28685
Automated optimum design of wing structure.	s.
Deterministic and probabilistic approach [NASA-TM-84475]	es №82-29317

Η

.

HANDBOOKS	
Operational test and evaluation handbook	for
aircraft training devices. Volume 1:	Planning
and management	-
, [AD-A112498]	N 82-29332
HARVESSES	
Comparative vertical impact testing of t	he
F/FB-111 crew restraint system and a p	roposed
modification	
[AD-A113957]	N 82-28267
Feasibility study of a 270V dc flat cabl	e aircraft
electrical power distributed system	
[AD-A114026]	N82-28552
HAWKER SIDDELEY AIRCRAFT	
U.S. Marine Corps AV-8A maintenance expe	
[AIAA PAPEE 81-2657]	A82-38446
HEAD-UP DISPLAYS	
Mıcro-heads-up display	
	A82-40533
Design study for a low-distortion hologr	
[AD-A113982]	N82-28292
Heads up display	
[NASA-CASE-LAB-12630-1]	N 82-293 19
HBAT TRANSFBR	
Cooled variable nozzle radial turbine for	r rotor
craft applications	
[NASA-CR-165397]	N 82-29323

BBA									los	oher	ic t	urbul	ence o	na	
		gu	ad	E O	tor	: 1	ea	v y			irsh				1 82-39009
	Pe	rf	or	Dal	nce	e (rac					buoyan	t	A 82-39009
8BI	ся	-	au	-10	στο)L	re	sea	irci	n ai	rcra	14			A 82-40974
0.01			cu:	rs:	ive	t	er	raj	n l	heid	ht c	orrel	ation	svst	en
		us	in	g ı	1 0]	.ti		e 1					techn		
HEL	IC														
	Si												us sid		
													l augm flight		tion
							522		leoj	pter	ter.	rain	TTIGUE		A82-38942
	A	ğr	ou	nd•	-si	. n u	1 1 a	ī io	on d	inve	stig	ation	of he	lico	
		de	CE.	le	cat	iı	ŋ	iņs	stri	unen	t ap	proac	hes		
	٨d	ap	ti	ve	fu	e]	l c	ont	ro	l fe	asib	ilıtş	inves	tiga	
	Co	0.0	en	+ /	100	0.01	n st	rai	tia	n of	ant	omati	c subs	vste	A82-40519
													ry hel		
		co	ck	pi	t i	ns	str	ume	enta	atio	n				
	λv	io	ni	cs	ST	s	tem	s f	For	hel	icop	ter i	ntegra	tion	A82-40530
					~1	~ .		~ .							A82-40534
	NA												on inve	stig	ation
		ot	R	N A '	V/2	ILS	51	nst	tru	ment	app	roach	les		A82-40535
BBI	.IC	:01	TB	B :	DBS	sie	58								A02-40JJJ
	Co) T F	os	it	eυ	ISE	e o	n l	hel:	icop	ters				
	ዋሪ	. 14 3	rð		11-		-	<u>.</u>	**	hol	1000	tor f	uselag	~	A82-38222
	10		ĽŪ	а.			c m p	03.	LLE	ner	rcob	cer 1	useray	e	A82-38223
	Тb		ne si		fc	r	a	de¢	lic	ated	pub	lic s	service	hel	licopter
							. .					_			A82-38422
	Th												terial		or blades
		-,					. Lu			3010	5 01	NCT 4	copier	100	A82-39263
	Sb	or	t	ra	nge	e 1	tac	t1 0	al	RPH	sys	tem			▲82-39730
	λœ												al For		38th,
		۸n	ab	ei	•	CI	A,	lia j	7 4.	-7,	1982	, Prc	ceedin	gs	102-10505
	A	ne	v	Tr	ans	501	nic	A	irf	oil	Desi	an We	thod a	nd i	A82-40505
													airfo:		lesign
	Po		n +	-	d				. r.	0+ 0F	+00	hnald		Rooi	A82-40507 .ng Vertol
	me		пc	a.				-		0001	Cec.	INOIC	gy ac	DOGT	A82-40508
	He								ion	red	ucti	on pl	rotor	bla	de
		шС	da	1 :	sha	1 p :	ing								A82-40514
	Co	F	el	at.	ior		o£	pre	edie	cted	vib	ratio	ons and	tes	t data
		fc	r	a	ViI	ıd	tu	nne	el i	heli	copt	er mo	odel		
	Sı	ko	TS	kv	20	• • •	Pn	re	lim	inar	ah v	sian	Ad	Vanc	A82-40515
	~-	Co	mp	os.	ıte	2	Air	fra	ame	Pro	gram	~~90			
	~				-										A82-40526
	CC	onc	ep	τu	aı	a	esı	gn	OI	τıe	THY	1076	egrated	COC	A82-40527
	TÌ	е	YA	H~	64	e	∎pe	nna	age	and	tai	l rot	tor - A	tec	hnical
		hj	st	or	Y										A82-40528
	Fu	ıtu	re	h	eli	ic	opt	er	co	ckpi	t de	sign			A02-40320
							-			-		-			A82-40529
	Åđ										to	the s	anufac	ture	e of
		це		00	pte	εT.	ço	шра	ле.	nts					A82-40537
	De				ent	: (of	the	e S	ea K	ing	compo	osite m	ain	rotor
		b1	ad	e											A82-40539
	Co	ap	ut	er	aj	iđ€	edi	co	ord	inat	e me	asuri	ng sys	tens	s in
													er comp		its
								а.	, f	atia	<u>по л</u>	1127if	lcatio		A82-40540
	A											copte		- h1	
												-			A82-40542
	op	tı	۵u	m :	sti	cuo	ctu	ra.	ιđ	esig	n	- foi	helic	opte	A82-40543
	De												osite r	ear	
													lawk/		100-105-4
	sŧ	. F #	ct	ur	al	đ	ອຣາ	an	of	ac	rash	worth	y land	ina	A82-40544 gear
	- •											opter		2	
	P -	D C	e i	"	- 11 -		- n+	a+-	ion	off	ects				A82-40547
	***	- my		• •		۲ اند و				~~~	~~~~				

HELICOPTER BEGINES

Results of the AH-64 Structural Demonstration A82-40551
Material identification for the design of composite rotary wings
A82-40937 HELICOPTEB ENGINES Civil helicopter propulsion system reliability and
engine monitoring technology assessments A82-40518
Adaptive fuel control feasibility investigation A82-40519
800 Shaft Horsepower Advanced Technology Demonstrator Engine
A82-40520 TF34 Convertible Engine System Technology Program A82-40521
Digital full authority controls for helicopter engines
۸82-40522 Support of the HH-65A - The impact of advanced
technology of VTOL systems upon existing product support
HELICOPTER PERFORMANCE
Flight dynamics of rotorcraft in steep high-g turns [AIAA PAPEE 82-1345] A82-39117 Rationalization of the maintenance process for
helicopter Ka-26 A82-39246
The operation of aircraft and helicopters in difficult meteorclogical and environmental
conditions Russian Ecok 182-39295
Short range tactical RFH system A82-39730
An evaluation of vertical drag and ground effect using the RSRA rotor balance system Rotor Systems Research Aircraft
A82-40510 Tandem rotor helicopter characteristics in a continuous icing environment
A82-40523 An evaluation of helicopter autorotation assist concepts
82-40524 Flight test evaluation of a video tracker for
enhanced offshore airborne radar approach capability
A82-40531 Avionics systems for helicopter integration
A82-40534 Support of the EH-65A - The impact of advanced technology of VTCL systems upon existing product
support A82-40541 Error minimization in ground vibration testing
of helicopter structures A82-40550
The prediction of helicopter rotor discrete frequency noise
A62-40553 Dynamic surface measurements on a model helicopter rotor during blade slap at high angles of attack A82-40555
Helicopter model scale results of flade-vortex interaction impulsive ncise as affected by blade planform
A82-40556 HELICOPTEB TAIL FOTORS
The YAH-64 empennage and tail rotor - A technical history
A82-40528 Ringfin augmentation effects
HELICOPTEB WAKES
A simplified approach to the free wake analysis of a hovering rotor A82-38474
An experimental and numerical study of 3-D rotor wakes in hovering flight
HELICOPTERS
Evaluation of an asymptotic method fcr helicopter rotor airloads
A82-40509 Micro-heads-up display

Micro-heads-up display A82-40509

·

Improved 243 BHz homing antenna system for	use on
helicopters [NLR-MP-81022-0]	N82-28276
Evaluations of helicopter instrument-fligh	
handling qualities	
[AD-A114004] Kinematic investigation Hughes Helicopter	N82-28285
chain qun	
[AD-A113114]	N82-28287
HISS calibration, ice phobics and FAA R/D	
evaluations [AD-A114435]	N82-28289
Limiting performance of nonlinear systems	
applications to helicopter vibration con-	trol
problems [AD-A113239]	N82-28301
Reliability model for planetary gear	NG2-20001
[NASA-TM-82859]	N82-28643
HIBBABCHIES	- 4
Investigations concerned with shifting pile activities to a higher hierarchical stage	ot e of
flight control German thesis	
	182-41453
BIGB ALTITUDE Reduction and analysis of mode C altitude	iata
collected at high altitudes over the con-	
United States	
[AD-A114655] High Aspect Batio	N82-29276
Means for controlling aerodynamically indu	ced twist
[NASA-CASE-LAR-12175-1]	N82-28279
BIGE GRAVITY ENVIRONMENTS Flight dynamics of rotorcraft in steep high	ha turne
[AIAA PAPER 82-1345]	A82-39117
HIGH SPBED	
Summary and recent results from the NASA ac high-speed propeller research program	ivanced
[AIAA PAPER 82-1119]	A82-40419
A semiempirical high-speed rotor noise pre-	
technique	A82-40554
HOLE DISTRIBUTION (MECHANICS)	A82-40554
Cracks interacting with contact forces - A	finite
-1	
, element study on loaded holes	A82-40959
HOLOGRAPHIC INTERFEROMETRY	A82-40959
BOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct	A82-40959
BOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construc using helographic methods	A82-40959
BOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct	A82-40959 ction A82-40977
BOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construc using helographic methods	A82-40959
 BOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construction using helographic methods Bigh-sensitivity holographic plates PL-38 BOLOGBAPHY Design study for a low-distortion holographic 	A82-40959 ction A82-40977 A82-41575 Dic HUD
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using helographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] 	A82-40959 ction A82-40977 A82-41575
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES 	A82-40959 Stion A82-40977 A82-41575 ANC HUD N82-28292
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using helographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters 	A82-40959 ction A82-40977 A82-41575 Dic HUD N82-28292 use on
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using helographic methods High-sensitivity holographic plates PL-38 HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] 	A82-40959 Stion A82-40977 A82-41575 ANC HUD N82-28292
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using helographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT 	A82-40959 Stion A82-40977 A82-41575 A82-28292 use on N82-28276
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using hclographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise 	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] 	A82-40959 Stion A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29118
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using hclographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NE-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional 	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29118 and
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using hclographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and i forward flight 	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29118 and
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NE-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and i forward flight [NASA-CR-169159]	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29118 and
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using hclographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and is forward flight [NASA-CR-169159] HORIZONTAL TAIL SUBPACES	A82-40959 Stion A82-40977 A82-41575 A82-28292 USE ON N82-28276 flight N82-29118 and N82-29312
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft constructuring holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [HPIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and if forward flight [NASA-CR-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugation	A82-40959 Stion A82-40977 A82-41575 A82-28292 use on N82-28276 flight N82-29118 and N82-29312 Steed web A82-39890
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using hclographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and i forward flight [NASA-CR-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugate Pabrication of CFRP prototype structure for	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29118 and N82-29312 ced web A82-39890
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft constructuring holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [HPIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and if forward flight [NASA-CR-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugation	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29118 and N82-29312 ced web A82-39890 ft rail
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and i forward flight [NASA-CR-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugat Pabrication of CFRP prototype structure for aircraft horizontal tail leading edge size	A82-40959 Stion A82-40977 A82-41575 A82-28292 USE ON N82-28276 flight N82-29118 and N82-29312 State Web A82-39890 St rall A82-39896
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MTS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and i forward flight [NASA-CR-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugate Pabrication of CPRP prototype structure for aircraft horizontal tail leading edge size HOVERING A simplified approach to the free wake analytication.	A82-40959 Stion A82-40977 A82-41575 A82-28292 USE ON N82-28276 flight N82-29118 and N82-29312 State Web A82-39890 St rall A82-39896
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft constructusing holographic methods High-sensitivity holographic plates PL-38 HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NE-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MPIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and i forward flight [NASA-CR-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugat Pabrication of CFRP prototype structure for aircraft horizontal tail leading edge size	A82-40959 tion A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29312 ted web A82-39890 t rail A82-39896 Lysis of A82-38474
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NE-NP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and i forward flight [NASA-CR-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugate Pabrication of CFRP prototype structure for aircraft horizontal tail leading edge size HOVERING A simplified approach to the free wake anal a hovering rotor	A82-40959 tion A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29118 and n N82-29312 ted web A82-39890 trail A82-39896 Lysis of A82-38474 hit on
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using hclographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and is forward flight [NASA-CE-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugat Fabrication of CFRP prototype structure for aircraft horizontal tail leading edge size HOVERING A simplified approach to the free wake anal a hovering rotor Flying quality requirements for V/STOL tran [AIAA PAPEE 82-1293] 	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29118 and N82-29312 ced web A82-39890 ct rall A82-39896 cysis of A82-38474 A82-40276
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NE-NP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and i forward flight [NASA-CR-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugate Pabrication of CFRP prototype structure for aircraft horizontal tail leading edge size HOVERING A simplified approach to the free wake anal a hovering rotor	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29118 and N82-29312 ced web A82-39890 ct rall A82-39896 cysis of A82-38474 A82-40276
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NER-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and is forward flight [NSA-CR-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugate Pabrication of CPRP prototype structure for aircraft horizontal tail leading edge size HOVERING A simplified approach to the free wake anal a hovering rotor Flying quality requirements for V/STOL trans [AIAA PAPEB 82-1293] Theory and application of optimum airloads rotors in hover and forward flight 	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29118 and N82-29312 ced web A82-39890 ft rall A82-39896 cysis of A82-38474 sition A82-40276 to A82-40506
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using hclographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NLR-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and is forward flight [NASA-CE-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugat Pabrication of CFRP prototype structure for aircraft horizontal tail leading edge size HOVERING A simplified approach to the free wake anal a hovering rotor Flying quality requirements for V/STOL tran [ATAA PAPER 82-1293] Theory and application of optimum airloads rotors in hover and forward flight Effect of tip wanes on the performance and 	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29118 and N82-29312 ced web A82-39890 ft rall A82-39896 cysis of A82-38474 sition A82-40276 to A82-40506
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NE-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and i forward flight [NASA-CR-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugat Pabrication of CFEP prototype structure for aircraft horizontal tail leading edge size HOVERING A simplified approach to the free wake anal a hovering rotor Flying quality requirements for V/STOL tran [ATAA PAPEB 82-1293] Theory and application of optimum airloads rotors in hover and forward flight Effect of tip wanes on the performance and field of a rotor in hover 	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29312 red web A82-39890 ct rall A82-39896 ysis of A82-38474 A82-39896 to A82-38474 A82-40506 flow A82-40511
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using hclographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NER-MP-81022-0] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and i forward flight [NASA-CE-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugat Pabrication of CPRP prototype structure for aircraft horizontal tail leading edge size HOVERING A simplified approach to the free wake anal a hovering rotor Flying quality requirements for V/STOL tran [ATAA PAPEE 82-1293] Theory and application of optimum airloads rotors in hover and forward flight Effect of tip wanes on the performance and field of a rotor in hover 	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29312 red web A82-39890 ct rall A82-39896 ysis of A82-38474 A82-39896 to A82-38474 A82-40506 flow A82-40511
 HOLOGBAPHIC INTERFEROMETRY Nondestructive testing in aircraft construct using holographic methods High-sensitivity holographic plates PL-3M HOLOGBAPHY Design study for a low-distortion holograph [AD-A113982] HOMING DEVICES Improved 243 MHz homing antenna system for helicopters [NE-MP-81022-U] HORIZONTAL FLIGHT Some comments on the prediction of forward effects on jet noise [MFIS-20/1981] Flap-lag-torsional dynamics of extensional inextensional rotor blades in hover and i forward flight [NASA-CR-169159] HORIZONTAL TAIL SUBPACES Tests of CFRP spar/rib models with corrugat Pabrication of CFEP prototype structure for aircraft horizontal tail leading edge size HOVERING A simplified approach to the free wake anal a hovering rotor Flying quality requirements for V/STOL tran [ATAA PAPEB 82-1293] Theory and application of optimum airloads rotors in hover and forward flight Effect of tip wanes on the performance and field of a rotor in hover 	A82-40959 ction A82-40977 A82-41575 hic HUD N82-28292 use on N82-28276 flight N82-29312 red web A82-39890 ct rall A82-39896 ysis of A82-38474 A82-39896 to A82-38474 A82-40506 flow A82-40511

-

•

An experimental and numerical study of 3-D	rotor
wakes in hovering flight	A82-40946
Plap-lag-torsional dynamics of extensional inertensional rotor blades in hover and	and in
forward flight [NASA-CE-169159] HOVERING STABILITY	₩82-29312
An analysis of a nonlinear instability in implementation of a VICL control system	the during
hover [AIAA 82-1611] An experimental investigation of a bearing	A82-38990 less
model rotor in hover Finite element analysis for bearingless ro	A82-40512 tor
blade aeroelasticity	A82-40517
HUBS Investigation of a rotor system incorporat	ing a
constant lift tip [NASA-CR-166261]	N82-29271
HUMAN FACTORS BNGINEERING The effects of the delays on systems subje	ct to
manual control	A82-38943
The system of 'objective control'	A 82-39245
Evaluation of an automatic subsystem param monitor for aircraft	eter
	A82-40552
The evolution of display formats for advan fighters using multimode color CBT displ	ays
Human factors in air traffic control	A82-40888
[AGABL-AG-275] The air traffic control system	N82-29293
Human factors contributions to air traffic systems	N82-29294 control
- Nan as a system component	N 82-29295
The work environment	N 82-29296
Displays	N82-29299
Controls	N82-29300
Additional functions within the air traffi	N82-29301
Control system	N82-29309
Puture trends and problems	
HUMAN PERFORMANCE	N82-29310
Human capabilities and limitations in syst	ems N82-29297
Aircraft fire safety [AGARD-LS-123]	N 82-29279
Human response to fire	N 82-29281
HYBRID STRUCTURES The effect of hybrid composite materials o	n the
dynamic characteristics of helicopter ro	
HYDRAULIC TEST TONNELS Use of the cavitation tunnel at the Dutch	
Experiment staticn (NSP), Wageningen for determination of the acoustic source str	the ength of
propeller cavitation [TPD-908-720]	N82-29116
HYDBOCARBON FUELS Atmospheric chemistry of hydrocarbon fuels	
Volume 2: Outdoor chamber data tabulati Part 1	
[AD-A113665]	N82-28842
BYGROSCOPICITY Recent development in nygrothermoviscoelas	tic
analysis of composites	N82-28676
HISTBRESIS Aerodynamic aspects of aircraft dynamics a	t high
angles of attack /AGARD Lecture/ [AIAA PAPER 82-1363]	A 82-39836

•

I	
ICE FORMATION Tandem rotor helicopter characteristics in continuous icing environment	
HISS calibration, ice phobics and FAA R/D evaluations	A82-40523 N82-28289
An evaluation of the Rosemount ice detector cloud water content measurements	for
[PB82~158833] ICE PREVENTION Analysis of an airplane windshield anti-ici	N82-29321
[AIAA PAPEE 82-1372] Ideal Pluids	A82-39134
Calculation of level flow using radial grat	11ng 182-38922
Scanner imaging systems, aircraft IMAGING TECHNIQUES	N82-28715
Computer program for analysis of spherical distortion	screen
[AD-A113136] IMPACT LOADS	N82-28309
The behavior of composite thin-walled struc in dynamic buckling under impact	ctures
IMPACT TESTS	A82-40976
Comparative vertical impact testing of the F/FB-111 crew restraint system and a prop modification	posed
[AD-A113957] IN-PLIGHT NCNITOBING	N82-28267
Minimal order time sharing filters for INS in-flight alignment	101 20420
'Listening' systems to increase aircraft structural safety and reduce costs	A82-38439
Concept demonstration of automatic subsyste	A82-39539
parameter mcnitoring military helico cockpit instrumentation	A82-40530
INCOMPRESSIBLE BOUNDARY LAYER Experimental and theoretical studies of	802-40330
three-dimensional turbulent boundary lay an empennage of a typical transport airpi	
INERTIAL DAVIGATION Minimal order time sharing filters for INS in-flight alignment	
Geophysical flight line flying and flight precovery utilizing the Litton LTN-76 iner	A82-38439 path ctial
navigation system [DE82~005555] INFLATABLE STRUCTURES	N82-29292
Inflated wings	A82-40966
INFORMATICN FLOW Communications	N82-29302
INFORMATION SYSTEMS Preliminary design of an advanced integrate and avionics information system	
INFRARED DETECTORS	A82-40907
Fixed pattern noise correction for staring in guidance systems	
INFRARED BADIONETERS Application of an optical data link in the	▲82-39190
airborne scanning system	A 82-39275
INFRARED TRACKING Algorithm development for infra-red air-to- guidance systems	
INGESTION (BNGINES)	A82-39191
Water ingestion into axial flow compressors 3: Experimental results and discussion [AD-A114830]	N82-29326
Effect of water on axial flow compressors. 2: Computational program [AD-A114831]	Part N82-29327

•

INJURIES

INJURIES Flight attendant injuries: 1971-1576 [AD-A114909] N82-29274 Annual review of aircraft accident data: ŪS general aviation calendar year 1979 [PB82-136250] N82-29278 INLET PLON A summary of V/STOL inlet analysis methods A82-40921 A summary of V/STOL inlet analysis methods [NASA-TM-82885] N82-28249 INLET PRESSURE Inlet and airframe compatibility for a V/STOL fighter/attack aircraft with top-mounted inlets A82-40908 INSPECTION Computer aided coordinate measuring systems --- in engineering design of helicopter components A82-40540 Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft A82-41016 Hethod for refurbishing and processing parachutes [NASA-CASE-KSC-11042-1] N82-29. N82-29330 INSTRUMENT APPROACH NASA/FAA Helicopter ATC sigulation investigation of RNAV/MLS instrument approaches A82-40535 Flight simulation studies on the feasibility of laterally segmented approaches in an MLS environment A82-40941 INSTRUMENT PLIGET BULES A ground-simulation investigation of helicopter decelerating instrument approaches A82-39118 Tandem rotor helicopter characteristics in a continuous icing environment A82-40523 Estimation of the number of in-flight aircraft on instrument flight rules A82-41117 Evaluations of belicopter instrument-flight handling gualities [AD-A114004] N82-28285 Development of flying gualities criteria for single pilot instrument flight operations
[NASA-CR-165932] N82-29288 Inflight IFR procedures simulator [NASA-CASE-KSC-11218-1] N82-29331 INSTRUMENT LANDING SYSTEMS Instrument landing systems /ILS/ at airports of the German Democratic Republic A82-39248 INTAKE SYSTEMS The effect of intake flow disturbances on APU compressor blade high cycle fatigue in the Airbus A300 A82-40983 INTERPERENCE DRAG The use of small strakes to reduce interference drag of a low wing, twi engine airplane [AIAA PAPER 82-1323] INTERNAL COMBUSTION BUGINES A82-39100 Mini-RPV propulsion A82-39736 INTERNATIONAL COOPERATION Engineering aspects of international collaboration on Tornado A82-40878 INVISCID FLOR Numerical solution of a problem concerning transonic flow past a wing-fuselage configuration A82-39996 IONOSPHERIC F-SCATTER PROPAGATION Electromagnetic Propagation Problems in the Tactical Environment [AGARD-LS-120] N82-29527 J JET AIRCRAFT

U.S. Marine Corps AV-8A maintenance experience [AIAA PAPER 81-2657] A82-38446 Minimization of the total costs incurred in the employment of passenger jet aircraft A82-39247

SUBJECT INDEX

Development status of a composite vertical stabilizer for a jet trainer A82-39897 Two-dimensional model studies of the impact of aircraft exhaust emissions on tropospheric ozone A82-40124 Operation V10F - Development of a composite material wing 182-40934 Analysis of jet transport wings with deflected control surfaces by using a combination of 2and 3-D methods A82-41022 Gust response of commercial jet aircraft including effects of autopilot operation [NASA-CR-165919] N82-28266 Computer enhanced analysis of a jet in a cross-stream N82-29555 JET AIRCRAFT NOISE Static noise tests on modified augmentor wing jet STCL research aircraft [NASA-TH-81231] N82-28295 The effect of barriers on wave propagation phenomena: With application for aircraft noise shielding [NASA-CR-169128] N82-29111 Some comments on the prediction of forward flight effects on jet noise [MPIS-20/1981] N82-29118 JET ENGINE FUELS An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 1: Freliminary process analyses [AD-A112681] N82-28462 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 2: Process variable analyses and laboratory sample production [AD-A112682] N82-28463 [AD-A11202] United States Air Force shale oil to fuels, phase 2 (AD-A114531] N82-29476 [AD-A114531] JET BIGINES Redundant control unit for an advanced multispool engine A82-40998 B747/JT9D flight loads and their effect on engine running clearances and performance deterioration; BCAC WAIL/P and WA JT9D engine diagnostics programs [NASA-CR-165573] N82-28296 CP6 jet engine performance improvement: High pressure turbine active clearance control [NASA-CR-165556] N82-28297 Water ingestion into axial flow compressors. Part 3: Experimental results and discussion [AD-A114830] N82-29326 Effect of water on axial flow compressors. 2: Computational program Part [AD-A114831] N82-29327 JET FLOW Wing-tip jets aerodynamic performance A82-40987 Aerodynamics of an airfoil with a jet issuing from its surface [NASA-TM-84825] N82-29267 JOINTS (JUNCTIONS) Fasteners for composite structures A82-39929 Theoretical and experimental investigation of joint-structural damping interaction for airplane construction A82-41013 JP-4 JET FUEL An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 3: Production of specification of JP-4 fuel from geokinetics shale oil [AD-112683] N82-28464 K

K

KALMAN FILTERS Adaptive filtering for an aircraft flying in turbulent atmosphere

A82-38441

A82-40957

.

Robust Kalman filter design for active flutter suppression systems A82-38442 Research on an adaptive Kalman filter for solving the radar tracking problem --- German thesis A82-40562 KINBHATICS Kinematic investigation Hughes Helicopter 7.62mm chain gun [AD-A113114] N82-28287 KUTTA-JOUKOUSKI CONDITION A summary of V/STOL inlet analysis methods [NASA-TM-82885] N82-28249 L-1011 AIRCRAFT Development and flight test evaluation of a pitch stability augmentation system for a relaxed stability L-1011 [AIAA PAPER 82-1297] A8 LAMIWAR BOUNDARY LAYER A82-39084 Aerodynamic development of laminar flow control on swept wings using distributed suction through porous surfaces A82-40894 External aerodynamic design for a laminar flow control glove on a Lockbeed JetStar wing A82-40895 LAMINAR FLOW Calculation of level flow using radial grating A82-38922 Observations and implications of natural laminar flow on practical airplane surfaces A82-40893 LAMINAR FLOW AIRFOILS Aerodynamic development of laminar flow control on swept wings using distributed suction through DOTOUS SUFfaces A82-40894 External aerodynamic design for a laminar flow control glove on a Lockheed JetStar wing A82-40895 Progress at Douglas on laminar flow control applied to commercial transport aircraft A82-40958 LANIBATES On the bearing strengths of CFRP laminates A82-39930 The promise of laminated metals in aircraft design A82-40903 Material identification for the design of composite rotary wings A82-40937 Application of a new hybrid material /ARALL/ in aircraft structures A82-40975 Design considerations and experiences in the use of composite material for an aercelastic research wing [NASA-TM-83291] N82-28280 LANDING The cost of neise reduction for departure and arrival operations of commercial tilt rotor aircraft [NASA-CR-137803] N82-29316 LANDING GEAR Developments on graphite/epoxy T-2 mose landing gear door A82-39893 Touchdown technology --- large aircraft landing gear stress A82~40057 Structural design of a crashworthy landing gear for the AH-64 Attack Helicopter A82-40547 LANDING LOADS Automated optimum design of wing structures. Deterministic and probabilistic approaches [NASA-TH-84475] N N82-29317 LANDING SIMULATION Visual scene simulation concerning the landing of sporting aircraft in connection with investigations regariing the control and learning behavior of the pilot --- German thesis A82-41447

LASER DOPPLER VELOCIMETERS Measurements of velocity distributions in the leading edge vortex of a delta wing by the laser-Doppler procedure A 82-38786 LASER GUIDANCE U.S. Army remotely piloted vehicle program A82-39732 LASER RANGE PINDERS Radars for UMA A82-39742 Baseline monitoring using aircraft laser ranging -- spaceborne laser simulation and aircraft laser tracking [NASA-TM-73298] N82-28690 LASERS Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-28624 LATERAL CONTROL The ideal controlled element for real airplanes is not K/s [AIAA 82-1606] A82-38986 Investigation of low order lateral directional transfer function models for augmented aircraft [AIAA 82-1610] A82-38989 [AIAA 92-1010] Flying qualities requirements for roll CAS systems [AIAA PAPER 82-1356] A82-402 A82-40287 LAUNCHERS U.S. Army remotely piloted vehicle supporting technology program 182-39739 LEADING EDGE FLAPS Fuselage effects in leading edge vortex flap aerodynamics A82-41006 LEADING EDGE SLATS Fabrication of CFEP prototype structure for aircraft horizontal tail leading edge slat rail A82-39896 LEADING EDGES Investigations regarding vortex formation at wings with bent leading edges A82-38783 Leading edge separation at delta wings with curved leading edges in supersonic flow A82-38784 Measurements of velocity distributions in the leading edge vortex of a delta wing by the laser-Doppler procedure A82-38786 Lateral aerodynamics of delta wings with leading edge separation [AIAA PAPER 82-1386] A82-39142 Inflated wings A82-40966 An experimental investigation of leading-edge spanwise blowing A82-40988 Spanwise distribution of vortex drag and leading-edge suction in subsonic flow A82-41005 LIFE CYCLE COSTS Axisymmetric approach and landing thrust reverser impacts on usage and LCC --- life cycle cost A82-40892 Logistics research program in the United States Air Force A82-40963 LIPT Wind-tunnel testing of V/STOL configurations at high lift A82-40949 Minimum induced drag of canard configurations A82-41116 LIFT AUGNENTATION Ejector powered propulsion and high lift subsonic Wing A82-40970 Development of an advanced no-moving-parts high-lift airfoil A82-40971 Test results of chordwise and spanwise blowing for low-speed lift augmentation A82-40999 LIFT DRAG RATIO Aerodynamic concepts for fuel-efficient transport aircraft

LIGHT AIRCRAFT

LIGHT AIRCRAFT Sport aircraft --- Russian book A82-40483 Computational and experimental studies of light twin aerodynamic interference A82-40930 Assessment of advanced technologies for high performance single-engine business airplanes A82-40932 The design integration of wingtip devices for light general aviation aircraft A82-40933 LIGHT EMITTING DIODES Heads up display [NASA-CASE-LAR-12630-1] N82-29319 LIGHT TRANSMISSION Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-28624 LIGHTING BOUIPHENT Effects of approach lighting and variation in visible runway length on perception of approach angle in simulated night landings [AD-A114742] N82-29290 LIGETNING A compendium of lightning effects on future aircraft electronic systems [AD-A114117] N82-28293 Carbon fiber reinforcel composite structures protected with metal surfaces against lightning strike damage [MBB-UD-340-82-0/E] N82-28364 Atmospheric electricity hazards analytical model development and application. Volume 1: Lightning environment modeling [AD-A114015] N82-29800 Atmospheric electricity nazards analytical model development and application. Volume 2: Simulation of the lightning/aircraft interaction event [AD-A114016] N82-29801 Atmospheric electricity hazards analytical model development and application. Volume 3: Blectromagnetic coupling modeling of the lightning/aircraft interaction event [AD-A114017] N82-29802 LINBAR ABBAYS The design of a viewing system for near real time stereo images from a UMA borne linescan sensor --- Unmanned Aircraft 182-39746 LINEAR SYSTEMS Application of multivariable model following method to flight controller [AIAA PAPER 82-1349] Applications to aeronautics of the theory of transformaticns of ncnlinear systems A82-39120 [NASA-TM-84249] N82-30013 LINEABIZATION The use of linearized-aerodynamics and vortex-flow methods in arcraft design /invited paper/ [AIAA PAPER 82-1384] LOAD TESTS A82-40294 On the bearing strengths of CFRP laminates A82-39930 In-plane shear test of thin panels 182-40545 LOADS (PORCES) Wind tunnel studies of store separation with load factor. Freedrops and captive trajectories N82-30261 LOGISTICS MANAGEMENT Logistics research program in the United States Air Force A82-40963 LONGITUDINAL CONTEOL Design and analysis of a multivariable control system for a CCV-type fighter aircraft [AIAA PAPER 82-1350] A62-1 Design of a longitudinal ride-control system by A62-39121 Zakian's method of inequalities A82-41114 Analytical and simulator study of advanced transport [NASA-CR-3572] N82-28298 LONGITUDINAL STABILITY Wind tunnel measurements of longitudinal stability and control characteristics of primary and secondary wing configurations A82-41025

LORAN C Flight evaluation of LORAN-C in the State of Vermont [NASA-TM-84711] N82-28278 LOW LEVEL TORBOLENCE The detection of low level wind shear. II N82-38463 LOW SPEED STABILITY Low-speed characteristics of a fighter-type configuration at high angles-of-attack and sideslip A82-41020

