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# AGARD

ADVISORY GROUP FOR AEROSPACE RESEARCH & DEVELOPMENT

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## AGARD BULLETIN

MEETINGS · PUBLICATIONS · MEMBERSHIP



JANUARY 1982

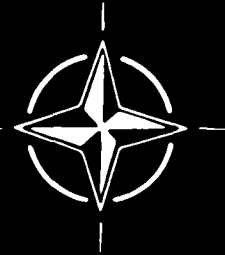
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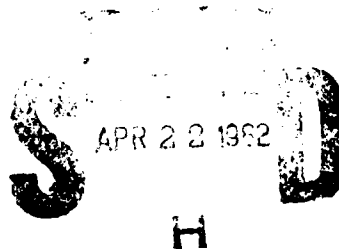
MEETINGS · PUBLICATIONS · MEMBERSHIP

JANUARY 1982

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## THE MISSION OF AGARD

The mission of AGARD is to bring together the leading personalities of the NATO nations in the fields of science and technology relating to aerospace for the following purposes:

- Exchanging of scientific and technical information;
- Continuously stimulating advances in the aerospace sciences relevant to strengthening the common defence posture;
- Improving the co-operation among member nations in aerospace research and development;
- Providing scientific and technical advice and assistance to the North Atlantic Military Committee in the field of aerospace research and development;
- Rendering scientific and technical assistance, as requested, to other NATO bodies and to member nations in connection with research and development problems in the aerospace field;
- Providing assistance to member nations for the purpose of increasing their scientific and technical potential;
- Recommending effective ways for the member nations to use their research and development capabilities for the common benefit of the NATO community.

The highest authority within AGARD is the National Delegates Board consisting of officially appointed senior representatives from each member nation. The mission of AGARD is carried out through the Panels which are composed of experts appointed by the National Delegates, the Consultant and Exchange Programme and the Aerospace Applications Studies Programme. The results of AGARD work are reported to the member nations and the NATO Authorities through the AGARD series of publications of which this is one.

Participation in AGARD activities is by invitation only and is normally limited to citizens of the NATO nations.

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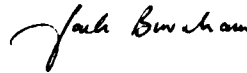
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## PREFACE

AGARD accomplishes its mission through the programmes of the Panels, the Consultant and Exchange Division and the Military Committee Studies Division. The Panel programmes of AGARD are conducted at meetings which are organized as conferences, symposia, specialists meetings, or working group meetings, and planned at business meetings. The Consultant and Exchange Division organizes Lecture Series and Short Courses as well as providing individual consultants to the nations and AGARD Panels. The Military Committee Studies Division organizes and participates in Technology Studies conducted by the Panels and special Aerospace Applications Studies; both types of studies are requested by or through the North Atlantic Military Committee.

This AGARD Bulletin contains information on all the planned 1982 AGARD meetings including dates, locations and brief descriptions of their themes. Additional specific information will be provided by means of *individual Meeting Announcements* which will be distributed by the various Panels. Queries about participation in AGARD meetings can be addressed to the appropriate Panel Members or National Delegates whose names and addresses are listed in Section III of this Bulletin.

Included in this Bulletin is also a list of all AGARD publications which were issued in 1981, together with their abstracts. Complete listings of all AGARD Publications which appeared since the founding of this agency are included in the AGARD Index of Publications. Information on how AGARD documents may be obtained is given on the back cover of this Bulletin.



Jack Burnham  
Director

## SECTION I

### 1982 AGARD TECHNICAL MEETINGS

- CALENDAR OF AGARD MEETINGS 1982
- SUMMARY OF 1982 MEETING THEMES

Attendance at AGARD Panel Meetings and Lecture Series is by invitation only and is normally limited to citizens of the NATO Nations. Invitations should be sought from an AGARD National Delegate or Panel Member from the applicant's own country. The names and addresses of National Delegates and Panel Members will be found in Section III of this Bulletin.

**CALENDAR OF MEETINGS  
1982**

<i>Dates</i>	<i>Location</i>	<i>Activity</i>	<i>Type of Meeting/Subject</i>
10-11 March	UNITED STATES (Langley, Virginia)	Fluid Dynamics	Lecture Series No.121 <b>High Angle of Attack Aerodynamics</b>
15-19 March	BELGIUM (VKI, Brussels)	Fluid Dynamics	Lecture Series No.121 <b>High Angle of Attack Aerodynamics</b>
22-23 March	GERMANY (Göttingen)	Fluid Dynamics	Lecture Series No.121 <b>High Angle of Attack Aerodynamics</b>
24-26 March	FRANCE (Paris)	Headquarters	52nd National Delegates Board Meeting 31st Steering Committee Meeting 32nd Panel Chairmen Meeting 12th National Coordinators Meeting
4-9 April	BELGIUM (Brussels)	Structures & Materials	54th Panel Meeting/Specialists' Meetings on - <b>Advanced Casting Technology</b> - <b>Aircraft Dynamic Response to Damaged and Repaired Runways (NATO Confidential)</b>
19-23 April	UNITED STATES (Ft Worth, Texas)	Fluid Mechanics	60th Panel Meeting/Symposium on <b>Criteria for Handling Qualities of Military Aircraft</b>
26-29 April	GERMANY (DFVLR Cologne)	Aerospace Medical	Specialists' Meeting on <b>Impact Injury Caused by Linear Acceleration: Mechanisms, Prevention, and Cost</b>
26-30 April	UNITED KINGDOM (Blackpool)	Avionics	43rd Panel Meeting/Symposium on <b>Advanced Avionics and the Military Aircraft Man/Machine Interface</b>
3-4 May	GERMANY (Munich)	Electromagnetic Wave Propagation	Lecture Series No.120 <b>EM Propagation Problems in the Tactical Environment</b>
6-7 May	FRANCE (Paris)	Electromagnetic Wave Propagation	Lecture Series No.120 <b>EM Propagation Problems in the Tactical Environment</b>
3-7 May	NORWAY (Spand)	Guidance & Control	34th Panel Meeting/Symposium on <b>Precision Guided Munitions: Technology and Operational Aspects</b> (NATO Secret)
17-21 May	UNITED KINGDOM (London)	Fluid Dynamics	50th Panel Meeting/Specialists' Meeting on - <b>Prediction of Aerodynamic Loads on Rotorcraft</b> - <b>Wall Interferences in Wind Tunnels</b>
10-12 May	ITALY (Naples)	Military Committee Studies	22nd Meeting of the AASC - <b>Final Review of AAS 15</b> - <b>Initial Review of AAS 16</b> - <b>Final Terms of Reference for AAS 17 &amp; 18</b> - <b>Organization of Study Group No.17</b> (NATO Secret)
24-28 May	DENMARK (Copenhagen)	Electromagnetic Wave Propagation	30th Panel Meeting/Symposium on <b>Propagation Effects on ECM-Resistant Systems in Communication and Navigation</b> (NATO Secret)
31 May-4 June	CANADA (Ottawa)	Propulsion & Energetics	59th Panel Meeting/Symposium on <b>Problems in Bearings and Lubrication</b>
7-8 June	NORWAY (Oslo)	Propulsion & Energetics	Lecture Series No.123 <b>Aircraft Fire Safety</b>
10-11 June	UNITED KINGDOM (London)	Propulsion & Energetics	Lecture Series No.123 <b>Aircraft Fire Safety</b>
15-16 June	UNITED STATES (Washington)	Propulsion & Energetics	Lecture Series No.123 <b>Aircraft Fire Safety</b>
14-15 June	GREECE (Athens)	Avionics	Lecture Series No.119 <b>Image Processing</b>
17-18 June	FRANCE (Paris)	Avionics	Lecture Series No.119 <b>Image Processing</b>



<i>Date</i>	<i>Location</i>	<i>Activity</i>	<i>Type of Meeting/Subject</i>
21-22 June	NETHERLANDS (The Hague)	Avionics	Lecture Series No.119 <b>Image Processing</b>
6-10 September	NETHERLANDS (The Hague)	Avionics	44th Panel Meeting/Symposium on <b>Software in Avionics</b>
6-7 September	ITALY (Rome)	Guidance & Control	*Lecture Series No.122 <b>Application of Digital Mapping Technology to Guidance and Control Systems</b> (NATO Secret)
9-10 September	GREECE (Agios Andreas)	Guidance & Control	*Lecture Series No.122 <b>Application of Digital Mapping Technology to Guidance and Control Systems</b> (NATO Secret)
13-14 September	UNITED KINGDOM (London)	Guidance & Control	*Lecture Series No.122 <b>Application of Digital Mapping Technology to Guidance and Control Systems</b> (NATO Secret)
15-17 September	UNITED STATES (Washington)	Headquarters	53rd National Delegates Board Meeting 18th Annual Meeting and 33rd Panel Chairmen Meeting
19-24 September	CANADA (Toronto)	Structures & Materials	55th Panel Meeting/Specialists' Meeting on - <b>Environmental Effects on Materials for Space Applications</b> - <b>Behaviour of Short Cracks in Airframe Components</b>
20-25 September	NORWAY (Trondheim)	Fluid Dynamics	51st Panel Meeting/Symposium on - <b>Aerodynamics of Missiles</b> - <b>Round Table Discussion on Two-Phase Flow</b>
11-15 October	GREECE (Agios Andreas)	Propulsion & Energetics	60th Panel Meeting/Symposium on <b>Engine Handling</b>
27 September - 1 October	ITALY (Rome)	Technical Information	35th Panel Meeting/Specialists' Meeting on <b>Use of Scientific and Technical Information in the NATO Countries</b>
4-7 October	DENMARK (Copenhagen)	Aerospace Medical	39th Panel Meeting (NATO Secret)
11-15 October	PORTUGAL (Lisbon)	Guidance & Control	35th Panel Meeting/Symposium on <b>Advances in Guidance and Control Systems</b> (NATO Secret)
11-15 October	TURKEY (Çeşme)	Flight Mechanics	61st Panel Meeting/Symposium on <b>Ground/Flight Test Techniques and Correlation</b>
11-12 October	PORTUGAL (Oporto)	Structures & Materials	Lecture Series No.124 on <b>Practical Considerations of Design, Fabrication and Tests for Composite Materials</b>
14-15 October	UNITED KINGDOM (London)	Structures & Materials	Lecture Series No.124 on <b>Practical Considerations of Design, Fabrication and Tests for Composite Materials</b>
18-19 October	TURKEY (Ankara)	Structures & Materials	Lecture Series No.124 on <b>Practical Considerations of Design, Fabrication and Tests for Composite Materials</b>
18-22 October	FRANCE (Paris)	Electromagnetic Wave Propagation	31st Panel Meeting/Symposium on <b>Propagation Aspects of Frequency Sharing and Interference, and System Diversity</b>
4-5 November	PORTUGAL (Lisbon)	Aerospace Medical	Lecture Series No.125 on <b>Human Factors Aspects of Aircraft Accidents</b>
8-9 November	TURKEY (Ankara)	Aerospace Medical	Lecture Series No.125 on <b>Human Factors Aspects of Aircraft Accidents</b>
11-12 November	GREECE (Athens)	Aerospace Medical	Lecture Series No.125 on <b>Human Factors Aspects of Aircraft Accidents</b>
15-17 November	GERMANY (OttoBrunn)	Military Committee Studies	23rd Meeting of the AASC - <b>Final Review of AAS 16</b> - <b>Initial Review of AAS 17</b> - <b>Consideration of Proposed AAS Studies</b> - <b>Organization of Study Group No.18</b> (NATO Secret)

\* *This is a classified Lecture Series to which special arrangements will apply.*

## SUMMARY OF 1982 MEETING THEMES

### AEROSPACE MEDICAL PANEL

**Specialists' Meeting: Impact Injury Caused by Linear Acceleration: Mechanisms, Prevention and Cost**  
26 - 29 April 1982, Cologne, Germany

Ten years ago the Panel organized a conference which brought together experts in linear acceleration effects, including parachuting, aircraft ejection seats, automobile crashes, fixed wing aircraft and helicopter crashes, impact injury mechanisms, impact test facilities and protective systems.

In the intervening decade the need for improved crash impact protection in NATO aircraft has increased largely because a big percentage are helicopters in which the only method of emergency escape is a landing under less than ideal conditions. Impact protection is important also in fixed wing aircraft in those accidents in which the living space of the occupants is maintained. Military land vehicles need impact protection against crashes and acceleration caused by blast loads from land mines and other ordnance.

The meeting will address these topics as well as the advances in injury mechanisms research and protective systems design.

**39th Panel Meeting: (Classified)**  
4 - 7 October 1982, Copenhagen, Denmark

Invited Speakers will present to Panel Members, "The Female Aviator Programme", and other topics.

### AVIONICS PANEL

**43rd Panel Meeting/Symposium: Advanced Avionics and the Military Aircraft Man/Machine Interface**  
26 - 30 April 1982, Blackpool, UK

The Spring Symposium will be primarily for Specialists and will address the impact of avionics on the man/machine interface. Avionics systems and components state-of-the-art and the technology likely to be available within the next few years for application to combat aircraft design present an attractive picture at first sight. They offer an increase in combat capability and efficiency with reduced aircrew workload. The aim of this Avionics Symposium is to explore in depth several topics of importance in interfacing the aircrew of modern military aircraft with advanced avionics equipment and systems now becoming available. These items require in-depth coverage and are closely identified with the interface between the aircrew and the system. The Meeting will be planned primarily for specialists concerned with selected areas of research. Topics covered will include provision and use of colour displays, provision and use of voice control technology, and application of bio-mechanical/electrical models and other aids to combat aircraft cockpit design.

**44th Panel Meeting/Symposium: Software in Avionics**  
6 - 10 September 1982, The Hague, Netherlands

This Symposium will discuss the complex problems of software management and development. The last decade has brought about an explosion-like progress in electronic data processing technology. This can be mainly attributed to the continuously improving performance of semi-conductor devices with an ever increasing integration density, and the tremendously fast development of digital computers. While hardware costs for computers of all sizes are decreasing, costs and complexity of software are rapidly increasing. This problem has become even more critical since the implementation and application of advanced microprocessors and microcomputers. With the high degree of digitalization in avionics systems, software also determines to a large extent the mission critical performance in navigation, weapon delivery, flight control and defensive aids.

## ELECTROMAGNETIC WAVE PROPAGATION PANEL

**30th Panel Meeting/Symposium: Propagation Effects on ECM-Resistant Systems in Communication and Navigation**  
(Classified)  
24-28 May 1982, Copenhagen, Denmark

Steady advancement in adapting signal characteristics and modulation methods to modern transmission systems requires more and more attention to limitations governed by parameters other than technological ones. They mainly refer to effects caused by propagation media. Thus operational reliability may ultimately be controlled by the characteristics of this media, or in other words, by the anthropogeneous capability of adapting systems to variations in medium behavior. A particularly important field of system-oriented applications concerns communication and navigation systems resistant to Electronic Counter Measures. Propagation limitations may be identified in terms of several categories defined by scenarios, such as tactical operation in surface, vicinity, general long-distance links, and medium area coverage. This meeting is to deal with the present state-of-the-art and also discuss future possibilities.

