

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, W.1

Telephone: Grosvenor 3515-9

Telegrams: Didaskalos, Audley, London

SUBSCRIPTIONS: £7 10s. 0d. PER ANNUM, PLUS 9s. POSTAGE AND PACKING

SINGLE COPIES: 12s. 6d. PLUS 9d. POSTAGE AND PACKING

VOLUME 64

NOVEMBER 1960

NUMBER 599

CONTENTS

Notices

Christmas Holiday—Lecture Theatre Opening Ceremony—Associate Fellowship Examination, December 1960—The Library—Lecture Theatre Appeal—The New By-Laws—Symposium on Supersonic Transport Aircraft—Univac Computer Courses—Symposium on Electromagnetics and Fluid Dynamics of Gaseous Plasma—N. E. Rowe Medal Competition—Diary—Elections—Annual Subscriptions—Letter from Chief Inspector of Taxes—News of Members—Changes of Address or Appointment—Faraday Lectures 1960/61—JOURNAL Binding—Society of Environmental Engineers—Lecture Summaries.

Relationship Between Theory and Practice in Aircraft Structural Problems

A. J. TROUGHTON 653

Some Experiments on the Reattachment of a Laminar Boundary Layer Separating from a Rearward Facing Step on a Flat Plate Aerofoil

T. W. F. MOORE 668

Creep-Stress Analysis of Thin-Walled Structures

S. A. PATEL, K. A. V. PANDALAI
and B. VENKATRAMAN 673

Transonic Buffeting on Aerofoils

C. J. WOOD 683

A History of the Development of Flight Refuelling

J. A. MILLER 687

Technical Notes

The Three-Dimensional Turbulent Boundary Layer—D. R. BLACKMAN and
P. N. JOUBERT. Shear Flow Past a Wing of Circular Plan Form—L. N. NIGAM.
The Natural Frequencies of Free and Constrained Non-Uniform Beams—
R. P. N. JONES and S. MAHALINGAM. The Performance of Ram-Jet Combustion Systems—Comment by S. W. GREENWOOD and Reply by L. A. POVINELLI.
The Hydro Biplane, Windermere, 1912—HERBERT à BRASSARD—H. F. COWLEY.

The Branches

702

Graduates' and Students' Section

703

The Library

704

REVIEWS: The Aerodynamics of Powered Flight—Basic Electronics—
Advances in Astronautical Sciences—The Smirnoff Story—The Exploration
of Space—Heat Exchangers: Applications to Gas Turbines—Design for
Flight.

ADDITIONS TO THE LIBRARY. REPORTS.

All communications for publication in the JOURNAL should be addressed to the Editor, JOAN BRADBROOK, A.R.Ae.S.; all communications on general matters affecting the Society should be addressed to the Secretary, A. M. BALLANTYNE, T.D., B.Sc., Ph.D., F.R.Ae.S., Hon.F.C.A.I., F.I.A.S.

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

ADVERTISEMENT OFFICE: Oxford House, 15 Crosswall, London E.C.3. Royal 7768.

PRINTED BY THE LEWES PRESS, WIGHTMAN & CO. LTD., LEWES, SUSSEX, ENGLAND, AND PUBLISHED
BY THE ROYAL AERONAUTICAL SOCIETY, 4 HAMILTON PLACE, LONDON, W.1, ENGLAND



The Royal Aeronautical Society

(Founded 1866)

PATRON
HER MAJESTY THE QUEEN

COUNCIL 1960—1961

PRESIDENT

DR. E. S. MOULT, C.B.E., B.Sc.(Eng.), F.R.Ae.S., M.I.Mech.E.

PAST-PRESIDENTS

SIR GEORGE EDWARDS, C.B.E., B.Sc., Hon.F.R.Ae.S., Hon.F.I.A.S.

SIR ARNOLD HALL, M.A., F.R.S., F.R.Ae.S.

PETER G. MASEFIELD, M.A., F.R.Ae.S., Hon.F.I.A.S., M.Inst.T.

