

Journal of
THE ROYAL AERONAUTICAL SOCIETY

WITH WHICH IS INCORPORATED THE INSTITUTION OF AERONAUTICAL ENGINEERS

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 62

FEBRUARY 1958

NUMBER 566

CONTENTS

	PAGE
Notices	VII
Presidential Address—New Year's Honours List—The Eleventh Louis Bleriot Lecture—American Honour Awarded to a Member—Nomination of Candidates for Council—Associate Fellowship Examinations, June 1958— Radio Aids to Aeronautical and Marine Navigation—International Analogy Computation Meeting—Acknowledgments—Royal Society of Arts Prizes— The Use of Magnesium in Aircraft Structures—Diary—Elections—News of Members—Annual Subscriptions—AGARD Meetings—Symposium on Rarefied Gas Dynamics and Aerothermodynamics.	
The First Lanchester Memorial Lecture— Lanchester's Contributions to the Theory of Flight and Operational Research	79
THEODORE VON KÁRMÁN	
The Second Henson and Stringfellow Memorial Lecture— Replacement of Piston Engines by Gas Turbines in Air Liners	94
H. SAMMONS	
The Effects of Kinetic Heating on Aircraft Structures	105
A. W. KITCHENSIDE	
Flight Development of the Avro CF-100 Mark 5 Aircraft	118
D. C. WHITLEY	
The Pressure Jet Helicopter	123
A. STEPAN	
Technical Notes	132
A Method for Calculating the Energy Available in the Exhaust Gas at the Inlet End of an Exhaust Pipe of a Two- or Four-Stroke Cycle Engine— R. S. BENSON. An Experiment on Flat Plate Turbulent Boundary Layer Flow —The Effect of Local Fluid Addition on Friction and Velocity Distribution —HENRY BARROW. Safety and Large Aircraft—WALTER TYE, WILLIAM BROOKES AND DONALD HOWARD.	
Graduates' and Students' Section	140
The Library	141
REVIEWS: Flight Today—Cloud Study: A Pictorial Guide—Thermal Stresses—Boron, Calcium, Columbium and Zirconium in Iron and Steel— The Geography of Air Transport—The Rocket Pioneers—Proceedings of the Society for Experimental Stress Analysis, Vol. XV, No. 1.	
ADDITIONS TO THE LIBRARY.	REPORTS.

All communications for publication in, and advertisements for, the JOURNAL should be addressed to the Editor, JOAN BRADBROOKE, 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., Hon.F.C.A.I., A.F.I.A.S., F.R.Ae.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.

THE ROYAL AERONAUTICAL SOCIETY

Overseas Divisions

AUSTRALIA

President: L. P. COOMBES, D.F.C.,
F.R.Ae.S.
Hon. Secretary: W. ISBISTER,
Science House, [A.F.R.Ae.S.]
Gloucester & Essex Streets,
Sydney, New South Wales.

NEW ZEALAND

President: A/Cdre. G. N. ROBERTS,
C.B.E., A.F.C., A.R.Ae.S.
Hon. Secretary: T. T. N. COLERIDGE,
The Shell Com- [A.F.R.Ae.S.],
pany of New Zealand Ltd.,
Box 2091, Wellington.

SOUTHERN AFRICA

President: Prof. W. J. WALKER, F.R.Ae.S.
Hon. Secretary: Mrs. D. D. HUGHES,
c/o Southern Africa Office,
Bristol Aeroplane Co. Ltd.,
409/410 Winchester House,
Loveday Street, Johannesburg.

Overseas Branch

SINGAPORE President: Air Marshal The Earl of Bandon, K.B.E., C.B., C.V.O., D.S.O., R.A.F.
Chairman: Wg. Cdr. W. E. French, A.F.R.Ae.S.
Hon Secretary: Sqn. Ldr. D. K. Kempston, Officers Mess, Far East Air Force, Changi, Singapore.

Branches in the United Kingdom

BELFAST

President: Rear-Admiral Sir MATTHEW
S. SLATTERY, C.B., F.R.Ae.S.
Chairman: F. H. ROBERTSON, F.R.Ae.S.
Hon. Secretary: M. K. BOWDEN,
A.F.R.Ae.S., Short Brothers &
Harland Ltd., Queens Island,
Belfast.