**31st Panel Meeting/Symposium: Propagation Aspects of Frequency Sharing and Interference, and Systems Diversity**  
18-22 October 1982, Paris, France

Increased demand for radio services has necessitated the sharing of radio frequencies between terrestrial services, space services, and between services in both categories. Further demand will call for more sharing assuming this is technically feasible, and the possibility will depend critically on propagation factors. In assessing such possibilities the following questions regarding propagation are posed: How do propagation factors affect the practicability of frequency-sharing between services? The amount of spectrum needed for each service? The limits on radiated power which may be necessary to avoid interference between services?

The incidence of interference depends on the statistical distribution of the ratio of interfering and wanted signals. Assuming the reliability of the wanted signal, a determination of the interfering signals which may be present for small, but unacceptable, percentages of time has to be made.

This Meeting will address all aspects of the above problem.

## FLIGHT MECHANICS PANEL

**60th Panel Meeting/Symposium: Criteria for Handling Qualities of Military Aircraft**  
19-23 April 1982, Ft Worth, USA

The most suitable format of criteria for handling qualities of piloted aircraft can depend on the type of control system used in the aircraft. New control system techniques may lead to modification of existing criteria or even the establishment of new criteria. Moreover, criteria for degraded conditions of the control system have to be established.

The last full FMP meeting on this topic was in 1971; since that time there has been additional research, and, in the US, up-dating of the existing MIL-F8785-B requirements is being undertaken. It is felt timely to readdress the subject, including treatment of rotorcraft, VTOL and STOL handling qualities. The Symposium will consider the following main areas:

- Present status of criteria.
- Gains achieved in the '70s, and future prospects (CTOL, STOL and VTOL).
- Criteria for handling qualities at high angles of attack (including stall, post-stall and spin).
- Special problems (e.g. impact of advanced flight control systems).
- Techniques for the determination of handling qualities.

**61st Panel Meeting/Symposium: Ground/Flight Test Techniques and Correlation**  
11-15 October 1982, Çeşme, Turkey

The emphasis of this meeting will be on aspects of correlation rather than on techniques. A previous meeting on the subject, in 1975, indicated many uncertainties in the extrapolation from ground tests to real flight conditions, and a further review of progress is justified. The meeting will include examination of ground and in-flight

means to predict the performance and flying qualities of a new aircraft, including analytical prediction, wind tunnels, ground and in-flight simulators, and flight demonstrators, and will also include some explanation of the test techniques used to gather the data. Sessions will address correlation in the areas of performance, flying qualities, buffet and flutter, and in subsystem testing. A Round Table Discussion will address the relative advantages or disadvantages of the various test methods.

#### FLUID DYNAMICS PANEL

##### 50th Panel Meeting/Specialists' Meetings: Prediction of Aerodynamic Loads on Rotorcraft, and Wall Interference in Wind Tunnels

17-21 May 1982, London, UK

The primary theme of the first meeting is the prediction and experimental verification of the steady and unsteady aerodynamic forces on the rotors of modern helicopters and related devices. Participants will present, discuss, and critique recent developments in this field in order to assess the assumptions, capabilities and limitations of the current methodology and to identify specific areas that need further effort. Sessions on rotor blade aerodynamic characteristics, wakes and aerodynamic interference effects of rotorcraft and wind turbines, rotor airloads prediction programs, and experimental correlations and verification are planned.

The meeting on wind tunnels will review and assess the current status of wall interference correction methods and adaptive wall research. Extensive research has been conducted to account for the effects of the wind tunnel upon aerodynamic testing conducted therein, either through analytical correction of data or through removal of effects by mechanisms such as ventilated or compliant walls. Sessions on solid, ventilated and adaptive wall tunnels and correction methods are planned.

##### 51st Panel Meeting/Symposium: Aerodynamics of Missiles. Round Table Discussion on Two-Phase Flow

20-25 September 1982, Trondheim, Norway

The symposium will survey current and foreseeable aerodynamic problems in tactical guided weapon design and review recent work which has improved basic understanding or enhanced prediction and design methods. Theoretical, numerical, experimental and empirical methods for guided missiles, projectiles and bombs will be covered over the subsonic through hypersonic flight régimes. Control and propulsion aspects are included in a broad cross-section of aerodynamic problems peculiar to weapon system design.

The round table discussion on two-phase flow will survey important work in this field in the NATO countries and serve as a planning session for future panel activities in this field.

#### GUIDANCE AND CONTROL PANEL

##### 34th Panel Meeting/Symposium: Precision Guided Munitions; Technology and Operational Aspects (Classified)

3-7 May 1982, Spatind, Norway

In the face of the Warsaw Pact Forces, of overwhelming numerical superiority, it is absolutely essential to utilize, effectively, high-kill-probability weapons systems, referred to as PGMs. The target environment includes such elements as tanks, armoured personnel carriers, self-propelled Howitzers, air defense systems, concrete airfield runways. The tactical importance of destruction of this array of Warsaw Pact Forces elements with high-kill-probability weapons is important in and of itself. There are other facets to this tactical requirement. One of these is that the advance of Warsaw Pact Forces can be expected to occur at a highly rapid rate unless deterred by high-kill-probability PGMs. While a PGM would ordinarily be expected to be more costly than unconventional munitions, a PGM will generally be far more cost-effective. It is clear that such a meeting on the guidance and control systems issues of such PGMs is of great timely importance to NATO.

The meeting will consist of five sessions: Systems Analysis, Supporting Technology, Seeker Technology, Guidance and Control, Weapon Developments.

**35th Panel Meeting/Symposium: Advances in Guidance and Control Systems (Classified)**  
11-15 October 1982, Lisbon, Portugal

The last Guidance and Control Panel symposium held on this subject was in 1973 in Geilo, Norway. Many significant advances in optimal control theory, synthesis techniques and design methodology have taken place since that time. It is therefore considered timely to hold a symposium in 1982 on advances in guidance and control systems. This symposium will treat all aspects of the technology from control theory through system applications including aircraft, missiles, space vehicles and unmanned vehicles.

This symposium will comprise the following sessions: Advances in control theory; Advanced design and performance optimization, component design and reliability; Advanced system design architecture and interfaces; Advances in synthesis, simulation and validation techniques; Recent systems applications including flight test and simulation.

### **PROPULSION AND ENERGETICS PANEL**

**59th Panel Meeting/Symposium: Problems in Bearings and Lubrication**  
31 May - 4 June 1982, Ottawa, Canada

The purpose of the meeting is to provide research scientists, development engineers and applications specialists with a broad overview of advanced bearings and lubrication technology with emphasis on high-speed bearings suitable for aircraft, missiles and aerospace applications.

The scope of the meeting includes all technical aspects of rolling bearings for high rotational speed, hydrostatic bearings and journal bearings, and also the lubrication of bearings and gears. The mechanical design of these various bearing types, their capabilities, their manufacturing and materials problems, their application and operational aspects, their users' experiences and their future potential are included in the scope of the meeting. Lubrication aspects include the chemistry and properties of liquid lubricants, additives, self-lubricating materials, lubricant-air mixtures and application experience.

**60th Panel Meeting/Symposium: Engine Handling**  
11-15 October 1982, Agios Andreas, Greece

The Symposium will focus on engine handling characteristics and transient behavior, emphasizing: operational experience, design criteria, and necessary research. A general definition of engine handling has been offered as: "achieving a desired state with a minimum of manual effort in the shortest possible time without any undue safety risks".

The "desired state", with high-performance combat aircraft, often is a power level and load factor different than current, with a life-or-death premium on reaching it quickly. Additionally, recently-developed combat aircraft have significantly more powerful engines which are complicated and highly sophisticated so as to remain within strict weight and volume constraints. Consequently, transients in engine power levels, "g" loadings, and intake angles of attack have become significantly more severe, requiring employment of more sophisticated techniques to understand their effects on engine design, and to minimize performance and life penalties.

The Symposium will address four topics: 1. field operational requirements and experience with combat aircraft engine handling; 2. aerothermodynamic interactions and modelling in engine handling; 3. thermal transient effects on engine component characteristics; and 4. control system concepts for advanced engine handling.

### **STRUCTURES AND MATERIALS PANEL**

**54th Panel Meeting/Specialists' Meetings: Aircraft Dynamic Response to Damaged and Repaired Runways (Classified).  
Advanced Casting Technology**  
4-9 April 1982, Brussels, Belgium

The first Meeting will bring together experts in military operations, runway repair, landing gear design, aircraft structural dynamic response and dynamic testing to explore areas of concern: the requirements of the military commander in the field, the aircraft designer and the certifying authorities; the variability of existing runways.

damage criteria, repair procedures and expected post-repair profiles; the development of mathematical modeling techniques for aircraft tires, landing gears, primary structure and store attachments; simplification of mathematical solutions and reduction in the time, hazard and cost of testing and validation of mathematical models; the development of simple rules to assess the safety of runway operations; recommendations for the ingredients of Military Specifications and Standards.

The second Meeting responds to the requirement within the NATO nations to reduce acquisition costs of aircraft and equipment as part of the drive to reduce lift cycle costs. Castings used to replace complicated fabricated/machined components could potentially lead to cheaper manufacture, but traditionally many designers have been reluctant to trust castings. The Meeting is intended to present the current state of development of Advanced Casting Technology, and bring together designers and materials and processing engineers for a full exchange of views so that areas of lack of knowledge that are limiting the use of castings can be highlighted.

**55th Panel Meeting/Specialists' Meetings: Environmental Effects on Materials for Space Applications. Behaviour of Short Cracks in Airframe Components**  
19-24 September 1982, Toronto, Canada

Systems requirements for future spacecraft and antennas with long duration of flight exert significant constraints on the design of the structure. The first Meeting will review these requirements in terms of lifetimes, dimensional stability, tolerable degradation of surface properties and interaction with other components. The physical implications of space environment and existing data on the variation of material properties with the environment will be considered. Finally, techniques for real-time and accelerated testing, including effects of vacuum conditions and dynamic qualification criteria, will be addressed.

New specifications for durability and fatigue strength of aircraft structures require that small cracks, which will be initiated during production or in an early life period, will not propagate to a critical crack length within a specified lifetime. An exchange of experience gained by different designers of various countries will promote a better understanding of the problem. The mechanisms of the growth of small cracks and the impact of small crack growth behaviour on aircraft structural design will be considered, as well as analysis methods, loading effects and correlation between test and analysis.

#### TECHNICAL INFORMATION PANEL

**35th Panel Meeting/Specialists' Meeting: Use of Scientific and Technical Information in the NATO Countries**  
27 September-1 October 1982, Rome, Italy

As is usual, the Technical Information Panel will hold one meeting during the year. Its title and theme for the Specialists' Meeting have been selected in consultation with the local National Authorities, and with the defence community in particular. The main objective is to disseminate more widely information concerning the demand for, and utilization of, scientific and technical information services in the NATO Countries, and particularly those services operating in the fields of aerospace and defence. The increase in such demand is well-known. What are less well-recognized are the specific nature of these requirements and how Government Departments and Agencies, Universities, and Industrial Organizations are coping with them.

The Meeting will address the structure and operation of defence information centers in the NATO countries; requirements for networking, translation services, and communications access and present current capabilities in the areas of on-line services, data bases, and document delivery systems. Problems encountered in Italy in meeting current requirements will be specifically addressed.

#### LECTURE SERIES

Following the proposals made by AGARD panels, the Consultant and Exchange Programme proposes to implement seven Lecture Series during the year 1982.

The numerous requests received from the NATO nations made it necessary to slightly increase the level of effort concerning the number of presentations, which will be held at twenty locations in 1982, instead of sixteen locations as in 1981.

The proposed budget includes the printing of the Lecture Series publications as well as the cost of preparation of the Lecture Series: travel expenses, subsistence allowance and honoraria, when appropriate, for participating speakers.

**Lecture Series No.119: Image Processing Techniques (with the Avionics Panel)**

14-15 June 1982, Athens, Greece  
17-18 June 1982, Paris, France  
21-22 June 1982, The Hague, The Netherlands

The Lecture Series will commence with a summary on human visual system capabilities and limitations. Fundamentals of imagery and display will be covered including analog and digital parameters, contouring, scan conversion, image generation, and interpretation. A session will be devoted to optical image processing, including image enhancement, edge detection, and filtering.

Digital image processing, transmission and coding, including colour will be covered.

Image enhancement will be emphasized. One session will be devoted to hardware implementations and applications. Trade-offs between digital versus analog and real-time versus off-line will be discussed.

Lecture Series Director: Prof. L.Gerhardt, Rensselaer Polytechnic Institute, USA.

**Lecture Series No.120: EM Propagation Problems in the Tactical Environment (with the Electromagnetic Wave Propagation Panel)**

3-4 May 1982, Munich, Germany  
6-7 May 1982, Paris, France

Due to the rapidly increasing employment of electronic equipment in battlefield activities, many of which are dependent on characteristics of the propagation medium, personnel must possess adequate knowledge of system relevant propagation criteria. They must also be trained to a level which permits efficient reaction under changeable battlefield conditions.

Lectures will include a general review of EM spectrum characteristics in tactical applications. There will be tutorial lectures on criteria of ground-wave propagation, aspects of ionospheric links over short and medium distances, limitations in scatter propagation, characteristics of satellite links, and aspects of antenna near-field conditions.

There will also be systems oriented lectures on propagation problems in: combat-net radio, radio-relay links, air/ground/air and air/air communications multifunction information distribution systems, tactical radar, and C<sup>3</sup>.

Lecture Series Director: Dr H.J.Albrecht, Forschungsgesellschaft für Angewandte Naturwissenschaften Wachtberg-Werthhoven, Federal Republic of Germany.

**Lecture Series No.121: High Angle of Attack Aerodynamics (with the Fluid Dynamics Panel)**

10-11 March 1982, Langley, USA  
15-19 March 1982, VKI, Brussels, Belgium  
22-23 March 1982, Göttingen, Germany

Manoeuvrability requirements for missiles currently include angles of attack up to 90°. Future combat aircraft for the 1990's will need to manoeuvre at supersonic speeds and angles of attack above 60°. This Lecture Series will cover applications to both aircraft and missiles since the problems are similar. The fundamental aspects of large-scale separated flows, three-dimensional and unsteady aerodynamics, favourable interference from strakes and canards and analyses of vortices will be covered across a wide speed range.

The Lecture Series will draw on the experience of the Panel in the conduct of a Symposium on the subject.

