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This supplement to Aeronautical Engineering — A Continuing Bibliography (NASA SP-7037) lists 431 reports, journal articles, and other documents originally announced in September 1980 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.

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FACTORS AFFECTING THE RETIREMENT OF COMMERCIAL TRANSPORT JET AIRCRAFT

Frank A Spencer Aug 1979 296 p refs
(Grant NsG 2149) (NASA CR 152308)
Aval NTIS HC A13/MF A01

The historical background of the technology and economics of aircraft replacement and retirement in the prejet era is reviewed in order to determine whether useful insights can be obtained applicable to the jet era. Significant differences between the two periods are noted. New factors are identified and examined. Topics discussed include concern over current policies regarding deregulation, regulatory reform, and retroactive noise regulations, financing and compliance legislation, aging, economic environment and inflation, technological progress, fuel efficiency, and cost, and a financial perspective of replacement decisions. A R H

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Effect of flow swirling on heat transfer in the cylindrical part of the prenozzle volume of a model chamber (Vlijanie zakrutki potoka na teplootdachu v tsihndncheskoi chasti predsoplovogo ob'ema model'noi kamery). F I Sharafutdinov, A I Mironov, and V K Shchukin (Kazanskii Aviatsionnyi Institut, Kazan, USSR), Inzhenerno-Fizicheskii Zhurnal, vol 37, Oct 1979, p 595 601 8 refs In Russian

Experimental results are presented on the hydrodynamics and heat transfer in swirling flow in a short orificed tube with straight blade turbulators. Data are correlated by the local simulation method, employing the maximum axial component of wall gas velocity and the torque momentum/axial momentum ratio at the turbulator outlet. B J
AERONAUTICAL
ENGINEERING

IAA ENTRIES


In two flights of the Concorde used for development purposes (G-BBDG) measurements of both ozone in ambient air and ozone in the air supplied to the cabin were obtained simultaneously. The measurements show that the concentration of ozone in the air at its point of entry into the cabin did not exceed 1% of the ambient concentration during high altitude Mach 2 cruise. However, when the aircraft commenced its descent, engine air bleed temperatures fell rapidly giving a corresponding reduction in the rate of ozone destruction while the aircraft was still at high altitude. Under these conditions, short-term excursions of the ozone level occurred in the fresh air entering the cabin, rising to a maximum of 0.14 ppmv. The measurements suggest that in cruise, the cabin ozone level is unlikely to exceed 0.01 ppmv, but in the descent phase there may be a brief period when the level could peak at higher values


Nonlinear natural vibration characteristics and the dynamic response of hingeless and fully articulated rotors of rectangular cross-section are studied by using the finite element method. In the formulation of response problems, the global variables are augmented with appropriate additional variables, facilitating direct determination of subharmonic response. Numerical results are given showing the effect of the geometric nonlinearity on the first three natural frequencies. Response analysis of typical rotors indicates a possibility of substantial subharmonic response especially in the fully articulated rotors widely adopted in helicopters

A80-40731 Aircraft noise annoyance contours Importance of overflight frequency and noise level R Rylander, M Bjorkman, U Ahlin (Goteborg, Universitet, Goteborg, Sweden), S Sorensen, and K Berglund (Statens Naturvardsverk, Stockholm, Sweden) Journal of Sound and Vibration, vol 69, Apr 22, 1980, p 583-595 24 refs Research supported by the Statens Naturvardsverk

The social survey studies to assess general annoyance and activity disturbances made in 38 areas around nine airports are presented. The noise exposure was expressed as the number of overflights/24 hr and dBA level from the nearest aircraft type. An increase in the number of overflights increased the extent of annoyance and activity disturbances up to the level of 50 overflights. The results indicate that the number of events is of limited value in describing the annoyance caused by aircraft noise exposure, and that the noise levels of aircraft are more important. The data suggest that a more accurate description and prediction of the extent of annoyance in a population can be obtained by using the dose-response relationships developed in this study


Application is made in the present paper of the recently developed relaxed aerodynamic energy concept and synthesis techniques to the definition of appropriate active control systems for the low-speed flutter model of the B-2707-300 supersonic cruise airplane. The effectiveness of the resulting activated systems is analytically tested for flutter suppression, wing root bending moment alleviation, and ride control (fuselage accelerations). The results obtained indicate that considerable increase in flutter speeds can be obtained by the various control systems, using a single trailing-edge control. In all cases, the flutter suppression control system led to a substantial reduction in both wing root bending moments and fuselage and wing accelerations


Neutron radiography is similar to X-ray inspection in that both depend upon use of radiation that penetrates some materials and is absorbed by others to provide a contrast image of conditions not readily available for visual inspection. X-rays are absorbed by dense materials, such as metals; whereas neutrons readily penetrate metals, but are absorbed by materials containing hydrogen. The neutron radiography has been successfully applied to a number of inspection situations. These include the inspection of explosives, advanced composites, adhesively bonded structures, and a number of aircraft engine components. With the availability of Californium 252, it has become feasible to construct mobile neutron radiography systems suitable for field use. Such systems have been used for in-situ inspection of flight line aircraft, particularly to locate and measure hidden corrosion

A80-40803 Experimental study of the interaction between a rapid subsonic aircraft wing and an engine nacelle at high dilution rate (Etude experimentale de l’interaction entre une voilure d’avion subsonique rapide et une nacelle de moteur a haut taux de dilution) P Levert (ONERA, Chaltilion-sous-Bagneux, Hauts de Seine, France) (NATO, AGARD, Symposium on Subsonic/Transonic Configuration Aerodynamics, Munich, West Germany, May 5-7, 1980) ONERA, TP no 1980-35, 1980 12 p 16 refs In French

An experimental wind tunnel study of wing-nacelle-jet-pylon interference in transonic flow has been conducted. The nacelle models represent a turbofan by means of two compressed air jets,
and the wing is located between the sidewalls of the test section, the drag coefficient of the wing was obtained by a wake survey. The following parameters were studied wing/nacelle position, upstream Mach number (from 0.3 to 0.8), jet pressure ratio, the presence or absence of the pylon, and the type of nacelle. It is found that wing/nacelle interference can be studied by means of total thrust drag analysis as a function of various parameters.

A80-40804  # Expected improvements from wind tunnel model testing at high angle of attack (Améliorations envisagées pour resoudre les problèmes rencontre au cours d'essais à grande incidence de maquettes en soufflene) X Vauchet (ONERA, Chatillon sous-Bagneux, Hauts-de-Seine, France) (NATO, AGARD, Symposium on Subsonic/Transonic Configuration Aerodynamics, Munich, West Germany, May 5-7, 1980) ONERA, TP no 1980-36, 1980 23 p 18 refs In French

Several problems were encountered during tests at high angle of attack in wind tunnels. Three are selected here: wall interference, sting interference, and vibrations beyond the stall. The state of the art on wall interference, systematically applied to the development tests, is shown with several comparisons between wind tunnels or between flight and tunnels tests. The models used in unconfined flow point out some deficiencies as regards apex vortex and active jets. Other correction methods have developed to palliate the assumptions and limits of the classical method. Thus AMD RA works on the vortex lattice method and ONERA on the model signatures on the test section walls. This method, already used in 2D flow for development tests with ventilated cylindrical test sections, is extended to the 3D case as a first stage for distorted but non-streamlined walls (Author)

A80-40805  # A fast method to control tackiness of fiber resin prepregs J P Favre (ONERA, Châtillon sous-Bagneux, Hauts-de-Seine, France) (Society for the Advancement of Material and Process Engineering, Symposium, 25th, San Diego, Calif., May 6-8, 1980) ONERA, TP no 1980-37, 1980 13 p 6 refs Research supported by the Delegation Generale a la Recherche Scientifique et Technique

Tackiness of prepregs has been demonstrated to be related very closely to the area of contact between the material to be tested and a glass prism pressed against it. Using an optical mechanical tack tester a series of commercial and specifically prepared materials have been tested. The method has been established as the most convenient means to compare materials in terms of tackiness (Author)

A80-40808  # Influence of the heterogeneity of flow at the rotor outlet on the performance of the diffuser of a centrifugal compressor (Influence de l'hétérogénéité de l'écoulement à la sortie du rotor sur les performances du diffuseur d'un compresseur centrifuge) H Hus (Societe Hispano Suiza, Saint Cloud, Hauts-de-Seine, France) and C Fradin (ONERA, Châtillon sous-Bagneux, Hauts-de-Seine, France) (NATO, AGARD, Meeting on Centrifugal Compressors, Flow Phenomena and Performance, 5th, Brussels, Belgium, May 7-8, 1980) ONERA, TP no 1980-40, 1980 13 p 6 refs In French

The performance of the diffuser of a centrifugal compressor is analyzed for the case of nonuniform inlet flow. Pressure transducers and hot-wire anemometers are used to measure instantaneous pressure and velocity. The detailed structure of the flow field is thus provided, and the effect on diffuser performance of nonuniformities is estimated. It is shown that the pressure losses are directly related to the nonuniformities. Also found was the insufficiency of the honeycombs to give a homogeneous flow at the outlet of the rotor above all with regard to the flow velocity (Author)

A80-40819  # Flight tests for the study of radioelectric perturbations of electrostatic origin (Essais en vol pour l’étude des perturbations radioelectriques d'origine electrostatique) P Laroche (ONERA, Châlillon-sous-Bagneux, Hauts-de-Seine, France), R Weber (Société Nationale Industrielle Aéronautique, Suresnes, Hauts-de-Seine, France), and D Gall (Toulouse, Centre d’Essais Aéro- nautiques, Toulouse, France) (NATO, AGARD, Technical Meeting on Electromagnetic Effects of /Carbon/ Composite Materials upon Avionics Systems, 39th, Lisbon, Portugal, June 16-19, 1980) ONERA, TP no 1980-58, 1980 12 p 8 refs In French

Flight tests on a Meteor NF11 aircraft for the investigation of radioelectric perturbations due to electrostatic aircraft charging are presented. Following a review of the types of electrostatic phenomena (arc discharges, rampant discharges, corona discharges) giving rise to charging and antistatic treatments for the dielectric and conducting regions of aircraft surfaces, the objectives and principles of the flight testing program are discussed. Instruments used in the measurement of aircraft electric potential, the evaluation of triboelectric charge current and the measurement of parasitic radio noise, static discharge currents, and the surface potentials and currents over dielectric surfaces are presented. Results of preliminary ground tests on the high-voltage polarization of the aircraft, and initial flight test results indicating the significance of electrostatically induced radioelectric perturbations, the frequencies most affected, the effectiveness of static dischargers and the presence of rampant discharges over dielectric surfaces are presented.


An inflight program was undertaken to detect phenomena associated with or near the lightning. These include the lightning current, skin currents at different points of the structure, external and internal electromagnetic fields, overvoltages on various onboard equipment and circuits, and various sensors detecting the characterization of the electric state of the aircraft during the lightning. In addition, the behavior of the composite material structure panels with regard to electromagnetic radiation was studied in order to define protection systems (Author)

A80-40892  # Force equilibrium and performance balance of aircraft longitudinal motion graphically presented in the Korhammer diagram (Gleichgewicht und Leistungsbilanz der Flugzeug-langsam- bewegung grafisch dargestellt im Korhammer-Diagramm) R Brockhaus and G Schanzer (Braunschweig, Technische Universität, Braunschweig, West Germany) Zeitschrift für Flugwissenschaften und Weltraumforschung, vol 4, May-June 1980, p 128-136 11 refs In German

A graphic representation showing the solution of the nonlinear equations of motion of an aircraft is presented, in which the vector polygon of longitudinal forces is linked with the Lihenthal polar. The addition of the triangle of velocity vectors as well as of rectangles representing the balance of power gain and power deficit leads to a very comprehensive representation of the physical relations not only in stationary but also in accelerated flight in the moving atmosphere. It is shown how the equilibrium of aircraft energy as well as the energy transfer from the surrounding air to the aircraft (gliding flight, windshear effects) is connected to the forces and variables which characterize the aircraft motion, especially with the measurable variables load factor and potential flight path angle (‘energy angle’). The clearness of the graphs called ‘Korhammer diagram’ is demonstrated through some typical examples of actual interest (Author)

Starting with a well known theorem by Oswatitsch, a formula for the relaxation drag of a body in a relaxing gas flow is developed, and the relaxation drag of a single profile for arbitrary Damköhler numbers is studied. Since very small and very large Damköhler numbers can be found for the limiting cases, the transition between these cases is of interest. Profiles are found which have an optimum shape minimizing the relaxation drag, and two examples are given. Finally, by means of a numerical calculation it is shown that because of the possible order of magnitude of the relaxation drag an optimization can be of importance for applications.

A80-40897 The influence of the thrust direction on the level flight of light aircraft (Der Einfluss der Horizontalflug von Leichtflugzeugen) O Wagner (München, Technische Universität, München, West Germany) Zeitschrift für Flugwissenschaften und Weltraumforschung, vol 4, May–June 1980, p 162-168 5 refs In German

The flight performance of an aircraft depends on the direction of the installed thrust. For light aircraft with reciprocating piston engines driving propellers and with a flight envelope which is independent of Mach number, the effects of the installed thrust angle are explored theoretically for range and endurance. A parabolic polo drag curve with the Mach number independent coefficients C sub W0 and k as well as constant specific fuel consumption and constant propeller efficiency at normal flow are assumed. The results are demonstrated with a sample aircraft.

A80-40899 Calculation of transonic viscous flows past wing profiles (Berechnung transonischer, reibungsbehafteter Profilströmungen) D Hanel Rheinisch-Westfälische Technische Hochschule, Aerodynamisches Institut, Abhandlungen, no 24, 1980, p 50-55 6 refs In German

In the present paper, the transonic viscous flow past wing profiles is calculated by obtaining finite-difference solutions of the potential equation and the boundary layer equations. The accuracy of the solutions is assessed by comparing a solution of a simplified potential equation by Murman’s (1973) method with a solution of the exact potential equation by Jameson’s (1976) method. An implicit algorithm is applied to the boundary layer equations, and the solutions are joined through the boundary conditions.

A80-40913 Calculation of compressible inlet flows (Berechnung kompressibler Einlaufströmungen) U Giese Rheinisch-Westfälische Technische Hochschule, Aerodynamisches Institut, Abhandlungen, no 25, 1980, p 52, 53 6 refs In German

It is noted that experimental investigations of the flow in the inlet of safety valves have shown that under certain conditions adverse inlet configuration can lead to operating difficulties. As a result of flow separation, the flow in the inlet can be accelerated to supersonic speeds, which results in static pressure losses and, under certain conditions, in shock oscillations. A study is presented in which the wall pressure distribution is determined for a given inlet contour. In addition, the most gradual curve radius which the flow will follow is determined.

A80-40944 The energy problem - Its effect on aircraft design IV - The unforeseeable future W Tye Aircraft Engineering, vol 52, June 1980, p 4-8

Future supplies of energy for aviation and their effect on aircraft design are considered. Attention is given to proven and ultimately recoverable reserves of oil and gas and to the use of coal for fuel oil. Also discussed are advanced aircraft concepts, including laminar flow and the associated requirements of the porous surfaced wing and the suction system. In addition, the use of liquid hydrogen and of multibladed turbo-propellers with large blade chords, small thickness and high tip speeds, efficient up to a Mach number of 0.8, is considered.

A80-40945 Fuel economy in the airlines T Ford Aircraft Engineering, vol 52, June 1980, p 5-8

Fuel savings during flight procedures are examined with regard to takeoff, climb optimization and automatic flight management using autopilot and autothrottle systems. The importance of the leading edge to the flow characteristics is also considered, along with engine design, development and maintenance. The research into terminal area capacity and efficiency, the improvement of approach and landing capability in adverse weather and the reduction of noise impact through operating procedures is discussed. In addition, the improvement of aircraft fuel efficiency by recovering deterioration losses and by incorporating drag reduction/engine fuel saving modifications is considered.

A80-40946 Aircraft noise monitoring at airports K Bauermeister and U Donner Aircraft Engineering, vol 52, June 1980, p 16-18

A Siemens aircraft noise monitor is described, which consists of a sound measuring device as well as data transmission, processing, printout and analysis. Attention is given to the requirements of the monitor microphones, the digital transmission system and the use of a microcomputer. It is noted that an individual reference level can be set in for every measurement point, and that a takeoff/landing evaluation can be carried out from the time sequences of the noise events.

A80-40966 Contract research on aerodynamic problems of turbomachinery vanes (Auftragsforschung an aerodynamischen Problemen von Turbomaschinenbeschauflungen) H Hohessel and R Kock (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Entwurfsaerodynamik, Braunschweig, West Germany) DFVLR-Nachrichten, June 1980, p 3-7 In German

A survey of some of the research performed by the DFVLR under contract to the aerospace industry is presented. It is shown that the characteristics of the test site employed, the high velocity grid wind tunnel in Braunschweig, enable the study of the physics of vane grid flow in axial turbomachinery, and thus the pursuit of basic technological research. Such investigations are discussed and examples of new investigations of highly loaded turbine and compressor grids are given.

A80-40972 Aircraft turbine oils - Problems and future aspects (Flugturbolene - Probleme und Zukunftsperspektiven) E Jantzen (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Technische Physik, Stuttgart, West Germany) DFVLR-Nachrichten, June 1980, p 32, 33 In German

Attention is given to the fact that the substantial success in recent years has been accomplished in this manner. It is shown that this has been made possible for the most part by improved cooling of all parts exposed to hot gases, especially the high pressure turbine vanes. The improvement of current cooling techniques as well as the development of new cooling technology is described.

A80-40977 On film-cooling of turbine blades (Zur Filmkühlung von Turbinenblättern) H Kruse (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Antriebs technik, Cologne, West Germany) DFVLR-Nachrichten, June 1980, p 8-11 In German

The demand for improved economy and performance of gas turbine engine powerplants as well as stationary installations has led to higher combustion temperatures and to higher pressures. Attention is given to the fact that the substantial success in recent years has been accomplished in this manner. It is shown that this has been made possible for the most part by improved cooling of all parts exposed to hot gases, especially the high pressure turbine vanes. The improvement of current cooling techniques as well as the development of new cooling technology is described.

A80-40972
Experiments with transonic profiles (Transsonische Profile im Experiment) E Stanewsky (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Experimentelle Stromungsmechanik, Göttingen, West Germany) DFVLR-Nachrichten, June 1980, p 34-40 In German

Information is presented on the continuing need for wind tunnel testing of transonic wing profiles and solutions to the problems experienced. It is shown that such consideration can be extended for complete aircraft models. The discussion covers the need for wind tunnel testing, noting the importance of measuring maximum lift, the onset of transonic resistance increase, and the onset of wing oscillation. Consideration is given to general and expanded wind tunnel testing including examples of actual testing. Finally, problems of wind tunnel testing and the future outlook are discussed.


A technique of system architecture for air traffic control is described which seeks the correct balance between user requirements, technological capability, financial constraints, compatibility with other systems and human resources. The use of computer based fast time simulation techniques for testing and optimizing the route structures and procedures is considered with regard to radar coverage and communications. Attention is also given to the problems of translating operational to technical requirements.

The design of an air navigation services system F W Fischer (Studienorganisation Flugsicherung, West Germany) and H Fischer (The Controller, vol 19, June 1980, p 17-21

The conditioning factors for the design of an air navigation services (ANS) system related to its safety, capacity and capability are presented, with attention given to the modernization and upgrading of present ANS systems. Compatibility of the ANS system with the adjacent systems in neighboring countries and with their system functions is considered along with national air traffic safety. Also discussed are operational philosophy and general communications considerations with respect to government decisions regarding ANS.

Condition evaluation of jointed concrete airfield pavement M Y Shahin (US Army, Construction Engineering Research Laboratory, Champaign, Ill), M I Darter (Illinois, University, Urbana, Ill), and S D Kohn (Michigan, University, Ann Arbor, Mich) ASCE, Transportation Engineering Journal, vol 106, July 1980, p 381-399

The paper describes the newly developed Air Force Pavement Condition Index (PCI) and the overall procedures for its field utilization. The basic objectives of the PCI are to (1) provide a standard measure of pavement condition in terms of both structural integrity and surface operational condition, (2) provide the pavement engineer with an objective and rational basis for determining maintenance and repair needs and priorities, and (3) provide a warning system for early identification of major repair requirements.


The paper describes HiMAT, a highly maneuverable research vehicle designed for 1990's fighters capable of a sustained 8g turn at Mach 0.9, at 30,000 ft. It utilizes a close coupled canard, vortex strakes, a variable-camber wing, drag modulation, cambered fuselage, and integrated propulsion and flight controls. HiMAT has five pairs of control surfaces: ailerons, elevators, canard flaps, and fins. The elevators, elevators, and canard flaps provide pitch and direct-lift control, and the canard Flaps and fins generate direct sideforce. Composites make up 30% of HiMAT's structural weight, aerodynamically tailored surfaces are carbon-fiber with a composite honeycomb filler. With a 3370 lb launch weight, HiMAT offers 3.7 minutes at Mach 1.4 at 40,000 ft, rising to the 22 minute test time at Mach 1.9 at 40,000 ft, it is carried aloft under the wing of a B-52 and released at Mach 0.7 at 40,000 to 45,000 ft. It has an endurance of over an hour, although most test flights will last about 30 minutes.


The paper updates the Mirage 2000 program which changed its main radar for the primary interception, the Radar Doppler Impulsions (RDI) to the Radar Doppler Multifunction (RDM). RDM is better suited to ground attack, but retains good air-to-air performance in clear conditions. Automatic terrain-following navigation in all weathers will be possible for the third Mirage role which is now flying in a Vautour used for ground mapping research. Mirage 2000 has built-in active and passive ECM systems including radar receiver, with aerials in the fin and forward-facing aerials in the wing-tips, it is limited to Mach 2.1 by its structural materials, although it can briefly surge to 2.3. The basis of Mirage 2000 avionics system is the EMD-Sagem 2084 central computer, plus the Digibis digital data highway linking all on-board avionics systems.


Recently published data for a number of simply constructed sailwings has been used in a numerical analysis of the performance of flexible-bladed Darneus rotors. To facilitate comparisons, the analysis has been repeated using data for a solid aerofoil. An improved understanding of the operation of sailwing rotors has been gained and some criteria for their design are reached. It is concluded that such rotors can reliably self-start and achieve a higher power coefficient than so far reported, although still rather lower than can be obtained with solid blades, but that their full potential will not be realized in very small scale applications.


Stall in compressors can be associated with the initiation of several types of fluid dynamic instabilities. These instabilities and the different phenomena, surge and rotating stall, which result from them, are discussed in this paper. Assessment is made of the various methods of predicting the onset of compressor and/or compression system instability, such as empirical correlations, linearized stability analyses, and numerical unsteady flow calculation procedures. Factors which affect the compressor stall point, in particular inlet flow distortion, are reviewed, and the techniques which are used to predict the loss in stall margin due to these factors are described. The influence of rotor casing treatment (grooves) on increasing compressor performance in rotating stall is emphasized because of the very different consequences on recoverability. The structure of the compressor flow field during rotating stall is examined, and the prediction of compressor performance in rotating stall, including stall/unstall hysteresis, is described.


Research sponsored by the Bundesministerium der Verteidigung.
Experimental results are presented of the effects of flow distortions, generated by a compressor cascade, on the performance of a short annular dump-diffuser type combustor inlet. The distance between the cascade and the diffuser entrance plane was varied. The loss increase substantially when this distance becomes small. In most of the tests, the losses turned out to be minimum at a distance of about two blade-chord lengths. When the cascade was removed, the losses were higher than this minimum value. Evidence is presented that the radial blockage factor rather than the total blockage factor determines the magnitude of the losses. (Author)

A80-41159 # Aircraft configuration optimization for ground attack mission P Ramamoorthy and A K Sinha (National Aeronautical Laboratory, Bangalore, India) Journal of Aircraft, vol 17, July 1980, p 538-542

The optimum aircraft wing configuration for a low-level ground attack mission is investigated. Wing planform variables, wing thickness ratio and wing loading were optimized to achieve the maximum radius of action for a given amount of fuel and armament, assuming fuselage and empennage distortion data is described. An overall configuration is presented, which increases the radius of action by 5 nautical miles without violating preset constraints on design variables, take-off distance or all-up weight. The inclusion of design variables characterizing the fuselage and empennage and further constraints into the procedure are under investigation. A L W


The effect of adding structural damping to nacelle strut side bending on a wing/nacelle hump type flow flutter mode is demonstrated. A flutter analysis is performed for a twin engine aircraft design with high bypass fan engines strut mounted on the wing with damping added to modify the behavior of the nacelle strut from that of a tuned mass damper to that of a tuned viscoelastic damper. It is found that the addition of damping increases the bandwidth of the nacelle side bending frequency in which the nacelle tuning suppresses flutter, while increasing flutter speed at some of the other nacelle side bending natural frequencies. It is recommended that structural damping be considered for designs requiring the suppression of chimney type flutter modes, and that the effects of structural damping be included in dynamic gust, fatigue and flutter calculations. A L W


Planning the development of technology applicable to military airbreathing propulsion systems is dominated by unknowns. Most significant among these unknowns is the uncertainty regarding desired characteristics of future systems. Effective planning must recognize these uncertainties and efficient use of development resources demands that technical goals established for the development of component technologies be consistent with maximum exploitation of advancing technology, while maintaining flexibility. A systematic method of identifying sets of consistent component technology goals, which maximize exploitation of advancing technology and maintain flexibility of application is discussed. (Author)
some of the improvements that have been made over the past decade are pointed out, and some future changes and uses of the system are discussed.

A80-41182 // Evaluation of a statistical method for determining peak inlet flow distortion using F-15 and F-18 data


Methods have been developed for significantly reducing the cost of determining inlet peak dynamic distortion values for advanced design purposes. These methods are not intended to replace the data acquisition and reduction systems required for final assessments of inlet/engine compatibility on aircraft development programs. However, they do satisfy the critical need for a prediction procedure for advanced design investigations that enables us to predict peak distortion levels using small scale models in small wind tunnels. Cost reductions are achieved by taking advantage of the statistical characteristics of the dynamic pressure and distortion data. Comparisons with measured distortion data show good agreement, thereby validating the statistical approach.

A80-41183 // Effect of aircraft power plant usage on turbine engine relative durability/life


A study to identify the causes of durability problems of gas turbine engines of recently developed fighter aircraft systems is reported. The differences between engine design usage and actual flight usage were evaluated, as were their effect on the relative durability/life of engine turbine components, and the effects of engine application and mission content on the relative cyclic and steady state durability of these components. Results have shown that military transport engine usage is more severe than commercial aircraft engine usage and that fighter aircraft usage is more severe than bomber aircraft usage for the specific engines tested. In both cases, the increased severity is due to higher cyclic usage content. In addition, aircraft training missions were found more severe than combat missions.

A80-41187 // Flight test of all-electronic propulsion control system


The paper describes the JT9D 7/747 flight test program for an all-electronic propulsion control system. Consideration is given to pilot controls and displays, an electronic engine control system, engine performance, and maintenance.

A80-41188 // Accelerating reliability growth of electronic propulsion controls in the 1980's


The paper deals with Combined Environmental Reliability Test (CERT), a system of real-time, end-assembly, electronic hardware tests. Objectives of CERT testing are explained along with technical approach and pictures of physical facilities. Attention is given to computer controls, safety features, and performance envelopes.

A80-41189 // Evaluating potential VCE control modes with respect to performance, stability, and engine life utilization

R C Boyer (General Motors Corp., Detroit Diesel Allison Div., Indianapolis, Ind.) AIAA, SAE, and ASME, Joint Propulsion Conference, 16th, Hartford, Conn., June 30-July 2, 1980, AIAA Paper 80-1120 7 p

The modern Variable Cycle Engine permits the control designer great latitude in the development of engine control modes. A method of evaluating potential control modes with the respect to mission performance, engine life, and engine stability during the preliminary design phase of the engine is presented. Control optimization criteria are evaluated with a steady-state engine simulation. Potential control schedules are used to generate steady-state data throughout the flight envelope. Missions are then simulated with the steady state data and mission time histories are analyzed to determine mechanical and thermal low cycle fatigue and stress rupture effects on critical engine components. (Author)

A80-41190 // Investigation of advanced thrust vectoring exhaust systems for high speed propulsive lift


The paper presents the results of a wind tunnel investigation conducted at the NASA-Langley research center to determine thrust vectoring/induced lift characteristics of advanced exhaust nozzle concepts installed on a supersonic tactical airplane model. Specific test objectives include (1) basic aerodynamics of a wing body configuration, (2) investigation of induced lift effects, (3) evaluation of static and forward speed performance, and (4) the effectiveness of a canard surface to trim thrust vectoring/induced lift forces and moments.

A80-41191 // A comparison of jet temperature effects on afterbody drag with those from jet molecular weight and nozzle area ratio variations


Experiments have been conducted to further assist in developing a wind tunnel test technique to allow simulation of or correction for jet exhaust temperature effects on afterbody drag. Integrated afterbody pressure drag data were acquired on a strut-mounted model, with free stream Mach numbers from 0.6 to 1.2 with nozzle area ratio and jet molecular weight as variables. A method for estimating temperature effects on afterbody drag has been developed. (Author)

A80-41193 // Development of a Kevlar/PN1-15 reduced drag DC-9 nacelle fairing


The paper describes an advanced composite fairing designed to reduce drag on DC-9 nacelles as a part of the NASA Engine Component Improvement Program. This fairing is the aft enclosure for the thrust reverser actuator system on JT9D engine nacelles and is subjected to a 500 F exhaust flow during the reverse thrust. A reduced drag configuration was developed by using in-flight tuft surveys for flow visualization in order to identify areas with low-quality flow, and then modifying the aerodynamic lines to improve the flow. A fabrication method for molding the part in an autoclave was developed, this material system is suitable for 500 F. The resultant composite fairing reduces the overall aircraft drag 1% with a weight reduction of 40% when compared with a metal component.

A80-41194 // Reduced bleed air extraction for DC-10 cabin air conditioning


Contract No. F33615-78-C-2021

The paper describes the JT9D-7/747 flight test program for an all-electronic propulsion control system. Consideration is given to pilot controls and displays, an electronic engine control system, engine performance, and maintenance.

A80-41192 // Evaluation of a statistical method for determining peak inlet flow distortion using F-15 and F-18 data

ence, 16th, Hartford, Conn., June 30-July 2, 1980, AIAA Paper 80-1197 8 p

It is noted that a significant fuel savings can be achieved by reducing bleed air used for cabin air conditioning. Air in the cabin can be recirculated to maintain comfortable ventilation rates but the quantity of the air tends to decrease due to entrainment of smoke and odors. Attention is given to a development system designed and fabricated under the NASA Engine Component Improvement Program to define the recirculation limit for the DC-10. It is shown that with the system, a wide range of bleed air reductions and recirculation rates is possible. A goal of 0.8% fuel savings has been achieved which results from a 50% reduction in bleed extraction from the engine.

