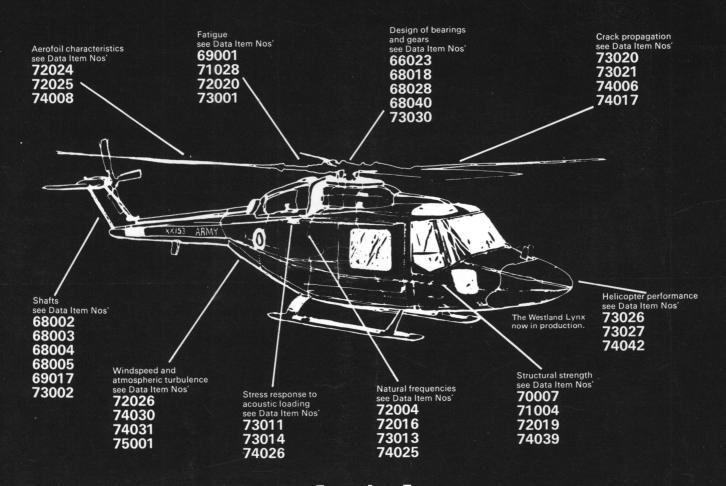




THE ROYAL AERONAUTICAL SOCIETY



Between the sketch and the successful designyou need ESDU Data Items

Design engineers need accurate, reliable information on which to base their designs and specifications. But much of the information available in essential areas is conflicting. Values for vital parameters such as pressure drops or stress concentrations in one source often differ widely from those in another.

Unless you choose the best values, you risk over-specifying materials and dimensions, with consequent cost penalties. Or you may under-specify, which could lead to unscheduled stoppages and breakdowns.

Engineering Sciences Data Unit can help you get things right, first time.

ESDU produces thoroughly evaluated and authoritative engineering design data in

aeronautical, chemical, mechanical and structural engineering. Committees of practising engineers and scientists monitor and guide qualified ESDU staff who sift and evaluate all the available data on each topic. Sometimes hundreds of separate references are involved.

ESDU issues the results of this work as Data Items in which information is presented in a way best suited to the engineer. Graphs, tables, flow charts, equations and presentation in both British and SI units are all combined to help you to get your design and specifications drawn up precisely and accurately.

ESDU's work is sponsored by the Institutions of Chemical, Mechanical and Structural Engineers and by the Royal Aeronautical Society.

Users of ESDU Data Items may become Associates of ESDU. As an

Associate, you would be entitled to a range of valuable services. If you want to know more about ESDU and the wide range of data always available, contact us for full details.

For all your sales enquiries, write or phone:

Engineering Data Sales Limited 34 Haymarket London SW1Y 4HZ United Kingdom 01-839 3002



Telex Endasa London 916168

VOLUME 80 NUMBER 783 **MARCH 1976**

THE nautica

Incorporating The Institution of Aeronautical Engineers and The Helicopter Association of Great Britain

JOURNAL

93

102

134

Published Monthly

contents

Editor:	G.	R.	Wrixe	n, A	MRAe	s.
		. 14/			Edito Scalle	
	Jay	W	OIII, L	aviu	Scann	m.

Secretary of the Society: E. M. J. Schaffter, MA, CEng, MRAeS. MRAeS. 4 Hamilton Place, London W1V OBQ. Tel: 01-499 3515. Telegrams: Didaskalos, London, W1

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

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

Advertisements: Advertisements: John G. Newman, Wheelwrights, Dormansland, Lingfield, Surrey RH7 6PS. Tel: Lingfield (STD 0342) 832603.

Printed by Lewes Press Ltd., Lewes, Sussex, England.

Subscriptions: £27.50 per annum, post free.

Single copies, including back numbers: £2.50

Published by The Royal Aeronautical Society, 4 Hamilton Place, London W1V OBQ, England.

ISSN: 0001-9240

Cover picture:

Cover picture:

In his paper presented as the Sixty-fourth Wilbur and Orville Wright Memorial Lecture last December (the full version of which appears in this issue), K. G. Wilkinson, Vice-Chairman of Rolls-Royce, looks at the possibilities and probabilities of civil airliner development for the next two decades, and concludes, inter alia, that there are still significant advances to be made in this area and the much-discussed plateau in aircraft design has yet to be reached.