Lecture Series Director: Dr J.Wendt, von Kármán Institute, Rhode St.Genese, Belgium.

**Lecture Series No.122: Application of Digital Mapping Technology to Guidance and Control Systems (Classified) (with the Guidance and Control Panel)**

6-7 September 1982, Rome, Italy  
9-10 September 1982, Agios Andreas, Greece  
13-14 September, London, UK

The Lecture Series is intended to address the theoretical analysis, functional and implementation techniques involved in the application of Digital Mapping Technology to guidance and control systems. Areas that will be addressed are computer-generated information requirements, methods of integrating positioning systems and the computation requirements associated with guidance and control integration. Emphasis will be placed upon the

analysis, functional and simulation techniques to provide the necessary informational and functional capabilities. New procedures in analysis and estimation techniques will be stressed. This will provide one document which covers the necessary design background and state-of-the-art involved in the application of advancing technologies.

Lecture Series Director: Mr R.R.Newbery, Royal Aircraft Establishment, Bedford, UK.

**Lecture Series No.123: Aircraft Fire Safety (with the Propulsion and Energetics Panel)**

7 8 June 1982, Oslo, Norway  
10 11 June 1982, London, UK  
15 16 June 1982, Washington, DC, USA

The Lecture Series will be based on the results of the AGARD PEP Working Group 11, on the same subject. The results were published in the AGARD Advisory Report No.132, Volumes I and II.

In the presentations the results will be updated and will be concentrated on the enhancement of passenger and crew fire survivability under aircraft crash conditions. Survivability represents the highest priority in fire safety needs.

The contents will cover:

- Aircraft mishap experience with respect to definition of post-crash fire scenario/survivability factors.
- Availability and operational suitability of aviation fuels versus fire safety enhancement.
- Applicability of aircraft sub-system fire protection engineering techniques for enhancement of post-crash fire survivability.
- Interior cabin materials and their influences on post-crash fire survivability.
- Aircraft post-crash survivability human response factors physiological, and psychological.

Lecture Series Director: Mr B.P.Botteri, Aero-Propulsion Laboratory, Wright Patterson Air Force Base, Ohio, USA.

**Lecture Series No.124: Practical Considerations of Design, Fabrication and Tests for Composite Components (with the Structures and Materials Panel)**

11 12 October 1982, Oporto, Portugal  
14 15 October 1982, London, UK  
18 19 October 1982, Ankara, Turkey

The Lecture Series will be directed at the practical application of composites to structures. The scope will include a lecture on design considerations involving material selection, fabrication techniques, and tooling concepts. Stress analysis will be covered including knockdown factors, load transfer concepts and analytical techniques. The Lecture Series will be concluded with a lecture on qualification requirements and practical consideration in inspection and testing techniques. These lectures will not be geared to the day-to-day developments on the very forefront of technology, but rather to state-of-the-art concepts, techniques, and materials that when combined will assure a high probability of success in achieving design goals for cost as well as weight savings.

Lecture Series Director: Prof. B.Harris, University of Bath, UK.

**Lecture Series No.125: Human Factors Aspects of Aircraft Accidents (with the Aerospace Medical Panel)**

4 5 November 1982, Lisbon, Portugal  
8 9 November 1982, Ankara, Turkey  
11 12 November 1982, Athens, Greece

Aircraft accident investigation technology varies considerably from nation to nation in the NATO community. Specific investigative techniques and development of data bases show similar variations. All our nations wish to profit from lessons learned but its effectiveness is dependant upon the adequacy of technology, procedures and data bases. With the introduction of high performance/multi-role aircraft, the human factors aspects of aircraft accidents have assumed increasing importance. The objective of this Lecture Series is to provide a broad review of the issues identified above.

The Lecture Series will comprise a broad-based review of the important sub-specialities of accident investigation as a base on which can be overlaid the human factors aspects.

Topics presented will include:

- Introduction/current status/statistical description of the past ten years.
- Medico/clinical aspects.
- Physiology/psychophysiology aspects.



- Engineering/crash worthiness aspects.
- Life support/escape aspects.
- Medico-legal/pathology aspects.

It is anticipated that the audience will be operational staff, both general officers and field grade officers plus senior physicians in staff/management positions, and line officers of the various safety branches.

Lecture Series Director: Dr B.Hartman, Texas, USA.

#### MILITARY COMMITTEE STUDIES

22nd Meeting of the **Aerospace Applications Studies Committee** (Classified)  
10 - 12 May 1982, Naples, Italy

The Committee will hold the initial review of AAS-16 "Stand-off System Concepts for the Acquisition and Neutralization of Mobile Surface Targets" and the final review of AAS-15 "Active, Semi-Active and Passive Surveillance Sensors and Fire Control for Air Defence". Terms of reference for AAS-17 and 18 will be finalized and the organization of AAS-17 will be established.

23rd Meeting of the **Aerospace Applications Studies Committee** (Classified)  
15 - 17 November 1982, Munich, Federal Republic of Germany

The final review of AAS-16 "Stand-off System Concepts for the Acquisition and Neutralization of Mobile Surface Targets" and the initial review of AAS-17 will be accomplished. Proposals for new Aerospace Applications Studies will be reviewed and their Terms of Reference refined as required. The organization for the AAS-18 Study Group will be established. Terms of Reference for AAS-18 will be finalized.

## SECTION II

## 1981 AGARD PUBLICATIONS

- 1981 AGARD PUBLICATIONS, BY SERIES
- ABSTRACTS OF 1981 AGARD PUBLICATIONS, BY PANEL OR ACTIVITY

## ABBREVIATIONS

AMP	AEROSPACE MEDICAL PANEL
AVP	AVIONICS PANEL
EPP	ELECTROMAGNETIC WAVE PROPAGATION PANEL
FMP	FLIGHT MECHANICS PANEL
FDP	FLUID DYNAMICS PANEL
GCP	GUIDANCE AND CONTROL PANEL
PEP	PROPULSION AND ENERGETICS PANEL
SMP	STRUCTURES AND MATERIALS PANEL
TIP	TECHNICAL INFORMATION PANEL
MCS	MILITARY COMMITTEE STUDIES
LS	LECTURE SERIES

## 1981 AGARD PUBLICATIONS, BY SERIES

## ADVISORY REPORTS

<u>Number</u>	<u>Title/Author/Editor</u>	<u>Publication Date</u>	<u>Activity</u>
AR146	TECHNICAL EVALUATION REPORT on the FLUID DYNAMICS PANEL SYMPOSIUM on SUBSONIC/TRANSONIC CONFIGURATION AERODYNAMICS H.Körner	January	FDP
AR164	CHARACTERISTICS OF FLIGHT SIMULATOR VISUAL SYSTEMS	May	FMP
AR165	TECHNICAL EVALUATION REPORT on DESIGN-TO-COST AND LIFE CYCLE COST W.E.Lamar	May	FMP
AR166	ROTORCRAFT ICING STATUS AND PROSPECTS	August	FMP
AR168	RANGE INSTRUMENTATION THE WHITE SANDS MISSILE RANGE DATA SYSTEMS MANUAL L.R.Sugerman	August	GCP
AR170	TECHNICAL EVALUATION REPORT on the IMPACT OF MILITARY APPLICATIONS ON ROTORCRAFT AND V/STOL AIRCRAFT DESIGN (Classified)	December	FMP
AR171	TECHNICAL EVALUATION REPORT on the FLUID DYNAMICS PANEL SYMPOSIUM on COMPUTATION OF VISCOUS-INVISCID INTERACTIONS J.C. Le Balleur	October	FDP
AR175	PROPULSION AND ENERGETICS PANEL WORKING GROUP 12 on THROUGH FLOW CALCULATIONS IN AXIAL TURBOMACHINES Ch.Hirsch, J.D.Denton (Editors)	October	PEP
AR177 Volume 1	POSSIBILITIES FOR ACHIEVING ACCURATE ASM DELIVERY FROM LONG RANGE AND LOW AND HIGH ALTITUDE (Classified)	August	MCS
AR177 Volume 2	POSSIBILITIES FOR ACHIEVING ACCURATE ASM DELIVERY FROM LONG RANGE AND LOW AND HIGH ALTITUDE (Classified)	August	MCS

## REPORTS

<u>Number</u>	<u>Title/Author/Editor</u>	<u>Publication Date</u>	<u>Activity</u>
R677	FACTORS OF SAFETY RELATED TO STRUCTURAL INTEGRITY	June	SMP
R681	SIXTH ADVANCED OPERATIONAL AVIATION MEDICINE COURSE: CENTRE DE MEDECINE AERONAUTIQUE, QUARTIER ROI ALBERT I, RUE DE LA FUSÉE, 70, B-1139 BRUSSELS, BELGIUM, 24-28 MARCH 1980 J.Bande (Editor)	May	AMP
R684	THE PRODUCTION OF THE AGARD MULTILINGUAL AERONAUTICAL DICTIONARY USING COMPUTER TECHNIQUES Van A.Wente, J.C.Kirschbaum, J.H.Kuney	April	TIP
R690	THE SIGNIFICANCE OF DEFECTS ON THE FAILURE OF FIBRE COMPOSITES Sarah M.Bishop	December	SMP
R691	APPLICATION OF A STRUCTURAL OPTIMIZATION PROCEDURE FOR ADVANCED WINGS H.Gödel and G.Schneider	January	SMP

**REPORTS**  
(Continued)

<u>Number</u>	<u>Title/Author/Editor</u>	<u>Publication Date</u>	<u>Activity</u>
R692	WIND-TUNNEL CORRECTIONS FOR HIGH ANGLE OF ATTACK MODELS	February	FDP
R698	NON-LINEAR AEROELASTIC ANALYSES AND TESTING R.Dat, P.Dunoyer, R.Freyman	July	SMP
R699	INVESTIGATION OF UNSTEADY AIRLOADS ON WINGS WITH OSCILLATING CONTROL FOR ACTIVE CONTROL PURPOSES W.Geissler	July	SMP
R700	MODERN DATA ANALYSIS TECHNIQUES IN NOISE AND VIBRATION PROBLEMS	November	SMP
R701	DURABILITY OF ADHESIVE BONDED STRUCTURES SUBJECTED TO ACOUSTIC LOADS H.F.Wolfe, I.Holehouse	December	SMP

**AGARDOGRAPHS**

<u>Number</u>	<u>Title/Author/Editor</u>	<u>Publication Date</u>	<u>Activity</u>
AG160 Volume 13	PRACTICAL ASPECTS OF INSTRUMENTATION SYSTEM INSTALLATION R.W.Borek	September	FMP
AG160 Volume 14	THE ANALYSIS OF RANDOM DATA D.A.Williams	November	FMP
AG235 Volume IV	MANUAL OF DOCUMENTATION PRACTICES APPLICABLE TO DEFENCE-AEROSPACE SCIENTIFIC AND TECHNICAL INFORMATION S.C.Schuler (General Editor)	March	TIP
AG238	DESIGN MANUAL FOR IMPACT DAMAGE TOLERANT AIRCRAFT STRUCTURE J.G.Avery	October	SMP
AG250(F)	PHYSIOPATHOLOGIE ET PATHOLOGIE DES AFFECTIONS DU RACHIS EN MEDECINE AEROSPATIALE (2ème Edition)	April	AMP
AG251	THEORY AND APPLICATIONS OF OPTIMAL CONTROL IN AEROSPACE SYSTEMS P.Kant	July	GCP
AG254	ADVANCES IN INERTIAL NAVIGATION SYSTEMS AND COMPONENTS H.Sorg (Editor)	April	GCP
AG260	SPACECRAFT POINTING AND POSITION CONTROL P.Ph van den Broek and S.Z.Szirmay (Editors)	November	GCP
AG263	A FURTHER COMPILATION OF COMPRESSIBLE BOUNDARY-LAYER DATA WITH A SURVEY OF TURBULENCE DATA H.H.Fernholz, P.J.Finley, V.Mikulla	November	FDP
AG264	AIRCRAFT EXCRESCENCE DRAG A.D.Young, J.H.Paterson, J.Lloyd Jones (Editor)	July	FDP
AG265	A COMPILATION OF UNSTEADY TURBULENT BOUNDARY-LAYER EXPERIMENTAL DATA L.W.Carr	November	FDP

**AGARDOGRAPHS**  
(Continued)

<u>Number</u>	<u>Title/Author/Editor</u>	<u>Publication Date</u>	<u>Activity</u>
AG267	MODELING THE LOWEST 1 KM OF THE ATMOSPHERE W.S.Lewellen	November	FDP
AG269	AIR-BREATHING ENGINE TEST FACILITIES REGISTER J.H.Krengel	July	PEP

**CONFERENCE PROCEEDINGS**

<u>Number</u>	<u>Title/Author/Editor</u>	<u>Publication Date</u>	<u>Activity</u>
CP291	COMPUTATION OF VISCOUS-INVISCID INTERACTIONS	February	FDP
CP293	TURBINE ENGINE TESTING	January	PEP
CP294	INFORMATION SERVICES: THEIR ORGANIZATION, CONTROL AND USE	January	TIP
CP295	THE PHYSICAL BASIS OF THE IONOSPHERE IN THE SOLAR-TERRESTRIAL SYSTEM	February	EPP
CP296	BOUNDARY-LAYER EFFECTS ON UNSTEADY AIRLOADS	February	SMP
CP297	HELICOPTER FATIGUE LIFE ASSESSMENT	March	SMP
CP298	PRECISION POSITIONING AND INERTIAL GUIDANCE SENSORS. TECHNOLOGY AND OPERATIONAL ASPECTS	March	GCP
CP298 (Supp.)	PRECISION POSITIONING AND INERTIAL GUIDANCE SENSORS. TECHNOLOGY AND OPERATIONAL ASPECTS (Classified)	April	GCP
CP299	SUBSYSTEM TESTING AND FLIGHT TEST INSTRUMENTATION	April	FMP
CPP300	SPECIAL TOPICS IN OPTICAL PROPAGATION (Preprints)	March	EPP
CP300	SPECIAL TOPICS IN OPTICAL PROPAGATION P.Halley	July	EPP
CPP301	AERODYNAMICS OF POWER PLANT INSTALLATION (Preprints)	March	FDP
CP301	AERODYNAMICS OF POWER PLANT INSTALLATION	September	FDP
CPP302	HELICOPTER PROPULSION SYSTEMS (Preprints)	April	PEP
CP302	HELICOPTER PROPULSION SYSTEMS	September	PEP
CPP303	TACTICAL AIRBORNE DISTRIBUTED COMPUTING AND NETWORKS (Preprints)	May	AVP
CP303	TACTICAL AIRBORNE DISTRIBUTED COMPUTING AND NETWORKS	October	AVP
CPP304	WHAT SHOULD USERS EXPECT FROM INFORMATION STORAGE AND RETRIEVAL SYSTEMS OF THE 1980's? (Preprints)	August	TIP
CP304	WHAT SHOULD USERS EXPECT FROM INFORMATION STORAGE AND RETRIEVAL SYSTEMS OF THE 1980's?	December	TIP

