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19970011969 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France

Impact Study on the Use of JET A Fuel in Military Aircraft During Operations in Europe *Etude de l'impact de l'utilisation du carburant JET A par les avions militaires lors des operations en Europe*

Batchelor, Graham, Advisory Group for Aerospace Research and Development, France; Moses, Cliff, Advisory Group for Aerospace Research and Development, France; Fletcher, Ron, Advisory Group for Aerospace Research and Development, France; Jan. 1997; 16p; In English

Report No.(s): AGARD-R-801; ISBN-92-836-1049-0; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

The differences in specifications and actual supply properties of kerosene fuels JET A1 and JET A are studied. Potential operation limitations within the European military arena are outlined in the case that JET A was to replace JET A1 as the base fuel in the NATO F-34 fuel specification. Interviews with the military users and the suppliers of the equipment and fuels are reported on.

Author

Jet Engine Fuels; Kerosene; Specifications; Attack Aircraft

19970012387 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France

Selection and Training Advances in Aviation *Les Progres Realises en Selection et Formation des Personnels Navigants*

Selection and Training Advances in Aviation; Nov. 1996; 286p; In English; In French; Aerospace Medical Panel Symposium, May 1996, Prague, Czechoslovakia; Also announced as 19970012388 through 19970012416

Report No.(s): AGARD-CP-588; ISBN-92-836-0035-5; Copyright Waived; Avail: CASI; A13, Hardcopy; A03, Microfiche

These proceedings include the Technical Evaluation Report, Keynote Address, Paper Presentations, and Poster Display Presentations of the Symposium sponsored by the AGARD Aerospace Medical Panel and held at the Ministry of Defence, Prague, Czech Republic, 28-31 May 1996. Over the last few decades, aircraft and air operations have become more sophisticated. Technological innovations have resulted in higher-performance, more-complex weapons systems. That increased performance and complexity have placed greater physical and psychological demands upon aviators. Refinement of materiel and improvements in selection and training technologies have enabled aviator selection and training processes to evolve. The purpose of this Symposium was to unite military and civilian experts in the field of selection and training. The papers addressed aviator selection and training, including: human abilities measurement; anthropometric accommodation; gender differences; crew resource management; flight simulators; spatial disorientation; cost effectiveness; centrifuge training; and g-tolerance. These proceedings will be of interest to those concerned with selection criteria, progression in selection techniques, training processes, physiological training, and facility advances in aviation. Interaction of medical, physiological, cognitive, psychomotor, and personality factors in the selection process are highlighted.

Derived from text

Research and Development; Flight Operations; Aircraft Pilots; Aerospace Medicine

19970012579 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France

Multi-Sensor Multi-Target Data Fusion, Tracking and Identification Techniques for Guidance and Control Applications
Les Techniques de poursuite et d'identification multi-cibles a base de fusion multi-senseur appliquees au guidage et au pilotage

Liang, David F., Editor, Department of National Defence, Canada; Butler, Steve, Editor, Advisory Group for Aerospace Research and Development, France; Garriga, Carlos, Editor, Advisory Group for Aerospace Research and Development, France; Mazzetti, Bruno, Editor, Advisory Group for Aerospace Research and Development, France; Uring, Thierry, Editor, Advisory Group for Aerospace Research and Development, France; Winter, Heinz, Editor, Advisory Group for Aerospace Research and Development, France; Multi-Sensor Multi-Target Data Fusion, Tracking and Identification Techniques for Guidance and Control Applications; Oct. 1996; 304p; In English; In French; Also announced as 19970012580 through 19970012599

Report No.(s): AGARD-AG-337; ISBN-92-836-0031-2; Copyright Waived; Avail: CASI; A14, Hardcopy; A03, Microfiche

The aim of this AGARDograph is to provide a quick overview of practical advances in Multi-Sensor, Multi-Target Tracking (MS/MTT) technology and applications. In order that this AGARDograph could serve as a useful reference for those involved in the design, development, simulation, and applications of the techniques and technology, we have encouraged our authors to take, as much as possible, a tutorial approach. This will provide the general summary of the MS/MTT techniques and technology with emphasis towards practical implementation. Many examples of sensor fusion involve the methodology of merging various track files taken from different sensors. This allows for more consistent, accurate, and reliable tracks than might be possible with any of the individual systems acting alone. Section 1 relates to the important use of sensor fusion prior to establishing a firm track file. By combining raw sensor information, greater discrimination of targets from background may be possible from the augmented body of available information. Tracking and fusion with multiple sensors deals with integration and correlation of data from diverse sources in order to arrive at the best possible situational assessment. In Section 2, we present the tutorial on representative data association and filtering techniques, and also address some of the key initiation issues, approaches and track management methodology that simplify and enhance the practical implementation. Section 3 presents different types of classification algorithms, Bayesian Belief Networks, and Neural Networks covering the complete Automatic Target Recognition process, including fusion, segmentation and classification, that are very promising for real-time, or quasi-real-time systems applications. Section IV covers the handling of Automatic Target Recognition (ATR) test data, deals with an effective tool to support the development of precision guided munitions, and presents a study of target acquisition and sensor cueing in air-to-air environment. The last Section presents several practical examples of MS/MTT applications.

