

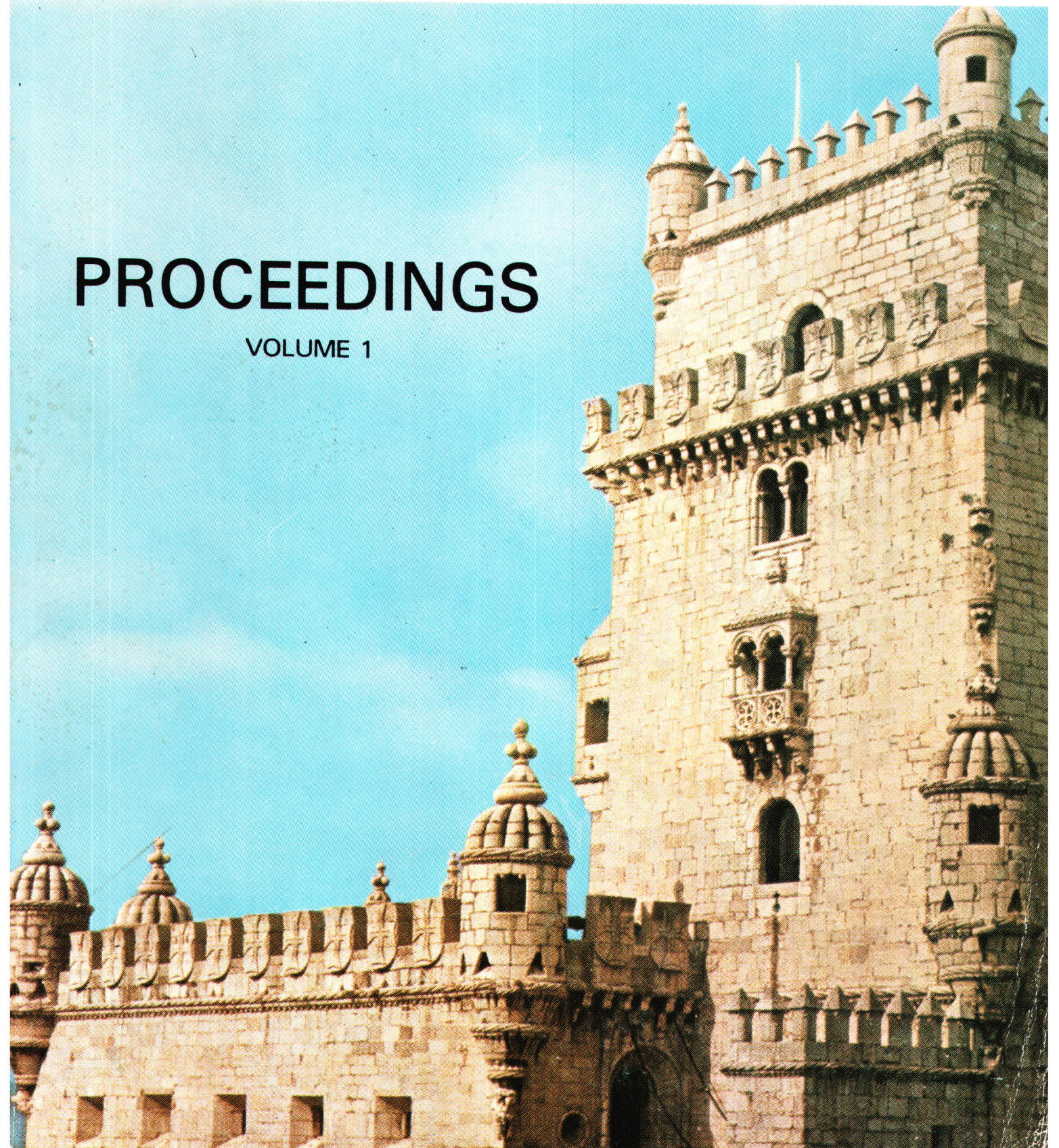
**ICAS**  
**1978**

**XI CONGRESS OF THE  
INTERNACIONAL COUNCIL OF THE  
AERONAUTICAL SCIENCES**

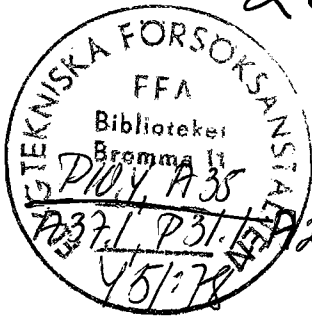
LISBON, PORTUGAL, 10-16 SEPTEMBER 1978

**PROCEEDINGS**

VOLUME 1



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ICAS 77



# ICAS PROCEEDINGS 1978

11th CONGRESS OF THE  
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10–16 September 1978

Lisboa / Portugal

edited by  
J. Singer and R. Staufenbiel

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## VOLUME 1

FUEL CONSERVATION, HYPERSONIC VEHICLES,  
ENVIRONMENTAL EFFECTS, MATERIALS and STRUCTURES,  
COMPUTATIONAL AERODYNAMICS, WIND TUNNELS,  
FLIGHT TESTING, STABILITY and CONTROL

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THE DANIEL AND FLORENCE GUGGENHEIM MEMORIAL LECTURE

The Role of Wind Tunnels  
in Future Aircraft Development

R. Smelt

In a dynamic field of activity, such as aeronautics, success might be said to come from the slogan "never look back". 'Seldom', might be a better word than 'never', for we sometimes can learn from past experience and mistakes. But certain it is that progress, fast and sure progress, comes from keeping one eye on the present, with its current problems, and one eye firmly fixed on the future and what problems it poses. As in past congresses, this one offers the opportunity for experts from many countries to meet, both formally and informally, to discuss these present and future problems, and ways in which they might be tackled and solved.

On behalf of the Council of ICAS, I offer its sincere thanks to the authors of the papers without whose efforts and contributions no congress could begin to be successful, nor its quality assured. To Dr. Cid, his Organizing Committee and the Grupo Português De Aeronáutica, our hosts, ICAS tenders its sincere thanks, not only for the warm invitation to hold this Congress in Lisbon but for the great effort which has been put into its organization and the excellent arrangements that have been made. Very special thanks are offered to all the many people who, under Dr. Cid's Committee's direction are "the troops" who will attend to all the day to day operations and the multitude of detailed arrangements and services which go into the smooth running of a congress of this nature.

To Professor Josef Singer, Chairman of the ICAS Program Committee, the thanks of the Council are tendered for the excellence of the 'fare' he has provided.

This is the first time that we have tried to have the Proceedings available at the opening of the Congress. Due to the tight schedule for preparing and printing the material in time, this was only partly successful. Volume 1, being on schedule, contains only 80 % of the papers to be presented at the Congress. The remaining papers, sent a little bit too late to the editors, will be collected in Volume 2 and published at a later date.

Finally, it is my pleasure to extend cordial thanks and appreciation to Prof. Dr.-Ing. Rolf W. Staufenbiel, Executive Secretary of ICAS, and the Deutsche Gesellschaft für Luft- und Raumfahrt e. V., which now provides the ICAS Secretariat, for their strong support and goodwill, in liaison with Dr. Cid, which are indispensable ingredients in the success of this Congress. Mrs. Helga Will of DGLR merits our warmest thanks and appreciation for the outstanding service she has rendered in the organization of the Congress.

June 17, 1978

John J. Green  
President, ICAS