

# RTO Technical Publications:

a quarterly listing

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This is a listing of unclassified RTO technical publications NASA received and announced in the NASA STI Database during the quarter cited above. Requests for reports on the list may be made by document identification number (19960003395) from the NASA Center for AeroSpace Information, 7121 Standard Drive, Hanover, MD 21076-1320. Requests may also be made by e-mail [help@sti.nasa.gov](mailto:help@sti.nasa.gov), fax (301) 621-0134, or telephone (301) 621-0390. Where stock permits, requests will be filled with printed copies; if printed copies are not available, microfiche copies will be supplied. This listing can also be viewed and downloaded via the NASA STI Program home page at <http://www.sti.nasa.gov>.

**20000004136** Research and Technology Organization, Systems Concepts and Integration Panel, Neuilly-sur-Seine, France  
**Introduction to Airborne Early Warning Radar Flight Test, Volume 16** *Introduction aux Essais en vol des Radars Aeroportes d'Alerte Lointaine, Volume 16*

Clifton, J. M., Editor, Research and Technology Organization, France; Lee, F. W., Editor, Research and Technology Organization, France; November 1999; 92p; In English

Report No.(s): RTO-AG-300-Vol-16; AC/323(SCI)TP/15-Vol-16; ISBN 92-837-1020-7; Copyright Waived; Avail: CASI; A05, Hardcopy; A01, Microfiche

During periods when military budgets and aircraft fleet sizes are shrinking, systems that serve to cost effectively increase the utility of the remaining weapons can still undergo procurement growth. The increased situational awareness and battle field management provided by Airborne Early Warning (AEW) radar is one such force multiplier. The primary role of an AEW aircraft is the long-range detection of airborne targets. As potent new airborne threats, such as low flying cruise missiles, reduce the timelines that traditional air defense systems have to react, the utility of an AEW system's long-range surveillance capabilities to recover the lost time is clear. Fundamentally, these new targets stress the principal performance capabilities of an AEW radar sensor leveling new requirements on these systems to deal with this advanced threat. These increased requirements have led to world-wide, substantive work in the development of radar upgrades to existing AEW aircraft, such as the U.S. Navy's E-2C Hawkeye and the U.S. Air Force's E-3A AWACS (Airborne Warning and Control Systems), as well as new systems and platforms, such as the Swedish Air Force's ERIEYE (Active Phased Array AEW Mission System). The required increases in sensitivity, resolution, and the associated data rates that stem from these performance improvements will have profound impact on the way these systems are operated and how they perform in various environments. As these increasingly capable systems evolve, AEW radar will be expected to take on additional missions and perform other surveillance functions in the pursuit of dominant battle field awareness. Unfortunately, little or nothing has been written to document the largely unique techniques needed to perform the system level flight testing of these new AEW radars. The procedures have largely been passed from one individual to the next without the benefit of substantive documentation. The purpose of this volume is to document the theory and procedures necessary to perform the developmental flight testing of the several major categories of AEW radar.

Author

*Early Warning Systems; Flight Tests; Radar Detection; Airborne Equipment; Military Technology; Airborne Surveillance Radar; AWACS Aircraft*

**20000004555** Research and Technology Organization, Systems Concepts and Integration Panel, Neuilly-sur-Seine, France  
**Application of Mathematical Signal Processing Techniques to Mission Systems** *L'Application des Techniques Mathematiques du Traitement du Signal aux Systemes de Conduite des Missions*

November 1999; 118p; In English, 1-2 Nov. 1999, Cologne, Paris, Monterey, CA, Germany, France, USA; See also 20000004556 through 20000004561

Report No.(s): RTO-EN-7; AC/323(SCI)TP/16; ISBN 92-837-1021-5; Copyright Waived; Avail: CASI; A06, Hardcopy; A02, Microfiche

Presents a whole range of perspectives for different levels of mathematical signal processing, based on some of the most promising techniques. Particular attention is paid to the following subjects: Wavelet analysis: summary of the possibilities; application to detection in natural background radiation and extraction of primitive invariants. The concept of Multirate Filter Banks in conjunction with the various transforms which this technique enables; applications to compressed video image and sequence transmission, to noise rejection, to jamming and to encoding. Variational methods based on partial derivative equations for image processing and multi-scale video sequences; presentation of different image segmentation approaches; Multi-sensor processing based on the theory of evidence: processing of the functions of detection, classification, matching of ambiguous observations, or tracking, with the aim of solving problems such as data modelling, decision making, the management of non-uniform reference systems, or the integration of contextual knowledge.

