# Journal of

## THE ROYAL AERONAUTICAL SOCIETY

INCORPORATING THE INSTITUTION OF AERONAUTICAL ENGINEERS AND THE HELICOPTER ASSOCIATION OF GREAT BRITAIN

## Published Monthly at 4 HAMILTON PLACE, LONDON, W1 Telephone: Grosvenor 3515-9 Telegrams: Didaskalos, London, W1

Subscriptions: £10 10s. 0d. per annum, post free

Single Copies: 17s. 6d.

Advertisements only: J. W. Williams, DFC, Magazine Advertising Ltd, 36-38 Whitefriars St., London, EC4.

Fleet Street 7539

VOLUME 69

**JUNE 1965** 

NUMBER 654

#### CONTENTS

Page **Notices** XLIII President-Elect and Vice-Presidents—New Fellows—Elections—Lecture by Richard Worcester—Other Meetings—Aircraft Design and Technology Meeting, Los Angeles—Annual General Meeting 6th May 1965—Acknowledgments—Royal Aeronautical Society Prize—Engineering Institutions Joint Council Report for 1964—News of Members—Reducing the Work-Load in the Cockpit. **XLVII** The Branches Graduates' and Students' Section XLVIII Modern Solutions to Coupling and Transmission Problems of 365 Aircraft Engines M. Bruyere The Present and Future State of the Aircraft Industry—A discussion 380 Hovercraft Noise and its Suppression E. J. Richards and I. J. Sharland 387 Air Transport Auxiliary: Its Place in Aviation History P. A. Wills 399 British Aviation—What Went Wrong?—Correspondence 403 Technical Notes 406 Application of Time-resolved Interferometry to Shock-tube Performance Studies-N. H. Johannesen and H. K. Zienkiewicz. An Empirical Formula for Stagnation Point Velocity Gradient for Spheres and Circular Cylinders in Hypersonic Flow—D. R. Topham. Stress Measurements in a Plate containing Two Reinforced Circular Holes using a Photoelastic Method—Shin-ichi Suzuki. Stresses in a Square Plate having a Central Circular Hole—G. A. O. Davies. Similarity Relations for Vibrating Cylinder with Temperature Gradient Across the Thickness—V. J. Modi. Use of Longeron Anchored Cables in Multilobed Liquid Booster Tanks-B. Klein. 418

Reviews: Practical Aerodynamics—Celestial Mechanics and Astrodynamics—Airline Management—Of Flight and Fliers—British Military Aircraft Serials 1912-1963—Analysis and Design of Flight Vehicle Structures—Ultrasonic Cutting—XIII International Astronautical Congress, Varna, 1962—Handbook of Analytical Design for Wear—The World's Fighting Planes—Torques and Attitude Sensing in Earth Satellites—Supersonic Flow, Chemical Processes and Radiative Transfer.

Additions to the Library

Reports

All communications for publication in the JOURNAL should be addressed to the Editor, JOAN BRADBROOKE, ARAES; all communications on general matters affecting the Society should be addressed to the Secretary, A. M. BALLANTYNE, TD, BSc, PhD, FRAES, HonFCASI, FAIAA—at 4 HAMILTON PLACE, LONDON, W1.

Reproduction in whole or in part of any of the papers and contributions published in this Journal is not permitted without the written consent of the Royal Aeronautical Society.

None of the papers or paragraphs must be taken as expressing the opinion of the Council of the Royal Aeronautical Society unless otherwise stated.

# The Royal Aeronautical Society

**FOUNDED 1866** 

INCORPORATED BY ROYAL CHARTER 1949

Patron: HER MAJESTY THE QUEEN

### COUNCIL 1965-1966

President: SIR GEORGE GARDNER, KBE, CB, DSc, HonFRAeS

President-Elect: A. D. BAXTER, MEng, FRAeS

#### Past-Presidents:

B. S. SHENSTONE, MASc, FAIAA, FCASI, FRAeS PROFESSOR A. R. COLLAR, CBE, MA, DSc, FRS, FAIAA, FCASI, FRAeS H. H. GARDNER, BSc, FRAeS

#### Vice-Presidents:

AIR COMMODORE F. R. BANKS, CB, OBE, CGIA, HonFAIAA, FRAeS M. B. MORGAN, CB, MA, FRAeS D. KEITH-LUCAS, MA, FRAeS

#### Members:

PROFESSOR J. A. J. BENNETT, DSc, PhD, FAIAA, FRAeS
(Also Chairman, Rotorcraft Section)

MAJOR G. P. BULMAN, CBE, BSc, FRAeS
R. H. BURRIN, GradRAeS (Chairman, Graduates' and Students' Section)

SIR SYDNEY CAMM, CBE, HonFRAES
DR. W. CAWOOD, CB, CBE, BSc, FRAES
A. V. CLEAVER, OBE, AFAIAA, FRAES
SIR ROBERT COCKBURN, KBE, CB, MSc, PhD, FRAES
L. P. COOMBES, CBE, DFC, BSc(Eng), FCGI, FAIAA, HonFRAES
(President of the Australian Division)

S. D. DAVIES, BSc(Eng), FRAES
SIR WILLIAM FARREN, CB, FRS, HonFAIAA, HonFRAES
DR. G. S. HISLOP, BSc, ARCST, FRAES
WING COMMANDER E. J. HOLDEN, MBE, AFRAES, RAF
COLONEL L. E. LANG, AFRAES
(President of the Southern Africa Division)
PROFESSOR M. J. LIGHTHILL, DSc, FRS, FRAES
A. A. LOMBARD, FRAES
P. G. MASEFIELD, MA, HonFAIAA, FRAES
DR. E. S. MOULT, CBE, BSc, FRAES
W. N. NEAT, MA, FRAES (Chairman, Astronautics and Guided Flight Section)
CAPTAIN M. O'DONOVAN, AFRAES
(President of the Rhodesia Division)
F. W. PAGE, CBE, MA, FRAES
PROFESSOR E. J. RICHARDS, OBE, MA, DSc, FRAES
G. T. WANSBROUGH-WHITE, ARAES
K. G. WILKINSON, BSc, DIC, ACGI, FRAES
GROUP CAPTAIN W. G. WOODWARD, OBE, BE, AFRAES, RNZAF
(President of the New Zealand Division)

### Officers:

Hon. Treasurer: MAJOR G. P. BULMAN, CBE, BSc, FRAeS Solicitor: L. A. WINGFIELD, MC, DFC, ARAeS Secretary: DR. A. M. BALLANTYNE, TD, BSc, FAIAA, HonFCASI, FRAeS

Note: The President of each Division and the Chairman of each Section of the Society is a Member of Council by reason of his office.