M E P


Zero-length, slotted-lip inlet performance and associated fan blade stresses were determined during model tests using a 20-inch diameter fan simulator in the NASA-LeRC 9 by 15-foot low-speed wind tunnel. The model configuration consisted of various contraction ratio, slot width, circumferential extent of slot fillers, and length of a constant area section between the inlet throat and fan face. Inlet configurations having contraction ratios of 1.2 and 1.3 satisfied all critical low-speed inlet operating requirements for a fixed horizontal nacelle and tilt-nacelle type subsonic V/STOL aircraft. Respectively, relative to a conventional axisymmetric nacelle inlet, the zero-length, slotted-lip inlet has a 27 percent smaller inlet lip contraction ratio, an 83 percent shorter total length, and a 5 percent smaller maximum cowl diameter. (Author)


This paper presents the results of stability analyses of the YF401 engine in the XVF 12A V/STOL aircraft. A description of scale model test data, including instrumentation and the test program, is presented. The method of screening the inlet model data on-line with an analog distortion factor calculator is reviewed. XVF-12A aircraft tests are then described including the instrumentation used to establish thermal reingestion levels. YF401 stability predictions are presented for selected operating conditions throughout the XVF-12A flight envelope. Temperature distortion during hover operation is shown to be a significant stability consideration, although less severe than pressure distortion. Study results predict compatible engine aircraft operation throughout the flight envelope. Predictions of compatible sea-level static operation have been confirmed by XVF-12A experience to date. (Author)


A Navy engine maintenance model (NAVEMM) developed to simulate the maintenance history of Naval aircraft engines is described. The NAVEMM is a Monte Carlo simulation model that tracks the events during the maintenance life of Naval aircraft engines. V T


Navy supported research

A complete calculation procedure for predicting turbulent mixing and burning in a scramjet combustor with a central fuel jet from a gas generator has been developed. All the important physical and chemical processes have been modelled, including for the first time the upstream influence of heat release in the duct. Calculations for a representative engine with Sheldyne H fuel at Mach 4 and 7 indicate that a combustor 1-2 m long is sufficient to insure complete heat release but that substantial nonuniformity of the combustor exit flow would still exist. (Author)


The challenges in combustion, facing the industry at the beginning of this decade are discussed, including improved combustor durability, broad-based and synthetic fuels, and the design and development process itself. Their origins and salient features are briefly described, and areas where more knowledge is required are highlighted. V T

A80-41366 # Nonlinear aeroelasticity of interfering surfaces Z Kopriva (Vojenska Akademie, Brno, Czechoslovakia) in International Conference on Nonlinear Oscillations, 8th, Prague, Czechoslovakia, September 11-15, 1978, Proceedings Volume 1 Prague, Academia, 1979, p 403-408 5 refs

The manner of arriving at the nonlinear aeroelastic characteristics of the system consisting of a supporting surface, control and auxiliary tab is outlined. The nonlinearity of the system is caused by flat spots in the hinges. The domain of unstable aeroelastic vibrations (flutter) is investigated. Theoretical analysis was made by an analog computer and simultaneously an experiment on an elastic model in aerodynamic tube was elaborated. The quantitative evaluation of the research shows a dangerous decrease of critical velocities of aerodynamic phenomena in such a configuration where nonlinearities are present. (Author)

A80-41369 # A glider in 2-dimensional gusts L Laudanski and J Kanowski (Politechnika, Rzeszow, Poland) in International Conference on Nonlinear Oscillations, 8th, Prague, Czechoslovakia, September 11-15, 1978, Proceedings Volume 1 Prague, Academia, 1979, p 423-428 8 refs

New numerical results give a picture of the behavior of a sailplane under action of vertical atmospheric gusts in a horizontal steady flight have been obtained for the Zefir 3 glider. The response has been represented by the rms, the gust alleviation factor and other averages describing samples of accelerations of five chosen points on the glider. The integral scale of turbulence has been the main model parameter. The results show the span-wise variations of gusts and their implications on the gust response. (Author)

A80-41421 # Conditions for exciting natural vibrations in a tricycle rolling along a straight line (Uslovna vozbuzdena avtokole-bani pn priamolinem kachenn tritsikla) L G Lobas (Akademna Nauk Ukrainskoi SSR, Instiut Mekhaniki, Kiev, Ukrainian SSR) in International Conference on Nonlinear Oscillations, 8th, Prague, Czechoslovakia, September 11-15, 1978, Proceedings Volume 2 Prague, Academia, 1979, p 942-954 9 refs

A major problem in the analysis of the motion of a tricycle is the correct representation of the interaction of the wheels and the road surface. In the present paper, the problem is attacked using several approaches. One is based on the assumption of classical nonholonomic rolling constraints, another approach is based on a wheel drift.
hypothesis, while in the third approach, the problem is analyzed within the framework of Keldysh's theory. The results are of interest to aircraft takeoff problems. V P

A80-41474


This paper summarizes recent heat pipe avionic thermal control hardware developments and system studies. Concepts which integrate heat pipe avionic thermal designs with accepted avionic packaging approaches are described and compared to current designs. Prototype heat pipes, their measured thermal performance, and their integration into avionic packaging concepts are described. Results of studies which define aircraft benefits for heat pipe avionic thermal control systems are presented. These avionic thermal control systems include heat pipes, liquid coolants, and closed cycle environmental control system. Substantial increases in avionic reliability and reductions in aircraft mass, fuel requirements, and life cycle costs are demonstrated for these systems. (Author)


Under the NASA-sponsored Energy Efficient Engine (EEE) Project, technology is being developed which will significantly reduce the fuel consumption of turbofan engines for subsonic transport aircraft. One technology concept being pursued is active control of rotor tip clearances. Attention is given to rotor tip clearance considerations and an overview of preliminary study results as well as the General Electric EEE clearance control approach is presented. Finally, potential fuel savings with active control of rotor clearances for a typical EEE mission are predicted. M E P


The infrared characteristics of three exhaust nozzles were investigated. The nozzles tested included a single axisymmetric convergent nozzle, a twin axisymmetric convergent divergent nozzle, and a twin 2-D wedge nozzle. Each nozzle was tested using turbojet engine simulators over a range in total gas temperature from 617 to 1033 K, and for nozzle pressures from 2 to 50. In addition, limited infrared measurements were made for several nozzle/mixer combinations examined with a turbofan engine simulator. It was shown that (1) the facility is a convenient tool for obtaining model infrared signature data, (2) the presence of shocks in the flow has secondary effects on the infrared signature, and (3) no appreciable differences existed in the plume signatures for the three nozzle concepts. Analysis of the nozzle/mixer data showed that reductions in plume infrared signature of up to 80% are possible. (Author)


A lightweight 125 lb/ft REA 20-4 monopropellant hydrazine thruster has been developed for applications requiring high total impulse with unlimited duty cycle operation. The catalytic engine has demonstrated more than 1,000,000 lb/sec total impulse with a propellant throughput of over 4350 lb/mI (m) It was designed to operate over a thrust range of 125 to 40 lb(f), corresponding to inlet pressures of 400 to 100 psia. Engine thrust was measured over the blowdown range, and resulted in demonstrated specific impulse of 237 to 232 sec over the thrust range. The paper describes the engine configuration and the development test program. (Author)

A80-41511* # Muzzle blast from canister launched missiles G L Romme and C T Edquist (Martin Marietta Aerospace, Denver, Colo.) AIAA, SAE, and ASME, Joint Propulsion Conference, 16th, Hartford, Conn., June 30-July 2, 1980, AIAA Paper 80-1187 13 p 19 refs Research supported by the Martin Marietta Aerospace, Contract No F04704 78 C 0016

Two approaches have been used to define the muzzle blast flow field that occurs during exit of a missile from a canister. The first utilized an existing time dependent finite difference technique and the second was to develop an approximate solution based on similarity considerations. In contrast to rifle and cannon muzzle blasts where the primary flow direction is axial, the muzzle blast resulting from missile launch is directed radially outward. The flow is strongly influenced by the missile base and canister exit geometry. The graphical results provided in this report clearly show this trend. Good correlation is shown between the two methods for the pressure pulse that travels along the missile surface. The analytical results also showed good agreement when compared to scale interceptor missile test results. (Author)


Increased demand for higher performance from airbreathing propulsion systems in general, and ramjet devices in particular, has resulted in the need to upgrade existing technologies to meet the emergence of more stringent design requirements. Criteria for higher performance includes reduced volume and weight and ways to achieve this involve the use of shorter combustors and high energy, high density fuels. Furthermore, systems constraints have dictated the use of sudden expansion (dump) combustors capable of operating effectively at high combustion intensities over wide ranges of conditions. Problems of flame stabilization, flame propagation and spray combustion have been encountered. This paper describes how the development and application of modeling techniques can be used to interpret the observations and to assist in the design of combustors and combustor components. (Author)


The paper describes a scale model configuration development test conducted to produce a high performance mixed flow exhaust system for a high bypass ratio engine for the DC-10 aircraft. A series of 12-lobe and 19-lobe mixer nozzles were fabricated, three-dimensional potential flow and boundary layer analyses were used to provide test configurations that contained no predicted flow separations. The geometric design variables covered were the number of lobes, the lobe shape contour, the mixer nozzle length, and the lobe-valley angle. Test results indicated that a substantial exhaust system performance improvement can be achieved for a high bypass ratio engine installed in a long-duct nozzle. (Author)

A80-41514* # CF6-50 Short Core Exhaust Nozzle D J Dusa (General Electric Co., Cincinnati, Ohio) and F J Hrach (NASA, Lewis Research Center, Engine Component Improvement Office, ATR 450
Hartford, Conn, June 30-July 2, 1980, AIAA Paper 80-1198 27 p

SAE, and ASME, Joint Propulsion Conference, 16th, Hartford, fuel breakup V Sarohia and R F Landel (California Institute of

Ohio) AIAA, SAE, and ASME, Joint Propulsion Conference, 16th, Anderson, L Povmelh, and W Gerstenmaier (NASA, Lewis Research Center, Cleveland, Ohio) AIAA, SAE, and ASME, Joint Propulsion Conference, 16th, and W Gerstenmaier (NASA, Lewis Research Center, Cleveland, Ohio) AIAA, SAE, and ASME, Joint Propulsion Conference, 16th, was run for a sonic corner body Contour plots of density, pressure, and temperature are presented The geometrical configuration allows a unified treatment of the flowfield about axisymmetric parabolic blunt bodies in a supersonic stream K J Weilmuenster and

A hybrid computational technique which splits the flowfield into inviscid and viscous regions is used to investigate the complete flowfield about axisymmetric parabolic blunt bodies in a supersonic stream The solutions are carried out on the CDC CYBER 203 computer which, with its extensive memory, allows for the use of a large number of finite-difference mesh points, allowing resolution of important flowfield features A range of freestream Mach number of 2.5 and a range of freestream stagnation pressure ratio of 500-125,000 was run for a sonic corner body Contour plots of density, pressure,
and Mach number, velocity vector plots, and surface distributions of pressure, heat transfer, and shear stress are presented. Also, correlations of the downstream extent of the base reattachment region with Re number based on flow-reach radius are given.


The paper compares several methods of transition prediction of linear stability analysis. The spectral stability analysis code SALLY is used to analyze flows over laminar flow control wings. It is shown that the transition prediction by the envelope method and a new modified wave packet method are comparable in reliability, but that the envelope method is more efficient computationally. This is based on the results which show that the wave packet method provides N factors which are at best as consistent as those of the envelope method, since the wave packet method is at least 3 times as expensive as the envelope method, the latter is recommended for engineering design calculations.


A method is presented which allows one to solve nonlinear transonic flow problems by analyzing a sequence of linear problems. The small disturbance formulation of steady transonic flow over airfoils is linearized by considering the perturbations due to small changes in airfoil thickness ratio and angle of attack. Repeatedly increasing those parameters results in a series of nonlinear solutions and cumulatively determines the effects of large changes in airfoil geometry. Successive line overrelaxation is used to solve the associated linear equations and is coupled with predictor-corrector methods to yield series of nonlinear solutions. Computed pressure distributions on bi-convex airfoils show good agreement with experimental data and other transonic prediction methods. Possible extensions to unsteady and/or three-dimensional transonic flow problems are briefly discussed.


A viscous-inviscid interaction algorithm is developed for prediction of trailing edge flow. A composite pressure field is defined, and a Poisson equation solved for transverse pressure variations. A parabolized form of the time-averaged steady Navier-Stokes equations are solved in conjunction with a viscous augmented two-dimensional inviscid potential flow analysis. A tensor constitutive equation is employed to predict Reynolds stress distributions from solutions of a turbulence kinetic energy equation. Two equation closure model. Numerical predictions compared favorably with detailed experimental data for mean and fluctuating velocities, and Reynolds shear stress distributions, in the trailing edge region of a NACA 63-012 airfoil.


A lifting surface and lifting line theories are developed for wings in nonuniform subsonic parallel stream whose velocity and density vary in the vertical direction. Solutions and numerical results are obtained, giving the lift and induced drag of elliptic wings in a jet stream, a wake stream, and in monotonic sheared stream.

A80-41614 * # Non-equilibrium flow over delta wings with detached shock waves R J Stalker (Queensland, University, Brisbane, Australia) American Institute of Aeronautics and Astronautics, Fluid and Plasma Dynamics Conference, 13th, Snowmass, Colo., July 14-16, 1980, Paper 80-1424 11 p 9 refs Research supported by the Australian Research Grants Committee

An analysis is made of the effect of streamwise density changes, due to chemical relaxation, on the flow in the shock layer of a medium to low aspect ratio delta wing at angles of incidence such that the shock wave is detached from the leading edges. It is shown that, at least near the midspan of the wing, the flow retains the constant characteristics which are present in the absence of density changes. The density changes displace the shock wave towards the wing surface, but do not alter the shock shape. Unless strong crossflows are present, the crossflow pattern can be obtained from that for the appropriate constant density solution by suitable linear contraction of the ordnates normal to the wing surface. The displacement effect predicted by the analysis is confirmed by experiments in a high enthalpy shock tunnel.


A simplified shock-fitting method is developed and applied to a supersonic internal corner flowfield. An analytical approach is discussed, and results for a case with a free stream Mach number of 2.47 and wedge angles of 12.2 degrees are shown.


A numerical solution of the compressible time-dependent Navier-Stokes equation, including a transition-turbulence model, is obtained for a cascade of airfoils utilizing a nonorthogonal body fitted coordinate system. The equations are solved by a consistently split linearized block implicit scheme due to Brierley and McDonald. Boundary conditions are formulated so as to allow placement of the outer boundary relatively close to the cascade without imposing physically unrealistic constraints. The transition-turbulence model is based upon the turbulence kinetic energy equation and an algebraic length scale equation. Results are presented for both laminar and turbulent flow through a cascade of uncambered NACA 0012 airfoils at zero incidence, and for laminar flow through the same cascade at six degrees incidence. The predicted flow field is consistent with experimental observation.

A80-41617 * # Investigation of transonic flow in a cascade using an adaptive mesh A Ecer and H U Akay (Purdue University, Indianapolis, Ind.) American Institute of Aeronautics and Astronautics, Fluid and Plasma Dynamics Conference, 13th, Snowmass, Colo., July 14-16, 1980, Paper 80-1430 12 p 19 refs Grant No NSG-3294

The solution of two-dimensional full potential equation for the analysis of steady transonic flow through cascades is investigated. Finite element method is employed in the analysis. Accuracy and

A numerical scheme for the solution of two-dimensional turbulent incompressible time-dependent Reynolds equations is considered for thin, relatively low aspect ratio wings. Aerodynamic design problems become more complex as demands on aircraft performance and efficiency increase. Therefore, the use of sophisticated analytical methods that allow evaluation of designs with a greater technical depth are required. This has only become possible with the advent of modern high-speed computers. The aerodynamic design process can be significantly improved with the use of modern information system theories. Airfoil design and analysis methodology (ADAM) is a data processing system that has made major improvements in engineering productivity. (Author)


The laminar separation, transition and turbulent reattachment near the leading edge of a two-dimensional NACA 663-018 airfoil were investigated using a low speed, smoke visualization wind tunnel. Lift and drag force measurements were made using an external strain gauge balance for a chord Reynolds number range of 40,000 to 400,000 An extensive flow visualization study was performed and correlated with the force measurements. Experiments were also conducted with distributed surface roughness at the leading edge and external acoustic excitation to influence the development of the airfoil boundary layer. This study delineates the effects of angle of attack and chord Reynolds number on the separation bubble characteristics and airfoil performance. (Author)

A80-41623 // Numerical study of separated turbulent flow over airfoils A Sugawara and J C Wu (Georgia Institute of Technology, Atlanta, Ga.) American Institute of Aeronautics and Astronautics, Fluid and Plasma Dynamics Conference, 13th, Snowmass, Colo., July 14-16, 1980, Paper 80-1441 11 p 27 refs Grant No DAAAG29-75-G-0147

A numerical scheme for the solution of the kinematics of the problem integral representation is used for the kinematics of the problem. Results are presented for the study of a 12% thick Joukowski airfoil at 15 deg angle of attack at a Reynolds number of 3,530,000. (Author)

A80-41625 /// Airfoil design and analysis using an information systems approach J C Narramore and R D Yearly (Bell Helicopter Textron, Fort Worth, Tex.) American Institute of Aeronautics and Astronautics, Fluid and Plasma Dynamics Conference, 13th, Snowmass, Colo., July 14-16, 1980, Paper 80-1444 11 p 21 refs

Aerodynamic design problems become more complex as demands on aircraft performance and efficiency increase. Therefore, the use of sophisticated analytical methods that allow evaluation of designs with a greater technical depth are required. This has only become possible with the advent of modern high-speed computers. The aerodynamic design process can be significantly improved with the use of modern information system theories. Airfoil design and analysis methodology (ADAM) is a data processing system that has made major improvements in engineering productivity. (Author)

A80-41626 /// Unsteady wake of a plunging airfoil C M Ho and S H Chen (Southern California, University, Los Angeles, Calif.) American Institute of Aeronautics and Astronautics, Fluid and Plasma Dynamics Conference, 13th, Snowmass, Colo., July 14-16, 1980, Paper 80-1446 8 p 15 refs Grant No DAAAG29-78-G-0073

The velocity field in the near wake of a plunging airfoil was surveyed with a hot-wire rake containing five x-wires. Both the mean streamwise and the mean transverse velocity profiles indicate that the wake consists of two parts, one part is the thin viscous wake formed by the two boundary layers on the airfoil. Another part is the inviscid wake of the airfoil. The inviscid wake extends about one chord length above and below the trailing edge. The simultaneous measured velocity traces for the rake across the wake revealed that the turbulent structures are asymmetric in the viscous wake. The upper portion and the lower portion of the wake appear self-preserving state with different rates. (Author)


A linearized theory is developed for underexpanded inviscid supersonic jets with arbitrary initial swirl. The radial displacement of a given stream line from its position at nozzle exit is used as the dependent variable. The governing equation is fairly complicated and has to be solved numerically by the method of characteristics. A simple expression for the wavelength of the primary shock cell is derived. The linearized theory is used to extend some of Howe and Flowers' theoretical results for shock-associated noise to swirling supersonic jets. In this way estimates are made of the effect of swirl on the total radiated sound power of shock-associated noise. It is found that for a certain type of swirl, the shock-associated noise could be greatly reduced, or even eliminated, for sufficiently high swirl levels. This could be achieved at the expense of a very small thrust loss. (Author)

A80-41647 // Theoretical and experimental determination of the aerodynamic characteristics of a helicopter rotor S D'Angelo (Torino, Politecnico, Tunn, Italy) and R Malvano (CNR, Centro di Studio per la Dinamica dei Fluidi, Tunn, Italy) Meccanica, vol 14, Mar 1979, p 2633 7 refs Research supported by the Consiglio Nazionale delle Ricerche

A simple theory for a hingeless rotor with stiff blades is extended to freely hinged rotors. The theory is based on the blade element theory and on energy, momentum, and angular momentum theorems. It can determine the aerodynamic characteristics of a freely hinged rotor in any condition of forward flight. A numerical model has been developed and results compared with real-flight data and data from tests of a helicopter model in a three meter diameter subsonic wind tunnel. The agreement is reasonably good. The numerical program makes it possible to consider the effects of the inverse flow area, tip losses, retreating blade stall, and twisting the blades for any forward steady flight with an advance ratio of 0.0 to 0.7, as well as to determine the global coefficient of lift, thrust, side force, and torque of the rotor. It is also possible to compute the speed increase at the disk and the local distribution of the aerodynamic incidence angle, lift, and thrust coefficient. (Author)


Some asymptotic results are presented for a wing in ground effect. Formulas for calculating the hydrodynamic characteristics of rectangular wings in steady and unsteady flows are derived, and the problem of the optimal wing in ground effect is examined. An asymptotic theory that is well suited for evaluating the wing characteristics in ground effect over a wide range of Strouhal numbers, aspect ratios, and other parameters is examined. (Author)

A80-41780 Variable camber airfoils J E Chacksfield (Short Brothers, Ltd, Belfast, Northern Ireland) Aeronautical Journal, vol 84, May 1980, p 131 139 11 refs

The use of variable camber (VC) on combat aircraft is considered for thin, relatively low aspect ratio wings. (Author)
features of leading and trailing edge VC are discussed along with performance gains and losses, direct lift control, gust load alleviation and battle damage. Provisional analysis of available data on VC airfoil applications indicates that both leading and trailing edge systems are necessary to minimize trimming requirements and optimize pressure distributions. In addition, the main improvement on combat aircraft appears to be the sustained maneuver phase of flight, with improvement in achievable turn radius.

**A80-41790**  

The roles of airline deregulation, a large number of inexperienced operators and an increased number of new users of older aircraft are explored with regard to a possible increase in aircraft accidents. Instances of inexperienced pilots and improperly loaded cargo in accidents are reported along with an analysis of accidents showing that as the pilots' total flight time exceeds 10,000 hours, there is a peak of accidents. Emphasis is placed on accidents caused by the manufacturer's negligence, the concept of strict liability and breach of warranty by the manufacturer, as well as the statute of limitations regarding aircraft accidents and the age of the aircraft and its parts.

**A80-41871**  
Energy and civil aviation (Energia ed aviazione civile) G Nicosa (Alitalia, Rome, Italy) Istituto Italiano di Navigazione, Atti, Jan-Mar 1980, p 5-16 In Italian

Repercussions of the energy crisis on air transport are examined, considering available resources of oil, natural gas, coal, sands and bituminous shales. Attention is given to the utilization of nuclear energy and of hydrogen, the synthesizing of fuel, and the amount of fuel used in air transport. The relationships between energy, economics and demand are also addressed, and a comparison is presented between the amount of fuel used by a Boeing 747 and the supersonic Concorde making the same Paris-New York flight.

**A80-41872**  

Technological advances in the 1980s are described for both civil and military aircraft, including advances in aerodynamic sciences, microelectronics and space sciences, and having the objectives of optimizing and automating air operations. Attention is given to the use of microelectronics in the flight management system which includes an automatic flight control system and a navigation/attitude system. Also discussed are digitalized flight, integrated flight decks, the use of the global positioning system/NAVSTAR and within it, the time division multiple access concept.

**A80-41878**  
UNIGEN - Universal language of aviation W R Franks, P Allen (Canadian Society of Aviation Medicine, Aerospace Linguistic Foundation, Toronto, Canada), J Soutendam (Canadian Society of Aviation Medicine, Aerospace Linguistic Foundation, School of Operational and Aerospace Medicine, Toronto, Canada), and T Taylor (Canadian Society of Aviation Medicine, Aerospace Linguistic Foundation, Toronto, University, Toronto, Canada) (Aerospace Medical Association, Annual Meeting, 50th, Washington, D.C., May 14-17, 1979) Aviation, Space, and Environmental Medicine, vol 51, Apr 1980, p 339-343 27 refs

In 1978, 12 million flights arose from nations where English is a foreign language. From these, crash-deaths averaged 200 per million flights. The Aerospace Linguistic Foundation is incorporated to further cooperative evolution of a suitable speech for universal air use as envisaged by ICAO. The language is called UNIGEN, an acronym from Geneva 111. It reflects the pragmatic monitoring of collective air communications and universal linguistic developments. The foundation underwrites investigations by existing communication faculties of linguistic problems identified from accidents, etc. (e.g. Tenerife shows English phonemes 'th' and 'wh' are not internationally suitable.) Optimum expressions may derive from the world languages. Phoneticians may also be selected to monitor the human factor, e.g. to spot hyperventilation or arousals for sleep. Future air communications must exploit hearing and sight concurrently to assure the million-to-one reliability required for perception transfer.

**A80-41889**  
Hypoxia-induced fatal aircraft accident revealed by voice analysis I Saito, O Fujinawa, N Utsuki, C Mizumoto, and T Amon (Japan Air Self-Defense Force, Aerospace Laboratory, Tachikawa, Japan) Aviation, Space, and Environmental Medicine, vol 51, Apr 1980, p 402-406 6s

The voice communication was the only clue of the fatal F-1043 accident encountered during high-altitude intercept procedures, and it was analyzed to prove the presence of hypoxia as a causal factor. A simulated low-pressure chamber flight was undertaken, and the subject's voice, saying the same words as the pilot, was analyzed in the same way. Comparison of these two voices revealed a similarity in characteristic changes of the sound spectrum and time course. The blurred formation of formant, fundamental, and harmonic frequencies, as well as the obscured gap in pre-vocal cord opening time (VOT) of the sound spectrogram, were thought to be the effects of hypoxia. Lowered fundamental frequency of the pilot's voice, even at the stressful period of attack, has strongly suggested decreased vigilance due to hypoxia. Through these findings, it was concluded that the cause of the accident was probably hypoxia in the pilot.

**A80-41899**  
The influence of compressibility on the simulation of the separation behavior of external stores from a carrier (Der Einfluss der Kompressibilität zur Simulation des Abgangsverhaltens von Lasten vom Trager) K Thomas (Messerschmitt-Bolkow-Blohm GmbH, Ottobrunn, West Germany) Deutsche Gesellschaft fur Luft- und Raumfahrt, Symposium über Abgang von Lasten und Waffen vom Trager, Bad Neuenahr, West Germany, Nov 26, 27, 1979, Paper 79-094 22 p In German

In the simulation of release behavior with the MBB-trajectory program, the MBB-panel method is used for determining the outer field around the panned carrier aircraft and for the calculation of the pressure distribution on the upper surface of the panned external stores. In this manner the influence of the compressibility on the external load-pressure distribution can be described relatively well through application of the Gothert-law. However, this law is not valid in the external field around the carrier aircraft. In order to approximate the compressibility influence, an outer field model based on the Gothert law and suited to the panel method is presented. By means of a calculated example, the influence of compressibility on an external store trajectory is shown. A measured flowfield is used for this calculation. In addition, the results of calculation with an outer field model are given.

**A80-41900**  
A theoretical method for the simulation of the separation behavior of external stores from a carrier (Ein theorethisches Verfahren zur Simulation des Abgangsverhaltens von Lasten vom Trager) R Deslandes (Messerschmitt-Bolkow-Blohm GmbH, Ottobrunn, West Germany) Deutsche Gesellschaft fur Luft- und Raumfahrt, Symposium über Abgang von Lasten und Waffen vom Trager, Bad Neuenahr, West Germany, Nov 26, 27, 1979, Paper 79-091 17 p 10 refs In German

An interference model is presented that is based on the flow-angularity method. In this manner the interference in the aircraft near field is determined in the form of induced up and side drafts. Forces and moments are obtained from the superposition of sectional load gradients of the external stores with aircraft flow. Non-linear effects are considered by means of the crossflow drag analogy since the flow and the sectional load are determined by the
linear functioning panel method. Finally, experimental and theoretical results are compared. M P

A80-41901 # Some vertical and horizontal ejection problems (Problematik des Vertikalen und Horizontalen Ausstosses von Korpern) A Foysi (Messerschmitt-Bolkow-Blohm GmbH, Ottobrunn, West Germany) Deutsche Gesellschaft für Luft und Raumfahrt, Symposium über Abgang von Lasten und Waffen vom Trager, Bad Neuenahr, West Germany, Nov 26, 27, 1979, Paper 79 101 17 p In German

A Monte Carlo simulation is proposed for evaluating the effectiveness of weapons ejected vertically from an aircraft with allowance for the influence of external factors (winds) and errors in the coordination of aircraft velocity with the ejection velocity and ejection angle. A mathematical model for horizontal ejection is proposed, and the problem of avoiding collisions among the ejected bodies is discussed. V P

A80-41902 # Theoretical investigations of the release and trajectories of aircraft stores (Theoretische Untersuchungen zum Abgang und zur Flugbahn von Aussenlasten) W Benner and W Frintz (Dornier GmbH, Friedrichshafen, West Germany) Deutsche Gesellschaft für Luft und Raumfahrt, Symposium über Abgang von Lasten und Waffen vom Trager, Bad Neuenahr, West Germany, Nov 26, 27, 1979, Paper 79 093 16 p 16 refs In German

The paper deals with the complex aerodynamic and dynamic effects and interactions accompanying the release of aircraft stores. A mathematical basis is developed for treating the 'aircraft-release hit' problem and determining its influence parameters. For illustration, the calculation of store release influence parameters is carried out for the alpha jet. V P

A80-41903 # Wind tunnel investigations of the release behavior of aircraft stores at low and high velocities (Windkanaluntersuchungen zur Ermittlung des Abgangsverhaltens von Aussenlasten im Nieder- und Hochgeschwindigkeitsbereich) P Esch and T Windeck (Dornier GmbH, Friedrichshafen, West Germany) Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über Abgang von Lasten und Waffen vom Trager, Bad Neuenahr, West Germany, Nov 26, 27, 1979, Paper 79 098 13 p In German

Wind tunnel store release data obtained by the Froude method, the heavy model method, and the light model method are diagrammed and discussed. The influence of the various parameters is demonstrated. The simulated releases are compared with the experiment. V P

A80-41904 # Release experiments in DFVLR wind tunnels (Abwurfversuche in DFVLR Windkanalen) K Wichmann (Deutsche Forschungs- und Versuchsanstalt für Luft und Raumfahrt, Cologne, West Germany) Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über Abgang von Lasten und Waffen vom Trager, Bad Neuenahr, West Germany, Nov 26, 27, 1979, Paper 79 097 20 p In German

The paper deals with wind tunnel investigations of the release behavior of aircraft stores. Some systems developed for controlling the model releases and recording the test data are described, and high-speed photographs of the release process are presented. V P

A80-41905 # External stores technology in subsonic wind tunnels (Aussenlasttechniken in Unterschall-Windkanalen) R Lestner (Messerschmitt-Bolkow-Blohm GmbH, Ottobrunn, West Germany) Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über Abgang von Lasten und Waffen vom Trager, Bad Neuenahr, West Germany, Nov 26, 27, 1979, Paper 79 098 38 p 5 refs In German

The use of the 3 m subsonic tunnel in Cologne for the testing of the separation characteristics of external stores is described. Attention is given to the significance of such investigations for the theoretical calculation of external store trajectories and the technical prerequisites for their utilization in the subsonic wind tunnel. In addition, the necessary and desirable improvements are suggested and special auxiliary devices are recommended. M E P

A80-41906 # Importance of simulations of weapon and load drops in the testing of attack aircraft (Die Bedeutung von Simulationsen des Abgang von Waffen und Lasten bei der Erprobung von Kampfflugzeugen) J Rohmer Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über Abgang von Lasten und Waffen vom Trager, Bad Neuenahr, West Germany, Nov 26, 27, 1979, Paper 79-100 14 p In German

Progress in the simulation of load releases and the ballistics of single and stock bombing is reviewed. The savings resulting from simulation are compared with the costs of procuring very precise input data required for effective simulation. The need to carefully examine the extent to which simulation and actual testing should be used to arrive at a cost effective solution is indicated. V P


Store release tests are described with particular reference given to a light body free flight wind tunnel trajectory testing. The test philosophy and ejection gun development to the present twin ram is discussed. Examples of specific model ERUs illustrating the application of design principles established are presented. V T


The effectiveness of two types of steady and flashing lights as escape hatch indicators for submerged helicopters was compared. Measurements were taken in moderately and highly turbid water. Response time was faster to the steady lights, and they were more accurately localized. Pairs of steady lights appeared to have some advantage over single lights, but this was not true for flashing lights. Subjects found it very difficult to discern how many different locations were being illuminated. (Author)

A80-42054 # Compressor response to spatially repetitive and non-repetitive transients R E Peacock and C C Erula (Cranfield Institute of Technology, Cranfield, Beds, England) American Society of Mechanical Engineers, Israel Joint Gas Turbine Conference and Exhibition, Haifa, Israel, July 9 11, 1979, Paper 79-GT-714 12 p 7 refs, Members, $1.50, nonmembers, $3.00

The problem of compressor inflow with superimposed wave propagation is addressed and solutions are offered using two separate time dependent mathematical models. In the actuator disc model the work input to the stage is achieved in an infinitesimally short axial length, the flow returning to the axial direction between stages. The simultaneous solution of the continuity and energy equation across the actuator disc is involved in this approach. The continuous flow model assumes a continuous work input axially along the compressor which consists of an infinite number of infinitesimally small stacked stages, every stage behaving quasi-steadily under transient flow conditions. This method involves the simultaneous solution of the continuity, tangential momentum and energy equations in non-homentropic circumstances. In both models, the method of characteristics is used to solve the partial differential equations of wave propagation through the system. A compressor of known geometry and steady state operating characteristics is embedded in a ductwork. The system is analyzed under superimposed conditions of repetitive (sinusoidal) and impulse type steps of pressure fluctuation. The effect of frequency, and amplitude of pulse is investigated and the onset of instability is predicted. (Author)
A80-42055 # Compressor rotating stall in uniform and non-uniform flow By J. Cossar (Royal Military College of Canada, Kingston, Ontario, Canada), and R. E. Peacock (Cranfield Institute of Technology, Cranfield, Beds, England), and W. C. Moffatt American Society of Mechanical Engineers, Israel Joint Gas Turbine Conference and Exhibition, Haifa, Israel, July 9-11, 1979, Paper 79-GT/ISR-18 10 p 7 refs Members, $1.50, nonmembers, $3.00 Defence Research Board of Canada Grant No. 3610-147, Grant No. AFOSR-77-3305

The paper describes a series of experiments in which a single-stage, lightly loaded compressor operated under stall-free conditions and with rotating stall, both with uniform inlet flow and with distortions generated by an upstream screen of uniform porosity. The distribution of static pressure along rotor blade surfaces is discussed

A80-42056 # Reliability prediction techniques for second generation marine and industrial gas turbines By B. Spence (General Electric Co., Marine and Industrial Projects Dept., Evendale, Ohio) American Society of Mechanical Engineers, Israel Joint Gas Turbine Conference and Exhibition, Haifa, Israel, July 9-11, 1979, Paper 79-GT/ISR-3 9 p 6 refs Members, $1.50, nonmembers, $3.00

The paper discusses reliability prediction techniques for second generation marine and industrial gas turbines. A technique to provide an 'early look' at the reliability of equipment and a means of projecting its reliability growth used for the LM2500 gas turbine is examined, this technique, employing a 'family concept' to reliability growth supplements the Failure Mode, Effect and Criticality Analysis (FMECA), providing a tool for earlier assessments of the reliability potential. This new prediction technique can also be applied to the selection of the most reliable power plant and to identifying the condition when a gas turbine is sufficiently mature for release. The paper compares the features of these two methods as they were applied to the LM2500 turbine

A80-42057 # Design of air-cooled jet engine testing facilities By F. M. Oran and M. I. Schiff (Industrial Acoustics Co., Inc., Bronx, N.Y.) American Society of Mechanical Engineers, Israel Joint Gas Turbine Conference and Exhibition, Haifa, Israel, July 9-11, 1979, Paper 79-GT/ISR-5 8 p Members, $1.50, nonmembers, $3.00

The analytical procedures used to design jet engine test facilities suitable for afterburner operation using air as a coolant for the discharge gases rather than the conventional use of water are presented. The application of these procedures in the design of a test facility is outlined. Furthermore, the effects of air cooling a test cell with specific implications regarding environmental and engineering economy considerations are reviewed

A80-42058 # Matching of turbocomponents described by the example of impeller and diffuser in a centrifugal compressor By F. M. Oran and M. I. Schiff (Industrial Acoustics Co., Inc., Bronx, N.Y.) American Society of Mechanical Engineers, Israel Joint Gas Turbine Conference and Exhibition, Haifa, Israel, July 9-11, 1979, Paper 79-GT/ISR-9 7 p 14 refs Members, $1.50, nonmembers, $3.00

An important task in the design of turbo machinery is the determination of the aerothermodynamic parameters necessary to assure optimum matching of the individual compressor components. With centrifugal compressors, the problem is to design impeller and diffuser such that a maximum overall efficiency is achieved for the desired design point. For this purpose, a mathematical model is developed coupling the individual component efficiencies. In the first part of the paper, the aerothermodynamic bases are derived and the coupling equation is illustrated. In the second part, a solution is displayed for the complex problem of matching the impeller and the vanless diffuser of a centrifugal compressor. The solution is obtained by means of a stochastic-mathematical optimization procedure based on the biological evolution strategy

A80-42060 # Conceptual examination of gas phase particulate formation in gas turbine combustors By S. S. Kesten, J. J. Sangiovanni (United Technologies Research Center, East Hartford, Conn.), and P. Goldberg (United Technologies Corp., Pratt and Whitney Aircraft Group, East Hartford, Conn.) American Society of Mechanical Engineers, Israel Joint Gas Turbine Conference and Exhibition, Haifa, Israel, July 9-11, 1979, Paper 79-GT/ISR-12 9 p 14 refs Members, $1.50, nonmembers, $3.00

Recent laboratory studies of droplet combustion indicate the potential for substantial gas phase particulate formation even with single component hydrocarbon fuels. Formation of large particles has been observed in the neighborhood of burning droplet arrays, particularly when the droplets are closely spaced. To provide insight into the potential for particulate formation during the combustion of fuel droplet sprays in gas turbine combustors, a mathematical framework is developed for examining the formation of soot nuclei in droplet combustion. A simplified model of the chemistry of fuel pyrolysis and nuclei formation is used and a series of calculations is made to explore the sensitivity of soot nuclei formation to conditions typical of gas turbine combustion systems

A80-42147 * # Experimental study of low aspect ratio compressor blading By L. Reid and R. D. Moore (NASA, Lewis Research Center, Cleveland, Ohio) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar. 10-13, 1980, Paper 80-GT-6 8 p Members, $1.50, nonmembers, $3.00

The paper presents a study of low aspect blading for the inlet stages of a high pressure ratio, high speed core compressor. The basic overall design variables in the stage pressure ratio and blade aspect ratio, these four stages represent two levels of total pressure ratio, two levels of rotor blade aspect ratio, and two levels of stator vane aspect ratios. Comparisons of the overall performance, radial distributions of performance parameters, diffusion factors at the near stall conditions, blade element data, and the axial distribution of rotor tip static pressures yielded the following results: (1) higher peak pressure ratio, higher stage efficiency, and greater stall margin were obtained with the lower aspect ratio blading, (2) the lower aspect ratio blading showed improved performance over the entire blade span, and (3) the lower aspect ratio rotors operated at higher diffusion factors and higher incidence angles over the entire blade span


Results of an experimental investigation of the aerodynamic performance of several annular prediffuser combustor systems are presented. Three curved wall, dump prediffusers of different length, area ratio, and turning angle were tested with and without a simulated combustor located downstream of the prediffuser. Performance was significantly influenced by the presence of the combustor. Pressure recovery and flow losses were determined as a function of prediffuser inlet velocity profile, flow extraction at the prediffuser inlet, axial and radial location of the combustor front end, and distribution of the flow in the combustor. Axial location of the combustor was found to be the most significant parameter influencing system performance

An improved version of a rotating stall control system has been tested successfully on a J85 turbojet engine. Past tests had pointed out the desirability of increasing the response speed of the control. In this study, the installation of the stall control on the J85 was modified so as to decrease the response time of the control by a factor of ten over that attained in the past tests. The modified control was tested to see if the decreased response time improved the ability to clear rotating stall once it has started, and also to see if rotating stall could be anticipated and prevented by proper selection of the variables in the stall control detection system. The performance of the stall control was tested by closing the bleed doors on the engine until rotating stall occurred or until the control anticipated stall and held the bleed doors open. The tests showed that the control is capable of anticipating stall before it occurs and keep the engine completely clear of stall at speeds up to 80 percent of design speed. No tests were performed above 80 percent of design speed because opening the bleed doors at such speeds might aggravate the stall rather than clear it.