Author

*Signal Processing; Mathematical Models; Systems Integration; Multisensor Applications; Data Processing; Image Processing; Mission Planning*

**20000011735** Research and Technology Organization, Human Factors and Medicine Panel, Neuilly-sur-Seine, France  
**Current Aeromedical Issues in Rotary Wing Operations** *Problemes Actuels de Medecine Aeronautique Poses par les Operations Utilisant des Voilures Tournantes*

Current Aeromedical Issues in Rotary Wing Operations; August 1999; 356p; In English, 19-21 Oct. 1998, San Diego, CA, USA; See also 20000011736 through 20000011776; Original contains color illustrations

Report No.(s): RTO-MP-19; AC/323(HFM)TP/4; ISBN 92-837-0008-2; Copyright Waived; Avail: CASI; A16, Hardcopy; A03, Microfiche

These proceedings include the Technical Evaluation Report, Keynote Address, and 41 papers from the Symposium sponsored by the NATO/RTO Human Factors and Medicine Panel, which was held in San Diego, California, USA from 19-21 October 1998. Rotary wing operations include military or civilian missions such as transport, medevac, and combat. A range of human factors problems may be implicated in helicopter mishaps, such as spatial disorientation or excessive workload. Furthermore, flying a helicopter can contribute to various specific pathologies, ranging from lower back pain to flight phobias. In several helicopter accidents, it has been suggested that injuries could have been avoided if adequate safety and protection technologies had been used. Although helicopters can be used for medevac involving large numbers of wounded, the use of helicopters has to be fully integrated with other transport systems and their equipment should be adapted for this type of mission. New training methods, such as crew resource management or spatial disorientation training, and new technologies, such as the "tactile situation awareness system" (TSASI) may, when fully implemented, help to avoid accidents. Utilization of swimming pools with specific tools for helicopter evacuation training can greatly reduce the risk of death by immersion. On the other hand, more effort is needed to improve the personal flight equipment. Although epidemiological data suggest that the risk of accidents and injuries is already low in certain air forces, the introduction of new protection technologies may help to further reduce the numbers of wounded. This symposium provided a review, of the state-of-the-art concerning the various human factors implicated in helicopter operations, new methods and systems for increasing safety and efficiency of the helicopter operations, and new methods and systems for increasing safety and efficiency of the helicopter crew.

Author

*Aerospace Medicine; Human Factors Engineering; Rotary Wing Aircraft; North Atlantic Treaty Organization (NATO); Resources Management; Conferences; Psychological Effects*

**20000011864** Research and Technology Organization, Applied Vehicle Technology Panel, Neuilly-sur-Seine, France  
**A Feasibility Study of Collaborative Multi-Facility Windtunnel Testing for CFD Validation** *Etude de Faisabilite d'Essais en Soufflerie Multisites Menes en Cooperation en vue de la Validation des Calculs de l'Aerodynamique Numerique - CFD*

December 1999; 40p; In English

Report No.(s): RTO-TR-27; AC/323(AVT)TP/21; ISBN 92-837-1023-1; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

Between 1997 and 1999, a Working Group on the feasibility of collaborative, multi-facility windtunnel testing for the validation of Computational Fluid Dynamics Codes (CFD) has established the following results: Windtunnel tests are the main source of CFD validation but all have specific bias errors. Testing of the same model in several facilities can better establish the level of uncertainty in windtunnel tests and hence help assess possible differences between CFD and windtunnel tests. The working group, after an initial inquiry, established the need for CFD validation for fighter aircraft, transport type aircraft, missiles and helicopters. Effort and cost can be controlled efficiently and would permit the improvement of CFD Codes for considerable cost saving in future developments.

Author

*Feasibility; Feasibility Analysis; Cost Analysis; Cost Effectiveness; Computational Fluid Dynamics; Wind Tunnel Tests; Wind Tunnels*

**20000012172** Research and Technology Organization, Systems Concepts and Integration Panel, Neuilly-sur-Seine, France  
**6th Saint Petersburg International Conference on Integrated Navigation Systems 6eme Conference Internationale de Saint Petersbourg sur les Systemes de Navigation Integree**

6th Saint Petersburg International Conference on Integrated Navigation Systems; October 1999; 280p; In English; 6th; Integrated Navigation Systems, 24-26 May 1999, Saint Petersburg, Russia; Sponsored by Academy of Sciences (Russia), Russia; See also 20000012173 through 20000012197; Original contains color illustrations

Report No.(s): RTO-MP-43; AC/323(SCI)TP/13; ISBN 92-837-1018-5; Copyright Waived; Avail: CASI; A13, Hardcopy; A03, Microfiche

The 6th Saint Petersburg International Conference on Integrated Navigation Systems was held on the 24-26 of May. It was organized this year by the Scientific Council of the Russian Academy of Sciences on the Problems of Motion Control and Navigation with the participation of the Research and Technology Organization of NATO. The Conference was sponsored by the State Research Center of the Russian Federation-Central Scientific and Research Institute "Elektropribor". This international conference, which is held annually in Saint Petersburg, brought together some 150 engineers and scientists from 17 different countries. The Conference was co-chaired by Prof. Vladimir G. Peshekhonov, (Russia), and Dr. John Niemela (USA). The Conference was organized into 4 sessions covering the main topics involved in integrated navigation systems and their applications: 1) Inertial Sensors and Systems; 2) Satellite Navigation; 3) SatNav/INS (Satellite Navigation/Integrated Navigation Systems) Technology; and 4) Integrated Navigation.