**CONFERENCE PROCEEDINGS**  
(Continued)

<u>Number</u>	<u>Title/Author/Editor</u>	<u>Publication Date</u>	<u>Activity</u>
CPP305	MEDIUM, LONG AND VERY LONG WAVE PROPAGATION (AT FREQUENCIES LESS THAN 3000 KHZ) (Preprints)	September	EPP
CPP307	RAMJETS AND RAMROCKETS FOR MILITARY APPLICATIONS (Preprints)	October	PEP
CPP308	FLUID DYNAMICS OF JETS WITH APPLICATIONS TO V/STOL (Preprints)	October	FDP
CP309	TOXIC HAZARDS IN AVIATION	April	AMP
CP310	THE EFFECT OF LONG-TERM THERAPEUTICS, PROPHYLAXIS AND SCREENING TECHNIQUES ON AIRCREW MEDICAL STANDARDS C.E.Simpson (Editor)	March	AMP
CP311	AURAL COMMUNICATION IN AVIATION K.E.Money	June	AMP
CP312	THE IMPACT OF NEW GUIDANCE AND CONTROL SYSTEMS ON MILITARY AIRCRAFT COCKPIT DESIGN	August	GCP
CP312 (Supp.)	THE IMPACT OF NEW GUIDANCE AND CONTROL SYSTEMS ON MILITARY AIRCRAFT COCKPIT DESIGN (Classified)	August	GCP
CP313	THE IMPACT OF MILITARY APPLICATIONS ON ROTORCRAFT AND V/STOL AIRCRAFT DESIGN	June	FMP
CP313 (Supp.)	THE IMPACT OF MILITARY APPLICATIONS ON ROTORCRAFT AND V/STOL AIRCRAFT DESIGN (Classified)	July	FMP
CP315	AIRCRAFT CORROSION	August	SMP
CP316	CORROSION FATIGUE	October	SMP
CP318	DYNAMIC ENVIRONMENTAL QUALIFICATION TECHNIQUES	December	SMP
CP319	COMBAT AIRCRAFT MANOEUVRABILITY	December	FMP

**LECTURE SERIES**

<u>Number</u>	<u>Title/Author/Editor</u>	<u>Publication Date</u>	<u>Activity</u>
LS113	MICROCOMPUTER APPLICATIONS IN POWER AND PROPULSION SYSTEMS	March	CPP
LS114	DYNAMIC STABILITY PARAMETERS	May	CPP
LS115	PERSONAL VISUAL AIDS FOR AIRCREW	June	CPP
LS116	ELECTROMAGNETIC COMPATIBILITY	August	CPP
LS117	MULTI-VARIABLE ANALYSIS AND DESIGN TECHNIQUES	September	CPP
LS118	FATIGUE TEST METHODOLOGY	October	CPP

## MISCELLANEOUS

<u>Title/Author/Editor</u>	<u>Publication Date</u>	<u>Activity</u>
AGARD BULLETIN 1981/1: MEETINGS, PUBLICATIONS, MEMBERSHIP	March	HQ
AGARD HIGHLIGHTS 1981/1	March	HQ
AGARD CALENDAR OF SELECTED AERONAUTICAL AND SPACE MEETINGS (JULY 1981 - DECEMBER 1982)	June	HQ
AGARD HANDBOOK (Revised)	June	HQ
AGARD BULLETIN 1981/2	August	HQ
AGARD HIGHLIGHTS 1981/2	September	HQ
AGARD CALENDAR OF SELECTED AERONAUTICAL AND SPACE MEETINGS (JANUARY 1982 - JUNE 1983)	December	HQ

<u>Number</u>	<u>Title/Author/Editor</u>	<u>Publication Date</u>	<u>Activity</u>
MAN10	MANUAL ON THE FATIGUE OF STRUCTURES W.G.Barrois	June	SMP

## ABSTRACTS OF 1981 AGARD PUBLICATIONS, BY PANEL OR ACTIVITY

## AEROSPACE MEDICAL PANEL (AMP)

**Conference Proceedings 310**  
C.E.Simpson (Editor)  
March 1981  
154 pages  
ISBN 92-835-0288-4

**The Effect of Long-Term Therapeutics, Prophylaxis and Screening Techniques on Aircrew Medical Standards**

The introduction of advanced aircraft has placed a much increased stress on aircrew who are subjected to the high physical stress loads of sustained high 'g' manoeuvres, vibration, high noise levels and heat stress. Crews are required to produce a constant high degree of concentration with little or no margin for error. Is an increased degree of aircrew fitness necessary? Is there a need for special selection of the crews to fly these aircraft?

The diagnosis of certain diseases has, to date, resulted in the concerned aircrew being declared permanently unfit to fly. Modern methods of treatment, however, have now made it possible to consider the return of these aircrew to flying duties. Under what conditions may aircrew with diseases which require long-term therapy continue to fly and what limitations must be applied in such cases?

**Conference Proceedings 309**  
April 1981  
138 pages  
ISBN 92-835-0291-4

**Toxic Hazards in Aviation**

The aviation environment has always contained many toxic materials and products. With the evolution of more advanced aircraft propulsion mechanisms, specialised aircraft material development and associated maintenance activities, there has been a major increase in the potential toxic hazards associated with these systems. The threat of toxic exposure covers the entire spectrum of low-level continuous or intermittent to high-level brief accidental or unavoidable exposures. However, the protection of the crew and passengers is not the only concern in dealing with the toxic hazards in aviation. Responsibilities include research to address the biomedical aspects of occupational health and safety standards, toxic substances, environmental impact criteria and classification of transportation.

**AGARDographie 250(FR)**  
(2ème Edition)  
Avril 1981  
336 pages  
ISBN 92-835-2108-0

**Physiopathologie et Pathologie des Affections du Rachis en Médecine Aérospatiale**

L'ensemble des connaissances physiologiques et médicales concernant les affections du rachis a beaucoup évolué depuis 1970, date de l'édition de l'AGARDographie No.140 consacrée aux mêmes problèmes.

Cette AGARDographie présente le point de vue actuel d'un groupe de spécialistes dans le domaine de l'aetiologie, les diagnostics et les pronostics des lésions de la colonne vertébrale entraînées par le pilotage des aéronefs à voilure tournante, des avions conventionnels, des planeurs, ou par la pratique du parachutisme.

La publication de ce nouvel ouvrage sera indispensable pour faciliter le travail médical du "flight surgeon" et pour informer également tous ceux qui s'intéressent à la fois à la surveillance médicophysologique du personnel navigant et à la sécurité des vols.

**Report 681**  
J.Bande (Editor)  
May 1981  
108 pages  
ISBN 92-835-0293-0

**Sixth Advanced Operational Aviation Medicine Course; Centre de Médecine Aéronautique, Quartier Roi Albert I, Rue de la Fusee, 70, B-1120 Brussels, Belgium, 24-28 March 1980**

This report contains most of the lectures delivered to the course participants. It dealt with the cardiological problems of selection and screening, the epidemiology and prevention aspects and the problems of ageing.

Special emphasis was placed on the cardiovascular problems and follow-up of pilots of the new generation, high performance aircraft.

**Conference Proceedings 311**  
Dr K.E.Money (Editor)  
June 1981  
196 pages  
ISBN 92-835-1388-6

**Aural Communication in Aviation**

Despite the dependance of military operations in air, on land or sea on reliable voice communication and the effective use of audio warnings, many of the systems currently in use have serious shortcomings and do not reflect the considerable research effort that has been expended.

In modern military aircraft, it is essential that aircrew should be able to perceive and respond to audio information with minimum effort and highest reliability. However, the low quality of most airborne voice communications systems imposes such a high additional workload that messages are liable to misinterpretation or to being missed altogether.

Hearing standards and conservation are also discussed.



## AVIONICS PANEL (AVP)

**Conference Preprint 303**  
May 1981  
306 pages

**Tactical Airborne Distributed Computing and Networks**  
Preprints of papers delivered at Meeting in Røros, June 1981.

**Conference Proceedings 303**  
October 1981  
434 pages  
ISBN 92-835-0302-3

**Tactical Airborne Distributed Computing and Networks**  
These proceedings consist of the papers and discussions presented at the Avionics Panel Meeting on "Tactical Distributed Computing and Networks" held in Røros, Norway, 22-25 June 1981. The 35 papers were divided as follows, three on state-of-the-art; five on system architecture; four on system design approaches; five on software; five on fault tolerance and reliability; six on interconnection, bussing and networking; seven on applications to avionics systems.

## ELECTROMAGNETIC WAVE PROPAGATION PANEL (EPP)

**Conference Proceedings 295**  
February 1981  
410 pages  
ISBN 92-835-0284-1

**The Physical Basis of the Ionosphere in the Solar-Terrestrial System**  
These Proceedings consist of the 36 papers and the discussions presented at the 27th Meeting of the Electromagnetic Wave Propagation Panel in Pozzuoli, Italy on 28-31 October 1980. There are 4 papers on the sun, solar wind, and magnetosphere; 6 on solar wind, magnetosphere ionosphere coupling; 7 on dynamical coupling; 7 on ionospheric prediction and morphology; 6 on irregularities and waves; and 6 on solar and ionospheric predictions.

**Conference Preprint 300**  
March 1981  
214 pages

**Special Topics in Optical Propagation**  
Preprints of papers delivered at Meeting in Monterey, April 1981.

**Conference Proceedings 300**  
P. Halley (Editor)  
July 1981  
434 pages  
ISBN 92-835-0295-7

**Special Topics in Optical Propagation**  
These Proceedings consist of the 42 papers and the discussions presented at the 28th Meeting of the Electromagnetic Wave Propagation Panel in Monterey. There are 8 papers on Propagation Effects in Air and Sea Water; 10 on Recent Atmospheric and Sea Measurements; 5 on Upper Atmosphere Effects: Theory and Experiments; 6 on Non-Linear Optics; 7 on Novel Communication Techniques and Devices; and 6 on Adaptive Optics.

**Conference Preprint 305**  
September 1981  
286 pages

**Medium, Long and Very Long Wave Propagation (at Frequencies Less than 3000 KHZ)**  
Preprints of papers delivered at Meeting in Brussels, September 1981.

## FLIGHT MECHANICS PANEL (FMP)

**Conference Proceedings 299**  
April 1981  
338 pages  
ISBN 92-835-0290-6

**Subsystem Testing and Flight Test Instrumentation**  
The proceedings consist of the papers presented at the FMP Symposium on Subsystem Testing and Flight Test Instrumentation. The papers cover: navigation/attack systems testing, aircraft systems testing, environmental testing, and instrumentation techniques.

**Advisory Report 164**  
May 1981  
90 pages  
ISBN 92-835-1386-X

**Characteristics of Flight Simulator Visual Systems**  
Out-of-the-window visual simulation is a formidable challenge because of the fantastic performance capabilities of the human eye, the impracticability of producing a simulation system matching this performance and the inadequate understanding of how a human uses the visual information in a simulator. There is a continuing task to define the design characteristics that may affect perception of physiological responses to establish the relative importance of the corresponding visual and physiological effects, and to understand their relationships with the physical continuums of the displays that can now be generated.

This report addresses only a very small part of the total problem, by identifying and defining those physical parameters that characterise the simulator visual system and determine its fidelity. These characteristics are discussed in terms of the three basic categories of spatial, energy and temporal properties, and for each of the

parameters there is a description of its effect, a definition of its appropriate units or descriptors, a discussion of methods of measurement and of its use or importance to image quality. There is also a presentation of the experience of the Working Group members regarding the importance of these parameters in accomplishing a given visual task under given conditions. The final chapters of this report present projections of future trends and recommendations for research.

**Advisory Report 165**  
William E. Lamar  
May 1981  
30 pages  
ISBN 92-835-1387-8

**Technical Evaluation Report on Design to Cost and Life Cycle Cost**

This Report evaluates the AGARD Flight Mechanics Panel Symposium on "Design to Cost and Life Cycle Cost" held from 19-22 May 1980 in Amsterdam, The Netherlands. The full papers of the Symposium are published as AGARD Conference Proceedings No.289; the present Report gives brief summaries of the papers, an account of the closing Round Table Discussion, and an extensive listing of conclusions and recommendations in the area of design to cost and life cycle costing.

**Conference Proceedings 313**  
June 1981  
274 pages  
ISBN 92-835-0294-9

**The Impact of Military Applications on Rotorcraft and V/STOL Aircraft Design**

These Proceedings consist of the unclassified papers that were presented at the AGARD Flight Mechanics Panel Symposium on The Impact of Military Applications on Rotorcraft and V/STOL Aircraft Design. The classified papers are published as a supplement to this document, in AGARD-CP-313 (Supp.).

The Symposium reviewed the technological status of rotorcraft and V/STOL aircraft in the light of operational possibilities and needs; session topics included operational experiences, present status of technology, future trends and military mission effectiveness. A comprehensive Technical Evaluation Report on the meeting appears in AGARD Advisory Report No.170.

**Conference Proceedings 313**  
(Supplement)  
(NATO-Secret)  
July 1981  
iv + 66 pages

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**Advisory Report 166**  
August 1981  
136 pages  
ISBN 92-835-1397-5

**Rotorcraft Icing - Status and Prospects**

The fielding of a new generation of helicopters in the NATO nations promises to provide significantly increased adverse weather operational capability, and in consequence a higher probability of icing encounters. Unfortunately, neither the technology nor the resources required to provide complete helicopter ice protection to NATO helicopters of the 1980s are available. Therefore, a Working Group was constituted to:

- develop a consensus on the icing protection requirements for the NATO operational environment; assess potential technical approaches to improved helicopter airframe and rotor icing protection; recommend R&D priorities; make recommendations on the exploitation of existing facilities and the development of new facilities for icing research and simulation; identify opportunities for cooperative efforts amongst the NATO nations.

This report contains the findings of the Working Group, including recommendations for future research, a survey of national R&D programmes and plans, consideration of where these plans are not meeting the future research needs, and proposals for actions to fill these gaps.

**AGARDograph 160**  
Volume 13  
R.W. Borek  
September 1981  
198 pages  
ISBN 92-835-1399-1

**Practical Aspects of Instrumentation System Installation**

This AGARDograph is the 13th of the AGARD Flight Test Instrumentation Series and outlines some of the factors that influence the development of an instrumentation system installation. The volume was not written with the intention of being a design handbook and therefore the guidelines presented are in most cases given as suggestions.

The material is presented in a progressive manner starting with a review of the mission profile requirements.

Included are such factors as environment, reliability and maintainability, and system safety.