Μ

IVI	
MACH NUMBER	
Flight-determined correction terms for ang attack and sideslip	le or
[AIAA PAPER 82-1374] HAGWETIC COMPASSES	A82-40290
Low cost development of INS sensors for ex	pendable
BPV control and navigation [AD-A112691]	N82-28291
MAGNETIC SURVEYS Geophysical flight line flying and flight recovery utilizing the Litton LTN-76 ine	
navigation system [DE82-005555]	N82-29292
MAINTENANCE Method for refurbishing and processing par	
[NASA-CASE-KSC-11042-1] MAN MACHINE SYSTEMS	N82-29330
A modern approach to pilot/vehicle analysı the Neal-Smith criteria	s and
[AIAA PAPER 82-1357] Evaluation of an automatic subsystem param- monitor for aircraft	A82-39125 eter
Applying advanced technology to flight sta design	A82-40552 tion
Human factors in air traffic control	182-40887
[AGARD-AG-275] Human factors contributions to air traffic systems	N82-29293 control
Man as a system component	N82-29295
Human capabilities and limitations in syst	N82-29296
	N82-29297
Communications	N 82- 20202
	N 82-29302
MANAGEMENT SYSTEMS Future terminal area systems	N 02-29302
	A82-38462
Puture terminal area systems	<u> 82-38462</u>
Future terminal area systems MANUAL CONTROL The effects of the delays on systems subject manual control Manual reversion flight control system for aircraft: Pilot performance and simulated	A82-38462 ct to A82-38943 A-10
Future terminal area systems MANUAL CONTROL The effects of the delays on systems subject manual control Manual reversion flight control system for aircraft: Filot performance and simulate effects [AD-A113463]	A82-38462 ct to A82-38943 A-10
<pre>Future terminal area systems MANUAL COBTEOL The effects of the delays on systems subject manual control Manual reversion flight control system for aircraft: Pilot performance and simulation effects [AD-A113463] HANUFACTURING Development of materials and manufacturing</pre>	A62-38462 ct to A82-38943 A-10 or cue N82-28302
<pre>Future terminal area systems MANUAL CONTEOL The effects of the delays on systems subject manual control Hanual reversion flight control system for aircraft: Pilot performance and simulate effects [AD-A113463] HANUPACTUBING</pre>	A62-38462 ct to A82-38943 A-10 or cue N82-28302
<pre>Future terminal area systems MANUAL CONTEOL The effects of the delays on systems subject manual control Manual reversion flight control system for aircraft: Pilot performance and simulate effects [AD-A113463] HANUFACTUBING Development of materials and manufacturing technology over the next 20 years: Comport materials [MBB-UD-341-82-0]</pre>	A82-38462 ct to A82-38943 A-10 or cue N82-28302
<pre>Future terminal area systems MANUAL COUTEOL The effects of the delays on systems subject manual control Manual reversion flight control system for aircraft: Pilot performance and simulate effects [AD-A113463] MANUPACTUBING Development of materials and manufacturing technology over the next 20 years: Compo materials [MBB-UD-341-82-0] MATEBIALS The development and applications of a full-</pre>	A82-38462 ct to A82-38943 A-10 or cue N82-28302 osite N82-28365 -scale
<pre>Future terminal area systems MANUAL COBTEOL The effects of the delays on systems subject manual control Manual reversion flight control system for arccaft: Pilot performance and simulate effects [AD-A113463] HANUFACTUBING Development of materials and manufacturing technology over the next 20 years: Compo materials [MBB-UD-341-82-0] MATEBIALS The development and applications of a full- wide body test article to study the behavious interior materials during a postcrash fur- </pre>	Δ82-38462 ct to Δ82-38943 Δ-10 or cue №82-28302 osite №82-28365 -scale wior of
<pre>Future terminal area systems MANUAL CONTEOL The effects of the delays on systems subject manual control Manual reversion flight control system for aircraft: Pilot performance and simulate effects [AD-A113463] HANUFACTUBING Development of materials and manufacturing technology over the next 20 years: Compo materials [MBB-UD-341-82-0] HATEBIALS The development and applications of a full- wide body test article to study the behavinterior materials during a postcrash fuel HATEBIALS TESTS Heat release rate calorimetry of engineering </pre>	A82-38462 ct to A82-38943 A-10 or cue N82-28302 osite N82-28365 -scale vior of el fire N82-29285
<pre>Future terminal area systems MANUAL COBTEOL The effects of the delays on systems subject manual control Manual reversion flight control system for arcraft: Pilot performance and simulative effects [AD-A113463] HANUFACTUBING Development of materials and manufacturing technology over the next 20 years: Comport materials [MBB-UD-341-82-0] HATEBIALS The development and applications of a full- wide body test article to study the behavior interior materials during a postcrash function HATEBIALS TESTS Heat release rate calorimetry of engineering plastics</pre>	A82-38462 ct to A82-38943 A-10 or cue N82-28302 osite N82-28365 -scale vior of el fire N82-29285
<pre>Future terminal area systems MANUAL CONTEOL The effects of the delays on systems subject manual control Manual reversion flight control system for aircraft: Pilot performance and simulate effects [AD-A113463] MANUFACTUBING Development of materials and manufacturing technology over the next 20 years: Compo materials [MBB-UD-341-82-0] MATEBIALS The development and applications of a full- wide body test article to study the behavion interior materials during a postcrash function MATEBIALS TESTS Heat release rate calorimetry of engineerizi plastics MATHEMATICAL MODELS Aerodynamic behavior of a slender slot in a </pre>	Δ82-38462 ct to A82-38943 Δ-10 or cue N82-28302 osite N82-28365 -scale vior of el fire N82-29285 ag Δ82-41075
<pre>Future terminal area systems MANUAL COBTEOL The effects of the delays on systems subject manual control Manual reversion flight control system for aircraft: Pilot performance and simulative effects [AD-A113463] HANUFACTUBING Development of materials and manufacturing technology over the next 20 years: Component and applications of a full- wide body test article to study the behavion interior materials during a postcrash fue HATEBIALS TESTS Heat release rate calorimetry of engineering plastics MATHEMATICAL MODELS Aerodynamic behavior of a slender slot in a tunnel wall</pre>	Δ82-38462 ct to A82-38943 Δ-10 or cue N82-28302 osite N82-28365 -scale vior of el fire N82-29285 ag Δ82-41075
<pre>Future terminal area systems MANUAL COBTEOL The effects of the delays on systems subject manual control Manual reversion flight control system for aircraft: Pilot performance and simulative effects [AD-A113463] HANUFACTUBING Development of materials and manufacturing technology over the next 20 years: Comport materials [MBB-UD-341-82-0] MATEBIALS The development and applications of a full- wide body test article to study the behavion interior materials during a postcrash fue MATEBIALS TESTS Heat release rate calorimetry of engineerizi plastics MATEBIALTICAL HODELS Aerodynamic behavior of a slender slot in a tunnel wall Pilot models for discrete maneuvers [AIAA 82-1519] Design of a longitudinal ride-control system </pre>	Δ82-38462 ct to A82-38943 Δ-10 or cue N82-28302 osite N82-28365 -scale vior of el fire N82-29285 ag A82-41075 a wind A82-38281 Δ82-38940
<pre>Future terminal area systems MANUAL CONTEOL The effects of the delays on systems subject manual control Manual reversion flight control system for aircraft: Pilot performance and simulate effects [AD-A113463] HANUFACTUBING Development of materials and manufacturing technology over the next 20 years: Componenterials [MBB-UD-341-82-0] HATEBIALS The development and applications of a full- wide body test article to study the behavinterior materials during a postcrash function HATEBIALS Heat release rate calorimetry of engineering plastics HATHEMATICAL MODELS Aerodynamic behavior of a slender slot in a tunnel wall Pilot models for discrete maneuvers [AIAA 82-1519] Design of a longitudinal ride-control system Zakian's method of inequalities</pre>	Δ82-38462 ct to A82-38943 Δ-10 or cue N82-28302 osite N82-28365 -scale yior of el fire N82-29285 ng Δ82-41075 Δ wind Δ82-38281 Δ82-38940 -m by Δ82-41114
<pre>Future terminal area systems MANUAL COBTEOL The effects of the delays on systems subject manual control Manual reversion flight control system for aircraft: Pilot performance and simulative effects [AD-A113463] HANUFACTUBING Development of materials and manufacturing technology over the next 20 years: Compo materials [MBB-UD-341-82-0] HATEBIALS The development and applications of a full- wide body test article to study the behavion interior materials during a postcrash fuct HATEBIALS TESTS Heat release rate calorimetry of engineerizi plastics MATHEBIALS To development of a slender slot in a tunnel wall Pilot models for discrete maneuvers [AIAA 82-1519] Design of a longitudinal ride-control system </pre>	Δ82-38462 ct to A82-38943 Δ-10 or cue N82-28302 osite N82-28365 -scale yior of el fire N82-29285 ng Δ82-41075 Δ wind Δ82-38281 Δ82-38940 -m by Δ82-41114

Reliability model for planetary gear [NASA-TM-82859] N82-28643 Establishment of a rotor model tasis [NASA-TP-2026] N82-29311 MAXIMUM LIKELIHOOD ESTIMATES System identification of nonlinear acrodynamic models N82-29996 MBASURING INSTRUMENTS Primary-data devices --- Russian book A82-39279 MECHANICAL PROPERTIES Technical and economic comparison of carbon fiber tape and woven fabric applications A82-40993 METAL BONDING The promise of laminated metals in aircraft design A82-40903 METAL FATIGUE Fatigue behavior of weldbonded joints A82-41115 METAL MATRIX COMPOSITES Application of a new hybrid material /ARALL/ in aircraft structures A82-40975 METAL SHEETS The promise of laminated metals in aircraft design A82-40903 METAL SURFACES Carbon fiber reinforcel composite structures protected with metal surfaces against lightning strike damage [MBB-UD-340-82-0/E] N82-28364 MBTEOROLOGICAL RADAR Demonstration of radar reflector detection and ground clutter suppression using airborne weather and mapping radar A82-40532 MICROBALANCES An evaluation of the Rosemcunt ice detector for cloud water content measurements
[PB82-158833] N82-29321 MICROCOMPUTERS The detection of low level wind shear. II A82-38463 MICROPBOCESSORS Hydraulic Universal Display Processor System (HUDPS) [AD-A114428] N82-28294 MICROWAVE LANDING SYSTEMS An MLS with computer aided landing approach [AIAA PAPES 82-1352] A82-39122 NASA/FAA Helicopter ATC simulation investigation of BNAV/MLS instrument approaches A82-40535 Plight simulation studies on the feasibility of laterally segmented approaches in an MLS environment A82-40941 Terminal area automatic navigation, guidance, and control research using the Microwave Landing System (MLS). Part 4: Transition path reconstruction along a straight line path containing a glideslope change wayroint [NASA-CR-3574-PT-4] N82-28269 MICROWAVE TRANSMISSION The feasibility of a high-altitude aircraft platform with consideration of technological and societal constraints [NASA-TM-84508] N82-29313 MIDAIR COLLISIONS Air-air collision avoidance systems A82-39323 Computer outages at air terminal facilities and their correlation to near miss mid-air collisions (AFMD-82-43) [B-206064] N82-28264 MILITARY AIRCRAFT JVI, what an opportunity --- Joint Services Advanced Vertical Lift Aircraft Program A82-38423 Guidance for the use of equivalent systems with MIL-F-8785C --- for aircraft flight control systems **[AIAA PAPER 82-1355]** A82-39124 U.S. Army remotely piloted vehicle program A82-39732 Age exploration in naval aviation --- Beliability Centered Maintenance program 182-40962

Historical research and development inflation indices for Army fixed and rotor winged aircraft [AD-A114368] N82-28290 BILITÀRY AVIATION The national dynamics "observer" mini-RPV for tropical operation A82-39734 Age exploration in naval aviation --- Reliability Centered Maintenance program A82-40962 Logistics research program in the United States Air Force A82-40963 MILITARY BELICOPTERS Flight dynamics of rotorcraft in steep high-g turns [AIAA PAPER 82-1345] A82-39117 Recent advances in rotor technology at Boeing Vertol A82-40508 Whirl mode stability of the main rotor of the YAH-64 Advanced Attack Helicopter A82-40513 An evaluation of helicopter autorotation assist concepts A82-40524 Conceptual design of the LHX integrated cockpit A82-40527 The YAH-64 empennage and tail rotor - A technical history A82-40528 Concept demonstration of automatic subsystem parameter monitoring --- military helicopter cockpit instrumentation A82-40530 MINIMUM DRAG Dual wing, swept forward swept rearward wing, and single wing design optimization for high performance business airplanes A82-40931 Minimum induced drag of canard configurations A82-41116 MIRAGE AIRCRAFT Mırage 2000 - Towards possible high series production aircraft A82-38249 MISSILE CONFIGURATIONS Supersonic missile aerodynamic and performance relationships for low observables mission profiles [AIAA PAPER 82-1298] A82-Summary of sting interference effects for cone, A82-39085 missile, and aircraft configurations as determined by dynamic and static measurements [AIAA FAPER 82-1366] A82-A82-40395 MISSILE CONTROL Air-to-air missile avoidance [AIAA 82-1516] A82-38939 Fixed pattern noise correction for staring arrays in guidance systems A82-39190 Algorithm development for infra-red air-to-air guidance systems A82-39191 BOISTURE CONTENT An evaluation of the Rosemount ice detector for cloud water content measurements [PB82-158833] N82-29321 ROWITORS Evaluation of an automatic subsystem parameter monitor --- for aircraft A82-40552 BONOPLANES Dual wing, swept forward swept rearward wing, and single wing design optimization for high performance business airplanes A82-40931 MONOPOLE ANTENNAS Monopole antenna patterns on finite size composite ground planes --- in aircraft A82-41055 MONTE CARLO METHOD Digital computer simulation of modern aeronautical digital communication systems 182-40940 MORTALITY Human response to fire N82-29281 MOUNTAINS Flight evaluation of LORAN-C in the State of Vermont [NASA-TM-84711] N82-28278

MOVING TARGET INDICATORS

- MOVING TARGET INDICATORS Moving target detector (Mod 2) [AD-A114709] N82-29520 MRCA AIRCRAFT Engineering aspects of international collaboration on Tornado A82-40878 MULTIPROCESSING (COMPUTERS) The design of a RPV ground station sigulator
 - The design of a RPV ground station simulator A82-39750

Ν

NACELLES	
Aerodynamic characteristics of a large-sca	ale, twin
tilt-nacelle V/STOL model	
[AIAA PAPEE 81-0150]	A82-38443
WASA PROGRAMS	
Summary and recent results from the NASA a	advanced
high-speed propeller research program [AIAA PAPEB 82-1119]	A82-40419
Predesign study for an advanced flight res	
Iotor	Jeuren
	A82-40525
Flight test evaluation of a video tracker	
enhanced offshore airborne radar approad	
capability	
	A82-40531
NASA research on viscous drag reduction	
NUMTORIAL DEDONICE COTTENETOR CHORES	A82-40896
NATIONAL AIRSPACE UTILIZATION SYSTEM	
Estimation of the peak count of actively controlled aircraft	
	A82-38447
NAVIGATION AIDS	
Problems in the simulation of correlation-	-extremal
navigation systems	
	A82-39403
Simulation of correlation-extremal receive	ers of
signals from sampling-phase radio-naviga	ation
systems	
	A82-39404
General aviation activity and avionics su	
[AD-A112924]	N82-28244
<pre>flight evaluation of LOBAN-C in the State [NASA-TM-84711]</pre>	N82-28278
NETWOEK ANALYSIS	NO2 20270
System data communication structures for	
active-control transport aircraft, volum	ie 1
[NASA-CR-165773-VOL-1]	N82-29510
NETWORK SYNTHESIS	
Flight control synthesis using robust outp	
fight control synthesis bailing tobust out	Jut
observers	
observers [(AIAA 82-1575]	A 82-39016
observers [(AIAA 82-1575] NOISE INTENSITY	
observers [(AIAA 82-1575] NOISE LETENSITY Field studies of the Air Force procedures	A 82-39016
observers [(AIAA 82-1575] NOISE INTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi	A 82-39016
observers [(AIAA 82-1575] BOISE INTENSITY Field studies of the Air Force procedures (NOISECH8CK) for measuring community noi exposure from aircraft operations	A 82-39016
observers [(AIAA 82-1575] NOISE INTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi	A 82-39016 Lse
observers [(AIAA 82-1575] NOISE INTENSITY Pield studies of the Air Force procedures (NOISECH8CK) for measuring community noi exposure from aircraft operations [AD-A113672] NOISE MEASUREMENT Pield studies of the Air Force procedures	A 82-39016 Lse N 82-28841
observers [(AIAA 82-1575] NOISE INTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] NOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi	A 82-39016 Lse N 82-28841
observers [(AIAA 82-1575]) NOISE LHTENSITY Pield studies of the Air Force procedures (NOISECH8CK) for measuring community noi exposure from aircraft operations [AD-A113672] NOISE MEASUREMENT Pield studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations	A 82- 39016 .se N 82- 288 41 ise
observers [(AIAA 82-1575] NOISE IMTENSITY Pield studies of the Air Force procedures (NOISECH8CK) for measuring community noi erposure from aircraft operations [AD-A113672] NOISE MEASUREMENT Pield studies of the Air Perce procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672]	A 82- 390 16 Lse N 82-288 41 Lse N 82-288 41
observers [(AIAA 82-1575] BOISE INTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] BOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch	A 82-39016 Se N 82-28841 Se N 82-28841 N 82-28841 N 8741
observers [(AIAA 82-1575] NOISE INTENSITY Pield studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] NOISE MEASUREMENT Pield studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (NSP), Wageningen for	A 82-39016 Se N82-28841 Se N82-28841 Naval the
observers [(AIAA 82-1575]) NOISE LHTENSITY Pield studies of the Air Force procedures (NOISECH8CK) for measuring community noi erposure from aircraft operations [AD-A113672] NOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (NSP), Wageningen for determination of the acoustic source str	A 82-39016 Se N82-28841 Se N82-28841 Naval the
observers [(AIAA 82-1575] BOISE IMTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] BOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (MSP), Wageningen for determination of the acoustic source str propeller cavitation	A82-39016 Lse N82-28841 Lse N82-28841 Naval the rength of
observers [(AIAA 82-1575] BOISE INTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] BOISE MEASUBEREWT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720]	A82-39016 Se N82-28841 Se N82-28841 Naval the rength of N82-29116
observers [(AIAA 82-1575] BOISE IMTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] BOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (MSP), Wageningen for determination of the acoustic source str propeller cavitation	A82-39016 Se N82-28841 Se N82-28841 Naval the rength of N82-29116
observers [(AIAA 82-1575] WOISE INTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] WOISE MEASUBERENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B]	A 82-39016 .se N82-28841 .se N82-28841 Naval .the .ength of N82-29116 .ed N82-30029
observers [(AIAA 82-1575] WOISE INTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] WOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects cn fan noise and	A82-39016 .se N82-28841 .se N82-28841 Naval .the rength of N82-29116 .se N82-30029 the
observers [(AIAA 82-1575]) BOISE LHTENSITY Pield studies of the Air Force procedures (NOISECH8CK) for measuring community noi exposure from aircraft operations [AD-A113672] BOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects on fan noise and suppression characteristics of advanced	A82-39016 .se N82-28841 ise N82-28841 Naval the cength of N82-29116 ed N82-30029 the inlets
 observers (AIAA 82-1575) NOISE IMTENSITY Pield studies of the Air Force procedures (NOISECHECK) for measuring community noiserposure from aircraft operations (AD-A113672) NOISE ABASUREMENT Pield studies of the Air Force procedures (NOISECHECK) for measuring community noiserposure from aircraft operations (AD-A113672) Use of the cavitation tunnel at the Dutch Brperiment station (NSP), Wageningen for determination of the acoustic source stripropeller cavitation (TFD-908-720) Estimated airplane noise levels in A-weigh decibels (AC-36-3B) Porward velocity effects cn fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for 	A82-39016 .se N82-28841 ise N82-28841 Naval the cength of N82-29116 ed N82-30029 the inlets
<pre>observers [(AIAA 82-1575] WOISE IMTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] WOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Erperiment station (MSF), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects cn fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel</pre>	A82-39016 .se N82-28841 ise N82-28841 Naval the rength of N82-29116 N82-30029 the inlets pot wind
<pre>observers [(AIAA 82-1575] NOISE INTENSITY Pield studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] NOISE MEASUREMENT Pield studies of the Air Force procedures [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (MSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects cn fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel [NASA-CR-152328]</pre>	A82-39016 .se N82-28841 ise N82-28841 Naval : the :ength of N82-29116 N82-30029 the inlets sot wind N82-30030
observers [(AIAA 82-1575]) NOISE LHTENSITY Pield studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] NOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects cn fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel [NASA-CR-152328] USAF bioenvironmental noise data handbook.	A82-39016 .se N82-28841 ise N82-28841 Naval : the :ength of N82-29116 N82-30029 the inlets sot wind N82-30030
<pre>observers [(AIAA 82-1575] WOISE IMTENSITY Pield studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] WOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Erperiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects cn fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel [NASA-CR-152328] USAF bioenvironmental noise data handbook. 148. T-37B in-flight crew noise</pre>	A82-39016
<pre>observers [(AIAA 82-1575] WOISE IMTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] WOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Erperiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects on fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel [MASA-CE-152328] USAF bioenvironmental noise data handbook. 140. T-37B in-flight crew noise [AD-A114943]</pre>	A82-39016 Lse N82-28841 ise N82-28841 Naval the rength of N82-29116 N82-30029 the inlets pot wind N82-30030 Volume N82-30031
<pre>observers [(AIAA 82-1575] WOISE IMTENSITY Pield studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] WOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Erperiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects cn fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel [NASA-CR-152328] USAF bioenvironmental noise data handbook. 148. T-37B in-flight crew noise</pre>	A82-39016 Lse N82-28841 ise N82-28841 Naval the rength of N82-29116 N82-30029 the inlets pot wind N82-30030 Volume N82-30031
<pre>observers [(AIAA 82-1575] NOISE INTENSITY Pield studies of the Air Force procedures (NOISECHECK) for measuring community noi exposure from aircraft operations [AD-A113672] NOISE MEASUREMENT Pield studies of the Air Force procedures [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (MSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects on fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel [NASA-CR-152328] USAF bioenvironmental noise data handbook. 148. T-37B in-flight crew noise [AD-A114943] Far-field acoustic data for the Tewas ASE,</pre>	A82-39016 Lse N82-28841 ise N82-28841 Naval the rength of N82-29116 N82-30029 the inlets pot wind N82-30030 Volume N82-30031
<pre>observers [(AIAA 82-1575] NOISE LHTENSITY Pield studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] VoISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Experiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Stimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects cn fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel [NASA-CR-152328] USAF bioenvironmental noise data handbook. 146. T-37B in-flight crew noise [AD-A114943] Far-field acoustic data for the Texas ASE, hush house</pre>	A 82-39016 .se N82-28841 .se N82-28841 Naval .the .se N82-29116 N82-30029 the .nlets .sot wind N82-30030 Volume N82-30031 .nc.
<pre>observers [(AIAA 82-1575] WOISE IMTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] WOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Erperiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TFD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects on fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel [NASA-CR-152328] USAF bioenvironmental noise data handbook. 148. T-37B in-flight crew noise [AD-A114943] Far-field acoustic data for the Tewas ASE, hush house [AD-A114564]</pre>	A 82-39016 .se N82-28841 ise N82-28841 Naval : the :ength of N82-29116 M82-30029 the inlets pot wind N82-30030 Volume N82-30031 Inc. N82-30032
<pre>observers [(AIAA 82-1575] WOISE IMTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] WOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Erperiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects cn fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel [NASA-CR-152328] USAF bioenvironmental noise data handbook. 148. T-37B in-flight crew noise [AD-A114943] Far-field acoustic data for the Tewas ASE, hush house [AD-A114564] WOISE POLLUTION Noise pollution and airport regulation</pre>	A 82-39016 .se N82-28841 Naval : the rength of N82-29116 N82-29116 N82-30029 the N82-30030 Volume N82-30031 Inc. N82-30032 A82-40051
<pre>observers [(AIAA 82-1575] WOISE IMTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] WOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Erperiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects on fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel [MASA-CR-152328] USAF bioenvironmental noise data handbook. 148. T-37B in-flight crew noise [AD-A114943] FAT-field acoustic data for the Texas ASE, hush house [AD-A114564] WOISE POLLUTION Noise pollution and airport regulation O'Hare International hirport - Impervious</pre>	A 82-39016
<pre>observers [(AIAA 82-1575] WOISE IMTENSITY Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] WOISE MEASUREMENT Field studies of the Air Force procedures (NOISECHECK) for measuring community noi erposure from aircraft operations [AD-A113672] Use of the cavitation tunnel at the Dutch Erperiment station (NSP), Wageningen for determination of the acoustic source str propeller cavitation [TPD-908-720] Estimated airplane noise levels in A-weigh decibels [AC-36-3B] Forward velocity effects cn fan noise and suppression characteristics of advanced as measured in the NASA-Ames 40 by 80 for tunnel [NASA-CR-152328] USAF bioenvironmental noise data handbook. 148. T-37B in-flight crew noise [AD-A114943] Far-field acoustic data for the Tewas ASE, hush house [AD-A114564] WOISE POLLUTION Noise pollution and airport regulation</pre>	A 82-39016

SUBJECT INDEX

NOISE PREDICTION (AIRCRAFT) The prediction of helicopter rotor discrete frequency ncise A82-40553 A semiempirical high-speed rotor noise prediction technique A82-40554 Dynamic surface measurements on a model helicopter rotor during blade slap at high angles of attack A82-40555 Some comments on the prediction of forward flight effects on jet noise [MPIS-20/1981] N82-29118 NOISE REDUCTION Fixed pattern noise correction for staring arrays in guidance systems A82-39190 NASA research in supersonic propulsion - A decade of progress [AIAA PAPER 82-1048] A82-40417 Predesign study for an advanced flight research rotor A82-40525 Demonstration of radar reflector detection and ground clutter suppression using airborne weather and mapping radar A82-40532 Static noise tests on modified augmentor wing jet STCL research aircraft [NASA-TH-81231] N82-28295 The effect of barriers on wave propagation phencmena: With application for aircraft noise shielding [NASA-CE-169128] N82-29111 The cost of noise reduction for departure and arrival operations of commercial tilt rotor aircraft [NASA-CE-137803] N82-29316 HOMOGEAPHS Computer enhanced analysis of a jet in a cross-stream N82-29555 BONDESTRUCTIVE TESTS Nondestructive testing in aircraft construction using holographic methods A82-40977 Recommended practice for a demonstration of Nondestructive Evaluation /NDE/ reliability on aircraft production parts - Introduction to the quidelines 182-41140 NONLINEAR BOUATIONS The rectangular wing with semiinfinite span in nonlinear theory A82-39359 BONLINBAR SYSTEMS An analysis of a nonlinear instability in the implementation of a VTOL control system during hover [AIAA 82-1611] A82-38990 The determination of gust loads on nonlinear aircraft using a power spectral density approach [NLE-TR-80123-U] N82-283 N82-28303 System identification of nonlinear aerodynamic models N82-29996 Applications to aeronautics of the theory of transformations of nonlinear systems [NASA-TM-842491 N82-30013 BOSE TIPS Analysis and wind tunnel tests of a probe used to sense altitude through measurement of static pressure [AINA PAPER 82-1361] NOZZLE FLOR A82-39128 An improved propulsion system simulation technique for scaled wind tunnel model testing of advanced fighters A82-41019 BOZZLE GEOMETRY A summary of V/STOL inlet analysis methods [NASA-IM-82685] N82-28249 NUCLEAR PROPULSICE The feasibility of a high-altitude aircraft platform with consideration of technological and societal constraints [NASA-TH-84508] N82-29313

UURREICAL ANALYSIS Numerical methods for solving boundary value problems for noncavitating and cavitating flow past wing profiles NUMERICAL CONTROL

- Design and flight testing of digital direct side-force ccntrcl laws [AIAA 82-1521] A82-38941 Digital full authority controls for helicopter engines
 - A82-40522 Design and flight testing of a digital optimal control general aviation autopilot
 - A82-40906 Advanced aircraft electrical system control technology demonstrator. Phase 1: Analysis and preliminary design [AD-A113633] N82-28284

0

OBLIQUE WINGS Unique flight characteristics of the AD-1 oblique-wing research airplane [AIAA PAPER 82-1329] A82-39106 OBSERVABILITY (SYSTEMS) Plight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 ONBOARD DATA PROCESSING A preliminary laboratory evaluation of a reconfigurable integrated flight control concept A82-38982 FAIAA 82-15971 Investigations concerned with shifting pilot activities to a higher bierarchical stage of flight control --- German thesis A82-41453 ONBOARD ROUIPNENT Peasibility study of a 270V dc flat cable aircraft electrical power distributed system [AD-A114026] N82-28552 OPERATING COSTS Minimization of the total costs incurred in the employment of passenger jet aircraft A82-39247 Advanced technologies applied to reduce the operating costs of small commuter transport aircraft 182-40915 OPTICAL EQUIPMENT Design study for a low-distortion hclographic HUD [AD-A113982] N82-28 N82-28292 OPTICAL BADAR Radars for UMA A82-39742 Baseline monitoring using aircraft laser ranging --- spaceborne laser simulation and aircraft laser tracking [NA SA-TH-73298] N82-28690 OPTICAL SCANNERS Application of an optical data link in the airborne scanning system A82-39275 Opto-electronical push-procm scanners for navigation, reconnaissance and generation of digital data bases A82-39747 OPTIMAL CONTROL Robust Kalman filter design for active flutter suppression systems A82-38442 Parameter estimation applied to general aviation aircraft - A case study [AIAA PAPEE 82-1313] A82-39094 Optimal three-dimensional turning performance of supersonic alrcraft [AIAA PAPER 82-1326] 182-39103 A modern approach to pilot/vehicle analysis and the Neal-Smith criteria [AIAA PAPER 82-1357] A82-39125 Optimal control application in supersonic aircraft performance A82-39374 Design and flight testing of a digital optimal control general aviation autopilot A82-40906

Optimal open-loop aircraft control for go-a	round
maneuvers under wind shear influence	
	A82-40943
Analytical and simulator study of advanced	transport
[NASA-CR-3572]	N82-28298
OPTIMISATION	
Bfficient optimum design of structures - Pr DDDU	ogram
	A82-38146
Application of the sequential optimization	
to the tuning of the natural frequencies	
qas-turbine engine compressor blades	UL
	A 82-39399
Optimum structural design for helicopte	
	A82-40543
Optimizing aerospace structures for manufac cost	turing
	A82-41014
Optimization of canard configurations - An	
integrated approach and practical drag	
estimation method	
estingtion method	A82-41023
ORBIT. DECAY	202-41025
Prelaunch estimates of near Earth satellite	
lifetimes using guasi-dynamic atmosphere	
- application to a proposed Brazilian sat	
[INFE-2325-PRE/080]	N82-29347
OSCILLATION DAMPERS	
Theoretical and experimental investigation	of
joint-structural damping interaction for	
airplane construction	
	A82-41013
OZOBE	
Two-dimongianal model studies of the impact	of

Two-dimensional model studies of the impact of aircraft exhaust emissions on tropospheric ozone A82-40124

Ρ

PANEL METHOD (PLUID DYNAMICS) Lateral aerodynamics of delta wings with leading edge separation [AIAA PAPER 82-1386] A82-39142 PANELS Design and fabrication of cocured composite hat-stiffened panels A82-40978 PARACHUTE PABRICS Nethod for refurbishing and processing parachutes x82-29330 [NASA-CASE-KSC-11042-1] PARACHUTES Method for refurbishing and processing parachutes [NASA-CASE-KSC-11042-1] N82-29 N82-29330 PARALLEL PLOW The unsteady motion of a wing traveling at subsonic speed above a plane A82-39358 PARAMETER IDENTIFICATION ' A recursive terrain height correlation system using multiple model estimation techniques A82-38937 [AIAA 82-1513] Applications of parameter estimation in the study of spinning airplanes [AIAA PAPEE 82-1309] A82-39090 A simple, low cost application of a flight test parameter identification system [AIAA PAPER 82-1312] 182-39093 Parameter estimation applied to general aviation allcraft - A case study [AIAA PAPER 82-1313] A82-39094 NASA Dryden's experience in parameter estimation and its uses in flight test [AIAA PAPER 82-1373] A82-39135 Determination of airplane aerodynamic parameters from flight data at high angles of attack A82-40928 System identification of nonlinear aerodynamic models N82-29996 PASSENGER AIRCRAFT Minimization of the total costs incurred in the employment of passenger jet aircraft A82-39247 Optimized 10 ton class commercial aircraft engine A82-40890 Advanced technologies applied to reduce the operating costs of small commuter transport aircraft A82-40915

PATTERN REGISTRATION Scanner imaging systems, aircraft N82-28715 PENDULUES Helicopter vibraticn suppression using simple pendulum absorbers on the rotor blade [NASA-CE-169131] N82-28282 PERFORMANCE PREDICTION An alternate method of specifying handwidth for flying qualities [(AIAA 82-1609] A82-38988 Supersonic missile aerodynamic and performance relationships for low observables mission profiles [AIAA PAPER 82-1298] A82-39085 The correlation of flight test and analytic M-on-N air combat exchange ratios --- Many-on-Many [AIAA PAPER 82-1328] A82-39105 Analysis of an airplane windshield anti-icing system [AIAA PAPER 82-1372] A82-39134 Analytic extrapolation to full scale aircraft dynamics [AIAA PAPER 82-1387] A82-39143 An experimental investigation of a bearingless model rotor in hover A82-40512 Correlation of predicted vibrations and test data for a wind tunnel helicopter model A82-40515 Digital computer simulation of modern aeronautical digital communication systems A82-40940 The prediction of propeller/wing interaction effects A82-40948 Development of the Circulation Control Wing-Upper Surface Blowing powered-lift system for STOL aircraft A82-40969 PERFORMANCE TESTS Performance of the Rotor Systems Research Aircraft calibrated rotor loads measurement system 182-40549 PERSONNEL Additional functions within the air traffic control system N82-29309 PHOTOCHEMICAL REACTIONS Two-dimensional model studies of the impact of aircraft exhaust emissions on tropospheric ozone A82-40124 PHOTOGRAPHIC PLATES High-sensitivity holographic plates FL-3M A82-41575 PILOT PERFORMANCE Pilot models for discrete maneuvers [AIAA 82-1519] A82-38940 The effects of the delays on systems subject to manual control A82-38943 The ideal controlled element for real airplanes is not K/s [AIAA 82-1606] A82-38986 A modern approach to pilot/vehicle analysis and the Neal-Smith criteria [AIAA PAPES 82-1357] A82-39125 The system of 'objective control' A82-39245 Manual reversion flight control system for A-10 aircraft: Pilot performance and simulator cue effects [AD-A113463] N82-28302 PILOT TRAINING Visual scene.sumulation concerning the landing of sporting aircraft in connection with investigations regarding the control and learning behavior of the pilot --- German thesis A82-41447 PILOTLESS AIRCRAFT MACHAN - A unmanned aircraft flight research facility A82-39735 PITCHING MOMENTS Development and flight test evaluation of a pitch stability augmentation system for a relaxed stability I-1011 [AIAA PAPEE 82-1297] A82-39084 Wind tunnel measurements of longitudinal stability and control characteristics of primary and secondary wing configurations A82-41025

SUBJECT INDEX

PITOT TUERS Correlation of Preston-tube data with laminar skin friction (Log No. J12984) [NASA-TH-84827] N82-29556 PLANE STRAIN In-plane shear test of thin panels A82-40545 PLANNTEG Human factors contributions to air traffic control systems N82-29295 PLASMA ABC WELDING In-motion radiography of titanium spar tube welds A82-40538 PLASTIC AIRCRAFT STRUCTURES Development of the advanced composite ground spoiler for C-1 medium transport aircraft **≥**82-39895 Development status of a composite vertical stabilizer for a jet trainer A82-39897 Operation V10F - Development of a composite material wind A82-40934 Development of materials and manufacturing technology over the next 20 years: Composite materials [MBB-UD-341-82-0] N82-28365 PLASTICS Heat release rate calorimetry of engineering plastics A82-41075 PLOTTEBS Programs for the transonic wind tunnel data processing installation. Part 8: Programs for processing data on the central site computer [AD-A112900] N82-28310 POLYMEBIZATION Water-compatible polymer concrete materials for use in rapid repair systems for airport runways [DE82-010994] N82-29 N82-29464 POROUS BOUNDARY LAYER CONTROL Aerodynamic development of laminar flow control on swept wings using distributed suction through porous surfaces A82-40894 POROUS PLATES Turbulent boundary layer on a porous surface with injection at various angles to the wall A82-39482 POTENTIAL FLOW Evaluation of an asymptotic method for helicopter rotor airloads A82-40509 Transonic small disturbance code for body-wing configuration coupled with full potential code for wing alone A82-40899 The prediction of propeller/wing interaction effects A82-40948 POWDER METALLURGY International aviation (selected articles) [AD-A114422] N82-28245 POWBRED LIFT AIBCRAFT Development of the Circulation Control Wing-Upper Surface Blowing powered-lift system for STOL aircraft A82-40969 Ejector powered propulsion and high lift subsonic WING A82-40970 QCSEE over-the-wing engine acoustic data [NASA-IM-82708] PREDICTION ANALYSIS TECHNIQUES N82-29324 Prediction of fatigue crack growth rates under variable loading using a simple crack closure model [NLE-MP-81023-0] N82-28685 Effect of water on axial flow compressors. Part 2: Computational program [AD-A114831] N82-29327 PREDICTIONS Future trends and problems N82-29310 PRESSURE DISTRIBUTION Experimental and theoretical studies of three-dimensional turbulent boundary layers on an empennage of a typical transport airplane A82-40955