The paper describes a method of simplifying the preparation and development of control programs for microprocessor-based engine control systems. The system described employs a video display unit, VDU, connected to the digital controller. Programs are prepared in a simple high level language tailored to the requirements of engine control schemes. The paper also describes the internal software structure and features that are provided. An example of the procedures used to develop a simple control program illustrates how a user can concentrate on the control scheme rather than on software problems.

A80-42164 * # Atomizing characteristics of swirl can combustor modules with swirl blast fuel injectors R D Ingebo (NASA, Lewis Research Center, Cleveland, Ohio) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-30 7 p 8 refs Members, $1.50, nonmembers, $3.00

Cold flow atomization tests of several different designs of swirl can combustor modules were conducted in a 7.6 cm diameter duct at airflow rates (per unit area) of 7.3 to 25.7 g/s cm sec and water flow rates of 6.3 to 18.9 g/sec. The effect of air and water flow rates on the mean drop size of water sprays produced with the swirl blast fuel injectors were determined. Also, from these data it was possible to determine the effect of design modifications on the atomizing performance of various fuel injector and air swirler configurations. The trend in atomizing performance, as based on the mean drop size, was then compared with the trends in the production of nitrogen oxides obtained in combustion studies with the same swirl can combustors.


An aerodynamic method is proposed to replace the variable inlet guide vanes used for imparting compressor inlet prewhirl. High pressure jets are injected obliquely into the inflow, from orifices spaced around the periphery of the inlet pipe. A mathematical model of the flow situation was developed, which considers an unbounded axisymmetric jet ejected obliquely at various angles into a cross flow. The solution for the trajectory and growth of the jet was found to be in good agreement with relevant published experimental data.

Prewhirl producing jet arrangements were designed and the flow deflection resulting from the combined action of the jets was measured for a range of jet velocities and cross flow velocities.


The use of self-actuating clutches in gas turbine driven electrical power generators is examined, in relation to operation of the clutch during fault conditions. Clutches are employed in the main shaft between the power turbine and the electrical generator, to enable the unit to operate as a synchronous compensator. Five particular fault conditions are identified which could cause overstressing of the clutch. Protection is not universally provided to protect the clutch under all five conditions, and methods of providing protection are suggested. Analysis of the fault conditions is developed to identify the differential acceleration requirement for the clutch. The analysis is extended to demonstrate the limited capability of a gas turbine generator, when operating as a synchronous compensator, to provide spinning reserve capacity for an electrical system.

A80-42168 # Time between overhaul vs premature removal rates as turbine design considerations C E Curry and A C Wei (General Motors Co., Detroit Diesel Allison Div., Indianapolis, Ind.) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-35 6 p Members, $1.50, nonmembers, $3.00

A general knowledge of aviation practices constituted the background for the identification of three distinct variables as the major drivers for engine removals in the operation of an aircraft. This study provides an insight into the interrelationships of the major drivers which determine engine removals for an aircraft utilization rate (U), time between overhaul (TOB), and premature removal rate (PRR). Each of these elements is of concern to nearly every aircraft operator. For this study, it was assumed to be the same as aircraft flight hours per month.


Extending data obtained from hot gas cascade measurements on the cooling effectiveness and pressure loss coefficients of full coverage film-cooled blading, use is made of similarity considerations to determine the heat transfer characteristics under actual engine conditions. Of primary interest are stationary gas turbines. Calculations are made for a four-stage single shaft gas turbine with air preheat and common component efficiencies. As a representative result it is found that for a pressure ratio of 10 equal to 10 a relative cooling air flow of approximately 8 percent will be required in raising the temperature from 1173 to 1573 K. The resulting improvement of the thermal efficiency is 24 percent and that of the specific work about 70 percent.

A80-42171 * # Aerodynamic loss in a gas turbine stage with film cooling S Ito (Istanbul Technical University, Atsugi, Kanagawa, Japan), E R G Eckert, and R J Golstem (Minnesota, University, Minneapolis, Minn.) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-38 7 p 8 refs Members, $1.50, nonmembers, $3.00 Contract No N00014-76-0246

Experiments have been performed to measure the total pressure loss of the flow through a two-dimensional turbine cascade with 'coolant' injection from a single row of holes on the suction or
To allow the behavior of the stator blade rows and tandem cascade arrangements, the application of multistage tandem cascade systems and speed control were measured further development of this compressor. The characteristics on speed control were measured for optimization and analytical predictions based on a model introduced by Hartsel. The mechanical behavior of the machine, the compressor characteristic on speed control was measured for optimization and further development of this compressor. Characteristic on adjustment of all stator blade rows and speed control were measured to allow the behavior of the stator blade rows and tandem cascade rotors to be assessed. The channel flow in the axial gaps behind selected blades was measured. The tandem cascade compressor, its layout and the results of experimental investigations are presented and discussed.

This paper describes a theoretical investigation of the influence of fillet radius on the aerodynamic behavior of turbocompressors. The fillet is that found at the intersection of an airfoil and a hub or shroud where no relative motion or gap is present. A modified power law velocity is used in conjunction with experimental estimates of the three-dimensional corner boundary layer extent to obtain values of the interference displacement and friction coefficient for a 90 deg corner flow which are in fair agreement with Gersten's experimental results. Likewise, interference displacement and friction coefficient are obtained in the case of a corner flow in a dihedral greater than 50 deg for which experimental data is unavailable but where the low curvature of the stream surfaces allows the three-dimensional boundary layer extent to be calculated from Bertotti's integral momentum equation. The boundary layer characteristics thus obtained are then applied, by means of a polyhedral approximation, in the evaluation of the influence of 90 deg corner fillet on corner flow separation. Some guidelines are provided relating the fillet radius to physical dimensions of the blading.

Measurements of heat transfer, pressure loss and friction factor inside simulated trailing edges of turbine blades are presented. The trailing edges considered are vented and the internal heat transfer surfaces are extended by means of staggered arrays of pillars interconnecting the blade pressure and suction surfaces. A number of pillar arrays and trailing edge configurations are considered, namely pillar pitch to diameter ratios nominally of 2, 3, and 4 and trailing edge included angles of 0, 10, 15, and 20 deg. The range of Reynolds numbers covered based on pillar diameter and maximum velocity through a row of pillars is from 10,000 to 200,000.

A joint technology demonstrator engine was tested by B. N. Rohm (General Motors Corp., Detroit, Michigan) and F. H. Alixson (Down, Indianapolis, Ind.). American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar. 10-13, 1980, Paper 80-GT-47: 8 p. Members, $1.50, nonmembers, $3.00.

An investigation was presented of the ingress for a simple shrouded rotating disc system with a radial outflow of coolant. A plane rotating disk and a plane stator with a cylindrical shroud were studied along with the more complex geometry of an annulus cooled gas turbine. Cooling air supplied to the center of the stator leaves radially through the clearance between the rotating disk and a stationary shroud, flow visualization and pressure measurements are used to determine the minimum dimensionless mass flow rate of cooling air necessary to prevent the ingress of external fluid at the periphery of the system. The results are correlated from theoretical considerations for a gap ratio of 0.1, shroud clearance between 0.0025 and 0.04, and the rotational Reynolds number between 2 x 10 to the 5th and 10 to the 6th by the formula derived for the minimum dimensionless mass flow rate.

The operation of a turboshaft engine under windmilling conditions was analyzed and the relationship of engine speed and airflow has been derived. Replacing the efficiencies of compressor and turbine by a total pressure loss coefficient, the author was able to obtain the equations for matching the engine components and the universal curve of windmilling turbine characteristic. Based on theoretical analysis and experimental data, the relations obtained, a simple method for calculating the windmilling characteristic of a turboshaft engine was derived. In the absence of compressor and turbine characteristics under windmilling conditions, two approximate calculating methods were developed. The theoretical relations developed have been checked by experimental data. An example of the application of the approximate method is presented in the Appendix and the agreement between the prediction and experimental data is generally good.

Aircraft turbine engine combustors C. C. Gleason and D. W. Bahr (General Electric Corp., Aircraft Engine Group, Cincinnati, Ohio) American Society of Mechanical Engineers, Gas Turbine Conference...
and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-55 9 p 8 refs Members, $1.50, nonmembers, $3.00

Contracts No F33615-77-C-2042, No F33615 77-C-2043

Results of a program to determine the effects of fuel properties on the life characteristics of two USAF/General Electric aircraft turbine engine combustors are presented. Thirteen test fuels were evaluated in an older technology annular combustion system (J79) and in an advanced technology, virtually smokeless, compact, annular combustion system (F101) over wide ranges of simulated engine operating conditions. Fuel variables were hydrogen content, aromatic structure, volatility and distillation end point. Significant increases in combustor liner temperatures were observed as fuel hydrogen content was decreased. With fuel hydrogen contents of 14.5, 14.0, 13.0 and 12.0, the resulting relative combustor liner life predictions were 1.00, 0.78, 0.52, and 0.36 for the J79 combustor and 1.00, 0.72, 0.62 and 0.47 for the F101 combustor, respectively. Based on these findings, it is concluded that improved liner cooling design features will be needed in most current technology combustors to accommodate the projected lower hydrogen content of future fuels.

(Author)

A80-42187 # Experimental evaluation of catalytic flame stabilization for aircraft afterburners L C Angello (Electric Power Research Institute, Palo Alto, Calif.) and E N Coppola (USAF, Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-56 10 p 6 refs Members, $1.50, nonmembers, $3.00

Catalytic flame stabilization encompasses the use of a porous catalytic surface to initiate, stabilize, and provide a continuous pilot for flame propagation. A preliminary assessment of the feasibility of employing catalytic flame stabilization to the design of flameholders for aircraft afterburners has been completed. Initial testing has demonstrated that catalytic flame stabilization in aircraft afterburners can be achieved. For the non-optimal catalytic flameholders evaluated, smooth light off and stable operation were obtained, higher combustion efficiencies were measured, and higher pressure losses were observed. During the course of the experiment a significant number of design aspects were determined to require further investigation. These design aspects along with other results of this study are discussed in this paper.

(Author)

A80-42188 # Composition structure of burning sprays of Jet A fuel and its emulsions with water S R Gollahalli and S H Javadi (Oklahoma, University, Norman, Okla.) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-57 8 p 20 refs Members, $1.50, nonmembers, $3.00

This paper presents the axial and radial concentration profiles of various species (O2, N2, CO2, H2O, NO, NOx, and CnHm) in the burning sprays of Jet A-fuel, its blend with 1 percent surfactant, and its emulsions with 1 percent surfactant and different water contents (5, 10, and 20 percent by volume). The composition structure of the flame studied is in conformity with the temperature, particulate concentration, and radiation profiles studied earlier. The results show that the increase of water content of emulsions decreases fuel pyrolysis and oxides of nitrogen, whereas the surfactant alone does not markedly affect the flame structure.

(Author)

A80-42193 # Temperature and flow measurements on near-freezing aviation fuels in a wing-tank model R Friedman (NASA, Lewis Research Center, Cleveland, Ohio) and F J Stockemer (Lockheed-California Co., Burbank, Calif.) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-63 12 p 15 refs Members, $1.50, nonmembers, $3.00

Freezing behavior, pumpability, and temperature profiles for aviation turbine fuels were measured in a 190-liter tank, to simulate internal temperature gradients encountered in commercial airplane wing tanks. Two low-temperature situations were observed. Where the bulk of the fuel is above the specification freezing point, pumpout of the fuel removes all fuel except a layer adhering to the bottom chilled surfaces, and the unpumpable fraction depends on the fuel temperature near these surfaces. Where the bulk of the fuel is at or below the freezing point, pumpout ceases when solids block the pump inlet, and the unpumpable fraction depends on the overall average temperature.

(Author)


The use of 'broad-specification' fuels in aircraft gas turbine engines can be a significant factor in offsetting anticipated shortages of current specification jet fuel in the latter part of the century. The changes in fuel properties accompanying the use of broad-specification fuels will tend to cause numerous emissions, performance, and durability problems in currently-designed combustion systems. The NASA Broad Specification Fuels Combustion Technology Program is a contracted effort to evolve and demonstrate the technology required to utilize broad-specification fuels in current and next generation commercial Conventional Takeoff and Landing (CTOL) aircraft engines, and to verify this technology in full-scale engine tests in 1983. The program consists of three phases: Combustor Concept Screening, Combustor Optimization Testing, and Engine Verification Testing.

(Author)

A80-42196 # The development and application of improved combuster wall cooling techniques A B Wasiell and J K Bhangu (Rolls-Royce, Ltd, Derby, England) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-66 10 p 5 refs Members, $1.50, nonmembers, $3.00 Research supported by the Ministry of Defence (Procurement Executive)

The continuing emphasis over the past few years on the development of lower SFC, long on wing life and low emission engines for commercial transportation has put a premium on combuster liner cooling techniques employing less cooling flow. Rolls-Royce pioneered the fully machined ring and impingement cooling concepts which formed the basis for the RB211 combuster design. Further improvement of the impingement cooling technique has led to the development of a laminated, pseudotranspiration material. It exploits the high impingement heat transfer coefficients and provides an extended internal surface area for heat transfer. Rolls-Royce has developed this material primarily for combuster applications. A major milestone has now been achieved with the certification by the CAA of a Spey combuster variant incorporating this material for limited release for commercial operations. These combustors are now entering service in the BAe11 with a number of UK airlines.

(Author)


The paper deals with the 'Low NO/x/ Heavy Fuel Combustor Program'. Main program objectives are to generate and demonstrate the technology required to develop durable gas turbine combustors for utility and industrial applications, which are capable of sustained, environmentally acceptable operation with minimally processed petroleum residual fuels. The program will focus on 'dry' reductions of oxides of nitrogen (NO/x), improved combustor durability and satisfactory combustion of minimally processed petroleum residual fuels. Other technology advancements sought include fuel flexibility for operation with petroleum distillates, blends of petroleum...
combustor emissions. C. C. Gleason (General Electric Aircraft Engine
Group, Cincinnati, Ohio) and J. A. Martone (USAF, Engineering and
Services Center, Tyndall AFF, Fla) American Society of Mechanical
Engineers, Gas Turbine Conference and Products Show, New Orleans,

Results of a program to determine the effects of fuel properties
on the pollutant emissions of two U.S. Air Force aircraft gas turbine
engines are presented. Thirteen test fuels, including baseline JP-4 and
JP-8, were evaluated in a cannular (J79) and a full annular (F101)
configuration. The principal fuel variables were hydrogen content,
aromatic structure, volatility, and distillation end point. Data
analysis shows that fuel hydrogen content is a key fuel property,
particularly with respect to high power emissions (oxides of nitrogen
and smoke), and that low power emissions (carbon monoxide and
hydrocarbons) are more dependent on fuel atomization and evapora-
tion characteristics. (Author)

Fuel character effects on J79 and F101 engine combustor emissions. C. C. Gleason (General Electric Aircraft Engine
Group, Cincinnati, Ohio) and J. A. Martone (USAF, Engineering and
Services Center, Tyndall AFF, Fla) American Society of Mechanical
Engineers, Gas Turbine Conference and Products Show, New Orleans,

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and smoke), and that low power emissions (carbon monoxide and
hydrocarbons) are more dependent on fuel atomization and evapora-
tion characteristics. (Author)

Combustor exit temperature B. G. A. Sjoblom (Volvo Flygmotor AB,
Trollhattan, Sweden) American Society of Mechanical Engineers,
Gas Turbine Conference and Products Show, New Orleans, La., Mar

A high turbine inlet temperature promotes the gas turbine
efficiency. Problems arising in the combustion system when
increasing the temperature are discussed. A high exit temp-
erature aircraft gas turbine combustor was designed by deleting the
dilution air in a double recirculation zone combustor. Rig tests were
conducted on OPERA code and comparisons were made with a reference combustor of conventional design. It was found that the overall fuel-air ratio
could be increased from 0.0182 to 0.0315 without impairing the
emission characteristics or the combustion efficiency at any power
setting. The exit temperature pattern factor was improved by providing a proper fuel and air mixing. (Author)

A review of current methods and problems in making gas path measurements in aircraft gas turbine engines. W. G. Alwong (United Technologies
Corp., Commercial Products Div., East Hartford, Conn.) American Society of Mechanical Engineers, Gas

The gas path of an aircraft gas turbine engine presents some
unique measurement problems. As part of the development of
an engine, it is necessary to verify all of the critical design parameters
such as air and metal temperature, dynamic and steady state stresses,
pressure distributions and air flow in order to accurately interpret
gas turbine performance and endurance tests. Although a great deal can be accomplished within the current state of the art, some very
significant gaps remain in the measurement technology, particularly in the hottest sections of the engine. New sensors and measuring techniques are currently under development which promise
to overcome many of the current problems. (Author)

Engineers, Gas Turbine Conference and Products Show, New Orleans,

A flexible rotor balancing procedure, which incorporates the
advantages of both the influence coefficient and the modal balancing methods is presented. A series of tests which were performed to
evaluate the effectiveness of various balancing techniques are
presented and discussed. These results confirm the superiority of this
balancing approach, which has been demonstrated on a supercritical power trans
mission shaft test rig. The test rig was successfully balanced through
four flexural critical speeds with a substantial reduction in effort as
compared with the effort required in modal and influence coefficient
balancing procedures. A brief discussion of the Unified Balancing
Approach and its relationship to the modal and influence coefficient
methods is presented. A series of tests which were performed to
evaluate the effectiveness of various balancing techniques are
described. The results of the Unified Balancing Approach tests are
presented and discussed. These results confirm the superiority of this
balancing procedure for the supercritical shaft test rig in particular
and for multiple-mode balancing in general. (Author)

A review of current methods and problems in making gas path measurements in aircraft gas turbine engines. W. G. Alwong (United Technologies
Corp., Commercial Products Div., East Hartford, Conn.) American Society of Mechanical Engineers, Gas

Turbine Conference and Products Show, New Orleans, La., Mar

The effects of angular acceleration on a Jeffcott rotor have been
examined both theoretically and experimentally. The equations of
motion were solved via numerical integration. The rotor's response to
unbalance was predicted for a number of cases of acceleration and

damping. Both amplitude and phase responses were studied. In addition, techniques were developed for identifying system damping from data taken during accelerated runs. The results of the analysis indicate that for high acceleration rates the amplitude response at the critical speed may be reduced by a factor of four or more. The speed at which the peak response occurs can also be shifted by 20 percent or more. Experimentally, a small lightly damped rotor (\( \zeta = 0.008 \)) was run for several acceleration rates. The peak response typically agrees within six percent of theoretical predictions. Also, a beat frequency was observed both theoretically and experimentally after the rotor had passed through the critical speed.

A80-42216 // Some effects of using water as a test fluid in fuel nozzle spray analysis H C Simmons and C F Harding (Parker Hannifin Corp, Gas Turbine Fuel Systems Div, Cleveland, Ohio) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La, Mar 10-13, 1980, Paper 80-GT-90 6 p Members, $1.50, nonmembers, $3.00

A systematic investigation was made of the differences in atomizing performance between water and kerosene fuel for six simplex fuel nozzles of small flow capacity. A large number of tests was run using two methods of spray analysis, to determine the effect of nozzle liquid pressure drop on Sauter Mean Diameter (SMD). It was found that there is a clearly defined relationship dependent on both the relative values of surface tension and also on a Weber Number calculated for conditions in the liquid film at the nozzle discharge orifice. It is concluded that large errors in estimating SMD for modeling programs are possible if results observed with water are assumed to be representative of behavior with kerosene fuel.


A holographic technique used to produce image plane interferograms with white light reconstruction is described. This was used to study the transonic flow in a passage of a turbine stator cascade at a typical Reynolds number, Mach number, and free stream to blade surface temperature ratio. Both absolute and relative SMD (fringes of constant flow density) and differential holographic interferograms (changes of density in 100 micrometers) are presented showing fine details in the boundary layer flow, trailing edge shocks, and wake structure. By counting the fringes on the interferograms, the free stream and surface Mach numbers and boundary layer temperature gradients can be determined.


With the advent of U.S. military aviation changing from the fixed-cycle inspection concept to the On-Condition Maintenance (OCM) concept, it has become readily apparent to the aircraft maintenance people that their existing inspection methods and diagnostic tools are not adequate to keep pace with the new concept. Some of those components which required removal and disassembly to facilitate inspection should now be inspected on-the-wing to maintain the inspection flow time. Some means of gaining visual access to those components is required. A method has been developed to inspect the gas path of a turbine engine with sufficient accuracy to provide the user with the decisive information on whether to continue the engine in service or remove it for repair. The genesis of using controlled light and vision for engine internal inspection is presented and progress from the early days on the flightline to the future is discussed.


A flight-critical engine control is any engine control system which has the authority to cause large thrust excursions or which can cause engine shut-down in flight. Large negative thrust excursions can clearly hazard an aircraft during critical maneuvers of takeoff and approach, or at any other times when the aircraft is operating at low altitude, while uncontrolled positive thrust excursions can lead to structural failure in the engine at any point in the flight. The paper reviews the basic issues in achieving software safety in a digital engine control of a level required for certification and discusses the effects of these issues. Particular attention is given to specification design validation and test procedures throughout the life of a given set of control software.


The paper describes a digital electronic engine control system being built by Dowty and Smiths Industries Controls Limited (DSIC) to demonstrate the control features required for the next generation of helicopters and their power plants. It is engine mounted, fuel cooled, and of lightweight design. The paper describes the mechanical design, the installation and the cooling of the system including the choice of the basic packaging concept. It also discusses the safety of flight aspects of system operation. Finally, the paper discusses how the design can be modulated to increase/reduce the capability of the system and thus, the more effectively to cover a range of requirements.


Research supported by the UK Ministry of Defence of England. The paper describes the evolution of a digital control approach to the Pegasus engine as applied to a single engined VTOL aircraft. The design is based on extensive engine evaluation of different control configuration with electronic and hydromechanical back up system. The paper describes the mechanical design, installation on the engine and the cooling of the system including the choice of basic packaging concept. It also discusses the rationale for the particular choice of back-up system and the reliability/safety of flight trade-offs involved.


A three-dimensional non-axisymmetric theory is presented to analyze the interaction effects due to wakes between two blade rows in an axial turbomachine. The relative importance of potential and wake interaction with varying row separations and the contribution to the flow of shed radial and shed streamwise vorticity by the first row are examined. Numerical calculations of turbomachine compressor stages are presented to illustrate the theory.

A80-42247 // The effect of the axial velocity density ratio on the aerodynamic characteristics of compressor cascades J Starke (Braunschweig, Technische Universität, Braunschweig, West Ger-
shown that it is, m turn, the axial velocity distribution that decisively
the cascade at a given wall shape and contraction ratio It is further
the combined effect of axial velocity density ratio (AVDR) and
aspect ratio (AR) on compressor cascade performance U Stark
ratio and aspect ratio on compressor cascade performance U Stark
American Society of Mechanical Engineers, Gas Turbine Conference
and Products Show, New Orleans, La., Mar 10-13, 1980, Paper
80-GT-138 13 p 18 refs Members, $1.50, nonmembers, $3.00
Research sponsored by the Deutsche Forschungsgemeinschaft
Research sponsored by the Cranfield Institute of Technology and Rolls-Royce, Ltd.
A highly efficient but relatively short length diffuser is
described It can produce high levels of pressure recovery, both with
and without external suction being applied Emphasis is placed on
pressure losses experienced by a bleed air and on a flow mechanism
High Speed Cascade Wind Tunnel at DF-VLR Braunschweig In
addition to wake traverses, measurements of the boundary layer
behavior were made These consisted of (1) use of a constant
temperature anemometer to measure the fluctuating heat transfer rate on an array of thin film platinum thermometers de|,c.sited on
the vane and (2) a flatened, traversing pitot probe held against the
vane surface Transition measured by these techniques is described
Boundary layer studies on highly loaded cas-
Research supported by the Ministry of Defence (Procurement Executive)
In the continuing quest for increased turbine efficiency, the part
played by blade profile shape remains crucial Three turbine vanes
with successively increased aerodynamic loading were tested in the
High Speed Cascade Wind Tunnel at DF-VLR Braunschweig In
addition to wake traverses, measurements of the boundary layer
behavior were made These consisted of (1) use of a constant
temperature anemometer to measure the fluctuating heat transfer rate on an array of thin film platinum thermometers de|,c.sited on
the vanes and (2) a flatened, traversing pitot probe held against the
vane surface Transition measured by these techniques is described
The combined effect of axial velocity density ratio and aspect ratio on compressor cascade performance U Stark (Braunschweig, Technische Universitat, Braunschweig, West Germany) and H Hoheisel (Deutsche Forschungs- und Versuchsanstalt fur Luft- und Raumfahrt, Institut fur Entwurfs-Aerodynamik, Braunschweig, West Germany) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-138 13 p 21 refs Members, $1.50, nonmembers, $3.00
Research supported by the Deutsche Forschungsgemeinschaft
The paper describes theoretical and experimental investigations on
the combined effect of axial velocity density ratio (AVDR) and
aspect ratio (AR) on compressor cascade performance in incompress-
ible and compressible flow The results presented demonstrate that it
is the aspect ratio that defines the axial velocity distribution through the
cascade at a given wall shape and contraction ratio It is further
shown that it is, in turn, the axial velocity distribution that decisively
determines the local values of pressure distributions as well as the
cascade overall parameters like turning angles and loss coefficients
Research sponsored by the Deutsche Forschungsgemeinschaft
Research sponsored by the Deutsche Forschungsgemeinschaft
Research sponsored by the Deutsche Forschungsgemeinschaft
A80-42259 # The determination of deviation angles at exit from the nozzles of an inward flow radial turbine F Fairbanks (Hatfield Polytechnic, Hatfield, Herts, England) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-147 7 p 9 refs Members, $1.50, nonmembers, $3.00

A rub test program was conducted using Brunswick's high speed rub rig to determine the independent effect of density and tensile strength on the abradability of FELMTAL seal material and to determine the optimum parameters for specific seal products. A series of 29 tests, 0.020 in deep (0.5 mm) 360 deg rubs, were conducted on the inner air seal (knife edge) configuration with Hastelloy X and Haynes 188 seal material. Fifteen tests were conducted on the outer air seal (blade tip) configuration with seal materials of the same alloys. The program demonstrated that ultimate tensile strength rather than density is the predominant factor in determining abradability for the fiber metal systems. Maximum tensile strengths were reduced and tighter density and tensile ranges were specified for four FELMTAL seal products to provide acceptable abradability for 360 deg rubs while maintaining erosion resistance.

A80-42260 # An investigation of vane-island diffusers at high swirl M A Rayan and T T Yang (Clemson University, Clemson, S C) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-148 5 p 8 refs Members, $1.50, nonmembers, $3.00

The results of an experimental investigation of the performance of vane island diffusers at high swirl (lambda = 10) are presented in this paper. Five different sets of vane-island designs and their corresponding performance are reported, and this study indicates that the performance of the vane-island diffuser depends on a significant degree on the mechanism of flow at the impeller exit. The investigation also shows that the radial distance from the vane leading edge to the impeller exit is one important factor in diffuser effectiveness. The lowest loss coefficient obtained was achieved when the vane-island leading edge was at a radius approximately equal to 1.2 times the diffuser inlet radius, and with the ratio of diffuser exit area to impeller exit area approximately equal to 1.


A80-42266 # Blade tip and knife edge rub testing of FELMTAL seals R P Tolokan, A R Erckson (Brustwick Corp., DeLand, Fla.), and R T. Frank (United States Crane, Certification Bureau, Orlando, Fla.) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-154 7 p Members, $1.50, nonmembers, $3.00


Cycle optimization for a 10,000 SHP high efficiency gas turbine system R Hendriks (Thomassen Holland, Netherlands) and P Levine (Fern Engineering Co, Bourne, Mass) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-157 5 p 8 refs Members, $1.50, nonmembers, $3.00

A new gas turbine system is under development by Thomassen Holland b v and Fern Engineering. The machine features a two-stage inter-cooled centrifugal compressor, a regenerator and an annular combustor. Prototype units will be operating in 1982. Cycle optimization results are presented which lead to the selection of a rotor inlet temperature of 2042 F, an overall compression ratio of 9.5 and a thermal efficiency of 44 percent.

This paper presents highlights of an ongoing study program to assess the technical and economic feasibility of advanced concepts for generating peak load electric power from a compressed air energy storage (CAES) power plant incorporating a coal-fired fluid bed combustor (FBC). It reviews the analyses performed to select an FBC/CAES power plant system configuration for the subsequent conceptual design phase of the study. Included in this review are the design and operating considerations involved with integrating either an atmospheric or a pressurized fluid bed combustor with a CAES system to yield practical system configurations, the integration of system configurations, the parametric performance of these system configurations, and the preliminary screening which considered performance, cost, and technical risk and led to the identification of an open-bed PFBC/CAES system as having the greatest near-term commercialization potential.

A80-42274  #  Turbopropulsion combustion - Research needs
A80-42275  #  The effect of aerodynamic phase lag on the twin vibration mode model of aeroengine fan flutter
A80-42276  #  Redesign of structural vibration modes by finite-element inverse perturbation
A80-42277  #  Blade excitation by elliptical whirling in viscous-damped jet engines
A80-42278  #  Heat transfer phenomena in gas turbines
A80-42279  #  Thermodynamics of heavy fuels operation in gas turbine
A80-42280  #  Future trends in subsonic transport energy efficient turbofan engines
A80-42281  #  Blade excitation by elliptical whirling in viscous-damped jet engines

A80-42277  #  Blade excitation by elliptical whirling in viscous-damped jet engines

An extension of the author's earlier method of analyzing multishift jet engine dynamics accounting for flexibility of bladed disks is outlined to calculate the first whirl harmonic for given nonlinear characteristics of squeeze-film dampers. A second whirler harmonic, of which experimental verification is found in Campbell's paper of 1924, is shown induced by orbit ellipticity. The possibility that this harmonic, especially due to backward whirling, may be a source of blade excitation at higher frequencies than currently recognized from linear analysis is discussed by relating some engine experience.

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A80-42280  #  Heat transfer phenomena in gas turbines
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A80-42278  #  Heat transfer phenomena in gas turbines

A discussion of the problems encountered in prediction of heat transfer in the turbine section of a gas turbine engine is presented. Areas of current concern to designers where knowledge is deficient or lacking are elucidated. Consideration is given to methods and problems associated with determination of heat transfer coefficients, external gas temperatures, and, where applicable, film cooling effectiveness. The paper is divided into parts dealing with turbine airfoil heat transfer, endwall heat transfer, and heat transfer in the internal cavities of cooled turbine blades. Recent literature dealing with these topics is listed.