Derived from text

Multisensor Fusion; Target Acquisition; Multisensor Applications; Data Acquisition; Tracking (Position)

19970014096 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France

The Characterisation and Modification of Wakes from Lifting Vehicles in Fluids *La Caracterisation et la Modification des Sillages Crees dans les Fluides par des Vehicules Portant*

The Characterisation and Modification of Wakes from Lifting Vehicles in Fluids; Nov. 1996; 415p; In English; In French; Fluid Dynamics Panel, 20-23 May 1996, Trondheim, Norway; Also announced as 19970014097 through 19970014132; Original contains color illustrations

Report No.(s): AGARD-CP-584; ISBN-92-836-0034-7; Copyright Waived; Avail: CASI; A18, Hardcopy; A04, Microfiche

Papers presented during the eight sessions addressed the following subjects: vortex wakes, air traffic control procedures, structure of a transport aircraft, the interaction between an injected vortex and a rolling up vortex sheet, three-dimensional turbulence models, and simulations of aircraft in vortex wakes.

Derived from text

Vortices; Wakes; Three Dimensional Models

19970014308 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France

Precision Terminal Guidance for Munitions *Le Guidage terminal precis pour les munitions*

Feb. 1997; 136p; In English

Report No.(s): AGARD-AR-342; ISBN-92-836-1048-2; Copyright Waived; Avail: CASI; A07, Hardcopy; A02, Microfiche

The effectiveness of the guided munitions used in that conflict emphasized their importance in 'conventional' warfare. Following this experience, the lessons learned from military interventions by NATO nations has often yielded less clear-cut results. In spite of these recent events, it seems clear that the future of precision guidance is assured, for reasons similar to those prevailing during the Gulf War, that is, their usefulness as a 'force multiplier'. This enables them to: maximize the effective fire power of launch platforms; minimize the number of missions required to carry out a given task; and reduce collateral damage to non-combatants to a minimum. The Working Group oriented its aims towards NATO military needs and the review of terminal guidance

technology in relation to those needs, using the two following items as a starting point: the AGARD planning guidelines, which give a top-down view, derived from the NATO strategic concept; an analysis by GCP of the implications of the Gulf War for guidance and control. The review of terminal guidance technologies was also aimed at identifying new capabilities not currently part of NATO's armory. Projections into the future often produce speculative concepts that, in the light of deeper study, turn out to be unworkable, unaffordable or even misguided. But new ideas, however impractical at first sight, are the stimulus NATO needs to stay at the forefront of technology advances.

Author (revised)

Terminal Guidance; Bombs (Ordnance); Weapon Systems; Military Technology

19970014315 Advisory Group for Aerospace Research and Development, Propulsion and Energetics Panel, Neuilly-Sur-Seine, France

Advanced Aero-Engine Concepts and Controls *Les Concepts Avancés et les Commandes des Nouveaux Moteurs d'Avion*

Jun. 1996; 414p; In English; 86th, 25-29 Sep. 1995, Seattle, WA, USA

Report No.(s): AD-A311466; AGARD-CP-572; ISBN-92-836-0025-8; No Copyright; Avail: CASI; A18, Hardcopy; A04, Microfiche

The Propulsion and Energetics Panel Symposium on Advanced Aero-Engine Concepts and Controls was held from 25-29 September 1995 in Seattle, USA. It dealt with propulsion, including thrust vectoring, for future combat aircraft, vertical landing aircraft and transport aircraft. Better fuel efficiency, longer range and higher operational flexibility will be gained from aero engines with advanced cycles which require improvements in fluid dynamics, materials and cooling. Five Sessions (37 papers including the keynote): Engine research and demonstration, requirements and programmes (3); Aircraft engine integration (5); Propulsion system and component technology (10); Engine control systems (13); Integrated flight and propulsion control (5). Dual use application of results is intended.

