

THE
AERONAUTICAL JOURNAL
VOL.—LXIX

THE ROYAL AERONAUTICAL SOCIETY

The Journal of the Royal Aeronautical Society

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

VOLUME LXIX

JANUARY - DECEMBER 1965

Edited for the Council of The Royal Aeronautical Society

by

Joan Bradbrooke, ARaES

Printed by the Lewes Press Wightman and Co. Ltd., Friars Walk, Lewes, Sussex
and Published by the Royal Aeronautical Society, 4 Hamilton Place, London W.1

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

APRIL 1965

NUMBER 652

CONTENTS

	Page
Notices	XXIX
<p style="margin-left: 20px;">Easter Holiday—Winston Churchill Memorial Appeal—Honours Awarded to Members—Library Notes—The EIJC—New Fellows—Symposium on Cheap Short-Range Air Transport—Third Handley Page Memorial Lecture—Acknowledgment—Engineers' Foreign Language Circle—XVI IAF Congress, Athens—Diary—Other Meetings—Postgraduate Courses for Production Engineers—Elections—Studentship for Research into Transport—Test Pilots' Group: ETPS News—News of Members—Lecture Summaries.</p>	
The Branches	XXXIII
Graduates' and Students' Section	XXXIV
Symposium on Future Developments in the Air Transport System	211
Potential Traffic Demand in the London Area	A. H. Watson
Scheduling of Commercial Air Movements: The Airline Point of View	R. Watts
The Organisation and Control of Air Traffic in a Terminal Area	A. H. Jessell and D. A. Blake
Application of Electronic Aids to Control of Terminal Area Air Traffic	S. Ratcliffe and S. S. D. Jones
Aircraft Design Possibilities	R. H. Whitby
The Impact of VTOL on the Air Transport System	I. Chichester-Miles
Summary of Discussions	J. A. Shaw
Balance of Helm and Static Directional Stability of Yachts Sailing Close-Hauled	J. S. Letcher, Jr. 241
Annual Report of the Council 1964-65	249
Technical Notes	274
<p style="margin-left: 20px;">Ice from a Cloudless Sky—A. E. Carte. The Maximum Pressure Rise Attainable in Subsonic Diffusers—B. S. Stratford and H. Tubbs. Buckling of Orthotropic Circular Plates—K. A. V. Pandalai and S. A. Patel. Dissertation on "The Rank Technique" and its Applications—J. Robinson. Correspondence on a New "Number" for Aircraft with Power-Augmented Circulation.</p>	
The Library	284
<p style="margin-left: 20px;">REVIEWS: Manned Spacecraft: Engineering Design and Operation—Bristol Aircraft since 1910—Manual on Aircraft Loads.</p>	
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

OVERSEAS DIVISIONS

Australia

President: L. P. COOMBES, CBE, HonFRAeS.
Hon. Secretary: W. ISBISTER, FRAeS, Science House, Gloucester & Essex Streets, Sydney, New South Wales.
Branches at: Canberra, Sydney, Melbourne and Adelaide.

Rhodesia

President: Capt. M. O'DONOVAN, AFRAeS.
Hon. Secretary: S. H. GUY, ARAeS, c/o Central African Airways, Private Bag 1, Salisbury Airport, Salisbury.
Branches at: Bulawayo and Gwelo.

New Zealand

President: B. CORNTHWAITE, AFRAeS.
Hon. Secretary: T. T. N. COLERIDGE, AFRAeS, The Shell Company of New Zealand Ltd, Box 2091, Wellington.
Branches at: Auckland, Wellington, Palmerston North and Christchurch.

Southern Africa

President: Col. L. E. LANG, AFRAeS.
Hon. Secretary: A. W. BENNELL, PO Box 4409, Johannesburg.
Branches at: Johannesburg and Pretoria.

BRANCHES IN THE UNITED KINGDOM

Belfast

President: D. KEITH-LUCAS, FRAeS.
Chairman: E. G. COLLINSON, FRAeS.
Hon. Secretary: D. SAUNDERS, AFRAeS, Short Bros. & Harland Ltd, Castlereagh, Belfast, Tel: Belfast 59271.

Birmingham and Wolverhampton

President: A. RATCLIFFE.
Chairman: Dr. L. W. J. NEWMAN, AFRAeS.
Hon. Secretary: G. O. FRAMPTON, AFRAeS, H. M. Hobson Ltd, Fordhouses, Wolverhampton, Staffs. Tel: Fordhouses 2381.

