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Preface

Soon after its founding in 1952, the Advisory Group for Aerospace Research and Development (AGARD) recognized the need for a comprehensive publication on Flight Test Techniques and the associated instrumentation. Under the direction of the Flight Test Panel (now the Flight Vehicle Integration Panel) a Flight Test Manual was published in the years 1954 to 1956. This original Manual was prepared as four volumes: 1. Performance, 2. Stability and Control, 3. Instrumentation Catalog, and 4. Instrumentation Systems.

As a result of the advances in the field of flight test instrumentation, the Flight Test Instrumentation Group was formed in 1968 to update Volumes 3 and 4 of the Flight Test Manual by publication of the Flight Test Instrumentation Series, AGARDograph 160. In its published volumes AGARDograph 160 has covered recent developments in flight test instrumentation.

In 1978, it was decided that further specialist monographs should be published covering aspects of Volumes 1 and 2 of the original Flight Test Manual, including the flight testing of aircraft systems. In March 1981, the Flight Test Techniques Group was established to carry out this task. The monographs of this latter series (with the exception of AG 237 which was separately numbered) are being published as individually numbered volumes in AGARDograph 300. In 1993, the Flight Test Techniques Group was transformed into the Flight Test Editorial Committee, thereby better reflecting its actual status within AGARD. Fortunately, the work on volumes could continue without being affected by this change.

An Annex at the end of each volume of both AGARDograph 160 and AGARDograph 300 lists the volumes that have been published in the Flight Test Instrumentation Series (AG 160) and the Flight Test Techniques Series (AG 300) plus the volumes that were in preparation when this volume was published.

In 1987 when several volumes in the Flight Test Techniques Series had already been published, it was decided that it was an omission not to have an introductory volume to the Flight Test Techniques Series. This volume was to provide an overview of the field of flight test engineering for the novice engineer engaged in this field. It took some time before an editor was found who would work closely with over fifty lead authors and contributing authors. Mr. F.N. Stoliker, former Technical Director of the US Air Force Flight Test Center at Edwards Air Force Base in California, was willing to undertake this heavy task and he started his preparations in 1989. The first authors started writing in 1991.

In 1995 the Volume has now been published and AGARD is convinced that it is a significant volume that will be met with great appreciation in the flight test community.

Préface

Peu de temps après sa création en 1952, le Groupe consultatif pour la recherche et les réalisations aérospatiales (AGARD), a pris conscience de la nécessité d'une publication très complète sur les techniques d'essais en vol et l'instrumentation y associée. Sous l'égide du Panel des essais en vol (l'actuel Panel conception intégrée des véhicules aérospatiaux) un manuel d'essais en vol a été publié au cours des années 1954 à 1956. Ce manuel unique comportait quatre volumes à savoir: Vol. 1: Performances, Vol. 2: Stabilité et contrôle, Vol. 3: Catalogue des appareils de mesure, Vol. 4: Systèmes de mesure.

Les novations dans le domaine des appareils de mesure pour les essais en vol ont conduit à créer, en 1968, le Groupe de travail sur les appareils de mesure pour les essais en vol, afin de permettre la remise à jour des volumes 3 et 4 du manuel sous la forme d'une série de publications appelées l'AGARDographie 160. Les différents volumes de l'AGARDographie 160 publiés jusqu'à ce jour couvrent les derniers développements dans le domaine.

En 1978, le Panel de la mécanique de vol a signalé l'intérêt de monographies supplémentaires sur certains aspects des volumes I et II du manuel initial et notamment les essais en vol des systèmes avioniques. Ainsi, au mois de mars 1981, le Groupe de travail sur les techniques d'essais en vol a été créé pour mener à bien cette tâche. Les monographies dans cette série (à l'exception de l'AG 237 qui fait partie d'une série distincte) sont publiées sous forme de volumes individuels de l'AGARDographie 300. En 1993, le Groupe est devenu le Comité de rédaction des techniques d'essais en vol pour mieux traduire sa nouvelle position au sein de l'AGARD. Heureusement, le travail en cours sur les différents volumes a pu continuer sans être perturbé par ce changement.

A la fin de chacun des volumes de l'AGARDographie 160 et de l'AGARDographie 300 figure une annexe donnant la liste des volumes publiés dans la série «Appareils de mesure pour les essais en vol» (AG 160) et dans la série «Techniques d'essais en vol» (AG 300), ainsi que les volumes en cours de rédaction au moment de la publication du présent volume.

