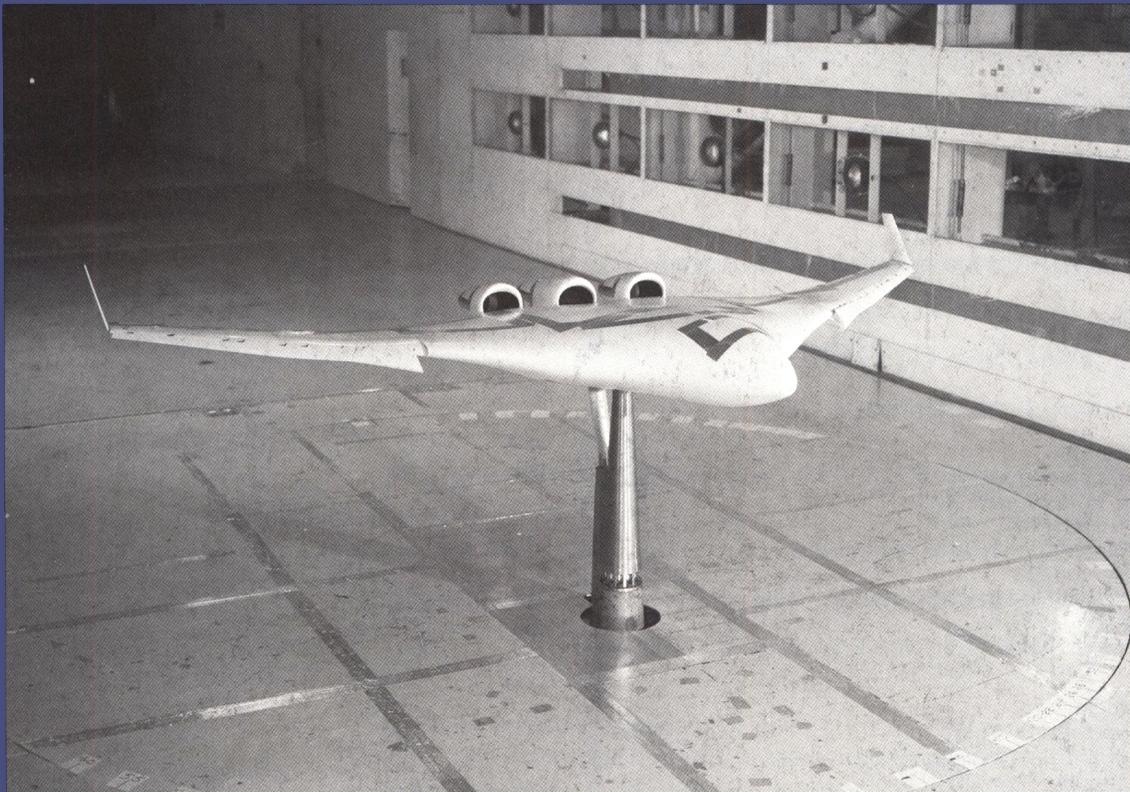




The
**AERONAUTICAL
JOURNAL**



ICAS 2000 special issue – part one

Volume 104, Number 1038

August 2000

Aims and scope

The aims and scope of *The Aeronautical Journal* are intended to reflect the objectives of the Royal Aeronautical Society as expressed in its Charter of Incorporation. Briefly, these are to encourage and foster the advancement of all aspects of aeronautical and space science. Thus the topics of the *Journal* include most of those covered by the various Specialist Groups of the Society, which are: aerodynamics, air law, air transport, airworthiness and maintenance, aviation medicine, avionics and systems, flight operations, flight simulation, guided flight, human factors, human powered flight, light aviation, management studies, propulsion, rotorcraft, space, structures and materials, systems and test procedures.

Papers are therefore solicited on all aspects of research, design and development, construction and operation of aircraft and space vehicles. Papers are also welcomed which review, comprehensively, the results of recent research developments in any of the above topics.