Derived from text

*Conferences; Satellite Navigation Systems; Algorithms; Inertial Navigation*

**20000012198** Research and Technology Organization, Information Systems Technology Panel, Neuilly-sur-Seine, France

**Tactical Mobile Communications Communications Tactiques Mobiles**

November 1999; 328p; In English, 14-16 Jun. 1999, Lillehammer, Norway; See also 20000012199 through 20000012232

Report No.(s): RTO-MP-26; AC/323(IST)TP/2; ISBN 92-837-1022-3; Copyright Waived; Avail: CASI; A15, Hardcopy; A03, Microfiche

This volume contains the Technical Evaluation Report and 35 unclassified papers, presented at the Information Systems Technology Panel Symposium held in Lillehammer, Norway from 14th to 16th June 1999. The papers were presented under the following headings: Personal Communications and COTS. Protocols and Networks. Propagation. Speech and Signal Processing. and High Frequency

Author

*Conferences; High Frequencies; Information Systems; Mobile Communication Systems; Signal Processing*

**20000016591**

**Saint Petersburg International Conference on Integrated Navigation Systems, 6th, St. Petersburg, Russia, May 24-26, 1999, Proceedings**

1999; In English

Report No.(s): RTO-MP-43; ISBN 92-837-1018-5; Copyright; Avail: AIAA Dispatch

The proceedings of the four sessions of the 6th Saint Petersburg International Conference on integrated navigation systems are presented. The sessions were devoted to inertial sensors and systems, satellite navigation, Satnav/INS technology, and integrated navigation.

AIAA

*Conferences; Satellite Navigation Systems; Systems Integration; Inertial Navigation; Air Navigation; Aircraft Communication*

**20000020789** Research and Technology Organization, Applied Vehicle Technology Panel, Neuilly-sur-Seine, France  
**Design Principles and Methods for Aircraft Gas Turbine Engines** *Les Principes et Methodes de Conception des Turbomoteurs*

Design Principles and Methods for Aircraft Gas Turbine Engines; February 1999; 482p; In English; In French, 11-15 May 1998, Toulouse, France; See also 20000020790 through 20000020828; Original contains color illustrations  
Report No.(s): RTO-MP-8; AC/323(AVT)TP/9; ISBN 92-837-0005-8; Copyright Waived; Avail: CASI; A21, Hardcopy; A04, Microfiche

The symposium dealt with design approaches for military aircraft propulsion systems to provide enhanced operational flexibility, longer range, better fuel efficiency and improved affordability. All classes of gas turbines were addressed in nine sessions as follows: Engine Design and Analysis (Part 1) (5 papers); Mechanical Systems (6 papers) Controls (4 papers); Combustors/Augmentors (4 papers); Compressor Systems (Part 1) (5 papers); Compressor Systems (Part 2) (3 papers); Turbines (Part 1) (5 papers); Turbines (Part 2) (4 papers); and Engine Design and Analysis (Part 2) (4 papers). These proceedings also include a Technical Evaluation Report and a Keynote address published in French and English.

Derived from text

*Aircraft Engines; Gas Turbine Engines; Engine Parts; Conferences; Engine Design*

**20000020829** Research and Technology Organization, Applied Vehicle Technology Panel, Neuilly-sur-Seine, France  
**Gas Turbine Engine Combustion, Emissions and Alternative Fuels** *La Combustion dans les Turbomoteurs, les Emissions et les Carburants de Remplacement*

June 1999; 608p; In English; In French, 12-16 Oct. 1998, Lisbon, Portugal; See also 20000020830 through 20000020875; Original contains color illustrations

Report No.(s): RTO-MP-14; AC/323(AVT)TP/10; ISBN 92-837-0009-0; Copyright Waived; Avail: CASI; A99, Hardcopy; A06, Microfiche

The symposium dealt with Gas Turbine Engine Combustion, Emissions, and Alternative Fuels. Forty-six papers and a Keynote Address elucidated the role of the combustion process as a crucial factor of engine performance and operability under various conditions including non-standard, new fuels, and environmental effects of civil and military interest. There were 12 Sessions covering the following topics (some in 2 sessions): Gas Turbines in Land, Sea and Air Applications, Low-Emission Combustors, Combustion Modelling, Optical Measurements, Emissions, Combustor Design, Ignition Processes, Active Combustion Control, and Alternative Fuels

Author

*Gas Turbine Engines; Conferences; Combustion; Fuels; Exhaust Emission*

**20000021379** Research and Technology Organization, Neuilly-sur-Seine, France  
**RTO Technical Publications: A Quarterly Listing** *Quarterly Report, 1 Oct. - 31 Dec. 1999*

January 2000; 2p; In English

Report No.(s): RTO-99-04; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

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Author

*Technical Writing; Reports*

**20000025079** Research and Technology Organization, Neuilly-sur-Seine, France  
**RTO Highlights 1999, December 1999**

December 1999; 52p; In English; Original contains color illustrations

Report No.(s): RTO-HIGHLIGHTS-99/1; Copyright Waived; Avail: CASI; A04, Hardcopy; A01, Microfiche

This document reviews the accomplishments of the RTO during the 1999 year. The 1999 von Karman medals and the Scientific achievement award recipients are announced. An article about possible alternatives to landmines, and a summary of a study about the future of land operations are included in this issue.

CASI

*Defense Program; International Cooperation*