En 1987, un certain nombre de volumes dans la série techniques d'essais en vol avaient déjà été publiés lorsque le groupe a décidé qu'il serait souhaitable de l'étoffer d'un volume liminaire. Ce volume devait fournir un panorama du domaine des techniques d'essais en vol pour le jeune ingénieur travaillant dans ce secteur d'activité. Il a fallu un certain temps pour trouver un rédacteur en chef à même d'assurer la collaboration étroite demandée avec plus d'une cinquantaine d'auteurs. M. F.N. Stoliker, ancien Directeur technique de l'Edwards Air Force Base en Californie, a bien voulu accepter d'assumer cette lourde tâche et il a entamé les travaux préparatoires dès 1989. Les premiers auteurs ont commencé la rédaction en 1991.

Aujourd'hui, nous sommes en 1995 et le premier volume vient de paraître. Le Panel FVP de l'AGARD est persuadé qu'il s'agit d'un ouvrage d'importance qui sera accueilli avec un grand intérêt par la communauté des essais en vol.

Foreword

The volumes that currently exist in the Flight Test Techniques Series are quite specific in their focus and are generally aimed at the engineer who has some knowledge in the field of flight test engineering. Even though these volumes meet a strong need for this type of information it was felt that there was a need to provide information to the novice engineer or to other people who have a need to interface with the flight test community. This volume is intended to lightly touch all those areas that must be considered when planning, establishing, conducting, closing out, and reporting on a flight test program. This volume is NOT intended to be a complete guide as to how to conduct a flight test program. Rather, it is a primer and contains references to additional material that will provide greater detail. The serious reader is encouraged to do further reading in the various volumes of the AGARD Flight Test Techniques series and the Flight Test Instrumentation series, AGARDographs 300 and 160, respectively, and other documents which are referenced in each Section of this volume.

The first two Sections are the Introduction and Historical Perspective. They provide some insight into the question of why flight test and give a short history of flight test engineering.

Sections 3 through 10 deal with the preparation for flight testing. They provide guidance on the preliminary factors that must be considered, such as the technical, commercial, and political background to the tests, and any relevant existing data or considerations (Section 3); the composition of the test team (Section 4), the logistic support requirements (Section 5); the instrumentation and data processing requirements (Sections 6 and 7); the overall flight test plan and the associated preliminary ground tests (Sections 8 and 9); and last, but by no means least, Section 10 discusses safety aspects.

Sections 11 through 27 describe the various types of flight tests that are usually conducted during the development and certification of a new or modified aircraft type. Each Section offers a brief introduction to the topic under consideration, and the nature and the objectives of the tests to be made. It lists the test instrumentation (and, where appropriate, other test equipment and facilities) required, describes the test maneuvers to be executed, and indicates the way in which the test data is selected, analyzed, and presented.

Section 28 "Post-flight Operations" discusses the various activities that should take place between test flights. Items that are covered include who to debrief, what type of reports to send where, types of data analysis required for the next flight, review of test data to make a comparison to predicted data, some courses of action if there is not good agreement, and comments on selecting the next test flight.

Section 29 "Post Test Operations" covers the activities that must take place upon completion of the test program. Briefly discussed are the types of reports and briefings that should take place and a discussion of some of the uses of the flight test data.

Section 30 "Future Trends" gives a brief forecast of where present trends may be leading.

The material presented in the Volume reflects the experience of the prime author and any contributing author(s) for each Section. The Sections will normally be typical of the procedures and practices of the author's home station; however, they are representative of those used by many organizations. As such, an individual Section may or may not include comments about civil and/or rotary wing aircraft. Wherever possible the authors and reviewers have provided bibliographic entries that would be useful to those who desire to test other than fixed wing military aircraft. The users of this Volume are reminded that they should interpret the advice given in the context of the rules, processes, and procedures of their parent/home organization.

Also, the reader must be aware that terms such as "project" are used in the context of the Section author's home base and experience. The same term could have an entirely different meaning at another base or another country. For example, in the US, "project" normally means a given set of tests whereas in the UK "project" usually means "aircraft type" such that "AV-8B Project" would encompass all aspects of that aircraft type's development.

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F.N. Stoliker
Camarillo, CA, US
March 1995

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The Flight Test Editorial Committee, formerly the Flight Test Techniques Working Group 11, was fortunate to have one of its past members and former chairman take on the difficult task of Editor for this AGARDograph. The committee is most grateful for the hard work and persistence of the Editor, Mr. Fred Stoliker, in bringing this volume into existence.

Besides the Editor, the following current and past members of the Flight Test Editorial Committee have taken an active part in the preparation of this Volume:

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