The latest version of the Tri-Star as shown on the cover in Gulf Air livery is reputed to be the quietest of the wide-bodied jets. It is powered by three R-R RB.211-22B engines and the launching of this aircraft marked the entry of Rolls-Royce into the big high bypass ratio turbofan league, and it was also the first 'time a U.S. civil airframe manufacturer had opted for British engines.

(photograph by Arthur Gibson)

N. D. Normar

AGRICULTURAL AND SPECIAL PURPOSE AIRCRAFT—A MANUFACTURER'S VIEWPOINT

K. G. Wilkinson

THE TECHNOLOGY AND ECONOMICS OF AIR TRANSPORT IN ITS **NEXT PHASE**

Air Chief Marshal Sir Frederick Rosier

128 DEFENCE AND INDUSTRY-WHERE NOW?

TECHNICAL NOTE

J. M. Gething and K. F. Gill

An attitude control system for a flexible satellite providing active damping of flexural motion

Library, Reviews, Additions and Reports 140

The Royal Aeronautical Society

FOUNDED 1866

INCORPORATED BY ROYAL CHARTER 1949

Patron: HER MAJESTY THE QUEEN

COUNCIL

President: AIR MARSHAL SIR CHARLES PRINGLE, KBE, MA, CEng, FRAeS

President-Elect: C. ABELL, OBE, FSLAET, CEng, FRAeS

Vice-Presidents:

H. DAVIES, CB, MSc, CEng, FRAeS PROF. L. F. CRABTREE, BSc, DIC, PhD, CEng, AFAIAA, FRAeS M. J. BRENNAN, BSc, CEng, FIMechE, FRAeS

Past Presidents:

K. G. WILKINSON, HonDSc, BSc, DIC, FCGI, CEng, FCIT, FRAeS DR. G. S. HISLOP, PhD, BSc, ARCST, CEng, FRAeS B. P. LAIGHT, OBE, MSc, CEng, MIMechE, FRAeS

Members:

A. J. ADCOCK, BSc(Eng), AMRAeS
AIR CDRE F. R. BANKS, CB, OBE, HonCGIA, CEng, HonFAIAA, HonFRAeS,
RAF (Ret'd)
F. R. J. BRITTEN, CBE, CEng, MRAeS
CAPTAIN E. M. BROWN, CBE, DSC, AFC, FRAeS, RN (Ret'd) (Chairman, Rotorcraft Section)
N. FALCONER, MRAeS
PROF. M. G. FARLEY, CEng, FIMechE, MBIM, FRAeS
D. J. FARRAR, OBE, MA, CEng, FRAeS
D. GILL, MRAES (President, Southern Africa Division)
DR. W. F. HILTON, PhD, DSC, CEng, AFAIAA, FRAES
F. J. LOW, MRAES
E. W. R. MARTIN, MNDTS, LIM, AMRAES
AIR CDRE J. R. MORGAN, OBE, BSC(Eng), CEng, FIMechE, FRAES, RAF (Ret'd)
G. M. MOSS, MSC, CEng, MRAES
DR. E. S. MOULT, CBE, BSC, CEng, FIMechE, FRAES
CAPTAIN M. O'DONOVAN, MRAES (President, Rhodesia Division)
AIR CDRE F. C. PADFIELD, BSC, CEng, MRAES (Chairman, Astronautics and
Guided Flight Section)
G. K. C. PARDOE, BSC(Eng), DLC, CEng, FBIS, FRAES
T. R. PIKE, MRAES (President, New Zealand Division)
R. P. PROBERT, CB, MA, CEng, FRAES
J. T. STAMPER, MA, CEng, FRAES
J. T. STAMPER, MA, CEng, FRAES
G. T. WANSBROUGH-WHITE, AMRAES
J. M. WARNER, FRAES (President, Australian Division)
G. E. WELLER, BTech, AMRAES (Chairman, Graduates' and Students' Section)
H. ZEFFERT, CEng, FIEE, FRAES

Officers:

Hon. Treasurer: C. F. HUGHESDON, AFC, FRAeS Solicitor: L. A. WINGFIELD, MC, DFC (Hon. Companion) Secretary: E. M. J. SCHAFFTER, MA, CEng, MRAeS