BIRMINGHAM

President: F. F. CROCOMBE, F.R.Ae.S.
Chairman: H. BOTTOMS.
Hon Secretary: A. James, A.F.R.Ae.S.,
Sir W. G. Armstrong Whitworth
Aircraft Ltd., Warwick Chambers,
14-20 Corporation Street, Birming-
ham 2.

BOSCOMBE DOWN

President: Air Cdr. A. E. CLOUSTON,
C.B., D.S.O., D.F.C., A.F.C.
Chairman: D. E. MORRIS, F.R.Ae.S.
Hon. Secretary: Miss K. HARRISON,
A.F.R.Ae.S., A. & A.E.E., Bos-
combe Down, Amesbury, Wilts.

BRISTOL

President: Dr. A. E. RUSSELL, C.B.E.,
F.R.Ae.S.
Chairman: R. N. WESTAWAY.
Hon. Secretary: G. WANSBROUGH-
WHITE, A.R.Ae.S., Bristol Air-
craft Ltd., Filton, Bristol.

BROUGH

President: N. E. ROWE, C.B.E.,
F.R.Ae.S.
Chairman: M. G. K. BYRNE,
A.F.R.Ae.S.
Hon. Secretary: A. D. HOWARTH,
A.R.Ae.S., Blackburn & General
Aircraft Ltd., Brough.

CAMBRIDGE

President: Prof. W. A. MAIR, F.R.Ae.S.
Chairman: C. F. C. SNEESBY,
A.F.R.Ae.S.
Hon. Secretary: R. C. GODWIN,
A.F.R.Ae.S., Marshalls Flying
School, Newmarket Rd., Cam-
bridge.

CHESTER

President: J. C. CORBY, O.B.E.
Chairman: J. G. SHARP, A.F.R.Ae.S.
Hon. Secretary: B. V. POULSTON,
Thornton Research Centre, P.O.
Box 1, Chester.

CHRISTCHURCH

President: W. A. TAMBLIN, F.R.Ae.S.
Chairman: G. B. EVANS.
Hon. Secretary: H. E. VINCENT,
A.F.R.Ae.S., de Havilland Aircraft
Co. Ltd., Airspeed Div., Christ-
church Aerodrome, Hants.

COVENTRY

President: H. M. WOODHAMS, C.B.E.
F.R.Ae.S.
Chairman: W. J. PETERS,
Hon. Secretary: C. T. SCULTHORPE,
A.F.R.Ae.S., Sir W. G. Armstrong
Whitworth Aircraft Ltd., Whitley,
Coventry.

DERBY

President: J. D. PEARSON, F.R.Ae.S.,
Chairman: A. A. RUBBRA, F.R.Ae.S.
Hon. Secretary: W. R. BENDALL,
A.F.R.Ae.S., Rolls-Royce Ltd.

GLASGOW

President: Professor W. J. DUNCAN,
C.B.E., F.R.Ae.S.
Chairman: Dr. A. W. BABISTER,
A.F.R.Ae.S.
Hon. Secretary: W. N. ALCOCK,
Civil Engineer in Chief Depart-
ment, Admiralty, Dalnottar
House, Old Kilpatrick, Glasgow.

GLOUCESTER AND CHELTENHAM

President: R. H. BOUND, F.R.Ae.S.
Chairman: J. F. CUSS, A.F.R.Ae.S.
Hon. Secretary: J. G. RUSSELL,
A.F.R.Ae.S., Rotol Ltd., Glou-
cester.

HALTON

President: Air Vice-Marshal G. SILYN
ROBERTS, C.B.E., A.F.C., F.R.Ae.S.
Chairman: Gp. Capt. A. K. HUNTER,
O.B.E., A.F.R.Ae.S.
Hon. Secretary: Flt. Lt. J. BEATTIE,
A.R.Ae.S., Instrument Fitter
Flight, Technical Wing, R.A.F.
Halton.

HATFIELD

President: Sir GEOFFREY DE
HAVILLAND, C.B.E., A.F.C. Hon.
F.R.Ae.S.
Chairman: R. C. GRINTER, A.F.R.Ae.S.
Hon. Secretary: J. A. KIRK,
A.F.R.Ae.S., de Havilland Aircraft
Co. Ltd., Hatfield, Herts.