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A80-42284 * \# CF6 fan performance improvement R F Patt
(General Electric Co., Evendale, Ohio) and D C Reemsnyder
Members, $1.50, nonmembers, $3.00
A significant portion of the NASA-sponsored Performance Improvement Program for the CF6 engine was the development of an improved fan concept. This involved aerodynamic redesign of the CF6 fan blade to increase fan efficiency while retaining the mechanical integrity, operability, and acoustic characteristics of the existing blade. A further improvement in performance was achieved by adding a fan case structure to the running tip clearance. Engine testing was performed to establish the performance, mechanical and acoustic properties of the new design relative to the current fan, and to establish power management characteristics for the CF6-50C2/E2 engine. A significant improvement in cruise power SFC of 18 percent was demonstrated in Sea Level testing projected to altitude flight conditions. (Author)

A80-42286 \# Analysis of rotating stall in vanedless diffusers of centrifugal compressors A N Abdelhamid (Carleton University, Ottawa, Canada) American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, New Orleans, La., Mar 10-13, 1980, Paper 80-GT-184 8 p & 8 refs
Members, $1.50, nonmembers, $3.00
This paper presents the effects of deterioration of gas turbine blade life with prolonged service exposure. This deterioration is primarily due to internal microstructural changes and the formation of creep voids or cavitation. Methods of evaluating residual blade life or life trend curves are presented along with a documentation of the creep damage observed. The extension of blade life by Hot isostatic pressing versus reheat treatment is discussed and data is presented to show that complete recovery of properties can be achieved even after the material has suffered extensive internal creep damage. As a result, the time between overhauls for blades can be significantly extended, and the need for replacement blades can be minimized. (Author)

A80-42334 \# Synthesis of piloting properties of training simulators with allowance for the human factor (Sintez pilotskikh svoistv trenazherv s uchetom chelovecheskogo faktora) N A Kirsenko (Kievskii Institut Inzhenerov Grazhdanskoii Aviatsii, Kiev, Ukrainian SSR) Kibernetika i Vychislitel’naia Tekhnika, no 46, 1979, p 16-21 In Russian
A method for the structural synthesis of training simulators with an immobile cabin is presented. The synthesis is based on the similarity of the piloting properties of the simulator to the piloting properties of an aircraft in the absence of noninstrumental acceleration information. A design example of the proposed method is presented, and its efficiency is evaluated. (Author)

A method has been developed for the synthesis of the performance criterion of an ergatic control system, its application to the parametric optimization of a man-machine control system is discussed. The particular example of the synthesis of a system for the longitudinal motion control of an aircraft during glide is discussed. (Author)

A80-42350 \# Some problems involving the assurance of the controllability of an aircraft in the control-wheel regime (Nekotorye zadachi bezopasnosti upravljayushchego korabla v shturval’nom rezhime) L N Degtyarensko and V I Kryvonogzhkin (Kievskii Institut Inzhenerov Grazhdanskoii Aviatsii, Kiev, Ukrainian SSR) Kibernetika i Vychislitel’naia Tekhnika, no 46, 1979, p 82-84 In Russian
A learning theory approach is taken to the investigation of the limiting controllability of an aircraft in the control-wheel regime with emphasis on the role of the pilot. Three problems of controllability are formulated with reference to the learning hypothesis. (Author)

A80-42353 \# New aircraft - Where are we heading in the 1980s and 1990s I S Macdonald (Air Canada, Montreal, Canada) Aircraft Engineering, vol 52, July 1980, p 13-17
Future improvements in aircraft and engine design with regard to fuel economy are surveyed. Attention is given to high bypass engines, supercritical airfoils, lightweight composites, and active controls which can provide an answer to span increases without the need for major wing redesign. Digital electronic systems, colored CRTs, and propulsion improvements are also discussed. Emphasis is placed on the costs and immensity of aircraft and equipment replacement. (Author)

The background of automatic landing is reviewed with emphasis on British Airways (particularly Trident aircraft) experience. Consideration is given to the following issues related to the implementation of automatic landing systems: fully integrated design, system integrity, ground operations, and the need for Category III. (Author)

Consideration is given to the origin of MLS, MLS limitations, MLS benefits, and possible problems with the introduction of MLS. It is argued that all segments of the aviation community must join in a commitment to proceed with MLS with the full enterprise and determination which will be needed to overcome the inevitable problems during the initial period of operation, when the benefits will be necessarily restricted. It is suggested that a forum of users and providers of landing guidance is essential to capitalize on the initiative which has been taken by ICAO and the investment which has been made. (Author)

A80-42574 Britain’s new air traffic control radar network W C Stokhof and P Garside (Hollandse Signaalapparaten, Hengelo, Netherlands) Interavia, vol 35, July 1980, p 631-633
The system which recently won the UK CAA contract for a new long-range radar network is described. The system consists of the
A80-42575

Applied aerodynamics of helicopters (Prakticheskaya aerodynamika vertoletov) V F Romaskevich and G A SamoIov Moscow, Voenizdat, 1980 384 p 22 refs In Russian

Some aspects of helicopter flight dynamics and aerodynamics are examined in the light of actual helicopter behavior under various normal and critical flight conditions. Characteristic pilot errors are discussed, and guidelines for helicopter pilots are given for a range of flight conditions. Particular attention is given to the basic characteristics of helicopter flight, some specific phenomena of flight dynamics and aerodynamics, and to the physical nature of helicopter flight limitations.

A80-42659 * Meteorological and air pollution modeling for an urban airport P R Swan (NASA, Ames Research Center, Moffett Field, Calif) and I Y Lee (San Jose State University, San Jose, Calif) Journal of Applied Meteorology, vol 19, May 1980, p 534-544 7 refs

Results are presented of numerical experiments modeling meteorology, multiple pollutant sources, and nonlinear photo-chemical reactions for the case of an airport in a large urban area with complex terrain. A planetary boundary-layer model which predicts the mixing depth and generates wind, moisture, and temperature fields was used; it utilizes only surface and synoptic boundary conditions as input data. A version of the Meitk Senfeld-Dodge chemical kinetics model is integrated with a new, rapid numerical technique, both the San Francisco Bay Area Air Quality Management District source inventory and the San Jose Airport aircraft inventory are utilized. The air quality model results are presented in contour plots, the combined results illustrate that the highly nonlinear interactions which are present require that the chemistry and meteorology be considered simultaneously to make a valid assessment of the effects of individual sources on regional air quality.

A80-42798 # The HUD optoelectronic projection indicator systems. I (Elektronizno-optyczne systemy wskaz projetoynych HUD) E Malinski (Instytut Lotnictwa, Warsaw, Poland) Technika Lotnictwa i Astronautyczna, vol 35, June 1980, p 10-14 10 refs In Polish

The paper deals with the design, development, and evolution of head-up displays for military aircraft. The advantages of HUD systems over conventional methods with respect to control of combat maneuvers, navigation, and flight control are noted. Design criteria and engineering solutions are reviewed.

A80-42799 # Analysis of the influence of the design parameters on the characteristics of an aircraft in spinning nose dive I (Analiza wpływu parametrw konstrukcyjnych na właściwości samo lotu w korkociagu) L L Jarzembki Technika Lotnictwa i Astronautyczna, vol 35, June 1980, p 19-22 In Polish


The first of Nimrod AEW Mk 3s, designed as an efficient high-technology early warning system, is now commencing flight tests to fulfill development work on performance and handling qualities, airframe systems operation, and testing of the high-capacity cooling system for the avionics. The Nimrod AEW Mk 3 airframe is a modification of that of Nimrod MR Mk 1. The Nimrod AEW Mk 3 retains the 12,160 lb Rolls Royce RB 168-20 Spey Mk 250 turbfans of the marine surveillance Nimrods and utilizes their fuel supply as a heat sink to cool the avionics systems. The AEW system is installed with the operators in the forward cabin, while the radar, IFF, and communications equipment are located towards the rear of the fuselage. The Nimrod AEW Mk 3 requires a tactical crew of six and a flight crew of four. Most of the early warning Nimrods will be committed to NATO as the UK's contribution to West European AEW coverage in lieu of its participation in the NATO E-3 Sentry program, and six Nimrod AEW Mk 3s will be able to cover the entire UK air defence region.

A80-42825 Mikoyan Flogger Air International, vol 19, Aug 1980, p 70-75, 86, 87

A family of combat aircraft assigned the name of Flogger in the West now provides the backbone of Soviet TacAir and will fulfill the same role for all major WarFac air arms in the coming years. These aircraft, featuring pilot-selected variable sweep wing sweep with NASA-style outboard hinges, have been conceived by the Mikoyan-Gurevich design bureau as a flexible combat aircraft combining increased warload and range performance with a field performance no more demanding than that of fighters of the preceding generation. Major design features and performance data are presented for MiG-23 MF Flogger-B optimized for air air mission, MiG-27 Flogger-D, a dedicated ground-to-air aircraft, and other models of this family.

A80-42831 Interferometer design and data handling in a high-vibration environment I - Interferometer design R P Walker and J D Rex (USAF, Geophysics Laboratory, Bedford, Mass) In Multiplex and/or high throughput spectroscopy, Proceedings of the Seminar, San Diego, Calif, August 27, 28, 1979 Bellingham, Wash, Society of Photo-Optical Instrumentation Engineers, 1979, p 88-91

An AFGL interferometer used in airborne work is described in terms of the mechanisms utilized to counteract the influences of the harsh aircraft cabin environment. The problems of vibration are dealt with by reliance upon a command voltage slaved balanced servo drive and Bendix Corp Flexure Pivots for the moving mirror transport system. A pezoelectric crystal system maintains auto-alignment of the stationary mirror thereby countering the warping effects that arise from aircraft cabin temperature fluctuations. The entire interferometer is further isolated from vibration by suspending it within an outer case on Aeroflex Corp flexible cable mounts. The result is an instrument that delivers highly accurate and reliable data.

A80-42832 Interferometer design and data handling in a high-vibration environment II - Data handling J H Schummers (USAF, Geophysics Laboratory, Bedford, Mass) In Multiplex and/or high throughput spectroscopy, Proceedings of the Seminar, San Diego, Calif, August 27, 28, 1979 Bellingham, Wash, Society of Photo-Optical Instrumentation Engineers, 1979, p 92-95 Research supported by the U S Defense Nuclear Agency and DARPA

Procedures have been developed for data handling from interferometers used in the high vibration environment produced by an NKC-135 aircraft. These procedures will be described in this paper covering the data recording, calibration, data processing, storage, and analysis procedures that have been developed and used at the Air Force Geophysics Laboratory.

A80-42918 # An experimental aircraft to test new technologies W Haberland Dornier-Post (English Edition), no 2, 1980, p 10-13

The Dornier TNT experimental aircraft designed for flight testing relevant key technologies for new General Aviation aircraft is described. Emphasis is placed on the design of a new-technology
wing (TNT) Following the presentation of the aircraft at the ILA’80, it was used for take-off and landing run measurements. V T

A80-42924 The status of theoretical methods for calculation of detached flows (Der Stand theoretischer Methoden zur Berechnung abgolber Stromungen) P. Sacher (Messerschmitt-Bolkow-Blohm GmbH, Ottobrunn, West Germany) Deutsche Gesellschaft für Luft und Raumfahrt, Symposium, Munich, West Germany, Sept 19, 20, 1979, Paper 56 p 21 refs In German (MBB-FE122-S-PUB-12)

Current methods for calculating detached flows are surveyed. Models are presented which cover four areas: (1) potential theory, (2) boundary layer models, (3) empirical models and (4) Navier-Stokes solutions. It is shown that numerous methods have been developed that are applicable even under the stipulation that they are proven methods. Further, civil applications in the automotive field are also considered. Attention is given to industry methods for dealing with relevant problems in the areas of rockets, rotary wing aircraft and airplanes. Finally, a summary of especially important areas of further development is presented. M E P


The book deals with experimental methods and procedures for determining the aerodynamic characteristics of a helicopter and also of its rotor and other elements. Methods of determining the angular displacements of the rotor blade root and the elastic strains in blades by means of special sensors and strain gauges are examined, along with methods of measuring the aerodynamic loads on rotor blades and methods of determining the structure of flows about a helicopter model. V P

A80-42964 Laminar boundary layer on swept wings of infinite span at an angle of attack (Lamnarnaya pogranichnyi sloi na strelolovdykh kryl’akh beskonechnogo razmakha, obtekaemykh pod ugлом ataki) I. G. Brykina, E. A. Gershbein, and S. V. Pingen Academii Nauk SSSR, Izvestia, Mekhanika Zhidkosti i Gaza, May-June 1980, p 27 39 24 refs In Russian

In the present paper, the compressible boundary layer flow on swept wings of infinite span is studied for various angles of attack under the assumption of an impermeable or BLC wing surface. A first-approximation analytical solution is obtained (also for assymetric flow) by an integral method of successive approximations. Asymptotic solutions of the boundary layer equations are obtained for large values of the BLC parameter. V P

A80-42965 Heat transfer at a breaking point of the leading edge of a plate in hypersonic flight (Teploobmen v okrestnosti tochki izloma perednei kromki plastiny pri giperzvukovom dvizhenii) G. N. Dudin and V. A. Neland Academii Nauk SSSR, Izvestia, Mekhanika Zhidkosti i Gaza, May-June 1980, p 40 45 7 refs In Russian

The analysis deals with the three-dimensional viscous gas flow past a flat plate with salient point of the leading edge generating, in the presence of strong interaction between the boundary layer and the external hypersonic flow. A numerical solution of the problem is obtained. It is shown that intense self induced secondary flows may arise at the salient point and that these induced flows may lead to local peaking of friction and heat fluxes. V P


Rae’s (1971) numerical method for calculating viscous low-density nozzle flows in the slender-channel approximation is applied to the numerical analysis of the local and integrated parameters of viscous gas flow in a Laval nozzle. The effectiveness of this approach is demonstrated by comparison with the experiment and calculations performed by other investigators. V P

A80-43106 Automation of aircraft control under unstable flight conditions (Avtomatizatsiya samoletovozhdennia i upravlennia vozdukhnym dvizhem) P. A. Agadzhanyan, V. G. Vorob’ev, A. A. Kuznetsov, and E. D. Markovich Moscow, Izdatel’stvo Transport, 1980 360 p 38 refs In Russian

The book deals with the basic concepts of air navigation, theory of flight control, and principles of designing onboard piloting and navigation systems. Much attention is given to the organization, planning, and operation of air traffic control and to the automation of the acquisition, processing, and displaying of information on the air situation. Approaches to the automation of air traffic control, in particular at major airports, are examined. V P


In order to alleviate the problem of bearing corrosion in aircraft engines and gearboxes, a program to develop a corrosion-inhibited MIL-L-23699 lubricant was initiated. This program was designed to (1) determine and evaluate the factors affecting corrosion inhibition of MIL-L-23699 lubricants, (2) determine the mechanism of this corrosion, (3) develop a laboratory test to simulate this corrosion, (4) conduct formulation studies and evaluations of potential corrosion inhibitors, (5) evaluate the roles of the chloride ion and oil decomposition products on corrosion and (6) complete the development of a corrosion-inhibited MIL-L-23699 lubricant. All program goals were achieved. Engine-performance verification of these lubricants is under way. (Author)


The data presented in this paper are the result of the first installation and operation of a silicon nitride bearing in a mainshaft supporting position of a currently operational gas-turbine engine. The paper identifies some of the potential advantages of the use of ceramic bearings for certain gas-turbine applications, and also defines some of the limits, design constraints, and manufacturing criteria which must be considered in determining the effective use of this material for specific applications. (Author)
Investigation of Air Force MIL-H-5606 hydraulic system malfunctions induced by chlorinated solvent contamination C E Snyder, Jr, G J Morris (USAF, Materials Laboratory, Wright-Patterson AFB, Ohio), L J Gschwender (Dayton University, Dayton, Ohio), and W F Campbel (USAF, Aero Propulsion Laboratory, Wright-Patterson AFB, Ohio) American Society of Lubrication Engineers, Annual Meeting, 35th, Anaheim, Calif, May 5-8, 1980, Preprint 80-AM-SC-2 4 p

A field problem in the C-141 aircraft associated with hydraulic selector valve malfunctions in landing gear and door systems was attributed to corrosion of the valve spool and stave. This corrosion was caused by the presence of chlorine in the operational hydraulic fluid. The primary source of chlorine contamination was determined to be from residual chlorinated solvents used in maintenance procedures. This paper discusses (1) proof of chlorine involvement in the selector valve problem, (2) the prevalence of chlorinated solvent contamination in Air Force aircraft, and (3) steps taken to control chlorine in C-141 hydraulic systems.


This paper describes improved thermal control system designs for both air cooled and liquid cooled avionics. The two systems use heat pipes to efficiently transfer heat from printed circuit boards to the avionic coolant. The resulting decrease in cooling requirements, relative to current air cooled designs, permits an increase in avionics reliability and a simultaneous reduction in cooling system penalties to the aircraft. An analytical evaluation of these heat pipe avionics thermal control systems was conducted for a subsonic V/STOL aircraft. Results presented include thermal control system weights, power and heat sink requirements, and aircraft takeoff gross weight penalties.

The cabin air conditioning and temperature control system for the Boeing 767 and 757 airplanes R E Crabtree, M P Saba, and J E Strang (AIAA Research Manufacturing Company of California, Terrance, Calif.) American Society of Mechanical Engineers, Inter society Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-5 5 p 5 refs Members, $1.50, nonmembers, $3.00

The emphasis in the design of the 767 and 757 air conditioning systems has been to incorporate technological advances that will result in an energy efficient, maintainable system with ‘wedgebody’ characteristics. A major factor has been to reduce bleed airflow to existing advanced system design that produces more cooling than a traditional system. Ram air reduction and improved maintenance features are also design goals that have been considered with the use of digital temperature controls and air bearings in the air cycle machine.

Optimizing the performance of the P-3C environmental control system P F Zalesak (U.S. Naval Air Systems Command, Naval Air Test Center, Patuxent River, Md.) American Society of Mechanical Engineers, Inter society Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-6 10 p 12 refs Members, $1.50, nonmembers, $3.00

The thermal environment of both flight crew and onboard electronics equipment is an important parameter affecting crew effectiveness and weapon system reliability. Although this parameter is receiving greater attention in the design of newer aircraft, it continues to be a problem in older aircraft where a complete redesign of the environmental control system (ECS) is not feasible. The problem arises when military aircraft in inventory receive updates (additions) to their weapon system avionics suites. The additional avionics impose a greater cooling load on the existing ECS and disturb whatever thermodynamic balance that may exist. Because of limited baseline data, engineers responsible for optimizing portions of the ECS to accommodate a new avionics configuration are often forced to use their best ‘engineering guess’ or simplified ECS software models to determine the best redesign approach. This paper outlines a procedure for resolving this dilemma.

Noise suppressors for jet engine testing M Lepor (U.S. Naval Oceans Systems Center, San Diego, Calif.) American Society of Mechanical Engineers, Inter society Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-28 7 p 9 refs Members, $1.50, nonmembers, $3.00

Noise control is one of the factors associated with post-maintenance jet engine ground run-up operations. Abatement alternatives currently being considered include modification of existing water-cooled test cells, the introduction of air-cooled noise suppressors, and technology advancements on cost-effective noise emission control techniques.

Environmental control system concept study for a Navy V/STOL aircraft W F Hibbert, A Bruno (Grumman Aerospace Corp., Bethpage, N.Y.), and J E McMamara (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.) American Society of Mechanical Engineers, Inter society Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-47 9 p 9 refs Members, $1.50, nonmembers, $3.00

Energy efficient closed-loop air and vapor cycles, rotary-vaned positive-displacement air cycle machinery, partial closed-loop air cycles, and advanced centrifugal machinery with high-speed electric motor drives show promise for advancing the state-of-the-art in ECS design. This paper presents study results to identify the benefits of this advanced ECS technology when applied to subsonic Navy V/STOL aircraft. Results show that the use of bleed air driven turbo-machines with partial recirculation of used cooling air back to the turbomachinery leads to the lowest overall system takeoff weight penalty to the aircraft and to the lowest life cycle costs. For this system, the total life cycle cost penalty decreased with decreasing avionic junction temperatures between 115 and 80°C, and then increased rapidly at junction temperatures lower than 80°C.

A theoretical and experimental investigation of propeller performance methodologies K D Korkan, G M Gregorek (Ohio State University, Columbus, Ohio), and D C Mikkelsen (NASA, Lewis Research Center, Subsonic Propulsion Section, Cleveland, Ohio) AIAA, SAE, and ASME, Joint Propulsion Conference, 16th, Hartford, Conn., June 30-July 2, 1980, AIAA Paper 80-2140 22 p 31 refs Grant No. N62-337

This paper briefly covers aspects related to propeller performance by means of a review of propeller methodologies, presentation of wind tunnel propeller performance data taken in the NASA Lewis Research Center 10 x 10 wind tunnel, discussion of the predominant limitations of existing propeller performance methodologies, and a brief review of airfoil developments appropriate for propeller applications.


Simple computational means are presented for prediction of wing body damping from incompressable to hypersonic velocities. The present paper extends previously developed analytic means for prediction of body-alone pitch damping to include the effect of tandem or cruciform lifting surfaces of low aspect ratio. At subsonic to low supersonic speeds a modification of an earlier developed wing-alone theory is used, and at hypersonic speeds the wing effect is obtained through simple strip theory. Comparison with experimental results shows that the accuracy of the developed theory is sufficient for preliminary design usage.


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A80-43285  #  Performance improvement of delta wings at subsonic speeds due to vortex flaps J F Marchman, III, E B Plentovich, and D Manor (Virginia Polytechnic Institute and State University, Blacksburg, Va) American Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif, Aug 4-6, 1980, Paper 80-1802 11 p 8 refs NASA-supported research

Subsonic wind tunnel tests were conducted to determine performance improvements possible from the use of leading edge vortex flaps (LEVF) on delta wings. Various flap sizes and deflection angles were examined and lift-to-drag ratio improvements of up to 40% were found at moderate angles of attack on 60° and 75° swept wings. The LEVF is concluded to be effective in moving the wing's leading edge vortex onto the flaps, tilting the vortex-induced force vector forward to produce a thrust or reduce the wing's drag while maintaining attached flow and lift on the wing's upper surface.

(Author)

A80-43286  #  A vortex-lattice method for the calculation of the nonsteady separated flow over delta wings D Levin and J Kate (NASA, Ames Research Center, Moffett Field, Calif) Ames Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif, Aug 4-6, 1980, Paper 80-1803 8 p 20 refs

An analysis is made of the wake structure and the forces on a delta wing as it undergoes nonsteady motion, wherein the flow separates at the leading edge. Comparisons of these predictions with existing experimental and theoretical data for the nonsteady and nonlinear motions indicate good agreement. It was found that the time-dependent, wake shedding numerical procedure applied here for the wake rollup and the lift force calculation resulted in considerable saving of computer time over methods using the iterative wake rollup procedure. Calculated results for various motions of the delta wing, including the plunging motion, are presented for both the separated and the attached flow cases.

(Author)


A wing with a bounded region of separated flow at high angles of attack was tested in the McDonnell Aircraft Company low-speed wind tunnel. Extensive wing surface pressure data, the boundaries of the separated flow bubble above and aft of the wing, and flow visualization data were obtained. Flow field velocity measurements were integrated to determine the displacement thicknesses of the viscous flow, which were subsequently used to determine an equivalent inviscid shape. The equivalency was verified by comparing the calculated potential flow pressures of this shape with the measured pressures. The results of this test will be used in the development of an analytical method for the calculation of the flow about stalled wings.

(Author)


This paper compares aircraft carrier capability with advanced notional CTOL aircraft - conventional takeoff and landing (catapult and arresting gear dependent) - and with notional VSTOL aircraft - capable of takeoff and landing in the vertical mode with increased mission payload and performance when operated in a STO (short takeoff) overload condition for the year 2000. Investigations were conducted on how generic aircraft were affected by the ship environment and how aircraft operations could be optimized. Starting with the CTOL aircraft, investigations were performed to determine the limiting operational factors and constraints. This established baseline for the operational sensitivity studies. Sensitivity studies were then made comparing equal size, equal cost, and equal performance airwings. Results of these studies parameterically show the impact on mission ranges out to 700 nautical miles at various cost levels.

(Author)


This paper reviews in detail the rationale behind the development of the takeoff and landing guidelines used for the Sea Based Air Master Study. It shows how these criteria are driven by the operating concepts, engagement scenarios and ship configurations and how changes or relaxation of certain guidelines affect the size of selected configurations. It also points out changes made in the guidelines during the course of the study and examines changes which might be made now that most of the work on the notional designs is complete. Additional operational considerations are discussed to show the need for continued studies and simulator work.

(Author)


An advanced high lift system is being developed which combines a Circulation Control Wing (CCW) with Upper Surface Blowing (USB) to produce significant lift for STOL operations by Navy aircraft. The concept uses Circulation Control to pneumatically deflect USB engine thrust and thus augment aerodynamic wing lift produced by the outboard CCW. Wind tunnel investigations have confirmed significant thrust turning to angles near 165°, providing a simple, highly effective STOL and thrust reverse system. A non-moving parts VTOL system is obtained by deflecting thrust to produce a small, simple aircraft. The concept uses Circulation Control to pneumatically deflect USB engine thrust and thus augment aerodynamic wing lift produced by the outboard CCW. Wind tunnel investigations have confirmed significant thrust turning to angles near 165°, providing a simple, highly effective STOL and thrust reverse system. A non-moving parts VTOL system is obtained by deflecting thrust to produce a small, simple aircraft.

(Author)

A80-43293  #  Impact of aircraft vs logistics characteristics on operational readiness I C Stiles (Grumman Aerospace Corp, Bethpage, N Y) American Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif, Aug 4-6, 1980, Paper 80-1830 10 p

The paper considers the relationship between the aircraft design characteristics, operational parameters, and the existing naval logistic system. It was shown that (1) it is feasible to predict readiness figures of merit based on the aircraft design characteristics by using the Designed Full Systems Capability Figures-Of-Merit (FOM) status of an aircraft weapon system, (2) that mission requirements dictate the need for a large, complex aircraft, or a small, simple aircraft which in turn drives the resulting Figures-Of-Merit in an inverse manner, (3) the reliability of the total aircraft level in excess of 1.5 of Mean Flight Hours Between Failure produces small increases in overall readiness FOM, (4) the overall logistic support contribution to readiness can be monitored and evaluated on the aircraft level using the existing Maintenance Material Management data and the Logistic Support System Capability FOM, and (5) visibility should be expanded to track the real-time contribution of all Weapon Replaceable Assemblies.

A T

A80-43295  #  Stability and control taught by design of tail surfaces R L Swaim (Oklahoma State University, Stillwater, Okla) American Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif, Aug 4-6, 1980, Paper 80-1835 5 p

As part of a senior aerospace engineering course on conventional airplane stability and control, the students are asked to complete a design project which requires the application of the analytical concepts learned in the course. The project used the past two years is...
the design of the horizontal and vertical tails for a light, single-engine, general aviation airplane. Design specifications to be met are given, as well as pertinent wing and fuselage aerodynamic data. Progress is evaluated by reviewing several milestone reports during the course. A final written report documents the total project and compliance with the specifications.

Author

Evaluation and selection of new aircraft for the eighties.
R. E. Gordon (American Airlines, Inc., Tulsa, Okla.)

This paper examines the approach currently used by one airline to evaluate, compare and select new aircraft and engine types. The need for new aircraft and engine types is reviewed in terms of mission requirements (capacity and range), fleet age, noise rule, and the critical importance of fuel efficiency for the 1980s. Discussion of the significant direct operating cost elements such as crew, fuel, maintenance, and depreciation are addressed along with other aircraft cost elements that are becoming more important in these evaluation efforts. Emphasis is placed on the increasingly important role of the engine and rapidly increasing fuel prices. In the 1980s, other considerations outside of the classic direct operating cost analysis which will be major aircraft selection factors include operational improvements on existing fleets, deregulation impacts, and financial capability.

Author

The economics of commonality: A Boeing product strategy view.

Rapidly escalating fuel and other costs mandate maximizing efficiency in the design, production, and operation of commercial jet transports. This paper addresses the commonality aspect of aircraft design as one means to improve economic performance of both the manufacturer and the user. The paper illustrates that the economic benefits of design commonality must be judged against other benefits arising from technical innovation. The challenges presented in quantifying the impact of commonality on a diverse customer population are explored. Examples are given of commonality and noncommonality between models of the Boeing Commercial Jet Family. The effect of today's business environment on the manufacturer's viewpoint and actions is also illustrated.

Author

Airliner economic benefit through engine development.

Aircraft gas turbine engines have continued their remarkable advancement from their commercial introduction nearly a quarter of a century ago. Fuel efficiency and engine durability have improved dramatically even though thrust has grown nearly fivefold. New requirements for noise and emission reduction have been met. The efforts to improve manufacturing capability, reduce engine cost, and reduce engine weight have seen the payoff of technology improvements in reducing the costs of ownership. The development of new families of engines as well as the initiation of new engine technologies are demonstrating our emphasis on providing engines to improve airliner operating profits.

Author

The economic impact of materials technology on supersonic transport selection.
D. L. Horning, R. H. Johnson, and J. V. Werner (Lockheed-California Co., Burbank, Calif.)

A series of studies on Advanced Supersonic Transports (AST) have been performed to determine the relative airplane profitability of various speed regimes and structural configurations in order to narrow the spectrum for future analysis. Of the many possible configurations, seven candidates were selected to cover the speed, material and manufacturing process spectrum: five Mach 2.0 and two Mach 2.55 configurations included are conventional aluminum and titanium design with conventional manufacturing processes, and various mixes of advanced aluminum, titanium and composite structural designs with advanced manufacturing processes. The study indicates (1) lower speed aircraft are more cost effective than the higher speed aircraft, (2) composite aircraft with their significantly lower weight provide the highest return on investment (ROI) and lower fare.

Author

Effects of discontinuous drooped wing leading-edge modifications on the spinning characteristics of a low-wing general aviation airplane.
D. J. DiCarlo, H. P. Stough, III, and J. M. Patton, Jr.

Wind tunnel and flight tests were conducted to determine the effects of several discontinuous drooped wing leading-edge configurations on the spinning characteristics of a light, single engine, low wing research airplane. Particular emphasis was placed on the identification of modifications which would improve the spinning characteristics. The spanwise length of a discontinuous outboard droop was varied and several additional inboard segments were added to determine the influence of such leading-edge configurations on the spin behavior. Results of the study indicated that the use of only the discontinuous outboard droop, over a specific spanwise area, was most effective towards improving spin and spin recovery characteristics, whereas the segmented configurations having both inboard and outboard droop exhibited a tendency to enter a flat spin.

Author

Full-scale wind-tunnel investigation of the effects of wing leading-edge modifications on the high angle-of-attack aerodynamic characteristics of a low-wing general aviation airplane.
J. L. Johnson, Jr., W. A. Newsom, and D. R. Satran (NASA, Langley Research Center, Hampton, Va.)

The paper presents the results of a recent investigation to determine the effects of wing leading edge modifications on the high angle-of-attack aerodynamic characteristics of a low-wing general aviation airplane in the Langley Full-Scale Wind Tunnel. The investigation was conducted to provide aerodynamic information for correlation and analysis of flight-test results obtained for the configuration. The wind-tunnel investigation consisted of force and moment measurements, wing pressure measurements, flow surveys, and flow visualization studies utilizing a tuft grid, smoke and nonintrusive mini-tufts which were illuminated by ultra violet light. In addition to the tunnel scale system which measured overall forces and moments, the model was equipped with an auxiliary strain gauge balance within the left wing panel to measure lift and drag forces on the outer wing panel independent of the tunnel scale system. The leading-edge modifications studied included partial- and full span leading edge droop arrangements as well as leading edge slats.

Author

Determination of an angle of attack sensor correction for a general aviation airplane at large angles of attack.
T. M. Moul and L. W. Taylor, Jr. (NASA, Langley Research Center, Hampton, Va.)

A comprehensive investigation into the flow correction for an angle of attack sensor mounted ahead of the wing tip of a general aviation research airplane has been conducted at the Langley Research Center. This correction has been determined in wind tunnels using a full-scale model up to angles of attack of 45 deg. and a 1/5-scale model up to 80 deg angle of attack. The flow correction has
A design study has been conducted to optimize a single engine airplane for a high performance cruise mission. The mission analyzed included a cruise speed of about 300 knots, a cruise range of about 1300 nautical miles, and a six passenger payload (5340 N (1200 lbf)). The purpose of the study is to investigate the combinations of wing design, engine, and operating altitude required for the mission. The results show that these mission performance characteristics can be achieved with fuel efficiencies competitive with present day high-performance, single- and twin-engine, business airplanes. It is noted that relaxation of the present Federal Aviation Regulation, Part 23, stall speed requirements for single engine airplanes facilitates the optimization of the airplane for fuel efficiency.

Fuel efficiency of small aircraft B. H. Carson

There is a basic mismatch between the amount of power installed in small propeller-driven aircraft and that required for efficient cruising, which results from climb performance requirements. It is shown in this paper that there is a way of using excess power for most efficient cruise, the resulting airspeed coming closest to the Gabrielli von Karman limit line of vehicular performance. A survey of 111 light aircraft were conducted, and it is found that many are operated at this optimum, while many more are not. A figure of merit is developed that measures cruise performance. Rationale is presented that is directly applicable to design for cruise efficiency.

Educational aspects of multi-microprocessor design used in flight simulation applications F. E. Huguenin (Zurich, Eidgenossische Technische Hochschule, Zurich, Switzerland) American Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif., Aug 4-6, 1980, Paper 80-1858, 8 p.

The paper presents the results of the design of a tightly coupled computer system for the real-time simulation of the lift and drag coefficients of a transport aircraft. Attention is given to the educational aspects of the design process of the system and to the chosen computer configuration. A software design problem is also outlined.

The fan is sized to operate at its maximum flow capacity, additional core energy cannot increase the energy of the low pressure system, and little additional thrust results.


The 'D' vented nozzle has been developed to provide efficient thrust vectoring for advanced subsonic V/STOL aircraft. The development of the nozzle, aerodynamic performance, and current future testing are described. The performance of the 'D' nozzle has been established through a number of small scale model tests at McDonnell Aircraft Company (MCAIR) and a large scale, tip turbine fan test at NASA Ames. Vectoring performance obtained during the most recent tests is presented for variations of nozzle pressure ratio, nozzle exit area, and thrust vector angle for both uniform and nonuniform entrance flow. Evaluation of vectoring performance for the case of core engine failure is also discussed.

Preliminary design analysis was performed on a specification that called for a twin engine business aircraft with performance metrics that of a jet airplane, combined with the fuel efficiency of a turboprop. Use was made of advanced technologies in the areas of aerodynamics, propulsion, construction and stability and control. Results are presented which indicate a significant improvement in performance compared to turboprop airplanes currently in use.