•	-
PRESSURE GRADIENTS	
Comparison of experimental and analytic	•
performance for contcured endwall stat	ors
[AIAA PAPEE 82-1286]	A82-40422
PRESSURE MEASUREMENT	
Analysis and wind tunnel tests of a prob-	e used to
sense altitude through measurement of	
pressure	
FAIAA PAPER 82-13611	A82-39128
An experimental investigation of leading	
spanwise blowing	cajo
spanetoc proving	A82-40988
PRESSURE SEESORS	102 10500
Analysis and wind tunnel tests of a prob	o used to
sense altitude through measurement of a	
pressure	Static
	A82-39128
[AIAA PAPER 82-1361]	A62-39128
PREVENTION	
Human response to fire	
	N82-29281
PROBABILITY THEORY	
The Shiryayev sequential probability rat.	10 test
for redundancy management	
[AIAA 82-1623]	A62-38998
PRODUCTION COSTS	
Unmanned aircraft in future combat	
	A82-39728
PROJECT MANAGEMENT	
Engineering aspects of international col	laboration
on Tornado	
	A82-40878
PROPELLER BLADES	
The application of small propellers to R.	₽V
propulsion	
1	A82-39737
PROPELLER FANS	
Turboprop design - Now and the future	
	A82-40965
PROPELLER SLIPSIREAMS	
The prediction of propeller/wing interac	tion effects
,,,	A82-40948
Use of the cavitation tunnel at the Dutc	
Experiment station (MSP), Wageningen f	
determination of the acoustic source s	
decerminantion of the doodpitte pouroe p	
propeller cavitation	
propeller cavitation	
[TPD-908-720]	N 82-29116
[TPD-908-720] PROPELLEES	N 82-29116
[TP]-908-720] PROPELLEES Propulsion opportunities for future comm	N 82-29116
[TP]-908-720] PROPELLERS Propulsion opportunities for future comm aircraft	N82-29116 uter
[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649]	N82-29116 uter A82-40418
[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1049] Summary and recent results from the NASA	N82-29116 uter A82-40418
[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program	N82-29116 uter A82-40418 advanced
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119]</pre>	N82-29116 uter A82-40418 advanced A82-40419
[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Duto	N82-29116 uter A82-40418 advanced A82-40419 h Naval
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1049] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Duto Experiment staticn (NSP), Wageningen f</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment statucn (MSP), Wageningen f determination of the acoustic source s propeller cavitation</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720]</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (MSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEB 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (MSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1]</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATIONS Evaluation of an experimental technique</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine</pre>	N82-29116 uter A82-40418 advanced N82-40419 h Naval or the trength of N82-29116 N82-29319 to position
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAE-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/Fylon/wing interference</pre>	N82-29116 uter A82-40418 advanced N82-40419 h Naval or the trength of N82-29116 N82-29319 to position
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 62-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (MSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/Fylon/wing interference tunnel tests [NLE-MP-81020-U]</pre>	N82-29116 uter A82-40418 advanced N82-40419 h Naval or the trength of N82-29116 N82-29319 to position
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEB 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEB 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-KP-81020-U] PROPULSION SYSTEM PERFORMANCE</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-AP-81020-U] PROPULSION SYSTEM PERFORMANCE Supersonic missile aerodynamic and performance</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 62-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (MSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATIONS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-KP-81020-U] PROPULSION SYSTEM PERFORMANCE Supersonic missile aerodynamic and perfor relationships for low observables miss</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion profiles
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-HP-81020-U] PROPULSION SYSTEM PERPORMANCE Supersonic missile aerodynamic and perfo relationships for low observables miss [AIAA PAPER 82-1298]</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 62-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (MSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATIONS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-KP-81020-U] PROPULSION SYSTEM PERFORMANCE Supersonic missile aerodynamic and perfor relationships for low observables miss</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion profiles A82-39085
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-HP-81020-U] PROPULSION SYSTEM PERPORMANCE Supersonic missile aerodynamic and perfo relationships for low observables miss [AIAA PAPER 82-1298]</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion profiles
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-HP-81020-U] PROPULSION SYSTEM PERPORMANCE Supersonic missile aerodynamic and perfo relationships for low observables miss [AIAA PAPER 82-1298]</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion profiles A82-39085 A82-39736
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-FP-81020-U] PROPULSION SYSTEM PERFORMANCE Supersonic missile aerodynamic and perfor relationships for low observables missi [AIAA PAPEE 82-1298] Mini-EFV propulsion</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion profiles A82-39085 A82-39736
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEB 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEB 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLE-KP-81020-U] PROPULSION SYSTEM FERPORMANCI Supersonic missile aerodynamic and perfo relationships for low observables miss [AIAA PAPER 82-1298] Mini-RFV propulsion The application of small propellers to R propulsion</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion profiles A82-39085 A82-39736 PV A82-39737
<pre>[TPD-908-720] PROPRILERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 62-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (MSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATIONS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-EP-81020-U] PROPULSION SYSTEM PERPORMANCE Supersonic missile aerodynamic and perfo relationships for low observables miss [AIAA PAPEE 82-1298] Mini-EFV propulsion The application of small propellers to R</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion ptofiles A82-39085 A82-39736 pv A82-39737 m
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEB 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEB 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLE-KP-81020-U] PROPULSION SYSTEM FERPORMANCI Supersonic missile aerodynamic and perfo relationships for low observables miss [AIAA PAPER 82-1298] Mini-RFV propulsion The application of small propellers to R propulsion</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion profiles A82-39085 A82-39736 PV A82-39737
<pre>[TPD-908-720] PROPRILERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 62-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (MSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-EP-81020-U] PROPULSION SYSTEM PERPORMANCE Supersonic missile aerodynamic and perfo relationships for low observables miss [AIAA PAPEE 82-1298] Mini-EPV propulsion The application of small propellers to R propulsion Electric propulsion for a mini EPV syste</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion ptofiles A82-39736 PV A82-39737 m A82-39744
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEB 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEB 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLE-KP-81020-U] PROPULSION SYSTEM FERPORMANCI Supersonic missile aerodynamic and perfo relationships for low observables miss [AIAA PAPER 82-1298] Mini-RFV propulsion The application of small propellers to R propulsion</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion ptofiles A82-39736 PV A82-39737 m A82-39744
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEB 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEB 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAE-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLE-KP-81020-U] PROPULSION SYSTEM PERFORMANCI Supersonic missile aerodynamic and perfo relationships for low observables misss [AIAA PAPEE 82-1298] Mini-EFV propulsion The application of small propellers to R propulsion Electric propulsion for a mini EFV syste Propulsion opportunities for future comm aircraft</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion ptofiles A82-39736 PV A82-39737 m A82-39744
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-EP-81020-U] PROPUSION SYSTEM PERPORMANCE Supersonic missile aerodynamic and perfor relationships for low observables miss [AIAA PAPEE 82-1298] Mini-EFV propulsion The application of small propellers to R propulsion Electric propulsion for a mini EFV syste Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1049]</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion profiles A82-39736 PV A82-39744 uter A82-40418
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEB 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEB 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NL=-HP-81020-U] PROPULSIOW SYSTEM PERFORMANCE Supersonic missile aerodynamic and perfo relationships for low observables misss [AIAA PAPER 82-1298] Mini-EFV propulsion The application of small propellers to R propulsion Electric propulsion for a mini EPV syste Propulsion opportunities for future comm aircraft [AIAA PAPER 82-1049] Summary and recent results from the NASA</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion profiles A82-39736 PV A82-39744 uter A82-40418
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEB 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEB 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-KP-81020-U] PROPULSION SYSTEM PERFORMANCE Supersonic missile aerodynamic and perfo relationships for low observables miss [AIAA PAPEB 82-1298] Mini-BPV propulsion The application of small propellers to R propulsion Electric propulsion for a mini EPV syste Propulsion opportunities for future comm aircraft [AIAA PAPEB 82-1049] Summary and recent results from the NASA high-speed propeller research program</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29319 to position wind N82-28262 rmance ion profiles A82-39736 PV A82-39737 m A82-39744 uter A82-40418 advanced
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAE-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLE-KP-81020-U] PROPULSION SYSTEM PERFORMANCE Supersonic missile aerodynamic and perfor relationships for low observables miss [AIAA PAPEE 82-1298] Mini-EFV propulsion The application of small propellers to R propulsion Electric propulsion for a mini EFV syste Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1049] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPER 82-1119]</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion profiles A82-39736 PV A82-39744 uter A82-40418 advanced A82-40419
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-EP-81020-U] PROPUSION SYSTEM PERPORMANCE Supersonic missile aerodynamic and perfor relationships for low observables miss [AIAA PAPEE 82-1298] Mini-EFV propulsion The application of small propellers to R propulsion Electric propulsion for a mini EFV syste Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1049] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPER 82-119] Civil helicopter propulsion system relia</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion ptofiles A82-39736 PV A82-39737 M A82-39744 uter A82-40418 advanced A82-40419 bility and
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAE-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLE-KP-81020-U] PROPULSION SYSTEM PERFORMANCE Supersonic missile aerodynamic and perfor relationships for low observables miss [AIAA PAPEE 82-1298] Mini-EFV propulsion The application of small propellers to R propulsion Electric propulsion for a mini EFV syste Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1049] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPER 82-1119]</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29116 N82-29319 to position wind N82-28262 rmance ion profiles A82-39736 PV A82-39737 M A82-39744 uter A82-40418 advanced A82-40419 bility and
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEB 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEB 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLE-KP-81020-U] PROPULSION SYSTEM FERPORMANCI Supersonic missile aerodynamic and perfo relationships for low observables miss [AIAA PAPER 82-1298] Mini-BFV propulsion The application of small propellers to R propulsion Electric propulsion for a mini EPV syste Propulsion opportunities for future comm aircraft [AIAA PAPER 82-1049] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPER 62-1119] Civil helicopter propulsion system relia engine monitoring technology assessment propulsion</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29319 to position wind N82-28262 rmance ion profiles A82-39736 PV A82-39737 M A82-39737 M A82-39744 uter A82-40418 advanced A82-40419 billity and ts A82-40518
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLB-EP-81020-U] PROPUSION SYSTEM PERPORMANCE Supersonic missile aerodynamic and perfor relationships for low observables miss [AIAA PAPEE 82-1298] Mini-EFV propulsion The application of small propellers to R propulsion Electric propulsion for a mini EFV syste Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1049] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPER 82-119] Civil helicopter propulsion system relia</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29319 to position wind N82-28262 rmance ion profiles A82-39736 PV A82-39737 M A82-39737 M A82-39744 uter A82-40418 advanced A82-40419 billity and ts A82-40518
<pre>[TPD-908-720] PROPELLERS Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1649] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Use of the cavitation tunnel at the Dutc Experiment staticn (NSP), Wageningen f determination of the acoustic source s propeller cavitation [TPD-908-720] Heads up display [NASA-CASE-LAR-12630-1] PROPULSION SYSTEM CONFIGURATICNS Evaluation of an experimental technique investigate the effects of the engine on engine/pylon/wing interference tunnel tests [NLE-EP-81020-U] PROPULSION SYSTEM PERFORMANCE Supersonic missile aerodynamic and perfor relationships for low observables miss [AIAA PAPEE 82-1298] Mini-EFV propulsion The application of small propellers to E propulsion Electric propulsion for a mini EFV syste Propulsion opportunities for future comm aircraft [AIAA PAPEE 82-1049] Summary and recent results from the NASA high-speed propeller research program [AIAA PAPEE 82-1119] Civil helicopter propulsion system relia engine monitoring technology assessmen Aerodynamic concepts for fuel-efficient</pre>	N82-29116 uter A82-40418 advanced A82-40419 h Naval or the trength of N82-29319 to position wind N82-28262 rmance ion profiles A82-39736 PV A82-39737 M A82-39737 M A82-39744 uter A82-40418 advanced A82-40419 billity and ts A82-40518

.

An improved propulsion system simulatio for scaled wind tunnel model testing	
fighters	A82-41019
PROPULSIVE' RFFICIENCY	A02-41019
The application of small propellers to propulsion	
	A 82-39737
Aircraft design for fuel efficiency	A82-40973
PROTECTION	A02-40373
Carbon fiber reinforced composite struc	
protected with metal surfaces against	lightning
strike damage	
[MBB-UD-340-82-0/E]	N82-28364
PROTECTIVE CLOTHING	
Human response to fire	N82-29281
FROTOTYPES	102-23201
Evaluation of CFRP prototype structures	for aircraft A82-39892
Fabrication of CFRP prototype structure	
aırcraft horızontal taıl leading edge	slat rail A82-39896
PULSE COMMUNICATION	
Digital computer simulation of modern a digital communication systems	eronautical
	A82-40940
PULTRUSION	
Adaptation of pultrusion to the manufac	ture of
helicopter components	A 82-40537
PUSHBROOM SENSOR MODES	A02-40557
Opto-electronical push-broom scanners f	or
navigation, reconnaissance and genera	
digital data pases	
	A82-39747
Ó	
OUADRATIC PROGRAMMING	
Anagario IRAANUTEA	

```
Efficient optimum design of structures - Program
DDDU A82-38146
```

QUALITY CONTROL Recommended practice for a demonstration of Nondestructive Evaluation /NDE/ reliability on aircraft production parts - Introduction to the guidelines A82-41140

R

RADAR DETECTION Complete flexibility and realism in radar simulation A82-38461 Demonstration of radar reflector detection and ground clutter suppression using airborne weather and mapping radar A82-40532 RADAR EQUIPMENT Radars for UMA A'82-39742 RADAR MAPS Demonstration of radar reflector detection and ground clutter suppression using airborne weather and mapping radar A82-40532 RADAR MEASUREMENT Baseline monitoring using aircraft laser ranging --- spaceborne laser simulation and aircraft laser tracking [NASA-TM-73298] N82-28690 BADAR REFLECTORS Demonstration of radar reflector detection and ground clutter suppression using airborne weather and mapping radar A82-40532 RADAR RESOLUTION Flight test evaluation of a video tracker for enhanced offshore airborne radar approach capability A82-40531 BADAR TARGETS Moving target detector (Mod 2) [AD-A114709] N82-29520

BADAB TRACKING

RADAR TRACKING Analysis of general-aviation accidents using ATC radar records [AIAA PAPER 82-1310] A82-39091 Target tracking using area correlation A82-39194 Flight test evaluation of a video tracker for enhanced offshore airpoine radar approach capability A82-40531 Research on an adaptive Kalman filter for solving the radar tracking problem --- German thesis A82-40562 RADIAL PLON Calculation of level flow using radial grating A82-38922 Cooled variable nozzle radial turbine for rotor craft applications
[NASA-CR-165397] N82-29323 RADIO ATTENUATION Electromagnetic Propagation Problems in the Tactical Environment [AGARD-LS-120] N82-29527 RADIO BEACONS Minimum operational performance standards for automatic direction finding (ADF) equipment [RTCA/DO-179] N82-28270 RADIO COMMUNICATION Propagation problems associated with aircraft communications systems N82-29535 RADIO DIRECTION FINDERS Minimum operational performance standards for automatic direction finding (ADF) equipment [RTCA/DO-179] N8: N82-28270 RADIO EQUIPHENT Multifunction multiband airborne radio architecture study [AD-A114427] N82-28523 RADIO NAVIGATION Problems in the simulation of correlation-extremal navigation systems A82-39403 Simulation of correlation-extremal receivers of signals from sampling-phase radio-navigation systems A82-39404 Minimum operational performance standards for automatic direction finding (ADF) equipment [RTCA/DO-179] N82-28270 Multifunction multibani airborne radio architecture study [AD-A114427] N82-28523 RADIO RELAY SYSTEMS VHF radio link for ground-air-ground communications using an integrated voice-data modulation A82-38405 Electromagnetic Propagation Problems in the Tactical Environment [AGARD-LS-120] N82-29527 RADIOGRAPHY In-motion radiography of titanium spar tube welds A82-40538 RADIONETRIC COREECTION Scanner imaging systems, aircraft N82-28715 RANGEFINDING Baseline monitoring using aircraft laser ranging --- spaceborne laser simulation and aircraft laser tracking [NASA-TM-73298] N82-28690 REAL GASES Estimation of simulation errors in the European Transonic Wind Tunnel /FIW/ A82-40950 REAL TIME OPERATION Air-to-air missile avoidance [AIAA 82-1516] A82-38939 Terrain following/terrain avoidance system concept development [AIAA PAPER 82-1518] RECTANGULAR WINGS 182-40428 The rectangular wing with semiinfinite span in nonlinear theory A82-39359 On embedded flow characteristics of sharp edged rectangular wings [LOG-C47121 N82-29263

SUBJECT INDEX

RECURSIVE FUNCTIONS A'recursive terrain height correlation system using multiple model estimation techniques [AIAA 82-1513] A A82-38937 REDUNDANT COMPONENTS Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 The Shiryayev sequential probability ratio test for redundancy management A82-38998 [AIAA 82-1623] Redundant control unit for an advanced multispool engine A82-40998 REGULATIONS Noise pollution and airport regulation A82-40051 O'Hare International Airport - Impervious to proposed state efforts to limit airport noise **▲82-40052** RELIABILITY ENGINEERING Generic faults and design solutions for flight-critical systems [AIÁA 82-1595] A82-38980 A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 Age exploration in naval aviation --- Reliability Centered Maintenance program 182-40962 REMOTE CONTROL Low cost development of INS sensors for expendable BPV control and navigation [AD-A112691] N82-28291 REMOTE SENSORS Application of an optical data link in the airborne scanning system A82-39275 The design of a viewing system for near real time stereo images from a UMA borne linescan sensor --- Unmanned Aircraft A82-39746 REMOTELY PILOTED VEHICLES Remotely piloted vehicles; International Conference, 2nd, Bristol, England, April 6-8, 1981, Conference Papers and Supplementary Papers A82-39727 Unmanned aircraft in future combat A82-39728 Horses for courses in RPV operations --- system components design and development in terms of performance and cost A82-39729 Short range tactical RPH system A82-39730 Canadair rotary wing technology development A82-39731 U.S. Army remotely piloted vehicle program A82-39732 Stabileye. R. Stephenson --- RPV performance, design and materials characteristics A82-39733 The national dynamics 'observer' mini-RPV for tropical operation A82-39734 Mini-RPV propulsion A82-39736 The application of small propellers to RPV propulsion A 82-39737 The control and guidance unit for MACHAN A82-39738 U.S. Army remotely piloted vehicle supporting technology program A82-39739 A terrain following system, an algorithm and a sensor A82-39740 Sensor stabilisation requirements of RPV's - A simulation study A82-39741 Radars for **HMA** A82-39742 Electric propulsion for a mini RPV system A82-39744 Flight control systems for aerial targets A82-39745

The design of a viewing system for near rea stereo images from a UMA borne linescan s Unmanned Aircraft	
Opto-electronical push-procm scanners for	182-39746
navigation, reconnaissance and generation digital data bases	of
The design of a RPV ground station simulate	A82-39747
Flight experience with a backup flight-cont	A82-39750
system for the HiMAT research vehicle [AIAA PAPER 82-1541]	A82-40429
Low cost development of INS sensors for exp RPV control and navigation	
[AD-A112691] The feasibility of a high-altitude aircraft	N82-28291
platform with considiration of technologi societal constraints	Ical and
[NASA-TM-84508] BEPLACING	N82-29313
New technology for the next generation of	
commercial transforts - Beal or imaginary	A82-41007
RESCUE OPERATIONS Aircraft fire safety	
[AGARD-LS-123] Aircraft fire mishap experience/crash fire	N82-29279
scenario guantitation	N82-29280
Human response to fire	N82-29281
Aircraft post-crash fire fighting/rescue	N82-29287
RESEARCH AIRCRAFT Unique flight characteristics of the AD-1	
oblique-wing researcn aırflane [AIAA PAPBE 82-1329]	≥ 82-39106
MACHAN - A unmanned aircraft flight researce facility	: h
Performance characteristics of a buoyant quad-rotor research airciaft	№82-39735
RESEARCH AND DEVELOFMENT	A82-40974
U.S. Army remotely piloted vehicle program	▲82-3973 2
Logistics research projram in the United St Air Force	ates
Recent airfoil developments at DFVLR	A82-40963
Aerodynamic research applications at Boeing	
Historical research and development inflat:	A82-41000 ion
indices for Army fixed and rotor winged a [AD-A114368]	N82-28290
RESEARCH FACILITIES MACHAN - A unmanned aircraft flight researc	:h
facility	A82-39735
Applying advanced technology to flight stat design	,
RESEARCH PROJECTS	A82-40887
Predesign study for an advanced flight reso rotor	
NASA research on viscous drag reduction	A82-40525
Advanced aerodynamic wing design for commen	A82-40896 cial
transports - Review of a technology progr the Netherlands	
RESIN MATRIX COMPOSITES	A82-40985
Design considerations and experiences in the of composite material for an aeroelastic	ie use
research wing [NASA-TM-83291] PECONUM PROPERTY	N82-28280
RESONANT FREQUENCIES Application of the sequential optimization	method
to the tuning of the natural frequencies gas-turbine engine compressor blades	
RESONANT VIBRATION	A82-39399
Influence of unsteady aerodynamics on hinge rotor ground resonance	
	A82-38445

-

A82-38445

REVISIONS Cost analysis of the discrete Address Beacon System for the low-performance general aviation aircraft community [AD-A112957] N82-28274 REYNOLDS STRESS Close-coupled canard-wing vortex interaction and Reynolds stress acquisition [AIAA PAPER 82-1368] A82-39132 RIBBONS Technical and economic comparison of carbon fiber tape and woven fabric applications A82-40993 RIDING QUALITY Design of a longitudinal ride-control system by Zakian's method of inequalities A82-41114 RIGID ROTORS Influence of unsteady aerodynamics on hingeless roter ground resonance A82-38445 The effect of hybrid composite materials on the dynamic characteristics of helicopter rotor blades A82-39263 RING STRUCTURES **Bingfin augmentation effects** A82-40548 ROBUSTNESS (MATEEMATICS) Robust Kalman filter design for active flutter suppression systems A82-38442 Flight control synthesis using robust output observers [(AIAA 82-1575] A82-39016 ROLLER BEARINGS Advances in high-speed rolling-element bearings [NASA-TM-82910] N82-N 82-28644 BOTARY STABILITY Use of rotary balance and forced oscillation test data in six degrees of freedom simulation [AIAA PAPER 82-1364] Whirl mode stability of the main rotor of the YAH-64 Advanced Attack Helicopter A82-39129 A82-40513 BOTARY WING AIRCRAFT Performance characteristics of a buoyant guad-rotor research aircraft 182-40974 ROTARY WINGS A simplified approach to the free wake analysis of a hovering rotor A82-38474 Calculation of the cross section properties and the shear stresses of composite rotor blades A82-38475 Canadair rotary wing technology development A82-39731 American Helicopter Society, Annual Forum, 38th, Anaheim, CA, May 4-7, 1982, Proceedings A82-40505 Theory and application of optimum airloads to rotors in hover and forward flight A82-40506 A new Transonic Airfoll Design Method and its application to helicopter rotor airfoil design A82-40507 Recent advances in rotor technology at Boeing Vertol A82-40508 Evaluation of an asymptotic method for helicopter rotor airloads A82-40509 Effect of tip vanes on the performance and flow field of a rotor in hover A82-40511 Whirl mode stability of the main rotor of the YAH-64 Advanced Attack Helicopter A82-40513 Wind tunnel modeling of rotor vibratory loads A82-40516 In-motion radiography of titanium spar tube welds A82-40538 Development of the Sea King composite main rotor blade **∆82-40539** The prediction of helicopter rotor discrete frequency noise A82-40553

A semiempirical high-speed rotor noise prediction technique A82-40554 Dynamic surface measurements on a model helicopter rotor during blade slap at high angles of attack A82-40555 Computer-aided derivation cf equations of motion for rotary-wing aeroelastic problems A82-40863 Material identification for the design of composite rotary wings A82-40937 Pluctuating forces and rotor noise due to distorted inflow A82-40945 Aerodynamic interactions between a 1/6-scale helicopter rotor and a body of revolution A82-40947 Aerodynamic interactious between a 1/6 scale helicopter rotor and a body of revolution [NASA-TM-84247] N82-28252 Wind-tunnel evaluation of an aeroelastically conformable rotor [AD-A114384] N82-28260 Helicopter vibration suppression using simple pendulum absorbers on the rotor flade [NASA-CR-169131] N82-28282 Investigation of a rotor system incorporating a constant lift tip [NASA-CR-166261] N82-29271 Flap-lag-torsional dynamics of extensional and inextensional rotor plades in hover and in forward flight [NASA-CR-169159] ROTOR ABBODYNAMICS N82-29312 Influence of unsteady aerodynamics on hingeless rotor ground resonance A82-38445 A simplified approach to the free wake analysis of a hovering rotor A82-38474 Calculation of level flow using radial grating A82-38922 Flight dynamics of rotorcraft in steep high-g turns [AIAA PAPER 82-1345] 182-39117 Theory and application of optimum airloads to rotors in hover and forward flight A82-40506 Wind tunnel modeling of rotor vibratory loads A82-40516 Predesign study for an advanced flight research rotor A82-40525 A semiempirical high-speed rotor noise prediction technique A82-40554 Dynamic surface measurements on a model helicopter rotor during blade slap at high angles of attack A82-40555 An experimental and numerical study of 3-D rotor wakes in hovering flight A82-40946 Aerodynamic interactions between a 1/6-scale helicopter rotor and a body of revolution A82-40947 Investigation of a rotor system incorporating a constant lift tip [NASA-CR-166261] N82-29271 Establishment of a rotor mcdel tasis [NASA-TP-2026] N82-29311 ROTOR BLADES The effect of hybrid composite materials on the dynamic characteristics of helicopter rotor blades A82-39263 Effect of tip vanes on the performance and flow field of a rotor 1D nover A82-40511 Helicopter vibration reduction by rotor blade modal shaping A82-40514 Finite element analysis for bearingless rotor blade aeroelasticity A82-40517 Belicopter vibration suppression using simple

pendulum absorbers on the rotor blade [NASA-CR-169131] N82-28282 SUBJECT INDEX

ROTOR BLADES (TUBBOMACHINERY)	
A simplified approach to the free wake anal	lysis of
a hovering rotor	
	A82-38474
Fluctuating forces and rotor noise due to	
distorted inflow .	
	A82-40945
Establishment of a rotor model basis	
[NASA-TP-2026]	N82-29311
ROTOR LIFT	
Investigation of a rotor system incorporati	ing a
constant lift tip	
[NASA-CR-166261]	N82-29271
BOTOR SYSTEMS RESEARCH AIRCRAFT	
Performance of the Rotor Systems Research A	
calibrated rotor loads measurement system	
	A82-40549
BOTORCEAFT AIRCRAFT	
Cooled variable nozzle radial turbine for r	otor
craft applications	
[NASA-CR-165397]	N82-29323
ROTORS	
The nonsynchronous whirls of the turbine ro	tor in
aerojet engines	
	A82-40944
BOUTES	
Maximizing South Carolina's aviation resour	
Identifying potentially profitable commut	er
airline routes, volume 2	
[PB82-139353]	N 82-29277
BUNWAYS	
Water-compatible polymer concrete materials	
use in rapid repair systems for airport r	unways
[DE82-010994]	N82-29464
S	
S-N DIAGRAMS	

A roadmap toward a fatigue gualification process for modern technology helicopters A82-40542 SAAB AIRCRAFT Design and experience with a low-cost digital fly-by-wire system in the SAAB JA37 Viggen A/C A 82-40905 SAFETY DEVICES Aircraft post-crash fire fighting/rescue N82-29287 SAFETY MANAGEMENT Aircraft fire safety [AGARD-LS-123] N82-29279 Human response to fire N82-29281 Aviation fuels-future outlook and impact on aircraft fire threat N82-29282 Puel system protection methods N82-29283 Aircraft post crash fire reduction/survivability enhancement from a manufacturer's viewpoint N82-29286 SATELLITE LIPETIME Prelaunch estimates of near Earth satellite Infetimes using guasi-dynamic atmosphere models - application to a proposed Brazilian satellite [INPE-2325-PRE/080] N82-29347 SATELLITE OBSERVATION Scanner imaging systems, aircraft N82-28715 SCALE MODELS An experimental investigation of a bearingless model rotor in hover A82-40512 An investigation of scale model testing of VTOL aircraft in hover A82-40911 An incroved propulsion system simulation technique for scaled wind tunnel model testing of advanced fighters A82-41019 Research model wing/tail fabrication --- transonic wind tunnel 1/7.5-scale model [AD-A114101] N82-28288 Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell helicopter Textron Model 222 [NASA-CR-166362]

N82-29315

N82-28571

SEAT BELTS Crashworthiness studies: Cabin, seat, restraint, and injury findings in selected general aviation accidents [AD-A114878] N82-29275 SEATS Crashworthiness studies: Cabin, seat, restraint, and injury findings in selected general aviation accidents [AD-A114878] N82-29275 SELF INDUCED VIERATION Dynamic load measurements with delta wings undergoing self-induced roll-oscillations [AIAA PAPER 82-1320] A82-39098 SENSORS Primary-data devices --- Russian book 182-39279 SEPARATED FLOW Symposium on Flows with Separation, Stuttgart, West Germany, November 23-25, 1981, Reports A82-38781 Lateral aerodynamics of delta wings with leading edge separation [AIAA PAPER 82-1386] A82-39142 Analysis of jet transport wings with deflected control surfaces by using a combination of 2and 3-D methods A82-41022 SEQUENTIAL ANALYSIS The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1623] A82-38998 SERVICE LIFE Determination of load spectra and their application for keeping the operational life proof of sporting airplanes A82-41010 The role of the scale parameter in service load assessment and simulation --- of aircraft flight 182-41011 SERVOCONTROL An analysis of a nonligear instability in the implementation of a VTOL control system during hover [AIAA 82-1611] A82-38990 SH-3 HELICOPTER Development of the Sea King composite main rotor blade A82-40539 SHALE OIL An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 1: Preliminary process analyses [AD-A112681] N82-28462 An exploratory researce and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 2: Process variable analyses and laboratory sample production [AD-A112682] N82-28463 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Fart 3: Production of specification of JF-4 fuel from geokinetics shale oil [AD-A112683] N82-28464 LAD-A112003 J United States Air Force shale oil to fuels, phase 2 [MAL-M144531] N82-29476 SHARP LEADING EDGES On embedded flow characteristics of sharp edged rectangular wings [LOG-C4712] N82-29263 SHEAR STRENGTH Tests of CFRP spar/rib models with corrugated web A82-39890 SHEAR STRESS Calculation of the cross section properties and the shear stresses of composite rotor blades A82-38475 In-plane shear test of thin panels A82-40545 SHOCK FRONTS Design study for a low-distortion helographic HUD [AD-A113982] N82-28. N82-28292 SHORT HAUL AIRCRAFT Short range tactical RPH system A82-39730

SHORT TAKEOFF AIRCRAFT Application of advanced exhaust nozzles for tactical aircraft A82-40889 Design and experimental verification of the USB-flap structure for NAL STOL arrcraft ---Upper Surface Blowing A82-40917 Development of the Circulation Control Wing-Upper Surface Blowing powered-lift system for STOL aircraft A82-40969 Test results of chordwise and spanwise blowing for low-speed lift augmentation A82-40999 Design of a longitudinal ride-control system by Zakian's method of inequalities A82-41114 SIDESLIP Effects of vortex breakdown on longitudinal and lateral-directional aerodynamics of slender wings by the suction analogy [AIAA PAPER 82-1385] A82-39 Lateral aerodynamics of delta wings with leading A82-39141 edge separation [AIAA PAPES 82-1386] A82-39142 Flight-determined correction terms for angle of attack and sideslip **FAIAA PAPER 82-13747** A82-40290 Low-speed characteristics of a fighter-type configuration at high angles-of-attack and sideslip A82-41020 SIGNAL ANALYZERS Error minimization in ground vibration testing --of helicopter structures A82-40550 SIGNAL GENERATORS Inflight IFR procedures simulator [NASA-CASE-KSC-11218-1] N82-29331 SIGNAL PROCESSING A recursive terrain height correlation system using multiple model estimation techniques [AIAA 82-1513] A82-38937 Parameter estimation applied to general aviation aircraft - A case study [AIAA PAPER 82-1313] Moving target detector (Mod 2) [AD-A114709] A82-39094 N82-29520 SIGNAL RECEPTION Simulation of correlation-extremal receivers of signals from sampling-phase radio-navigation systems A82-39404 SIKORSKY AIRCRAFT Sikorsky ACAP preliminary design --- Advanced Composite Airframe Program A82-40526 SINULATION Laboratory-scale simulation of underground coal gasification: Experiment and theory [DE82-001063] N82-2 N82-28470 SKIN (STRUCTURAL MEMBER) Non-honeycomb F-16 horizontal stabilizer structural design A82-40936 Design considerations and experiences in the use cf composite material for an aeroelastic research wing [NASA-TM-83291] N82-28280 SKIN PRICTION Heasurement and visualization of skin friction on the leeside of delta wings in supersonic flow A82-38785 Correlation of Preston-tube data with laminar skin friction (Log No. J12984) [NASA-TM-84827] N82-29556 SLENDER WINGS Effects of wortex breakdown on longitudinal and lateral-directional aerodynamics of slender wings by the suction analogy [AIAA PAPER 82-1385] A82-39141 SLOTTED WIND TUNNELS Aerodynamic behavior of a slender slot in a wind tunnel wall A82-38281 Measuring the flow properties of slotted test-section walls

[FFA-1357

SMALL PERTURBATION PLON

SHALL PERTURBATION FLOW Transonic small disturbance code for body-wing configuration coupled with full potential code for wing alone A82-40899 A finite difference method for the calculation of transonic flow about a wing, based on small perturbation theory [NLE-IE-81031-U] N82-28263 SHOKE ABATEMENT Smoke abatement system for crash rescue/fire training facilities [AD-A114380] N82-28268 SOLAR POWBEBD AIECBAFT The feasibility of a high-altitude aircraft platform with consideration of technological and societal constraints [NASA-TM-84508] N82-29313 SOUND FIELDS Fluctuating forces and rotor noise due to distorted inflow A82-40945 SOUTH CAROLINA Maximizing South Carolina's aviation resources: Identifying rotentially profitable commuter airline routes, volume 2 [PB82-139353] N82 SPACE SHUTTLE OBBITERS N82-29277 NASA Dryden's experience in parameter estimation and its uses in flight test [AIAA PAPER 82-1373] A82-39135 SPACECRAFT DESIGN CDS-the designer's media, the analyst's model ---Configuration Development System for aircraft A82-40991 SPANNISE BLOWING Close-coupled canard-wing vortex interaction and Reynolds stress acquisition [AIAA PAPER 82-1368] A82-39132 An experimental investigation of leading-edge spanwise blowing A82-40988 Test results of chordwise and spanwise blowing for low-speed lift augmentation 182-40999 SPECIFIC ATIONS An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Fart 1: Preliminary process analyses [AD-A112681] N82-28462 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Fart 3: Production of specification of JE-4 fuel from geokinetics shale oil [AD-A112683] N82-28464 SPECTRAL SENSITIVITY High-sensitivity helographic plates HL-3M A82-41575 SPEED INDICATORS Correlation of Preston-tube data with laminar skin friction (Log No. J12984) [NASA-TM-84827] N82-29556 SPIN DYNAMICS Applications of parameter estimation in the study of spinning airplanes [AIAA PAPE5 82-1309] A82-39090 Prediction of high alpha flight characteristics utilizing rotary balance data A82-40953 SPIN TESTS Prediction of high alpha flight characteristics utilizing rotary balance data A82-40953 Spin behaviour of the filatus PC-7 Turbor Trainer A82-40979 SPOILERS Development of the advanced composite ground spoiler for C-1 medium transport aircraft A82-39895 SPOT WELDS Fatigue behavior of weldbonded joints A82-41115 STABILITY AUGMENTATION Guidance for the use of equivalent systems with MIL-P-8785C --- for aircraft flight control systems [AIAA PAPES 82-1355] A82-39124

SUBJECT INDEX

STABILITY DERIVATIVES Aerodynamic interactions between a 1/6 scale helicopter rotor and a body of revolution [NASA-TH-84247] N82-28252 STABILIZED PLATFORMS Analyzing stable pad disturbances and design of a sensor vault to monitor pad stability [AIAA 82-1565] A82-39011 STABLIZERS (FLUID DYNAMICS) Development status of a composite vertical stabilizer for a jet trainer A82-39897 A one-shot autoclave manufacturing process for carbon epoxy components A82-40935 Non-honeycomb F-16 horizontal stabilizer structural design A82-40936 STANDARDS Perspectives of the flying gualities specification [AIAA FAPER 82-1354] A8 Minimum operational performance standards for A82-39123 automatic direction finding (ADP) equipment [BTCA/DO-179] STATIC ABBODYBANIC CHARACTERISTICS N82-28270 Methodology for determining elevon deflections to trim and maneuver the DAST vehicle with negative static margin [NASA-TM-84499] N82-28299 STATIC PRESSURE Aerodynamic behavior of a slender slot in a wind tunnel wall A82-38281 Analysis and wind tunnel tests of a probe used to sense altitude through measurement of static pressure [AIAA PAPER 82-1361] A82-39128 Bultistage axial compressor program on tip clearance effects [AD-A107445] N82-29325 STATIC STABLILITY Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 STATISTICAL ANALYSIS Field studies of the Air Force procedures (NOISECHECK) for measuring community noise erposure from aircraft operations [AD-A113672] N82-28841 STATORS Comparison of experimental and analytic performance for contoured endwall stators [AIAA PAPER 82-1286] A82-40422 STERBOPHOTOGRAPHY The design of a viewing system for near real time stereo images from a UMA borne linescan sensor --- Unmanned Aircraft 182-39746 STIPPNESS MATRIX Calculation of the cross section properties and the shear stresses of composite rotor blades A82-38475 STOCHASTIC PROCESSES The correlation of flight test and analytic M-on-N air combat exchange ratios --- Many-on-Many [AIAA PAPEE 82-1328] A82-3910 The role of the scale parameter in service load assessment and simulation --- of aircraft flight A82-39105 A82-41011 STRAKES The use of small strakes to reduce interference drag of a lcw wing, twin engine airplane [MIAA PAPES 82-1323] A82-39100 STRESS (PHYSIOLOGY) Special investigation report: Air traffic control system [PB82-136276] N82-28277 STRESS ANALYSIS Determination of load spectra and their application for keeping the operational life proof of sporting airplanes A82-41010 STRESS CONCENTRATION Calculation of the cross section properties and the shear stresses of composite rotor blades A82-38475 STRESS INTENSITY FACTORS Cracks interacting with contact forces - A finite element study on loaded holes A82-40959

