

The Journal of

THE HELICOPTER ASSOCIATION OF GREAT BRITAIN

CONTENTS include

Automatic Pilots for Helicopters

(Part I) by H Collomosse

(Part II) by M C Curties

Analogue Computer Development with reference to

Helicopter Applications by B H Venning

LONDON

4, THE SANCTUARY,
WESTMINSTER, S W 1

Vol 11 No 2 APRIL, 1957



*Photograph by courtesy of
Helicopter Services Ltd*

HELICOPTER ROTOR BLADES...

*and materials for blade manufacture
produced to B C A R by*

HORDERN RICHMOND LTD

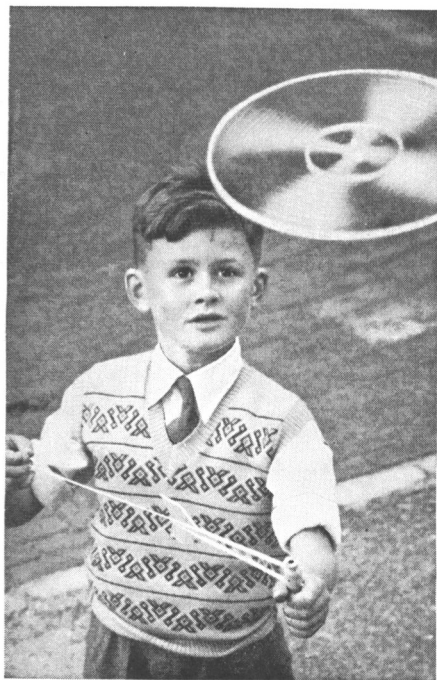
Haddenham, Bucks Tel Aylesbury 1100

- Makers of tail rotor blades for Bristol and Westland Helicopters
- Suppliers of Hy-du-lignum for main rotor blades of Bristol Sycamore and 173 helicopters and for tail rotors of the Saunders Roe Skeeter
- AGENTS FOR BELL and AGUSTA-BELL helicopters in the U.K. and Republic of Ireland



BELL & HILLER BLADES TO B C A R

A complete type-testing programme, using the company's Bell 47G helicopter has been satisfactorily concluded securing A R B approval for Bell and Hiller rotor blades manufactured by the company under licence from the Bell Helicopter Corporation U S A



Since the earliest days...

Not only the imagination of schoolboys has been captured by the possibilities of vertical flight. Since the earliest days Palmer have enthusiastically worked in close collaboration with Helicopter designers—pioneering the development of many special components.

The Helicopter removable polythene floor tray, for example, is a component pioneered by Palmer in this country—as is the pneumatic bag for the smooth engagement and release of the rotor clutch.

It is because Palmer Tyres, Wheels and Brakes, as well as other Helicopter components, possess *special* features that they are now fitted on most British-designed Helicopters for civil and service use.

There's a wealth of Palmer experience in the development and production of aircraft components at your disposal—experience which can be invaluable when an idea is at the "can it be done?" stage.

Palmer

components are on:

WESTLAND TYPE S 51

BRISTOL 'SYCAMORE'

BRISTOL TYPE 192

SAUNDERS-ROE 'SKEETER'

FAIREY 'ROTODYNE'



The Palmer Tyre Limited PENFOLD ST EDGWARE RD LONDON N W 8

WHEELS TYRES BRAKES RAMS VALVES SILVOFLEX HOSE X RAY INSPECTION SERVICE

51272



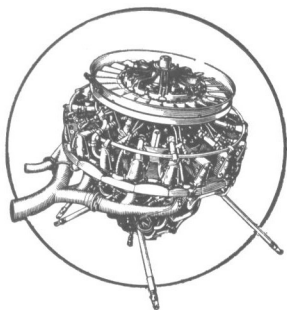
MADE FOR THE JOB

THE strong flexible and sensitive trunk of the elephant was thoughtfully provided by nature as a specialised part of the elephant body essential to its way of life. Similar careful thought has been given to every aspect of the Skeeter designed and built by Saunders-Roe to give the finest performance in the many roles which a light helicopter has to fill. The Skeeter is ideal for training, light liaison and A O P duties and is now in production for the British Army, the Royal Air Force and the armed forces of West Germany.

SAUNDERS-ROE

L I M I T E D

HELICOPTER DIVISION FASTLEIGH SOUTHAMPTON
HEAD OFFICE OSBORNE EAST COWES ISLE OF WIGHT



Ordered for the

West German Air Force



Powered by the Alvis Leonides engine, the Bristol Sycamore was the first all-British helicopter to receive a full C of A. Today the Alvis Leonides engine, proved and developed through a decade of service from the Arctic to the Tropics, is the standard power unit for most British helicopters and now ordered for the new German Air Force.