Editorial Advisory Committee

Chairman: Prof Peter Bearman
Editor: Prof John Stollery

Aerodynamics

Tony Cross Manager — Aerodynamic Technology
BAE Systems

Avionics/Simulation

Prof David Allerton Head, Department of Avionics, College of
Aeronautics, Cranfield University

Materials

Dr Mike Hicks Head of Materials, Rolls-Royce Aerospace

Propulsion

Dr Peter Stow Head of Aerothermal Methods,
Rolls-Royce Aerospace Group

Rotorcraft

Alan Vincent Head of Engineering, GKN Westland
Dr Gareth Padfield James Bibby Professorship, Aerospace
Engineering, University of Liverpool

Space

Roy Gibson Consultant (Former Director General of
the European Space Agency)

Structures

Prof Glyn Davies Senior Research Fellow, Department of
Aeronautics, Imperial College, London

Systems

Prof Donald McLean Professor of Flight Control, Department of
Aeronautics and Astronautics,
University of Southampton

Testing

Dr Graham Coleman Chief Scientist (Aircraft Systems),
DERA Farnborough

Subscriptions

The Aeronautical Journal

Non-members

Annual subscription (12 issues) £299
Single copies, including back issues £30

From: Royal Aeronautical Society
Publications Subscriptions Department
Bradley Pavilions
Bradley Stoke North
Bristol BS32 0PP, UK
Tel: +44 (0)1454 620070 Fax: +44 (0)1454 620080
e-mail: cihotline@aol.com

RAeS members

Annual subscription (12 issues) £50
Single copies, including back issues £5

From: Professional Affairs Department
Royal Aeronautical Society
4 Hamilton Place
London W1J 7BQ, UK
Tel: +44 (0)20 7670 4300 Fax: +44 (0)20 7499 6230

e-mail: professional@raes.org.uk

RAeS Conference Proceedings

Details, price and availability of Royal Aeronautical Society
Conference Proceedings can be obtained from:

Conference Department
Royal Aeronautical Society
4 Hamilton Place
London W1J 7BQ, UK
Tel: +44 (0)20 7670 4300 Fax: +44 (0)20 7670 4349
e-mail: conference@raes.org.uk

Submissions

To submit a paper to *The Aeronautical Journal*, THREE printed manuscripts along with high quality figures (see Guidelines for Authors, p 346) should be sent to the Editor at

John Stollery
Royal Aeronautical Society
4 Hamilton Place
London
W1J 7BQ
United Kingdom

For further advice on submitting papers to *The Aeronautical Journal*, please refer to the Guidance for Authors on page 346. If previously agreed with the editorial staff, it may be possible to supply a paper in a different format.

The Royal Aeronautical Society reserves the right to reject a paper which is not submitted in the required manner.



Contents

Volume 104, Number 1038

Reproduction of any of the papers published in this journal is not permitted without the written consent of the Editor.

Editor

Professor J L Stollery CBE DSc(Eng) FEng FAIAA
HonFRAeS

Managing Editor

C S C Male BSc(Eng) MRAeS

Production Editor

G T Corsi BEng(Hons) GradRAeS

Production Assistant

Bill Read MA(Econ)

Production coordinator

Davina Rodrigues BSoc Sc

Publisher

Royal Aeronautical Society (RAeS)
4 Hamilton Place
London W1J 7BQ, UK
Tel: +44 (0)20 7670 4300
Fax: +44 (0)20 7499 6230
e-mail: raes@raes.org.uk
publications@raes.org.uk

<http://www.aerosociety.com>

The Royal Aeronautical Society
is a registered charity: No 313708

RAeS Director

K D R Mans BA FRAeS

The content does not necessarily express
the opinion of the Council of the Royal
Aeronautical Society.

Advertisement Sales

David Holmes, Advertisement Sales Director
The Media Centre
East Rudham
King's Lynn
Norfolk PE31 8RD
United Kingdom
Tel: +44 (0)1485 528020
Fax: +44 (0)1485 528022
e-mail: mcentre@aol.com

Subscriptions
See left

Printers
Manor Creative Limited
7 and 8 Edison Road
Eastbourne
East Sussex
BN23 6PT
United Kingdom

ISSN: 0001-9240

Published monthly

Introduction	336
B.E. Launder CFD for aerodynamic turbulent flows: progress and problems	337
N.T. Birch 2020 vision: the prospects for large civil aircraft propulsion	347
C.A. Powell and J.S. Preisser NASA subsonic jet transport noise reduction	353
P. G. Thomasson Modelling, simulation and flight test experience in the development of unstable robotic aircraft	359
A. Kumar and J. N. Hefner Future challenges and opportunities in aerodynamics	365
K. Early Propulsion airframe integration design, analysis and challenges going into the 21st century	375
C. Fielding and M. Lodge Stability and control of STOVL aircraft: The design of longitudinal flight control laws	383
Book Reviews	390
B.P. Lee Recent experience in flight testing for pilot induced oscillations (PIO) on transport	391

Front cover: A blended wing body model tested at NASA Langley.