SWEPT FORWARD WINGS

STRESS MEASUREMENT Performance of the Rotor Systems Research Aircraft calibrated rotor loads measurement system 197-40549 STRUCTURAL ANALYSIS Research on the behavior of a turbojet engine during internal and external disturbances with respect to early recognition of damage ---German thesis A82-40561 Cooled variable nozzle radial turbine for rotor craft applications [NASA-CR-165397] N82-29323 STRUCTURAL DESIGN Efficient optimum design of structures - Program DDDU A82-38146 Optimum structural design --- for helicopters A82-40543 STRUCTURAL DESIGN CRITERIA Helicopter vibration reduction by rotor blade modal shaping A82-40514 Results of the AH-64 Structural Demonstration A82-40551 STRUCTURAL PAILURE On the bearing strengths of CFRP laminates A82-39930 STRUCTURAL VIBRATION Correlation of predicted vibrations and test data for a wind tunnel helicopter model 182-40515 The nonsynchronous whirls of the turbine rotor in aerojet engines A82-40944 Limiting performance of nonlinear systems with applications to belicopter vibration control problems FAD-A1132391 N82-28301 SUBSONIC PLON The unsteady motion of a wing traveling at subsonic speed above a plane A82-39358 Ejector powered propulsion and high lift subsonic wing A82-40970 Spanwise distribution of vortex drag and leading-edge suction in subsonic flow A82-41005 SUBSONIC FLUTTER Investigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps, at transonic speed and high Reynolds numbers A82-40909 SUBSONIC SPEED The use of linearized-aerodynamics and vortex-flow ne use of linearized-aerogynamics and the second se SUCTION Effects of vortex breakdown on longitudinal and lateral-directional aerodynamics of slender wings by the suction analogy [AIAA PAPER 82-1385] A82-39141 Aerodynamic development of laminar flow control on swept wings using distributed suction through porous surfaces A82-40894 Spanwise distribution of vortex drag and leading-edge suction in subsonic flow A82-41005 SUPERCRITICAL WINGS Improved solutions to the Falkner-Skan boundary-layer equation 182-38283 Development of an advanced no-moving-parts high-lift airfoil A82-40971 Design considerations and experiences in the use of composite material for an aercelastic research wing [NASA-TM-83291] N82-28280 SUPERSONIC AIRCRAFT Forward-swept wings add supersonic zip 182-38216 Optimal three-dimensional turning performance of supersonic aircraft [AIAA PAPEE 82-1326] A82-39103

Optimal control application in supersonic aircraft performance A82-39374 NASA research in supersonic propulsion - A decade of progress [AIIA FAPER 82-1048] A82-404 Calculations of transonic steady state aeroelastic A82-40417 effects for a canard airplane A82-40882 An initial look at the supersonic aerodynamics of twin-fuselage aircraft concepts A82-41008 SUPRESONIC AIRFOILS Research model wing/tail fabrication --- transonic wind tunnel 1/7.5-scale model [AD-A114101] N82-28288 SUPERSONIC CRUISE AIRCRAFT RESEARCH Piloted simulator evaluation of a relaxed static stability fighter at high angle-of-attack [AIAA PAPES 82-1295] A82-39082 Upper Vortex Plap - A versatile surface for highly swept wings A82-41002 Analytical study of vortex flaps on highly swept delta wings 182-41003 Wind-tunnel investigation of vortex flaps on a highly swept interceptor configuration A82-41004 SUPERSONIC PLIGHT Wing design for supersonic cruise/transonic maneuver aircraft A82-41021 SUPERSONIC FLOW Leading edge separation at delta wings with curved leading edges in supersonic flow A82-38784 Measurement and visualization of skin friction on the leeside of delta wings in supersonic flow A82-38785 Computation of supersonic flow around three-dimensional wings A82-40898 SUPERSONIC INLEYS Intake swirl - A major disturbance parameter in engine/intake compatibility A82-41018 SUPERSONIC LOW ALTITUDE MISSILE Supersonic missile aerodynamic and performance relationships for low observables mission profiles [AIAA PAPEB 82-1298] SUPERSONIC TRANSPORTS A82-39085 Advanced aerodynamic wing design for connercial transports - Review of a technology program in the Netherlands A82-40985 SUPPORT INTERFERENCE Summary of sting interference effects for cone, missile, and aircraft configurations as determined by dynamic and static measurements [AIAA PAPER 82-1366] A82-1 A82-40395 SURPACE VEHICLES Requirements and trends in fuel consumption in transport mission with aircraft and surface vehicles 182-40956 SURVIVAL Aircraft fire safety [AGARD-LS-123] N82-29279 Aircraft fire mishap experience/crash fire scenario guantitation N82-29280 Human response to fire N82-29281 Fuel system protection methods N82-29283 Aircraft post crash fire reduction/survivability enhancement from a manufacturer's viewpoint N82-29286 SWRPT FORWARD WINGS Forward-swept wings add supersonic zip A82-38216 X-29A flight control system design experiences [AIAA 82-1538] A 82-39003 Bigh angle-of-attack characteristics of a forward-swept wing fighter configuration [AIAA PAPER 82-1322] A82-39099

Dynamic stability of flexible forward swept wing aircraft [AIAA PAPER 82-1325] A82-39102 Dual wing, swept forward swept rearward wing, and single wing design optimization for high performance business airplanes 182-40931 SURPT WINGS Aerodynamic development of laminar flow control on swept wings using distributed suction through porous surfaces 182-40894 Upper Vortex Plap - A versatile surface for highly swept Wings A82-41002 Analytical study of vortex flaps on highly swept delta wings A82-41003 Wind-tunnel investigation of vortex flaps on a highly swept interceptor configuration 182-41004 A finite difference method for the calculation of transonic flow about a wing, based on small perturbation theory Î NLR-TR-81031-01 N82-28263 SWEPTBACK WINGS Dual wing, swept forward swept rearward wing, and single wing design optimization for high performance business allflanes A82-40931 SWIRLING Intake swirl - A major disturbance parameter in engine/intake cospatibility A82-41018 SYSTEM EFFECTIVENESS Borses for courses in BPV operations --- system components design and development in terms of performance and cost A82-39729 SYSTEM FAILURES Computer outages at air terminal facilities and their correlation to near miss mid-air collisions (AFMD-82-43) [B-206064] N82-28264 SISTER IDENTIFICATION Parameter estimation applied to general aviation aircraft - A case study [AIAA PAPER 82-1313] A82-39094 SYSTEMS ABALYSIS System identification of nonlinear aerodynamic models N82-29996 SISTERS COMPATIBILITY Target acquisition system/air-to-surface weapon compatibility analysis [AIAA 82-1618] A 82-38995 Inlet and airframe compatibility for a V/STOL fighter/attack aircraft with top-mounted inlets A82-40908 SYSTEMS ENGINEERING A design criterion for nighly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 The use of differential pressure feedback in an automatic flight control system TAIAA 82-15961 A82-38981 Avoiding the pitfalls in automatic landing control system design [AIAA 82-1599] A82-39013 Application of multivariable model following method to flight controller [AIAA PAPER 82-1349] A82-39120 A practical approach to the incorporation of technical advances in avionics A82-40886 Design and experience with a low-cost digital fly-by-wire system in the SAAB JA37 Viggen A/C A82-40905 Design of a longitudinal ride-control system by Zakian's method of inequalities A82-41114 Hydraulic Universal Display Processor System (HUDPS) [AD-A114428] N82-28294 SYSTEMS INTEGRATION VHF radio link for ground-air-ground communications using an integrated voice-data modulation A82-38405

SUBJECT INDEX

A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-38982 Conceptual design of the LHX integrated cockpit 182-40527 Avionics systems for helicopter integration A82-40534 Advanced fighter technology integration program AFTI/F-16 A82-40900 Preliminary design of an advanced integrated power and avionics information system ×82-40907 Multifunction multiband airborne radio architecture study [AD-A1144271 N82-28523 Problems related to the integration of fault tolerant aircraft electronic systems [NASA-CR-165926] N82-29022 Windtunnel capability related to test sections, cryogenics, and computer-windtunnel integration [AGARD-AR-174] N82-29 N82-29334 SYSTEMS MANAGEMENT Special investigation report: Air traffic control system [PB82-1362761 N82-28277 SYSTEMS SIMULATION Problems in the simulation of correlation-extremal navigation systems A82-39403 Sensor stabilisation requirements of RPV's - A simulation study A82-39741 Т

T-2 AIRCRAFT Developments on graphite/epoxy T-2 nose landing gear door A82-39893 Design, fabrication and gualification of the T-2 composite rudder A82-39894 T-37 AIRCHAFT USAF bioenvironmental noise data handbook. Volume 148. T-37B in-flight crew noise [AD-A114943] N82-30031 T-56 BRGINE Results of T56 engine performance monitoring trial in Hercules aircraft, February - July 1977 [ARL-MECH-ENG-TECH-MEMO-409] N 82-29322 TABLES (DATA) Flight attendant injuries: 1971-1976 [AD-A114909] TAIL ASSEMBLIES N82-29274 Tail versus canard configuration - An aerodynamic comparison with regard to the suitability for future tactical combat aircraft A82-40901 Experimental and theoretical studies of an espennage of a typical transport airplane A82-40955 Research model wing/tail fabrication --- transonic wind tunnel 1/7.5-scale model [AD-A1141011 N82-28288 TAKEOPP Alert aircraft roll over chocks [AD-A107456] N82-28307 The cost of pcise reduction for departure and arrival operations of commercial tilt rotor aircraft [NASA-CR-137803] N82-29316 TANDEM BOTOR BELICOPTERS Tandem rotor helicopter characteristics in a continuous scing environment A82-40523 TARGET ACQUISITION Target acquisition system/air-to-surface weapon compatibility analysis [AIAA 82-1618] A82-38995 Algorithm development for infra-red air-to-air quidance systems A82-39191 Target tracking using area correlation A82-39194 U.S. Army remotely piloted vehicle program A82-39732

TARGET RECOGNITION	
Target acguisition system/air-to-surface w compatibility analysis	eapon
[AIAA 82-1618]	A82-38995
Moving target detector (Mod 2) [AD-A114709] TASKS	N82-29520
Jobs and tasks in air traffic control	N82-29298
Alert aircraft roll over chocks [AD-A107456] TECHNOLOGICAL FORECASTING	N82-28307
Future terminal area systems	A82-38462
Future helicopter cockpit design	182-40529
Engine controls for the 1960s and 1990s	
Advanced casting: Today and tomorrow aerospace industry components casting	<u> 182 - 40984</u>
TECHNOLOGY ASSESSMENT Canadair rotary wing technology developmen	N82-28486 t
On the state of technology and trends in c materials in the United States	A82-39731 omposite
Touchdown technology large aircraft la gear stress	A82-39882 nding
Civil helicopter propulsion system reliabi engine monitoring tecnnology assessments	
Support of the HH-65A - The impact of adva technology of VTOL systems upon existing support	
Recent advances in the performance of high ratio fans	A82-40541 bypass
Advanced technologies applied to reduce th operating costs of small commuter transp aircraft	A82-40891 e ort
Assessment of advanced technologies for hi performance single-engine business airpl	
Turboprop design - Now and the future	A82-40932 A82-40965
New technology for the next generation of commercial transports - Real or imaginar	У
Cost analysis of the discrete Address Beac System for the lcw-parformance general a	A82-41007 on viation
aircraft community [AD-A112957] TECHNOLOGY TRANSFER	N82-28274
Optimizing aerospace structures for manufa cost	cturing
TECHNOLOGY UTILIZATION	A82-41014
The need for a dedicated public service he design	-
The technclogical aspects of titanium appl in the TU-144 aircraft structure	A82-38422 ication
On the state of technology and trends in c materials in the United States	A82-39718 omposite
800 Shaft Horsepower Advanced Technology Demonstrator Engine	182-39882
Advanced technologies applied to reduce th operating costs of small commuter transp aircraft	
Nondestructive testing in aircraft constru using holographic methods	A82-40915 ction
TELECOMMUNICATION	182-40977
Communications .	N82-29302
TELEVISION CAMEBAS	
The design of a viewinj system for near re stereo images frcm a UMA Lorne linescan Unmanned Aircraft	Sensor

TELEVISION SISTEMS	- 1
Sensor stabilisation requirements of RPV's simulation study	- A
TEMPEBATURE EFFECTS	A82-39741
Evaluation of heat damage to aluminum airc structures	raft
TENPERATURE MRASUREMENT	A82-41141
The use of analog computers in solutions o	f
inverse problems of heat conduction for	
identification of boundary conditions on	
surfaces of gas-turbine-engine parts on	
basis of temperature-measurement results	A 82- 39467
TERMINAL PACILITIES	AC2-33407
Future terminal area systems	
- · · · · · · · · · · · · · · · · · · ·	A82-38462
TERMINAL GUIDANCE	
Algorithm development for infra-red air-to	-air
guidance systems	A82-39191
Terminal information display system benefi	
costs	
[AD-A114937]	N82-29291
TERRAIN ANALYSIS	
A recursive terrain height correlation sys using multiple model estimation techniqu	
[AIAA 82-1513]	A82-38937
TERRAIN FOLLOWING AIRCRAFT	
Simulator investigations of various side-s	
controller/stability and control augment	ation
systems for helicopter terrain flight [AIAA 82-1522]	A82-38942
A terrain following system, an algorithm a	
sensor	
	A82-39740
Terrain following/terrain avoidance system	concept
development [AIAA PAPER 82-1518]	A82-40428
TEST STANDS	402-40420
Analyzing stable pad disturbances and desi	gn of a
sensor vault to monitor pad stability	
[AIAA 82-1585] TP-34 BNGINE	A82-39011
TF34 Convertible Engine System Technology	Program
	A82-40521
TBEBATIC MAPPING	
Scanner imaging systems, aircraft	N82-28715
THERMAL EXPANSION	102-20715
Evaluation of an asymptotic method for hel	icopter
rotor airloads	
THERMOPLASTIC RESINS	A82-40509
Heat release rate calorimetry of engineeri	no
plastics	- 5
	A82-41075
THERMOVISCOBLASTICITY	
Recent development in hygrothermoviscoelas	
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES	tic
Recent develorment in hygrothermoviscoelas analysis of composites	tic N82-28676
Recent develorment in hygrothermoviscoelas analysis of composites 	tic
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THIN WALLS	tic N82-28676 A82-40545
Recent develorment in hygrothermoviscoelas analysis of composites 	tic N82-28676 A82-40545
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THIN WALLS The behavior of composite thin-walled stru in dynamic buckling under impact	tic N82-28676 A82-40545
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THIN WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS	tic N82-28676 A82-40545 ctures
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THIN WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS The unsteady motion of a wing traveling at	tic N82-28676 A82-40545 ctures
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THIN WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS	tic N82-28676 A82-40545 ctures
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THEN WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS The unsteady motion of a wing traveling at subsonic speed above a plane On embedded flow characteristics of sharp	tic N82-28676 A82-40545 ctures A82-40976 A82-39358
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THIN WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS The unsteady motion of a wing traveling at subsonic speed above a plane On embedded flow characteristics of sharp rectangular wings	tic N82-28676 A82-40545 ctures A82-40976 A82-39358 edged
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THIN WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS The unsteady motion of a wing traveling at subsonic speed above a plane On embedded flow characteristics of sharp rectangular wings [LOG-C4712]	tic N82-28676 A82-40545 ctures A82-40976 A82-39358
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THE WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS The unsteady motion of a wing traveling at subsonic speed above a plane On embedded flow characteristics of sharp rectangular wings [LOG-C4712] THREE DIMENSIONAL BOUNDARY LAYEE	tic N82-28676 A82-40545 ctures A82-40976 A82-39358 edged
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THE WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS The unsteady motion of a wing traveling at subsonic speed above a plane On embedded flow characteristics of sharp rectangular wings [LOG-C4712] THREE DIMENSIONAL BOUNDARY LAYEE Experimental and theoretical studies of	tic N82-28676 A82-40545 ctures A82-40976 A82-39358 edged N82-29263
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THE WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS The unsteady motion of a wing traveling at subsonic speed above a plane On embedded flow characteristics of sharp rectangular wings [LOG-C4712] THREE DIMENSIONAL BOUNDARY LAYEE	tic N82-28676 A82-40545 ctures A82-40976 A82-39358 edged N82-29263 ers on Lane
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THIN WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS The unsteady motion of a wing traveling at subsonic speed above a plane On embedded flow characteristics of sharp rectangular wings [LOG-C4712] THERE DIMENSIONAL BOUNDARY LAYEE Experimental and theoretical studies of three-dimensional turbulent boundary lay an empennage of a typical transport airp	tic N82-28676 A82-40545 ctures A82-40976 A82-39358 edged N82-29263
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THE WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS The unsteady motion of a wing traveling at subsonic speed above a plane On embedded flow characteristics of sharp rectangular wings [LOG-C4712] THERE DIMENSIONAL BOUNDARY LAYEE Experimental and theoretical studies of three-dimensional turbulent boundary lay an empennage of a typical transport airp	tic N82-28676 A82-40545 ctures A82-40976 A82-39358 edged N82-29263 ers on Lane
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THIN WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIE WINGS The unsteady motion of a wing traveling at subsonic speed above a plane On embedded flow characteristics of sharp rectangular wings [LOG-C4712] THREE DIMENSIONAL BOUNDARY LAYEE Experimental and theoretical studies of three-dimensional turbulent boundary lay an empennage of a typical transport airp	tic N82-28676 A82-40545 ctures A82-40976 A82-39358 edged N82-29263 ers on Lane A82-40955
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THE WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIN WINGS The unsteady motion of a wing traveling at subsonic speed above a plane On embedded flow characteristics of sharp rectangular wings [LOG-C4712] THERE DIMENSIONAL BOUNDARY LAYEE Experimental and theoretical studies of three-dimensional turbulent boundary lay an empennage of a typical transport airp THERE DIMENSIONAL FLOW Comparison of experimental and analytic performance for contoured endwall stator	tic N82-28676 A82-40545 ctures A82-40976 A82-39358 edged N82-29263 ers on Lane A82-40955
Recent develorment in hygrothermoviscoelas analysis of composites THIN PLATES In-plane shear test of thin panels THIN WALLS The behavior of composite thin-walled stru in dynamic buckling under impact THIE WINGS The unsteady motion of a wing traveling at subsonic speed above a plane On embedded flow characteristics of sharp rectangular wings [LOG-C4712] THREE DIMENSIONAL BOUNDARY LAYEE Experimental and theoretical studies of three-dimensional turbulent boundary lay an empennage of a typical transport airp	tic N82-28676 A82-40545 ctures A82-40976 A82-39358 edged N82-29263 ers on lane A82-40955 s

A82-40898

182-39746

.

•

.

Determination of the efficiency of a trailing edge flap in unsteady three-dimensional flow A82-40910 TERUST AUGMENTATION Ringfin augmentation effects A82-40548 THEUST REVERSAL Axisymmetric approach and landing thrust reverser impacts on usage and LCC --- life cycle cost A82-40892 THRUST VECTOR CONTROL Performance of a 21-CD nonaxisymmetric exhaust [AIAA PAPEE 82-1137] A82-40420 THUNDERSTORMS A study of wind shear effects on aircraft operations and safety in Australia [ARL-SYS-REPT-24] N82-28265 TILT BOTOR AIRCRAFT JVX, what an opportunity --- Joint Services Advanced Vertical Lift Aircraft Frogram A82-38423 Aerodynamic characteristics of a large-scale, twin tilt-nacelle V/SIOL model [AIAA PAPER 81-0150] A82-38443 Flight dynamics of rotorcraft in steep high-g turns [AIAA PAPER 82-1345] 182-39117 The cost of noise reduction for departure and arrival operations of commercial tilt rotor aircraft [NASA-CR-137803] N82-29316 TILT WING AIRCRAFT Optimization of flight with tilt wings A82-40912 TIME LAG The effects of the delays on systems subject to manual control A82-38943 TIME SHARING Minimal order time sharing filters for INS in-flight alignment 182-38439 TIP SPEED Forward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind tunnel [NASA-CR-1523281 N82-30030 TITANIUN ALLOYS The technological aspects of titanium application in the TU-144 aircraft structure A82-39718 In-motion radiography of titanium spar tube welds A82-40538 International aviation (selected articles) [AD-A114422] N82-28245 TOLERANCES (MECHABICS) Computer aided coordinate measuring systems --- in engineering design of helicopter components A82-40540 Multistage axial compressor program on tip clearance effects [AD-A107445] N82-29325 TOBSION Flap-lag-torsional dynamics of extensional and inextensional rotor plades in hover and in forward flight [NASA-CR-169159] N82-29312 TOWED BODIES Maneuver stability of a vehicle with a towed body [AIAA PAPER 82-1347] A82-39 A82-39119 TRACKING PROBLEM Target tracking using area correlation A82-39194 Research on an adaptive Kalman filter for solving the radar tracking problem --- German thesis A82-40562 TRAILING EDGES Inflated wings A82-40966 Development of an advanced no-moving-parts high-lift airfoil A82-40971 . TRAILING-EDGE FLAPS Investigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps, at transonic speed and high Beynclds numbers

SUBJECT INDEX

Determination of the efficiency of a trailing edge flap in unsteady three-dimensional flow 182-40910 TRAIBING AIRCRAFT Development status of a composite vertical stabilizer for a jet trainer A82-39897 Spin behaviour of the Pilatus PC-7 Turbor Trainer A82-40979 A discussion of the flying quality requirements of a tasic training aircraft [AD-A114805] N82-29318 TRAISING ANALYSIS Operational test and evaluation handbook for aircraft training devices. Volume 1: Planning and management [AD-A112498] N82-29332 TRAINING DEVICES Snoke abatement system for crash rescue/fire training facilities
[AD-A114380] N82-28268 TRAIBING EVALUATION Operational test and evaluation handbook for aircrew training devices. Volume 3: Operational suitability evaluation [AD-A112569] N82-28306 Operational test and evaluation handbook for allcraft training devices. Volume 1: Planning and management [AD-A112498] N82-29332 TRAINING SIMULATORS Complete flexibility and realism in radar simulation A82-38461 TRAJECTORIES Wind tunnel studies of store separation with load factor. Freedrops and captive trajectories N82-30261 TRAJECTORY ANALYSIS User's manual for the AMEER flight path-trajectory simulation code [DE82-007004] N82-29343 TRANSFER PUNCTIONS The ideal controlled element for real airplanes is not K/s [AIAA 82-1606] Investigation of low order lateral directional transfer function models for augmented aircraft [AIAA 82-1610] A82-38 A82-38989 The effects of atmospheric turbulence on a guadrotor heavy lift airship [AIAA 82-1542] A82-39009 TRANSFORMATIONS (MATHEMATICS) Applications to aerobautics of the theory of transformations of nonlinear systems [NASA-TM-84249] N82-30013 TRABSHISSION Advances in high-speed rolling-element bearings [NASA-TM-82910] N82-28644 TRANSMISSION LINES Peasibility study of a 270V dc flat cable aircraft electrical power distributed system [AD-A114026] N82-285 N82-28552 TRANSMISSIONS (MACHINE BLEMENTS) Reliability model for planetary gear [NASA-TM-82859] N82-28643 TRANSONIC FLIGHT Wing design for supersonic cruise/transonic maneuver aircraft A82-41021 TRANSONIC FLOW Numerical solution of a problem concerning transonic flow past a wing-fuselage configuration A82-39996 A new Transonic Airfoil Design Method and its application to helicopter rotor airfoil design 182-40507 Calculations of transonic steady state aeroelastic effects for a canard airplane A82-40882 Viscous transonic airfoil flow simulation A82-40897 Transonic small disturbance code for body-wing configuration coupled with full potential code for wing alone A82-40899 A finite difference method for the calculation of transonic flow about a wing, based on small perturbation theory [NLE-TE-81031-01 N82-28263

A82-40909

TRANSONIC WIND TUNNELS Aerodynamic behavior of a slender slot in a wind tunnel wall A82-38281 Estimation of simulation errors in the European Transonic Wind Tunnel /EIW/ A82-40950 National Transonic Facility (NTF) prototype fan blade fatigue test
[AD-A114405] N82-28261 Programs for the transonic wind tunnel data processing installation. Part 8: Programs for processing data on the central site computer [AD-A112900] N82-28310 Design basis for a new transonic wind tunnel [AD-A112899] N82-28311 Windtunnel capability related to test sections, cryogenics, and computer-windtunnel integration [AGARD-AR-174] N82-293 Correlation of Preston-tube data with laminar skin N82-29334 friction (Log No. J12984) [NASA-TM-84827] N82-29556 TRANSPORT AIRCRAFT Investigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps, at transonic speed and high Reynclds numbers A82-40909 A concept for 4D-guidance of transport aircraft in the IMA --- Terminal Maneuvering Area A82-40942 Experimental and theoretical studies of an empennage of a typical transport airplane A82-40955 Reguirements and trends in fuel consumption in transport mission with aircraft and surface vehicles A82-40956 Aerodynamic concepts for fuel-efficient transport aircraft A82-40957 Progress at Douglas on laminar flow control applied to commercial transport aircraft A82-40958 A crack growth model under spectrum loading A82-40961 Application of composite materials and new design concepts for future transport aircraft A82-40994 Aerodynamic research applications at Boeing A82-41000 Analysis of jet transport wings with deflected control surfaces by using a combination of 2-and 3-D methods A82-41022 Analytical and simulator study of advanced transport [NASA-CR-3572] N8 Fireworthiness of transport aircraft interior N82-28298 systems N82-29284 System data communication structures for active-control transfort aircraft, volume 1 [NASA-CR-165773-VOL-1] N8 N82-29510 System data communication structures for active-control transport aircraft, volume 2 [NASA-CR-165773-VOL-2] N82-29511 TRANSPORTATION Maximizing South Carolina's aviation resources: Identifying potentially profitable commuter airline routes, volume 2 [PB82-139353] N82-29277 TRANSPORTATION ENERGY Requirements and trends in fuel consumption in transport mission with aircraft and surface vehicles A82-40956 TRAPEZOIDAL WINGS An experimental investigation of leading-edge spanwise blowing A82-40988 TROPOSPHERE Two-dimensional model studies of the impact of aircraft exhaust emissions on tropospheric ozone A82-40124 TRUSSES Efficient optimum design of structures - Program DDDB

TU-144 AIRCRAFT The technological aspects of titanium application in the TU-144 aircraft structure A82-39718 TURBING BLADES Comparison of HP turbine 'deep blade design' different bearing structure configurations A82-40996 TURBINE ENGINES An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 1: Freliminary process analyses [AD-A112681] N82-28462 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 2: Frocess variable analyses and Laboratory sample production [AD-A112682] N82-28463 An exploratory research and development program leading to specifications for aviation turbine fuel from whele crude shale oil. Part 3: Production of specification of JP-4 fuel from geokinetics shale oil [AD-A112683] N82-28464 Aviation fuels-future outlook and impact on allcraft fire threat N82-29282 TURBINE WHEELS Sliced disc design - A composite conform concept for a turbo engine axial compressor A82-40995 TURBINES CF6 jet engine performance improvement: Hi pressure turbine active clearance control нıqh [NASA-CR-165556] N82-28297 Cooled variable nozzle radial turbine for rotor craft applications [NASA-CE-165397] N82-29323 TURBOCOMPRESSORS The effect of intake flow disturbances on APU compressor blade high cycle fatigue in the Airbus A300 A82-40983 Sliced disc design - A composite conform concept for a turbo engine axial compressor A82-40995 Multistage axial compressor program on tip clearance effects [AD-A107445] N82-29325 Water ingestion into axial flow compressors. Part 3: Experimental results and discussion [AD-A114830] N82-29326 Effect of water on axial flow compressors. Part 2: Computational program [AD-&114831] N82-293 Aerodynamics of advanced axial-flow turbomachinery N82-29327 [AD-A114911] N82-29328 TURBOFAN ENGINES Optimized 10 ton class commercial aircraft engine A82-40890 Recent advances in the performance of high bypass ratio faas A82-40891 Third generation turbo fans A82-40964 Comparison of HP turbine 'deep blade design' different bearing structure configurations A82-40996 Forward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind tunnel [NASA-CR-152328] N82-30030 TURBOJET ENGINE CONTROL Performance of a 2D-CD nonaxisymmetric exhaust nozzle on a turbojet engine at altitude A82-40420 • [AIAA PAPER 82-1137] TURBOJET ENGINES Performance of a 2D-CD nonaxisymmetric exhaust nozzle on a turbojet engine at altitude [AIAA FAFER 82-1137] A82-A82-40420

A-47

A82-38146

Research on the behavior of a turbojet engine during internal and external disturbances with respect to early recognition of damage -German thesis A82-40561 The nonsynchronous whirls of the turbine rotor in aerojet engines A82-40944 TURBOMACHINE BLADES The use of analog computers in solutions of inverse problems of heat conduction for the identification of boundary conditions on the surfaces of gas-turbine-engine parts on the basis of temperature-measurement results 182-39467 TURBOPROP AIRCRAFT Turboprop design - Now and the future 182-40965 TURBOPROP. REGINES Propulsion opportunities for future commuter aircraft [AIAA PAPER 82-1049] A82-40418 Summary and recent results from the NASA advanced high-speed propeller research program [AIAA PAPER 82-1119] 182-40419 Turboprop design - Now and the future A82-40965 TURBULENCE Flight attendant injuries: 1971-1976 [AD-A114909] N82-29274 TURBULENCE EFFECTS Adaptive filtering for an aircraft flying in turbulent atmosphere **182-38441** The effects of atmospheric turbulence on a guadrotor heavy lift airship [AIAA 82-1542] A82-39009 TURBULENT BOUNDARY LAYER Turbulent boundary layer cn a porous surface with injection at various angles to the wall A82-39482 Experimental and theoretical studies of three-dimensional turbulent boundary layers on an empennage of a typical transport airplane A82-40955 TURBULENT FLOD Close-coupled canard-wing wortex interaction and Reynolds stress acquisition [AIAA PAPEE 82-1368] A82-39132 Estimation of simulation errors in the European Transonic Wind Tunnel /ETW/ A82-40950 TURBULENT HEAT TRANSFER Turbulent boundary layer on a porous surface with injection at various angles to the wall A82-39482 TURNING FLIGHT Optimal three-dimensional turning performance of supersonic aircraft AIAA PAPER 82-1326] A82-39103 Flight dynamics of rotorcraft in steep high-g turns [AIAA PAPER 82-1345] A82-39117 THISTING Means for controlling serodynamically induced twist [NASA-CASE-LAR-12175-1] N82-28279 U UH-1 HELICOPTER Adaptation of pultrusion to the manufacture of helicopter components A82-40537

N82-40537 UH-60A HELICOPTER Design and fabrication of a composite rear fuselage for the UH-60 /Black Hawk/ N82-40544 UBSTEADY FLOW The unsteady motion of a wing traveling at subsonic speed above a rlane A82-39358 The rectangular wing with semiinfinite span in nonlinear theory

A82-39359 Evaluation of an asymptotic method for helicopter rotor airloads A82-40509

Determination of the efficiency of a trailing edge flap in unsteady three-dimensional flow A82-40910 SUBJECT INDEX

UPPER SUBFACE BLOWING Development of the Circulation Control Wing-Upper Surface Blowing powered-lift system for STOL aircraft A82-40969 Design integration of CCW/USB for a sea-based aircraft A82-40972 UPPER SURFACE BLOWN PLAPS Design and experimental verification of the USB-flap structucture for NAL STOL aircraft ---Upper Surface Blowing' A82-40917 Upper Vortex Plap - A versatile surface for highly swept wings A82-41002 URBTHANES The development and applications of a full-scale wide body test article to study the behavior of interior materials during a postcrash fuel fire N82-29285 USER MANUALS (COMPUTER PROGRAMS) User's manual for the AMBER flight path-trajectory simulation code [DE82-007004] N82-29343 UTILITY AIRCRAFT The need for a dedicated public service helicopter design A82-38422

,V

V/STOL AIRCRAFT Aerodynamic characteristics of a large-scale, twin tilt-nacelle V/STOL model [AIAA PAPER 81-0150] A 82-38443 U.S. Marine Corps AV-8A maintenance experience [AIAA PAPER 82-1292] A82-38446 A82-39081 Flying quality requirements for V/STOL transition [AIAA PAPER 82-1293] A82-40276 summary of weight savings data for composite VSIOL structure A82-40546 Inlet and airframe compatibility for a V/STOL fighter/attack aircraft with top-mounted inlets A82-40908 A summary of V/STOL inlet analysis methods A82-40921 Wind-tunuel testing of V/STOL configurations at high lift A82-40949 Turboprop design - Now and the future A82-40965 A summary of V/STOL inlet analysis methods [NASA-TM-82885] N82-28249 VANES Effect of tip vanes on the performance and flow field of a rotor in hover A82-40511 VARIABLE GEOMETRY STRUCTURES Variable geometry aerofoils as applied to the Beatty B-5 and B-6 sailplanes A82-40968 VELOCITY DISTRIBUTION An experimental and numerical study of 3-D rotor wakes in hovering flight A82-40946 VELOCITY MEASUREMENT Measurements of velocity distributions in the leading edge vortex of a delta wing by the laser-Doppler procedure 182-38786 VERTICAL AIR CURBENTS Dynamic energy transfer between wind and aircraft A82-40939 VERTICAL FLIGHT An evaluation of vertical drag and ground effect using the BSRA rotor balance system --- Rotor Systems Research Aircraft A82-40510 VERTICAL TAKEOFF AIRCRAFT JVX, what an opportunity --- Joint Services Advanced Vertical Lift Aircraft Program A82-38423

An X-Wing aircraft control system concept [AIAA 82-1540] A82-38954

An analysis of a nonlinear instability in the implementation of a VTCL control system during hover [AIAA 82-1611] A82-38990 Support of the HH-65A - The impact of advanced technology of VTCL systems upon existing product support A82-40541 An investigation of scale model testing of WTOL aircraft in hover A82-40911 VERY HIGH FREQUENCIES VHF radio link for ground-air-ground communications using an integrated voice-data modulation A82-38405 Improved 243 MHz homing antenna system for use on helicopters [NLR-MP-81022-U] N82-28276 VIBRATION DAMPING Robust Kalman filter design for active flutter suppression systems A82-38442 Application of the sequential optimization method to the tuning of the natural frequencies of gas-turbine engine compressor blades A82-39399 Helicopter vibration reduction by rotor blade modal shaping A82~40514 Predesign study for an advanced flight research rotor 182-40525 Theoretical and experimental investigation of joint-structural damping interaction for airplane construction A82-41013 Helicopter vibration suppression using simple pendulum absorbers on the rotor blade [NASA-CE-169131] N82-28282 VIBRATION EFFECTS Analysis of vibration induced error in turbulence velocity measurements from an aircraft wing tip boom [NASA-CR-3571] N82-28881 VIBRATION ISOLATORS Analyzing stable pad disturbances and design of a sensor vault to monitor rad stability [AIAA 82-1585] A82~39011 Design of compensated flutter suppression systems 182-40904 Limiting performance of nonlinear systems with applications to helicopter vibration control problems [AD-A113239] N82-28301 VIBRATION MEASUREMENT Wind tunnel modeling of rotor vibratory loads A82-40516 VIBRATION MODE Belicopter vibration reduction by rotor blade modal shaping A82-40514 VIBRATION TESTS for a wind tunnel helicopter model A 82-40515 Error minimization in ground vibration testing --of helicopter structures A82-40550 VIBRATORY LOADS Wind tunnel modeling of rotor vibratory loads A82-40516 Investigation of a rotor system incorporating a constant lift tip [NASA-CR-166261] N82-29271 VIEW BFFECTS Computer program for analysis of spherical screen distortion [AD-A113136] N82-28309 VISCOUS FLOW NASA research on viscous drag reduction A82-40896 Viscous transonic airfcil flow simulation A82-40897 VISUAL AIDS Displays N82-29300 VISUAL PERCEPTION Design study for a low-distortion holographic HUD [AD-A113982] N82-28 N82-28292 Effects of approach lighting and variation in visible runway length on perception of approach angle in simulated night landings [AD-A114742] N82-29290 VOICE COMMUNICATION VHF radio link for ground-air-ground communications using an integrated voice-data modulation A82-38405 Human factors in air traffic control [AGARD-AG-275] N82-29293 VORTEX BREAKDOWN Effects of vortex breakdown on longitudinal and lateral-directional aerodynamics of slender wings by the suction analogy [AIAA FAPER 82-1385] A82-39141 VORTEX FLAPS Opper Vortex Flap - A versatile surface for highly swept winds A82-41002 Analytical study of wortex flaps on highly swept delta wings A82-41003 Wind-tunnel investigation of vortex flaps on a highly swept interceptor configuration A82-41004 VORTICES Investigations regarding vortex formation at wings with bent leading edges A82-38783 Measurements of velocity distributions in the leading edge vortex of a delta wing by the laser-Doppler procedure A82-38786 The use of linearized-aerodynamics and vortex-flow methods in aircraft design /invited paper/ [AIAA PAPEE 82-1384] A82-40294 Prediction of high alpha flight characteristics utilizing rotary balance data A82-40953 Vortex formation over double-delta wings 182-40989 Spanwise distribution of wortex drag and leading-edge suction in subsonic flow A82-41005 Fuselage effects in leading edge vortex flap aerodynamics A82-41006 VORTICITY Computer enhanced analysis of a jet in a cross-stream

w

N82-29555

WALL PLON Turbulent boundary layer on a porous surface with injection at various angles to the wall A82-39482 Comparison of experimental and analytic [AIAA PAPER 82-1286] A82-40422 Measuring the flow properties of slotted test-section walls [FFA-1351 N82-28571 WARNING SISTERS Wind shear - Its effect on an aircraft and ways to reduce the hazard. II A82-38500 WARPAGE Calculation of the cross section properties and the shear stresses of composite rotor blades A82-38475 WATER Water ingestion into axial flow compressors. Part 3: Experimental results and discussion [AD-A114830] N82-29326 Effect of water on axial flow compressors. Part 2: Computational program [AD-A114831] N82-29327 WAVE ATTENUATION Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-28624

WAVE FRONTS Design study for a low-distortion helegraphic BOD
[AD-A113982] N82-28292 WAVE PROPAGATION The effect of barriers on wave propagation
phenomena: With application for aircraft noise shielding
[NASA-CR-169128] N82-29111 WEAPON SYSTEMS Target tracking using area correlation
Logistics research program in the United States Air Force
A82-40963 Kinematic investigation Hugbes Helicopter 7.62mm
chain gun [AD-A113114] N82-28287 WEAPONS DELIVERY
Target acquisition system/air-to-surface weapon compatibility analysis
[AIÀA 82-1618] A82-38995 Unmanned aircraft in future combat A82-39728
WEATHER
The operation of aircrift and helicopters in difficult meteorological and environmental conditions Russiaa book
NEDGE FLOW
Improved solutions to the Falkner-Skan boundary-layer equation A82-38283
WEIGHT REDUCTION
Committing composites to the Boeing 767 A82-38224 The national dynamics 'observer' mini-FPV for
tropical operation 182-39734
Mini-RPV propulsion A82-39736
Radars for UMA A82-39742
Electric propulsion for a mini BPV system A82-39744
A summary of weight savings data for composite VSTOL structure
WELD TESTS A82-40546
In-motion radiography of titanium spar tube welds A82-40538 WELDED JOINTS
Fatigue behavior of welconded joints A82-41115 WHEEL BRAKES
Touchdown technology large aircraft landing
gear stress A82-40057
WIND MEASUREMENT The detection of low level wind shear. II A82-38463
WIND SHEAR The detection of low lavel wind shear. II
A82-38463 Wind shear - Its effect on an aircraft and Ways to reduce the hazard. If
A82-38500 Optimal open-loop aircraft control for go-around maneuvers under wind shear influence
182-40943 A study of wind shear effects on aircraft
operations and safety in Australia [ARL-SYS-REPI-24] N82-28265
WIND TUNNEL CALIBRATION
WIND TUNNEL CALIBRATION Correlation of Preston-tube data with laminar skin
WIND TUNNEL CALIBERTION Correlation of Preston-tube data with laminar skin friction (Log No. J12984) [NASA-TH-84827] N82-29556
WIND TUNNEL CALIBRATION Correlation of Preston-tube data with laminar skin friction (Lcg No. J12984). [NASA-TM-84827] N82-29556 WIND TUNNEL MODELS Robust Kalman filter design for active flutter
WIND TUNNEL CALIBRATION Correlation of Preston-tube data with laminar skin friction (Lcg No. J12984) [NASA-TH-84827] N82-29556 WIND TUNNEL MODELS Robust Kalman filter design for active flutter suppression systems A82-38442 Correlation of predicted vibrations and test data
WIND TUNNEL CALIBERTION Correlation of Preston-tube data with laminar skin friction (Lcg No. J12984). [NASA-TH-84827] [NASA-TH-84827] N82-29556 WIND TUNNEL MODELS Robust Kalman filter design for active flutter suppression systems A82-38442 Correlation of predicted vibrations and test data for a wind tunnel helicopter model A82-40515
WIND TUNNEL CALIBERTION Correlation of Preston-tube data with laminar skin friction (Lcg No. J12984). [NASA-TM-64827] [NASA-TM-64827] WIND TUNNEL MODELS Robust Kalman filter design for active flutter suppression systems A82-38442 Correlation of predicted vibrations and test data for a wind tunnel helicopter model A82-40515 Wind tunnel modeling of rotor vibratory loads A82-40516
WIND TUNNEL CALIBERTION Correlation of Preston-tube data with laminar skin friction (Log No. J12984) [NASA-TH-84827] N82-29556 WIND TUNNEL HODELS Robust Kalman filter design for active flutter suppression systems A82-38442 Correlation of predicted vibrations and test data for a wind tunnel helicopter model A82-40515 Wind tunnel modeling of rotor vibratory loads

SUBJECT INDEX

.