DTIC

Thrust Vector Control; Transport Aircraft; Propulsion; Fighter Aircraft; Engine Control

19970015638 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France

Echocardiography in NATO Aircrew: A Multi-National Study *l'Enchocardiographie chez les pilotes de l'OTAN- une etude multinationale*

Apr. 1997; 104p; In English

Report No.(s): AGARD-AR-351; ISBN-92-836-1052-0; Copyright Waived; Avail: CASI; A06, Hardcopy; A02, Microfiche

Based on physiologic considerations and observations in animal experiments, a serious concern was raised: that repeated exposures to increased radial acceleration forces (+Gz) might have a deleterious effect on the pilot's heart. This concern was supported by the results of a preliminary echocardiographic (heart ultrasound) study carried out by French researchers and reported to AGARD in 1985. There were a number of uncontrolled variables in that initial study, including the amount of exercise and smoking. The investigators cautioned against forming any definite conclusion and recommended further studies. Because of these potentially serious occupational concerns and the findings of the preliminary study, the AGARD Aerospace Medical Panel initiated a carefully controlled study using echocardiography to compare current NATO pilots flying high-sustained G (HSG) aircraft with a control group of transport and rotary wing pilots. HSG aircraft were arbitrarily defined as those designed to maintain greater than +7Gz for at least 15 seconds, e.g. F-15, F-16, F-18, Mirage 2000, Hawk. Working Group 13 designed a protocol by which investigators from many NATO countries could contribute data to a central database. The study was carried out by Working Group 18 and involved over 30 investigators from 13 NATO countries. Data were collected and transmitted for analysis and quality control to a central database at the USAF Armstrong Laboratory at Brooks Air Force Base, Texas. Over 1600 echocardiograms were entered into the database. Data analyses compared 289 pilots of high sustained G (HSG) aircraft with 254 control pilots. The results conclusively show that there is no effect of HSG flight on the heart. The conclusions are limited to the resolution of the technology employed (echocardiography) and to the flight envelopes utilized in the current generation of NATO HSG fighter aircraft. The study serves as a model by which other military occupational medical questions may be addressed quickly and efficiently by the AGARD Aerospace Medical Panel.

Author

Aerospace Medicine; Echocardiography; Fighter Aircraft; Heart; Pilots (Personnel); High Gravity Environments

19970015688 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France

Piloted Simulation in Low Altitude, High Speed Mission Training and Rehearsal *la Simulation pilotée pour l'entraînement et la préparation des missions a basse altitude et a grande vitesse*

Mar. 1997; 116p; In English

Report No.(s): AGARD-AR-333; ISBN-92-836-1050-4; Copyright Waived; Avail: CASI; A06, Hardcopy; A02, Microfiche

The subject of low altitude flying training has received increased attention in recent years for political and technical reasons, including cost, environmental impact and the expanding training requirements of modern airborne weapon systems. Conducting low-level flying training 'live' is becoming less and less acceptable in many NATO nations, while the threat continues to demand even lower altitudes at higher speeds. Restrictions on low flying training exist in many countries, and include reduced low flying time, speed restrictions, and altitudes restricted to no lower than 1000 ft. Following the AASC studies on 'Low Level Flight Training' and 'Reduction of the Environmental Impact of Operational Flying Training'. Working Group 20 was established by the AGARD Flight Mechanics Panel (now the Flight Vehicle Integration Panel) to build on their conclusions and to examine the current capability and future potential of simulation technology in low altitude high speed mission training and rehearsal. It held its first meeting in October 1991. In conducting its review, the Working Group examined some relevant mission simulators in several NATO countries: the UK Harrier GR Mk5/7 mission simulator, the German Tornado Low-Level Test Bed simulator, and the US Apache helicopter Combat Mission Simulator.

Author (revised)

Flight Training; Systems Simulation; Flight Simulation; Combat; Flight Mechanics; Low Altitude

19970016374 Advisory Group for Aerospace Research and Development, Neuilly-Sur-Seine, France

Special Course on Advances in Cryogenic Wind Tunnel Technology *les avancees en technologie des souffleries cryogeniques*

Special Course on Advances in Cryogenic Wind Tunnel Technology; Feb. 1997; 276p; In English, 20-24 May 1996, Koln, Germany; Also announced as 19970016375 through 19970016390

Report No.(s): AGARD-R-812; ISBN-92-836-1047-4; Copyright Waived; Avail: CASI; A13, Hardcopy; A03, Microfiche

The development and use of cryogenic wind tunnels represents a major advance in aerodynamics testing. One advantage of cryogenic tunnels is their ability to achieve full-scale values of Reynolds number in tunnels of moderate size at reasonable operating pressures. Another important advantage is the ability to independently vary temperature, pressure and speed, which lets one separate the effects of Reynolds number, aeroelasticity and Mach number. This series of lectures, supported by the AGARD Fluid Dynamics Panel and the von Karman Institute, incorporated a brief review of the development and early uses of cryogenic tunnels, and reports on current operational cryogenic facilities. It then covered the theory and advantages of cryogenic wind tunnels, as well as the special considerations required in their design, construction, and use. Subjects included cryogenic systems, thermal insulation, facility and model design and construction, strain-gage balances, pressure instrumentation, flow visualization, data accuracy, safety, and productivity.

Author

Cryogenic Wind Tunnels; Aerodynamics; Aeroelasticity; Flow Visualization; Boundary Layer Control; Hypersonic Flight; Laminar Flow; Incompressible Flow; Viscous Flow; Turbulent Flow