

PREFACE

The 10th Congress of the International Council of the Aeronautical Sciences (ICAS), of which this volume is a collection of the papers presented thereat, was held at the Chateau Laurier Hotel, Ottawa, Ontario, Canada, from October 4 - 8, 1976, under the auspices of the Canadian Aeronautics and Space Institute (CASI).

The opening session took place on October 4, in the Adam Room, under the chairmanship of Dr. J.J. Green, President of ICAS, with Mr. J.P. Beauregard, President of CASI, as the Master of Ceremonies. Addresses of welcome were delivered by the Hon. C.M. Drury, formerly Minister of State for Science and Technology, the Hon. Donald Irvine, Provincial Secretary for Resources Development, Government of Ontario, and Controller Marion Dewar, the Deputy Mayor of the City of Ottawa. Close to 400 delegates and guests attended this opening session. In his welcoming remarks, Mr. Drury referred to Canada's long and distinguished record in fostering aeronautical research and development and reflected on some of the problems which have resulted from the rapid evolution of aviation technology in this century, problems which are now of high priority for the attention of aeronautical scientists and engineers. In his reply to the speeches of welcome, Dr. Green noted that ICAS had come of age, for it was 21 years ago that the first steps were taken to create this body, dedicated to co-operation between all countries having an interest in aeronautical science, and to encouragement of the free interchange of information on all phases of mechanical flight. He concluded his remarks with an analysis of the program for this Congress and how the papers to be presented addressed themselves to the more pressing of our common problems in aviation.

At the conclusion of the opening ceremonies, Dr. Richard D. Hiscocks, Vice-President, National Research Council of Canada, delivered the Daniel and Florence Guggenheim Memorial Lecture on "*The Dynamics of STOL*".

All of the papers presented at the Congress are contained in this volume of Proceedings, with the exception of one paper on the NASA Aircraft Energy Efficiency Program which can be procured, at no cost, by writing directly to NASA. A total of 56 papers were presented, from 14 countries. It was particularly gratifying that five of these were joint papers by authors from different countries. This development of truly co-operative international programs in aeronautics was an objective which Dr. Theodore von Karman, the founder and first President of ICAS, was striving to achieve.

Following the 9th Congress in Haifa, in 1974, the ICAS Council took steps to solicit papers for the 10th Congress which would discuss problem areas vital to the attainment of significant advances in aviation, and papers which would deal with advanced programs now at the early operational stage, or the stage of fruition. The Program Committee met at Zurich, on September 29, 1975, under the distinguished chairmanship of Dr. Raymond L. Bisplinghoff, to select the best papers from those submitted, for presentation at the Congress in Ottawa.

Broadly speaking, the papers chosen for the 10th Congress fell into six general areas — aerodynamics, structures and materials, power plants, STOL, operations, and environmental problems. To touch on the highlights, they dealt with new wind tunnels and extensions of wind tunnel technology; supercritical airfoils and aerodynamic advances for transonic flight; supersonic aerodynamics and experience with supersonic flight for commercial operations. In the area of STOL, there were review papers covering the history of our test and development experience, the current design philosophy, and one paper giving in-depth experience with a STOL demonstration system. There were papers which took a fresh look at the basics of flight testing and new developments in this field. There was a session devoted to composite materials, that very important field of development which holds much promise for the future of aircraft structures. There were papers, also, which discussed that all-important aspect of structural design — optimization problems — and others which dealt with vibration and fatigue. In the field of power plants, the emphasis seemed to be on the problems of internal aerodynamics, noise generation and propagation. There

was one important paper on the US program in aircraft fuel conservation technology, and several papers on environmental effects, especially noise and atmospheric pollution. Finally, there were papers on air traffic control which underlined the need for new concepts and explored and evaluated the potentials of such concepts for improved efficiency in the handling of air traffic.

Most of the papers were presented in simultaneous sessions but four papers were of sufficiently broad interest or importance that they were given as General Lectures in plenary sessions.

As in past Congresses, the papers provided an excellent opportunity for experts from many countries to discuss common problems of current and major concern. The very lively discussions which characterized all the sessions at this Congress were a testimony to the excellent choice displayed by the member societies of ICAS in the various countries, and by the Program Committee in its deliberations.

The Council is indebted to CASI, its Officers and Staff for hosting this Congress in Canada. In particular, special thanks are due to Air Commodore H.R. Footitt and the members of his Local Organizing Committee for their superb handling of all the arrangements and a host of details during the eighteen months prior, and up to, the Congress itself.

The success of the Congress program was due primarily to the authors of the papers, to whom the sincere thanks of the Council are extended. To the session Chairmen and Coordinators, some of whom accepted the invitation to serve only at the last minute when prior arrangements failed, our warm thanks are hereby recorded. To the many volunteers from the Ottawa Branch of the CASI, who came forward to help, and the projectionists who served so efficiently and cheerfully, we are greatly indebted. Finally, to the media — Press and TV — who covered the Congress with interest and understanding, I am happy to say "*thank you!*". The Council is most grateful to the National Research Council of Canada for permitting the arrangement of the Field Trip, on Wednesday afternoon, October 6, to the National Aeronautical Establishment, Uplands, Ont. Very special thanks are offered to the Staff of NAE who arranged the demonstrations, met the delegates and briefed them on the work in progress.

It is my pleasure to extend my thanks and appreciation to Mr. Robert R. Dexter, Executive Secretary of ICAS, whose unstinted efforts and unfailing goodwill have always contributed to the success of our Congresses. The American Institute of Aeronautics and Astronautics (AIAA), in New York, has provided the Secretariat for ICAS, since its creation, and has rendered to ICAS the strongest of support. Mrs. Anneliese C. Ranze of AIAA has, especially, rendered outstanding service in the organization of the 10th Congress and merits our warmest thanks.

In publishing these Proceedings every attempt is being made to save both time and cost. If this has led to sins either of commission or omission the indulgence and forgiveness of those affected are humbly requested.

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President, ICAS