Research model wing/tail fabrication transonic
vind tunnel 1/7.5-scale model [AD-A114101] N82-28288
Investigation of correlation between full-scale
and fifth-scale wind tunnel tests of a Bell
helicopter Textron Model 222
[NASA-CE-166362] N82-29315
WIND TUNNEL STABILITY TESTS
Wind tunnel measurements of longitudinal stability
and control characteristics of primary and secondary wing configurations
A82-41025
WIND TUNNEL TESIS
Measurement and visualization of skin friction on
the leeside of delta wings in supersonic flow
A82-38785
An X-Wing aircraft control system concept
[AIAA 82-1540] A82-38954 An estimation of aerodynamic forces and moments on
an airplane model under steady state spin
conditions
[AIAA PAPER 82-1311] A82-39092
Analysis and wind tunnel tests of a probe used to
sense altitude through measurement of static
pressure [AIAA PAPER 82-1361] A82-39128
Analytic extrapolation to full scale aircraft
dynamics
[AIAA FAPEE 82-1387] A82-39143
Summary of sting interference effects for cone,
missile, and aircraft configurations as
determined by dynamic and static measurements [AIAA PAPER 82-1366] A82-40395
[AIAA PAPER 82-1366] A82-40395 An experimental and numerical study of 3-D rotor
wakes in hovering flight
A82-40946
Aerodynamic interactions between a 1/6-scale
helicopter rotor and a body of revolution
A82-40947
The prediction of propeller/wing interaction effects A82-40948
Wind-tunnel testing of V/STOL configurations at
high lift
A82-40949
Design and tests of airfolls for sailplanes with
an application to the ASW-19B
A82-40967 Spin bebaviour of the Pilatus PC-7 Turbor Trainer
Vortex formation over double-delta wings
A82-40989
Wind tunnel test and aerodynamic analysis of three
aeroelastically tailored wings
182-41001 Fuselage effects in leading edge vortex flap
aerodynamics
A82-41006
An improved propulsion system simulation technique
for scaled wind tunnel model testing of advanced
fighters
A82-41019 Wind-tunnel investigation of a full-scale
canard-configured general aviation aircraft
A82-41024
Aerodynamic interactions between a 1/6 scale
helicopter rotor and a body of revolution
[NASA-TM-84247] N82-28252
Wind-tunnel evaluation of an aeroelastically
conformable rotor
conformable rotor [AD-A114384] N82-28260
conformable rotor [AD-A114384] Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell
conformable rotor [AD-A114384] Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell helicopter Textron Model 222
conformable rotor [AD-A114384] N82-28260 Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell helicopter Textron Model 222 [NASA-CR-166362] N82-29315
conformable rotor [AD-A114384] N82-28260 Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell belicopter Textron Model 222 [NASA-CR-166362] N82-29315 Windtunnel capability related to test sections,
conformable rotor [AD-A114384] Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell helicopter Textron Model 222 [NASA-CR-166362] Windtunnel capability related to test sections, cryogenics, and computer-windtunnel integration
conformable rotor [AD-A114384] N82-28260 Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell belicopter Textron Model 222 [NASA-CR-166362] N82-29315 Windtunnel capability related to test sections,
conformable rotor [AD-A114384] Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a.Bell helicopter Textron Model 222 [NASA-CR-166362] Windtunnel capability related to test sections, cryogenics, and computer-windtunnel integration [AGARD-AR-174] Forward velocity effects on fan noise and the suppression characteristics of adwanced inlets
<pre>conformable rotor [AD-A114384] Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell helicopter Textron Model 222 [NASA-CR-166362] N82-29315 Windtunnel capability related to test sections, cryogenics, and computer-windtunnel integration [AGARD-AR-174] N82-29334 Porward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind</pre>
<pre>conformable rotor [AD-A114384] N82-28260 Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell helicopter Textron Model 222 [NASA-CR-166362] N82-29315 Windtunel capability related to test sections, cryogenics, and computer-windtunnel integration [AGARD-AR-174] N82-29334 Forward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind tunnel</pre>
<pre>conformable rotor [AD-A114384] N82-28260 Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell helicopter Textron Model 222 [NASA-CR-166362] N82-29315 Windtunnel capability related to test sections, cryogenics, and computer-windtunnel integration [AGARD-AR-174] N82-29334 Forward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind tunnel [NASA-CR-152328] N82-30030</pre>
<pre>conformable rotor [AD-A114384] Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a.Bell helicopter Textron Model 222 [NASA-CR-166362] N82-29315 Windtunnel capability related to test sections, cryogenics, and computer-windtunnel integration [AGARD-AR-174] N82-29334 Forward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind tunnel [NASA-CR-152328] N82-30030 WIND TUNNEL WALLS</pre>
<pre>conformable rotor [AD-A114384] N82-28260 Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell helicopter Textron Model 222 [NASA-CR-166362] N82-29315 Windtunnel capability related to test sections, cryogenics, and computer-windtunnel integration [AGARD-AR-174] N82-29334 Forward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind tunnel [NASA-CR-152328] N82-30030</pre>
conformable rotor [AD-A114384] Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a.Bell helicopter Textron Model 222 [NASA-CR-166362] Windtunel capability related to test sections, cryogenics, and computer-windtunnel integration [AGARD-AR-174] Forward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind tunnel [NASA-CR-152328] WIND TUNNEL WALLS Aerodynamic behavior of a slender slot in a wind tunnel wall A82-38281
<pre>conformable rotor [AD-A114384] N82-28260 Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a. Bell helicopter Textron Model 222 [NASA-CR-166362] Windtunnel capability related to test sections, cryogenics, and computer-windtunnel integration [AGARD-AR-174] N82-29334 Forward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind tunnel [NASA-CR-152328] N82-30030 WIND TUNNEL WALLS Aerodynamic behavior of a slender slot in a wind tunnel wall Na82-38281 Wind-tunnel testing of V/STOL configurations at</pre>
conformable rotor [AD-A114384] Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a.Bell helicopter Textron Model 222 [NASA-CR-166362] Windtunel capability related to test sections, cryogenics, and computer-windtunnel integration [AGARD-AR-174] Forward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind tunnel [NASA-CR-152328] WIND TUNNEL WALLS Aerodynamic behavior of a slender slot in a wind tunnel wall A82-38281

A-50

.

Measuring the flow properties of slotted test-section walls [FPA-135] WIND VELOCITY	N 82-28571
Computer enhanced analysis of a jet in a cross-stream	
	N82-29555
Analysis of an airplane windshield anti-ici	ng system A82-39134
subsonic speed above a plane	A82-39358
Vortex formation over double-delta wings	A82-40989
WING LOADING Investigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge at transonic speed and high Reynclds numb	flaps, ers
The design integration of wingtip devices f light general aviation aircraft	
Operation V10F - Development of a composite	A82-40933
	A82-40934
	A82-40961
Test results of chordwise and spanwise blow low-speed lift augmentation	-
Minimum induced drag of canard configuratio	
Automated optimum design of wing structures	
Deterministic and probabilistic approache [NASA-TM-84475] VING NACELLE COMPLEURATIONS	N82-29317
The use of small strakes to reduce interfer drag of a low wing, twin engine airplane	ence
	A82-39100
WING OSCILLATIONS	A82-40948
Dynamic load measurements with delta wings undergoing self-induced roll-oscillations	
	1 82-39098
joint-structural damping interaction for airplane construction	
WING PANELS	A82-41013
Efficient optimum design of structures - Pr DDDU	
Operation V10F - Development of a composite material wing	A82-38146 A82-40934
WING PLANFORMS Wind tunnel test and aerodynamic analysis o	
aeroelastically tailored wings	A82-41001
WING PROFILES Numerical methods for solving boundary valu	
problems for noncavitating and cavitating past wing profiles	
Numerical solution of a problem concerning transonic flow past a wing-fuselage confi	A82-38722
transonic flow past a wing-fuselage confi Computation of supersonic flow around	guration A82-39996
three-dimensional wings	A82-40898
Dual wing, swept forward swept rearward win single wing design oprimization for high performance business airplanes	
Ejector powered propulsion and high lift su wing	
Ping decign for encoderic envice (thereas)	A82-40970
Wing design for superscnic cruise/transonic maneuver aircraft	
	A82-41021

BING SPAN	
The rectangular wing with semiinfinite span nonlinear theory	a in
BOMZENCUL CECCAY	A 82-39359
RING TIP VORTICES	
Close-coupled canard-wing wortex interaction	on and
Beynolds stress acquisition [AIAA PAPEB 82-1368]	A82-39132
NING TIPS	A02-39132
Gust load alleviation on Airbus A 300	
	A82-40881
Wing-tip jets aerodynamic performance	
Analysis of vibration induced error in tur	A82-40987
velocity measurements from an aircraft w	
boom	and crb
[NASA-CR-3571]	N82-28881
BING-PUSELAGE STORES	
Wind tunnel studies of store separation with	
factor. Freedrops and captive trajector:	N82-30261
VINGLETS	802-30201
The design integration of wingtip devices i	for
light general aviation aircraft	
	A82-40933
NINGS Investigations regarding vortex formation a	
with bent leading edges	at wings
tica beat reducing edges	A82-38783
Optimization of flight with tilt wings	
	A82-40912
Advanced aerodynamic wing design for conner	
transports - Review of a technology prog. the Netherlands	ram in
che Mecherianas	A82-40985
Means for controlling aerodynamically indu	
[NASA-CASE-LAR-12175-1]	N82-28279
Aerodynamics of an airfoil with a jet issu	ing from
its surface [NASA-TH-84825]	N82-29267
FORK	802-23207
The work environment	
•	N82-29299
HOBKLOADS (PSYCHOPHYSIOLOGY)	
Boeing's new 767 eases crew workload	A82-40348
Special investigation report: Air traffic	
system	
[PB82-136276]	N82-28277

Х

X WING BOTORS An X-Wing aircraft control system concept [AIAA 82-1540] A82-38954

Y

X78 An analysis of a nonlinear instability in the implementation of a VTOL control system during hover [AIAA 82-1611] YIELD STRENGTH On the bearing strengths of CPRP laminates A82-38990

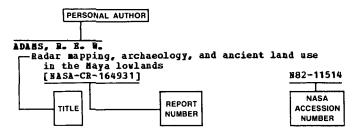
A82-39930

PERSONAL AUTHOR INDEX

AERONAUTICAL ENGINEERING / A Continuing Bibliography (Suppl. 154)

NOVEMBER 1982

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., N82-11514. Under any one author's name the accession numbers are arranged in sequence with the *IAA* accession numbers appearing first.

Α ABBOTT. J. M. A summary of V/STOL inlet analysis methods A82-40921 A summary of V/STOL inlet analysis methods [NASA-TM-82885] N82-28249 ABDALLA, K. L. TF34 Convertible Engine System Technology Program A82-40521 ABE, Y. Evaluation of CFRP prototype structures for aircraft A82-39892 ABRAMS, C. R. A design criterion for highly augmented fly-by-wire aircraft [AIAA 82-1570] A82-38969 ABU-MOSTAPA, A. Correlation of Preston-tube data with laminar skin friction (Log No. J12984) [NASA-TM~84827] N82-29556 ACREE, C. W., JR. Performance of the Rotor Systems Research Aircraft calibrated rotor loads measurement system 182-40549 ADAM, V. A concept for 4D-guidance of transport aircraft in the TMA A82-40942 ADLAKHA. V. Problems related to the integration of fault tolerant aircraft electronic systems [NASA-CR-165926] N82-29022 APANASEV, V. P. Application of the sequential optimization method to the tuning of the natural frequencies of gas-turbine engine compressor blades A82-39399 AGRELL, N. Calculations of transonic steady state aeroelastic effects for a canard airplane A82-40882 AIKEN, E. W. Simulator investigations of various side-stick controller/stability and control augmentation systems for helicopter terrain flight [AIAA 82-1522] A82-38942 AKKARI, S. H. Analysis of vibration induced error in turbulence velocity measurements from an aircraft wing tip boom [NA SA-CR-35711 N82-28881

ALBRECHT, S. K. CDS-the designer's media, the analyst's model A82-40991 ALEKSEEV, V. I. Problems in the simulation of correlation-extremal navigation systems A82-39403 ALJABRI, A. S. The prediction of propeller/wing interaction effects A82-40948 ALLEN. J. B. Aerodynamic development of laminar flow control on swept wings using distributed suction through porous surfaces A82-40894 ALLEN, P. D. Algorithm development for infra-red air-to-air quidance systems A82-39191 ALSPAUGE, T. A., JR. Problems related to the integration of fault tolerant aircraft electronic systems [NASA-CE-165926] N82-29022 AMER, K. B. The YAH-64 empennage and tail rotor - A technical history A82-40528 ANDERS, K. Measurements of velocity distributions in the leading edge vortex of a delta wing by the laser-Doppler procedure A82-38786 ANDERSON, D. J. Demonstration of radar reflector detection and ground clutter suppression using airborne weather and mapping radar A82-40532 ANDERSON, J. R. Moving target detector (Mod 2) [AD-A114709] N82-29520 ANDERSON, K. W. A study of wind shear effects on aircraft operations and safety in Australia [ARL-SYS-REPT-24] N82-28265 ANSELL, H. Cracks interacting with contact forces - A finite element study on loaded holes A82-40959 ARAI, H. Evaluation of CFRP prototype structures for aircraft A82-39892 ARATA, N. Evaluation of CFRP prototype structures for aircraft A82-39892 ARDEN, R. A summary of weight savings data for composite VSTOL structure A82-40546 ARDEN, R. W. A roadmap toward a fatigue qualification process for modern technology helicopters A82-40542 ARI-GUR, J. The behavior of composite thin-walled structures in dynamic buckling under impact A82-40976 ARLINGER, B. G. Computation of supersonic flow around three-dimensional wings A82-40898 LULEBLA, P. Intake swirl - A major disturbance parameter in engine/intake compatibility A82-41018

AUSTIE, B. G.	
Horses for courses in RPV operations	
-	A82-39729

B

BACH, R. E., JR. Analysis of general-aviation accidents using ATC radar records [AIAA PAPER 82-1310] A82-39091 BACON, B. J. A modern approach to pilot/vehicle analysis and the Neal-Smith criteria [AIAA PAPEE 82-1357] A82-3 A82-39125 BAILEY, C. D. 'Listening' systems to increase aircraft structural safety and reduce costs 182-39539 BAKER, D. J. In-plane shear test of thin panels A82-40545 BALANIS, C. A. Monopole antenna patterns on finite size composite ground planes A82-41055 BANDA, S. S. Design and analysis of a multivariable control system for a CCV-type fighter aircraft [AIAA PAPER 82-1350] A82-39121 BANNISTER, J. A. Problems related to the integration of fault tolerant aircraft electronic systems [NASA-CE-165926] N82-29022 BANNISTER, J. D. A practical approach to the incorporation of technical advances in avionics A82-40886 BAR-GILL, A. Development of flying qualities criteria for single pilot instrument flight operations [NASA-CR-165932] N82-29288 BAB-ITZHACK, I. Y. Minimal order time sharing filters for INS in-flight alignment A82-38439 BARGERY, A. W. Flight control systems for aerial targets A82-39745 BARTIE, K. Investigation of a rotor system incorporating a constant lift tip [NASA-CR-166261] N82-29271 BATEH, B. J. Fasteners for composite structures A82-39929 BATTERSON, J. G. Determination of airplane aerodynamic parameters from flight data at aigh angles of attack A82-40928 BEATTIE. J. A. C. The design of a viewin; system for near real time stereo images from a JMA borne linescan sensor A82-39746 BBAUCLAIR, N. Mirage 2000 - Towards possible high series production aircraft A82-38249 BECKER, J. Gust load alleviation on Airbus A 300 A82-40881 BELKNAP, C. E. Performance characteristics of a buoyant quad-rotor research aircraft A82-40974 BENELLI, G VHF radio link for ground-air-ground communications using an integrated voice-data modulation A82-38405 BENNETT, J. A. External aerodynamic design for a laminar flow control glove on a Lockheed JetStar wing A82-40895 BENNETT. R. L. Optimum structural design A82-40543 BERNAN. Ħ. X-29A flight control system design experiences

X-29A flight control system design experiences [AIAA 82-1538] A82-39003

PERSONAL AUTHOR INDEX

BERNARD, F. CATIA - A computer aided design and manufacturing tridimensional system A82-40990 BERNDT, S. B. Measuring the flow properties of slotted test-section walls [FFA-135] N82-28571 BETZINA, M. D. Aerodynamic interactions between a 1/6-scale helicopter rotor and a body of revolution A82-40947 Aerodynamic interactions between a 1/6 scale helicopter rotor and a body of revolution [NASA-TM-84247] N82-28252 BHAT, S. K. Sensor stabilisation requirements of RPV's - A simulation study A82-39741 BIANCO, A. J. Advanced fighter technology integration program AFTI/F-16 A82-40900 BIHRLE, W., JR. Prediction of high alpha flight characteristics utilizing rotary balance data A82-40953 BILEKA, B. D. The use of analog computers in solutions of inverse problems of heat conduction for the identification of boundary conditions on the surfaces of gas-turbine-engine parts on the basis of temperature-measurement results A82-39467 BIRD, N. W. PNCS - A commercial flight management computer system [AIAA 82-1515] A82-38938 BIRKENHEUER, N. J. Computer enhanced analysis of a jet in a cross-stream N82-29555 BIRKENSHAW, J. A. The control and guidance unit for MACHAN A82-39738 BISCHOFF, D. E. Investigation of low order lateral directional transfer function models for augmented aircraft [AIAA 82-1610] A82-38989 BISSELL, J. R. Theory and application of optimum airloads to rotors in hover and forward flight A82-40506 BLACKMAN, J. P. Axisymmetric approach and landing thrust reverser impacts on usage and LCC A82-40892 BLACKWELL, R. H. Predesign study for an advanced flight research rotor A82-40525 BLAKE, E. E. Adaptation of pultrusion to the manufacture of helicopter components A82-40537 BLISS. D. B. Aerodynamic behavior of a slender slot in a wind tunnel wall A82-38281 BLOOMER, H. E. QCSEE over-the-wing engine acoustic data [NASA-TM-82708] N82-29324 BOARD, T. G. United States Air Force shale oil to fuels, phase 2 [AD-A114531] N 82-29476 BODNAR, L. L. Multifunction multiband airborne radio architecture study [AD-A114427] N82-28523 BODNER, V. A. Primary-data devices A82-39279 BOBRHANS, L. H. M. Design and tests of airfoils for sailplanes with an application to the ASW-19B

A82-40967

PERSONAL AUTHOR INDEX

- - -

- - - - ..

BOES, G. Carbon fiber reinforced composite structur	es
protected with metal surfaces against li strike damage	ghtning
[MBB-UD-340-82-0/E] BOLDT, T. B.	N82-28364
Advanced aircraft electrical system contro technology demonstrator. Phase 1: Anal preliminary design	l ysis and
[AD-A113633]	N82-28284
BOLTON, B. L. Adaptive fuel control feasibility investig	ation A82-40519
BONNER, E. Wing design for supersolic cruise/transoni maneuver aircraft	.c
·	▲82-41021
BOVERS, D. L. Application of advancel exhaust nozzles for tactical aircraft	r
BOYLE, R. J.	A82-40889
Comparison of experimental and analytic performance for contoured endwall stator [AIAA PAPER 82-1286] BRANDT, L. B.	s 182-40422
Brternal aerodynamic design for a laminar control glcwe on a Lockheed JetStar wing	flow 182-40895
BRAYMEN, W. W. Wind tunnel test and aerodynamic analysis	
aeroelastically tailored Wings	182-41001
BRENNENSTURL, Q. Investigations regarding vortex formation	
with bent leading edges	A82-38783
Vortex formation over louble-delta wings	A82-40989
BREWARD, M. J. Short range tactical RPd system	A82-39730
BRIDGMAN, A. L. Heat release rate calorimetry of engineeri	
plastics	A82-41075
BRIENS, G. Technical and econcuic comparison of carbo	
tape and woven fabric applications	A82-40993
BRINKLEY, J. W. Comparative vertical impact testing of the	
F/FB-111 crew restraint system and a promodification	
[AD-A113957] Broadway, H. W.	N82-28267
Maximizing South Carolina's aviation resou Identifying potentially profitable commu airline routes, volume 2	
Identifying potential⊥y profitable commu airline routes, volume 2 [PB82-139353]	
Identifying potentially profitable commu airline routes, volume 2	N82-29277
Identifying potentially profitable commu airline routes, volume 2 [PB02-139353] BROCK, L. D. System data communication structures for active-control transport aircraft, volum	N82-29277 N82-29277 N82-29510
Identifying potentially profitable commu airline routes, volume 2 [PB82-139353] BROCK, L. D. System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-1] System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-2] BROOKS, A.	nter N82-29277 N82-29510 N82-29510 N82-29511
Identifying potentially profitable commu airline routes, volume 2 [PB02-139353] BROCK, L. D. System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-1] System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-2] BROOKS, A. TF34 Convertible Engine System Technology BROUSSARD, J. R.	N82-29277 N82-29510 N82-29510 N82-29511 Program A82-40521
Identifying potentially profitable commu airline routes, volume 2 [PB82-139353] BROCK, L. D. System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-1] System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-2] BROOKS, A. TP34 Convertible Engine System Technology	N82-29277 N82-29510 N82-29510 N82-29511 Program A82-40521
Identifying potentially profitable commu airline routes, volume 2 [PB82-139353] BROCK, L. D. System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-1] System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-2] BROOKS, A. TF34 Convertible Engine System Technology BROUSSARD, J. R. Design and flight testing of a digital opt control general aviation autopilot	<pre>http: N82-29277 N82-29510 N82-29511 Program A82-40521 http: imal A82-40906</pre>
Identifying potentially profitable commu airline routes, volume 2 [PB82-139353] BROCK, L. D. System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-1] System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-2] BROOKS, A. TP34 Convertible Engine System Technology BROUSSARD, J. R. Design and flight testing of a digital opt control general aviation autopilot BROWN, E. N. An evaluation of the Rosemount ice detector cloud water content measurements	<pre>http: N82-29277 N82-29510 N82-29511 Program A82-40521 http: imal A82-40906</pre>
Identifying potentially profitable commu airline routes, volume 2 [PB82-139353] BROCK, L. D. System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-1] System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-2] BROOKS, A. TF34 Convertible Engine System Technology BROUSSARD, J. R. Design and flight testing of a digital opt control general aviation autopilot BROWH, E. N. An evaluation of the Rosemount ice detector cloud water content measurements [PB82-158833] BRYANT, W. H.	<pre>http: N82-29277 N82-29510 N82-29511 Program A82-40521 timal A82-40906 or for N82-29321</pre>
Identifying potentially profitable commu airline routes, volume 2 [PB02-139353] BROCK, L. D. System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-1] System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-2] BROOKS, A. TF34 Convertible Engine System Technology BROUSSARD, J. R. Design and flight testing of a digital opt control general aviation autopilot BROWE, E. N. An evaluation of the Rosemount ice detector cloud water content measurements [PB62-158833]	<pre>http: N82-29277 N82-29510 N82-29510 Program A82-40521 Simal A82-40906 Dr for N82-29321 Simal</pre>
Identifying potentially profitable commu airline routes, volume 2 [PB82-139353] BROCK, L. D. System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-1] System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-2] BROOKS, A. TF34 Convertible Engins System Technology BROUSSARD, J. R. Design and flight testing of a digital opt control general aviation autopilot BROWH, E. N. An evaluation of the Rosemount ice detector cloud water content measurements [PB62-158033] BRYANT, W. B. Design and flight testing of a digital opt control general aviation autopilot	<pre>http: N82-29277 N82-29510 N82-29511 Program A82-40521 imal A82-40906 or for N82-29321 imal A82-40906</pre>
Identifying potentially profitable commu airline routes, volume 2 [PB82-139353] BROCK, L. D. System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-1] System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-2] BROOKS, A. TF34 Convertible Engine System Technology BROUSSARD, J. R. Design and flight testing of a digital opt control general aviation autopilot BROWH, E. N. An evaluation of the Rosemount ice detector cloud water content measurements [PB82-158833] BRYANT, W. H. Design and flight testing of a digital opt control general aviation autopilot	<pre>http: N82-29277 N82-29510 N82-29511 Program A82-40521 imal A82-40906 or for N82-29321 imal A82-40906</pre>

.

BULL, J. S.	
Demonstration of radar reflector detection	and
ground clutter suppression using airborn	e
weather and mapping radar	
	A82-40532
BURGESS, B. Propagation problems associated with aircr.	- f+
communications systems	ai t
oppendent Sincen	N82-29535
BUENS, B. R. A.	
Advanced aerodynamic design for future com	bat
aircraft	
	A82-40879
BUTCHBR, D. N. Non-honeycomb F-16 horizontal stabilizer	
structural design	
	A82-40936
BUTTARS, C.	
Complete flexibility and realism in radar :	
	A82-38461
-	
C	
CALARBSE, W.	
Close-coupled canard-wing vortex interacti	on and
Reynolds stress acquisition	
[AIAA PAPER 82-1368]	182-3913 2

- CALE, D. B. 800 Shaft Horsepower Advanced Technology Demonstrator Engine A82-40520 CAMPBELL, T. G. Predesign study for an advanced flight research rotor A82-40525 CANGELOSI, J. Piloted simulator evaluation of a relaxed static
- stability fighter at high angle-of-attack [AIAA PAPER 82-1295] A82-39082 CAPRILE, C. Material identification for the design of
- composite rotary wings A82-40937 CARAMASCHI. V.
- CARAMASCHI, V. Material identification for the design of composite rotary wings A82-40937
- CARPENTER, C. G. Plying guality requirements for V/STOL transition [ATAA PAPER 82-1293] A82-40276 CARTER, W. P. L. Atmospheric chemistry of hydrocarbon fuels.
- Volume 2: Outdoor chamber data tabulations, Part 1 [AD-A113665] N82-28842 CATER, D. Geophysical flight line flying and flight path recovery utilizing the Litton LTN-76 inertial navigation system [DE82-005555] N82-29292 CHADEAU, A. Electronic stabilization of an aircraft
- A82-39322 CHALK, C. R. The ideal controlled element for real airplanes is not K/s [AIAA 82-1606] A82-38986 In-Flight investigation of large airplane flying gualities for approach and landing [AIAA PAPER 82-1296] A82-39083 CHAN, M. Terminal information display system benefits and costs [AD-A114937] N82-29291 CHANANI, G. R. Fatigue behavior of weldbonded joints A82-41115 CHANDLER, E. F. Flight attendant injuries: 1971-1976 [AD-A114909] N82-29274 CHANG, I. D. The effect of barriers on wave propagation phenomena: With application for aircraft noise
- phenomena: With application for aircraft noise shielding [NASA-CR-169128] N82-29111 CHAURETE, D. Operation V10F - Development of a composite
- Operation V10F Development of a composite material wing A82-40934

.