The assessment of the mission profile is followed by an overview of electrical and mechanical installation factors. The material presented is primarily directed at

shock/vibration isolation systems and standardization of the electrical wiring installation, two factors often overlooked by instrumentation engineers.

A discussion of installation hardware reviews the performance capabilities of wiring, connectors, fuses and circuit breakers, and so forth. Information is provided to guide proper selections.

The discussion of the installation is primarily concerned with the electrical wire routing, shield terminations and grounding. Also included are some examples of installation mistakes that could affect system accuracy.

The remaining two sections discuss system verification procedures and special considerations such as sneak circuits, pyrotechnics, aircraft antenna patterns, and lightning strikes.

**AGARDograph 160**  
Volume 14  
D.A. Williams  
November 1981  
168 pages  
ISBN 92-835-1405-X

#### **The Analysis of Random Data**

This AGARDograph is the 14th of the AGARD Flight Test Instrumentation Series and discusses the analysis of random data. The availability of powerful computing facilities, both on-line and off-line, for processing experimental data means that the flight test engineer has great flexibility in choosing the dividing line between "hard wired" and "soft" signal conditioning equipment. Further, the techniques described in this Volume are being used increasingly to extract meaningful information in situations where more conventional test and analysis techniques are inappropriate. This Volume is not intended to be a reference document for the specialist analyst who is required to generate the software for analyzing random data. Rather it is intended to introduce the non-specialist both to the possibilities and to the fundamental limitations of those techniques which are most frequently encountered.

**Advisory Report 170**  
(NATO-Confidential)  
December 1981  
20 pages

#### **Impact of Military Applications on Rotorcraft and V/STOL Aircraft Design**

This Report evaluates the AGARD Flight Mechanics Panel Symposium on "The Impact of Military Applications on Rotorcraft and V/STOL Aircraft Design", held from 6-9 April 1981 in Paris, France. The papers of the Symposium are published as AGARD Conference Proceedings No.313, Unclassified, and No.313 (Supplement), Classified NATO Secret. The present Report gives an overview of the meeting, including brief summaries of the papers and an account of the closing Round Table Discussion.

**Conference Proceedings 319**  
December 1981  
248 pages  
ISBN 92-835-0304-X

#### **Combat Aircraft Manoeuvrability**

These Proceedings consist of the unclassified papers that were presented at the AGARD Flight Mechanics Panel Symposium on Combat Aircraft Manoeuvrability. The classified papers are published as a supplement to this document in AGARD-CP-319 (Supplement).

The Symposium reviewed the operational requirements for manoeuvrability, technical prospects for manoeuvrability improvements, and prediction and assessment methods and their value. A comprehensive Technical Evaluation Report on the meeting appears in AGARD Advisory Report No.179.

### **FLUID DYNAMICS PANEL (FDP)**

**Advisory Report 146**  
H.Körner  
January 1981  
19 pages  
ISBN 92-835-1380-0

#### **Technical Evaluation Report on the Fluid Dynamics Panel Symposium on Subsonic/Transonic Configuration Aerodynamics**

This report presents an evaluation of the presentations made and the discussion held during the AGARD Fluid Dynamics Panel Symposium on Subsonic/Transonic Configuration Aerodynamics held 5-7 May 1980 in Neubiberg, Federal Republic of Germany. A brief discussion of the presentations is followed by a summary of conclusions and recommendations for action. The full text of the papers presented at the Symposium is available in AGARD Conference Proceedings No.291, published in September 1980.

**Conference Proceedings 291**  
February 1981  
538 pages  
ISBN 92-835-0286-8

#### **Computation of Viscous-Inviscid Interactions**

The Symposium was organized by the AGARD Fluid Dynamics Panel to review work on procedures for coupling the knowledge of viscous flow in the boundary and shear layers with the perfect fluid assumptions made for the remainder of the flow; to determine methods and algorithms to link the viscous and inviscid parts of the flows.

Thirty-one papers comprised the meeting; four of these papers were invited reviews. A general introduction was followed by sessions on: (1) Unseparated

flows, thin-layer concept, (2) Turbulent strong interaction without extensive separated flow, and (3) Separated flows. One additional paper was presented and the meeting was closed with a Round Table Discussion which was transcribed for the Proceedings. A Technical Evaluation Report will be published at a later date.

**Report 692**

February 1981  
124 pages  
ISBN 92-835-0283-3

**Wind-Tunnel Corrections for High Angle of Attack Models**

This report contains papers on various wind-tunnel correction methods used in high angles of attack tests. The papers were solicited from the various NATO countries and presented in a round table discussion following the AGARD Fluid Dynamics Panel Symposium in Neubiberg, Germany in May 1980. Papers given and published here are from Canada, France, Germany, Netherlands, Sweden, United Kingdom and the United States.

Several methods in use or under study are presented for closed, open and ventilated wind tunnels. The Mach number ranges up to the high subsonic and some methods are for incompressible flow. Techniques include vortex lattice, panel, system of images, wall pressure and adaptive walls.

**Conference Preprint 301**

March 1981  
236 pages

**Aerodynamics of Power Plant Installation**

Preprints of papers delivered at Meeting in Toulouse, May 1981.

**AGARDograph 264**

A.D.Young and J.H.Paterson  
J.Lloyd Jones (Editor)  
July 1981  
172 pages  
ISBN 92-835-1392-4

**Aircraft Excess Drag**

A review has been undertaken of the available data on the subject of the drag of excrescences on aircraft surfaces. Information from this review has been summarized and presented in a way that is readily usable for prediction and design purposes. The basic characteristics of boundary layers are discussed and, where possible, the drag of excrescences is related to those characteristics.

In particular, because the size of many types of surface imperfection is small in comparison with boundary-layer thicknesses, the drag of such imperfections can be correlated in terms of the properties of inner regions of the boundary layer. Several previously published analyses of this type are highlighted and, where possible, extensions to other data sources or other types of excrescences are presented. The practical problems of applying these data in the varying velocity gradients existing on aircraft surfaces are treated and one section is devoted to the drag of auxiliary air inlet and exit openings. Gaps in existing data which offer opportunities for research effort are pointed out.

**Conference Proceedings 301**

September 1981  
528 pages  
ISBN 92-835-0301-5

**Aerodynamics of Power Plant Installation**

Powerplant installations involve complex flows, strongly influenced by viscous effects and often with important aerodynamic interactions between the airframe and propulsion system. The introduction of new vehicle propulsion concepts, and new points of emphasis in aircraft and missile design requirements, provide an expanding range of aerodynamic problems which call for both experimental and theoretical study. It was the purpose of the symposium to survey the current and foreseeable aerodynamic problems in powerplant installation and to review recent work which has improved basic understanding or has enhanced prediction and design methods in this field.

The symposium focused on combat and transport aircraft, with five sessions

- I - Combat Aircraft Intakes
- II - Afterbodies and Nozzles
- III - Testing and Analysis Techniques
- IV - Installation Aerodynamics of Transport Aircraft
- V - Round Table Discussion.

This symposium was planned by the AGARD Fluid Dynamics Panel with the support of the Propulsion and Energetics Panel which held a simultaneous meeting on "Helicopter Propulsion Systems" at the same meeting site.

**Advisory Report 171**

(French and English)  
J.C.Le Balleur  
October 1981  
21 pages  
ISBN 92-835-0300-7

**Technical Evaluation Report on the Fluid Dynamics Panel Symposium on Computation of Viscous-Inviscid Interactions**

The Symposium surveys the status of current research in computational aerodynamics based on methods solving a viscous-inviscid interaction problem. In spite of limitation in the models or numerical techniques for shock wave boundary layer interaction or trailing edge problems, the situation is well advanced in unseparated, steady two-dimensional flow, with the potential approximation for the inviscid part. Progress has advanced in the computation of separations, based on strong interaction models. It would be fruitful to make use of the complete Euler equations in transonic flow. Progress toward strong interaction methods is much less advanced in unsteady or

three-dimensional flow, but seems likely. The development of strong interaction methods, highly connected with that of "Inviscid" and "Navier-Stokes" numerical techniques, appears as mandatory to having access to practical application needs.

The Symposium took place on 29 September - 1 October 1980, at the US Air Force Academy, Colorado Springs, Col., USA. The four general lectures, 27 papers and the Round Table Discussion presented at the Symposium are published in the AGARD Conference Proceedings CP-291, dated February, 1981.

**Rapport de Synthèse 171**  
(Français et Anglais)  
J.C. Le Balleur  
Octobre 1981  
21 pages  
ISBN 92-835-0300-7

**Rapport d'Evaluation Technique du Symposium Organisé par la Commission de Dynamique des Fluides de l'AGARD sur le Calcul de l'Interaction Fluide Parfait-Fluide Visqueux**

Le Symposium éclaire l'état des recherches en matière de calcul des écoulements aérodynamiques, au moyen de méthodes résolvant le problème de l'interaction entre Fluide Parfait et Fluide Visqueux. En dépit des limitations des modèles ou des techniques numériques sur les problèmes d'interaction couche limite-onde de choc ou de bord de fuite, la situation est bien avancée en écoulement bidimensionnel stationnaire non décollé, avec approximation potentielle du fluide parfait. Des progrès nouveaux sont perceptibles pour le calcul des décollements à partir de modèles de forte interaction. Le recours aux équations d'Euler complètes en transsonique serait souhaitable. La progression vers des méthodes de forte interaction est beaucoup moins avancée en écoulement instationnaire ou tridimensionnel, mais apparaît concevable. Un développement des méthodes de forte interaction coordonné à celui des techniques numériques "Fluide Parfait" et "Navier-Stokes" paraît indispensable pour accéder aux besoins des applications pratiques.

**Conference Preprint 308**  
October 1981  
274 pages

**Fluid Dynamics of Jets with Applications to V/STOL**

Preprints of papers delivered at Meeting in Lisbon, November 1981.

**AGARDograph 267**  
W.S. Lewellen  
November 1981  
88 pages  
ISBN 92-835-1407-6

**Modeling the Lowest 1 km of the Atmosphere**

The interdependence between the turbulent transport of mass, momentum, and energy through the lower levels of the atmosphere, and the distribution of wind, temperature, and species within this layer are reviewed. Particular emphasis is placed on models, either analytical or numerical, which have a basic theoretical foundation in turbulent transport modeling. The results of example model solutions are used to discuss such micrometeorological problems as: wind shear and turbulence around airports; the prediction of low-level clouds and fog; the dispersion of industrial pollutants; the interaction of electromagnetic radiation with turbulent fluctuations in humidity and temperature; and the evolution of organized features within the boundary layer.

**AGARDograph 265**  
Lawrence W. Carr  
November 1981  
56 pages  
ISBN 92-835-1406-8

**A Compilation of Unsteady Turbulent Boundary Layer Experimental Data**

A comprehensive literature search was conducted and those experiments related to unsteady turbulent boundary layer behavior were cataloged. In addition, an international survey of industrial, university, and governmental research laboratories was made, in which new and ongoing experimental programs associated with unsteady turbulent boundary-layer research were identified. Pertinent references were reviewed and classified based on the technical emphasis of the various experiments. Experiments that include instantaneous or ensemble-averaged profiles of boundary-layer variables are stressed. Detailed reviews that include descriptions of the experimental apparatus, flow conditions, summaries of acquired data, and significant conclusions are made. The measurements made in these experiments that exist in digital form have been stored on magnetic tape, and instructions are presented for accessing these data sets for further analysis.

**AGARDograph 263**  
Prof. Dr Ing. H.H. Fernholz,  
P.J. Finley, M.A., Ph.D.  
and Dr V. Mikulla  
November 1981  
222 pages  
ISBN 92-835-1404-1

**A Further Compilation of Compressible Boundary Layer Data with a Survey of Turbulence Data**

This volume is a continuation of AGARDographs 223, 253 (Fernholz and Finley 1977, 1980). The data compilation for 59 nominally two-dimensional compressible shock-free flows presented in AGARDograph 223 is supplemented by a further 18 cases, including some shock-boundary-layer interactions. The data are also available on magnetic tape from AGARD centres as for AGARDograph 223.

The text preceding the compilation gives a review of the available turbulence measurements. The measurements are compared on the basis of inner and outer region similarity relationships. There is little evidence of any quantitative correlation between different experiments.

There is also an examination of the breakdown conditions for the Van-Driest/Crocco mean-flow temperature-velocity correlation and the associated transformation procedures. The effects of extreme transverse curvature on the mean flow are briefly considered.

#### GUIDANCE AND CONTROL PANEL (GCP)

**Conference Proceedings 298**  
March 1981  
380 pages  
ISBN 92-835-0287-6

#### **Precision Positioning and Inertial Guidance Sensors. Technology & Operational Aspects**

The proceedings include papers presented at a symposium of the Guidance and Control Panel held at Church House, Westminster, London, UK on 14-17 October 1980.

Twenty-six papers were presented on the following topics:

- Inertial sensors and systems technology
- Positioning systems. Development and status
- Evaluation methods and results
- Filtering and estimate
- Fault tolerance design and redundancy techniques
- Systems requirements and applications.

Twenty-two papers are included in this volume, the other four are classified and appear in CP-298 Supplement, classified NATO-CONFIDENTIAL.

**Conference Proceedings 298**  
(Supplement)  
(NATO-Confidential)  
April 1981  
56 pages

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- Positioning systems. Development and status
- Evaluation methods and results
- Filtering and estimate
- Fault tolerance design and redundancy techniques
- Systems requirements and applications.

**AGARDograph 254**  
Dr Helmut Sorg (Editor)  
April 1981  
142 pages  
ISBN 92-835-1383-5

#### **Advances in Inertial Navigation Systems and Components**

This AGARDograph, prepared at the request of the Guidance and Control Panel of AGARD, covers the state-of-the-art characterized by three major developments in the last decade: the dry tuned gyro, the laser gyro and the strapdown technology, taking into consideration cost reduction and higher reliability.

**AGARDograph 251**  
Ir. Pieter Kant (Editor)  
July 1981  
292 pages  
ISBN 92-835-1391-6

#### **Theory and Applications of Optimal Control in Aerospace Systems**

This AGARDograph addresses the advances effected in the theory and design of modern optimal guidance and control systems, in the following areas: Part I: Theory. Part II: Design Techniques. Part III: Applications, and should provide an aid in the application of these modern techniques.

**Advisory Report 168**  
L.R. Sugerman  
August 1981  
10 pages  
ISBN 92-835-1395-9

#### **Range Instrumentation - The White Sands Missile Range Data Systems Manual**

This report analyses the ten volumes (1600 pages) edited by the Physical Science Laboratory (PSL) of the New Mexico State University for the White Sands Missile Range (WSMR), entitled "The Data Systems Manual". The ten volumes are titled: Data products, Techniques of statistical analysis, Least squares, Coordinate systems and map projections, Meteorology and timing, Radar systems, Telemetry systems, Drone formation control system, Optical instrumentation systems, Optical data reduction.