Boscombe Down

President: Air Cdre. F. R. BIRD, DSO, DFC, AFC.
Chairman: G. MACLAREN-HUMPHREYS, MBE, AFRAeS.
Hon. Secretary: Sqn. Ldr. H. H. HORSHAM, MBE, ARAeS, A & AEE, Boscombe Down, Amesbury, Wilts. Tel: Amesbury 3331, Ext 2143.

Bristol

President: Dr. W. J. STRANG, FRAeS.
Chairman: K. B. CHAMBERLAIN, FRAeS.
Hon. Secretary: W. O. LEE, ARAeS, BAC (Op) Ltd, Filton Division, Filton, Bristol 7. Tel: Bristol 693831, Ext 499.

Brough

President: Capt. E. D. G. LEWIN, CB, CBE, DSO, AFRAeS.
Chairman: A. G. SMITH, FRAeS.
Hon. Secretary: A. D. HOWARTH, ARAeS, c/o Hawker Siddeley Aviation Ltd, Hawker-Blackburn Division, Brough, Yorkshire. Tel: Brough 667121, Ext 314.

Cambridge

President: Professor W. A. MAIR, FRAeS.
Chairman: R. O. GATES, AFRAeS.
Hon. Secretary: E. M. J. SCHAFFTER, AFRAeS, Marshall of Cambridge (Engineering) Ltd, Aircraft Division, Airport Works, Cambridge. Tel: Cambridge 56291.

Chester

President: C. B. V. NEILSON, AFRAeS.
Chairman: F. G. EVANS, FRAeS.
Hon. Secretary: G. W. MONNINGTON, AFRAeS, Electro-Hydraulics Ltd, Liverpool Road, Warrington, Lancs. Tel: Warrington 35922.

Christchurch

President: E. W. J. GRAY, FRAeS.
Chairman: H. E. VINCENT, AFRAeS.
Hon. Secretary: J. F. BRENNAN, ARAeS, c/o BAC (Op) Ltd, Weybridge Division, Bourne-mouth (Hurn) Airport, Christchurch, Hants. Tel: Northbourne 3201.

Coventry

President: J. WRIGHT, CBE, FRAeS.
Chairman: D. A. WOODLEY, AFRAeS.
Hon. Secretary: J. G. LUM, AFRAeS, Wind Tunnel Dept, Hawker Siddeley Dynamics Ltd, Whitley, Coventry, Warwickshire. Tel: Tollbar 3271, Ext 121.

Derby

President: Sir DENNING PEARSON, HonFRAeS.
Chairman: H. PEARSON, FRAeS.
Hon. Secretary: V. R. HAAS, AFRAeS, Rolls-Royce Ltd, Derby. Tel: Derby 42424.

Glasgow

President: Dr. A. W. BABISTER, AFRAeS.
Chairman: Wm. H. G. FINLAY, ARAeS.
Hon. Secretary: W. N. ALCOCK, Shenhstone, Dumbuck Crescent, Dumbarton.

Gloucester and Cheltenham

President: K. FEARNSIDE, FRAeS.
Chairman: J. G. RUSSELL, AFRAeS.
Hon. Secretary: C. E. HUTT, ARAeS, c/o S. Smith & Sons (England) Ltd, Bishops Cleeve, Cheltenham, Glos. Tel: Bishops Cleeve 3333.

Halton

President: Air Vice-Marshal J. K. ROTHERHAM, CB, CBE, AFRAeS.
Chairman: Gp. Capt. R. C. FORDHAM, CBE, AFRAeS.
Hon. Secretary: Sqn. Ldr. J. MACKINTOSH, Officers' Mess, RAF Halton, Bucks. Tel: Wendover 2242, Ext 310.

Hatfield

President: Sir GEOFFREY DE HAVILLAND, OM, CBE, AFC, HonFRAeS.
Chairman: F. MARKING, AFRAeS.
Hon. Secretary: G. B. EVANS, AFRAeS, Drawing Office, Hawker Siddeley Aviation Ltd, de Havilland Division, Hatfield, Herts. Tel: Hatfield 2345, Ext 274.

Henlow

President: J. HANSON, FRAeS.
Chairman: F. O'HARA, AFRAeS.
Hon. Secretary: Flt. Lt. D. WILLIAMS, Officers' Mess, RAF Technical College, Henlow, Beds. Tel: Henlow Camp 391.