٩

CHEN, R. I. N. Flight dynamics of rotorcraft in steep high-g turns [AIAA PAPEE 82-1345] A82-39117 CBEN, 2. L. Wing-tip jets aerodynamic performance A82-40587 CHEPASKINA, S. M. The use of analog computers in sclutions of inverse problems of heat conduction for the identification of boundary conditions on the surfaces of gas-turbine-engine parts on the basis of temperature-measurement results 182-39467 CHEVALIER, H. L. Wind tunnel measurements of longitudinal stability and control characteristics of primary and secondary wing configurations A82-41025 CHIN, J. X-29A flight control system design experiences [AIAA 82-1538] A82-39003 CHISHOLH, J. P. Demonstration of radar reflector detection and ground clutter suppression using airborne weather and mapping radar 182-40532 CHIU, S. T.-T. A roadmap toward a fatigue qualification process for modern technology helicopters A82-40542 CHOPRA, I. Finite element analysis for bearingless rotor blade aeroelasticity A82-40517 CHON. S. Digital computer simulation of modern aeronautical dígital communication systems A82-40940 CHUNG, J. C. Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 CHUNG, T. J. Recent development in aygrothermoviscoelastic analysis of composites N82-28676 CHURCHILL, A. V. Aviation fuels-future outlook and impact on aircraft fire threat N82-29282 CLARK, A. S. Canadair rotary wing technology development A82-39731 CLARK, B. A. J. A study of wind shear effects on aircraft operations and safety in Australia [ARL-SYS-REPT-24] N82-28 CLARK, J. W., JR. Plying quality requirements for V/STCL transition [AIAA PAPER 82-1293] A82-40 N82-28265 A82-40276 CLARKE, R. A simple, low cost application of a flight test parameter identification system [AIAA PAPER 82-1312] A82-. A82-39093 CLARY, G. R. Flight test evaluation of a video tracker for enhanced offshore airborne radar approach capability A82-40531 CLIPF, B. M. Maneuver stability of a vehicle with a towed body [AIAA PAPER 82-1347] A82-39 A82-39119 COLBURN, N. S. Design study for a low-distortion helographic HUD [AD-A113982] N82-28292 COLR, R. T. Pasteners for composite structures A82-39929 COLLINGS, T. A. . On the bearing strengths of CPRP laminates A82-39930 CONNER, D. A. Relicopter model scale results of blade-wortex interaction impulsive noise as affected by blade planform 182-40556 CONNOLLY, J. M. Alert aircraft roll over chocks [AD-A107456] N82-28307

PERSONAL AUTHOR INDEX

CONSIGNY, H.	
Determination of the efficiency of a trail flap in unsteady three-dimensional flow	ing edge
	A82-40910
COOK, G. R. Static noise tests on modified augmentor w STOL research alrcraft	ing jet
[NASA-TH-81231]	N82-28295
COOPBE, I. P. The control and guidance unit for MACHAN	A82-39738
COOPEE, P. G.	A02-39730
Plight test evaluation of a video tracker enhanced offshore airborne radar approac	
capability	A82-40531
COPLIN, J. F. Third generation turbo fans	
Intel generation furbo rans	A82-40964
COSTE, J. Wind tunnel studies of store separation wi	th load
factor. Freedrops and captive trajector	
COX, R. A.	N82-30261
Research model wing/tail fabrication	
[AD-A114101] COY, J. J.	N82-28288
Reliability model for planetary gear	
[NASA-TH-82859] Coy, P. P.	N82-28643
Wind-tunnel investigation of a full-scale	
canard-configured general aviation aircr	aft A82-41024
COZZOLONGO, J. V.	
Aircraft geometry verification with enhanc computer-generated displays	ed
	182-40992
Aırcraft geometry verification with enhanc computer generated displays	ea
[NASA-IM-84254] CRAIG, J. B.	N82-29268
Nearfield aercdynamics and optical propaga	tion
characteristics of a large-scale turret [AD-A113910]	model N82-28624
CRANFORD, C. C., JR. JVX, what an opportunity	
CREIGHTON, J. R.	A82-38423
Laboratory-scale simulation of underground	coal
gasification: Experiment and theory [DE82-001063]	N 82-28470
CRONIN, M. J.	
Electronic/electric technology benefits st [NASA-CR-165890]	udy N82-28243
CROOH, H. A.	
High angle-of-attack characteristics of a forward-swept wing fighter configuration	
[AIAA FAPER 82-1322]	A82-39099
CHOSSLEY, T. R. Design of a longitudinal ride-control syst	em by
Design of a longitudinal ride-control syst Zakian's method of inequalities	-
Design of a longitudinal ride-control syst Zakian's method of inequalities CROWELL, R. T.	A82-41114
Design of a longitudinal ride-control syst Zakian's method of inequalities CROWELL, B. T. Method for refurbishing and processing par [NASA-CASE-KSC-11042-1]	A82-41114
Design of a longitudinal ride-control syst Zakian's method of inequalities CROWELL, R. T. Method for refurbishing and processing par	A82-41114 achutes N82-29330
Design of a longitudinal ride-control syst Zakian's method of inequalities CEOWELL, E. T. Hethod for refurbishing and processing par [NASA-CASE-KSC-11042-1] CUDAEL, G. F.	A82-41114 achutes N82-29330 ubsonic
Design of a longitudinal ride-control syst Zakian's method of inequalities CROWELL, E. T. Method for refurbishing and processing par [NASA-CASE-KSC-11042-1] CUDART, G. F. Ejector powered propulsion and high lift s wing CULLON, B. R.	A82-41114 achutes N82-29330 ubsonic A82-40970
Design of a longitudinal ride-control syst Zakian's method of inequalities CROWELL, B. T. Method for refurbishing and processing par [NASA-CASE-KSC-11042-1] CUDANE, G. F. Bjector powered propulsion and high lift s wing CULLON, B. R. Performance of a 2D-CD nonaxisymmetric exh	A82-41114 achutes N82-29330 ubsonic A82-40970
<pre>Design of a longitudinal ride-control syst Zakian's method of inequalities CEOWELL, E. T. Method for refurbishing and processing par [NASA-CASE-KSC-11042-1] CUDAEL, G. F. Ejector powered propulsion and high lift s wing CULLOM, B. R. Performance of a 2D-CD nonaxisymmetric exh nozzle on a turbojet engine at altitude [AIAA PAPEE 82-1137]</pre>	A82-41114 achutes N82-29330 ubsonic A82-40970
<pre>Design of a longitudinal ride-control syst Zakian's method of inequalities CROWELL, E. T. Method for refurbishing and processing par [NASA-CASE-KSC-11042-1] CUDAEE, G. F. Bjector powered propulsion and high lift s wing CULLON, B. R. Performance of a 2D-CD nonaxisymmetric exh nozzle on a turbojet engine at altitude [AIAA PAPEE 82-1137] CURRT, B. E.</pre>	A82-41114 achutes N82-29330 ubsonic A82-40970 aust
 Design of a longitudinal ride-control syst Zakian's method of inequalities CROWELL, B. T. Method for refurbishing and processing par [NASA-CASE-KSC-11042-1] CUDAHT, G. F. Ejector powered propulsion and high lift s wing CULLOM, B. R. Performance of a 2D-CD nonaxisymmetric exh nozzle on a turbojet engine at altitude [AIAA PAPEB 82-1137] CURBT, R. B. Unique flight characteristics of the AD-1 oblique-wing research airplane 	A82-41114 achutes N82-29330 ubsonic A82-40970 aust A82-40420
 Design of a longitudinal ride-control syst Zakian's method of inequalities CROWELL, B. T. Method for refurbishing and processing par [NASA-CASE-KSC-11042-1] CUDAEF, G. F. Bjector powered propulsion and high lift s wing CULLON, B. R. Performance of a 2D-CD nonaxisymmetric exh nozzle on a turbojet engine at altitude [AIAA PAPER 82-1137] CURRY, B. B. Unique flight characteristics of the AD-1 	A82-41114 achutes N82-29330 ubsonic A82-40970 aust
 Design of a longitudinal ride-control syst Zakian's method of inequalities CROWELL, B. T. Method for refurbishing and processing par [NASA-CASE-KSC-11042-1] CUDAHT, G. F. Ejector powered propulsion and high lift s wing CULLOM, B. R. Performance of a 2D-CD nonaxisymmetric exh nozzle on a turbojet engine at altitude [AIAA PAPEB 82-1137] CURBT, R. B. Unique flight characteristics of the AD-1 oblique-wing research airplane 	A82-41114 achutes N82-29330 ubsonic A82-40970 aust A82-40420
 Design of a longitudinal ride-control syst Zakian's method of inequalities CROWELL, B. T. Method for refurbishing and processing par [NASA-CASE-KSC-11042-1] CUDAHT, G. F. Ejector powered propulsion and high lift s wing CULLOM, B. R. Performance of a 2D-CD nonaxisymmetric exh nozzle on a turbojet engine at altitude [AIAA PAPEB 82-1137] CURBT, R. B. Unique flight characteristics of the AD-1 oblique-wing research airplane 	A 82-41114 achutes N 82-29330 ubsonic A 82-40970 aust A 82-40420 A 82-39106

Redundant control unit for an advanced multispool engine A82-40998

DAHSHAN, A. H. Design of a longitudinal ride-control system by Zakian's method of inequalities A82-41114

PRESONAL AUTHOR INDEX

DASILVA, C. Flap-lag-torsional dynamics of extensional and inextensional rotor blades in hover and in forward flight [NASA-CR-169159] N82-29312 DAVIDSON, P. B. Logistics research program in the United States Air Force A82-40963 DAVIS, B. H. Analytical design and validation of digital flight control system structure [AIAA PAPER 82-1626] A82-40434 DAWSON, S. An experimental investigation of a bearingless model rotor in hover A82-40512 DE CAPITANI, M. Material identification for the design of composite rotary winjs A82-40937 DEAN. E. H. National Transonic Facility (NTF) prototype fan blade fatigue test [AD-A114405] N82-28261 DECARLO, D. Monopole antenna patterns on finite size composite ground planes A82-41055 DEKONING, A. U. Prediction of fatigue crack growth rates under variable loading using a simple crack closure model [NLR-MP-81023-0] N82-28685 DEMRIS, B. Forward-swept wings add supersonic zip A82-38216 DERVENT, R. G. Two-dimensional model studies of the impact of aircraft exhaust emissions on tropospheric ozone A82-40124 DESTUYEDER, R. Investigation of the uisteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps, at transonic speed and high Reynolds numbers A82-40909 DETHONAS, A. P. A preliminary laboratory evaluation of a reconfigurable integrated flight control concept A82-38982 [AIAA 82-1597] DEVERENUX, P. A. An improved propulsion system simulation technique for scaled wind tunner mcdel testing of advanced fighters A82-41019 DOLLYBIGH, S. M. An initial look at the supersonic aerodynamics of twin-fuselage aircraft concepts A82-410C8 DOMENIC, B. E. Conceptual design of the IHX integrated cockpit A 82-40527 DOWNING, D. R. Design and flight testing of a digital optimal control general aviation autopilot A82-40906 DREKSLER, H. L. Hydraulıc Universal Dısplay Processor System (HUDPS) [AD-A114428] N82-28294 N82-28294 DUDLEY, M. R. Aerodynamic characteristics of a large-scale, twin tilt-nacelle V/STOL model [AIAA PAPEE 81-0150] A82-38443 An investigation of scale model testing of VTOL aircraft in hover A82-40911 DUNFORD, P. J. Tandem rotor helicopter characteristics in a continuous icing environment A82-40523 DONN, G. L. Preliminary design of an advanced integrated power and avionics information system A82-40907 Advanced aircraft electrical system control technology demonstrator. Phase 1: Analysis and preliminary design [AD-A113633]

DUNE, H. J. Robust Kalman filter design for active flutter suppression systems A82-38442 DURSTON, D. A. Inlet and airframe compatibility for a V/STOL fighter/attack aircraft with top-mounted inlets A82-40908 DUZICH, J. J. Hydraulic Universal Display Processor System (HUDPS) [AD-A114428] 182-28294 F BCCLES, B. S. Digital full authority controls for helicopter engines A82-40522 ECESTRON, C. V. Design considerations and experiences in the use of composite material for an aeroelastic research wing [NASA-TH-83291] N82-28280 BGOROV, I. M. Simulation of correlation-extremal receivers of signals from sampling-phase radio-navigation systems A82-39404 BHRESNAN, C. M. Water ingestion into axial flow compressors. Part 3: Experimental results and discussion [AD-A114830] N82-29326 RIGBWAANE, H. P. Axisymmetric approach and landing thrust reverser impacts on usage and LCC A82-40892 An improved propulsion system simulation technique for scaled wind tunnel model testing of advanced flahters A82-41019 BLANGOVAN, G. Sensor stabilisation requirements of RPV's - A simulation study A82-39741 BLBBR. W. Means for controlling aerodynamically induced twist [NASA-CASE-LAB-12175-1] №82-28279 BLGBBONA, P. O. Design and experience with a low-cost digital fly-by-wire system in the SAAB JA37 Viggen A/C A82-40905 BLLINWOOD, J. X-29A flight control system design experiences [AIAA 82-1538] A82-39003

 ELLIS, D. B.

 The use of small strakes to reduce interference drag of a low wing, twin engine airplane [AIAA PAPER 82-1323]

 182-39100 BLLIS, G. S. Ethanol production by vapor compression distillation [DE82-004892] N82-29393 BLSEBAAR, A. Evaluation of an experimental technique to investigate the effects of the engine position on engine/pylon/wing interference [NLE-MP-81020-U] N82-28262 BNGLAR, R. J. Development of the Circulation Control Wing-Upper Surface Blowing powered-lift system for STOL aircraft A82-40969 Development of an advanced no-moving-parts high-lift airfoil 182-40971 BRICKSON, R. B. An evaluation of vertical drag and ground effect using the RSRA rotor balance system A82-40510 BRICSSON, L. B. Analytic extrapolation to full scale aircraft dynamics [AIAA PAPEE 82-1387] A82-39143 ERIKSEN, P. J. Atmospheric electricity hazards analytical model development and application. Volume 3: Blectromagnetic coupling modeling of the lightning/aircraft interaction event [AD-A114017] N82-29802

N82-28284

- EBKELENS, L. J. J. Plight simulation studies on the feasibility of laterally segmented approaches in an MLS environment 182-40941 EROSHEBKO, V. H. Turbulent boundary layer on a porous surface with injection at various angles to the wall A82-39482 BULER, D. A. Performance characteristics of a buoyant quad-rotor research aircraft A82-40974 F FAIRCHILD, R. C. Design study for a low-distortion holographic HUD N82-28292 [AD-A113982] PAIRLIE, B. D. Programs for the transonic wind tunnel data processing installation. Part 8: Programs for processing data on the central site computer [AD-A112900] N82-28310 FALARSKI, H. D. Aerodynamic characteristics of a large-scale, twin tilt-nacelle V/SIOL scdel [AIAA PAPER 81-0150] A82-38443 PARASSAT, F. The prediction of helicopter rotor discrete frequency noise A82-40553 FARLEY, G. L. In-plane shear test of thin panels A82-40545 PARMER, P. P. Geophysical flight line flying and flight path recovery utilizing the Litton LTN-76 inertial navigation system [DE82-005555] N82-29292 FASCHING, W. A. CF6 jet engine performance improvement: High pressure turbine active clearance control [NASA-CR-165556] N83 N82-28297 FAULKNER, H. B. The cost of noise reduction for departure and arrival operations of commercial tilt rotor aircraft [NASA-CR-1378031 N82-29316 FAVIER, D. An experimental and numerical study of 3-D rotor wakes in hovering flight A82-40946 FIALA, R.
- Aircraft post-crash fire fighting/rescue N82-29287 FINN, P. D. The use of differential pressure feedback in an automatic flight control system [AIAA 82-1596]
- A82-38981 PISHBACH, L. H. NASA research in supersonic propulsion - A decade of progress [AIAA PAPES 82-1048] A82-40417 PISHER, V. A.
- Engine controls for the 1980s and 1990s A82-40984 PLEMMING, R. J. An evaluation of vertical drag and ground effect using the RSRA rotor balance system A82-40510 FOLK, B. D. Flight attendant injuries: 1971-1576 [AD-A114909] N82-29274
- FOLKESSON, K. Design and experience with a low-cost digital fly-by-wire system in the SAAB JA37 Viggen A/C A82-40905
- FORBRICH, C. A., JR. Improved solutions to the Falkner-Skan boundary-layer equation A82-38283 PORD, J.
- The design of a RPV ground station simulator A82-39750 PORTE, M. J. The evolution of display formats for advanced fighters using multimode color CET displays

PERSONAL AUTHOR INDEX

FOX. D. Preliminary design of an advanced integrated power and avionics information system 182-40907 POTE, R. L. A summary of weight savings data for composite VSTOL structure 182-40546 PRANKLIN, S. N. System identification of nonlinear aerodynamic models N82-29996 FREDRIKSSON, B. Cracks interacting with contact forces - A finite element study on loaded holes A82-40959 FREEMAN, C. Recent advances in the performance of high bypass ratio fans A82-40891 PRIELIEG, R. Design and construction of a flexible autonomic electronic display device 182-40569 PRINK, N. T. Analytical study of wortex flaps on highly swept delta wings A82-41003 PROST, W. Analysis of vibration induced error in turbulence velocity measurements from an aircraft wing tip hoom [NASA-CR-3571] N82-28881 FUES, A. E. Analysis and wind tunnel tests of a probe used to sense altitude through measurement of static pressure [AIAA FAPER 82-1361] 182-39128 PUJINÒRI, Y. Design and experimental verification of the USB-flap structucture for NAL STOL aircraft A82-40917 FUKUI, I. Design, fabrication and qualification of the T-2 A82-39894 POLLER, S. G. Perspectives of the flying gualities specification [AIAA PAPER 82-1354] A82-3912 A82-39123 G GABEL, R. Wind tunnel modeling of rotor vibratory loads A82-40516 GABRIELLI, G. Requirements and trends in fuel consumption in transport mission with aircraft and surface **v**ehicles A82-40956 GABIUSHKIN, IU. P. The effect of hybrid composite materials on the

- dynamic characteristics of helicopter rotor blades A82-39263 GARLITZ, J.
- Estimation of the peak count of actively controlled aircraft A82-38447 Estimation of the number of in-flight aircraft on instrument flight rules A82-41117 GARNER. H. D. Heads up display [NASA-CASE-LAR-12630-1] N82-29319 GARBARD, W. L. Robust Kalman filter design for active flutter suppression systems A82-38442 GATZEN, B. S. Turboprop design - Now and the future A82-40965 GAY, S. P., JB. Geophysical flight line flying and flight path recovery utilizing the Litton LTN-76 inertial navigation system
 - N82-29292

A82-40888

[DE82-005555]

- - - -

GEDEON, J. The role of the scale parameter in service load assessment and simulation A82-41011 GENTRY, T. A. Guidance for the use of equivalent systems with MIL-F-8785C [AIAA PAPER 82-1355] A82-39124 GIAVOTTO, V. Naterial identification for the design of composite rotary wings A82-40937 GIFFORD, R. V. The design integration of wingtip devices for light general aviation aircraft A82-40933 GILBER, W. P. High angle-of-attack characteristics of a forward-swept wing fighter configuration [AIAA PAPER 82-1322] A82-39099 GINGRÌCH, P. B. Wing design for supersonic cruise/transonic maneuver aircraft A82-41021 GLENNY, D. E. Results of T56 engine performance monitoring trial in Hercules aircraft, February - July 1977 [ARL-MECH-ENG-TECH-MEMO-409] N82-2932 N82-29322 GOEL, S. C. A preliminary laboratory evaluation of a reconfigurable integrated flight control concept [AIAA 82-1597] A82-389 A82-38982 Т. GOKA . Analysis of in-trail following dynamics of CDTI-equipped aircraft A82-39107 [AIAA PAPER 82-1330] GOLDBERG, J. H. Gust response of commercial jet aircraft including effects of autopilot operation [NASA-CR-165919] N82-28266 GOODAN, J. R. Micro-heads-up display A82-40533 GORANSON, U. G. Principles of achieving camage tolerance with flexible maintenance programs for new and aging aircraft A82-41016 GOSSETT, T. D. U.S. Army remotely piloted vehicle supporting technology program A82-39739 GRAETZSCH, K.-D. The system of 'objective control' A82-39245 GRAFTON, S. B. High angle-of-attack characteristics of a forward-swept wing fighter configuration [AIAA PAPER 82-1322] A82-39099 GRAVES, E. B. The feasibility of a high-altitude aircraft platform with consideration of technological and societal constraints [NASA-IM-84508] N82-29313 GRAVES, J. D. An evaluation of helicopter autorotation assist concepts A82-40524 GRAY, T. H. Manual reversion flight control system for A-10 aircraft: Pilot performance and simulator cue effects [AD-A113463] N82-28302 Operational test and evaluation handbook for aircrew training devices. Volume 3: Operational suitability evaluation [AD-A112569] N82-28306 Operational test and evaluation handbook for aircraft training devices. Volume 1: Planning and management [AD-A112498] N82-29332 GREEN, M. J. Application of an optical data link in the airborne scanning system A 82-39275 GROSSIN. J. Flight management computers A 82-39321

GRUNDY, P. H. Fuel conservation: The airline - ATC A82-38464 GRUNWALD, S. L. Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 GU, J.-L. The nonsynchronous whirls of the turbine rotor in aerojet engines A82-40944 GUNNINK, J. W. Application of a new hybrid material /ARALL/ in aircraft structures A82-40975 GUSTAPSON, A. J. National Transonic Facility (NTF) prototype fan blade fatigue test [AD-A114405] N82-28261 н HAAS. J. B.

-

Comparison of experimental and analytic performance for contoured endwall stators AIAA PAPER 82-1286] A82-40422 HABERHAN, D. R. Summary of sting interference effects for cone, missile, and aircraft configurations as determined by dynamic and static measurements [AIAA PAPER 82-1366] A82-A82-40395 The use of a multi-degree-of-freedom dual balance system to measure cross and cross-coupling derivatives [AD-A114813] N82-29333 BAGEBAIER, D. J. Evaluation of heat damage to aluminum aircraft structures A82-41141 HAGIN, W. V. Operational test and evaluation handbook for aircrew training devices. Volume 3: Operational suitability evaluation [AD-A1125691 N82-28306 HAGLUND, R. Design and experience with a low-cost digital fly-by-wire system in the SAAB JA37 Viggen A/C A82-40905 HAGUE, D. S. The correlation of flight test and analytic N-on-N air combat exchange ratios [AIAA PAPER 82-1328] A82-39105 J. HALL, Principles of achieving damage tolerance with flexible maintenance programs for new and aging aircraft A82-41016 HALL, L. D. Analyzing stable pad disturbances and design of a sensor vault to monitor pad stability [AIAA 82-1585] A82-39011 HAMILL, T. G. NACHAN - A unmanned aircraft flight research facility ▲82-39735 HAMMER, R. Committing composites to the Boeing 767 A82-38224 HAMRE, J. A. Smoke abatement system for crash rescue/fire training facilities [AD-A114380] N82-28268 BANKINS, D. E. Advanced aircraft electrical system control technology demonstrator. Phase 1: Analysis and preliminary design [AD-A113633] N82-28284 HANLEY, L. D. System data communication structures for active-control transport aircraft, Volume 1 [NASA-CR-165773-VOL-1] N8 N82-29510 System data communication structures for active-control transport aircraft, volume 2 [NASA-CR-165773-VOL-2] N82-29511 HANOUVA, N. W. H. Helicopter vibration suppression using simple pendulum absorbers on the rotor blade [NASA-CR-169131] N8: ₩82-28282

BANSEN, H. Investigation of the unsteady airloads on a transport aircraft type airfoil with two interchangeable oscillating trailing edge flaps, at transonic speed and high Reynolds numbers A82-40909 HARRINGTON, D. D. Terrain following/terrain avoidance system concept development [AIAA PAPER 82-1518] A82-40428 HARRIS, G. L. Electric propulsion for a mini RPV system A82-39744 HARRIS, M. J. Development of the Circulation Control Wing-Upper Surface Blowing powered-lift system for SIOL aircraft A82-40969 HARRIS, W. L. Dynamic surface measurements on a model helicopter rotor during blade stap at high angles of attack A82-40555 HAWORTH, L. HISS calibration, ice phobics and FAA B/D evaluations [AD-A114435] N82-28289 HEARON, B. F. Comparative vertical impact testing of the F/FB-111 crew restraint system and a proposed modification [AD-A113957] N82-28267 HEATH, B. O. Engineering aspects of international collaboration on Tornado A82-40878 HEBB, R. C. Computer program for analysis of spherical screen distortion [AD-A113136] N82-28309 HECKERT, C. M. Carbon fiber reinforcei composite structures protected with metal surfaces against lightning strike damage [MBB-UD-340-82-0/E] N82-28364 Development of materials and manufacturing technology over the next 20 years: Composite materials [MBB-UD-341-82-01 N82-28365 BEDMAN, S. G. Calculations of transonic steady state aeroelastic effects for a canard airplane A82-40882 HEFFLEY, B. K. Pilot models for discrete maneuvers [AIAA 82-1519] A82-38940 HEINBOLD, R. L. The fourth dimension A82-39540 HELLARD, G. Operation V10F - Development of a composite material wing A82-40934 HELMS, J. L. Noise pollution and airport regulation A82-40051 HENDERSON, J. C. HISS calibration, ice paobics and FAA B/D evaluations [AD-A114435] N82-28289 HENKE, R. Leading edge separation at delta wings with curved leading edges in superscnic flow A82-38784 HESS, R. A. The effects of the delays on systems subject to manual control A82-38943 HEUMANN, Π. Visual scene simulation concerning the landing of sporting aircraft in connection with investigations regarding the control and learning behavior of the pilot A82-41447 HILAIBE, G. Technical and economic comparison of carbon fiber tape and woven fabric applications A82-40993

PRESONAL AUTHOR INDEX

HILBIG, R. Aerodynamic concepts for fuel-efficient transport aircraft A82-40957 HILL, R. G. The development and applications of a full-scale wide body test article to study the behavior of interior materials during a postcrash fuel fire N82-29285 BILL, W. G., JR. An investigation of scale model testing of VTOL aircraft in hover A82-40911 HILLE, H. K. USAF bioenvironmental noise data handbook. Volume 148. T-37B in-flight crew noise [AD-A114943] N82-30031 HOAD, D. B. Helicopter model scale results of blade-vortex interaction impulsive noise as affected by blade planform A82-40556 HOCKENBERGER, R. I. Operational test and evaluation handbook for aircraft training devices. Volume 1: Planning and management [AD-A112498] N82-29332 HOCKENBERGER, R. L. Operational test and evaluation handbook for arrcrew training devices. Volume 3: Operational suitability evaluation [AD-A112569] N82-28306 HODDER, D. Wind tunnel modeling of rotor vibratory loads A82-40516 HODGKINSON, J. An alternate method of specifying bandwidth for flying qualities [(AIAA 82-1609] A82-38988 Flying quality requirements for V/STOL transition [AIAA PAPER 82-1293] A82-40276 HOPMANN, O. Opto-electronical push-broom scanners for navigation, reconnaissance and generation of _ digital data bases A82-39747 HOGE, F. E. Baseline monitoring using aircraft laser ranging [NASA-TM-73298] N82-28690 HOH, R. H. An alternate method of specifying bandwidth for flying gualities [(AIAA 82-1609] A82-38988 Handling gualities criteria for flight path control of V/STOL aircraft [AIAA PAPSB 82-1292] A82-39081 Flying quality requirements for V/STOL transition [AIAA PAPER 82-1293] A82-40276 Plying gualities requirements for roll CAS systems [AIAA PAPER 82-1356] A82-40287 HOLLINS, H. L. Fuselage effects in leading edge vortex flap aerodynamics A82-41006 HOLMES, B. J. Observations and implications of natural laminar flow on practical airplane surfaces A82-40893 Assessment of advanced technologies for high performance single-engine business airplanes A82-40932 HOPKIN, V. D. Human factors in air traffic control [AGARD-AG-275] N82-29293 HOPKINS, A. L. System data communication structures for active-control transport aircraft, volume 1 [NASA-CE-165773-VOL-1] N8 N82-29510 System data communication structures for active-control transport aircraft, volume 2 [NASA-CR-165773-VOL-2] N82-29511 HORBFP, T. G. Aircraft fire mishap experience/crash fire scenario quantitation N82-29280 HORI, N. Application of multivariable model following method to flight controller [AIAA PAPER 82-1349] A82-39120

_

BOWELL, G. A.	
Test results of chordwise and spanwise blo	wing for
low-speed lift augmentation	
TOM-Speed III's addmentation	A82-40999
	A02-40999
HOWBLL, N. D.	
The development and applications of a full	-scale
wide body test article to study the beha	vior of
interior materials during a postcrash fu	el fire
	N82-29285
HOWELL, W. E.	
Heads up display	802 20240
[NASA-CASE-LAR-12630-1]	N82-29319
HOWISON, W. W.	
Electronic/electric technology benefits st	udy
[NASA-CR-165890]	N82-28243
HSU, ČH.	
Effects of vortex breakdown on longitudina	l and
lateral-directional aerodynamics of slen	
wings by the suction analogy	uer
[AIAA PAPER 82-1385]	A82-39141
HU, Y.	
Models for the motor state of VSCF aircraf	t
electrical power system	
- •	A82-40982
HUANG, M. Y.	
Multifunction multiband airborne radio	
architecture study	
[AD-A114427]	N82-28523
HUBBARD, J. E., JR.	
Dynamic surface measurements on a model he	licopter
rotor during blade slap at high angles o	f attack
	A82-40555
HUENECKE, K.	
Low-speed characteristics of a fighter-typ	
configuration at high angles-of-attack a	nd
sideslip	
PIGEPITh	A82-41020
	A02-41020
HUIZING, G. H.	
A finite difference method for the calcula	tion or
transonic flow about a wing, based on sm	
	all
perturbation theory	a11
perturbation theory [NLR-TR-81031-0]	N82-28263
perturbation theory [NLR-TR-81031-0]	
perturbation theory [NLR-TR-81031-0] HUMMBL, D.	N82-28263
perturbation theory [NLR-TR-81031-0] HUMMBL, D- Investigations regarding vortex formation	N82-28263
perturbation theory [NLR-TR-81031-0] HUMMBL, D.	N82-28263 at Wings
perturbation theory [NLR-TR-81031-0] HUMMBL, D. Investigations regarding vortex formation with bent leading edges	N82-28263
perturbation theory [NLR-TR-81031-0] HUMMBL, D- Investigations regarding vortex formation	N82-28263 at wings A82-38783
perturbation theory [NLR-TR-81031-0] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings	N82-28263 at Wings
perturbation theory [NLR-TR-81031-0] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HOMT, L. R.	N82-28263 at wings A82-38783 A82-40989
perturbation theory [NLR-TR-81031-0] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUMT, L. B. Applications to aeronautics of the theory	N82-28263 at wings A82-38783 A82-40989
perturbation theory [NLR-TR-81031-0] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUMT, L. R. Applications to aeronautics of the theory transformations of nonlinear systems	N82-28263 at wings A82-38783 A82-40989
perturbation theory [NLR-TR-81031-0] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUMT, L. B. Applications to aeronautics of the theory	N82-28263 at wings A82-38783 A82-40989
perturbation theory [NLR-TR-81031-0] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUNT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249]	N82-28263 at wings A82-38783 A82-40989 of
perturbation theory [NLR-TR-81031-0] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUBT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G.	N82-28263 at wings A82-38783 A82-40989 of N82-30013
perturbation theory [NLR-TR-81031-0] HUNHBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUNT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper
perturbation theory [NLR-TR-81031-0] HUMHBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUMT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper
perturbation theory [NLR-TR-81031-0] HUNHBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUNT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL
perturbation theory [NLR-TR-81031-U] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUBT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper
perturbation theory [NLR-TR-81031-0] HUMHBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUMT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P.	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL A82-40969
perturbation theory [NLR-TR-81031-U] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUBT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL A82-40969
<pre>perturbation theory [NLR-TR-81031-U] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUNT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TH-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P. A summary of V/STOL inlet analysis methods</pre>	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL A82-40969 A82-40921
perturbation theory [NLR-TR-81031-0] HUMHBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUMT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P.	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL A82-40969 A82-40921
<pre>perturbation theory [NLR-TR-81031-U] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUNT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TH-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P. A summary of V/STOL inlet analysis methods</pre>	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL A82-40969 A82-40921
<pre>perturbation theory [NLR-TR-81031-0] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HOBT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P. A summary of V/STOL inlet analysis methods A summary of V/STOL inlet analysis methods</pre>	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL A82-40969 A82-40921
<pre>perturbation theory [NLR-TR-81031-0] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HOBT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P. A summary of V/STOL inlet analysis methods A summary of V/STOL inlet analysis methods</pre>	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL A82-40969 A82-40921
<pre>perturbation theory [NLR-TR-81031-0] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HOBT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P. A summary of V/STOL inlet analysis methods A summary of V/STOL inlet analysis methods</pre>	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL A82-40969 A82-40921
perturbation theory [NLR-TR-81031-0] HUMHBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUMT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P. A summary of V/STOL inlet analysis methods [NASA-TM-82885]	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL A82-40969 A82-40921
perturbation theory [NLR-TR-81031-0] HUMHBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUMT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSOW, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P. A summary of V/STOL inlet analysis methods [NASA-TM-82885] IAKOVLEV, S. A.	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL A82-40969 A82-40921
perturbation theory [NLR-TR-81031-0] HUMHBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUMT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P. A summary of V/STOL inlet analysis methods [NASA-TM-82885]	N82-28263 at wings A82-38783 A82-40989 of N82-30013 cg-Upper STOL A82-40969 A82-40921 N82-28249
<pre>perturbation theory [NLR-TR-81031-U] HUMMBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUNT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TH-84249] HUSON, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P. A summary of V/STOL inlet analysis methods [NASA-TH-82885] IAKOVLEV, S. A. Sport aircraft</pre>	N82-28263 at wings A82-38783 A82-40989 of N82-30013 ag-Upper STOL A82-40969 A82-40921
perturbation theory [NLR-TR-81031-0] HUMHBL, D. Investigations regarding vortex formation with bent leading edges Vortex formation over jouble-delta wings HUMT, L. B. Applications to aeronautics of the theory transformations of nonlinear systems [NASA-TM-84249] HUSOW, G. G. Development of the Circulation Control Win Surface Blowing powered-lift system for aircraft HWANG, D. P. A summary of V/STOL inlet analysis methods [NASA-TM-82885] IAKOVLEV, S. A.	N82-28263 at wings A82-38783 A82-40989 of N82-30013 g-Upper STOL A82-40969 A82-40921 N82-28249

IABOVSKII, L. S. Turbulent boundary layar on a porous surface with injection at various angles to the wall A82-39482 IDEL, S. Development status of a composite vertical stabilizer for a jet trainer NA2-39897 IKUYAMA, T. Pabrication of CFRF prototype structure for aircraft horizontal tail leading edge slat rail A82-39896 ILIPP, K. W. NASA Dryden's experience in parameter estimation and its uses in fligat test [AIAA PAPEE 82-1373] ISHIKAWA, T. Tests of CFRP spar/rib models with corrugated web A82-39890 IVANNIKOVA, B. V. The effect of hybrid composite materials on the dynamic characteristics of helicopter rotor blades A82-39263

J

JACKSON, R. M. B.	
Target tracking using area correlation	A82-39194
JACOB, H. G. Optimal open-loop aircraft control for go- maneuvers under wind shear influence	around
	∆82-40943
JACOBS, P. P. Performance characteristics of a buoyant guad-rotor research aircraft	
JAMBSON, A.	A82-40974
Viscous transonic airfoil flow simulation	A82-40897
JANECZER, K. Rationalization of the maintenance process	for
helicopter Ka-26	A82-39246
JANKOVIC, J.	
Reduced nonlinear flight dynamic model of structure aircraft	elastic
JANSSON, D. G.	A82-41009
System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-1]	e 1 N82-29510
System data communication structures for active-control transport aircraft, volum [NASA-CR-165773-VOL-2] JENKINS, B. C.	e 2 N82-29511
An investigation of scale model testing of aircraft in hover	VIOL
	A82-40911
JEWEL, J. W., JR. Agricultural airplane mission time structu characteristics	re
[NASA-TM-84470] JEX, H. B.	N82-29329
The effects of atmospheric turbulence on a	
guadrotor heavy lift airshıp [AIAA 82-1542]	A82-39009
JOBRG, J. The effect of intake flow disturbances on compressor blade high cycle fatigue in t. Airbus A300	
	A82-40983
JOHNSON, W. Influence of unsteady aerodynamics on hing rotor ground resonance	eless
-	A82-38445
JORGENSEN, P. A. Future terminal area systems	
-	A82-38462

Κ

KAITATZIDIS, M.	
A one-shot autoclave manufacturing process	for
carbon epoxy components	
	A82-40935
KALVISTE, J.	
Use or rotary balance and forced oscillation	on test
data in six degrees of freedom simulation	n
[AIAA FAPEE 82-1364]	A82-39129
KANAI, K.	
Application of multivariable model followi	ng
method to flight controller	
[AIAA PAPER 82-1349]	A82-39120
KAPLUN, L. IA.	
High-sensitivity holographic plates PL-3M	
high-sensitivity notographic plates if sh	
, , , , ,	A82-41575
KARAMCHETI, K.	
KARAMCHETI, K. Aerodynamics of an airfoil with a jet issue	
KARAMCEBTI, K. Aerodynamics of an airfoil with a jet issuits surface	ing from
KARAMCHETI, K. Aerodynamics of an airfoil with a jet issu its surface [NASA-TH-84825]	
<pre>KARAMCHETI, K. Aerodynamics of an airfoil with a jet issu its surface [NASA-TH-84825] KARP, D.</pre>	ing from
<pre>KARAMCHETI, K. Aerodynamics of an airfoil with a jet issu: its surface [NASA-TM-84825] KARP, D. Moving target detector (Mod 2)</pre>	ng from N82-29267
<pre>KARAMCHETI, K. Aerodynamics of an airfoil with a jet issu its surface [NASA-TM-84825] KARP, D. Moving target detector (Mod 2) [AD-A114709]</pre>	ing from
<pre>KARAMCHETI, K. Aerodynamics of an airfoil with a jet issu its surface [NASA-TH-84825] KARP, D. Moving target detector (Mod 2) [AD-A114709] KASTE, R. P.</pre>	ng from N82-29267 N82-29520
<pre>KARAMCHETI, K. Aerodynamics of an airfoil with a jet issu its surface [NASA-TH-84825] KARP, D. Moving target detector (Mod 2) [AD-A114709] KASTE, R. P. Kinematic investigation Hughes Helicopter</pre>	ng from N82-29267 N82-29520
<pre>KARAMCHETI, K. Aerodynamics of an airfoil with a jet issu its surface [NASA-TH-84825] KARP, D. Moving target detector (Mod 2) [AD-A114709] KASTE, R. P.</pre>	ng from N82-29267 N82-29520

KATZ. J. Dynamic load measurements with delta wings undergoing self-induced roll-oscillations [AIAA PAPER 82-1320] A82-39098 Lateral aerodynamics of delta wings with leading edge separation TATAA PAPER 82-13861 A82-39142 KAVANAGH. P. Aerodynamics of advanced axial-flow turbomachinery [AD-A114911] N82-29328 KAY, B. F. Sikorsky ACAP preliminary design A82-40526 Design and fabrication of a composite rear fuselage for the UH-60 /Elack Hawk/ A82-40544 KELLNER, A. Fluctuating forces and rotor noise due to distorted inflow A82-40945 KRMPRL. R. W. Flight experience with a backup flight-control system for the HiMAT research vehicle [AIAA PAPER 82-1541] A82-40429 KERELIUK, S. Evaluations of helicopter instrument-flight handling gualities [AD-A114004] N82-28285 KERR, J. D. Analyzing stable pad disturbances and design of a sensor vault to monitor rad stability [AIAA 82-1585] A82-39011 KESTELBAN, V. N. The effect of hybrid composite materials on the dynamic characteristics of helicopter rotor blades A82-39263 KIESSLING, F. Computer-aided derivation of equations of motion for rotary-wing aeroelastic problems A82-40883 KIHO, T. Fabrication of CPBP prototype structure for aircraft horizontal tail leading edge slat rail A82-39896 KIM. D. G. Low cost development of INS sensors for expendable RPV control and navigation [AD-A112691] N82-28291 KIRKHAN, W. R. Crashworthiness studies: Cabin, seat, restraint, and injury findings in selected general aviation accidents [AD-A114878] N82-29275 KLEIN, R. W. Piloted simulator evaluation of a relaxed static stability fighter at nigh angle-of-attack [AIAA PAPER 82-1295] A82-39082 KLEIN, V. Parameter estimation applied to general aviation aircraft - A case study [AIAA PAPER 82-1313] A82-39094 Determination of airplane aerodynamic parameters from flight data at nigh angles of attack A82-40928 KLIMENKO, V. N. The use of analog computers in sclutions of inverse problems of heat conduction for the identification of boundary conditions on the surfaces of gas-turbine-engine parts on the basis of temperature-measurement results 182-39467 KLIMOV, A. A. Turbulent boundary layer on a porous surface with injection at various angles to the wall A82-39482 KLIMZO, E. P. High-sensitivity hclographic plates FL-3M A82-41575 KLINKER, F. Improved 243 MHz homing antenna system for use on helicopters [NLR-MP-81022-U] N82-28276 KNAPP, S. C. Human response to fire N82-29281 KNOX, P. S., III

Human response to fire

KOCHENDOERFER, R. Sliced disc design - A composite conform concept for a turbo engine axial compressor 182-40995 KOBENER, H. Recent airfoil developments at DFVLR A82-40986 KOEDA. T. Evaluation of CFRP prototype structures for aircraft A82-39892 KOHLMAN, D. L. Assessment of advanced technologies for high performance single-engine business airplanes 182-40932 KOLBO, L. A. Mini-RPV propulsion A82-39736 KORIKOV, A. M. Simulation of correlation-extremal receivers of signals from sampling-phase radio-navigation systems A82-39404 KOSSIBA, H. J. Determination of load spectra and their application for keeping the operational life proof of sporting airplanes A82-41010 KOTTAPALLI, S. B. R. Correlation of predicted vibrations and test data for a wind tunnel helicopter model A82-40515 KOURTIDES, D. A. Fireworthiness of transport aircraft interior systems N82-29284 KOWALSKI, S. Cost analysis of the discrete Address Beacon System for the low-performance general aviation aircraft community [AD-A112957] N82-28274 KRABILL, W. B. Baseline monitoring using aircraft laser ranging [NASA-TM-73298] N82-28690 KRASILSHCHIKOVA, E. A. The unsteady motion of a wing traveling at subsonic speed above a plane A82-39358 KRENZ, G. Aerodynamic concepts for fuel-efficient transport aircraft A82-40957 KRIDER, E. P. Atmospheric electricity hazards analytical model development and application. Volume 1: Lightning environment modeling [AD-A114015] N82-29800 KRIEGER, R. J. Supersonic missile aerodynamic and performance relationships for low observables mission profiles [AIAA PAPER 82-1298] A82-39085 KBIVOSIC, I. N. Theoretical and experimental investigation of joint-structural damping interaction for airplane construction A82-41013 KROO, I. H. Optimization of canard configurations - An integrated approach and practical drag estimation method 182-41023 Minimum induced drag of canard configurations A82-41116 KUHN, G. B. The promise of laminated metals in aircraft design A82-40903 KUKACKA, L. B. Water-compatible polymer concrete materials for use in rapid repair systems for airport runways [DE82-010994] N82-29464 KUROWSKY, R. V. Concept demonstration of automatic subsystem parameter monitoring A82-40530 Evaluation of an automatic subsystem parameter monitor A82-40552

N82-29281

KWAN, A. J. Smoke abatement system for crash rescue/fire training facilities [AD-A114380] N82-28268

LAAUBODER, C. The determination of gust loads on nonlinear aircraft using a power spectral density approach [NLR-TR-80123-U] N82-28303 LAMAR, J. E. The use of linearized-aerodynamics and vortex-flow methods in aircraft design /invited paper/ [AIAA PAPER 82-1384] x 87-40294 LAMBREGTS, A. A. Avoiding the pitfalls in automatic landing control system design [AIAA 82-1599] A82-39013 LABPART, C. Aircraft design for fuel efficiency 182-40973 LAN. C. B. Effects of vortex breakdown on longitudinal and lateral-directional aerodynamics of slender wings by the suction analogy [AIAA PAPER 82-1385] A82-39141 LANGE, R. H. Application of composite materials and new design concepts for future transport aircraft A82-40994 LABZ, N. Design of compensated flutter suppression systems A82-40904 LAPINS, E. Piloted simulator evaluation of a relaxed static stability fighter at high angle-cf-attack [AIAA PAPEE 82-1295] A82-39082 LABSON, B. S. On embedded flow characteristics of sharp edged rectangular wings [LOG-C4712] N82-29263 LASCHKA, B. International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Froceedings. Volumes 11 & 2 A82-40876 LAUGHREY, J. A. Application of advanced exhaust nozzles for tactical aircraft A82-40889 LAURENS, R. Optimized 10 ton class commercial aircraft engine A82-40890 LEBACQZ, J. V. A ground-simulation investigation of helicopter decelerating instrument approaches A82-39118 LECENER. W. A concept for 4D-guidance cf transport aircraft in the TMA A82-40942 LEE, H. Q. NASA/FAA Helicopter ATC simulation investigation of RNAV/MLS instrument approaches A82-40535 LEE, R. A. Field studies of the AIC Force procedures (NOISECHECK) for measuring community noise exposure from aircraft operations [AD-A113672] N82-28841 Far-field acoustic data for the Texas ASE, Inc. hush house [AD-A114564] N82-30032 LEFFLER, M. F. The fourth dimension A82-39540 LEPRITZ, N. M. The evolution of display formats for advanced fighters using multimode color CBT displays A82-40888 LEHNAN, L. O. Aircraft design for fuel efficiency A82-40973

LEMONT, H. E.

