A Flight Test Evaluation Of The 16 6 Meter Ventus By

Although a number of texts on helicopter aerodynamics have been written, few have explained how the various theories concerning rotorborne flight underpin practical flight test and evaluation. This book combines theoretical information on aerodynamics, stability, control and performance with details of evaluation methodologies and practical guidance on the conduct of helicopter flight tests. For each topic the relevant theory is explained briefly and followed by details of the practical aspects of testing a conventional helicopter. These include: * safety considerations * planning the tests * the most efficient way to conduct individual flights Where possible typical test results are presented and discussed. The book draws on the authors' extensive experience in flight test and flight test training and will appeal not only to professionals working in the area of rotorcraft test and evaluation, but also to helicopter pilots, rotorcraft designers and manufacturers and final year undergraduates of aeronautical engineering

The TACAN/INS Performance Evaluation test program investigated the feasibility of test missions requiring aircraft position information without using dedicated ground based tracking radars. This test examined the accuracy of the aircraft's TACAN receiver and on board inertial navigation system by comparing data from these airborne systems with information from a ground based precision laser tracker. Data analysis concentrated on the distance measuring equipment information from the TACAN transceiver. The report contains a summary of the data collected as well as a description of the data reduction techniques, including dual DME position fixing and three dimensional coordinate transformations. The results indicate that a dual TACAN positioning system can provide accurate position fixing. Keywords: Interial measurement unit; Laser tracking; Accuracy; Radio; Navigation Flight testing.

The results of an exploratory full-scale ground and flight test evaluation of the stability, control, performance, handling, and maintenance characteristics of the Robertson Ultra-Low-Speed Control System (ULS) are presented. The (ULS) consists of a small set of aerodynamic control surfaces placed immediately behind the propeller disk and permanently connected to the airplane's conventional flight control system. The results of this program showed that, at 40 mph., the ULS increased pitch, yaw, and roll control powers to 256, 280, and 250%, respectively, of basic airplane values. This increase also reduced the airplane's minimum speed from a control-limited 40 to a power-limited 20 mph with an attendant 50% reduction in landing and take-off distance. Glide angle was increased from 10 to 20 degrees through installation of the new system. The ULS installation did not appreciably affect stability or handling qualities, and caused no 'oversensitivity' at maximum speed (168 mph). Test results indicate that the rudimentary ULS system tested is a light, simple, and inexpensive way of generating the powerful low-spped control moments required for V/STOL operation. (Author).

Comprehensive textbook which introduces the fundamentals of aerospace engineering with a flight test perspective Introduction to Aerospace Engineering with a Flight Test Perspective is an introductory level text in aerospace engineering with a unique flight test perspective. Flight test, where dreams of aircraft and space vehicles actually take to the sky, is the bottom line in the application of aerospace engineering theories and principles. Designing and flying the real machines are often the reasons that these theories and principles were developed. This book provides a solid foundation in many of the fundamentals of aerospace engineering, while illuminating many aspects of real-world flight. Fundamental aerospace engineering subjects that are covered include aerodynamics, propulsion, performance, and stability and control. Key features: Covers aerodynamics, propulsion, performance, and stability and control. Includes self-contained sections on ground and flight test

techniques. Includes worked example problems and homework problems. Suitable for introductory courses on Aerospace Engineering. Excellent resource for courses on flight testing. Introduction to Aerospace Engineering with a Flight Test Perspective is essential reading for undergraduate and graduate students in aerospace engineering, as well as practitioners in industry. It is an exciting and illuminating read for the aviation enthusiast seeking deeper understanding of flying machines and flight test.

Real-time or real-time interactive flight testing (or displays) is the use of rapidly processed flight test data displayed in a form most effective for engineering evaluation or analysis at a rate permitting interaction between engineering personnel on the ground and the pilot in the test aircraft. The time delays involved in making the computations and absorbing the meaning of the displayed results of a particular test must be small enough to allow the engineer to communicate his satisfaction or concerns to the flight test controller and the pilot soon enough to permit re-testing, modifications, omission of the next step, or proceeding as planned. Typical delays of 1 or 2 minutes could probably be tolerated.