HENLOW

President: Air Cdre. T. U. C. SHIRLEY,
C.B.E., F.R.Ae.S.
Chairman: D. CLAYSON, A.F.R.Ae.S.
Hon. Secretary: Flt. Lt. A. H. CRAVEN,
A.F.R.Ae.S., R.A.F. Technical
College Mess, Henlow, Beds.

ISLE OF WIGHT

President: Sir ARTHUR GOUGE, Hon.
F.R.Ae.S.
Chairman: H. KNOWLER, F.R.Ae.S.
Hon. Secretary: L. W. ROSENTHAL,
A.F.R.Ae.S., Saunders-Roe Ltd.,
E. Cowes, Isle of Wight.

LEICESTER

Chairman: K. B. AYERS, A.F.R.Ae.S.
Hon. Secretary: M. G. RUSSELL,
A.R.Ae.S., Design Office, Auster
Aircraft, Rearsby, Leics.

LONDON AIRPORT

President: G. W. HALL, F.R.Ae.S.
Chairman: B. S. SHENSTONE, F.R.Ae.S.
Hon. Secretary: N. BROWN, A.R.Ae.S.,
c/o B.O.A.C. H.Q., London Air-
port, Middx.

LUTON

President: A. T. SLATOR.
Chairman: H. E. CURTISS.
Hon. Secretary: L. A. WILLOTT,
A.F.R.Ae.S., Hunting Aircraft
Ltd., Luton Airport.

MANCHESTER

President: Sir ROY H. DOBSON, C.B.E.,
J.P., Hon.F.R.Ae.S.
Chairman: C. E. FIELDING, O.B.E.,
F.R.Ae.S.
Hon. Secretary: J. A. E. WATERFALL,
56 Manor Avenue, Ashton-on-
Mersey, Cheshire.

MERTHYR TYDFIL

President: CHARLES MCGIBBON.
Chairman: J. INGRAM.
Hon. Secretary: J. McLAUGHLIN,
D.S.O., D.F.C., Teddington Con-
trols Ltd., Cefn Coed, nr. Merthyr
Tydfil, South Wales.

PRESTON

President: Sir GEORGE H. NELSON.
Chairman: E. LOVELESS, A.F.R.Ae.S.
Hon. Secretary: J. H. GROUT,
Grad.R.Ae.S., Aircraft Division,
English Electric Co. Ltd., Warton
Aerodrome, nr. Preston.

READING

President: Sir FREDERICK HANDLEY
PAGE, C.B.E., Hon.F.R.Ae.S.
Chairman: R. J. FENNER, A.F.R.Ae.S.
Hon. Secretary: E. L. PEARSON,
A.R.Ae.S., Handley Page (Reading)
Ltd., The Aerodrome, Woodley,
Reading.

SOUTHAMPTON

Chairman: D. B. SMITH, O.B.E.,
A.F.R.Ae.S.
Hon. Secretary: J. W. WARRISS,
A.F.R.Ae.S., Air Service Training
Ltd., Hamble, Hants.

SOUTHEND

President: B. F. COLLINS, A.R.Ae.S.
Chairman: S. J. SMYTH, A.F.R.Ae.S.
Hon. Secretary: J. L. MORT,
A.F.R.Ae.S., c/o Aviation Traders
(Eng.) Ltd., Southend Airport,
Essex.

SWINDON

Chairman: W. GILLESPIE, A.F.R.Ae.S.
Hon. Secretary: J. ROSE, A.F.R.Ae.S.,
Vickers-Armstrongs (Aircraft) Ltd.,
Supermarine Works,
South Marston, Swindon.

WEYBRIDGE

President: SIR GEORGE EDWARDS,
C.B.E., F.R.Ae.S.
Chairman: H. H. GARDNER, F.R.Ae.S.
Hon. Secretary: E. G. BARBER,
A.R.Ae.S., Vickers - Armstrongs
(Aircraft) Ltd., Weybridge.

YEOVIL

President: E. C. WHEELDON.
Chairmen: D. L. HOLLIS-WILLIAMS,
F.R.Ae.S., and
Dr. E. W. STILL, F.R.Ae.S.
Hon. Secretary: L. A. LANSDOWN,
A.F.R.Ae.S., Westland Aircraft
Ltd., Yeovil.