Bingfin augmentation effects

LEONG, P. Preliminary design of an advanced integrated power and avionics information system A82-40907 LEONG, P. J. Advanced aircraft electrical system control technology demonstrator. Phase 1: Analysis and preliminary design [AD-A113633] N82-28284 LEVIN, D. Dynamic load measurements with delta wings undergoing self-induced roll-oscillations [AIAA PAPER 82-1320] A82-39098 LEVISON, P. H. Analytical and simulator study of advanced transport [NASA-CR-3572] N82-28298 LEVY. D. W. The use of differential pressure feedback in an automatic flight control system [AIAA 82-1596] A82-38981 LEWIS, H. P. Effects of approach lighting and variation in visible runway length on perception of approach angle in simulated night landings [AD-A114742] N82-29290 LEYNABRT, J. Wind tunnel studies of store separation with load factor. Freedrops and captive trajectories N82-30261 LI. J.-J. HAJIP-II - A program system for the dynamic analysis of aeronautical structures A82-40884 LILLEY, B. P. Static noise tests on modified augmentor wing jet STOL research aircraft [NASA-TM-81231] N82-28295 LIN. C.-P. Optimal three-dimensional turning performance of superscnic aircraft
[AIAA PAPER 82-1326] A82-39103 Optimal control application in supersonic aircraft performance A82-39374 LINES, C. W., JR. Bistorical research and development inflation indices for Army fixed and rotor winged aircraft FAD-A1143681 N82-28290 LIU, G.-G. HAJIF-II - A program system for the dynamic analysis of aeronautical structures 182-40884 LID, M. An experimental investigation of leading-edge spanwise blowing A82-40988 LOEFFLER, I. J. QCSEE over-the-wing engine acoustic data [NASA-TM-82708] N82-29324 LOGAN, A. H. An evaluation of helicopter autorotation assist concepts A82-40524 LONGO, J. Viscous transonic airfoil flow simulation A82-40897 LOTTER, K. W. The effect of intake flow disturbances on APU compressor blade high cycle fatigue in the Airbus A300 A82-40983 LOVELL. D. T. Material and process developments on the Boeing 767 A82-40902 LOWREY, D. L. Crashworthiness studies: Cabin, seat, restraint, and injury findings in selected general aviation accidents [AD-A114878] N82-29275 LUBTZ, A. Transonic small disturbance code for body-wing configuration coupled with full potential code for wing alone A82-40899 LUSEBRINK, H. Gust load alleviation on Airbus A 300 A82-40881

A82-40548

LYTLE, C. D.

```
LITLE, C. D.
   Flight evaluation of LORAN-C in the State of Vermont
     [NASA-TM-84711]
                                                  N82-28278
                             Μ
MA. L. N.
   Multifunction multibant airborne radio
     architecture study
      [AD-A114427]
                                                  N82-28523
MACDONALD, I. S.
   New technology for the next generation of
     connercial transports - Real or imaginary
                                                  182-41007
MACKENZIE, F. D.

Flight evaluation of LORAN-C in the State of Vermont
     [NASA-TM-84711]
                                                  N82-28278
HADDALON, D. V.
   NASA research on viscous drag reduction
                                                  A82-40896
MADGWICK, T.
   Aircraft post crash fire reduction/survivability
     enhancement from a manufacturer's viewpoint
                                                  N82-29286
HADBORANATH, M.
   Sensor stabilisation requirements of RPV's - A
     simulation study
                                                  182-39741
BARKAWA, S.
   Design and experimental verification of the
USB-flap structucture for NAL STOL aircraft
                                                  A82-40917
MAPFIOLI, G. C.
Material identification for the design of
     composite rotary wings
                                                  A82-40937
MAHESH. J. K.
   Robust Kalman filter design for active flutter
     suppression systems
                                                  A82-38442
MAINE, R. B.
   NASA Dryden's experience in parameter estimation
     and its uses in flight test
     [AIAA PAPER 82-1373]
                                                  A82-39135
MANDY, G. A.
Air-to-air missile avoidance
     [AIAA 82-1516]
                                                  182-38939
MANGOLD, P.
   Some aerodynamic/flightmechanic aspects for the
     design of future comfat aircraft
                                                  A82-40880
MANTEGAZZA, P.
   Design of compensated flutter suppression systems
                                                  A82-40904
MARCHINSKI, L
   Toward all-composite helicopter fuselage
                                                  A 82- 38223
MARCHMAN, J. P., III
   Fuselage effects in leading edge vortex flap
     aerodynamics
                                                  A82-41006
MARESCA, C.
   An experimental and numerical study of 3-D rotor
     wakes in hovering flight
                                                  A82-40946
MARIS, J. L.
   The promise of laminated metals in aircraft design
                                                  A82-40903
MARKER, L. L.
Wind-tunnel evaluation of an aeroelastically
     conformable rotor
     [AD-A114384]
                                                  N82-28260
MARSTILLER, J. K.
   U.S. Army remotely piloted vehicle program
                                                  A82-39732
MARTIN, C. A.
   A discussion of the flying quality requirements of
     a basic training aircraft
[AD-A114805]
                                                  N82-29318
HARTIB, C. F.
Baseline monitoring using aircraft laser ranging
     [NASA-TA-73298]
                                                  N82-28690
MARTIN, J. H.
   System data communication structures for
     active-control transport aircraft, volume 1
     [NASA-CR-165773-VOL-1]
                                                  N82-29510
   System data communication structures for
     active-control transport aircraft, volume 2
[NASA-CR-165773-VOL-2] N8.
```

PERSONAL AUTHOR INDEX

MARTIN, P. Multifunction multiband airborne radio architecture study N82-28523 FAD-A1144271 HARTIN, R. L. B747/JT9D flight loads and their effect on engine running clearances and performance deterioration; BCAC NAIL/P and WA JT9D engine diagnostics programs [NASA-CR-165573] N82-28296 NARTORELLA, E. P. Piloted simulator evaluation of a relaxed static stability fighter at high angle-of-attack [AIAA PAPER 82-1295] A82-39082 HASABDA, H. Development of the advanced composite ground spoiler for C-1 medium transport aircraft A82-39895 MASEFIELD, O. Advanced technologies applied to reduce the operating costs of small commuter transport aircraft A82-40915 Spin behaviour of the Pilatus PC-7 Turbor Trainer A82-40979 NASLENNIROV, S. S. Numerical methods for solving boundary value problems for noncavitating and cavitating flow past wing profiles A82-38722 ACDBRHOTT, J. H. Structural design of a crashworthy landing gear for the AH-64 Attack Helicopter A82-40547 **ECFABLAND, R. B.** Establishment of a rotor model basis [NASA-TP-2026] N82-29311 MCGBEB, T. Optimization of canard configurations - An integrated approach and practical drag estimation method A82-41023 MCGOWAN, L. A. Comparative vertical impact testing of the F/FB-111 crew restraint system and a proposed modification [AD-A113957] N82-28267 MCHUGH, F. J. Recent advances in rotor technology at Boeing Vertol A82-40508 Investigation of a rotor system incorporating a constant lift tip [NASA-CR-166261] N82-2 N82-29271 HCKNEW, M. A. Maximizing South Carolina's aviation resources: Identifying potentially profitable commuter airline routes, volume 2 [PB82-139353] N82 N82-29277 MCLEAN, J. D. Experimental and theoretical studies of three-dimensional turbulent boundary layers on an empennage of a typical transport airplane A82-40955 MCVEIGH, N. A. Recent advances in rotor technology at Boeing Vertol A82-40508 Investigation of a rotor system incorporating a constant lift tip [NASA-CR-166261] N82-29271 MEALY, G. L. A recursive terrain height correlation system [AIAA 82-1513] A82-38937 MEHDI, I. S. Advanced aircraft electrical system control technology demonstrator. Phase 1: Analysis and prelipinary design [AD-A113633] N82-28284 MERTENS, H. W. Effects of approach lighting and variation in visible runway length on perception of approach angle in simulated night landings [AD-A114742] N82-29290 MEYER, E. J. User's manual for the AMEER flight path-trajectory simulation code [DE82-007004] N82-29343

N82-29511

ABYRE, G.	.f
Applications to aeronautics of the theory of transformations of nonlinear systems	or .
[NA SA-TH-84249]	N82-30013
MEYER, R. R., JR.	n and
A unique flight test facility - Description results	
	A82-40925
MEYRRHOFF, N. J. Estimation of the peak count of actively	
controlled aircraft	
	A82-38447
MGANA, C. V. M. The effect of barriers on wave propagation	
phenomena: With application for aircraft	t noise
shielding	N82-29111
[NASA-CR-169128] HICNBL, A.	802-29111
Air-air collision avoidance systems	
MIBTBACH, D.	A82-39323
Advanced casting: Today and tomorrow	
	N82-28486
MIKHAILOVA, T. F. Application of the sequential optimization	method
to the tuning of the natural frequencies	
gas-turbine engine compressor blades	107-20200
MIKKELSON, D. C.	A82-39399
Summary and recent results from the NASA a	dvanced
high-speed propeller research program [AIAA PAPEE 82-1119]	A82-40419
MILLER, D. S.	
An initial look at the supersonic aerodyna twin-fuselage aircraft concepts	mics of
CWIN-IUSERAGE AITCIALE CONCEPTS	A82-41008
MILLER, G. E.	
Development of flying jualities criteria f single pilct instrument flight operation	or s
[NASA-CR-165932]	N82-29288
MILLER, B. H.	lucia of
A simplified approach to the free wake ana. a hovering rotor	LYSIS OF
-	▲82-38474
MILNE, R. J. In-motion radiography of titanium spar tub	e welds
the motion realography of citabila that can	A82-40538
MITCHELL, A. R.	
Target acquisition system/air-to-surface w compatibulity analysus	capon
[AIAA 82-1618]	∆82-38995
HITCHELL, D. G. Flying qualities requirements for roll CAS	systome
[AIAA PAPER 82-1356]	A82-40287
MITCHELL, G. A.	
Summary and recent results from the NASA a high-speed propeller research program	uvanced
[AIAA PAPER 82-1119]	A82-40419
MITKOS, A. P.	n
Geophysical flight lin∋ flying and flight recovery utilizing the Litton LTN-76 ine	yatu mtaal
recovery detrive the riccon pra-10 ine	Triat
pavigation system	
pavigation system [DE82-005555]	N82-29292
pavigation system [DE82-005555] MOFFITT, B. C. Theory and application of optimum airloads	N82-29292
Davigation system [DE82-005555] MOFFITT, R. C.	N82-29292 to
pavigation system [DE82-005555] MOFFITT, B. C. Theory and application of optimum airloads	N82-29292
bavigation system [DE82-005555] MOFFITT, R. C. Theory and application of optimum airloads rotors in hover and forward flight	N82-29292 to A82-40506 r aircraft
 bavigation system [DE82-00555] MOFFITT, B. C. Theory and application of optimum airloads rotors in hover and forward flight MOGINI, K. Evaluation of CFEP prototype structures for 	N82-29292 to A82-40506 r aircraft A82-39892
<pre>navigation system [DE82-005555] MOFFITT, R. C. Theory and application of optimum airloads rotors in hover and forward flight MOGANI, K.</pre>	N82-29292 to A82-40506 r aircraft A82-39892 nding
 navigation system [DE82-005555] MOFFITT, B. C. Theory and application of optimum airloads rotors in hover and forward flight MOGAMI, K. Bvaluation of CFEP prototype structures fo Developments on graphite/epoxy T-2 nose la gear door 	N82-29292 to A82-40506 r aircraft A82-39892 nding A82-39893
 havigation system [DE82-005555] MOFFITT, B. C. Theory and application of optimum airloads rotors in hover and forward flight MOGANI, K. Evaluation of CFRP prototype structures fo Developments on graphite/epoxy T-2 nose la 	N82-29292 to A82-40506 r aircraft A82-39892 nding A82-39893
 navigation system [DE82-005555] MOFFITT, R. C. Theory and application of optimum airloads rotors in hover and forward flight MOGAMI, K. Evaluation of CFEP prototype structures fo Developments on graphite/epoxy T-2 nose la gear door Design, fabrication and gualification of the composite rudder 	N82-29292 to A82-40506 r aircraft A82-39892 nding A82-39893 he T-2 A82-39894
 navigation system [DE82-005555] MOFFITT, R. C. Theory and application of optimum airloads rotors in hover and forward flight MOGAMI, K. Evaluation of CFEP prototype structures for Developments on graphite/epoxy T-2 nose la gear door Design, fabrication and gualification of the composite rudder Development of the advanced composite group 	N82-29292 to A82-40506 r aircraft A82-39892 nding A82-39893 he T-2 A82-39894 nd
 havigation system [DE82-005555] MOFFITT, R. C. Theory and application of optimum airloads rotors in hover and forward flight MOGANI, K. Evaluation of CFEP prototype structures for Developments on graphite/epoxy T-2 nose la gear door Design, fabrication and gualification of the composite rudder Development of the advanced composite group spoiler for C-1 medium transport aircraft 	N82-29292 to A82-40506 r aircraft A82-39892 nding A82-39893 he T-2 A82-39894 nd A82-39895
 navigation system [DE82-005555] MOFFITT, R. C. Theory and application of optimum airloads rotors in hover and forward flight MOGAMI, K. Evaluation of CFRP prototype structures fo Developments on graphite/epoxy T-2 nose la gear door Design, fabrication and qualification of the composite rudder Development of the advanced composite grout spoiler for C-1 medium transport aircraft Fabrication of CFRP prototype structure for 	N82-29292 to A82-40506 r aircraft A82-39892 nding A82-39893 he T-2 A82-39894 nd t A82-39895 r
 havigation system [DE82-005555] MOFFITT, R. C. Theory and application of optimum airloads rotors in hover and forward flight MOGANI, K. Evaluation of CFEP prototype structures for Developments on graphite/epoxy T-2 nose la gear door Design, fabrication and gualification of the composite rudder Development of the advanced composite group spoiler for C-1 medium transport aircraft 	N82-29292 to A82-40506 r aircraft A82-39892 nding A82-39893 he T-2 A82-39894 nd t A82-39895 r
<pre>navigation system [DE82-005555] MOFFITT, R. C. Theory and application of optimum airloads rotors in hover and forward flight MOGANI, K. Evaluation of CFEP prototype structures fo Developments on graphite/epoxy T-2 nose la gear door Design, fabrication and gualification of t composite rudder Development of the advanced composite grou spoiler for C-1 medium transport aircraft Fabrication of CFEP prototype structure fo aircraft hcrizontal tail leading edge sl MOBSON, D. J.</pre>	N82-29292 to A82-40506 r aircraft A82-39892 nding A82-39893 he T-2 A82-39894 nd t A82-39895 r at rail A82-39896
 navigation system [DE82-005555] MOPFITT, R. C. Theory and application of optimum airloads rotors in hover and forward flight MOGAMI, K. Evaluation of CFRP prototype structures fo Developments on graphite/epoxy T-2 nose la gear door Design, fabrication and qualification of the composite rudder Development of the advanced composite grout spoiler for C-1 medium transport aircraft Fabrication of CFRP prototype structure fo aircraft horizontal tail leading edge sl MONSON, D. J. Measurement and visualization of skin fric 	N82-29292 to A82-40506 r aircraft A82-39892 nding A82-39893 he T-2 A82-39894 nd t A82-39895 r at rail A82-39896 tlob on
<pre>navigation system [DE82-005555] MOFFITT, R. C. Theory and application of optimum airloads rotors in hover and forward flight MOGANI, K. Evaluation of CFEP prototype structures fo Developments on graphite/epoxy T-2 nose la gear door Design, fabrication and gualification of t composite rudder Development of the advanced composite grou spoiler for C-1 medium transport aircraft Fabrication of CFEP prototype structure fo aircraft hcrizontal tail leading edge sl MOBSON, D. J.</pre>	N82-29292 to A82-40506 r aircraft A82-39892 nding A82-39893 he T-2 A82-39894 nd t A82-39895 r at rail A82-39896 tlob on

MOORE, J. W. Application of composite materials and new design concepts for future transport aircraft 182-40994 HOORE, H. T. Forward velocity effects on fan noise and the suppression characteristics of advanced inlets as measured in the NASA-Ames 40 by 80 foot wind tunnel [NASA-CR-152328] N82-30030 MOORHOUSE, D. J. Perspectives of the flying qualities specification FAIAA PAPER 82-1354] 182-39123 BORAWSKI, J. M. Wind shear - Its effect on an aircraft and ways to reduce the hazard. II A82-38500 MORISSET, J. Mirage 2000 - Towards possible high series production aircraft A82-38249 HORBISON, R. The need for a dedicated public service helicopter design 182-38422 MORRISSEY, R. W. U.S. Marine Corps AV-8A maintenance experience [AIAA PAPER 81-2657] 182-38446 HOXON, J. Touchdown technology A82-40057 MOYLE, I. Multistage axial compressor program on tip clearance effects [AD-A107445] N82-29325 NULCARE, D. B. Analytical design and validation of digital flight control system structure [AIAA PAPER 82-1626] A82-40434 MUNNIKSMA, B. Evaluation of an experimental technique to investigate the effects of the engine position on engine/pylon/wing interference [NLE-MF-81020-0] N82-24 N82-28262 MURPHY, J. A. Civil helicopter propulsion system reliability and engine monitoring technology assessments 182-40518 HURRI, D. G. High angle-of-attack characteristics of a forward-swept wing fighter configuration [AIAA FAPEB 82-1322] A82-39099 MURTEY, S. N. B. Water ingestion into axial flow compressors. Part 3: Experimental results and discussion [AD-A114830] N82-29326 Effect of water on axial flow compressors. Part 2: Computational program [AD-A114831] N82-29327 HUSGA, H. J. Peasibility study of a 270V dc flat cable aircraft electrical power distributed system [AD-A1140261 N82-28552 HUSSI, P. Material identification for the design of composite rotary wings A82-40937 MYERHOPP, N. Estimation of the number of in-flight aircraft on instrument flight rules A82-41117

N

NAGABHUSHAN, B. L. Maneuver stability of a vehicle with a towed body [AIAA PAPER 82-1347] Performance characteristics of a buoyant guad-rotor research aircraft NAGARAJA, K. S. Ejector powered propulsion and high lift subsonic wing NAGEL, A. L. Aerodynamic research applications at Boeing A82-41000

MAGY, B. J. Error minimization in ground vibration testing A82-40550 NAKAI, B. Tests of CFRP spar/rib models with corrugated web A82-39890 NARAYANAN, K. G. Sensor stabilisation requirements of RPV's - A simulation study A82-39741 NARRAMORE, J. C. A new Transonic Airfoil Design Method and its application to helicopter rotor airfoil design A82-405C7 NASTRI, J. W. Computer aided coordinate measuring systems A82-40540 NAVE, P. S. S. Opto-electronical push-brccm scanners for navigation, reconnaissance and generation of digital data bases A82-39747 NEELY, W. R., JR. Piloted simulator evaluation of a relaxed static stability fighter at high angle-of-attack [AIAA PAPER 82-1295] A82-39082 NEIGHBOR, T. L. Air-to-air missile avoidance [AIAA 82-1516] A82-38939 NELSON, D. R. Avionics systems for helicopter integration A82-40534 NELSON, G. L. Beat release rate calorimetry of engineering plastics A82-41075 BESS, R. G. Analytical design and validation of digital flight control system structure [AIAA PAPER 82-1626] A82-40434 NEUWERTH, G. Fluctuating forces and rotor noise due to distorted inflow A82-40945 NICHOLAS, D. J. Recent advances in the performance of high bypass ratio fans A82-40891 WICHOLS, J. H., JR. Development of the Circulation Control Wing-Upper Surface Blowing powered-lift system for STOL aircraft A82-40969 Design integration of CC%/USB for a sea-based aircraft A82-40972 NIKIPORUK, P. N. Application of multivariable model following method to flight controller [AIAA PAPEE 82-1349] A82-39120 NIXON, W. B. Development of flying qualities criteria for single pilot instrument flight operations [NASA-CR-165932] N82-29288 WOBACK, R. The determination of gust loads on nonlinear aircraft using a power spectral density approach [NLR-TR-80123-0] N82-283 N82-28303 BORITAKE, Y. Evaluation of CFRP prototype structures for aircraft A82-39892 BORTHFIELD, J. Algorithm development for infra-red air-to-air quidance systems A82-39191 NOTON. B. R. Optimizing aerospace structures for manufacturing cost A82-41014 MSI MBA. M. An experimental and numerical study of 3-D rotor wakes in hovering flight

.

A82-40946

0

OBARA, C. J. Observations and implications of natural laminar flow on practical airplane surfaces A82-40893 OBERMEIER. F. Some comments on the prediction of forward flight effects on jet noise [MPIS-20/1981] N82-29118 OGI, S. K. Multifunction multiband airborne radio architecture study [AD-A114427] N82-28523 OHLSON, W. E. Wind-tunnel investigation of vortex flaps on a highly swept interceptor configuration A82-41004 OHNUBA, M. Experimental and theoretical studies of three-dimensional turbulent boundary layers on an empennage of a typical transport airplane A82-40955 OKIISHI, T. H. Aerodynamics of advanced axial-flow turbomachinery [AD-A114911] N82-29328 OKUBO, H. Adaptive filtering for an aircraft flying in turbulent atmosphere A82-38441 OLSSON, N. J. B747/JT9D flight loads and their effect on engine running clearances and performance deterioration; BCAC NAIL/P and WA JT9D engine diagnostics programs [NASA-CR-165573] N82-28296 OMBLCBENKO, S. F. Application of the sequential optimization method to the tuning of the natural frequencies of gas-turbine engine compressor blades A 82- 39399 ORLIK-RUCKEMANN, K. J. Aerodynamic aspects of aircraft dynamics at high angles of attack /AGARD Lecture/ [AIAA PAPBR 82-1363] A82-33 A82-39836 ORLINO, D. G. Design and fabrication of a composite rear fuselage for the UH-60 /Black Hawk/ A 82-40544 OSBORNE, S. R. Operational test and evaluation handbook for aircrew training devices. Volume 3: Operational suitability evaluation [AD-A112569] N82-28306 Operational test and evaluation handbook for aircraft training devices. Volume 1: Planning and management [AD-A112498] N82-29332 OSDER, S. S. Generic faults and design solutions for flight-critical systems [AIAA 82-1595] A82-38980 OSTOWARI, C. Computational and experimental studies of light twin aerodynamic interference A82-40930 OVERDORF, R. L. Terrain following/terrain avoidance system concept development [AIAA PAPER 82-1518] A82-40428 Ρ

.

PAMADI, B. N.	
An estimation of aerodynamic forces and mo an airplane model under steady state spi	
Conditions [AIAA PAPEE 82-1311] PARIDOW, C. A.	A82-39092
Reliability model for planetary gear [NASA-TM-82859] PARKER, J. A.	N82-28643
Pireworthiness of transport aircraft inter systems	ior
-	N82-29284
PARKER, L. C. Inflight IFR procedures simulator [NASA-CASE-KSC-11218-1]	N82-29331
PARKER, T. W. Effect of tip vanes on the performance and	flow
field of a rotor in hover	▲82-40511
PAVLICEK, H. J. O'Hare International Airport - Impervious proposed state efforts to limit airport	
PBACH, L. L., JR. NASA/FAA Helicopter ATC simulation investi	
of BNAV/MLS instrument approaches	
PBARCE, W. B.	A82-40535
Progress at Douglas on laminar flow contro applied to commercial transport aircraft	
PBDDIE, G. D. Design and fabrication of cocured composit hat-stiffened panels	
PERALA, R.	A82-40978
Atmospheric electricity hazards analytical development and application. Volume 3: Electromagnetic coupling modeling of the	
lightning/aircraft interaction event [AD-A114017]	N82-29802
PEBRY, B., III Methodology for determining elevon deflect trim and maneuver the DASI vehicle with	ions to negative
statıc margin [NASA-TM-84499]	N82-28299
PERRIMAN, D. C. Advanced trending analysis/EDS data progra [AD-A113511]	■ N82-28286
PETER, K. Cost analysis of the discrete Address Beac	οη
System for the low-performance general a aircraft community	
[AD-A112957] PRTEESRN, D. H.	N82-28274
The promise of laminated metals in aircraf PETERSEN, B. H.	t design A82-40903
NASA research on viscous drag reduction PPEIPPER, N. J.	182-40 896
Experimental and theoretical studies of three-dimensional turbulent boundary lay	Arc or
An empennage of a typical transport airp Analysis of jet transport wings with defle control surfaces by using a combination	lane A82-40955 cted
and 3-D methods	A82-41022
PIERCE, G. A. Evaluation of an asymptotic method for hel	icopter
rotor airloads	- A82-40509
Helicopter vibration suppression using sim pendulum absorbers on the rotor blade	ple
[NASA-CR-169131] PILKEY, W. D.	N82-28282
Limiting performance of nonlinear systems applications to helicopter vibration con problems	
[AD-A113239] PINES, S.	N82-28301
Terminal area automatic navigation, guidan control research using the Microwave Lan	ding
System (MLS). Part 4: Transition path reconstruction along a straight line pat	
containing a glideslope change waypoint [NASA-CR-3574-PT-4]	N82-28269

RAO.	D.	И.

PISANO, A. Aerodynamic characteristics of a large-scale, twin tilt-nacelle V/STOL model [AIAA PAPER 81-0150] A82-3844 A82-38443 PITTS, J. H., JR. Atmospheric chemistry of hydrocarbon fuels. Volume 2: Outdoor chamber data tabulations, Part 1 [AD-A113665] N82-28842 PLESS, W. H. 'Listening' systems to increase aircraft structural safety and reduce costs A82-39539 POINDEXTER, N. A. The promise of laminated metals in aircraft design A82-40903 FOLLARD, D. W. Flight attendant injuries: 1971-1976 N82-29274 [AD-A114909] POLLOCK, N. Design basis for a new transonic wind tunnel [AD-A112899] N82-28311 PORTER, J. L. Ejector powered propulsion and high lift subsonic WIDG A82-40970 POTTER, J. Fasteners for composite structures A82-39929 POTTHAST, A. J. An X-Wing aircraft control system concept [AIAA 82-1540] POWERS, J. M. A82-38954 Comparative vertical impact testing of the F/FB-111 crew restraint system and a proposed modification [AD-A113957] N82-283 PROUTY, R. W. The YAH-64 empennage and tail rotor - A technical history N82-28267 A82-40528 PRUYN, B. R. Conceptual design of the LHX integrated cockpit A82~40527

Q

QIAN, L.-I. Efficient optimum design of structures - Program DDDU A82-38146 QIU, C. An experimental investigation of reading-edge spanwise blowing A82-40988 QIU, I. Hodels for the motor state of VSCF aircraft electrical power system A82-40982 QUIBLIVAN, J. T. Material and process developments on the Boeing 767 A82-40902

R

BACHOVITSKY, B.	
Terrain following/terrain avoidance system	concept
development	
[AIAA PAPEB 82-1518]	A82-40428
RADDIN, J. H., JR.	
Comparative vertical impact testing of the	
F/FB-111 crew restraint system and a prop	osed
modification	
[AD-A113957]	N82-28267
RAMAN, K. R.	
Nearfield aerodynamics and optical propagat	
characteristics of a large-scale turret a	nodel
[AD-A113910]	N82-28624
RANDOLPH, M. S.	
Concept demonstration of automatic subsyste	эш
parameter monitoring	
	A82-40530
RAO, D. H.	
Upper Vortex Plap - A versatile surface for swept wings	c highly
	A82-41002

RAO, K. R.

```
RAO, K. R.
    Prelaunch estimates of near Earth satellite
      lifetimes using quasi-dynamic atmosphere models
- application to a proposed Brazilian satellite
      [INPE-2325-PRE/080]
                                                       N82-29347
RAO.
     S. S.
    Automated optimum design of wing structures.
      Deterministic and probabilistic approaches
      [NASA-TM-84475]
                                                       N82-29317
RASCH. N. O.
    A compendium of lightning effects on future
      aircraft electronic systems
      [AD-A114117]
                                                        N82-28293
BAY, J.
    Composite use on helicopters
                                                       A82-38222
RAYMER, D. P.
    CDS-the designer's media, the analyst's model
                                                       A82-40991
REDEKER, G.
    Recent airfoil developments at DFVLR
                                                       182-40986
REDING, J. P.
    Analytic extrapolation to full scale aircraft
      dynamics
      [AIAA PAPER 82-1387]
                                                       A82-39143
REED.
      М.
    The national dynamics 'observer' mini-RPV for
      tropical operation
                                                       A82-39734
REED, T. D.
    Correlation of Preston-tube data with laminar skin
      friction (Log No. J12984)
[NASA-TM-84827]
                                                       N82-29556
REHAMMAR, U.
    A terrain following system, an algorithm and a
      sensor
                                                       A82-39740
REIF, H. B.
   An exploratory research and development program
leading to specifications for aviation turbine
      fuel from whole crude shale oil. Part 1:
      Preliminary process inalyses
      [AD-A112681]
                                                       N82-28462
   An exploratory research and development program
leading to specifications for aviation turbine
fuel from whole cruue shale oil. Part 2:
      Process variable analyses and laboratory sample
      production
      [AD-A112682]
                                                       N82-28463
   An exploratory research and development program
leading to specifications for aviation turbine
      fuel from whole crude shale oil. Fart 3:
      Production of specification of JP-4 fuel from
      geokinetics shale oil
      [AD-A112683]
                                                       N82-28464
RBINICKE, H.
Advanced technologies applied to reduce the
      operating costs of small commuter transport
      aircraft
                                                       A82-40915
REN, P.-Z.
    The nonsynchronous whiris of the turbine rotor in
      aerojet engines
                                                       A82-40944
RENZ, R.
    A one-shot autoclave manufacturing process for
      carbon epoxy components
                                                       A82-40935
REYNOLDS, J. C.
    Logistics research program in the United States
      Air Force
                                                       A82-40963
RHODES, M. D.
Dual wing, swept forward swept rearward wing, and
single wing design optimization for high
      performance business airplanes
                                                       A82-40931
RICH, S. R.
   CF6 jet engine performance improvement: High
pressure turbine active clearance control
[NASA-CR-165556] N8:
                                                       N82-28297
RICHARDS, D.
    Water ingestion into axial flow compressors. Part
      3: Experimental results and discussion
      [AD-A114830]
                                                       N82-29326
BICKARD, W. W.
Analytical and simulator study of advanced transport
```

Analytical and simulator study of advanced transport [NASA-CR-3572] N82-28298

PERSONAL AUTHOR INDEX

RIDGELY, D. B. Design and analysis of a multivariable control system for a CCV-type fighter aircraft [AIAA PAPER 82-1350] A82-39121 RIEDL, P. J. United States Air Porce shale oil to fuels, phase 2 [AD-A114531] N82-29476 BIGOLIZZO, R. Reduction and analysis of mode C altitude data collected at high altitudes over the continental United States [AD-A114655] N82-29276 RINEHART, R. J. Feasibility study of a 270V dc flat cable aircraft electrical power distributed system [AD-A114026] N82-28552 RIPLEY, P. S. Atmospheric chemistry of hydrocarbon fuels. Volume 2: Outdoor chamber data tabulations, Part 1 [AD-A113665] N82-28842 RISING, J. J. Development and flight test evaluation of a pitch stability augmentation system for a relaxed stability L-1011 [AIAA PAPER 82-1297] A82-39084 RIST, D. Comparison of HP turbine 'deep blade design' effects in turbofan engine gas generators with different bearing structure configurations A82-40996 ROBB, J. D. Atmospheric electricity hazards analytical model development and application. Volume 2: Simulation of the lightning/aircraft interaction event [AD-A114016] N82-29801 ROBERTS, A. C. The application of small propellers to RPV propulsion A82-39737 ROBERTS, C. J. Horses for courses in RPV operations A82-39729 ROEHRLE, H. The behavior of composite thin-walled structures in dynamic buckling under impact A82-40976 ROGERS, W. A. Wind tunnel test and aerodynamic analysis of three aeroelastically tailored wings A82-41001 ROGO, C. Cooled variable nozzle radial turpine for rotor craft applications [NASA-CR-165397] N82-29323 ROITHAN, A. B. Application of the sequential optimization method to the tuning of the natural frequencies of gas-turbine engine compressor blades A82-39399 RCONBY, R. H. Modal control of relaxed static stability arcraft [AIAA 82-1524] A82-38944 ROPELEWSKI, R. R. Boeing's new 767 eases crew workload A82-40348 ROSE, W. C. Nearfield aerodynamics and optical propagation characteristics of a large-scale turret model [AD-A113910] N82-28624 ROSELLI, A. Inflated wings A82-40966 ROSENBERG, K. N. Flight control systems for aerial targets A82-39745 ROSENSTEIN, H. Investigation of a rotor system incorporating a constant lift tip [NASA-CR-166261] N82-29271 ROSKAN, J. The use of differential pressure feedback in an automatic flight control system [AIAA 82-1596] A82-38981 A simple, low cost application of a flight test parameter identification system [AIAA PAPER 82-1312] A82-39093

ROSS. P. Analysis of an airplane windshield anti-icing system [AIAA PAPER 82-1372] 182-39134 ROUGHTON, D. A practical approach to the incorporation of technical advances in avionics A82-40886 ROY, S. D. Future helicopter cockpit design 182-40529 RUDOLPH. T. H. Atmospheric electricity hazards analytical model development and application. Volume 3: Electromagnetic coupling modeling of the lightning/aircraft interaction event N82-29802 [AD-A114017] RUMMRL, W. D. Recommended practice for a demonstration of Nondestructive Evaluation /NDE/ reliability on aircraft production parts - Introduction to the guidelines A82-41140 RUSETSKII, A. A. Numerical methods for solving boundary value problems for noncavitating and cavitating flow past wing profiles A82-38722 RUSSELL, J. G. Low cost development of INS sensors for expendable RPV control and navigation [AD-A112691] N82-28291 RYNASKI, E. G. Flight control synthesis using robust output observers

S

A82-39016

[(AIAA 82-1575]

SAKATANI, Y. Developments on graphite/epoxy T-2 mose landing gear door A82-39893 SALVIONI, L. Material identification for the design of composite rotary wings A82-40937 SANDERS, R. Development of the Sea King composite main rotor blade A82-40539 SANO, M. Design and experimental verification of the USB-flap structucture for NAL STCL aircraft A82-40917 SANTANBLLI, A. S. Evaluation of an automatic subsystem parameter monitor A82-40552 SARKOS, C. P. The development and applications of a full-scale wide body test article to study the behavior of interior materials during a postcrash fuel fire N82-29285 SATO, T. Design, fabrication and gualification of the T-2 composite rudder A82-39894 SAVAGE, M. Reliability model for planetary gear [NASA-TH-82859] N82-28643 SAVITSKII, V. I. Numerical solution of a pictlem concerning transonic flow past a wing-fuselage configuration Ã82-39996 SAYLOR, D. M. National Transcnic Facility (NIF) prototype fan blade fatigue test [AD-A114405] N82-28261 SCARICH, G. V. Fatigue behavior of weldbended joints A82-41115 SCHAENZER, G. Dynamic energy transfer between wind and aircraft A82-40939 SCHIJVE, J. Application of a new hybrid material /ARALL/ in aircraft structures A82-40975

SCHMIDT, D. K. A modern approach to pilot/vehicle analysis and the Neal-Smith criteria [AIAA FAPER 82-1357] 182-39125 SCHHIDT, N. Viscous transonic airfoil flow simulation A82-40897 SCHNEIDER, A. An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 1: Preliminary process analyses [AD-A112681] N82-28462 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 2: Process variable analyses and laboratory sample production [AD-A112682] N82-28463 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 3: Production of specification of JP-4 fuel from geokinetics shale oil [AD-A112683] N82-28464 SCHOOBOVER, W. E., JR. Wind-tunnel investigation of vortex flaps on a highly swept interceptor configuration A82-41004 SCHREIER, J. Fluctuating forces and rotor noise due to distorted inflow A82-40945 SCHUMACHER, W. Research on an adaptive Kalman filter for solving the radar tracking problem A82-40562 SCHUST, A. Cost analysis of the discrete Address Beacon System for the low-performance general aviation aircraft community [AD-A112957] N82-28274 SCHNEDOCK, J. P. An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 1: Preliminary process analyses [AD-A112681] N82-28462 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 2: Process variable analyses and laboratory sample production [AD-A112682] N82-28463 An exploratory research and development program leading to specifications for aviation turbine fuel from whole crude shale oil. Part 3: Production of specification of JP-4 fuel from geokinetics shale oil [AD-A112683] N82-28464 SCHWERK, J. C. General aviation activity and avionics survey [AD-A112924] N82-28244 SCORER, M. Radars for UMA A 82-39742 SCOTT, L. U.S. Marine Corps AV-8A maintenance experience [AIAA PAPER 81-2657] A82-38446 SEARS, W. R. Wind-tunnel testing of V/STOL configurations at high lift A82-40949 SEEMANN. G. R. Electric propulsion for a mini RPV system A82-39744 SEETHARAM, H. C. Experimental and theoretical studies of three-dimensional turbulent boundary layers on an empennage of a typical transport airplane A82-40955 SELBEBG, B. P. Dual wing, swept forward swept rearward wing, and single wing design optimization for high performance business airplanes A82-40931

Т

SELEN, H. J. W.