An analytical study was undertaken to identify those design characteristics which would optimize the earning potential of a new airplane. Designs considered were (1) a re-engined Ag Husky (and derivatives thereof), and (2) completely new configurations (biplane, monoplane, and spider). Concepts were investigated. Variables considered were: in hop capacity, weight, wing area, and engine size were investigated. The economic potential of each configuration investigated was analyzed by analyzing six (via computer simulation) through a matrix of 18 spray missions. The optimum design characteristics were determined by comparing their effects on the results of the simulations.


A review and evaluation of current and future technology as applicable to Navy aircraft for the remainder of the century is presented. Attention is given to the design problems which result from the unique requirements of the Navy. Emphasis is given to an evaluation of panning technologies which promise payoffs in increased performance and reduced life cycle costs. Finally, management and funding trends are considered.

A new approach has been developed for measuring advances in jet fighter air vehicle performance. The approach recognizes the multiparameter trade-offs imposed by the development process by simultaneously considering trends in a number of performance areas, rather than treating each area separately. Relationships are established between the time of appearance of an aircraft design and such parameters as specific power, sustained load factor, Breguet range, and payload fraction. Using the approach to project where the current acquisition environment is leading us with respect to fighter performance suggests that (1) U.S. fighter air vehicle performance is presently advancing at a diminishing rate, (2) increasing the rate of advance may be costly, and (3) performance growth opportunities offered by derivative aircraft seem limited. The results raise some questions about the most desirable mix of investment in air vehicle, avionics, and armament technology.

(Author)


Aircraft technology is continually being challenged to develop new and innovative aircraft concepts with higher performance and lower cost. In the structures area, several new advances are meeting this challenge. Large and complex primary structure components designed for integral composite fabrication methods show significant improvement over conventional composite techniques. Superplastic-formed and diffusion bonded (SPF/DB) titanium offers low-cost methods of fabricating efficient aircraft hardware. Fiber-reinforced advance titanium (FRAT) promises to effectively combine the high strength/stiffness and tailorability of filamentary composites with the low-cost fabrication methods of SPF/DB. These and other new and advanced technologies are presented showing their impact on the aircraft of the future.

(Author)

A80-43314 * # Effect of winglets on performance and handling qualities of general aviation aircraft C. P. van Dam (Kans, University, Lawrence, Kan.), B. J. Holmes (NASA, Langley Research Center, Hampton, Va.), and C. Pitts (Oklahoma State University, Stillwater, Okla.) American Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif., Aug 4-6, 1980, Paper 80-1870 8 p 22 refs

Recent flight and wind tunnel evaluations of winglets mounted on general aviation airplanes have shown improvements in cruise fuel efficiency, and climbing and turning performance. Some of these analyses have also uncovered various effects of winglets on airplane handling qualities. Retrofitting an airplane with winglets can result in reduced cross wind take-off and landing capabilities. Also, winglets can have a detrimental effect on the lateral directional response characteristics of an aircraft that have a moderate to high level of adverse yaw due to theileron. Introduction of an aileron-rudder interconnect, and reduction of the effective dihedral by canting-in of the winglets, or addition of a lower winglet can eliminate these flying quality problems.

(Author)


The pressure field in the cooling air and the drag associated with engine cooling of a typical general aviation twin-engine aircraft was investigated experimentally. The semispan model was mounted vertically in the 40- by 80-Foot Wind Tunnel at Ames Research Center. The propeller was driven by an electric motor to provide thrust with low vibration levels for the cold-flow configuration. It was found that the propeller slipstream reduces the frontal air spillage around the blunt nacelle shape. Consequently, this slipstream effect promotes flow reattachment at the rear section of the engine nacelle and improves inlet pressure recovery. These effects are most pronounced at higher angles of attack, that is, climb condition. For the cruise condition these improvements were more moderate.

(Author)


The differential equation for the trajectory of a spherical particle injected into an aircraft wake was developed and the proper scaling relations extracted. After some simplification a convenient set of similarity parameters was established. Using these similarity parameters a scale model test program was designed and performed in the NASA Langley vortex research facility. The results of the tests demonstrated the validity of the similarity parameters in conducting scale model testing for aerial application research.

(Author)

A80-43317 * # Noise reduction characteristics of general aviation type dual-pane windows F. Grosveld, R. Navaneethan, and J. Roskam (Kansas University, Lawrence, Kan.) American Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif., Aug 4-6, 1980, Paper 80-1874 8 p 8 refs NASA-sponsored research

The noise reduction characteristics of general-aviation-type, dual-pane windows in various configurations have been experimentally investigated. The effects of inner and outer pane thickness, spacing between the panes, edge conditions, inclination of the inner pane and dephasing of the air between the panes are presented. The space in between the two window panes is sealed airtight in all cases. Results show that increasing the mass of a 'floating' window pane does not increase the noise reduction below the fundamental resonance frequency. It is concluded that the concept of dephasing of the air between thin (1/8 in.) Plexiglas panes and application of multiple-freedom edge conditions for the inner pane are promising to reduce noise levels in general aviation airplanes.

(Author)

A80-43318 # The impact of propulsion performance parameters on V/STOL design and sizing J. D. Louthan (Vought Corp., Dallas, Tex.) American Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif., Aug 4-6, 1980, Paper 80-1875 7 p

Vought, in cooperation with NASA's Lewis Research Center, conducted several series of tests on inlets and nozzle systems for a tandem lift/cruise fan propulsion system concept developed by Vought for subsonic and supersonic V/STOL applications. This paper examines the impact of these emerging test results on the size and performance capabilities of a subsonic V/STOL aircraft which uses tandem fan propulsion. The design impacts are defined in terms of (a) adjustments in size/weight with mission and performance held constant and (b) effects on mission and performance capabilities for a fixed vehicle size and configuration.

(Author)


Light aircraft carrier designs are being considered in order to increase the number of air capable ships and disperse air power more widely at sea. The deletion of catapult launch devices is a major contributor to reducing the weight, complexity and cost of these ships, but this requires aircraft with short takeoff capability. The ramp launch techniques developed by the British and used by the Sea Harrier, which is a very high thrust-to-weight ratio design, is shown to be applicable to reducing the deck run of conventional naval aircraft. A short takeoff using a free deck run and a ramp is achieved.
by lifting off at a speed less than stall speed and accelerating to a 1g flight speed during a ramp-induced semi-ballistic flight trajectory. This paper shows the impact of the ramp launch technique on low thrust-to-weight ratio aircraft and describes a design study to modify the Navy S-3A ASW aircraft to operate from a light aircraft carrier with an 800-foot deck run and a 4-degree circular arc launch ramp. (Author)


An analysis of the thrust-induced longitudinal aerodynamic characteristics of three fighter type configurations is presented. A brief discussion of the take-off and landing requirements for the next generation fighter aircraft leads to the conclusion that advances in lift coefficient and thrust reversing will be required to allow short-field operation. Typical power-on longitudinal aerodynamic data for these fighter configurations, indicating different approaches to meet these requirements, are discussed. Thrust reversing is not addressed in this paper. The power-on data are analyzed to determine what power effects are present, that is, direct thrust, boundary-layer control, vortex flows, or supercircuitation. The results of the analysis indicate, for the configurations studied, that induced effects are small compared to direct thrust and that boundary-layer control, rather than leading-edge vortex flows or supercircuitation, is the only significant thrust-induced effect. (Author)


The new test arena is reviewed. Work on the test arena is in progress and will be complete in the first half of 1981. The test arena will be a versatile facility that can be used for flight test research, commercial testing, and contract research. The test arena will be used to support a large number of test programs and is a key element in the total aircraft Systems Research Program. The test arena is also being used to reduce program risk by increasing the utilization of the test facility as an R&D tool. (Author)

A80-43329 # Systems redesign for compatibility with C-141 fuselage stretch B A Peaster (Lockheed-Georgia Co, Marietta, Ga ) American Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif , Aug 4-6, 1980, Paper 80-1889 9 p

The fuselage of the C-141 aircraft was to be stretched by inclusion of a 160-inch long plug forward of the wing and a 120-inch long plug aft of the wing. The hydraulic, oxygen and control systems would be affected by this structural change and some redesign would be necessary. The technical approach to these problems is discussed, and the methods used to investigate the problem, and the final solutions are shown. (Author)

A80-43322 # Development of a mission adaptive wing system for a tactical aircraft W W Gilbert (General Dynamics Corp., Fort Worth Div, Fort Worth, Tex ) American Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif , Aug 4-6, 1980, Paper 80-1889 7 p 7 refs

The cruise efficiency of the supercritical airfoil in the transonic range is well known. Adaptation of this technology to a multi role tactical aircraft system requiring Mach 2+ maximum speed and 7+g maneuver is enhanced by airfoil modification capabilities. This paper describes the hardware design and development of a Mission Adaptive Wing System utilizing variable camber leading and trailing edge mechanisms to optimize wing airfoil for all flight conditions. Development included design and manufacture of a full scale wing test component to demonstrate system capability and reliability. (Author)

A80-43330 # Full scale test of a stall proof device H L Chevalier and M L Faulkner (Texas A & M University, College Station, Tex ) American Institute of Aeronautics and Astronautics, Aircraft Systems Meeting, Anaheim, Calif , Aug 4-6, 1980, Paper 80-1890 7 p 7 refs

An airplane stall proofing system utilizing a spoiler as a second pitch control system has been tested on a full sized model representative of a low wing general aviation aircraft. The tests were conducted in the NASA Langley 30 x 60 foot full scale wind tunnel. A test velocity of 86 feet per second, corresponding to a Reynolds number of 2.20 x 10 to the 6th, was used. Using the test results, this report shows the stall proofing capability of the spoiler and verifies a previous theoretical approach to analyzing the spoiler's contribution to airplane static longitudinal stability. Controlled spoiler deployment in a narrow angle of attack range immediately preceding stall produced a reduction in pitching moment coefficient and an increase in longitudinal static stability. The data also illustrate some Reynolds
number limitations of small-scale model testing in the development of the spoiler system (Author)

A80-43333 # Three-dimensional supersonic flow through a cascade of twisted flat plates C F Grainger American Society of Mechanical Engineers, Fluids Engineering Conference, New Orleans, La , Mar 10-13, 1980, Paper 80-FE-3 7 p 5 refs Members, $1 50, nonmembers, $3 00

The three-dimensional flow through a cascade of twisted flat plate blades is calculated using a computer program based on a finite-difference approximation to the method of characteristics. The relative flow is supersonic but the axial flow is subsonic. For two-dimensional flow under similar conditions, the inlet flow field is one of 'unique-influence', the effect discussed by Starken (1976) and others. In the present work the understanding of this effect is extended to three-dimensional flow. Important differences between the two and three-dimensional flow fields are explained in terms of the interaction between neighboring sections of the flow (Author)


The irrotational 2-dimensional motion of an incompressible inviscid fluid at rest at infinity, effected by the displacement and the deformation of an aerofoil, is investigated. Complex potential, lift force and pitching moment acting on the aerofoil are determined, after introducing a Joukowsky condition at the cusp of the profile. Then periodic deformations of an aerofoil are constructed giving an improvement of the lift force (Author)


The article gives the results of a theoretical and experimental investigation of the convective-film cooling of nozzle-type blades of gas turbines. On the basis of a model of a heat sink with the use of a power law of the change in the velocity in the boundary layer, dependences were obtained for calculation of the efficiency of film-type cooling, in good agreement with the results of experiments, carried out under actual conditions (Author)


Shock associated noise from unheated supersonic jets is investigated through acoustic measurements in both the near and far fields. The peak Helmholtz number of broadband shock noise is found to be independent of nozzle pressure ratio when based on the length of the shock cells and the ambient speed of sound. This indicates that the acoustic wavelengths generated in the shock noise process are limited in size by the shock cell spacing. Excellent agreement between power spectral densities measured at various far-field angles is obtained at and above the peak shock noise frequency when source convection effects are included. Results show a directivity of broadband shock noise pointed in the upstream direction, with omnidirectional being approached only at high pressure ratios. The relative importance of shock noise with respect to jet mixing noise is found to be maximum near the pressure ratio at which a Mach disc begins to form in the jet. Near field measurements point to the downstream shock cells as the region where the dominant shock noise emanates from the jet (Author)

A80-43683 # Certification of avionics systems on the commercial airplanes of the 1980's J R Combley (Boeing Commercial


The purpose of this paper is to discuss the certification of avionics systems on the next generation of commercial airplanes, with particular emphasis on the flight testing requirements. In order to do this it is necessary to outline the development of new avionics systems, particularly digital computers and cathode ray tube (CRT) displays, over the last decade, showing how these developments have led to the systems which will be certified on the new airplanes. This discussion will also describe the integration of what used to be separate functional systems into a single flight management system as well as the elimination of some traditional systems. The new Aeronautical Radio and Instrument Corporation (ARINC) specifications for digital avionics systems and for a standard data transmission format between systems are described. The proposed avionics systems for a new commercial transport airplane, the Boeing 767, will be briefly described in terms of system function. Flight test experience during development and certification of new systems, particularly digital systems, will be related to the expected certification testing on the new airplanes. This certification testing will include bench tests and use of simulators in addition to flight testing (Author)

A80-43686 # A technique for simulating the motion and ground effect of aircraft wake vortices R H Wickens (National Aeronautical Establishment, Ottawa, Canada) Canadian Aeronautics and Space Journal, vol 26, 2nd Quarter, 1980, p 129-133 5 refs

An experimental technique is described which is intended to simulate the motion and induced flow of a vortex pair in ground effect without the use of a wind tunnel or lifting surface. The basic principle of the simulation is that the trailing vortex flows which occur in planes downwind of the aircraft, relative to an observer fixed on the ground, are similar in most respects to the vortex pair in two-dimensional flow. The production of lift and the shedding of trailing vortices result from a large number of short impulsive flows which disturb the ambient fluid and merge into a continuous streamwise effect. The sudden appearance of the vortices and their subsequent downward motion is meant to represent the passage of an aircraft above an observer on the ground (B J

A80-43687 # A streamline concept for lift - With reference to the maximum size and configuration of aerial spray emissions R H Wickens (National Aeronautical Establishment, Ottawa, Canada) Canadian Aeronautics and Space Journal, vol 26, 2nd Quarter, 1980, p 134 143 9 refs

The momentum streamline theory of airplane performance is a simple means of relating downwash to lift, and has been used to evaluate different classes of aircraft in which the distributive effects of engine power may be important. In this note, the concept is extended to include the effects of ground interaction, and is also examined as a means of estimating the maximum initial size of airborne aircraft generated spray emissions (Author)


The paper describes the development of a Mach 2.2 supersonic cruise version of the F-16 aircraft featuring an advanced-technology wing. The improvements include a 125% increase in the air-to-air combat mission radius and doubling of the supersonic cruise radius of action, a 120% increase in air-to-ground mission radius and doubling of payload, a decrease of 33% in takeoff and landing distances, and maximum lift capacity, providing improved gun-firing opportunities during air combat. The bolt-on wing concept will allow 93% of the fuselage airframe components and 91% of the avionics subsystems to be utilized. Because of the 1351 Ib increase in wing structural weight due to its greater area and thickness, the upper and lower skins will be fabricated from graphite epoxy
composites, this will save 574 lb of weight compared to the use of aluminum, and will ease the fabrication of complex contours. A T


In the experiments described, a turbine stage and eight combustion chambers (providing an operational temperature of 1100 C) were used to study the temperature fields of rotor blades cooled longitudinally with air and water vapor. The cooling effectiveness was found to be satisfactory. In the case of air, the gas temperature in front of the blade may reach 1000 to 1150 C. In the case of water vapor, the cooling effectiveness was appreciably higher, permitting a raise in gas temperature to 1250 C. VP

A80-43787 // Perturbing influence of the probe on the characteristics of a subsonic wake behind a two-dimensional model (Vozmushchauchiione влиание зонда на характерстики dozvukovogo sleda za ploskoi model'iu) L A Ignat'evskaia and V A Savost'ianov (Moskovski Energeticheskii Institut, Moscow, USSR) Energetika, vol 23, May 1980, p 116 119 7 refs In Russian

The paper deals with a vapor tunnel study of the influence of the probe configuration and flow conditions on the base pressure and vortex streets of a plane model. The parameters of the turbulent wake were investigated. For a probe located in the symmetry plane of the near wake, two sources of pressure pulsations were observed, one at the aft section of the model in the region of vortex street formation, and the other at the forward stagnation point. The pressure pulsations were accompanied by density waves propagating in the flow. VP
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SHAPES BY THE USE OF POISSON'S EQUATION

A COMPUTER PROGRAM TO GENERATE TWO-DIMENSIONAL GRIDS ABOUT AIRFOILS AND OTHER SHAPES BY THE USE OF POISSON'S EQUATION

A standard service airspeed system on a single engine research support airframe was calibrated by the trailing anemometer method. The effects of flaps power sideslip and fag were evaluated. The factory supplied airspeed was not sufficient for high accuracy flight research applications. The trailing anemometer airspeed calibration was conducted to provide the capability to use the research support airplane to perform pace aircraft airspeed calibrations.

Transportation Research Board Washington D C AVIATION FORECASTING, PLANNING, AND OPERATIONS

A description of the program, a discussion of the control parameters and a set of sample cases are included.

A COMPUTER PROGRAM TO GENERATE TWO-DIMENSIONAL GRIDS ABOUT AIRFOILS AND OTHER SHAPES BY THE USE OF POISSON'S EQUATION

A method for generating two-dimensional finite difference grids about airfoils and other shapes by the use of the Poisson differential equation is developed. The inhomogeneous terms are automatically chosen such that two important effects are imposed on the grid at both the inner and outer boundaries. The first effect is control of the spacing between mesh points along mesh lines intersecting the boundaries. The second effect is control of the angles with which mesh lines intersect the boundaries. A FORTRAN compiler has been written to use the method and runs on CDC 6600 computer. J M S

A numerical procedure developed for optimizing the circulation control airfoils is presented. The procedure finds the optimum airfoil shape by a combination of baseline shapes representing aerofoils suitable for circulation control purpose. The coefficients of these basis vectors are then used as the design variables in the optimization process. Three baseline shapes (a cambered ellipse, a cambered ellipse with a drooped trailing edge and cambered ellipse with a logaritmically spiralled trailing edge) are employed for special contouring of the trailing edge geometry. With some minor

requirements can be met though marginally. The maximum lift requirement at M = 0.5 and most of the profile drag objectives cannot be met without some compromise of at least one of the higher order priorities.

A COMPUTER PROGRAM FOR CALCULATING AERODYNAMIC CHARACTERISTICS OF LOW ASPECT-RATIO WINGS WITH PARTIAL LEADING-EDGE SEPARATION

The necessary information for using a computer program to predict distributed and total aerodynamic characteristics for low aspect ratio wings with partial leading-edge separation is presented. The flow is assumed to be steady and inviscid. The wing boundary condition is formulated by the Quasi-Vortex-Lattice method. The leading edge separated vortices are represented by discrete free vortex elements which are aligned with the local velocity vector at midpoints to satisfy the force free condition. The wake behind the trailing edge is also free. The flow tangency boundary condition is satisfied on the wing including the leading and trailing edges. The program is restricted to wings with zero thickness and no camber. It is written in FORTRAN language and runs on CDC 6600 computer.

AEREO SYSTEMS INC. Burlington, Mass STEADY, OSCILLATORY, AND UNSTEADY SUBSONIC AND SUPersonic aerodynamics, production version (SOUSSA-P 1.1) VOLUME 1 THEORETICAL MANUAL

Recent developments of the Green's function method and the computer program SOUSSA (Steady Oscillatory, and Unsteady Subsonic and Supersonic Aerodynamics) are reviewed and summarized. Applying the Green's function method to the fully unsteady (transient) potential equation yields an integro-differential-delay equation. With spatial discretization by the finite-element method, this equation is approximated by a set of differential-delay equations in time. Time solution by Laplace transform yields a matrix relating the velocity potential to the normal wash. Premultiplying and postmultiplying by the matrices relating generalized forces to the potential and the normal wash to the generalized coordinates one obtains the matrix of the generalized aerodynamic forces. The frequency and mode-shape dependence of this matrix makes the program SOUSSA useful for multiple frequency and repeated mode-shape evaluations.

AERIAL PHOTOGRAMMETRY AND REMOTE SENSING

Numerical optimization of circulation control airfoils Interim Report, Sep 1978 - Dec 1979

A numerical procedure developed for optimizing the circulation control airfoils is presented. The procedure finds the optimum basic airfoil shapes subjected to specified flow conditions and geometric constraints. It consists of a numerical optimization code for linear constrained problems coupled with a viscous potential flow interaction analysis for necessary viscous inviscid flow field calculations. The desired airfoil shape is defined by a combination of baseline shapes representing the airfoils suitable for circulation control purpose. The coefficients of these basis vectors are then used as the design variables in the optimization process. Three baseline shapes (a cambered ellipse, a cambered ellipse with a drooped trailing edge and cambered ellipse with a logarithmically spiralled trailing edge) are employed for special contouring of the trailing edge geometry.
modification of the analysis method the combined program allows optimization for maximum lift without substantial difficulty but for minimizing the drag further improvement of the analysis method is required

Author

N80-26275

N80-26285# National Aeronautics and Space Administration Langley Research Center Langley Station Va

PRELIMINARY RESULTS OF SIMULATED VORTEX ENCOUNTERS BY A TWIN-ENGINE, COMMERCIAL AIRCRAFT DURING FINAL LANDING APPROACH

Earl C Hastings Jr G Thomas Holbrook and Gerald L Keyser Jr May 1980 56 p refs

(INASA-7M-81782) Avail NTIS HC A04/MF A01 CSCL 01C

Piloted simulations of encounters with vortices of various ages and degrees of attenuation were performed with the Visual Motion Simulator In the simulations a twin engine commercial transport on final approach, encountered the modeled vortices of four engines, wide body commercial transport. The data show the effect of vortex age and attenuation on the severity of the initial upset as well as the effect of the vortex encounters on the landing capability

Author

N80-26286# National Transportation Safety Board Washington D C

AIRCRAFT ACCIDENT REPORTS BRIEF FORMAT, US CIVIL AVIATION ISSUE NUMBER 8, 1979 ACCIDENTS

25 Jun 1980 170 p

(NTSB-BA-80-5) Avail NTIS HC A08/MF A01

For three hundred general aviation aircraft accident reports occurring in the U.S civil aviation operations during calendar year 1979 are discussed. The facts conditions, circumstances and probable cause(s) for each accident are studied. Additional statistical information is tabulated by injury index, injuries and causal factors

B D

N80-26277# Air Force Flight Dynamics Lab Wright-Patterson AFB Ohio Analysis and Optimization Branch

UNSTEADY PRESSURE MEASUREMENTS ON OSCILLATING MODELS IN EUROPEAN WIND TUNNELS

James J Olsen Mar 1980 83 p refs

(AF Proj 2307)

(AD-A083248 AFWAL-TM-80-1-F181) Avail NTIS HC A05/MF A01 CSCL 20/4-

The purpose of this report is to summarize the broad aspects of the aerodynamic tests that have been performed over the last twenty years on oscillating bodies and wings in European wind tunnels. While an extensive list of references is available in the open literature, there does not seem to be a general awareness in the United States government or aerospace industry of the intensity and diversity of European efforts. This report gives the background of the development of the major European testing facilities and illustrates the payoffs that have been accrued in the Netherlands, Germany, France and England

GRA

N80-26284# Jet Propulsion Lab California Inst of Tech Pasadena

FUSELAGE VENTILATION DUE TO WIND FLOW ABOUT A POSTCRASH AIRCRAFT

Jay W Stuart 15 Jun 1980 26 p refs

(Contract NAS7-100)

(NASA-CR-163273 JPL-Pub-80-36) Avail NTIS HC A03/MF A01 CSCL 01C

Postcrash aircraft fuselage fire development dependent on the internal and external fluid dynamics is discussed. The natural ventilation rate, a major factor in the internal flow patterns and fire development, is reviewed. The flow about the fuselage as affected by the wind and external fire is studied. An analysis was performed which estimated the rates of ventilation produced by the wind for a limited idealized environmental configuration. The simulation utilizes the empirical pressure coefficient distribution of an infinite circular cylinder near a wall with its boundary layer flow to represent the atmoshpheric boundary layer. The resulting maximum ventilation rate for two door size openings with varying circumferential location in a common 10 mph wind was an order of magnitude greater than the forced ventilation specified in full scale fire testing. The parameter discussed are (1) fuselage size and shape, (2) fuselage orientation and proximity to the ground, (3) fuselage-openings size and location, (4) wind speed and direction, and (5) induced flow of the external fire plume is recommended. The fire testing should be conducted to a maximum ventilation rate at least an order of magnitude greater than the inflight air conditioning rates

B D

N80-26288# Aeronautical Systems Div., Wright-Patterson AFB Ohio Technical and Resources Management Div

AERONAUTICAL SYSTEMS TECHNOLOGY NEEDS ES-CAPE, RESCUE AND SURVIVAL Annual Report

D C Kettinger Feb 1980 34 p Supersedes ASD-TR-79-5038

(AD-A083552 ASD-TR-80-5010 ASD-TR-79-5038) Avail NTIS HC A03/MF A01 CSCL 06/7

This report is a part of a compilation of formalized Technology Needs (TN) covering Equipment Subsystems as identified in the Aeronautical Systems Division. They are based on development/operational experience systems studies and new concepts - all related to future system applications. Their presentation is to serve a threefold purpose i.e. (1) guidance for technology program (2) proven developmental potential and (3) engineer
The identified needs delineate progress desired in performance control design flexibility, safety, and cost.

N80-26291# Advisory Group for Aerospace Research and Development Neuly-sur-Seine (France)

TECHNICAL EVALUATION REPORT ON THE 25TH GUIDANCE AND CONTROL PANEL SYMPOSIUM ON AIR TRAFFIC MANAGEMENT CIVIL/MILITARY SYSTEMS AND TECHNOLOGIES


Air traffic control is considered as a joint civil/military system with emphasis on the coam compatibility the coordination and the complementary aspects of the civil and military components. The adequacy of those ATC concepts in current use is discussed and recent advances in technology are reviewed.

N80-26292# National Inst for Aeronautics and Systems Technology Pretoria (South Africa)

THE ANALYTICAL PREDICTION OF THE SEPARATION BEHAVIOUR OF EXTERNAL STORES AFTER RELEASE FROM THE CARRIER AIRCRAFT PART 2 APPLICATIONS


An analytical store separation prediction method was developed. The method is based on inviscid linear potential theory for subsonic and supersonic flow. The aircraft and external stores are divided into a large number of panels each of which contains an aerodynamic singularity distribution. Source and vortex distributions are used. The strengths of the singularities are determined and the store loads obtained. The store loads are combined with the six-degree-of-freedom equations of motion to provide the separation characteristics of the store. Various aspects of the computational method are investigated in considerable detail. Approximative schemes are studied to speed up the calculations, resulting in an economical separation prediction method. Extensive comparisons with experimental data regarding the various aspects of the computational method are presented. In general satisfactory agreement is observed.

Areas for improvement are defined.

N80-26293# Rockwell International Corp Los Angeles Calif Aircraft Div

DESIGN STUDIES OF LAMINAR FLOW CONTROL (LFC) WING CONCEPTS USING SUPERPLASTICS FORMING AND DIFFUSION BONDING (SPF/DB) Final Report, Aug 1978 - Sep 1979


Alternate concepts and design approaches were developed for suction panels and techniques were defined for integrating these panels designs into a complete LFC 200R wing. The design concepts and approaches were analyzed to assure that they would meet the strength stability and internal volume requirements. Cost and weight comparisons of the concepts were also made. Problems of integrating the concepts into a complete aircraft system were addressed. Methods for making splices both chordwise and spanwise fuel joints and internal duct installations were developed. Manufacturing problems such as throat alignment tapered slot spacing, production methods and repair techniques were addressed. An assessment of the program was used to develop recommendations for additional research in the development of SPF/DB for LFC structure.

N80-26294# Societe Nationale Industrielle Aerospatiale Paris (France) Lab Centrale

EVOLUTION OF MATERIALS AND ASSOCIATED TECHNOLOGIES IN AEROSPACE MATERIAL STRUCTURES (EVEOLUTIO DES MATERIAUX ET DES TECHNOLOGIES ASSOCIEES DANS LES STRUCTURES DE MATERIAUX AEROSPATIAUX)

G Sertour and G Hilaire 30 May 1979 57 p In FRENCH Presented at 14th Congr Intern Aeron Paris 6-8 Jun 1979 (SNIAS-792-551-106) Avail NTIS HC A04/MF A01

A brief history of developments is given. Specific topics examined include propagation of fatigue cracks, stress corrosion aluminum alloy forming processes and composite materials. Selected applications are illustrated tanks for the 1st stage of Ariane structures of the Mirage 2000 Concorde and Airbus a 300B aircraft and Intelsat 5 Maroc satellite antenna a rigid solar generator. Anane's double launching system composite carbon/carbon materials with multidirectional armatures and a Kevlar foil for a propulsion device.

N80-26295# National Aeronautics and Space Administration Ames Research Center. Moffett Field. Calif

HEAD-UP DISPLAY IN THE NON-PRECISION APPROACH


The problem of head-up guidance for an aircraft making an instrument approach without glide slope information is discussed. Requirements for path control are considered for each section of the approach profile and a head-up display is developed to meet these needs. The display is an unreference flight director which is modified by adding a ground referenced symbol as an alternative guidance component. The director is used for holding altitude in the first segment and for descent at a controlled rate in the second segment. It is used in the third segment to maintain the minimum decision altitude while assessing the approach situation. This is done by means of occasional brief changes to the referenced symbol. In the final segment a visual approach is made with the referenced symbol used continuously for path control. The display is investigated experimentally in simulated approaches made by three pilots. The results show a good agreement between objective and subjective estimates of the quality of landing decisions.

N80-26297# Old Dominion Univ. Research Foundation Norfolk Va

EXPERIMENTAL AND ANALYTICAL STUDIES OF A TRUE AIRSPEED SENSOR Final Report, period ending 29 Feb 1980

G L Gogla and J Y Shen Jun 1980 173 p refs (Grant NsG-1177) (NASA-CR-163261) Avail NTIS HC A08/MF A01 CSCL 103

A true airspeed sensor having a flow phenomenon which is the vortex precession or the vortex whistle is not moving parts and is independent of temperature density altitude or humidity changes is proposed. The designed sensor consists basically of a vortex tube, a swirler, and a pickup system. When air passes through the swirler a precessional flow is generated at the region before and after the sudden enlargement area. An audible vortex whistle is generated which is picked up by the microphone and the frequency response shown in a frequency counter. Measurements for both the closed conduit test and wind tunnel test are recorded. A computer is used to obtain the numerical solution. For a specific flow rate or airspeed the larger the exit swirler angle the greater the frequency response. For a smaller cross sectional area at a precessional flow region the frequency response is higher. As the airspeed is increased the Strouhal number dependent only on the exit angle of the swirler remains constant.

N80-26298# National Aeronautics and Space Administration Ames Research Center. Moffett Field. Calif

REDUCTION OF NITRIC OXIDE EMISSIONS FROM A COMBUSTOR Patent

Roger A Craig and Huw O Pritchard, inventors (to NASA) Issued 27 May 1979 6 p Filed 8 Sep 1977 Supersedes N77-31260
Aero Dynamic and Acoustic Model Testing of the Variable Cycle Engine (VCE) Testbed Coannular Exhaust Nozzle System

D P Nelson and P M Morris

Aero Dynamic performance and jet noise characteristics of a one sixth scale model of the variable cycle engine testbed exhaust system were obtained in a series of static tests over a range of simulated engine operating conditions. Model acoustic data were acquired. Data were compared to predictions of coannular model nozzle performance. The model tested with and without a hardwall ejector had a total flow area equivalent to a 0.127 meter primary nozzle area ratio and a 0.82 fan nozzle radius ratio. Fan stream temperatures and velocities were varied from 422 K to 1089 K (760 R to 1960 R) and 434 to 755 meters per second (1423 to 2477 feet per second) Primary stream properties were varied from 589 to 1089 K (1060 R to 1960 R) and 353 to 600 meters per second (1158 to 1968 feet per second) Exhaust plume velocity surveys were conducted at one operating condition with and without the ejector installed. Thirty aerodynamic performance and jet noise measurements were obtained in ten operating conditions. The performance of ideal ejectors was compared to predictions of coannular model nozzle performance. The model tested with and without a hardwall ejector had a total flow area equivalent to a 0.127 meter primary nozzle area ratio and a 0.82 fan nozzle radius ratio. Fan stream temperatures and velocities were varied from 422 K to 1089 K (760 R to 1960 R) and 434 to 755 meters per second (1423 to 2477 feet per second) Primary stream properties were varied from 589 to 1089 K (1060 R to 1960 R) and 353 to 600 meters per second (1158 to 1968 feet per second) Exhaust plume velocity surveys were conducted at one operating condition with and without the ejector installed. Thirty aerodynamic performance and jet noise measurements were obtained in ten operating conditions. The performance of ideal ejectors was compared to predictions of coannular model nozzle performance.

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A systematic comprehensive approach was used recently to develop an in-flight thrust computational routine for a mixed-flow dual spool, augmented turbofan engine with a variable area convergent-divergent exhaust nozzle. To provide an insight for the necessity of this approach, a brief historical background of in-flight thrust measurement is presented and classical nozzle theory is discussed briefly. The development of the computational routine is discussed and some general test planning guidelines are presented.

**N80-26308**# Rolls-Royce Ltd., Bristol (England)
**EXPERIMENTAL FULL-AUTHORITY DIGITAL ENGINE CONTROL ON CONCORDE**

Aval NTIS HC A11/MF A01

The first ever flight standard full-authority digital engine controller is described. As well as the existing dry engine control and monitoring functions the controller incorporated reheating control, fault recording and ground-check and fitted into the same volume as the existing analog dry engine controller. Particular emphasis is given to computer monitoring techniques and the production of high-integrity software.

**N80-26309**# VDO-Luftfahrtgeraete Werk Adolf Schmdling G mb H Frankfurt (West Germany)
**THE SECONDARY POWER SYSTEM CONTROL UNIT, AND ELECTRONIC SUBSYSTEM IN THE PANAVIA TORNADO**
W Bender In AGARD Advan Control Systems for Aircraft Powerplants Feb 1980 8 p

Aval NTIS HC A11/MF A01

The Secondary Power System Control Unit is discussed with emphasis on system configuration. The automatic starting cycle of the APU operation of the accessory drive gearboxes under well defined speed and acceleration conditions as well as the starting phase of the aircraft engines are described.