This report presents flight test results on the operation of the Prewitt Scratch Strain Gage. The program involved the use of a T-37B, which was previously instrumented for use as a flight loads survey aircraft. Three scratch gages were installed on the aircraft. The flight program included individual high and low g manuevers and also manuevers taken from the Air Training Command flight syllabus. Data correlation between the electrical resistance gages and the scratch gages was acomplished . The results indicate that the scratch strain gage is a feasible and reliable means of recording strain cycles of a character and magnitude found in a fighter aircraft structure. Automated data reduction techniques and system applications of the gage are discussed.

This report presents the results of an operational test and evaluation of a Loran-C navigation system. The tests were performed in a Coast Guard HH-52A helicopter from 21 September to 19 October 1976. The flight test profiles, procedures and test objectives were developed to determine the applicability of the prototype Loran-C navigator to Coast Guard operations as well as to assess the functional and accuracy performance of the Loran-C navigator operating as an area navigation system in the National Airspace System. The operational testing reported in this document includes search and rescue missions as well as surveillance and enforcement missions. The former consisted of evaluating the Loran-C navigator during creeping line, sector, and expanding square search patterns. The latter involved performing low altitude hovers over fixed and movable objects and documenting Loran-C accuracy and repeatability. This latter data is also directly applicable to the operations of the off-shore oil industry.

This report presents the procedures and results of the flight testing of the Chadwick Electronic Weighing System (CHEWS). The consensus of opinions from pilot questionnaires concerning the system is discussed. A more extensive flight test program is recommended.

A flight test evaluation of the Whittaker A/A24U-6 Structural Loads Data Recording System was conducted to determine the capability of the recorder to acquire flight loads data for use in the Air Fore Structural Integrity Program. The system consists of a small, eight-channel, airborne, digital tape recorder; a magnetic tape magazine; and a ground playback converter. A 24-flight evaluation program was conducted using an F-102 aircraft to acquire a nominal sample of VGH flight loads data. Measurements of identical acceleration peaks were successfully correlated on both systems by signals from a precise, master, timereference source

recorded by both systems. The Whittaker system was found to be a reliable means of recording both 6 cps and 12 cps vertical acceleration data. Comparisons of acceleration frequency distributions indicated that those data obtained from the Whittaker recorder had essentially the same distribution function as data obtained simultaneously by the oscillograph recorder. Pressure transducers used to measure airspeed and altitude were judged to be less accurate and less reliable than the rest of the Whittaker system. It is concluded that overall system accuracy can be increased by increasing the digital count of the acceleration, airspeed, and altitude measurements to seven digital bits. (Author).

Evaluation of the data from the flight test programs proved that the P-177A and TRU-54 pitot-static tubes are aerodynamically suitable for use on the KC-135, C-141, and similar type aircraft. These tubes are designed to be installed on the side of the fuselage and have the static pressure ports located integrally on the circumference of the pitot tube, thus eliminating the need for separate fuselage flush mounted ports. (Author).

The Airborne Information for Lateral Spacing (AILS) concept is designed to support independent parallel approach operations to runways spaced as close as 2,500 feet. This report briefly describes the AILS operational conce pt and the results of a flight test of one implementation of this concept. The focus of this flight test experiment was to validate a prior simulator study, evaluating pilot performance, pilot acceptability, and minimum miss-distances for the rare situation in which an aircraft on one approach intrudes into the path of an aircraft on the other approach. Although the flight data set was not meant to be a statistically valid sample, the trends acquired in flight followed those of the simulator and therefore met the intent of validating the findings from the simulator. Results from this study showed that the design-goal mean miss-distance of 1,200 feet to potential collision situations was surpassed with an actual mean miss-distance of 1,859 feet.