**Conference Proceedings 312**  
August 1981  
224 pages  
ISBN 92-835-0297-3

#### **The Impact of New Guidance and Control Systems on Military Aircraft Cockpit Design**

The proceedings include papers presented at a symposium of the Guidance and Control Panel of AGARD held at the Theodor-Heuss-Kaserne in Stuttgart Bad-Cannstatt, Germany, 5-8 May 1981.

26 papers were presented on the following topics:

- Overview Requirements/Technology
- Displays

Controls/Displays System Integration  
Automated Systems/Man Interface  
Cockpit Systems Evaluation.

**Conference Proceedings 312**  
(Supplement)  
(NATO-Confidential)  
August 1981  
vi + 106 pages

**The Impact of New Guidance and Control Systems on Military Aircraft Cockpit Design**

This publication is a classified supplement to the AGARD Conference Proceedings No.312. The main unclassified volume contains a Keynote Address, a Technical Evaluation Report and 16 papers on the following topics:

Overview Requirements/Technology  
Displays  
Controls/Displays System Integration  
Automated Systems/Man Interface  
Cockpit Systems Evaluation.

**AGARDograph 260**  
P.Ph. van den Broek and  
Dr S.Z.Szirmay (Editors)  
November 1981  
264 pages  
ISBN 92-835-1408-4

**Spacecraft Pointing and Position Control**

This AGARDograph addresses recent developments in spacecraft pointing and position control and the state-of-the-art technologies in these areas. The following topics are covered:

PART I: Attitude control and instrument pointing  
PART II: Orbit determination and control  
PART III: Flexible satellite control.

**PROPULSION AND ENERGETICS PANEL (PEP)**

**Conference Proceedings 293**  
January 1981  
490 pages  
ISBN 92-835-0282-5

**Turbine Engine Testing**

These Conference Proceedings contain 34 of the 35 papers presented at the AGARD Propulsion and Energetics Panel 56th Symposium on Turbine Engine Testing which was held in Turin, Italy, on 29 September - 3 October 1980. The Technical Evaluation Report is included at the beginning of the Proceedings. Questions and answers of the discussions follow each paper.

The Symposium was organized into 7 sessions: Certification/Demonstration Testing Requirements (8 papers); Development of Test Requirements (5 papers); Engine Life Prediction/Correlation (5 papers); Complete Powerplant Testing (7 papers); Engine Component Testing (7 papers); Development Testing of Gas Turbines for Limited Life Application (1 paper); and Requirements for Future Testing (2 papers).

The aim of the Symposium was to provide better test methods to the engine research and development engineers and to meet the manufacturer's, the buyer's and the user's test requirements for engine delivery, reliability, economy and maintenance. The Symposium created an examination of the various testing types which are proof testing, capability testing, design testing and trouble shooting, and discussed the definition of procedures, instrumentation and test performance for current and future requirements.

**Conference Preprint 302**  
April 1981  
86 pages

**Helicopter Propulsion Systems**

Preprints of papers delivered at Meeting in Toulouse, May 1981.

**AGARDograph 269**  
Joachim H.Krengel  
July 1981  
126 pages  
ISBN 92-835-1394-0

**Air-Breathing Engine Test Facilities Register**

Complementary to the Symposium on "Turbine Engine Testing", sponsored by the Propulsion and Energetics Panel, and held in Turin, Italy on 29 September - 3 October 1980, a register of airbreathing engine test facilities was compiled, aimed at comprising the test facilities relevant for research and development in NATO countries. Included are test facilities being in use or under construction at the various research organizations, industrial firms, and universities.

Test facilities and their technical data are given as far as the response to a questionnaire was received or open literature was available. Nevertheless interested test engineers will be able to find whether a test facility suiting their specific demands already exists or may be easily adapted to their purposes.

In order to ease contacts with organizations, complete addresses are given and cross-reference from the lists of test facilities and their data sheets to the list of organizations or vice versa is possible.

**Conference Proceedings 302**  
September 1981  
288 pages  
ISBN 92-835-0299-X

### **Helicopter Propulsion Systems**

The Conference Proceedings contain the 22 papers presented at the AGARD Propulsion and Energetics Panel 57th Specialists' Meeting on Helicopter Propulsion Systems which was held in Toulouse, France, on 11-14 May 1981. The Technical Evaluation Report is included at the beginning of the Proceedings. Questions and answers of the discussions follow each paper.

The Specialists' Meeting was organized into 6 sessions: Helicopter Propulsion Surveys (3 papers); Engine Component Technology (5 papers); Drive Train Component Technology (4 papers); Inlets and Particle Separators (2 papers); Engine-Airframe Dynamic Compatibility (4 papers); Future Advances and New Requirements (3 papers), and a keynote paper was delivered at the beginning of the meeting.

The aim of the meeting was to highlight progress in propulsion systems for rotary wing aircraft and to provide a forecast of technological developments for future applications. A large share of the development effort was still based on reaction to the operational environment of fielded units. As such, development activity had produced many lessons that now can be applied early in the design process to achieve improved future solutions.

**Conference Preprint 307**  
October 1981  
138 pages

### **Ramjets and Ramrockets for Military Applications**

Preprints of papers delivered at Meeting in London, October 1981.

**Advisory Report 175**  
Ch.Hirsch and  
J.D.Denton (Editors)  
October 1981  
342 pages  
ISBN 92-835-1400-9

### **Propulsion and Energetics Panel Working Group 12 on Through Flow Calculations in Axial Turbomachines**

In 1977, the Propulsion and Energetics Panel of AGARD had set up its Working Group 12 on "Through Flow Calculations in Turbomachines" after having found in the 47th (B) Meeting that the prediction of off-design performances, especially for axial flow compressors, was not fully satisfactory.

The objectives were to review the existing information on blade performance and wall effect prediction, and to extend this information by systematic application of numerical methods to representative geometries.

In its performance period Working Group 12 had confined to axial turbomachines only and split into a Turbine Sub-Group and a Compressor Sub-Group. In the Turbine Sub-Group five correlations were reviewed and evaluated against the test cases. Each correlation had its strengths and weaknesses and room for further improvements.

The Compressor Sub-Group report begins with a comprehensive survey of the various loss and deviation mechanisms. For comparison of the prediction methods to the test cases five authors have used their own correlations, while the sixth employed a single code in conjunction with three correlations for the four stage compressor. The results of the evaluation are similar to those of the Turbine Sub-Group, but the spanwise parameter distribution is often poorly predicted.

## **STRUCTURES AND MATERIALS PANEL (SMP)**

**Report 691**  
H.Gödel and G.Schneider  
January 1981  
19 pages  
ISBN 92-835-1379-7

### **Application of a Structural Optimization Procedure for Advanced Wings**

A computer software system called ASAT exists at MBB which allows an automatic design of minimum weight structures. In this paper, the application of this system to several structures is described.

It is shown that a structural optimization system can be very useful in the preliminary design of an airplane, especially when it consists of several modules such as static load calculation, deformations and stress calculation by finite elements, static aeroelastics, weight calculation, unsteady aerodynamic forces, vibration calculation, flutter calculation, flutter and strength optimization which all can be used separately and independently.

**Conference Proceedings 296**  
February 1981  
180 pages  
ISBN 92-835-0281-7

### **Boundary Layer Effects on Unsteady Airloads**

The Meeting presented a survey of recent progress in the theoretical and experimental analysis of unsteady behaviour of the boundary layer. These improvements were presented as possible future tools for the introduction of viscous effects in classical aeroelastic applications. Some papers also dealt with actual means for coupling inviscid and viscous flow, and for deriving relatively simple models.



**Conference Proceedings 297**

March 1981

268 pages

ISBN 92-835-0289-2

**Report 677**

June 1981

43 pages

ISBN 92-835-1390-8

**Manual 10 (Eng.)**

W.G.Barrois

June 1981

140 pages

ISBN 92-835-1389-4

**Report 698**

R.Dat, P.Dunoyer

and R.Freymann

July 1981

42 pages

ISBN 92-835-0296-5

**Report 699**

W.Geissler

July 1981

16 pages

ISBN 92-835-1393-2

**Conference Proceedings 315**

August 1981

202 pages

ISBN 92-835-0298-1

**Helicopter Fatigue Life Assessment**

The major objective of this Meeting was to take a further step towards the collection of experience on the fatigue evaluation and substantiation of new helicopters. The Meeting included surveys of current procedures and service experience, consideration of new concepts associated with the introduction of new technologies such as composite materials, new philosophies relevant to service damage and combat damage, and a review of testing techniques and methodologies for airframes and dynamic components. Finally, presentations were made on a European exercise aimed at the development of standardized fatigue load histories for helicopter rotors.

**Factors of Safety Related to Structural Integrity – A Review of Data from Military Airworthiness Authorities**

The concept of structural safety as presently applied by the military airworthiness authorities of the main NATO-Member-Countries has proven satisfactory, though being far from having a rational basis.

Before this background, a Sub-Committee of SMP established a Questionnaire (see chapter 1), asking the military authorities for all numerical factors applied to ensure structural safety of aircraft. The answers given are condensed in chapter 2 of this report, including the results of personal discussions between coordinators and nominated representatives of the authorities. The précis of the round table discussion as well as an evaluation of answers and discussion are included for reasons of completeness.

From the evaluation it may be concluded that there exists a considerable amount of agreement with respect to the Factors of Safety and their application. On the other hand, some disagreements and different interpretations have resulted. Thus this report forms a basis for discussing the disagreements in order to achieve a higher degree of conformity between the authorities of the NATO-Countries with regard to structural safety and reliability.

**Manual on the Fatigue of Structures**

The present publication (AGARD-MAN-10 (Eng.)) contains Chapter 7 which deals with mechanical surface damage. This concerns surface damage arising from wheel grinding, wear, rolling fatigue, contact fatigue, fretting fatigue and erosion by solid or liquid particles. Such damage is often the origin of fatigue cracks. An attempt is made to summarize those aspects of scientific knowledge in the field which are particularly relevant to the structural design process. It is hoped that full appreciation of this information and its careful use by designers will improve significantly the environmental resistance of our future vehicles and will thus produce important benefits in cost and maintenance reduction and in aircraft availability.

**Non-Linear Aeroelastic Analyses and Testing**

This report comprises two papers presented to the Sub-Committee on Aeroelasticity. One gives an exposition of the ground vibration testing of aircraft with active control systems. The other presents a method of performing and interpreting dynamic tests on non-linear systems, such as control surface actuators.

**Investigation of Unsteady Airloads on Wings with Oscillating Control for Active Control Purposes**

Intensive experimental investigations have been carried out on a wing section with oscillating control including a streamlined gap between both wing parts. Steady as well as unsteady pressure distributions have been measured outside and inside the gap region for various incidences, flap angles and frequencies.

In addition to the experimental investigations, a calculation procedure has been developed taking into account the real boundaries of the configuration including the gap region and assuming the fixed wing part and the oscillating control as two lifting systems with two Kutta conditions and correspondingly two wakes behind wing and control.

Comparisons between theory and experiment are discussed in detail and the major influences and effects of viscosity are pointed out. The results lead to special conclusions for the applicability of lifting systems for active control purposes.

**Aircraft Corrosion**

Aircraft corrosion is a very expensive phenomenon in terms of cost, inspection, maintenance and repair manpower requirements, or decreased aircraft availability.

This Meeting responded to the perception that improved communication between the corrosion R&D, the design and engineering, and the operating and maintenance

communities should be helpful in anti-corrosion efforts. Presentations were given from each of these communities and, together with the scheduled discussions, were intended to improve the intercommunity communication. Recommendations were agreed for desirable future action in this field.

**Conference Proceedings 316**

October 1981  
94 pages  
ISBN 92-835-1402-5

**Corrosion Fatigue**

The objectives and scope of the AGARD Corrosion Fatigue Cooperative Testing Programme were described and plans developed for a supplemental programme of considerably wider scope. In addition, six papers were presented, stimulating thought on the fundamentals of corrosion fatigue and on its combat for real structures.

Papers presented at the 52nd Meeting of the AGARD Structures and Materials Panel held in Çeşme, Turkey, on 5 - 10 April 1981.

**AGARDograph 238**

John G. Avery  
October 1981  
240 pages  
ISBN 92-835-1403-3

**Design Manual for Impact Damage Tolerant Aircraft Structure**

The Manual presents a methodology for integrating projectile impact damage tolerance into aircraft structural design. The information is presented in three sections: (1) Description of Projectile Threats; (2) Analysis Methods for Predicting Structural Response to Projectile Impact; (3) Design Guidelines for Impact Damage Tolerance.

**Report 700**

November 1981  
164 pages  
ISBN 92-835-0303-1

**Modern Data Analysis Techniques in Noise and Vibration Problems**

Aeroacoustics and hydroacoustics have many points in common when it comes to consideration of the characteristic features of far field radiation from acoustic or vibrating sources. The approach used to characterize such sources may be different, but in many cases this difference is more apparent than real, though it may be accentuated by the use of special purpose instrumentation.

Data analysis techniques used by acoustics specialists on the one hand and vibration specialists on the other are analogous in many respects, even though data interpretation is made in response to different needs. In this special course specialists in the fields of acoustics, vibrations (in air and in water) and data analysis present their points of view. Particular emphasis is placed on points of similarity and on probable future developments.

**Report 690**

Sarah M. Bishop  
December 1981  
24 pages  
ISBN 92-835-1410-9

**The Significance of Defects on the Failure of Fibre Composites**

In the United Kingdom, research on defects in composites is being carried out in government research establishments, aerospace industries and universities. Defects produced during manufacture, cracking produced during loading and in-service damage such as impact have been studied together with their effects on mechanical properties and their implications for structural design. There is also work modelling the behaviour of notched composites and on the design of composites to give improved toughness and increased tolerance to damage.

A review of research in the United Kingdom is given based on papers presented at a meeting of the Institute of Physics held in November 1979 on "the significance of defects on the failure of fibre composites" and on more recent work.

**Report 701**

H.F. Wolfe and I. Holehouse  
December 1981  
16 pages  
ISBN 92-835-1409-2

**Durability of Adhesive Bonded Structures Subjected to Acoustic Loads**

The development of high strength adhesives, integral damping, advanced composite materials and lower cost manufacturing techniques has led to structural concepts quite different from the conventional riveted configurations. These new structural concepts are finding widespread interest in aircraft design and application and they must survive high intensity acoustic excitation for the service life of the aircraft. Acoustic fatigue prediction information for advanced composite and adhesively bonded structures is rather limited, and since these concepts represent a significant change in dynamic characteristics and failure mechanisms, prediction methods based on riveted technology may not be valid.

This report constitutes a review of the potential problem by the SMP and an effort to determine if there was sufficient concern in several NATO countries to warrant further activity.