**N80-26311**# Societe Micrтурbo, Toulouse (France)
**A NEW FUEL SUPPLY CONTROL SYSTEM FOR SMALL TURBOMACHINES [NOUVEAU SYSTEME DE COMMANDE DE DEBIT DE CARBURANT POUR PETITES TURBOMACHINES]**
F Arnaud J Gonzales, and B Secher In AGARD Advan Control Systems for Aircraft Powerplants Feb 1980 13 p In FRENCH

Aval NTIS HC A11/MF A01

Small turbomachines used as starting systems or as autonomous power groups require specific devices for controlling fuel flow. The constraints proper to these turbomachines and the different solutions possible are reviewed. The underlying principle and operations are described for an original system, which is composed of an electric pump whose speed can be controlled. Stress is placed on the system configuration. The automatic starting cycle well defined speed and acceleration conditions as well as the starting phase of the aircraft engines are described.

**N80-26312**# Plessey Aerospace Ltd, Titchfield (England)
**TRANSUDERS FOR ENGINE CONTROL SYSTEMS**
G E Davies In AGARD Advan Control Systems for Aircraft Powerplants Feb 1980 12 p

Aval NTIS HC A11/MF A01

Some active fluidic transducers which measure the fundamental nondimensional quantities required for engine control systems are described. The use of these transducers offers a true nondimensional measurement of engine performance and allows the system designer a freer choice of control parameters.

**N80-26313**# Pierburg Luftfahrtgeraete Union G mb H Neuss (West Germany)
**ENGINE INTAKE CONTROL DESIGN FOR ADVANCED FIGHTER AIRCRAFT**

A COMBINED PARALLEL-DIGITAL AND PULSE-DURATION MODULATED FUEL METERING SYSTEM
H Holzem In AGARD Advan Control Systems for Aircraft Powerplants Feb 1980 6 p refs

Aval NTIS HC A11/MF A01

A fuel metering system is presented which is controlled parallel-digitally by a computer. This system is preferably suited for small and medium size engines. High accuracy requirements coupled with both robust and simple construction are met. The design and functional description is supplemented by the laboratory test results so far achieved.

**N80-26314**# Societe Nationale d'Etude et de Construction de Moteurs d Aviation Suresnes (France)
**THE APPLICATION OF MICROPROCESSORS TO THE REGULATION OF MILITARY AIRCRAFT ENGINES. THE DESIGN OF ELECTRONIC REGULATORS [APPLICATION DES MICROPROCESEURS A LA REGULATION DES MOTEURS D'AVIONS MILITAIRES CONCEPTION DES REGULATEURS ELECTRONIQUES]**
J M Collin and B Gau In AGARD Advan Control Systems for Aircraft Powerplants Feb 1980 16 p refs In FRENCH

Aval NTIS HC A11/MF A01

The availability of highly integrated circuits offers the designer new possibilities for rationally defining automatons numerically integrated in the engine regulating system. The architecture of these automatons is defined by simultaneously taking into consideration functional specifications, operational specifications which have an important bearing on the reliability and security of missions and the technological constraints imposed by an aggressive environment. The possibilities offered by microprocessors are illustrated with a summary description of three types a minicomputer type regulator, a microprocessor system and a regulator with a data processor.

**N80-26315**# Hawker Siddeley Dynamics Ltd, Hatfield (England)
**THE DESIGN CONCEPT AND EXPERIMENTAL RESULTS USING THE INTEL 8080/8085 MICROPROCESSOR**
Nicholas A Justice In AGARD Advan Control Systems for Aircraft Powerplants Feb 1980 9 p

Aval NTIS HC A11/MF A01

Prototype flight equipment was built using the 8080A and is flying with full authority in a twin engine helicopter. Isochronous load sharing on torque with simultaneous data logging output of transducer inputs and control functions was provided for monitoring purposes. This detailed background provided valuable insight to the true flexibility of a microprocessor controller and also illustrated any shortcomings that the later generation devices will need to overcome.

**N80-26316**# Air Force Aero Propulsion Lab, Wright-Patterson AFB, Ohio
**DESIGN, EVALUATION AND TEST OF AN ELECTRONIC, MULTIVARIABLE CONTROL FOR THE F100 TURBOFAN ENGINE**

Aval NTIS HC A11/MF A01 CSLC 21E

A digital multivariable control design procedure for the F100 turbofan engine is described. The controller is based on locally linear synthesis techniques using linear quadratic regulator design methods. The control structure uses an explicit model reference form with proportional and integral feedback near a nominal trajectory. Modeling issues design procedures for the control law and the estimation of poorly measured variables are presented.

**N80-26317**# Pisa Univ (Italy)
**ENGINE INTAKE CONTROL DESIGN FOR ADVANCED FIGHTER AIRCRAFT**

A COMBINED PARALLEL-DIGITAL AND PULSE-DURATION MODULATED FUEL METERING SYSTEM
H Holzem In AGARD Advan Control Systems for Aircraft Powerplants Feb 1980 6 p refs

Aval NTIS HC A11/MF A01

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**THE APPLICATION OF MICROPROCESSORS TO THE REGULATION OF MILITARY AIRCRAFT ENGINES. THE DESIGN OF ELECTRONIC REGULATORS [APPLICATION DES MICROPROCESEURS A LA REGULATION DES MOTEURS D'AVIONS MILITAIRES CONCEPTION DES REGULATEURS ELECTRONIQUES]**
J M Collin and B Gau In AGARD Advan Control Systems for Aircraft Powerplants Feb 1980 16 p refs In FRENCH

Aval NTIS HC A11/MF A01

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**N80-26317**# Pisa Univ (Italy)
**ENGINE INTAKE CONTROL DESIGN FOR ADVANCED FIGHTER AIRCRAFT**
Dino Dini and R Lazzaretto In AGARD Advan Control Systems for Aircraft Powerplants Feb 1980 11 p refs (For primary document see N80-26306 17-07) Avail NTIS HC A11/MF A01

The factors influencing variable geometry intake design for fighter aircraft over their flight velocity profile are reviewed. Separate operating performance ranges depending on the positions of the changeover valves ramps and doors are analyzed for an acceptable design compromise. A criterion for prediction of airflow integration effects on inlet stability with application to the advanced fighter aircraft is presented and discussed. To accommodate desired flow changes through the engine as flight speed altitude and climatic conditions change the control of intake is studied and designed taking into account mutual interferences between propulsion units and controlled elements Airframe/propulsion integration in fighter aircraft is considered in the design of intake control.


Two operational modes can be distinguished for a simple body turbojet engine without afterburning changing the limits and regulating the limits. A rapid change of limits is desirable but a suitable margin of safety must be assured during the transition and the engine must be left in a practically stabilized state after the transition. The engine controls are the fuel flow and the tail pipe section. They are released by actuators which are themselves controlled by a digital or analog computer or electromechanically. The control laws are not sought for the actuators directly but for the fuel flow and the optimal tail pipe section. The laws determined are those displayed on the actuators.

N80-26319# Motoren- und Turbinen-Union Muenchen G mb H (West Germany) MODE CONTROL A FLEXIBLE CONTROL CONCEPT FOR MILITARY AIRCRAFT ENGINES Klaus Bauerfeind In AGARD Advan Control Systems for Aircraft Powerplants Feb 1980 9 p Avail NTIS HC A11/MF A01

An engine control concept (mode control) which will minimize the aircraft performance penalties due to normal engine matching to severe handling requirements is described. In mode control these penalties are reduced by matching the engine closer to the optimum steady state performance of the aircraft. Extreme flight conditions are registered and signalled to an electronic control system. This control system then trims and overrides the normal control laws in order to provide the necessary margins required for safe operation so long as the extreme condition prevails. In order to implement mode control successfully the response rates of the engine variables or trims must be compatible with the requirements, i.e., the respective rates at which a control problem can develop. Because of the type of computing required a digital control system is more suitable for this task than an analogue one. The example of a military three spool by-pass engine equipped with an afterburner is presented.


The available methods of redundancy in full authority electronic engine controls and the reasons for their selection in particular applications are surveyed with particular reference to the effects of the electro-hydromechanical interface. Various dual redundant arrangement, Adour and Pegasus engine controls and helicopter controls are specifically addressed. System safety and the variety of failure survival strategies which can be employed are considered. In general ease of analysis is accompanied by simple failure survival strategies. More complex strategies may result in higher system availability and there is therefore a trade-off to be conducted between non-recurring design cost and system availability in service. The impact of more flexible system architectures due to microprocessors and military requirements are discussed and the direction of future development is indicated.


The general problem of engine performance is considered including the objectives to be satisfied and the basic principles to be retained. The operation of the A-300 aircraft is described with emphasis on gas control, hydromechanical regulation, principal instrumentation, motors, the theory and choice of performance parameters associated automatic systems, and operational procedures. Solutions currently envisioned for future AIRBUS A-310 are presented particularly the introduction of partially electronic regulation.


Digital control systems for gas turbine engines are examined in the light of the commonality of hardware and software requirements between diverse applications. Alternative control configurations for a main gas turbine engine are examined including (1) a full hydromechanical (2) hydromechanical with a supervisory electronic trim (3) a full electronic with a hydromechanical backup and (4) a full electronic with a further electronic backup. Through a consideration of the digital control unit structure for the different configurations the commonality in hardware requirements is demonstrated. In addition, by having modules for each input and output a standard pack of cards can be created from which a selection can be made for any application. Self monitoring and testing capabilities in digital systems are examined and examples from different applications are discussed, including helicopters, civil transport engines, industrial gas turbines and military power plants.


Requirements to be met by the digital control units and the advantages resulting therefrom are discussed. It is shown that with respect to their capacity future digital engine control units have essential advantages (integrated engine-flight control functions, reliability, adjustments) compared to hydromechanical and analog control systems. Digital control units have a
higher efficiency but will probably be of the same volume than actual control units. A considerable reduction of the interface and its volume will only be possible if the environment of the digital computer is digitalized as well that means if sensors are provided with a digital pick-up and if a direct digital control of the actuators and the displays is available.

**N80-26326** Rolis-Royce Ltd Leavesden (England) Aero

**THE DIGITAL CONTROL SYSTEM AS PART OF AN INTEGRATED ACCESSORY FIT FOR FUTURE ENGINES**

M P Perks and T G Morton In AGARD Advan Control Systems for Aircraft Powerplants Feb 1980 11 p ref

Avail NTIS HC A11/MF A01

**N80-26327** Optimization Software Inc Los Angeles Calif

**OPTIMIZATION AND SIMULATION OF FLIGHT CONTROL LAWS UNDER PARAMETER UNCERTAINTY AND EXTERNAL DISTURBANCES** Final Report

1 Dec 1979 136 p refs (Contract NASw-3158)

(NASA-CR-163292) Avail NTIS HC A07/MF A01 CSCL 01C

Several tasks pertinent to flight control in parameter uncertainty and wind-gust loading were successfully completed. Identification algorithms for extracting stability and control derivatives from flight data taking gust loading into account were developed. They were verified by simulation and evaluated thoroughly on actual flight data taken on a Lockheed Jet Star flying in turbulence. In particular, the need for automatically generated dither-like inputs was studied. Criteria for performance evaluation using stochastic models were developed for gust alleviation as well as handling qualities. Algorithms for assessing degradation in performance due to parameter uncertainty were developed and evaluated using flight test data.

Author

**N80-26328** National Aeronautics and Space Administration

Hugh L. Dryden Flight Research Center, Edwards Calif

**DEVELOPMENT AND FLIGHT TEST RESULTS OF AN AUTOTHROTTLE CONTROL SYSTEM AT MACH 3 CRUISE**

Glenn B. Gilyard and John J. Burken Jul 1980 40 p refs

(AIR65-1090) Avail NTIS HC A03/MF A01 CSCL 01C

Flight test results obtained with the original Mach hold autopilot designed the YF-12C airplane which uses elevator control and a newly developed Mach hold system having an autthrottle integrated with an altitude hold autopilot system are presented. The autthrottle tests demonstrate good speed control at high Mach numbers and high altitudes while simultaneously maintaining control over altitude and good ride qualities. The autthrottle system was designed to control either Mach number or knots equivalent air speed (KEAS). Excellent control of Mach number or KEAS was obtained with the autthrottle system when combined with altitude hold ride qualities were significantly better than with the conventional Mach hold system.

**N80-26329** Messerschmitt-Boelkow-Blohm G mbH Otto

brunn (West Germany) Unternehmensbereich Flugzeuge

**INTERACTIVE DESIGN SYSTEM FOR AIRCRAFT DYNAMIC CONTROL PROBLEM**


(MBB- FE-324/S/Pub/11) Copyright Avail NTIS HC A02/MF A01

An interactive system for control law design and synthesis is described. Available methods (continuous discrete, time domain-frequency domain) are reviewed and the system is illustrated. Selection of method (i.e. discrete vs continuous complete vs incomplete state feedback, optimal control vs pole-placement etc.) is followed by a dialog designer-computer with immediate results presented in numerical and graphical form (plots, print-outs). Each result is stored and can be compared with any other via dual plots. The system also allows the input of disturbance like white or colored noise ramps steps sine and cosine combinations. There is no practical restriction on the number of state variables. A helicopter control problem is used to demonstrate use of the system.

Author (ESA)

**N80-26330** Advisory Group for Aerospace Research and Development, Neuedly-Orléans (France)

**TECHNICAL EVALUATION REPORT ON THE FLUID DYNAMICS PANEL SYMPOSIUM ON AERODYNAMIC CHARACTERISTICS OF CONTROLS**

H. B. M. Thomas Mar 1980 18 p refs


The different ways in which active control technology can impact aircraft design and tasks facing the aerodynamicist are reviewed, including the area of aircraft configuration on relaxed stability and the effect of control integration on aerodynamics. The correlation of flight and wind tunnel control effectiveness measurements is considered as well as difficulties in predicting transonic flow and attached flow.

Author (ESA)

**N80-26331** Yang (Nai C) and Associates New York, NY

**NONDESTRUCTIVE EVALUATION OF AIRPORT PAVEMENTS VOLUME 3. OPERATION MANUAL FOR MLGPAV PROGRAM AT TCC**

David Yang Sep 1979 47 p

(Contract DOT-FA77WA-3964) (AD-A079591 FAA-RD-78-154-Vol-3) Avail NTIS HC A03/MF A01 CSCL 01/5

Sensitivity analysis of aircraft parameters on functional pavement design is discussed. The MLGPAV program is an integrated system which is data independent based on defined mathematical models and operational logic. The input data is divided into job and universal default inputs. The job inputs consists of only the aircraft data such as (1) forecast of aircraft movements (2) maximum takeoff weight (3) natural frequency of aircraft at tire pavement interface (4) tire pressure of main landing gear wheel (5) wheel configuration of main landing gear and (6) gear spacing. The default system contains all of the data independent of the aircraft such as (1) regional cost values (2) types of facility runway taxiway apron (3) navigation system (4) operation speed (5) roughness and maintenance standards (6) subgrade conditions and (7) airport traffic distribution. A unified mechanical method is used to design five types of functional pavements for identical service requirements on riding quality and maintenance needs. They are (1) asphalt pavements in southern or northern region (2) concrete pavements on stabilized or aggregate base and (3) full depth stabilized base pavement.

Author

**N80-26332** Oregon Univ Eugene Dept of Psychology

**LOW COST SIMULATION OF PILOTING TASKS**

Gerald R. Meacher Brian J. Davidson Harold L. Hawkins and Gilbert Osgood 21 Jan 1980 29 p refs
AERONAUTICAL SYSTEMS TECHNOLOGY NEEDS-TEST
complex visual task in ASPT under one of three instructional
P B Shepherd Mar 1980 7 p
N80-26334# Johns-Manville Sales Corp Denver Colo
groups were not statistically significant The surprising finding
(AD-A081754 AFHRL-TR-79-52) Avail NTIS HC A02/MF A01 CSCL 05/9
The objective of Task Order no 9 was to conduct a market and literature survey to determine the current state-of-the-art on heat reclamation devices for air conditioners used with flight simulators Applicability of such devices to each flight simulator facility will be evaluated and will include energy savings cost effectiveness, operation maintenance, safety code compliance, and product warranty limitation considerations GRA

(AAD-083553 ASD-TR-80-5011 ASD-TR-79-5039) Avail NTIS HC A04/MF A01 CSCL 14/2
This report is part of a compilation of formalized Technology Needs (TN) covering Equipment Subsystems as identified by the Aeronautical Systems Division They are based on development/operational experience, system studies, and on concepts of future system applications. Their presentation is to serve a threefold purpose: i) Guidance for technology program proven development potential and engineering data/hardware requirements; ii) Essential for technology use in systems; and iii) Identifies needs delineate progress desired in performance control design flexibility, safety and cost

(AAD-083553 ASD-TR-80-5011 ASD-TR-79-5039) Avail NTIS HC A04/MF A01 CSCL 14/2

A Poisson type model was developed and exercised to estimate the risk of economic losses through 1993 due to potential electric effects of carbon fibers released from United States general aviation aircraft in the aftermath of a fire. Of the expected 354 annual general aviation aircraft accidents with fire reported for 1993, approximately 88 could involve carbon fibers. The average annual loss was estimated to be about $250,000 (1977 dollars) and the likelihood of exceeding $107,000 (1977 dollars) in annual loss in any one year was estimated to be approximately one in ten thousand.

Author

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Author

A portable device for starting aircraft engines and the like is disclosed. The device includes a lead testing and motor starting circuit characterized by (1) a direct current voltage source, (2) a pair of terminal plugs connected with the circuit (each being characterized by first and second terminals) (3) a pair of manually operable switches for connecting the first terminal of each plug to the pair to the positive side of the voltage source (4) a circuit lead connecting to the second terminal of each plug the negative side of said source (5) a pair of electrical cables adapted to connect said first and second terminals of each plug to an air-start unit and means for connecting each cable of the pair of cables between the first terminal of one plug and the third terminal of the other plug of the pair and (6) a second pair of manually operable switches for selectivity connecting the third terminal of each plug of the pair to the negative side of the voltage source

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


A radiometer design suitable for use in NASA's WB-57F aircraft to collect data from severe storm regions was developed. The design recommended was a 94/183 GHz scanning radiometer with 3 IF channels on either side of the 183.3 GHz water vapor line and a single IF channel for a low loss atmospheric window channel at 94 GHz. The development and construction of the 94/183 GHz scanning radiometer known as the Advanced Microwave Moisture Sounder (AMMS) is presented. The radiometer scans the scene below the aircraft over an angle of ± 45 degrees with the beamwidth of the scene viewed of approximately 2 degrees at 94 GHz and 1 degree at 183 GHz. The AMMS data collection system consists of a microcomputer used to store the radiometer data on the flight cartridge recorder. The stepper motor driven scanner and collect housekeeping data such as thermistor temperature readings and aircraft time code


A gas path seal suitable for use with a turbine engine or compressor is provided. A shroud wearable or abradable by the abrasion of the rotor blades of the turbine or compressor shrouds the rotor blades. A compliant backing surrounds the shroud. The backing is a compliant material covered with a thin ductile layer. A mounting fixture surrounds the backing. Official Gazette of the U.S. Patent and Trademark Office

N80-26680# Lockheed-California Co Burbank SUMMARY OF 1979 INDEPENDENT RESEARCH ON RISK ANALYSIS METHODS L Bakow and J C Ekvall 22 Dec 1977 43 p refs (LR-28380) Avail NTIS HC AOS/MF A01

A statistical analysis was conducted on aluminum superconducting-nonconducting (S-N) fatigue test data. The scatter (log normal standard deviation) for S-N data is comparable to the scatter for spectrum fatigue test data. However, the log normal standard deviation of the S-N data was larger than spectrum fatigue data for higher levels of confidence. Scatter factors to be applied to fatigue test results were worked out for various levels of probability and confidence. The scatter characteristics of the K sub Ic aluminum fracture toughness data was also evaluated. A statistical procedure was developed to determine A-basis and B-basis fracture toughness values


The control of forced vibration excitation and response of helicopter airframes is addressed. Methods and hardware for...
vibration control including isolators, absorbers, direct rotor control and structural modification are considered.

N80-26697# Virginia Polytechnic Inst and State Univ Blacksburg NONLINEAR TRANSIENT ANALYSIS BY ENERGY MINIMIZATION: A THEORETICAL BASIS FOR THE ACTION OF COMPUTER CODE
Manohar P Kamat Jul 1980 109 p refs (Contract NAS1-15080 Grants NGR-47-004-14 NsG-1546) (NASA-CR-32877) Avail NTIS HC A08/MF A01 CSCL 20L The formulation basis for establishing the state or dynamic equilibrium configurations of finite element models of structures which may behave in the nonlinear range are provided. With both geometric and time independent material nonlinearities included the development is restricted to simple one and two dimensional finite elements which are regarded as being the basic elements for modeling full aircraft-like structures under crash conditions. Representations of a rigid link and an impene-
trable contact plane are added to the deformation model so that any number of nodes of the finite element model may be connected by a rigid link or may contact the plane. Equilibrium configurations are derived as the stationary conditions of a potential function of the generalized nodal variables of the model. Minimization of the nonlinear potential function is achieved by using the best current variable metric update formula for use in unconstrained minimization. Powell's conjugate gradient algorithm, which offers very low storage requirements at some slight increase in the total number of calculations, is the other alternative algorithm to be used for extremely large scale problems.

N80-26685# National Aeronautics and Space Administration Langley Research Center Langley Station Va SUPPORTING STATEMENT FOR COMMUNITY STUDY OF HUMAN RESPONSE TO AIRCRAFT NOISE
Thomas K Dempsey Richard DeLoach and David G Stephens Mar 1980 30 p (NASA-TM-81803) Avail NTIS HC A03/MF A01 CSCL 13A A study plan for quantifying the relationship between human annoyance and the noise level of individual aircraft events is studied. The validity of various noise descriptors or noise metrics for quantifying aircraft noise levels are assessed.

N80-26971# Environmental Protection Agency Ann Arbor Mich Standards Development and Support Branch EVALUATION OF HC (HYDROCARBON) CONTROL STRATEGIES FOR GENERAL AVIATION PISTON ENGINES
Richard S Wilcox Jul 1979 19 p refs (PB80-155393) EPA-AA-SDSB-79-17) Avail NTIS HC A02/MF A01 CSCL 01C The cost effectiveness of controlling hydrocarbon (HC) exhaust emissions from general aviation piston powered aircraft is evaluated. Recent analyses have indicated that these aircraft are not major contributors to violations of the National Ambient Air Quality Standard for CO which adversely affect the public health and welfare. Although HC emissions from general aviation are also small when compared to many other sources the oxidant formation problem is so widespread that all reasonable controls should be implemented.

N80-27212 Societe Nationale Industrielle Aerospatiale Paris (France) Direction Centrale Industrielle VALUE ANALYSIS FOR THE AIRCRAFT AIRBUS L’ANALYSE DE LA VALEUR DANS UN PROGRAMME INTERNATIONAUX
Robert Tassman 1979 34 p In FRENCH Presented at Soc of Am Valve Eng Intern Conf on Save Proc Vol 19 1979 (SN1AS-792-501-105) Avail NTIS HC A03 The implementation of an agreement among Germany, England, France, Netherlands, and more recently Spain, to develop a transport aircraft is discussed. With emphasis on the economic and technical aspects involved the method in which the various tasks were assigned and performed is described. Project and value engineering considerations are reviewed as well as the factors determining the choice of materials and the methods for optimizing the system. The management of modification procedures is described and some value analysis examples are included.

N80-27274# Battelle Columbus Labs Ohio THE GENERAL AVIATION DYNAMIC MODEL VOLUME 2 TECHNICAL REPORT Final Report, 2 Sep 1977 - 30 May 1979
Michael A Duffy and Jane H McCreery 30 May 1979 169 p refs (Contract DOT-F-A77WA-4043) (AD-A073544 FAA-AVP-79-8-Vol-2) Avail NTIS HC A08/MF A01 CSCL 01/2 A detailed description of the General Aviation Dynamics (GAD) model is given. It contains a complete set of statistics including actual data for the estimated causal relationships within each sector of the model. Also illustrated is how the GAD model can be used to evaluate alternative policy actions. The model is a dynamic simulation interactive computer model built upon the cause-effect interactions displayed between various sectors of the general aviation system.

N80-27277 Pennsylvania State Univ University Park A NUMERICAL AND EXPERIMENTAL STUDY OF THE TURBULENT WAKES OF TURBOMACHINERY ROTOR BLADES, ISOLATED AIRFOILS, AND A CASCADE OF AIRFOILS Ph.D Thesis Chunill Hah 1980 341 p Avail Univ Microfilms Order No 8015798 The Three turbulence models were employed to obtain closure of the governing equations. The first model was comprised of transport equations for the turbulent kinetic energy and the rate of energy dissipation and the second and third models were comprised of equations for the rate of turbulent kinetic energy dissipation and Reynolds stresses respectively. The second model handles the convection and diffusion terms in the Reynolds stress transport equation collectively while the third model handles them individually. All three models were modified for the effect of streamline curvature. The rotation enginestrained distribution terms were added in the transport equation of Reynolds stresses of the second and third models. The turbulent wakes of an isolated airfoil and a cascade of airfoils are handled as simpler cases of the general rotating three dimensional wake. The numerical results demonstrate that the second and third models provide accurate predictions. The computer time and memory storage can be considerably saved by the second model.

N80-27278 California Univ Los Angeles AIRFOILS AT SONIC VELOCITY Ph.D Thesis Egbert Sau-Nam Tse 1980 103 p Avail Univ Microfilms Order No 8016054 A method for calculating flows and corresponding airfoils shapes where the free-stream Mach number is unity is described. The calculation is done in two parts. Both are on hodograph planes. The basic equation is the Tricomi equation and solved numerically. In one part which corresponds to the front section of the airfoil, the equation is solved in a region where it changes type. The algorithm developed is thus type dependent. The implicit difference scheme formulates uses a rectangular grid in the elliptic region and a characteristic grid in the hyperbolic region. The boundary curve is prescribed in the hodograph and the shape of the airfoil is determined afterwards. This is useful in airflow design. The computed result for a thin wing is in good agreement with analytic results obtained by others. Airfoil with convex surfaces and parabolic noses are generated. Their center of pressure distribution lift coefficient drag coefficient and moment coefficient are also obtained.

N80-27280# Boeing Aerospace Co Seattle Wash AN IMPROVED PANEL METHOD FOR THE SOLUTION OF THREE-DIMENSIONAL LEADING EDGE VORTEX FLOWS Dissert Abstr
VOLUME 2 USER'S GUIDE AND PROGRAMMER'S DOCUMENT Report, Dec 1977 - May 1979

The projected performance of the selected transport design

J A Braden J P Hancock J E Hackett K P Burdges and VOLUME 1 THEORY DOCUMENT Topical Report. Dec - in the experimental study as well as acoustical data obtained in presented from a compatibility study in which a short-haul

Summary Report


THREE-DIMENSIONAL LEADING-EDGE VORTEX FLOWS AN IMPROVED PANEL METHOD FOR THE SOLUTION OF

in FORTRAN

A R H

N80-27281*# Lockheed-Georgia Co Marietta EXPLORATORY STUDIES OF THE CRUISE PERFORMANCE OF UPPER SURFACE BLOWN CONFIGURATIONS Final Summary Report


The data and major conclusions obtained from an experimen-
tal/analytical study of upper-surface blown (USB) configurations at cruise are summarized The high-speed (subsonic) experimental
work studying the aerodynamic effects of wing-nacelle geometric variations, was conducted around semi-span model configurations composed of diversified interchangeable components Power
simulation was provided by high pressure air ducted through closed forebody nacelles Nozzle geometry was varied across size exit aspect ratio exit position and boattail angle Both 3-D
force and 2-D pressure measurements were obtained at cruise Mach numbers from 0.5 to 0.8 and at nozzle pressure ratios up to about 3.0 The experimental investigation was supported by an analytical study of the system using a vortex lattice representation with first-order power effects Results are also presented from a compatibility study in which a short-haul transport is designed on the basis of the aerodynamic findings in the experimental study as well as acoustical data obtained in a concurrent program High-lift test data are used to substantiate the projected performance of the selected transport design

A R H

N80-27282# Boeing Aerospace Co Seattle Wash AN IMPROVED PANEL METHOD FOR THE SOLUTION OF THREE-DIMENSIONAL LEADING-EDGE VORTEX FLOWS VOLUME 1 THEORY DOCUMENT Topical Report, Dec - May 1977


An improved panel method for the solution of three

dimensional flow and wing and wing-body combinations with leading edge vortex separation is presented The method employs a three dimensional inviscid flow model in which the configuration the rolled-up vortex sheets and the wake are represented by quadratic doublet distributions The strength of the singularity

distribution as well as shape and position of the vortex spirals are computed in an iterative fashion starting with an assumed initial sheet geometry The method calculates forces and moments as well as detail surface pressure distributions Improvements include the implementation of improved panel numbers for the purpose of elimination the highly nonlinear effects of ring vortices around double panel edges, and the development of a least squares procedure for damping vortex sheet geometry update instabilities A complete description of the method is included A variety of cases generated by the computer program implementing the method are presented which verify the mathematical assumptions of the method and which compare computed results with experimental data to verify the underlying physical assumptions made by the method

F O S

N80-27283# National Aeronautics and Space Administration Langley Research Center Langley Station Va

EFFECT OF REYNOLDS NUMBER ON STABILITY CHARACTERISTICS OF A CRUCIFORM WING-BODY

Robert L Stallings Jr Milton Lamb and Carolyn B Watson Jul 1980 111 p refs (NASA-TP-1683 L-13530) Avail NTIS HC A06/ MF A01 CSCL 01A

An experimental investigation was conducted to determine the effect of Reynolds number on the stability characteristics of a body with cruciform wings at large angles of attack Pressure distributions and force and moment data (axial force not measured) are presented for Mach 1.60 and 2.70 Reynolds numbers based on body diameters from approximately 130 000 to 2 800 000 and angles of attack from 0 deg to 50 deg In general the data show only small effects of Reynolds number throughout the range of test condition Also discussed are force balance and pressure data that suggest a direct relationship between wind chocking and the onset of a nonlinear stability variation with angle of attack

Author

N80-27287# National Aeronautics and Space Administration Langley Research Center Langley Station Va

EXPERIMENTAL STUDIES OF SCALE EFFECTS ON OSCILLATING AIRFOILS AT TRANSONIC SPEEDS

Sanford S Davis Jul 1980 16 p refs (NASA-TR-811216 A-8259) Avail NTIS HC A02/ MF A01 CSCL 01A

Experimental data are presented on the effect of Reynolds number on unsteady pressures induced by the pitching motion of an oscillating airfoil Scale effects are discussed with reference to a conventional airfoil (NACA 64A010) and a supercritical airfoil (NLR 7301) at mean-flow conditions that support both weak and strong shock waves During the experiment the Reynolds number was varied from 3 000 000 to 12 000 000 at a Mach number and incidence necessary to induce the required flow Both fundamental frequency and complete time history data are presented over the range of reduced frequencies that is important in aeroelastic applications The experimental data show that viscous effects are important in the case of the supercritical airfoil at all flow conditions and in the case of the conventional airfoil under strong shock-wave conditions Some frequency-dependent viscous effects were also observed

Author

N80-27289# Detroit Diesel Allison Indianapolis Ind

TIME-VARIANT AERODYNAMICS FOR TORSIONAL MOTION OF LARGE-TURNING AIRFOILS Final Report


A cascade of five airfoil sections modeling the hub section of an advanced design turbine featuring a high inlet Mach number and 112 degrees of turning was evaluated at 4 steady-state conditions of varying exit Mach number and expansion ratio The resulting steady-state airfoil surface pressures were compared to a state-of-the-art analytical prediction A time-variant investigation was conducted at the 4 operating conditions of the steady-state experiment Time-variant pressure signals were obtained from a Kulite-instrumented airfoil as the cascade was torsionally oscillated at four values of interblade phase angle per expansion ratio by computer-controlled electromagnetic drive systems The dynamic pressure signals were evaluated in amplitude and phase lag (referenced to blade motion) and correlated with a state-of-the-art analytical prediction based on a flat-plate cascade A quasi-static experiment was performed to relate the dynamic surface pressure amplitudes to those obtained by resetting the cascade to various temporal positions in the torsional cycle of oscillation

GRA

N80-27290# Nielsen Engineering and Research Inc Mountain View Calif

DATA REPORT FOR AN EXTENSIVE STORE SEPARATION TEST PROGRAM CONDUCTED AT SUPERSONIC SPEEDS Final Report, Jun 1975 Aug 1979
Fredrick K Goodwin and Calvin L Dyre (AFFDL) Wright-Patterson AFB Ohio AFFDL Dec 1979 292 p refs
(Contract F33615-76-C-3077 AF Proj 2403)

This report describes an extensive store separation test program conducted at Mach number range covering 1.5 to 2.5. The purpose of the program was to provide a systematic set of data which could be used to evaluate and improve analytical techniques for predicting supersonic store separation trajectories. Parent aircraft configurations tested ranged from a simple circular body model to more complex configurations such as a noncircular fuselage with wing flow through engine inlets and pylons and racks. The parent configuration was built up component by component so that model component effects could be isolated. Flow-field survey store pressure-distribution, store force-and-moment and store trajectory data were obtained. The store tested were circular and elliptical in cross section with various fin arrangements. The data obtained during five wind-tunnel entries are summarized in this report. The data have been collected on magnetic tapes and FORTRAN computer programs have been written which retrieve the data from the tapes. This report also describes the use of these programs and tapes and describes the tabulated output from the programs.

FREDERICK K. GOODWIN and CALVIN L. DYRE

A wind tunnel field was conducted to study the mutual interference of multiple bodies in the flow field of the F-4C aircraft in the transonic speed range. The test utilized 1/20 scale models of the F-4C aircraft, the MK-83 bomb (with and without fins), and the triple ejector rack (TER) to obtain aerodynamic loads on the MK-83 at and near the carnage position on the wing inboard pylons. Flow field data in the vicinity of the TER were also obtained. Test variables included aircraft angle of attack from -3 to 17 deg, freestream Mach number from 0.60 to 0.95, and aircraft configuration. Freestream aerodynamic loads data were also obtained on the MK-83 bomb model.