A seventy hour flight test program was accomplished to determine the suitability and accuracy of a low cost Omega navigation receiver in a general aviation aircraft. An analysis was made of signal availability in two widely separated geographic areas. Comparison was made of the results of these flights with previous work focused on VOR/ DME. Conclusions are drawn from the test experience that indicate developmental system improvement is necessary before a competent fail safe or fail soft area navigation system is offered to general aviation.

This report covers the results of a two part research effort on the Ball-Bartoe Jetwing propulsive lift concept. This effort was conducted by the University of Tennessee Space Institute, Tullahoma, Tennessee for the Advanced Aircraft Development and Systems Objectives Office (AIR-03PA) of Naval Air Systems Command under contract Number N00019-81-C-0506. The first part of the effort, which is covered in Part I of this report, was a follow on to a previous effort conducted under Naval Air Systems Command Contract Number N00019-80-C- 1026 and reported in UTSI Report

81-1(1). The effort reported herein consisted of a performance flight test with the upper wing (ejector wing) removed, and flyover noise measurements with and without the upper wing. Performance, Stability and Control flight test with the upper wing installed were a part of the previous effort. The second part of the effort consisted of an analytical study to develop a method, or methods, to predict the aerodynamic coefficients of a Jetwing configured aircraft. These coefficients would be of sufficient accuracy for use in preliminary design studies, The results of this analytical effort are reported in Part II of this report. Results of both the flight test and analytical effort are compared to full scale test results of the research aircraft in the NASA Ames Research Center 40' x 80' wind tunnel with the aim of evaluating the Jetwing concept for applications to future flight vehicles.

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During this flight test evaluation, Polyurethane and stainless steel erosion tapes were tested. Hover and level flight performance tests and qualitative handling qualities tests were conducted to determine the effects of applying these leading edge erosion tapes to the main rotor blades of the test JOH-58C. Hover and level flight performance were slightly improved by the installation of the stainless steel tape and slightly degraded by the installation of the polyurethane tape. No significant changes in handling qualities were noted as a result of the erosion tape installations. One shortcoming related to the difficult installation of the erosion tapes was noted.

Technology is ever-changing in the field of aircraft avionics and new systems may require a different approach to testing. The Federal Aviation Administration (FAA) revises its regulatory material as a result of system updates and therefore requirements for

airworthiness testing also need to be updated.Test and Evaluation of Aircraft Avionics and Weapon Systems, 2nd Edition is a unique training book which serves as both a text and practical reference for all personnel involved in avionics and weapons system evaluation and testing, in the air and on the ground. Whether training pilots and personnel or planning to test systems, this book provides readers with the fundamentals and practical information needed to get the job done.

Test flights were conducted to evaluate the capability of Differential Global Positioning System (DGPS) to provide the accuracy and integrity required for International Civil Aviation Organization (ICAO) Category (CAT) III precision approach and landings. These test flights were part of a Federal Aviation Administration (FAA) program to evaluate the technical feasibility of using DGPS based technology for CAT III precision approach and landing applications. An IAI Westwind 1124 aircraft (N24RH) was equipped with DGPS receiving equipment and additional computing capability provided by E-Systems. The test flights were conducted at NASA Ames Research Center's Crows Landing Flight Facility, Crows Landing, California. The flight test evaluation was based on completing 100 approaches and landings. The navigation sensor error accuracy requirements were based on ICAO requirements for the Microwave Landing System (MLS). All of the approaches and landings were evaluated against ground truth reference data provided by a laser tracker. Analysis of these approaches and landings shows that the E-Systems DGPS system met the navigation sensor error requirements for a successful approach and landing 98 out of 100 approaches and landings, based on the requirements specified in the FAA CAT III Level 2 Flight Test Plan. In addition, the E-Systems DGPS system met the integrity requirements for a successful approach and landing or stationary trial for all 100 approaches and landings and all ten stationary trials, based on the requirements specified in the FAA CAT III Level 2 Flight Test Plan. Kaufmann, David N. and Mcnally, B. David Ames Research Center NASA-TM-110368, NAS 1.15:110368, A-950096 ...

