

FOREWORD

Du 24 au 28 Août 1964, sur l'invitation de l'Association Française des Ingénieurs et Techniciens de l'Aéronautique et de l'Espace (AFITAE), s'est tenu à Paris le IVème Congrès biennal du Conseil International des Sciences Aéronautiques (ICAS), faisant suite à celui de Madrid en 1958, de Zurich en 1960 et de Stockholm en 1962.

Comme les précédents, ce Congrès avait pour objet de présenter une revue de progrès récents, ou en cours d'accomplissement, des sciences aéronautiques dans plusieurs domaines qui ont été choisis et délimités, selon l'usage de ICAS, par son Comité "ad hoc," c'est-à-dire par son Comité de Programme.

Selon les vues du très regretté Fondateur de ICAS, le Dr. Théodore von Kármán, ce Comité s'est continuellement appliqué, depuis sa formation en 1956, à sélectionner les sujets d'intérêt de ces Congrès biennaux de manière à illuminer successivement, tel un phare tournant, les principaux secteurs où les sciences aéronautiques peuvent et doivent contribuer au perfectionnement de la technique des véhicules aériens ou aérospatiaux, notamment quant à leurs performances, leur économie et leur sécurité.

Il a été satisfaisant et agréable pour les organisateurs de ce IVème Congrès de noter le sentiment généralement très favorable des participants au sujet du haut niveau de qualité de presque toutes les contributions.

J'ai confiance que le Lecteur à qui je suis heureux de présenter ce Volume de Comptes Rendus partagera volontiers ce sentiment. Il se rendra compte aisément de l'orientation propre de ce Congrès en consultant la Table des Matières et l'Index analytique du présent volume.

La maison d'édition SPARTAN BOOKS Inc. a réalisé avec célérité et avec talent cette publication.

L'excellent Editeur en a été le Secrétaire Exécutif de ICAS, Robert R. Dexter, dont la compétence, l'efficiency et le dévouement à ICAS ne sauraient être trop hautement reconnus et appréciés.

Le IVème Congrès ICAS était le premier survenant après le décès du Dr. Théodore von Kármán, survenu à Aachen le 7 Mai 1963. Afin de rendre à sa mémoire un hommage solennel et particulièrement approprié, ce Congrès s'est ouvert par la traditionnelle Conférence commémorative Daniel et Florence Guggenheim, consacrée cette année à dégager des premières vingt-cinq années de formation et d'activité scientifiques du Fondateur de ICAS l'inoubliable et très précieux enseignement que son exemple a légué à ses élèves et à ses émules.

MAURICE ROY

Vice-Président de l'Académie des Sciences, Paris
Président d'Honneur de ICAS

PREFACE

This volume is a collection of the papers presented at the 4th Congress of the International Council of the Aeronautical Sciences held in Paris, August 24-28, 1964. Many conferences have been held dealing with aeronautical problems, but it was the opinion of the first honorary chairman, the late Dr. Théodore von Kármán, that ICAS is the first international congress to give aeronautical representatives of all nations an opportunity to meet and to discuss problems of mutual interest.

ICAS was founded in the Fall of 1956 to encourage free interchange of information on all phases of mechanical flight. The organized national associations of the world dedicated to the advancement of aeronautical sciences, engineering and technology are eligible to participate in the activities of ICAS, subject to approval of the Council, which consists of at least one delegate from each participating country. The American Institute of Aeronautics and Astronautics (AIAA) in New York has served as the permanent Secretariat for ICAS since its organization.

The topics covered at the Paris Congress were predetermined at a meeting of the Council held in Stockholm during the 3rd Congress. The papers presented and reproduced in this volume were given at the invitation of the Program Committee. The balance between survey papers (general lectures) and original contributions is an important decision which occurs in the process of the organization of any technical congress. Four interesting and timely survey papers were scheduled by the Committee on the following topics: Aircraft Noise, Upper Atmosphere Research, Engineering Education, and Nuclear Space Propulsion Systems. The remaining papers, written more for the specialist, cover a wide range of problems of both theoretical and practical importance. Papers have been grouped in an order as consistent and logical as possible, under the special topic areas of the Congress: (1) Supersonic Aircraft; (2) VTOL/STOL; (3) Simulation of Flight Dynamics; (4) Reliability; (5) Flight of Winged Space Vehicles in the Atmosphere.

In addition to the written manuscripts of the talks given at the Congress, discussion which followed each presentation is included. A complete record of the discussion was not obtained, as only written comments submitted before the end of the Congress were considered. Thus the printed comments are not in all cases representative of the original verbal exchange. It is believed, however, that the discussions reported are useful and will be of interest to many readers.

The Council of ICAS was indeed fortunate to have Prof. Maurice Roy as Chairman of the Program Committee. With the aid of the Committee, he effectively coordinated and supervised the technical programming for

this important event. At the invitation of the Council, he opened the meeting by presenting the traditional Daniel and Florence Guggenheim Memorial Lecture. On this occasion he paid homage to the late Dr. von Kármán by reviewing his many contributions in the fields of science and education during his first twenty-five years of activity in aeronautics.

It is customary for the technical society in the country where the meeting is held to act as host. The Council is indebted to M. Jules Jarry, Honorary President, M. André Collomb, Executive Secretary, and the staff of the Association Française des Ingénieurs et Techniciens de l'Aéronautique et de l'Espace (AFITAE), for the excellent facilities and arrangements at UNESCO.

The proceedings of the Congress provide documentation of the forty-six papers presented. The Editorial Committee has striven for early publication, realizing that the rapid dissemination of new research results is essential and in keeping with the engineering and scientific tempo of today. I wish to express my gratitude to the authors for delivering their manuscripts and returning proofs so promptly. We are also indebted to the staff of Spartan Books, Inc., for the excellent work done in the production of the Proceedings. Every effort has been expended by the Authors, Council and Committees to make the Proceedings a valuable book for those engaged in aeronautical engineering and research.

At the meeting in Paris the Council accepted the invitation of the Royal Aeronautical Society to hold the 5th Congress in London in September 1966, as part of the centenary celebration of the founding of The Royal Aeronautical Society. The following officers were elected: Prof. Maurice Roy, Honorary Chairman; Sir Arnold Hall, Chairman of the Executive Committee; Dr. John J. Green, Chairman of the Program Committee, and Robert R. Dexter, Executive Secretary.

I also wish to express my thanks to my secretary, Mrs. Anneliese C. Ranze, for the great volume of correspondence, record-keeping and other secretarial duties that she so competently performed.

ROBERT R. DEXTER
Editor