N80-27293# Naval Ship Research and Development Center Bethesda Md Aviation and Surface Effects Dept

NUMERICAL OPTIMIZATION OF CIRCULATION CONTROL AIRFOILS Interim Report, Sep 1978 - Dec 1979
Tato C Tai George H Kedwell Jr and Garrett N Vanderplaats Apr 1980 51 p refs
(Contract ZDR30201)

A numerical procedure developed for optimizing the circulation control airfoil's performance. The procedure finds the optimum basis airfoil shapes subjected to specified flow conditions and geometric constraints. It consists of a numerical optimization code for linear constrained problems coupled with a viscous-potential flow interaction analysis for necessary viscous-inviscid flow field calculations. The desired airfoil shape is defined by a combination of baseline shapes representative of airfoils suitable for circulation control purposes. The coefficients of these basis vectors are then used as the design variables in the optimization procedure. Three baseline shapes (a cambered ellipse and a cambered ellipse with a drooped trailing edge and a cambered ellipse with a logarithmically spiralled trailing edge) are employed for special contouring of the trailing edge geometry. With some minor modification of the analysis method the combined program allows optimization for maximum lift with substantial difficulty but for minimizing the drag further improvement of the analysis method is required.

N80-27293# Naval Ship Research and Development Center Bethesda Md Aviation and Surface Effects Dept

MUTUAL INTERFERENCE OF MULTIPLE BODIES IN THE FLOW FIELD OF THE F-4C AIRCRAFT IN THE TRANSONIC SPEED RANGE Final Report. 12 - 21 Nov 1979
A A Hesketh AEDC Dec 1979 90 p refs
(AD-A084704 AEDC-TR-79-579) Avail NTIS HC A04/MF A01 CSCL 20/4

A wind tunnel field was conducted to study the mutual interference of multiple bodies in the flow field of the F-4C aircraft. The test utilized 1/20 scale models of the F-4C aircraft, the MK-83 bomb (with and without fins), and the triple ejector rack (TER) to obtain aerodynamic loads on the MK-83 at and near the carnage position on the wing inboard pylons. Flow field data in the vicinity of the TER were also obtained. Test variables included aircraft angle of attack from -3 to 17 deg, freestream Mach number from 0.60 to 0.95, and aircraft configuration. Freestream aerodynamic loads data were also obtained on the MK-83 bomb model.

N80-27300 Ohio State Univ Columbus

GENERAL AVIATION DYNAMICS THE IMPACT OF COST RECOVERY Ph D Thesis
Loran-C chain by quantifying navigation and position errors within its coverage area. (2) Test Loran-C as a non-precision approach aid in mountainous conditions using a commercially available Loran-C receiver/navigator in this case a Teledyne TDL-711 (3) Record the effects of bas, shifts and station outages on overall accuracy and approach procedures especially near a baseline extension (4) Calculate the absolute flight technical error (FTE) during Loran-C approaches using a typical general aviation aircraft. The main conclusions of the test were: The West Coast Loran-C chain appears stable and dependable. Time difference errors were consistent and related to signal propagation differences over land and over water. TDL-711 was found to be easy to operate, giving stable and repeatable course guidance, although susceptible to random loss of track a problem which may be software-related. The system did not accurately calculate cross track deviation and distance to waypoint. Without needed hardware software and/or procedural changes. Loran-C may not meet the RNAV non-precision approach requirements of AC 90-45A.

This report documents an evaluation of Aircraft Separation Assurance (ASA) concepts using an airline flight simulator. The primary objective of the experiment was to determine the cockpit information requirements for an aircraft collision avoidance system. Qualified pilots from commercial aviation and industry flew typical operational scenarios in the simulated Los Angeles area. During the flight conflict situations with other aircraft developed and pilots were asked to respond to these situations on the basis of information presented to them by one of three experimental collision avoidance displays: Computer-collected data on pilot response to collision avoidance commands and resultant miss distances were correlated with data from questionnaires filled out by participating pilots to determine the cockpit information requirements. The subjective comments addressed the areas of required display information items use of color audible alert symbols workload pilot confidence in the system and pilot display preference. Altitude range relative bearing and other aircraft heading have been identified as the most important and most essential information elements in the resolution of potential conflicts. The report provides a statistical analysis of the accumulated data and includes recommendations for the development and operational implementation of the ASA program.

GRA

N80-27309# National Aviation Facilities Experimental Center Atlantic City N J
ATARS/ATC SIMULATION TESTS WITH SITE ADAPTATION LOGIC IN THE PHILADELPHIA TERMINAL AREA Final Report, May - Oct 1978


Federal Aviation Administration (AD-A083718 FAA-NA-79-23 FAA-RD-79-116) Available NTIS HC A06/MF A01 CSCL 17/7

The purpose of this project was to provide further evaluation and refinement of the Automatic Traffic Advisory and Resolution Service (ATARS) concept. The tests were conducted at the National Aviation Facilities Experimental Center (NAFEC) at Atlantic City, New Jersey using the Air Traffic Control Simulation Facility (ATCSF). Test results indicated that ATARS had no significant impact on the controllers or control procedures in a Philadelphia Terminal Control Area (TCA) environment. Outside the immediate TCA where the majority of encounters occurred, the factors contributing to the generation of alarms were in general satellite operations and the use of Visual Flight Rules (VFR) separation criteria. The incidence of positive resolution advisories was low averaging only 0.5 encounters per hour. Recommendations are to reduce the size of the ATARS desensitization zone at the Philadelphia main airport to ap proximately 2.0 nautical miles (nm) from runway thresholds to incorporate a convergence/divergence detection filter into the ATARS algorithm and to investigate the possibility of reducing tracker lag by improving turn and level-off detection.

GRA

N80-27310# AMA Industries Columbia Md
FEASIBILITY OF OFFSET CARRIER SYSTEMS FOR AIR TRAFFIC CONTROL Interim Report

J David Glaborne Oct 1979 17 p refs (Contract DOT-FA78WAJ-B30)

Federal Aviation Administration (AD-A084044 FAA-RD-79-106 IR-2) Available NTIS HC A06/MF A01 CSCL 17/7

A brief description of FAA trials of offset carrier systems and multiple outlet systems is given. Short descriptions are also given of existing offset carrier systems in Great Britain and the ARINC system in the United States. The communication deficiencies that could be remedied by an offset carrier system are listed. A short discussion is given concerning the system design deficiencies inherent with an offset carrier system. No conclusions are made concerning the usefulness or practicality of an offset carrier system.

GRA

N80-27311# Amrc Research Corp Annapolis Md
AN EVALUATION OF AIRCRAFT SEPARATION ASSURANCE CONCEPTS USING AIRLINE FLIGHT SIMULATORS VOLUME 1 STUDY REPORT Final Report

Bruce Morgenstern and Thomas P Berry Nov 1979 108p (Contract DOT-FA78WAJ-4091)

Federal Aviation Administration (AD-A083986 Rep-1343-01-3-2058-Vol-1 FAA-RD-79-124-1) Available NTIS HC A06/MF A01 CSCL 01/2

This report documents an evaluation of Aircraft Separation Assurance (ASA) concepts using an airline flight simulator. The primary objective of the experiment was to determine the cockpit information requirements for an aircraft collision avoidance system. Qualified pilots from commercial aviation and industry flew typical operational scenarios in the simulated Los Angeles area. During the flight conflict situations with other aircraft developed and pilots were asked to respond to these situations on the basis of information presented to them by one of three experimental collision avoidance displays: Computer-collected data on pilot response to collision avoidance commands and resultant miss distances were correlated with data from questionnaires filled out by participating pilots to determine the cockpit information requirements. The subjective comments addressed the areas of required display information items use of color audible alert symbols workload pilot confidence in the system and pilot display preference. Altitude range relative bearing and other aircraft heading have been identified as the most important and most essential information elements in the resolution of potential conflicts. The report provides a statistical analysis of the accumulated data and includes recommendations for the development and operational implementation of the ASA program.

GRA

N80-27312# Ohio Univ Athens Avionics Engineering Center

May 1979 487 p. refs (Contract DOT-FA78WAJ-4062)

Federal Aviation Administration (AD-A075556 EER-40-1 FAA-R-6750 2 FAA-AAF-420) Available NTIS HC A21/MF A01 CSCL 17/7

This report documents a task effort undertaken by Ohio University between October 1977 and May 1979 Engineering data resulting from a study of the sideband reference glide-slope system baseline operating parameters and the effects of specific faults are presented. A series of perturbational and numerous field experiments at Ohio University's Tamiami Florida site facility are described. Suggested technical improvements and text changes for existing technical manuals have also resulted. The effects of a wide range of terrain profiles on the performance of sideband reference null reference and capture effect systems are compiled in a volume. Sideband reference system setup procedures are reviewed the electrical and physical requirements for the countermeasure are explored and an introductory look at threshold-plane DDM profiles is presented. ILS anomaly investigations have resulted in the design testing and implementation of a modification to the Type FA-5723 clearance transmitter. Also predictions of complete glide-slope performance for a proposed site on Runway 22L at Boston Logan are presented. The maximum allowable VSWR for the 15-element V-Rmg and O-Rmg localizers are investigated on the basis of technical and experimental work. The findings are that the maximum VSWR is not that of a simple specification but rather that of values that are within the bounds of worst and best-case conditions depending on the value of the complex reflection coefficient.

GRA
greater than 5000 ft the crossed beam system can be seen at night at the middle marker for visual ranges greater than 700 ft can be seen at night at the middle marker for visual ranges greater than 1200 ft confirmed the validity of the model Using a criterion taken from the previous study, the system was deemed generally suitable for use in the ATC system of the future GRA

AN INVESTIGATION OF LASER LIGHTING SYSTEMS TO AUGMENT THE BASELINE SYSTEM TO PRODUCE THE FUTURE SYSTEM designed by the GRA for dispatch of ETIS messages and a number of operational criteria for the concept is the establishment of requirements for an ETIS system This is followed by a determination of the information and data to be provided to the aircraft over the data link and the probable sources of that data An assumption is made that the availability of automated weather sensor systems of some form will coincide with implementation of ETIS A detailed functional description of the system is then given including system configuration interfaces with other ATC automation systems and hardware and software both at the airport and at the controlling ATC facility Also discussed are message content and formats controller and pilot display design considerations criteria for dispatch of ETIS messages and a number of operational considerations The report concludes with several typical flight scenarios representative of different levels of aircraft avionics and pilot capabilities in an air traffic control environment where ETIS is implemented GRA

PRECISION NAVIGATION FOR AIR TRAFFIC MANAGEMENT
S Radcliffe Oct 1979 9 p refs Presented at the AGARD symposium, Copenhagen Oct 1979 7000 ft the crossed beam system can be seen at night at the middle marker for visual ranges greater than 700 ft

This report discusses the problems that would arise if airspace users had the use of NAVSTAR or some other much better position fixing aid than at present and the uses that ATC could or could not make of this capability There would be formidable transitional problems in the vertical plane because NAVSTAR measures height from the Earth's center whereas current altimeters measure atmosphere pressure In either vertical or horizontal planes much work will be necessary to prove that the separation standards can be reduced at all The paper discusses changes that might be possible in the ATC system should appreciable reductions in separation standards prove possible NAVSTAR might form the basis of a collision avoidance system based on either of the broadcast coordinates of each aircraft or on a time-frequency basis using NAVSTAR as the time reference The latter scheme would offer protection of a fully equipped aircraft against a threat that could not afford the expense of a NAVSTAR fit This paper is a contribution to the 29th AGARD GCP Symposium Copenhagen Oct 1979 It is issued as a memo to make it available earlier and in an unclassified document GRA

ANALYSIS OF EXPANDABILITY AND MODIFIABILITY OF COMPUTER CONFIGURATION CONCEPTS FOR ATC VOLUME 1 DISTRIBUTED CONCEPT Final Report
David F Clapp, Joseph B Hagopian and Ronald M Rutledge Nov 1979 195 p refs

This report describes a concept for providing enhanced terminal information services (ETIS) to aircraft utilizing the ground-air-ground data link capability of the Discrete Address Beacon System (DABS) ETIS is envisioned as an eventual replacement for and significant improvement to the Automated Terminal Information Services (ATIS) in use today The initial step in developing the concept is the establishment of requirements for an ETIS system This is followed by a determination of the information and data to be provided to the aircraft over the data link and the probable sources of that data An assumption is made that the availability of automated weather sensor systems of some form will coincide with implementation of ETIS A detailed functional description of the system is then given including system configuration interfaces with other ATC automation systems and hardware and software both at the airport and at the controlling ATC facility Also discussed are message content and formats controller and pilot display design considerations criteria for dispatch of ETIS messages and a number of operational considerations The report concludes with several typical flight scenarios representative of different levels of aircraft avionics and pilot capabilities in an air traffic control environment where ETIS is implemented

AN INVESTIGATION OF LASER LIGHTING SYSTEMS TO ASSIST AIRCRAFT LANDING Final Report Oct 1978 - Sep 1978
D C Burnham and J F Fantasia Oct 1979 64 p refs

This report presents the results of the 16 - 20 November 1979 TRACALS Evaluation of the Davis-Monthan AFB AN/GRN-280 (1) SSILS and associated power systems The evaluation was conducted in conjunction with the system commissioning to determine the capabilities and limitations of the system in its installed environment Results presented in this report can be used as a guide to anticipated performance until there is a significant change in ground equipment, such as environment screening or operational use

SSILS INITIAL EVALUATION REPORT DAVIS-MONTHAN AFB, ARIZONA, 16-20 NOVEMBER 1979 Final Report
Joseph P Coyle 11 Apr 1980 109 p refs

This report describes a concept for providing enhanced terminal information services (ETIS) to aircraft utilizing the ground-air-ground data link capability of the Discrete Address Beacon System (DABS) ETIS is envisioned as an eventual replacement for and significant improvement to the Automated Terminal Information Services (ATIS) in use today The initial step in developing the concept is the establishment of requirements for an ETIS system This is followed by a determination of the information and data to be provided to the aircraft over the data link and the probable sources of that data An assumption is made that the availability of automated weather sensor systems of some form will coincide with implementation of ETIS A detailed functional description of the system is then given including system configuration interfaces with other ATC automation systems and hardware and software both at the airport and at the controlling ATC facility Also discussed are message content and formats controller and pilot display design considerations criteria for dispatch of ETIS messages and a number of operational considerations The report concludes with several typical flight scenarios representative of different levels of aircraft avionics and pilot capabilities in an air traffic control environment where ETIS is implemented
PROBABILITIES OF VERTICAL OVERLAP A SENSITIVITY ANALYSIS


Because of the potential increase in traffic at FL 290 and above both current and alternative vertical separation standards are being reviewed A sensitivity analysis carried out to assess how different assumptions about the probability distribution of total vertical error affect the probability of vertical overlap is documented The four factors affecting the probability of vertical overlap which are examined are the functional form of the vertical-error distribution function the standard deviation of this probability distribution the vertical dimensions of the aircraft and the vertical separation standard Probabilities of vertical over-lap were computed over a range of possibilities for each of these four factors in order to discern the effect of each factor GRA

AIR TRAFFIC MANAGEMENT CIVIL/MILITARY SYSTEM AND TECHNOLOGIES


Various aspects of air traffic control in civil and military systems and technologies are presented The specific areas discussed are (1) operational scene and requirements (2) air traffic management philosophy (criteria and human factors communications and separation) (3) air traffic management in hostile environment (4) flight management in terminal area (5) subsystem technology and (6) advanced systems

AIR TRAFFIC IN NATO EUROPE ITS CHARACTERISTICS AND ITS NEEDS

M Pedder In AGARD Air Traffic Management Civil/Mil Systems and Technol Feb 1980 3 p refs

The needs and characteristics of air traffic in NATO Europe are reviewed The divergent requirements and particular problems of airspace users are described and it is concluded that efficient use of the airspace can only be achieved through cooperation between the civil and military authorities Areas where research and development would be fruitful are listed Author

ARMY AVIONICS RESEARCH AND DEVELOPMENT ACTIVITY

Fort Monmouth N J Air Traffic Management Systems Div

HELICOPTER AIR TRAFFIC MANAGEMENT SYSTEMS WITH CIVIL/MILITARY INTEROPERABILITY

Joseph T Saganowich In AGARD Air Traffic Management Civil/Mil Systems and Technol Feb 1980 16 p refs

In order to achieve significant near-term improvement in the Army's air traffic management capability several configurations of very lightweight air traffic management equipment (VLATME) were developed Based upon totally compatible use of today's common civil/military system ATCRBS (air traffic control radar beacon system) Concurrently with the VLATME development helicopter instrument landing technology work over the past few years has revealed that the key to solving this problem lies in the ability to perform deceleration of the aircraft on instruments along the approach path so as to bring the aircraft to a hover a few feet above the intended landing point The decelerated instrument approach paths that helicopter pilots would encounter would have to be much smaller than those encountered in fixed wing practice

if reasonable flow rates are to be realized Because of the potential garbling problem in conventional ATCRBS with closely spaced aircraft a system which integrates the ground and airborne equipments of a scanning beam microwave landing system with the airborne transponder while preserving interoperability was also developed and successfully tested R E S

A STUDY FOR DEVELOPMENT OF METHODS FOR AIR TRAFFIC MANAGEMENT

R Petrioli S Pardi B Bertoni (Bologna Univ) and C Bonvento (Bologna Univ) in AGARD Air Traffic Management Civil/Mil Systems and Technol Feb 1980 14 p refs

Models and methods for optimal air traffic management were studied as part of the multi-year project Navigation aids and air traffic control funded by the Italian National Research Council (CNR) The scope of the study on the context of CNR project is reviewed The software structure its main characteristics and possible utilisations in the planning and management of air traffic system is discussed Finally a description is given of more relevant used models and algorithms R E S

AIR TRAFFIC CONTROL AUTOMATION ITS IMPACT AND USE IN THE SELECTION AND SCREENING OF AIR TRAFFIC CONTROLLERS

James O Boone In AGARD Air Traffic Management Civil/Mil Systems and Technol Feb 1980 7 p refs see N80-27324 18-04)

The impact of automation in air traffic control on personnel screening is discussed The mathematical and technical aspects as they are currently being developed are focused upon R E S

Civil Aeromedical Inst Oklahoma City Okla Aviation Psychology Lab

DATA LINK THE KEY TO IMPROVEMENTS IN CIVIL/ MILITARY AIR TRAFFIC MANAGEMENT?

M E Cox In AGARD Air Traffic Management Civil/Mil Systems and Technol Feb 1980 20 p refs

Experimental work which is being undertaken both to explore how an air/ground data link might be exploited for future air traffic control purposes and to determine its possible capacity requirements is described Details of the form and functions of experimental equipment built to investigate what is believed to be the major problem area influencing communications improvements the pilot/link interface are given Details are also given of studies investigating the possible use of the link in transferring aircraft derived data both to yield improvements in the precision
of meteorological forecast data and to enhance the performance of radar-based tracking and conflict-alerting systems. Capacity requirements and the feasibility of realizing a link for these purposes within the next two decades are discussed. R E S

N80-27331

Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany)

MIDAIR CONFLICTS AND THEIR POTENTIAL AVOIDANCE BY PROGRESSIVE IMPLEMENTATION OF AUTOMATION

G. Weber In AGARD Air Traffic Management Civil/Mil Systems and Technol. Feb 1980 16 p refs

Avail NTIS HC A13/MF A01

Actual midair conflicts between civil and military aircraft in German airspace where at least one of the airplanes involved was flying under visual flight rules were analyzed. Operational environmental and human factors which contributed to the accidents and the limits of the see and avoid concept for collision avoidance are discussed. Some shortcomings of the present air traffic control system are mentioned. Taking the actual midair conflicts and some simulated three dimensional flights as examples the improvement of collision avoidance by progressive implementation of advanced techniques is discussed. The lead time to the potential conflict or to a circular zone of protection the distance at the closest approach and some other thresholds estimated by means of a ground-based radar system or an airborne electronic collision avoidance system are used as main criteria for an automatic conflict alert. Potential advantages of a data link to detect sudden manoeuvres in time are mentioned. R E S

N80-27332

National Aerospace Lab, Amsterdam (Netherlands)

DETERMINATION OF THE SAFETY IN A NORTH ATLANTIC ORGANIZED TRACK SYSTEM WITH REDUCED LATERAL SEPARATION

G. Moek and C. R. Traas In AGARD Air Traffic Management Civil/Mil Systems and Technol. Feb 1980 7 p refs

Avail NTIS HC A13/MF A01

Collision risk modelling as related to the reduction of lateral separation from 120 NM to 60 NM at any fixed level in the North Atlantic Organized Track System is considered. Requirements on the navigation performance are described which aircraft must be able to meet if this reduction would be implemented. Two statistical tests are derived which can be applied to the measured number of navigation errors to determine whether the actual navigation performance is such that the system with 60 NM lateral separation meets a target level of safety. The first test which belongs to the standard equipment of the NAT/SPG for judging the safety of the track system is based on one random model for all navigation errors. The second test is applicable for the case different types of navigation errors can be distinguished and modelled separately. The different contribution of each type of error to the total risk is taken into account by the use of weighting factors. This test however is still in discussion in the North Atlantic Systems Planning Group. A R H

N80-27333

Army Air Traffic Control Office, APO New York, N Y 09056

US ARMY USERS OVERLOOK ON AIR TRAFFIC MANAGEMENT

William H. Maloney and Larry P. Kreps In AGARD Air Traffic Management Civil/Mil Systems and Technol. Feb 1980 5 p

Avail NTIS HC A13/MF A01

The need for air traffic control not only in support of its fixed base peace-time mission but also its tactical mission is recognized by the U.S. Army Air traffic management as it existed during the Vietnam era of the 1960s and as it evolved during the 1970s is described. The European scenario literally dictates doctrine for host/sof operations in a mid-intensity environment. What is happening and planned from an ATC viewpoint in support of the assigned air bases in Germany. As soon as this system's technical capabilities are to be exploited to the full extent for operational use all relevant rules and regulations applicable for ILS category 2 operations must be exhaustively expanded and supplemented. This concerns concepts for infrastructural measures such as extension of obstacle clearance limits to the whole area of coverage calibration and testing of the total radio field modifications of the approach light pattern additional training and licensing of ATC staff and pilots etc. In order to reduce this extensive task to a short-term solution a stage-wise procedure of system introduction is outlined. The concept is to utilize SETAC equipment with all the corresponding advantages regarding installation but to return in the first stage as closely as possible all regulations flight procedures and instrumentation pertaining to ILS approach and landing. A R H

N80-27334

Army Avionics Research and Development Activity, Fort Monmouth, N J

ADVANCED AVIONICS SYSTEMS DIV

THE DEVELOPMENT AND TEST OF A TACTICAL SELF-CONTAINED LANDING SYSTEM

Norman K. Shupe In AGARD Air Traffic Management Civil/Mil Systems and Technol. Feb 1980 25 p refs

Avail NTIS HC A13/MF A01

The existence of a digital symbol generator (DSG) whose basic function is to compute and display the augmenting symbolic data is necessary to operate a helicopter in the NOE environment via a FLIR presentation of the contact world and a digitally-generated topographic map display (DMG) is sufficient justification to consider adaptation of the DSG and DMG equipments to the reversionary function of providing IMC terrain-following and tactical landing capabilities. The control/display architecture necessary to use a radar altimeter to control the elevation flight path of the aircraft and a Doppler radar to control the deceleration of the aircraft is presented. The assumed precision navigation system provides the North/Northing aircraft position (1) to permit the aircraft to be steered along the prescribed ground track to the landing zone (2) to provide a starting point for interrogation of the DMG terrain elevation data for purposes of generating anticipation for the TF system (3) and (3) to act in concert with the velocity output of the Doppler radar for purposes of following a prescribed deceleration profile to the landing zone. A multi-phase simulation and flight-test program to assess the performance of the complete system in the NOE environment are described. R H
The operational need for a single avionics system to operate with the present instrument landing system, the future ICAO approved microwave landing system and the Marine remote area approach landing system (MRAALS) is discussed. The operational solution developed in response to a U.S. Navy/Marine requirement is a multimode receiver that is capable of operating with any of the systems mentioned above. The evolutionary process involved in progressing from a single to a multiple mode system capability is reviewed with emphasis on the technological advances leading to a most cost and volume effective system.

The operational value of air traffic control systems is increasing yearly. The introduction of new operational concepts and the development of new systems are increasing the demand for the use of computer-aided decision making. The unique characteristics of airborne systems present special opportunities to apply microprocessors to the control of aircraft. Several technologies exist today that can improve the operational efficiency of ATC systems. A key to these improvements is the elimination of manual errors in all aspects of the ATC system. This is accomplished through the use of computer-aided decision making. As a result of the rapid advancements that have occurred in digital computers, microprocessors have become the most suitable role of the microprocessor in ATC Systems. The impact of microprocessors on ATC systems has been considerable and will continue to increase as technological advances are developed.

The introduction of area navigation (RNAV) into the terminal area airspace system is examined. The characteristics of microprocessors are compared with those of min machines and main frame computers to identify the most suitable role of the microprocessor in ATC Systems. The application of microprocessors for system functions such as Data Link Management Display Console Management and Format Converters is discussed. To emphasize the impact of microprocessors on system design a conventional display system is compared with one using microprocessors. This device is built into the overall design of the display system with consequent saving in display generation hardware. The design is extended so that the display microprocessor becomes the central element in display console management. The F100L microprocessor is described in some detail and used as model to define the capability of a microprocessor.
to be aware of and comment upon directions provided to others Network control techniques are discussed which support civil air traffic management applications. These techniques provide for the apportionment of capacity among subscribers in such a manner as to allow all subscribers access to all data in their area of interest without real-time network management. The potential exists for a substantial reduction in the avionics boxes aboard aircraft. A JTIDS-like system can simultaneously provide data for airspace management and control, collision avoidance, area navigation, air-to-air coordination, cooperative surveillance, cockpit situation display, airport surface traffic control, and possibly instrument landing. The transition from the existing air traffic management system to a JTIDS-like system is also addressed. Auster terminal designs appear to be possible at a cost that is affordable for general aviation.

M G

N80-27344# Federal Aviation Administration Washington, DC Systems Research and Development Service DISCRETE ADDRESS BEACON SYSTEM P D Hopkins In AGARD Air Traffic Management Civil/Mil Systems and Technol Feb 1980 10 p refs

AvailNTIS HC A13/MF A01 A discrete address beacon system (DABS) to provide upgraded air traffic control radar beacon system (ATCRBS) surveillance is discussed. The DABS concept provides improved air traffic control automation service by adding ground-based automatic traffic advisory and resolution service through its integral high-capacity digital air ground data link. The compatibility of DABS with ATCRBS interrogation concepts and the computer-processing subsystems are specifically discussed, and current testing and evaluations of the system are reviewed.

M G

N80-27345# Royal Signals and Radar Establishment, Malvern (England) ADSEL SELECTIVE ADDRESS SSR, PERFORMANCE OF THE EVALUATION STATION R C Bowes T B Nichols and J M Bonny In AGARD Air Traffic Management Civil/Mil Systems and Technol Feb 1980 8 p refs

AvailNTIS HC A13/MF A01 A selectively addressed radar system (ADSEL) designed to overcome the garble problem of the current secondary surveillance radar (SSR) system and provide a data link facility is discussed. The system requires aircraft to carry a transponder which includes the selective address mode of operation and a ground station with multipurpose detection finding system plus data processing facilities. In particular, the evaluation trials that have been carried out are reviewed, and the results of a large number of aircraft flights are given. The main aim of the trials is to assess the accuracy with which the position of an aircraft can be measured. The performance of the communication links and to optimise the operating rules. A detailed analysis is given of the performance of the SSR and ADSEL system when monitoring two aircraft flying close together such that their transponder replies were garbling.

M G


AvailNTIS HC A13/MF A01 The field measurements taken to evaluate the surveillance performance of the Discrete Address Beacon System (DABS) are described. Simultaneous measurements made by transportable measurements facilities and the existing ground stations provided the opportunity for a side-by-side comparison of DABS off-boresite monopulse and conventional surveillance measurement performance. The results indicate that both range and azimuth accuracies of the DABS design are four times better than those provided by current terminal secondary surveillance radar (SSR) equipment. Blip/scan ratio for monopulse SSR is 98% or better and remains high in crossing track situations where the performance of existing equipment is observed to degrade. Significantly, this improvement in SSR performance was accomplished with 1/4 the pulse repetition frequency of the present equipments.

M G

N80-27347# National Aeronautics and Space Administration Ames Research Center Moffett Field Calif EFFECTIVENESS OF ADVANCED FUEL-CONSERVATIVE PROCEDURES IN THE TRANSITIONAL ATC ENVIRONMENT L Tobias and Paul J Obren (National Aviation Facilities Experimental Center Atlantic City N J) In AGARD Air Traffic Management Civil/Mil Systems and Technol Feb 1980 14 p refs AvailNTIS HC A13/MF A01 CSCL 17G

The real-time simulation (involving both the pilot and the air traffic controller) of fuel conservative approaches profile descents and four-dimensional area navigation to assess the effectiveness of the procedures is discussed. Generally, results indicate some difficulties with the procedures tested in a mixed traffic environment and point to the need for computer assistance for effective implementation of candidate procedures.

M G

N80-27348 Washington Univ Seattle EFFECT OF SOME STRUCTURAL PARAMETERS ON ELASTIC ROTOR LOADS BY AN ITERATIVE HARMONIC BALANCE Ph D Thesis Abraham Epie 1979 122 p Avail Univ Microfilms Order No 8012195

The coupled flap-lag equations of motion for an elastic helicopter blade in forward flight are derived including several structural coupling parameters. These nonlinear equations of motion are solved by an iterative harmonic balance method. Depending on the nature of the rotor load trim, the equations for the steady thrust and roll and pitch moments are also solved simultaneously with the flap equation of motion to obtain the unknown control settings. Once the generalized coordinates and the control settings are known, the rotor load harmonics are computed by Fourier analysis. Effects of various structural coupling parameters on rotor loads are studied for three typical rotors: a stiff in-plane hingeless tail rotor, a soft in-plane hingeless main rotor, and an articulate main rotor. The results show excellent convergence of the iterative solution scheme. Dissertation Abstr.

N80-27349 California Univ Los Angeles MULTILEVEL OPTIMUM DESIGN OF WING BOX STRUCTURES WITH FIBER COMPOSITE PANEL COMPONENTS Ph D Thesis Massood Mehrinfar 1980 180 p Avail Univ Microfilms Order No 8016018

A multilevel approach is used which considers the overall sizing of the structure using equivalent thickness type design variables as a system level task while detailed design is carried out at the component level for each individual panel. The total structural weight is taken as the system level objective function while the change in equivalent system stiffness is taken to be the objective function for each of the uncoupled component level problems. The key idea is to select the component level objective function so as to minimize change in component loads due to subsequent force redistribution accomplished by taking the change in stiffness as the component level objective function to be minimized. Finite element analysis is used at the system level to compute the internal forces. Each fiber composite panel is modelled by stacking layers of orthotropic assumed stress rectangular elements representing equivalent thicknesses. Approximation concepts such as linking constraint deletion and explicit approximations of retained constraints are employed. A quadratic extended interior penalty function formulation is used as the optimization tool at both the system and component design modification levels. Dissertation Abstr.

N80-27350# Hydraulic Research Textron Valencia Calif FLIGHTWORTHY ACTIVE CONTROL LANDING GEAR FOR A SUPERSONIC AIRCRAFT Final Report

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A flightworthy active control landing gear system for a supersonic aircraft was designed to minimize aircraft loads during takeoff impact rollout and taxi. The design consists of hydromechanical modifications to the existing gear and the development of a fail-safe electronic controller. Analytical results indicate that for an aircraft sink rate of 0.914 m/sec (3 ft/sec) the system achieves a peak load reduction of 36% during landing impact.

N80-27351*‡ National Aeronautics and Space Administration Washington D C

MEASURES FOR IMPROVING THE ZEPPELIN AIRSHIPS FOR LONG DISTANCE TRANSPORTATION

(NASA-TM-76142) Avail NTIS HC A02/MF A01 CSCL O1C

Factors to be considered in the construction of dirigibles include the design and weight of support structures, static and aerodynamic loads on the main ring, the annealing of support materials, and the dynamic gas pressure. Adaptations made for using helium as the lifting gas and a method for extracting ballast are described.

N80-27362*‡ Ballistic Research Labs, Aberdeen Proving Ground Md

MUZZLE BLAST OVERPRESSURE LEVELS ON THE AH-1S HELICOPTER TOW SIGHT UNIT Final Report

An experimental program was conducted to measure the muzzle blast overpressures upon a simulated AH-1S Helicopter TOW Sight Unit (TSU). Different weapon configurations were fired to examine the effect of gun caliber and the presence of muzzle devices. Surface pressure distributions were measured along the line of symmetry of the TSU and were supplemented by spark shadowgraphs of the blast wave propagation. Limited data was acquired in the BRL Aerodynamics Range to measure the trajectory perturbation association with the internal gas dynamics of the muzzle devices.

N80-27353‡ McDonnell Aircraft Co St Louis Mo


The objective of this program was to evaluate the ability of a crack growth gage to monitor potential crack growth damage in fatigue critical locations of F-4C/D aircraft structure. Crack growth gages were designed for use on the lower wing skin of F-4 aircraft. An element test program was performed to verify gage design and provide data for predicting gage behavior when attached to the fatigue test article. Results of these tests prompted performance of a supplemental test program to investigate effects of sheet thickness on crack growth retardation. Results from both of these test programs were used to develop procedures to predict crack growth in gages attached to the fatigue test article. Eight gages were bonded to the test article using room temperature cure adhesive. An elevated cure temperature adhesive failed. Results show gage crack growth is predictable. Analysis results demonstrate the monitoring potential of the gage.