**Conference Proceedings 318**

December 1981  
254 pages  
ISBN 92-835-0306-6

**Dynamic Environmental Qualification Techniques**

The Meeting reviewed the state-of-the-art of dynamic qualification techniques and test methods for military aircraft with external stores, including consideration of the rationale and interpretation of existing standards. The determination of environmental inputs from various sources and their application to specific aircraft and store configurations, including helicopters, was covered. Presentations were also given on the development of vibration analysis techniques and the evaluation of possible improvements in prediction methods and establishment of criteria.

## TECHNICAL INFORMATION PANEL (TIP)

**Conference Proceedings 294**  
January 1981  
86 pages  
ISBN 92-835-0285-X

**Information Services: Their Organization, Control and Use**

These Proceedings concern an AGARD Technical Information Panel Specialists' Meeting held in Lisbon, Portugal on 5-6 November 1980. The Portuguese scientific and technical information scene is reviewed as is the context of the European information environment (specifically, EURONET and its interlinking with other networks). The subject of external information services, both national and international, are addressed, as are information retrieval and document delivery problems. The final Session of the Meeting deals with in-house information services. The Proceedings are preceded by a Technical Evaluation Report on the Meeting.

**AGARDograph 235**  
Volume IV  
S.C.Schuler (General Editor)  
March 1981  
124 pages  
ISBN 92-835-1382-7

**Manual of Documentation Practices Applicable to Defence-Aerospace Scientific and Technical Information – Volume IV: Security Storage and Control, Organisation and Management, Networks and External Sources of Information**

The last of four separately published volumes describing the basic documentation practices involved in the initial setting up and operation of an Information-Library organisation to provide defence-aerospace information services. The focus is on a practical, rather than theoretical, approach for both the senior person setting up a new system as well as junior staff who may be using the manual as a training aid.

This volume consists of three main sections. The first is concerned with basic problems in the security control and storage of classified and other sensitive documents. Guidelines are given for setting up procedures for document movements, housekeeping and physical security. The second section gives a general background to organisational factors involved in establishing an information centre. It also discusses accommodation requirements, staffing, budgets and promotional activities. In the final section the basic aspects of telecommunications and networking are reviewed and information given on the availability and use of on-line data bases in the USA and Europe.

**Report 684**  
Van A.Wente, J.C.Kirschbaum  
and J.H.Kuney  
April 1981  
44 pages  
ISBN 92-835-1384-3

**The Production of the AGARD Multilingual Aeronautical Dictionary Using Computer Techniques**

The AGARD Multilingual Aeronautical Dictionary (MAD), second edition, published in 1980, contained 7,300 technical terms defined in English but also translated into nine other languages. The preparation work was performed by some 250 scientists and engineers who were members of AGARD and involved the translation skills of staff in many of the NATO nations. Nearly all the compilation and setting work for the book was done by computer and automatic photo-composition, a task of great complexity and one which is unique. The purpose of this publication is to record how the task was approached, in terms of management planning; to state frankly what went wrong, so that these errors will not be repeated; and to make some modest reference to the successes of the programme. It does not deal in great detail with the technical aspects of the task.

**Conference Preprint 304**  
August 1981  
92 pages

**What Should Users Expect from Information Storage and Retrieval Systems of the 1980's?**

Preprints of papers delivered at Meeting in Munich, September 1981.

**Conference Proceedings 304**  
December 1981  
122 pages  
ISBN 92-835-0305-8

**What Should Users Expect from Information Storage and Retrieval Systems of the 1980's?**

These Proceedings concern an AGARD Technical Information Panel Specialists' Meeting held in Munich in September 1981. The Sessions were as follows.

Session I: The information storage and retrieval scene in the beginning of the eighties (a retrospect of significant developments in the last decade and a review of the prospects ahead). Session II addressed current factors which will be influential in the eighties, and Session III was concerned with user expectations. The final session of the meeting, which is summarised, was a Forum Discussion in the form of a user/supplier dialogue.

## LECTURE SERIES

**Lecture Series 113**  
 March 1981  
 160 pages  
 ISBN 92-835-1381-9

**Microcomputer Applications in Power and Propulsion Systems**

The objective of this Lecture Series is to familiarise the participants with micro-processor technology, design methods, and current applications in the aeronautical power and propulsion field. Topics include microprocessor characteristics by manufacturer, memory characteristics, software HI and LO level language tradeoffs, sensor and actuator interfacing, control logic design methods, redundancy management, and a description of several current applications to engine control.

The material in this publication was assembled to support a Lecture Series under the sponsorship of the Propulsion and Energetics Panel and the Consultant and Exchange Programme of AGARD presented on 2-3 April 1981 in London, UK, 6-7 April 1981 at Oberpfaffenhofen, Germany and 9-10 April 1981 in Genoa, Italy.

**Lecture Series 114**  
 May 1981  
 400 pages  
 ISBN 92-835-1385-1

**Dynamic Stability Parameters**

The advent of flight at high angles of attack has revived our interest in the dynamic stability of aircraft and missiles. This Lecture Series provides a review of the impact of high- $\alpha$  aerodynamics on dynamic stability characteristics of aerospace vehicles and presents a state-of-the-art survey of the analytical, wind-tunnel and flight-test techniques used for dynamic stability work. The programme also features a discussion of the various mathematical models used for the analysis of flight behaviour of aircraft at high angles of attack including the non-linear and time dependent formulations as well as a review of some pertinent sensitivity and simulator studies. The material presented by the Lecture Series covers not less than four distinct disciplines: theoretical aerodynamics, wind-tunnel experiments, flight testing and flight mechanics. It is, of course, only through simultaneous use of all these disciplines that a better understanding of the flight dynamics of a modern aerospace vehicle can be achieved.

The material in this publication was assembled to support a Lecture Series under the sponsorship of the Fluid Dynamics Panel, the Consultant and Exchange Programme of AGARD and the von Kármán Institute of Fluid Dynamics presented on: 2-5 March 1981 at NASA Ames Research Center, Moffett Field, California, USA and 16-19 March 1981 at the von Kármán Institute, Rhode-Saint-Genèse, Belgium.

**Lecture Series 115**  
 June 1981  
 64 pages  
 ISBN 92-835-0292-2

**Personal Visual Aids for Aircrew**

This Lecture Series No. 115 on the subject of Personal Visual Aids for Aircrew was sponsored by the Aerospace Medical Panel of AGARD and implemented by the Consultant and Exchange Programme.

The purpose of the Lecture Series was to review:

- The various conventional modes of optical correction required either by ametropias or by normal or pathological drops in visual acuity.
- The various optical corrections by means of contact visual aids.
- Individual brilliance enhancement systems for night flying conditions.
- The harmful effects, on the ocular apparatus, of various radiations (ultraviolet, infra-red, visible spectrum, ionizing radiations, laser, nuclear weapons).
- Means of protection against these various hazards.

The material in this publication was assembled to support a Lecture Series under the sponsorship of the Aerospace Medical Panel and the Consultant and Exchange Programme of AGARD, presented on 22-23 June 1981 in Paris, France and 25-26 June 1981 in Fürstenfeldbruck, Germany.

**Lecture Series 116**  
 August 1981  
 138 pages  
 ISBN 92-835-1396-7

**Electromagnetic Compatibility**

This AGARD Lecture Series No. 116 on the subject of Electromagnetic Compatibility was sponsored by the Avionics Panel of AGARD and implemented by the Consultant and Exchange Programme.

The increasing complexity and density of avionics systems has placed special demands upon those responsible for achieving electromagnetic compatibility (EMC) within host weapon platforms. Achievement of EMC means that equipment, sub-systems, and the complete system perform in their operational electromagnetic environment at design levels of efficiency without causing or suffering unacceptable degradation due to electromagnetic interference (EMI). The process of achieving EMC requires careful attention throughout the life cycle of the system. The NATO governments need greater visibility and control over the EMC process in order to field weapon systems whose performance will not be EMI limited.

Recent advances in the EMC discipline now provide a technology base for achieving visibility and control of potentially serious EMC problems. It was proposed that the Avionics Panel sponsor a *Lecture Series on EMC* which would highlight proven methods for its attainment.

The Lecture Series covered the following subjects: the EMC problem, system EMC analysis methods, actual case studies and test methods.

The material in this publication was assembled to support a Lecture Series under the sponsorship of the Avionics Panel and the Consultant and Exchange Programme of AGARD, presented on 31 August–1 September 1981 at Bolkesjø, Norway, 3–4 September 1981 in Munich, Germany and 7–8 September 1981 in Rome, Italy.

**Lecture Series 117**  
September 1981  
172 pages  
ISBN 92-835-1398-3

#### **Multi-Variable Analysis and Design Techniques**

The Lecture Series is intended to provide the basic theories and concepts involved in the design of advanced guidance and control systems employing state-space and multi-variable design methods. An intrinsic part of the Lecture Series will be computer-aided and graphical techniques that can be employed in preliminary design and related analysis methods. This will provide *one document* which covers the necessary design background and state-of-the-art involved in the application of advancing technologies.

Among the main topics to be reviewed are:

- Analysis and Synthesis Techniques
- Application of Observer and Estimation Principles
- Computer-Aided Design and Analysis Methods
- System Simulation Techniques
- Tests Evaluation and Validation.

The material in this publication was assembled to support a Lecture Series under the sponsorship of the Guidance and Control Panel and the Consultant and Exchange Programme of AGARD presented on 28–29 September 1981 in Ankara, Turkey; on 1–2 October 1981 in Bolkesjø, Norway and on 5–6 October 1981 in Delft, The Netherlands.

**Lecture Series 118**  
October 1981  
262 pages  
ISBN 92-835-1401-7

#### **Fatigue Test Methodology**

This Lecture Series is concerned with laboratory fatigue testing of small components and specimens. It covers testing philosophies, hardware systems required to carry out those philosophies and the associated test specimens.

The material in this publication was assembled to support a Lecture Series under the sponsorship of the Structures and Material Panel and the Consultant and Exchange Programme of AGARD presented on 19–20 October 1981 in Lyngby, Denmark; on 22–23 October 1981 in Lisbon, Portugal and on 26–27 October 1981 in Athens, Greece.

### **MILITARY COMMITTEE STUDIES (MCS)**

**Advisory Report 177**  
Volume 1  
(NATO-Secret)  
August 1981  
xii + 38 pages

#### **Possibilities for Achieving Accurate ASM Delivery from Long Range and Low and High Altitude**

Concentrating on guidance aspects, this study assesses the possibility and effectiveness of long range air to surface missiles released from aircraft flying at both low and high altitudes in the attack of a variety of fixed and mobile targets. The study is presented in two volumes, Volume 1 is the Executive Summary and Volume 2 contains the Main Report and Appendices.

This Study was conducted in response to a request from the North Atlantic Military Committee, under the management of the Aerospace Applications Studies Committee, Mr H.A.Zwemer, Chairman.

**Advisory Report 177**  
Volume 2  
(NATO-Secret)  
August 1981  
xvi + 180 pages

#### **Possibilities for Achieving Accurate ASM Delivery from Long Range and Low and High Altitude**

Concentrating on guidance aspects, this study assesses the possibility and effectiveness of long range air to surface missiles released from aircraft flying at both low and high altitudes in the attack of a variety of fixed and mobile targets. The study is presented in two volumes, Volume 1 is the Executive Summary and Volume 2 contains the Main Report and Appendices.

This Study was conducted in response to a request from the North Atlantic Military Committee, under the management of the Aerospace Applications Studies Committee, Mr H.A.Zwemer, Chairman.

## AGARD HEADQUARTERS (HQ)

**Bulletin 81/1**  
March 1981  
72 pages

**Meetings – Publications – Membership**

This issue of the AGARD Bulletin gave a schedule of meetings to be held in 1981, and a directory of AGARD members as of 1 January 1981.

**Highlights 81/1**  
March 1981  
32 pages

This booklet is one of a series aimed at establishing a more direct and informal means of communications between members of the AGARD community and their friends in the international aerospace profession. Items for publication are invited from all interested readers, and it is hoped that the Highlights will contain articles on the future activities of AGARD and provide a forum for the discussion of matters relating to AGARD's activities.

June 1981  
122 pages  
December 1981  
132 pages

**AGARD Calendar of Selected Aeronautical and Space Meetings (July 1981 – December 1982 issue and January 1982 – June 1983 issue)**

This document is published every six months, each issue covering the forthcoming 18-month period. As its title indicates, the Calendar contains details of a wide range of meetings, symposia, courses, etc., details of which were obtained from national and international organizations concerned with aeronautical and space subjects. For each entry is given the date, location, title and sponsor, keywords (indicating the main topics to be covered), and a contact code for enquiries. Distribution is limited to AGARD members only.

June 1981  
48 pages

**AGARD Handbook (Revised)**

This Handbook has been prepared primarily to serve as an introduction to AGARD. It is intended for three groups of readers. First, it serves those scientists, engineers and members of the NATO Community who have come in contact with AGARD through one means or another and who would like to know more about what it is and how it works. Second, it is intended to be an introductory guide to newly-appointed members of AGARD, such as members of Panels, Committees, Working Groups and Staff. Third, this Handbook may prove to be useful to the present members of AGARD, who may like to have at hand a simple reference book to help describe AGARD to others, or to refresh their own memories on some points of procedure.

For these reasons, the treatment of the subject has been general rather than detailed in order to give a broad overall picture of AGARD. However, the By-Laws under which AGARD operates are included in the Handbook for specific detailed reference purposes.

**Bulletin 81/2**  
August 1981  
32 pages

This Bulletin reported the content and scope for the 1982 AGARD Technical Programme approved during the AGARD National Delegates Board Meeting, March 1981.

**Highlights 81/2**  
September 1981  
24 pages

See Highlights 81/1 above.