Isle of Wight

President: H. KNOWLER, FRAeS.
Chairman: W. H. J. DIBBENS, AFRAeS.
Hon. Secretary: B. J. SUMMERS, GradRAeS, Design Office, Westland Aircraft Ltd, Saunders-Roe Division, Osborne, Isle of Wight. Tel: Cowes 2211.

Leicester

President: K. L. C. LEGG, FRAeS.
Chairman: K. B. AYERS, AFRAeS.
Hon. Secretary: D. M. WATERS, AFRAeS, 24 Roulstone Crescent, East Leake, Loughborough, Leics.

London Airport

President: Rear Admiral Sir MATTHEW S. SLATTERY, KBE, CB, FRAeS.
Chairman: J. R. FINNIMORE, AFRAeS.
Hon. Secretary: N. BROWN, ARAeS, BOAC HQ, Technical Publications Department, London (Heathrow) Airport, Middlesex. Tel: Skyport 5511, Ext 2883.

Luton

President: K. D. MORGAN.
Chairman: H. E. CURTIS, AFRAeS.
Hon. Secretary: L. A. WILLOTT, AFRAeS, BAC (Op) Ltd, Luton Division, The Airport, Luton, Beds. Tel: Luton 31151.

Manchester

President: C. E. FIELDING, OBE, FRAeS.
Chairman: M. J. BRENNAN, FRAeS.
Hon. Secretary: J. A. E. WATERFALL, 56 Manor Avenue, Ashton-on-Mersey, Cheshire. Tel: Failsworth 2020.

Merthyr and Treforest

President: E. J. BUSH.
Chairman: E. R. CHAYTOR, AFRAeS.
Hon. Secretary: Dr. G. O. FORESTER, Chief of Research, Teddington Aircraft Controls Ltd, Cefn Coed, Merthyr Tydfil, South Wales. Tel: Merthyr Tydfil 3261.

Preston

President: F. W. PAGE, CBE, FRAeS.
Chairman: E. LOVELESS, AFRAeS.
Hon. Secretary: J. T. FROUD, AFRAeS, Project Research Office, BAC (Op) Ltd, Preston Division, Warton Aerodrome, Preston, Lancs. Tel: Freckleton 531.

Prestwick

President: R. McINTYRE, FRAeS.
Chairman: R. HOSIE, ARAeS.
Hon. Secretary: Ir. B. J. G. ASBEEK BRUSSE, AFRAeS, Design Office, Scottish Aviation Ltd, Prestwick Airport, Ayrshire. Tel: Prestwick 79888.

Reading

President: E. N. MOBBS.
Chairman: J. T. APPLEBY, AFRAeS.
Hon. Secretary: E. W. C. ANGELL, ARAeS, M. L. Aviation Co Ltd, White Waltham, Maidenhead, Berks. Tel: Littlewick Green 248.

Southampton

President: Professor E. J. RICHARDS, OBE, FRAeS.
Chairman: F. C. KIRKPATRICK, ARAeS.
Hon. Secretary: Dr. B. L. CLARKSON, AFRAeS, Institute of Sound and Vibration Research, The University, Southampton. Tel: Southampton 56331.

Southend

President: F. A. LAKER, ARAeS.
Chairman: K. A. COLE, AFRAeS.
Hon. Secretary: T. R. C. BERRETT, ARAeS, Aviation Traders (Eng) Ltd, Southend Airport, Essex. Tel: Southend 49471.

Swindon

President: S. R. HUGHES, AFRAeS.
Chairman: Prof. D. S. HOUGHTON, AFRAeS.
Hon. Secretary: D. E. J. TIPPING, AFRAeS, Vickers-Armstrongs (Engineers) Ltd, South Marston, Swindon, Wilts. Tel: Stratton St. Margaret 3241.

Weybridge

President: Sir GEORGE EDWARDS, CBE, HonFRAeS.
Chairman: J. HEAP, AFRAeS.
Hon. Secretary: A. M. DOBSON, AFRAeS, BAC (Op) Ltd, Weybridge Division, Weybridge, Surrey. Tel: Weybridge 45555.

Yeovil

President: E. C. WHEELDON, CBE.
Chairman: Dr. G. S. HISLOP, FRAeS and Dr. E. W. STILL, FRAeS.
Hon. Secretary: L. A. LANSDOWN, AFRAeS, Westland Aircraft Ltd, Yeovil, Somerset. Tel: Yeovil 5222.