SELEN, H. J. W. Design and tests of airfeils for sailplanes with an application to the ASE-19B A82-40967 SENSBURG, O. Gust load alleviation on Airbus A 300 A82-40881 SERBEN. S. System data communication structures for active-control transport aircraft, volume 1 [NASA-CR-165773-VOL-1] N8 N82-29510 System data communication structures for active-control transport aircraft, volume 2 [NA SA-CB-165773-VOL-2] N82-29511 SERGEEVA, E. N. High-sensitivity holographic plates FL-3M A82-41575 SEROVY, G. K. Aerodynamics of advanced axial-flow turbomachinery [AD-A114911] N82-29328 SENTON, G. A. Applying advanced technology to flight station design A82-40887 SHAPER. S. P. Flight-determined correction terms for angle of attack and sideslip [AIAA PAPER 82-1374] A82-40290 SHAPIRO, E. T. Modal control of relaxed static stability aircraft [AIAA 82-1524] A82-38944 SHEFFLER, M. Wind tunnel modeling of rotor vibratory loads A82-40516 SHENOY, K. R. A semiempirical high-speed rotor noise prediction technique A82-40554 SHINODA, P. Aerodynamic interactions between a 1/6-scale helicopter rotor and a bcdy of revolution A82-40947 Aerodynamic interactions between a 1/6 scale helicopter rotor and a body of revolution [NASA-TM-84247] N82-28252 SHIBATA, T. Development of the advanced composite ground spoiler for C-1 medium transport aircraft A82-39895 SHIRK, M. H. Wind tunnel test and aerodynamic analysis of three aeroelastically tailored wings A82-41001 SIDDIGEE, W. Terminal information display system benefits and costs [AD-A114937] N82-29291 SIKONIA, J. G. United States Air Force shale oil to fuels, phase 2 [AD-A114531] N82-29476 SILVERTHORN, J. T. Design and analysis of a multivariable control system for a CCV-type fighter aircraft [AIAA PAPER 82-1350] A82-39121 SILVERTHORN, L. J. Whirl mode stability of the main rotor of the YAH-64 Advanced Attack Helicopter A82-40513 SIN. A. G. Unique flight characteristics of the AD-1 oblique-wing research airplane [AIAA PAPER 82-1329] A82-39106 SIMMONS, P. D. The detection of low level wind shear. II A82-38463 SIMPSON, W. D. Unmanned aircraft in future combat **≥82-39728** SINCLAIR, S. R. M. Evaluations of helicopter instrument-flight handling gualities [AD-A114004] N82-28285 SIBGER, J. The behavior of composite thin-walled structures in dynamic buckling under impact **A82-40976**

PERSONAL AUTHOR INDEX

SIVANERI, N. T. Finite element analysis for bearingless rotor blade aeroelasticity A82-40517 SKARMAN, E. A terrain following system, an algorithm and a Sensor A82-39740 SLOOFF, J. W. Advanced aerodynamic wing design for commercial transports - Review of a technology program in the Netherlands A82-40985 SLOTEB, L. E., II The promise of laminated metals in aircraft design A82-40903 SMELTZER, D. B. Inlet and airframe compatibility for a V/STOL fighter/attack aircraft with top-mounted inlets A82-40908 SMITH, C. G. Atmospheric chemistry of hydrocarbon fuels. Volume 2: Outdoor chamber data tabulations, Part 1 [AD-A1136651 N82-28842 SHITE, J. P. Operational test and evaluation handbook for aircrew training devices. Volume 3: Operational suitability evaluation [AD-A112569] N82-28306 Operational test and evaluation handbook for aircraft training devices. Volume 1: Planning and management [AD-A112498] N82-29332 SMITH, T. B. System data communication structures for active-control transport aircraft, volume 1 [NASA-CR-165773-VOL-1] N82-29510 System data communication structures for active-control transport aircraft, volume 2 [NASA-CR-165773-VOL-2] N82-29511 SHOLICZ, T. Wind shear - Its effect on an aircraft and ways to reduce the hazard. II A82-38500 SOPBER, R Correlation of predicted vibrations and test data for a wind tunnel helicopter model A82-40515 SORENSEN, J. A. Analysis of in-trail following dynamics of CDTI-equipped aircraft [AIAA PAPER 82-1330] A82-39107 SPAIN, C. V. Design considerations and experiences in the use of composite material for an aeroelastic research wing [NASA-TM-83291] N82-28280 SPEYER, J. L. The Shiryayev sequential probability ratio test for redundancy management A82-[AIAA 82-1623] A82-38998 SPIER, B. B. Design and fabrication of cocured composite hat-stiffened panels A82-40978 SPREUER, K. R. Results of the AH-64 Structural Demonstration A82-40551 SQUIRES, P. K. Investigation of correlation between full-scale and fifth-scale wind tunnel tests of a Bell helicopter Textron Model 222 [NASA-CR-166362] N82-29315 SQUYBES, R. A. Ejector powered propulsion and high lift subsonic wing A82-40970 STARKEY, O. D. Analyzing stable pad disturbances and design of a sensor wault to monitor pad stability [AIAA 82-1585] A82-39011 STAUFEBBIEL, B. Fluctuating forces and rotor noise due to distorted inflow A82-40945

B-18

STAUKENBIEL, R. International Council of the Aeronautical Sciences, Congress, 13th and AIAA Aircraft Systems and Technology Conference, Seattle, WA, August 22-27, 1982, Froceedings. Volumes 11 & 2 A82-40876 STECK, B. H. Calculation of level flow using radial grating A82-38922 STRIBBICHLER, H. Nondestructive testing in aircraft construction using holographic methods A82-40977 STEINLE, P. W., JR. Correlation of Preston-tube data with laminar skin friction (Log No. J12984) [NASA-TH-84827] N82-29556 STEKOLNIKOV, V. N. The effect of hybrid composite materials on the dynamic characteristics of helicopter rotor blades A82-39263 STENGEL. R. F. Design and flight testing of digital direct side-force control laws [AIAA 82-1521] A82-38941 STITT, L. B. NASA research in supersonic propulsion - A decade of progress [AIAA PAPER 82-1048] A82-40417 STONE, C. R. Robust Kalman filter design for active flutter suppression systems A82-38442 STOPE, J. R. NASA research in supersonic propulsion - A decade of progress [AIAA PAPER 82-1048] A82-40417 STRACK, N. C. Propulsion opportunities for future commuter aircraft [AIAA PAPEB 82-1049] A82-40418 STRAIGHT, D. M. Performance of a 2D-CD nonaxisymmetric exhaust nozzle on a turbcjet engine at altitude [AINA PAPER 82-1137] A82-40420 STREATHER, B. A. Variable geometry aerofoils as applied to the Beatty B-5 and B-6 sailplanes A82-40968 STUBBO, P. B. Axisymmetric approach and landing thrust reverser impacts on usage and LCC A82-40892 SU, R. Applications to aeronautics of the theory of transformations of nonlinear systems [NASA-TM-84249] N82-30013 SU. N. An experimental investigation of leading-edge spanwise blowing A82-40988 SUCCI, G. P. The prediction of belicopter rotor discrete frequency noise A82-40553 SUGAMA, T. Water-compatible polymer concrete materials for use in rapid repair systems for airport runways [DE82-010994] N82-29 N82-29464 SUI. ¥. Efficient optimum design of structures - Program DDDU A82-38146 SUNDERMEYER, P. Investigations concerned with shifting pilot activities to a higher hierarchical stage of flight control 182-41453 SUTTON, L. R. Wind-tunnel evaluation of an aeroelastically conformable rotor [AD-A114384] N82-28260 SUZUKĪ, K. Pabrication of CPRP prototype structure for aircraft horizontal tail leading edge slat rail A82-39896

SWAN, N. M. The cost of noise reduction for departure and arrival operations of commercial tilt rotor aircraft [NASA-CR-137803] N82-29316 SWANN, D. Cost analysis of the discrete Address Beacon System for the low-performance general aviation aircraft community [AD-A112957] N82-28274 SHORTZEL, F. R. Advanced fighter technology integration program AFTI/F-16 A82-40900 SZODRUCH. J. Measurement and visualization of skin friction on the leeside of delta wings in supersonic flow A82-38785

Т

TADA, Y. Tests of CFRP spar/rib models with corrugated web A82-39890 TAKAGI, K. Development status of a composite vertical stabilizer for a jet trainer A82-39897 TANG, W. A recursive terrain height correlation system using multiple model estimation techniques [AIAA 82-1513] A82-389 **TARASENKO, V. P.** Problems in the simulation of correlation-extremal A82-38937 navigation systems A82-39403 TARZANIN, F. Wind tunnel modeling of rotor vibratory loads A82-40516 TAVELLA. D. A. Aerodynamics of an airfoil with a jet issuing from its surface [NASA-TM-84825] N82-29267 TAYLOR, G. H. Maximizing South Carolina's aviation resources: Identifying potentially profitable commuter airline routes, volume 2 [PB82-139353] N82-29277 TAYLOR, G. R. Delta electrical load analysis C-141B JACC/CF aircraft [AD-A113761] N82-28283 TAYLOR, L. W., JR. An estimation of aerodynamic forces and moments on an airplane model under steady state spin conditions [AIAA PAPER 82-1311] A82-39092 TAYLOR, R. B. Helicopter vibration reduction by rotor blade modal shaping A82-40514 Predesign study for an advanced flight research rotor A82-40525 TESSIER, N. J. Adaptation of pultrusion to the manufacture of helicopter components A82-40537 THELANDER, J. A. Aerodynamic development of laminar flow control on swept wings using distributed suction through porous surfaces A82-40894 THOMASSCE, P. G. The design of a RPV ground station simulator A82-39750 THOMSON, R. G. Computational and experimental studies of light twin aerodynamic interference A82-40930 TRORSNESS, C. B. Laboratory-scale simulation of underground coal gasification: Experiment and theory [DE82-0010631 N82-28470 TILLOTSON, K. D. Analysis and wind tunnel tests of a probe used to sense altitude through measurement of static pressure [AIAA PAPER 82-1361] A82-39128

TISCHLER, H. B.

TISCHLER, H. B. The effects of atmospheric turbulence on a guadrotor heavy lift airship [AIAA 82-1542] 182-39009 Handling qualities criteria for flight path control of V/STOL aircraft [AIAA PAPER 82-1292] A82-39081 TOBIAS, L. NASA/FAA Belicopter ATC simulation investigation of RNAV/MLS instrument approaches X82-40535 TOBNSKOETTER, H. Research on the behavior of a turbojet engine during internal and external disturbances with respect to early recognition of damage A82-40561 TORNON, J. Terminal information display system benefits and costs [AD-A114937] N82-29291 TOYOHIRA, S. Evaluation of CFRP prototype structures for aircraft A82-39892 TRANKLE. T. L. System identification of nonlinear aerodynamic models N82-29996 TREMPLER, N. Instrument landing systems /ILS/ at airports of the German Democratic Republic A82-39248 TRIBBSTEIN, H. Investigation of the unsteady airloads on a transport aircraft type airfoll with two interchangeable oscillating trailing edge flaps, at transonic speed and high Reynolds numbers A82-40909 TRISCHKA, J. W. Computer enhanced analysis of a jet in a cross-stream N82-29555 TRIYEDI, K. Problems related to the integration of fault tolerant aircraft electionic systems [NASA-CR-165926] N82-29022 TSUCHIYA, T. Water ingestion into axial flow compressors. Part Experimental results and discussion [AD-A114830] N82-29326 Effect of water on axial flow compressors. Part 2: Computational program [AD-A114831] N82-29327 TUPOLEV, A. H. The technological aspects of titanium application in the TU-144 aircraft structure A82-39718 TURBATU, S. The rectangular wing with semiinfinite span in nonlinear theory A82-39359 TURI, A. Advanced technologies applied to reduce the operating costs of small commuter transport aircraft A82-40915 TUTTLE, J. H., JB. The evolution of display formats for advanced fighters using multimode color CRT displays

U

UCHIKADO, S.	
Application of multivariable model follows:	ng
method to flight controller	
[AIAA PAPEE 82-1349]	A82-39120
UEAN, H. A.	
Atmospheric electricity hazards analytical	model
development and application. Volume 1:	
Lightning environment modeling	
[AD-A114015]	N82-29800
UNGAR, S. G.	
Scanner imaging systems, aircraft	
	N82-28715
UPTON, H. W.	
Micro-heads-up display	
	A82-40533

PERSONAL AUTHOR INDEX

USELTON, B. L. Summary of sting interference effects for cone, missile, and aircraft configurations as determined by dynamic and static measurements A82-40395 [AIAA PAPER 82-1366] VAIDYABATHAN, A. R. Evaluation of an asymptotic method for helicopter rotor airloads A82-40509 VAKILI, A. Wing-tip jets aerodynamic performance A82-40987 VAN DAN, C. P. The design integration of wingtip devices for light general aviation aircraft A82-40933 VANDEBLINDEN, H. H. Prediction of fatigue crack growth rates under variable loading using a simple crack closure model [NLR-MP-81023-0] N82-28685 VANDERVOOREW, J. A finite difference method for the calculation of transonic flow about a wing, based on small perturbation theory [NLB-TR-81031-U] N82-28263 VANENGEREN, J. A. J. Evaluation of an experimental technique to investigate the effects of the engine position on engine/pylon/wing interference [NLR-MF-81020-U] N82-28262 VANESSEN, A. A finite difference method for the calculation of transonic flow about a wing, based on small perturbation theory [NLR-TE-81031-0] N82-28263 VELKOFF, H. B. Effect of tip vanes on the performance and flow field of a rotor in hover A82-40511 VEBKATABAMAN, N. S. Prelaunch estimates of near Barth satellite lifetimes using guasi-dynamic atmosphere models - application to a proposed Brazilian satellite [INPE-2325-PRE/080] N82-293 N82-29347 VERHULST, K. Use of the cavitation tunnel at the Dutch Naval Experiment station (NSP), Wageningen for the determination of the acoustic source strength of propeller cavitation [TPD-908-720] N82-29116 VIGDORTCHIK, S. A. The technological aspects of titanium application in the TU-144 aircraft structure A82-39718 VINCENT, J. H. System identification of nonlinear aerodynamic models N82-29996 VINSON, J. B. On the state of technology and trends in composite materials in the United States A82-39882 VOGELESAEG, L. B. Application of a new hybrid material /ARALL/ in aircraft structures 182-40975 VOLODKO, A. M. The operation of aircraft and helicopters in difficult meteorological and environmental conditions A82-39295 VOOGT, N. Advanced aerodynamic wing design for commercial transports - Review of a technology program in the Netherlands A82-40985 W TD

•	Applications of parameter	estimation	ın	the study
	of spinning airplanes [AIAA PAPER 82-1309]			≥ 82-39090

A82-40888

WAGDI, M. N. An MLS with computer aided landing approach A82-39122 [AIAA PAPES 82-1352] WAGENKNECHT, C. D. An improved propulsion system simulation technique for scaled wind tunnel model testing of advanced fighters A82-41019 WAGNER, B. Estimation of simulation errors in the European Transonic Wind Tunnel /EIW/ A82-40950 WAGNER, S. N. Spanwise distribution of vortex drag and leading-edge suction in subsonic flow A82-41005 WALKUP. R. R. Support of the HH-65A - The impact of advanced technology of VTCL systems upon existing product support A82-40541 WALLIS, T. B. The use of small strakes to reduce interference (AIAA PAPES 82-1323) 182-39100 WANDERS, K. Nondestructive testing in aircraft construction using holographic methods A82-40977 WAYMIRE, W. J. Historical research and development inflation indices for Army fixed and rotor winged aircraft [AD-A114368] N82-28290 WBBBR, J. A. An analysis of a nonlinear instability in the implementation of a VIOL control system during hover SATAA 82-16111 A82-38990 WEDBEIND, G. Tail versus canard configuration - An aerodynamic comparison with regard to the suitapility for future tactical combat aircraft 182-40901 WEDBBRYER, E. Measurements of velocity distributions in the leading edge vortex of a delta wing by the laser-Doppier procedure A82-38786 WEINGARTEN, N. C. In-Flight investigation of large airplane flying gualities for approach and landing [AIAA PAPES 82-1296] A82-39083 **BEISS**, F. Gust load alleviation on Airbus A 300 A82-40881 WEISSHAAR, T. A. Dynamic stability of flexible forward swept wing aircraft [AIAA PAPER 82-1325] A82-39102 WELGE, H. R. Aerodynamic development of laminar flow control on swept wings using distributed suction through porous surfaces A82-40894 WELLS, W. R. Parameter estimation applied to general aviation aircraft - A case study [AIAA PAPEE 82-1313] A82-39094 WENTZ, W. H., JR. The use of small strakes to reduce interference drag of a low wing, twin engine airplane [AIAA PAPES 82-1323] A82-39100 Computational and experimental studies of light twin aerodynamic interference A82-40930 WENTZEL, H. P. Carbon fiber reinforced composite structures protected with metal surfaces against lightning strike damage [MBB-UD-340-82-0/E] N82-28364 WHINRAY, D. T. Fixed pattern noise correction for staring arrays in quidance systems A82-39190 WHITE, G. T.

An evaluation of helicopter autorotation assist concepts A82-40524 WEITE, J. E. The Shiryayev sequential probability ratio test for redundancy management [AIAA 82-1623] A82-38998 WHITE, R. P., JR. Wind-tunnel evaluation of an aeroelastically conformable rotor [AD-A114384] N82-28260 BHITBHURST, C. H., JR. Maximizing South Carolina's aviation resources: Identifying potentially profitable commuter airline routes, volume 2 F PB82-1393531 N82-29277 WHITLOW, J. B., JB. NASA research in supersonic propulsion - A decade of progress [AIAA PAPEB 82-1048] A82-40417 WICKER, H. Composite structures repair A82-41015 MICKS. S. M. Crashworthiness studies: Cabin, seat, restraint, and injury findings in selected general aviation accidents FAD-A1148781 N82-29275 WILCOX, J. R. United States Air Force shale oil to fuels, phase 2 [AD-A114531] N82-29476 WILDE, J. Minimization of the total costs incurred in the employment of passenger jet aircraft A82-39247 WILLIAMS, A. D. Age exploration in naval aviation A82-40962 WILLIS, J. B. Design basis for a new transonic wind tunnel [AD-A112899] N82-28311 WINGROVE, R. C. Analysis of general-aviation accidents using ATC radar records FAIAA PAPER 82-13101 A82-39091 WITTHER, P. Spin behaviour of the Pilatus PC-7 Turbor Trainer A82-40979 WOERNDLE. R. Calculation of the cross section properties and the shear stresses of composite rotor blades A82-38475 FOLL, D. Aircraft design for fuel efficiency **▲82-4097**3 WOOD, J. R. An alternate method of specifying bandwidth for flying qualities [(AIAA 82-1609] A82-38988 WOOD, R. M. An initial look at the supersonic aerodynamics of twin-fuselage aircraft concepts A82-41008 WORATSCHEK, R-HISS calibration, ice phobics and FAA R/D evaluations N82-28289 [AD-A114435] J. M. WU, Wing-tip jets aerodynamic performance A82-40987 WURZEL, D. A one-shot autoclave manufacturing process for carbon epoxy components A82-40935 WYETH, H. W. G. Fuel system protection methods N82-29283

X

XIONG, S. An experimental investigation of leading-edge spanwise blowing

A82-40988

Y

YAMAGUCHI, Y. Developments on graphite/epoxy T-2 nose landing gear door A82-39893

B-21

YAMAUCHI, P. Evaluation of CPBP prototype structures for aircraft A82-39892	
Developments on graphite/epoxy T-2 nose landing gear door	
A82-39893 Design, fabrication and gualification of the T-2 composite rudder	
A82-39894 Development of the advanced composite ground	
spoiler for C-1 medium transport aircraft A82-39895 Pabrication of CPEF prototype structure for	
aircraft hcrizontal tail leading edge slat rail 182-39896	
YAN, Y. Models for the motor state of VSCP aircraft electrical power system	
A82-40982 YANG, BX. A crack growth model under spectrum loading	
XANG, H. S. D.	
Design integration of CCW/USB for a sea-based aircraft A82-40972	
IBN, J. G. A new Transonic Airfoll Design Method and its	
application to helicopter rotor airfoil design A82-40507	
YIP, L. P. Wind-tunnel investigation of a full-scale canard-configured general aviation aircraft A82-41024	
YOUNG, G. D., JR. Terrain following/terrain avoidance system concept development	
[AIAA PAPEE 82-1518] A82-40428 Young, P.	
Cost analysis of the discrete Address Beacon System for the low-performance general aviation aircraft community	
[AD-A112957] N82-28274	
7	

.

Ζ

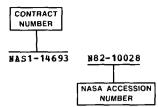
Z	
ZARETSKY, B. V.	
Advances in high-speed rolling-element bea	rings
[NA SA-TM-82910]	N82-28644
ZAVADOVSKII, N. IU.	
Numerical methods for solving boundary val	ue
problems for noncavitating and cavitatin	g flow
past wing profiles	
	A82-38722
ZEILBR, T. A.	_
Dynamic stability of flaxible forward swep	t wing
aircraft	
[AIAA PAPEE 82-1325]	A82-39102
ZHANG, J.	
Efficient optimum design of structures - P: DDDU	rogram
טעעע	A82-38146
ZHONG, W.	A02-30140
Efficient optimum design of structures - P	rogram
2220	A82-38146
ZHOU, B.	
An experimental investigation of leading-e	dge
spanwise blowing	-
•	A82-40988
ZOK, J.	
Civil helicopter propulsion system reliabi	
engine monitoring technology assessments	
	A82-40518

;

CONTRACT NUMBER IN

AERONAUTICAL ENGINEERING / A Continuing Bibliography (Suppl. 154)

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		317J	1					J
				N 8	2-	28	62	4	
AF	PROJ	•	1123						
						28			
				N8					
1.5	BDO 7				2-	29	33	2	
ÅF	PROJ	•	1900		n _	28	0 11	2	Í
AF	PROJ		2003		2-	20	04	2	
n.	FROO	•	2003	่ท8	2-	28	52	3	
AF	PROJ	. :	2307		~	20	22	2	
		•			2-	29	32	8	
				N 8					1
AF	PROJ	- 3	2402	:					
						29			
				N8					
					2-	29	80	2	
ÅF	PROJ	• 2	2480		<u>າ</u> -	20	11 C	2	1
				N 8 N 8					
AF	PROJ		2505		2-	20	40	-	
AT.	1.00	• •		่ง8	2-	28	26	8	
ÅF	PROJ	. :	3048		•	-0	20	-	
				N 8	2-	28	46	2	
AF	PROJ		3066		-				
	_			N 8	2-	28	28	6	
				N8	2-	29	32	6	
					2-	29	32	7	
A F	PROJ		3145						
				N8	2-	28	28	4	1
AF	PROJ	•	7231		~	~~	~	-	
				N8					
						28 30			
						30			
AF-	AFOS	R-'	77-3			50	05	2	
A1	A1 05		,, ,			38	28	1	
AF-	AFOS	R-(0004			-0	-0	•	
				N8		29	32	8	
AFC	SR I	ssi	A 80		00				- 1
				N 8	2-	29	46	4	
	/KM/			N 8	2-	29	11	6	
BMF	T-LA	W — 1	7901		_				
<u>-</u>		~ ~			2-	40	95	0	
CNE	-81,	00,	,202		2	20	,, ^	-	- 1
CNT	- 01	0.24	= 2 6	84	2-	38	40	5	1
CNP	-81,	U Z:	130,	07 84	2 -	^ ۱	٥٨	и	
DA	PROJ		1L1-]
DA	I NOU	•		N8					
				N8					
DA	PROJ		111-					-19	
			_	N8					1
DA	PROJ	•	112-						1
				N 8	2-				
DAA	G29-	79-	-G-0						
		~ •		N 8		28	30	1	1
DAA	K51-	80-	-C-0						
		- ^		84		40	52	4	1
DAA	K 80-	19-	-C-0		-		E 2	^	1
D # 19	¥ 8 0	7 0	-C-0	A8		40	23	v	
JAK	K80-	, ,-	-c-0	26 18		38	¢۵	7	
DR-	AC02	-74	SCR-				23	•	
- 4- 6				N8			46	4	
				- 0	-			-	1

DE-AC13-79GJ-01692
N82-29292 DE-FG02-80R5-10240
DE-FG02-80R5-10240 N82-29393
DE0AC04-76DP-00789
N82-29343 Dot-FA-79-WA-4344
N82-29291
DOT-FATQ-WAI-679
N82-29520 DOT-FA76WA-3788
N 82-282 7 4
DRET-78-456 A82-40946 EDA-04-06-03042-40
N82-29277
ETW-79/01/68730/143963
A82-40950 FMV-AU-1540 A82-40882
FNV-AU-1691 A82-40882
F08635-80-C-0086
N82-28842 F09603-80-C-0602
N82-28283
F09603-81-C-1953 N82-28283
F19628-80-C-0002
N82-29520
F29601-79-C-0011 N82-28624
F33615-76-C-5412
A82-41115 F33615-77-c-1172
N82-28523
F33615-78-C-0063 N82-28306
N82-29332
F33615-78-C-2024
N82-28462 N82-28463
N82-28464
F33615-78-C-2070 N82-28286
F33615-78-C-2079
N82-29476
F33615-78-C-2401 N82-29326
N82-29327
F33615-79-C-3017 A82-40970
F33615-79-C-3412
N82-29800 N82-29801
N82-29801
F33615-79-C-3616
N82-28291 F33615-79-C-3618
A82-39083
F33615-80-C-1077 N82-28292
F33615-80-C-2004
A82-40907
N82-28284 F33615-80-C-3003
A82-39105
F33615-80-C-3604 A82-40287
TOT- 40201

F33615-80-C-3617
A82-40428
F33615-81-K-3034
A82-40987 F33657-79-C-0508
A82-39744
NAGW-00218 A82-39098
A82-39142 NAG1-26 A82-40931
NAG1-134 A82-39141
NAG1-157 A82-39102 NAG2-38 N82-29312
NAG2-76 N82-29556
NAG4-1 A82-39125
NAG4-5 A82-38981 NAS1-15116 N82-28269
NAS1-15325 N82-28296
NAS1-15326 A82-38944
A82-39084 NAS1-15359 N82-29510
N82-29511
NAS1-15486 A82-38442 NAS1-15764 N82-29288
NAS1-16095 N82-28266
NAS1-16135 A82-39107
NAS1-16199 N82-28243 NAS1-16222 A82-40509
NAS1-16303 A82-40906
NAS1-16410 N82-28298 NAS1-16489 N82-29022
NAS1-16489 N82-29022 NAS1-16817 A82-40509
NAS2-7620 N82-29316
NAS2-8675 N82-30030 NAS2-10330 A82-39009
NAS2-10645 A82-40911
NAS2-10769 N82-29271
NAS2-10773 N82-29315 NAS2-10777 A82-40974
NAS3-20629 N82-28297
NAS3-20632 N82-28296 NAS3-22005 N82-29323 NAS8-34627 N82-28881
NASS-22005 N82-25525 NASS-34627 N82-28881
NCC2-13 A82-40517
NCC2-74 N82-29267 NCC2-76 N82-29111
NIVR-RB-1854 N82-28303
NIVR-1739 N82-28263
NIVR-1777 N82-28685 NIVR-1822 N82-28685
NIVR-1823 N82-28685
NSF ATM-77-23757 N82-29321
NSG-1583' A82-40555
NSG-1592 N82-28282
NSG-2396 N82-29556 NSG-4019 A82-39093
N00014-76-C-1136
N82-30013 N00014-78-c-0257
A82-38941
N00014-79-C-0010 A82-40949
N00014-81-C-0680
N82-28288
N 62 26 9-80-C-02 90 A 82-39 08 1
N62269-81-C-0231
N82-28552
N62269-81-C-0243 N82-28294
N62271-80-M-2504
N82-29325 W-7405-ENG-48
N82-28470
505-32-42 N82-28644 505-33-53-02 N82-28280
505-33-53-02 N82-28280 505-33-63-02 N82-29317
505-34-31 N82-30013
505-34-43-06 N82-29022 505-42-13-04 N82-28282
505-42-21 N82-28252
N82-29315
505-42-62 N82-29324 505-43-02 N82-28249
511-58-12 N82-28643

533-01-43-08 N82-29313

534-02-13-21 N82-28299

N82-29271 N82-29268 N82-29311

535-03-11 535-03-12

992-21-01

1. Report No. NASA SP-7037(154)	2. Government Accessi	on No	3. Recipient's Catalog	No.		
4. Title and Subtitle Aeronautical Engineering			5 Report Date November 1982			
A Continuing Bibliography (Su	pplement 154)		6. Performing Organization Code			
7. Author(s)			8. Performing Organization Report No.			
9. Performing Organization Name and Address	1	10 Work Unit No.				
National Aeronautics and Space Washington, D.C. 20546	1	11. Contract or Grant No.				
12. Sponsoring Agency Name and Address	· · · · · · · · · · · · · · · · · · ·	1	3. Type of Report and	Period Covered		
		1	4. Sponsoring Agency	Code		
15. Supplementary Notes	<u></u>	L	·			
16. Abstract	<u></u>	- <u> </u>				
T 1 C C C C C C C C C C				_		
This bibliography lists 511 reports, articles and other documents introduced into the NASA scientific and technical information system in October 1982.						
17. Key Words (Suggested by Author(s))	······································	18. Distribution Statement				
Aerodynamics Aeronautical Engineering Aeronautics		Unclassified - Unlimited				
Bibliographies						
19. Security Classif. (of this report)	20. Security Classif. (L of this page)	21. No. of Pages	22. Price*		
Unclassified	Unclassifie	d	148	\$5.00 HC		

*For sale by the National Technical Information Service, Springfield, Virginia 22161

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools to eleven special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA University of California, Berkeley COLORADO University of Colorado, Boulder DISTRICT OF COLUMBIA Library of Congress GEORGIA Georgia Institute of Technology, Atlanta ILLINOIS The John Crerar Library, Chicago

MASSACHUSETTS

Massachusetts Institute of Technology, Cambridge MISSOURI Linda Hall Library, Kansas City NEW YORK Columbia University, New York OKLAHOMA University of Oklahoma, Bizzell Library PENNSYLVANIA Carnegie Library of Pittsburgh WASHINGTON University of Washington, Seattle

NASA publications (those indicated by an '*' following the accession number) are also received by the following public and free libraries

CALIFORNIA

Los Angeles Public Library San Diego Public Library COLORADO Denver Public Library CONNECTICUT Hartford Public Library MARYLAND Enoch Pratt Free Library, Baltimore MASSACHUSETTS **Boston Public Library** MICHIGAN **Detroit Public Library MINNESOTA** Minneapolis Public Library and Information Center **NEW JERSEY** Trenton Public Library

NEW YORK Brooklyn Public Library Buffalo and Erie County Public Library Rochester Public Library New York Public Library OHIO Akron Public Library Cincinnati and Hamilton County Public Library Cleveland Public Library Dayton Public Library Toledo and Lucas County Public Library TEXAS **Dallas Public Library** Fort Worth Public Library WASHINGTON Seattle Public Library WISCONSIN Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 555 West 57th Street, 12th Floor, New York, New York, 10019.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division. Boston Spa. Wetherby. Yorkshire. England By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy of microfiche of NASA and NASA-sponsored documents. those identified by both the symbols # and * from ESA - Information Retrieval Service. European Space Agency, 8-10 rue Mario-Nikis, 75738 Paris CEDEX 15, France

National Aeronautics and Space Administration

Washington, D.C. 20546

Official Business Penalty for Private Use, \$300 MASA

National Aeronautics and Space Administration

Washington, D.C. 20546

SPECIAL FOURTH CLASS MAIL BOOK

10 1 SP-7037, 830112 S90569AU 850609 NASA SCIEN & TECH INFO FACILITY ATTN: ACCESSIONING DEPT P 0 BOX 8757 BWI ARPRT BALTIMORE MD 21240

NASA

POSTMASTER: If Undeliverable (Section 158 Postal Manual) Do Not Return



Postage and Fees Paid National Aeronautics and Space Administration NASA-451