PRESIDENT-ELECT

AIR MARSHAL SIR OWEN JONES, K.B.E., C.B., A.F.C., B.A., D.I.C.,
F.R.Ae.S., M.I.Mech.E.

VICE-PRESIDENTS

AIR COMMODORE F. R. BANKS, C.B., O.B.E., C.G.I.A., F.R.Ae.S.,
Hon.F.I.A.S., M.I.Mech.E.

PROFESSOR A. R. COLLAR, M.A., D.Sc., F.R.Ae.S., F.I.A.S.
B. S. SHENSTONE, M.A.Sc., F.R.Ae.S., F.C.A.I., A.F.I.A.S.

ORDINARY MEMBERS

A. D. BAXTER, M.Eng., F.R.Ae.S., M.I.Mech.E.

PROFESSOR J. A. J. BENNETT, D.Sc., Ph.D., D.I.C.,
F.R.Ae.S. (Chairman, Rotorcraft Section)

MAJOR G. P. BULMAN, C.B.E., B.Sc., F.R.Ae.S.

SIR SYDNEY CAMM, C.B.E., F.R.Ae.S.

DR. W. CAWOOD, C.B., C.B.E., B.Sc., F.R.Ae.S.

A. V. CLEAVER, F.R.Ae.S., F.B.I.S. (Chairman,
Astronautics and Guided Flight Section)

SIR ROBERT COCKBURN, K.B.E., C.B., O.B.E.,
M.Sc., Ph.D., A.F.R.Ae.S.

SIR WILLIAM S. FARREN, C.B., M.B.E., M.A., D.Sc.,
F.R.S., Hon.F.R.Ae.S., Hon.F.I.A.S.,
M.I.Mech.E.

L. G. FRISE, B.Sc., F.R.Ae.S., A.F.I.A.S.
SIR GEORGE GARDNER, K.B.E., C.B., D.Sc.,
F.R.Ae.S., M.I.Mech.E.

H. H. GARDNER, B.Sc., F.R.Ae.S.

DR. G. S. HISLOP, B.Sc., Ph.D., A.R.C.S.T.,
F.R.Ae.S.

D. KEITH-LUCAS, M.A., F.R.Ae.S., M.I.Mech.E.

M. B. MORGAN, C.B., M.A., F.R.Ae.S.

D. A. PATTERSON, M.B.E., A.R.Ae.S.
(President, New Zealand Division)

SQN. LDR. R. C. G. T. ROGERS, D.C.Ae.,
A.F.R.Ae.S., R.A.F.

N. E. ROWE, C.B.E., D.I.C., B.Sc., F.R.Ae.S.,
M.I.Mech.E., A.C.G.I., M.Inst.T., F.C.G.I.

A. A. RUBBRA, B.Sc., F.R.Ae.S., M.I.Mech.E.

DR. R. R. SHAW, B.Mech.E., A.F.R.Ae.S.,
A.M.I.E., A.M.I.Mech.E.

(President, Australia Division)

PROFESSOR S. SMOLENIEC, A.F.R.Ae.S.
(President, Southern Africa Division)

AIR MARSHAL SIR HERBERT D. SPRECKLEY, K.B.E.,
C.B., F.R.Ae.S., M.I.Mech.E.

W. TYE, O.B.E., B.Sc., F.R.Ae.S.

W. G. WILSON, Grad.R.Ae.S.
(Chairman, Graduates' and Students' Section)

T. A. WOLSTENHOLME, A.R.Ae.S.

OFFICERS

Hon. Treasurer: MAJOR G. P. BULMAN, C.B.E., B.Sc., F.R.Ae.S.

Solicitor: L. A. WINGFIELD, M.C., D.F.C., A.R.Ae.S.

Secretary: A. M. BALLANTYNE, T.D., B.Sc.(Eng.), Ph.D., F.R.Ae.S.,
Hon.F.C.A.I., F.I.A.S.

NOTE: Under the revised By-Laws, allowed on 11th January 1960, the President of each Division and the Chairman of each Section of the Society is a Member of Council by reason of his office.

November 1960