N80-27354‡ Boeing Vertol Co Philadelphia, Pa

STUDY OF COST/BENEFIT TRADEOFFS AVAILABLE IN HELICOPTER NOISE TECHNOLOGY APPLICATIONS Final Report
R H Spencer and H Sternfeld Jr Jan 1980 34 p refs (Contract DOT-F478WA-4161) (AD-A083955 FAA/EE-80-5) Avail NTIS HC A03/MF A01 CSCL 01/3

This study investigated cost/benefit tradeoffs using the case histories of four helicopters for which design and development were complete and in three cases have undergone substantial flight testing. The approach to quelling each helicopter was an incremental reduction of each source as required to obtain reductions in flyover noise with modifications to other secondary systems only as necessary. The methodology used to predict the effects of the design modifications on acquisition maintenance and operating costs were typical of those employed by rotorcraft manufacturers. The reduction of helicopter flyover noise generally was achieved through reductions in rotor tip speed. Performance characteristics were maintained to specified minimums for each aircraft in the study.

N80-27355‡ Federal Aviation Administration Washington D C Office of Environment and Energy

ENERGY CONSERVATION POTENTIAL OF GENERAL AVIATION ACTIVITY Final Report
Sep 1979 52 p refs (AD-A081182 FAA/EE-79-20) Avail NTIS HC A04/MF A01 CSCL 01/2

Three approaches for reducing energy consumption were investigated: hardware modification pilot education, and air traffic control. It is recommended that research into new aircraft engine designs, automatic controls, and conventional engine fuel savings improvements, composite materials development and aerodynamic drag reduction continue, and that this hardware be introduced into the fleet when cost reliability and safety considerations allow. It is further recommended that the pilot awareness and education programs listed above be implemented by the FAA and the general aviation industry and finally that the ATC actions listed should be further evaluated to determine whether the anticipated fuel savings justify their implementation.

N80-27356‡ Noah (J. Watson) Associates Inc Falls Church Va

COSTS AND BENEFITS OF REQUIRING NEW PRODUCTION OF OLDER AIRCRAFT TYPES TO MEET AMENDED NOISE STANDARDS Final Report
C F Day and E D Studholme Sep 1979 76 p refs (Contract DOT-F478WA-4192) (AD-A080130 FAA/EE-79-22) Avail NTIS HC A05/MF A01 CSCL 01/3

This report examines costs and benefits associated with requiring new production of older aircraft models to meet amended noise standards. Two cases are examined: (1) all aircraft produced after 1983 must meet a noise emission standard halfway between Stage 2 and Stage 3 limits, and (2) all aircraft produced after 1985 must meet Stage 3 noise standards. The cost elements are combined and expressed as a change in direct operating costs in either cost-per-passenger mile or cost-per-aircraft mile, as appropriate. Noise benefits are estimated in terms of the change in area under a 100 EPNL contour resulting from the amended standards.

N80-27357‡ Bolt Beranek and Newman Inc Canoga Park Calif

COST/BENEFIT TRADEOFFS AVAILABLE IN AIRCRAFT NOISE TECHNOLOGY APPLICATIONS IN THE 1980'S Final Report
John F Wilby and William J Galloway Dec 1979 175 p refs (Contract DOT-F478WA-4037) (AD-A082028 BBN-3856 FAA/EE-80-2) Avail NTIS HC A08/MF A01 CSCL 01/3

The current status of aircraft noise control technology is reviewed to identify those measures that have a reasonable
potential for application to aircraft coming into service in the 1980's. Noise reduction achievable when these noise control measures are applied to two transport category airplanes a business jet and a small propeller-driven twin is determined. Costs and performance penalties are determined for each noise control option. Benefits are measured by reductions in FAR 36 certification noise levels and in reductions in EPNL contour areas. The study shows that current late 1970's noise control practices permit transport category airplanes to meet the FAR 36 Stage 3 noise limits yet application of additional noise control measures is not likely to provide additional reduction of the noise levels for these aircraft by more than 10 decibels. New business jet noise levels will be as much as 10 decibels lower than Stage 3 limits for takeoff and as much as 5 decibels lower on approach with additional reductions of more than 3 decibels unlikely. Introduction of newly designed geared recirculating engines would provide reductions of 10 or more decibels for high performance single and twin-engine propeller-driven small airplanes relative to existing practice.
An off-design performance loss model is developed for variable-area ( pivoted vane) radial turbines. The variation in stator loss with stator area is determined by a viscous loss model. With the variation in rotor loss due to stator area variation (i.e., no stator end-clearance gap) is determined through analytical matching of experimental data. An incidence loss model is also based on matching of the experimental data. A stator vane end-clearance leakage model is developed and sample calculations are made to show the predicted effects of stator vane end-clearance leakage on performance.

Author

N80-27368# United Technologies Corp Windsor Locks Conn INFLUENCE OF NOISE REDUCTION ON WEIGHT AND COST OF GENERAL AVIATION PROPELLERS Final Report Robert J Klatte and Frederick B Metzger Jun 1979 111 p refs (Contract DOT-FALT77W-4411) FAAA-AEE-79-18) Avail NTIS HC A06/MF A01 CSCL 01/3

Results of a study are reported in which the influence of noise reduction on weight and cost of propellers used in General Aviation aircraft was evaluated. Aircraft performance was not to be degraded by installation of the reduced noise propellers. Only propeller modifications were permitted. Engine modifications such as introduction of a gearbox to reduce noise by reduction of RPM were not permitted in the study. Major factors in noise reduction found promising in the study were (1) optimization of performance by use of the best available airfoils (2) use of thin airfoils and a narrow elliptical tip blade planform and (3) increasing the number of blades consistent with maintaining aircraft performance. For the three aircraft studied (a single engine a twin engine and a heavy twin) the flyover noise reduction potential varied from 3 to 8 dBA with no weight or cost penalties. Greater reductions in noise resulted in increased weight and/or cost penalties. Also in some cases engine noise would have to be reduced to achieve greater reductions. The progress by General Aviation aircraft manufacturers in reducing noise is indicated by the finding that the most recent aircraft design had the smallest noise reduction potential.

Author


This report consists of a collection of abstracts of the numerous research progress reports given by AFSOR contractors and of invited papers from other governmental agencies and contractors. These papers presented over a five day period composed the 1979 annual contractors meeting on Air-Breathing Combustion Dynamics and Kinetics. The principal investigators and their organizational association are also identified.

Author


The response of an axial flow turbomachine to spatial velocity variations can be determined by the unsteady pressure distribution function which has been developed and represents an extension of an earlier analysis of the unsteady lift. A computer program has been written to formulate the unsteady pressure difference as a function of design parameters. This program is versatile in that it includes the effects of the cascade geometrical parameters and disturbance flow characteristics such as the blade camber, angle of incidence, nonconvected disturbance, and it also gives the unsteady lift and moment. The documentation and the use of this program are presented herein.

Author


Results of an investigation in which turbomachinery rotor sound spectra were correlated with aerodynamic measurements of the inlet turbulence strut wake and vortex flow strengths are reported. Aerodynamic measurements included mean velocity profiles turbulence intensity and axial length scales. Inlet turbulence data indicate that the major effect of flow contraction appears to be the elongation of turbulent eddies from 20 cm to 200 cm. Eddies of this size dominate the blade passing frequency (BPF) tones. Decreasing eddy size by use of a grid revealed vortex flow strength to be the second major sound source. A doubling of vortex flow strength produced a 6 dB increase in the SPL of the first BPF. The sound pressure level showed less than a 2 dB change with doubling of wake turbulence intensity and velocity defect. A discussion of the relative importance of various sources of noise due to flow distribution at the inlet is given. This report will be submitted to the Journal of Sound and Vibration for publication.

Author


The objective of this program was to provide and demonstrate the technology required to economically manufacture a cooled high temperature radial turbine with sufficient integrity and aerodynamic performance to meet future requirements for a reliable low-cost high performance small gas turbine engine. The work to accomplish this objective was subdivided into three phases.

Author


Twenty-four papers addressing the different models and methods used in turbine engine research are presented. Four general areas are discussed: basic phenomena transient phenomena and instabilities, furnaces and boilers, and gas turbine combustors and R/H systems.

Author


Past achievements current status and future prospects of combustor modelling are discussed. The past achievements largely consist of detailed studies of idealized flames which have given an understanding of the relevant fundamental processes. However, gas turbine combustor computations must include the simultaneous interacting processes of three dimensional two-phase turbulent flow evaporating droplets multiphase radiation and chemical kinetics. At the present time numerical prediction algorithms are becoming available which can model all these processes to a

Author
compute the hydrodynamic, thermodynamic and chemical quantities throughout a three-dimensional field. Complementary stirred reactor network algorithms permit the prediction of minor constituents (pollutants) again including such effects as droplet evaporation and unmixedness. Experimental verification of these various predictions reveals remarkably good agreement between measured and predicted values of all parameters in spite of the physical and mathematical assumptions currently used. Future problems include more accurate modeling of turbulence/kinetic interactions, numerical procedure optimization and detailed measurements of residence time distribution and two-phase parameters in real hot combustors. 

**N80-27374** Imperial Coll of Science and Technology London (England) Dept of Chemical Engineering and Chemical Technology

**MATHEMATICAL MODELLING OF GAS-TURBINE COMBUSTION CHAMBERS**

W P Jones and J J McGurk In AGARD Combustor Modelling Feb 1980 11 p refs Sponsored by Rolls-Royce Ltd

Avail NTIS HC A17/MF A01

A mathematical model for predicting the performance of gas turbine combustion chambers is described. The model is based on the finite difference solution of the averaged forms of the governing partial differential conservation equations and turbulent transport is approximated via a variable density form of the k-epsilon turbulence model. The reactions associated with heat release are assumed sufficiently fast for chemical equilibrium to prevail on an instantaneous basis and the influence of local turbulent fluctuations in mixture strength accounted for by a beta-probability density function. Liquid fuel sprays are represented by a transport equation for the probability density function describing the variation of droplet mass fraction with droplet radius. Computations of 2-d axisymmetric and 3-d flows are compared with experimental results and an assessment made of the adequacy of the various submodels embodied in the prediction procedure. 

**N80-27382** Science Applications Inc, Woodland Hills, Calif Combustion Dynamics and Propulsion Technology Div

**FUNDAMENTAL CHARACTERIZATION OF ALTERNATIVE FUEL EFFECTS IN CONTINUOUS COMBUSTION SYSTEMS**


Avail NTIS HC A17/MF A01

The problem of net soot generation which is aggravated by the reduced hydrogen content characteristic of syntheses that have been identified as probable alternate fuel sources for use in gas turbines is addressed. The kinetics of the processes modelled using the quasi-global concept while experimental data are developed primarily from a laboratory jet stirred reactor. Results are presented showing that soot emissions can be characterized in terms of major species and that soot oxidation must be included in the prediction of net soot generation. In addition the techniques being employed for coupling the chemical and aerodynamic processes are outlined.

**N80-27393** Purdue Univ Lafayette Ind School of Mechanical Engineering

**SEMI-EMPIRICAL CORRELATIONS FOR GAS TURBINE EMISSIONS, IGNITION, AND FLAME STABILIZATION**

A M Mellor In AGARD Combustor Modelling Feb 1980 13 p refs (Contract F33615-77-C-2069)

Avail NTIS HC A17/MF A01

For operating conditions where the fuel evaporation rate is fast compared to the fuel vapor/air mixing rate a characteristic time model has been formulated to predict gaseous emissions and efficiency in terms of combustor inlet conditions and geometry. The model which involves kinetic and fluid mechanic times has been used to design low metric oxide burners and study of several different conventional engine combustors suggests that the correlation may be universal. A related model which includes a fuel droplet evaporation time is being validated with data from laboratory combustors for spark ignition and lean flame stabilization. The preliminary application of this latter model to engine situations is described. 

**N80-27394** Universite Laval (Quebec)

**COMBUSTION MODELLING WITHIN GAS TURBINE ENGINES, SOME APPLICATIONS AND LIMITATIONS**

J Odgers In AGARD Combustor Modelling Feb 1980 14 p refs

Avail NTIS HC A17/MF A01

Some of the more pertinent models postulated to describe the performance of gas turbine combustors are reviewed. Six different design/development stages are considered (1) the initial sizing of a combustor (2) the initial development testing (3) primary zone modelling (4) secondary zone modelling (5) dilution zone modelling and (6) changes due to the alteration of ambient conditions. The models are assessed in scope 1 plausibility experimentally, and in terms of time and economic justification. For (1) it is suggested that a zero-dimensional model is sufficient as also for (2) Item (3) will probably require a three-dimensional model (4) and (5) with probably sufficient with a zone or two-dimensional model. For item (6) a zero-order model might well be satisfactory. If it can be produced with sufficient accuracy a single complex (probably three-dimensional) model could adequately describe all items (1) to (6). 

The need of future data, the type of models which may be used currently and those which are likely to be used in the future are discussed.

**N80-27395** Office National d Etudes et de Recherches Aeronautiques Paris (France)

**AERODYNAMIC STUDY OF A COMBUSTION CHAMBER WITH A VIEW TO ITS SEMI-EMPIRICAL MODELLING**

Patrick Hebrard and Philippe Magre In AGARD Combustor Modelling Feb 1980 18 p refs In FRENCH ENGLISH summary

Avail NTIS HC A17/MF A01

The prediction of combustion performance and of polluting species formation in turbomachine combustors requires a calculation method that takes into account all phenomena taking place in various parts of the combustion chamber. Among these aerodynamic effects often very poorly known must be introduced to justify modelling methods based on a combination of elementary combustors. These methods rest on a correct description of their features and their relationships location nature volume flowrate and distribution connections. To this end experiments were carried out on a combustor model both without and with a reactor of the (1) characteristics of the combustor aerodynamics by visualizations in the water tunnel and velocity measurements on an aerodynamic model (2) measure residence times in a flame tube by thermodilution (aerodynamics) and particle dynamics (water tunnel) and (3) determine the combustion efficiency and the polluting species production for each regime. Using these results for the development of a one-dimensional model of elementary combustors makes it possible to calculate the distribution function of residence time in all elementary reactors especially in the primary zone. The overall performance of the combustor can also be predicted. The agreement between calculated and experimental results is satisfactory if the simplicity of the assumptions on which the model is based is considered.

**N80-27396** California Univ Berkeley

**COUPLED BENDING-TORSION FLUTTER IN CASCADES WITH APPLICATIONS TO FAN AND COMPRESSOR BLADES**


Avail Univ Microfilms Order No B015952

A method is presented for determining the aeroelastic stability boundaries of a cascade with aerodynamic, inertial and structural coupling between the bending and torsional degrees of freedom. The real rotor is modeled as an infinite two-dimensional cascade of identical harmonic motion with an arbitrary but constant interblade phase angle. Lane’s assumption about the possible
fluctuation mode shapes is assumed to hold. Two different unsteady aerodynamic theories are incorporated into the flutter analysis The first is Whitehat’s solution for the unsteady incompressible flow though an oscillating cascade. The second is a solution for the unsteady supersonic flow through a cascade with a subsonic leading edge locus. The aeroelastic stability boundary of the cascade is obtained by solving a complex eigenvalue problem analogous to the isolated wing case The eigenvalue problem is solved directly and the critical interblade phase angle is determined by minimizing the fluctuation speed with respect to this phase angle while maintaining the restrictions imposed by Lane’s assumption. Boundaries are presented for both the incompressible and the supersonic case for several cascade configurations and locations of elastic axis coupling strength and structural damping. 

Dissert Abstr

N80-27397# Northrop Corp Hawthorne Calif. 


A preliminary design for a helicopter/VTOL wide-angle simulator image generation display system is studied. The visual system is to be part of a simulator capability to support Army aviation systems research and development within the near term. As required for the Army to simulate a wide range of aircraft characteristics versatility and ease of changing cockpit configurations were primary considerations of the study. Due to the Army’s interest in low altitude flight and descents into and landing in constrained areas particular emphasis is given to wide field of view resolution brightness contrast and color. The visual display study includes a preliminary design demonstrating feasibility of advanced concepts and a plan for subsequent detail design and development. Analysis and tradeoff considerations for various visual system elements are outlined and discussed. 

E D K


The steel towers which are currently used to support runway approach lights present a significant collision hazard to landing aircraft and are being replaced by frangible towers which reduce but do not eliminate this hazard. This study analyzes optical concepts for indirect generation of runway approach lights which would reduce the tower height or the mass of elevated components. Three concepts are investigated: projection of images with mirrors use of a ground based lamp in conjunction with a diverging mirror in the light plane and use of a fiber optic light pipe. The projection of images can achieve a height reduction of several feet but would require the construction and maintenance of large mirrors. The other two techniques would eliminate wiring from elevated structures but would require more complex optics and higher levels of power consumption. None of these techniques appears to be practical when the marginal benefits are weighed against their complexity and cost.

Gra


This program was sponsored in order that the performance of selected rain erosion coatings might be evaluated and that those parameters affecting the performance of these materials might be studied with the goal in mind to upgrade rain erosion coatings for use on high performance aircraft. In order to realize this goal the following characteristics of two select polyurethane materials were evaluated: coating adhesion to the reinforced composite substrates, solvent evaporation rates or solvent release from each select rain erosion coating material for the purpose of reducing coating porosity of the cured material and the polymerization study related to the chemical reactivity of these moisture reactive materials after exposure to known quantities of free water. A coating familiarization study for each of the rain erosion coating materials such as radar signal attenuation studies to determine signal losses through the rain erosion coating and high-speed erosion tests for selected coating materials and primer combinations.

Gra
manufacturing experience established a natural testbed for validation of Phase 2 Detail Design and yielded excellent feedback for advancement of the PABST technology in Engineering Materials and Process and Quality Assurance.

**N80-27510#**
National Aeronautics and Space Administration
Lewis Research Center Cleveland, Ohio

**ADVANCED FUEL SYSTEM TECHNOLOGY FOR UTILIZING BROADENED PROPERTY AIRCRAFT FUELS**
13-17 Oct 1980
(NASA-TM-81538 E-492) Avail NTIS HC A02/MF A01 CSCL 21D.

Possible changes in fuel properties are identified based on current trends and projections. The effect of those changes with respect to the aircraft fuel system are examined and some technological approaches to utilizing those fuels are described.

**R C T**

**N80-27512#**
Exxon Research and Engineering Co Linden, N J

**CARBON SLURRY FUELS FOR VOLUME LIMITED Missiles**
R H Salvesen D C Ragano W S Blazowski and W F Taylor
Nov 1979 219 p refs

(Contract F33615-78-C-2025 AF Proj 3048)
(AF-A084710 EXXON/PLUS 1KW 79 AR-1

The Air Force has contracted with E R E to develop a carbon slurry fuel with a minimum of 180,000 BTU/gal. This report provides results of the first year's effort of this twenty-seven month program. Initial results indicate that a dispersion of carbon black in JP-10 with select dispersing agents can be made that meets the BTU requirements. Preliminary results look promising. Combustion tests using a specially developed Liquid FuelJet Stirred Combustor (LFJSC) have demonstrated that carbon burnout efficiencies greater than 90% are achievable with 300 nm particles in residence times down to 4 ms. Homogeneous iron lead manganese and zirconium catalysts at concentrations up to 1000 ppm proved ineffective as accelerators of carbon burnout. Further tests are in progress to optimize the composition of the most promising formulations and to test these materials under more vigorous conditions in order to determine their suitability for missile applications.

**N80-27513#**
Virginia Polytechnic Inst and State Univ Blacksburg

**TWO AND 13C FOURIER TRANSFORM NMR CHARACTERIZATION OF JET FUELS DERIVED FROM ALTERNATIVE ENERGY SOURCES**
H C Dorn 30 Aug 1979 80 p refs

(Contract N00173-78-C-0424)

(AD-A084169) Avail NTIS HC A05/MF A01 CSCL 07/4

Initially four jet samples were examined in this phase of the study using gel permeation liquid chromatography. We have previously discussed these results in the six month Progress Report. Although the gel permeation approach has the advantage of nearly quantitative recovery from the chromatography column (typically greater than 95%) and high preparative loading, it suffers from two drawbacks in studies of the present jet fuels. In general the molecular weight and/or size of the compounds present in typical jet fuels do not cover a broad range. This is an obvious result of the relatively narrow distillation range(s) used to generate the jet fuels. That is the gel permeation approach is more ideally suited in separations involving mixtures with a broad range in size and/or molecular weight (e.g. 100-1000 MW), whereas the jet fuels have a narrow range (e.g. 100-250MW).

**N80-27562#**
Magnavox-General Atomics Philadelphia Pa

**HIGH POWER HF AND NOISE CANCELLATION SYSTEM**
Samuel J Harris and Stephen J Rosasco Griffiss AFB NY
RADC Mar 1980 48 p refs

(Contract F30602-78-C-0338 AF Proj 2338)

The objectives of this effort were achieved and should permit high power HF (2-30 MHz) transmitters and conventional HF receivers to be collocated on an aircraft and operated simultaneously (full duplex) with appreciably less than 10% frequency separation between the transmit and receive channels. The option of frequency assignment between the Maximum Usable Frequency (MUF) and the Lowest Usable Frequency (LUF) for the transmit and receive frequencies can result in a 40 dB improvement in a duplex circuit or stated another way, it may be the only way to establish a circuit between two points. One or more full duplex HF circuits can be operated simultaneously on an aircraft. The technique employed is a high power HF Interference Cancellation System which is adaptive and completely automatic. The significance of this effort is that it has direct application to C3 aircraft and collocated ground HF sites including those sites with transmitters of ultra high power output (1 kW). In addition the ultra linear high power weight/controller technology employing goniometers can be applied in any frequency range from VLF to UHF.

**N80-27568#**
Transportation Systems Center Cambridge Mass

**TRANSPORTATIONAL FEASIBILITY OF DIGITAL COMMUNICATION OVER OCEAN AREAS BY HIGH FREQUENCY RADIO**
George W Haydon Charles M Rush and Larry R Teters
Nov 1979 69 p refs Prepared in cooperation with the National Telecommunication Administration, Boulder, Colo.

(AD-A079424 TSC-FAA-79-26 FAA-EM-78-20) Avail NTIS HC A05/MF A01 CSCL 17/2

The theoretical reliability of digital data transmission via high-frequency radio is examined for typical air traffic routes in the Atlantic and Pacific areas to assist the U.S. Department of Transportation in the evaluation of a system for improving air traffic control over ocean areas. The expected performance of a reference high-frequency digital transmission system of 1200 bits per second with a permissible error rate of one in a thousand binary error is expressed as a percentage of time that a given theoretical reliability will be equaled or exceeded. The expected performance of air-to-air HF systems is also considered and it is concluded that these systems should work for the reference communication system out to the line-of-sight range of about 800 km for high-flying aircraft.

**N80-27573#**
Ohio State Univ Columbus

**RADIATION BY SOURCES ON PERFECTLY CONDUCTING CONVEX CYLINDERS WITH AN IMPEDANCE SURFACE PATCH**
L Ersoy and P H Pathak Griffiss AFB NY RADC Jan 1980 129 p refs

(Contract F19628-77-C-0107 AF Proj 2305)
(AD-A084345 ESL-784641-2) Avail NTIS HC A07/MF A01 CSCL 20/14

This report deals with an asymptotic high frequency analysis of the radiation patterns of a magnetic line source or a magnetic dipole located on a uniform impedance surface patch which partly covers an electrically large perfectly conducting convex cylinder. This work is relevant for example to the analysis of fuselage mounted airborne antennas for satellite communication purposes. In the latter application impedance surface patches may be employed to increase the radiation intensity near the antenna. This work is part of an effort to determine any such impedance loading. In the present analysis the impedance surface patch is represented as an equivalent aperture for the currents on the impedance surface patch. These expressions for the currents are valid in the neighborhood of the source and partly cover an electrically large perfectly conducting convex cylinder. This work is relevant for example to the analysis of high frequency form of the perfectly conducting convex cylinder. The objectives of this effort were achieved and should permit a high power HF transmitters and conventional HF receivers to be collocated on an aircraft and operated simultaneously (full duplex) with appreciably less than 10% frequency separation between the transmit and receive channels. The option of frequency assignment between the Maximum Usable Frequency (MUF) and the Lowest Usable Frequency (LUF) for the transmit and receive frequencies can result in a 40 dB improvement in a duplex circuit or stated another way, it may be the only way to establish a circuit between two points. One or more full duplex HF circuits can be operated simultaneously on an aircraft. The technique employed is a high power HF Interference Cancellation System which is adaptive and completely automatic. The significance of this effort is that it has direct application to C3 aircraft and collocated ground HF sites including those sites with transmitters of ultra high power output (1 kW). In addition the ultra linear high power weight/controller technology employing goniometers can be applied in any frequency range from VLF to UHF.
The accuracy of the final mass flow data and its specific gravity and their use during on-line data acquisition is described. The unique curve fits for flowmeter viscosity and characteristics are found to compare quite well with a numerical moment analysis. Significant test cases involving different combinations of mechanical and thermal loading on impingement cooled airfoils with and without leading edge film cooling holes are presented. The von Mises effective total strains at maximum takeoff computed from the elastic and elastic plastic finite element analyses agreed with 9 percent for rotating airfoils and 28 percent for stationary airfoils with the elastic results on the conservative side.

Author: N80-27816f

Defense Intelligence Agency Washington, D.C.

HYDROGEN TECHNOLOGY FOREIGN, CHANGE 1 Report for period ending Mar 1980

James D. Busi and Philip Greenbaum 14 Apr 1980 66 p

(AAD-083665 DIA-IST-1860S-522-78-CHG-1) Avail NTIS HC A04/MF A01 CSCL 10/2

A bibliography containing 77 abstracts concerning the use of holographic methods in flow visualization is presented. Research covering flow in wind tunnels gas lasers aircraft wakes aircraft engines supersonic flow and shock waves is cited. Most of the techniques involve interferometric holography.

Author: N80-27882# National Technical Information Service Springfield Va
Hydrogen is both a promising medium for the efficient storage and transmission of energy and a potential alternate fuel. Hydrogen is not a primary energy source; however, since its production is dependent upon other energy sources (thermal, electrical, and radiant), to be practicable as a fuel, hydrogen must be produced in bulk quantities with a standardized purity that will satisfy consumer specifications. In addition, improved distribution systems must make hydrogen widely available to military, industrial, and domestic consumers if the successful evolution of a hydrogen economy is to occur. The greatest potential military impact of hydrogen lies in its use as an aviation fuel. Because of its high specific energy (124 kJ/kg--2.7 times greater than conventional aviation fuels), hydrogen has potential use as a fuel for subsonic transports, supersonic aircraft, and helicopters. However, safety measures, logistics, and storage and handling systems must be developed and standardized before this capability can be achieved. Initial experimental use of hydrogen in military aircraft may occur in the 1980s. Followup conversion and modification of aircraft and airports to hydrogen will require an additional 10 to 15 years. Secondary military interests include the use of hydrogen fuel cells for portable and transportable power generation and its use as a propellant in aerospace applications.

N80-27837# Aerospace Medical Research Labs Wright-Patterson AFB, Ohio
COMMUNITY NOISE EXPOSURE RESULTING FROM AIRCRAFT OPERATIONS VOLUME 7 ACOUSTIC DATA ON AIRCRAFT GROUND RUNUP NOISE SUPPRESSORS Robert A Lee Dec 1979 282 p
(Contract DOT-85-23731)
(AD-A083701 AMRL-TR-73-110-Vol-7) Avail NTIS HC A13/MF A01 CSCL 01/2
This report presents the results of field measurements of the far-field noise produced on the ground by military aircraft operating inside Grade-2 demountable suppressors during ground runup operations. For these ground runup data, the far-field noise is presented as a function of angle and distance to the aircraft. All of the data are normalized to standard acoustic reference conditions of 59 F temperature, 70% relative humidity. Volume 1 discusses the scope limitations and definitions needed to understand and use the volume containing the noise data. Noise data are presented in this Volume 7 for the following aircraft suppressor systems: A-7 in the AF32A-19 and AF-32A-24 noise suppressors; KC-135A in the modified AF32A-52 noise suppressor; F-4 in the AF32A-14 noise suppressor; F-5 in the AF32A-18 noise suppressor; F-15 in the AF32A-23 noise suppressor; F-16 in the AF32A-32 noise suppressor; F-100 in the AF32A-16 noise suppressor; F-106 in the AF32A-17 noise suppressor; F-111 in the AF32A-13 noise suppressor; and T-38 in the AF32A-18 noise suppressor.

N80-27838# Computer Sciences Corp Arlington Va
Andras Spiegel and Roger A Shepherd Jul 1979 162 p
(Contract DOT-FA78WA-4163)
(AD-A0801159 FAA-AEE-79-8-2) Avail NTIS HC A08/MF A01 CSCL 01/2
The development and evaluation of noise emission charge systems for inducing aircraft noise abatement modifications is described in Noise Abatement Economic Policy Analysis Model (NAEPAM). The objective of this User's Guide is to describe the model implementation and to provide the necessary information to analysts who wish to execute the model.

N80-27839# Computer Sciences Corp Arlington Va
Andras Spiegel and Roger A Shepherd Jul 1979 73 p
(Contract DOT-FA79WA-4163)
(AD-A081190 FAA-AEE-79-8-1) Avail NTIS HC A04/MF A01 CSCL 01/2
This report examines the role of economic disincentive as an inducement to noise abatement. The particular disincentive analyzed is a system of noise emission charges (NEC) which is imposed at airports on commercial aircraft operations which are above maximum noise emission allowances. The methodology developed is in the form of a mathematical programming (MP) model which seeks to minimize the total cost of a disincentive-based policy. Preliminary analyses conducted with the model indicate (qualitatively) that the method of noise emission charges administered at the airport level on operations exceeding the current noise emission standards is an economically feasible method for inducing noise abatement. The single most critical assumption underlying this conclusion is that if the NEC administration is voluntary then a sufficient number of airports must impose the charges. The modeling concept presented is suitable for the analysis of a broad spectrum of aviation economic policy related issues.

N80-27840# Federal Aviation Administration Washington D C Office of Environment and Energy
INTEGRATED NOISE MODEL (INM) VERSION 2 USER'S GUIDE
Thomas Connor and Robert Hinckley Sep 1979 405 p
Supersedes FAA-EQ-78-01
(AD-A079493 FAA-AEE-79-09 FAA-EQ-78-01) Avail NTIS HC A18/MF A01 CSCL 01/2
This document contains the instructions to execute the Integrated Noise Model (INM) Version 2. The INM is a collection of computer programs which can calculate the aircraft noise environment in the vicinity of an airport given certain information on airport location, layout, and type and movement of its air traffic.

N80-27842# Mitre Corp McLean. Va Metrek Div
FAA INTEGRATED NOISE MODEL VALIDATION PHASE 1 ANALYSIS OF INTEGRATED NOISE MODEL CALCULATIONS FOR AIR CARRIER FLYOVERS
R G Gados and J M Aldred Dec 1979 103 p
(Contract DOT-FA80WA-4370)
(AD-A081426 MTR-79W FAA/EE-B0-04) Avail NTIS HC A06/MF A01 CSCL 01/3
The Federal Aviation Administration's Integrated Noise Model is a set of computer programs which is used to predict the noise impact of aircraft in the vicinity of an airport. Through the use of extensive statistical analyses this study investigates the accuracy and suitability of the noise model in calculating aircraft noise exposure by examining the agreement between the noise model in calculating single noise events and the actual measurement of those events. Assessing the sensitivity and controllability of the noise model to aircraft noise assumptions and investigating noise curves used in calculating noise exposure by testing variables for significance in estimating noise and by comparing the shape of empirical noise curves with those already in the noise model. Data for the analysis were obtained from field observations of noise from air carrier flight operations over various noise monitoring sites near Washington National and Dulles International Airports.

N80-28091# Adaptronics Inc McLean Va
INVESTIGATION INTO ADAPTIVE CONTROL OF A SLIP-CAST, REACTION-BONDED SILICON-NITRIDE PROCESS VIA ADAPTIVE LEARNING NETWORK MODELING
Dixon Cleveland Peter M Garafola, Basil A Decina and Anthony N Muccardi 30 Nov 1979 97 p
(Contract MDA903-79-C-0186 DARPA Order 3799)
(AD-A089730 ADI-REF-542) Avail NTIS HC A05/MF A01 CSCL 07/1
A program was conducted to model the modulus of rupture (MOR) strength using Adaptive Learning Networks (ALN's) for aircraft engine components produced by a slip-cast reaction-bonded silicon-nitride production process. The primary objectives of the work were to identify key process variables and to predict
optimum values for those variables as a guide for further experimentation. Nonlinear models have been synthesized that predict MOR with an average error of about 4 ksi over a range from 186 to 478 ksi. The manufacturing and analysis work done to date has demonstrated the feasibility of modeling the slip-cast RBSN process with the Adaptive Learning Network methodology and is viewed as the first iteration in the optimization procedure which is ultimately aimed at finding those manufacturing conditions which will produce the strongest, most consistent material strengths.

N80-28153: Watkins and Associates Lexington Ky

ASSESSMENT OF THE ENVIRONMENTAL COMPATIBILITY OF DIFFERING HELICOPTER NOISE CERTIFICATION STANDARDS Final Report

Richard G. Edwards, Alvin B. Broderson, Roger W. Barbour, Donald F. McCoy, and Charles W. Johnson

Juni 1979 67 p refs

Prepared in cooperation with Kentucky University, Lexington

(Contract DOT-FA78WA-4194)

(A-D-A080525 FAA-AEE-79-13) Avail NTIS

HC A04/MF A01 CSCL 01/2

Areas having the heaviest helicopter activity in the U.S. were visited and environmental noise measurement made in order to evaluate the impact of possible relaxed noise emission standards for helicopters restricted to remote regions. Measurement results showed that an average of 10 flyovers per hour produced a one-hour energy-averaged sound level (Leq) of 54.5 dBA, a level 2.5 dBA above ambient. An average of 34 events per hour adjacent to heliports produced a one-hour Leq of 63.1 dBA, which was 13.3 dBA above ambient. If emission levels were increased by 10 dBA, projected Leq values of 57.0 and 71.2 dBA resulted for the flyover and heliport conditions, respectively. Sixty-four percent of those responding to a questionnaire stated that they had not experienced a problem from helicopter noise. The degree to which the remaining respondents were bothered ranged from (slightly) to (very annoyed) with no significant preference for either category.

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G. J. L. Brown

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I. J. N. Eason

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K. L. G. G. Grant

L. J. H. Hall

M. J. I. Hotchkiss

N. J. K. Ives

O. J. L. James

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