Flight Test Evaluation of the Airborne Information for Lateral Spacing (AILS) Concept

To date there is no agreed upon definition of mental workload and therefore there is no agreement on how it should be measured. Current workload researchers do seem to agree on at least three aspects of mental workload: it is multidimensional construct, a clear distinction must be maintained between imposed mental load (task load) and the mental load as experienced (subjective load), and the use of subjective ratings should be central to any investigation of workload. On this last point, The President's Task Force on Aircraft Crew Complement made the following recommendations: This technique (task/timeline analysis based on comparison with previous aircraft designs), supplemented by improved subjective evaluation methods applied by qualified pilots, will offer the best means for demonstrating compliance with faa crew complement criteria. We recommend that FAA incorporate such methods in the tests to be employed for the certification of the B-757 and B-767 aircraft. The paper outlines the Pilot Subjective Evaluation (PSE) process developed by Boeing, in conjunction with the FAA, to supplement the analytical, simulator, and flight test crew workload evaluation techniques used to demonstrate compliance with the minimum crew size requirements of FAR 25.1523 and Appendix D(4).

A new boundary-layer rake has been designed and built for flight testing on the NASA Dryden Flight Research Center F-15B/Flight

Test Fixture. A feature unique to this rake is its curved body, which allows pitot tubes to be more densely clustered in the near-wall region than conventional rakes allow. This curved rake design has a complex three-dimensional shape that requires innovative solid-modeling and machining techniques. Finite-element stress analysis of the new design shows high factors of safety. The rake has passed a ground test in which random vibration measuring 12 g rms was applied for 20 min in each of the three normal directions. Aerodynamic evaluation of the rake has been conducted in the NASA Glenn Research Center 8x6 Supersonic Wind Tunnel at Mach 0-2. The pitiot pressures from the new rake agree with conventional rake data over the range of Mach numbers tested. The boundary-layer profiles computed from the rake data have been shown to have the standard logarithmic-law profile. Skin friction values computed from the rake data using the Clauser plot method agree with the Preston tube results and the van Driest II compressible skin friction correlation to approximately plus/minus 5 percent.

The need for military aircraft that will operate from short unimproved airfields, and the decks of smaller aircraft carriers has increased in recent years due to a changing world situation and the shrinking of the dollar. Such aircraft need to be fuel efficient, quiet, maneuverable, have low infrared signature, and carry a large useful load. The Ball-Bartoe 'Jetwing' is a single engine upper surface blowing concept which offers the possibility of achieving these objectives. The 'Jetwing' concept achieves supercirculation lift and STOL performance by ducting all engine air through the leading edge of the wing and ejecting it over the top surface of the wing through a slot nozzle. This nozzle extends along approximately 70% of the wing span. A Coanda flap is mounted at the trailing edge of the blown portion of the wing. In addition to the main wing, a smaller wing panel is mounted above the slot nozzle. The air passage between the main wing and the smaller upper wing acts as an ejector to reduce installed thrust losses. For high speed applications that concept may be used without this upper wing. A thrust reversing method is also incorporated into the concept. The thrust is reversed by rotating the top of the slot nozzle so as to close the nozzle and open a reverse flow path. This report covers the flight test program of the Jetwing research airplane.

A full envelope database of a thrust-vectoring axisymmetric nozzle perfomance for the Pratt & Whitney Pitch/Yaw Balance Beam Nozzle (P/YBBN) is being developed using the F-15 Advanced Control Technology for Integrated Vehicles (ACTIVE) aircraft. At this time, flight research has been completed for steady-state pitch vector angles up to 20 deg. at an altitude of 30,000 ft from low power settings to maximum afterburner power. The nozzle performance database includes vector forces, internal nozzle pressures, and temperatures all of which can be used for regression analysis modeling. The database was used to substantiate a set of nozzle performance data from wind tunnel testing and computational fluid dynamic analyses. Findings from initial flight research at Mach 0.9 and 1.2 are presented in this paper. The results show that vector efficiency is strongly influenced by power setting. A significant discrepancy in nozzle performance has been discovered between predicted and measured results during vectoring.