**SECTION III****AGARD MEMBERSHIP LISTS****1 JANUARY 1982**

- NATIONAL DELEGATES
- STEERING COMMITTEE MEMBERS
- NATIONAL COORDINATORS
- PANEL MEMBERS
- AEROSPACE APPLICATIONS STUDIES  
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- AGARD STAFF

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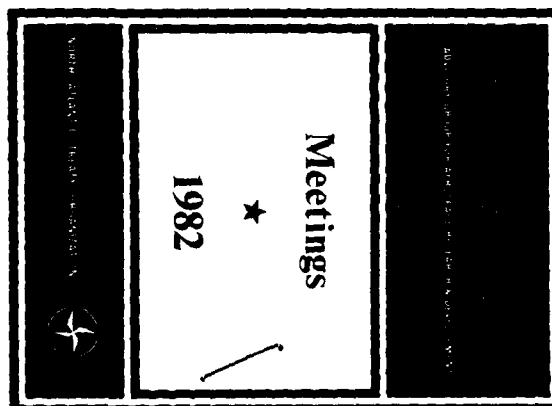
\* Voluntary National Contribution

† Double-posted

\*\* Temporary



- 19-24 Sep (Toronto) SMP 55th Panel Meeting/Specialists' Meeting: ENVIRONMENTAL EFFECTS ON MATERIALS FOR SPACE APPLICATIONS; BEHAVIOUR OF SHORT CRACKS IN AIRFRAME COMPONENTS
- 20-24 Sep (Trondheim) FDP 51st Panel Meeting/Symposium: AERODYNAMICS OF MISSILES; ROUND TABLE DISCUSSION ON TWO-PHASE FLOW
- 27 Sep-1 Oct (Rome) TIP 35th Panel Meeting/Specialists' Meeting: USE OF SCIENTIFIC AND TECHNICAL INFORMATION IN THE NATO COUNTRIES
- 4-7 Oct (Copenhagen) AMP 39th Panel Meeting (Classified)
- 11-15 Oct (Agios Andreas) PEP 60th Panel Meeting/Symposium: ENGINE HANDLING
- 11-15 Oct (Lisbon) GCP 35th Panel Meeting/Symposium: ADVANCES IN GUIDANCE AND CONTROL SYSTEMS (Classified)
- 11-15 Oct (Çeşme) FMP 61st Panel Meeting/Symposium: GROUND/FLIGHT TEST TECHNIQUES AND CORRELATION
- 11-12 Oct (Oporto) } SMP Lecture Series No.124: PRACTICAL CON-  
14-15 Oct (London) } siderations of design, fabrication and  
18-19 Oct (Ankara) } test for composite materials
- 18-22 Oct (Paris) EPP 31st Panel Meeting/Symposium: PROPAGATION ASPECTS OF FREQUENCY SHARING AND INTERFERENCE, AND SYSTEM DIVERSITY
- 4-5 Nov (Lisbon) } AMP Lecture Series No.125: HUMAN FACTORS  
8-9 Nov (Ankara) } ASPECTS OF AIRCRAFT ACCIDENTS  
11-12 Nov (Athens) }
- 15-17 Nov (Ottobrunn) MCS 23rd Meeting of the AASC - FINAL REVIEW OF AAS 16 - INITIAL REVIEW OF AAS 17 - CONSIDERATION OF PROPOSED AAS STUDIES - ORGANIZATION OF STUDY GROUP NO.18 (Classified)



10-11 Mar (Langley, VA)	} FDP Lecture Series No.121: HIGH ANGLE OF ATTACK AERODYNAMICS
15-19 Mar (VKI, Brussels)	
22-23 Mar (Göttingen)	
24-26 Mar (Paris)	52nd National Delegates Board Meeting; 31st Steering Committee Meeting; 32nd Panel Chairmen Meeting; 12th National Coordinators Meeting
4-9 Apr (Brussels)	SMP 54th Panel Meeting/Specialists' Meetings: ADVANCED CASTING TECHNOLOGY; AIRCRAFT DYNAMIC RESPONSE TO DAMAGED AND REPAIRED RUNWAYS (Classified)
19-23 Apr (Ft Worth, US)	FMP 60th Panel Meeting/Symposium: CRITERIA FOR HANDLING QUALITIES OF MILITARY AIRCRAFT
26-29 Apr (DFVLR Cologne)	AMP Specialists' Meeting: IMPACT INJURY CAUSED BY LINEAR ACCELERATION: MECHANISMS, PREVENTION, AND COST
26-30 Apr (Blackpool)	AVP 43rd Panel Meeting/Symposium: ADVANCED AVIONICS AND THE MILITARY AIRCRAFT MAN/MACHINE INTERFACE
3-4 May (Munich)	} EPP Lecture Series No.120: EM PROPAGATION PROBLEMS IN THE TACTICAL ENVIRONMENT
6-7 May (Paris)	
3-7 May (Spatind)	GCP 34th Panel Meeting/Symposium: PRECISION GUIDED MUNITIONS: TECHNOLOGY AND OPERATIONAL ASPECTS (Classified)
17-21 May (London)	FDP 50th Panel Meeting/Specialists' Meeting: PREDICTION OF AERODYNAMIC LOADS ON ROTORCRAFT; WALL INTERFERENCES IN WIND TUNNELS
10-12 May (Naples)	MCS 22nd Meeting of the AASC - FINAL REVIEW OF AAS 15 - INITIAL REVIEW OF AAS 16 - FINAL TERMS OF REFERENCE FOR AAS 17 & 18 - ORGANISATION OF STUDY GROUP NO. 17 (Classified)
24-28 May (Copenhagen)	EPP 30th Panel Meeting/Symposium: PROPAGATION EFFECTS ON ECM-RESISTANT SYSTEMS IN COMMUNICATION AND NAVIGATION (Classified)
31 May -5 June (Ottawa)	PEP 59th Panel Meeting/Symposium: PROBLEMS IN BEARINGS AND LUBRICATION
7-8 Jun (Oslo)	} PEP Lecture Series No.123: AIRCRAFT FIRE SAFETY
10-11 Jun (London)	
15-16 Jun (Washington)	
14-15 Jun (Athens)	} AVP Lecture Series No.119: IMAGE PROCESSING
17-18 Jun (Paris)	
21-22 Jun (The Hague)	
6-10 Sep (The Hague)	AVP 44th Panel Meeting/Symposium: SOFTWARE IN AVIONICS
6-7 Sep (Rome)	} *GCP Lecture Series No.122: APPLICATION OF DIGITAL MAPPING TECHNOLOGY TO GUIDANCE AND CONTROL SYSTEMS (Classified)
9-10 Sep (Agios Andreas)	
13-14 Sep (London)	
15-17 Sep (Washington)	53rd National Delegates Board Meeting; 18th Annual Meeting; 33rd Panel Chairmen Meeting

\*This is a classified Lecture Series to which special arrangements will apply.

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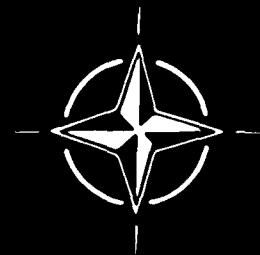
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**January 1982**

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# AGARD

ADVISORY GROUP FOR AEROSPACE RESEARCH & DEVELOPMENT

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## Calendar of AGARD Technical Meetings 1982

NORTH ATLANTIC TREATY ORGANIZATION



**CALENDAR OF MEETINGS  
1982**

<i>Dates</i>	<i>Location</i>	<i>Activity</i>	<i>Type of Meeting/Subject</i>
10-11 March	UNITED STATES (Langley, Virginia)	Fluid Dynamics	Lecture Series No.121 <b>High Angle of Attack Aerodynamics</b>
15-19 March	BELGIUM (VKI, Brussels)	Fluid Dynamics	Lecture Series No.121 <b>High Angle of Attack Aerodynamics</b>
22-23 March	GERMANY (Göttingen)	Fluid Dynamics	Lecture Series No.121 <b>High Angle of Attack Aerodynamics</b>
24-26 March	FRANCE (Paris)	Headquarters	<b>52nd National Delegates Board Meeting</b> <b>31st Steering Committee Meeting</b> <b>32nd Panel Chairmen Meeting</b> <b>12th National Coordinators Meeting</b>
4-9 April	BELGIUM (Brussels)	Structures & Materials	54th Panel Meeting/Specialists' Meetings on - <b>Advanced Casting Technology</b> - <b>Aircraft Dynamic Response to Damaged and Repaired Runways (NATO Confidential)</b>
19-23 April	UNITED STATES (Ft Worth, Texas)	Fluid Mechanics	60th Panel Meeting/Symposium on <b>Criteria for Handling Qualities of Military Aircraft</b>
26-29 April	GERMANY (DFVLR Cologne)	Aerospace Medical	Specialists' Meeting on <b>Impact Injury Caused by Linear Acceleration: Mechanisms, Prevention, and Cost</b>
26-30 April	UNITED KINGDOM (Blackpool)	Avionics	43rd Panel Meeting/Symposium on <b>Advanced Avionics and the Military Aircraft Man/Machine Interface</b>
3-4 May	GERMANY (Munich)	Electromagnetic Wave Propagation	Lecture Series No.120 <b>EM Propagation Problems in the Tactical Environment</b>
6-7 May	FRANCE (Paris)	Electromagnetic Wave Propagation	Lecture Series No.120 <b>EM Propagation Problems in the Tactical Environment</b>
3-7 May	NORWAY (Spatind)	Guidance & Control	34th Panel Meeting/Symposium on <b>Precision Guided Munitions: Technology and Operational Aspects</b> (NATO Secret)
17-21 May	UNITED KINGDOM (London)	Fluid Dynamics	50th Panel Meeting/Specialists' Meeting on - <b>Prediction of Aerodynamic Loads on Rotorcraft</b> - <b>Wall Interferences in Wind Tunnels</b>
10-12 May	ITALY (Naples)	Military Committee Studies	22nd Meeting of the AASC - <b>Final Review of AAS 15</b> - <b>Initial Review of AAS 16</b> - <b>Final Terms of Reference for AAS 17 &amp; 18</b> - <b>Organization of Study Group No.17</b> (NATO Secret)
24-28 May	DENMARK (Copenhagen)	Electromagnetic Wave Propagation	30th Panel Meeting/Symposium on <b>Propagation Effects on ECM-Resistant Systems in Communication and Navigation</b> (NATO Secret)
31 May-4 June	CANADA (Ottawa)	Propulsion & Energetics	59th Panel Meeting/Symposium on <b>Problems in Bearings and Lubrication</b>
7-8 June	NORWAY (Oslo)	Propulsion & Energetics	Lecture Series No.123 <b>Aircraft Fire Safety</b>
10-11 June	UNITED KINGDOM (London)	Propulsion & Energetics	Lecture Series No.123 <b>Aircraft Fire Safety</b>
15-16 June	UNITED STATES (Washington)	Propulsion & Energetics	Lecture Series No.123 <b>Aircraft Fire Safety</b>
14-15 June	GREECE (Athens)	Avionics	Lecture Series No.119 <b>Image Processing</b>
17-18 June	FRANCE (Paris)	Avionics	Lecture Series No.119 <b>Image Processing</b>



<i>Date</i>	<i>Location</i>	<i>Activity</i>	<i>Type of Meeting/Subject</i>
21-22 June	NETHERLANDS (The Hague)	Avionics	Lecture Series No.119 <b>Image Processing</b>
6-10 September	NETHERLANDS (The Hague)	Avionics	44th Panel Meeting/Symposium on <b>Software in Avionics</b>
6-7 September	ITALY (Rome)	Guidance & Control	*Lecture Series No.122 <b>Application of Digital Mapping Technology to Guidance and Control Systems</b> (NATO Secret)
9-10 September	GREECE (Agios Andreas)	Guidance & Control	*Lecture Series No.122 <b>Application of Digital Mapping Technology to Guidance and Control Systems</b> (NATO Secret)
13-14 September	UNITED KINGDOM (London)	Guidance & Control	*Lecture Series No.122 <b>Application of Digital Mapping Technology to Guidance and Control Systems</b> (NATO Secret)
15-17 September	UNITED STATES (Washington)	Headquarters	53rd National Delegates Board Meeting 18th Annual Meeting and 33rd Panel Chairmen Meeting
19-24 September	CANADA (Toronto)	Structures & Materials	55th Panel Meeting/Specialists' Meeting on - Environmental Effects on Materials for Space Applications - Behaviour of Short Cracks in Airframe Components
20-25 September	NORWAY (Trondheim)	Fluid Dynamics	51st Panel Meeting/Symposium on - Aerodynamics of Missiles - Round Table Discussion on Two-Phase Flow
11-15 October	GREECE (Agios Andreas)	Propulsion & Energetics	60th Panel Meeting/Symposium on <b>Engine Handling</b>
27 September- 1 October	ITALY (Rome)	Technical Information	35th Panel Meeting/Specialists' Meeting on <b>Use of Scientific and Technical Information in the NATO Countries</b>
4-7 October	DENMARK (Copenhagen)	Aerospace Medical	39th Panel Meeting (NATO Secret)
11-15 October	PORTUGAL (Lisbon)	Guidance & Control	35th Panel Meeting/Symposium on <b>Advances in Guidance and Control Systems</b> (NATO Secret)
11-15 October	TURKEY (Çeşme)	Flight Mechanics	61st Panel Meeting/Symposium on <b>Ground/Flight Test Techniques and Correlation</b>
11-12 October	PORTUGAL (Oporto)	Structures & Materials	Lecture Series No.124 on <b>Practical Considerations of Design, Fabrication and Tests for Composite Materials</b>
14-15 October	UNITED KINGDOM (London)	Structures & Materials	Lecture Series No.124 on <b>Practical Considerations of Design, Fabrication and Tests for Composite Materials</b>
18-19 October	TURKEY (Ankara)	Structures & Materials	Lecture Series No.124 on <b>Practical Considerations of Design, Fabrication and Tests for Composite Materials</b>
18-22 October	FRANCE (Paris)	Electromagnetic Wave Propagation	31st Panel Meeting/Symposium on <b>Propagation Aspects of Frequency Sharing and Interference, and System Diversity</b>
4-5 November	PORTUGAL (Lisbon)	Aerospace Medical	Lecture Series No.125 on <b>Human Factors Aspects of Aircraft Accidents</b>
8-9 November	TURKEY (Ankara)	Aerospace Medical	Lecture Series No.125 on <b>Human Factors Aspects of Aircraft Accidents</b>
11-12 November	GREECE (Athens)	Aerospace Medical	Lecture Series No.125 on <b>Human Factors Aspects of Aircraft Accidents</b>
15-17 November	GERMANY (Ottobrunn)	Military Committee Studies	23rd Meeting of the AASC - Final Review of AAS 16 - Initial Review of AAS 17 - Consideration of Proposed AAS Studies - Organization of Study Group No.18 (NATO Secret)

\* This is a classified Lecture Series to which special arrangements will apply.

Attendance at AGARD Panel Meetings and Lecture Series is by invitation only and is normally limited to citizens of the NATO Nations. Invitations should be sought from an AGARD National Delegate or Panel Member from the applicant's own country. The names and addresses of National Delegates and Panel Members will be found in Section III of AGARD Bulletin 82-1.

L'assistance aux Réunions des Panels et aux Séries de Conférences de l'AGARD est normalement réservée aux personnes munies d'une invitation et, en règle générale, aux citoyens des pays membres de l'OTAN. Les demandes d'invitation sont à adressées à un Délégué National ou à un Membre du Panel concerné. Les noms et adresses des Délégués Nationaux et des Membres des Panels, figurent dans la 3ème Partie du Bulletin 82-1 de l'AGARD.



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Harford House, 7-9 Charlotte St, London, W1P 1HD*