ALVIS LEONIDES Aero Engines

ALVIS LIMITED COVENTRY ENGLAND



3 engines of increasing importance to helicopter operators

ELAND Fairey's new large transport helicopter, the Rotodyne, is to be powered by two *Elands*—basically similar to the standard *Eland*, but with an auxiliary compressor mounted coaxially at the rear. Power is taken through the auxiliary compressor (in the form of compressed air to the rotor for vertical flight and through the propeller for forward flight).

ORYX The Napier *Oryx* 780-950 gas h.p. turbo gas generator provides the hot gas which is ducted to the rotor head for the propulsion of helicopters by jet reaction at the rotor blade tips. This system eliminates all mechanical transmission. The *Oryx* has been officially Type Tested at 780 and 865 gas h.p.

GAZELLE *Gazelle* 1 260 2 000 s.h.p. A rugged new free turbine engine for helicopters—selected for the Royal Navy Westland Wessex and the R.A.F. twin rotor Bristol 192. For ease of installation it can be mounted in any position between the vertical and horizontal. Helicopters demand tough, reliable engines—the *Gazelle* is designed for strenuous duty, long service between overhauls, while its outstanding simplicity means economical and speedy maintenance.

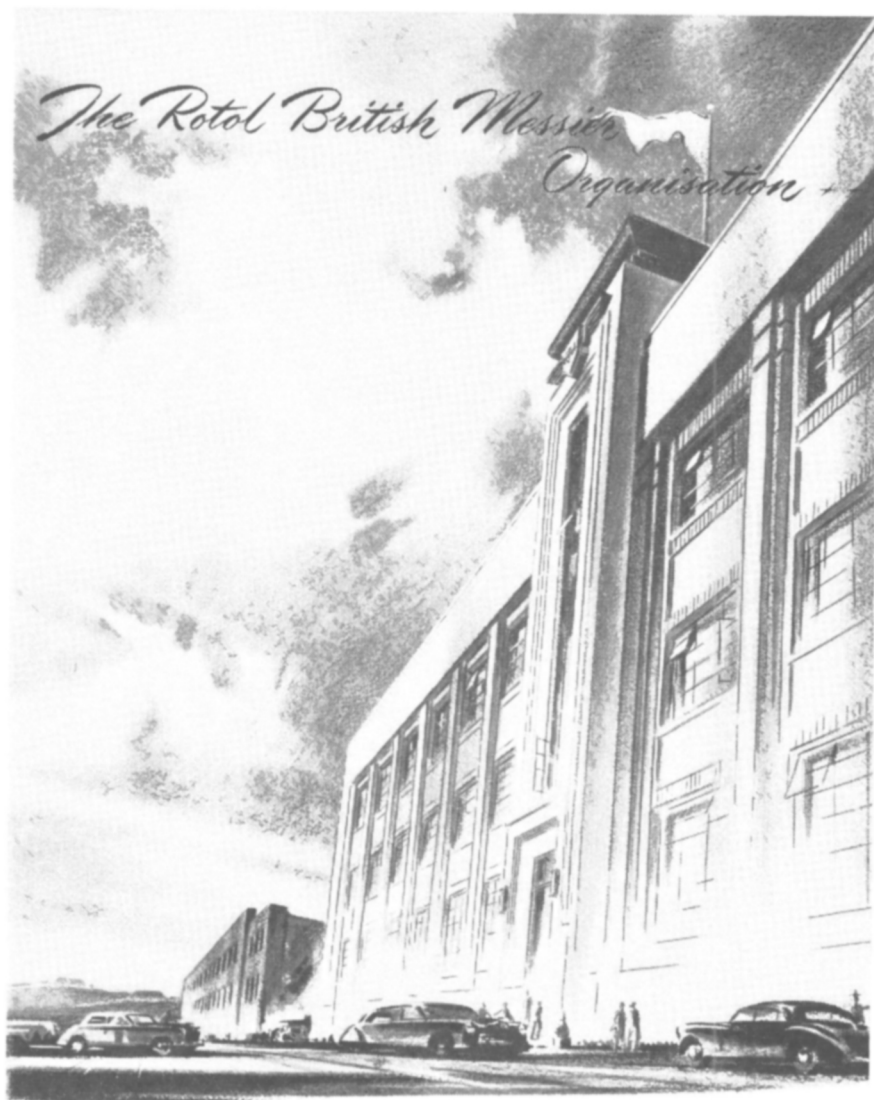
Designers and Manufacturers
of Rocket Engines and Ramjets

NAPIER

MORE POWER AT LOWER COST

D. NAPIER AND SON LIMITED LONDON W 3

CRC S25



Rotol British Messier designers and suppliers of Propellers, Undercarriages and Hydraulic Equipment have, since its foundation, served the aircraft industry

The equipment of Helicopters for short-haul work and rescue operations forms an integral part of the Company's industrial development

ROTOL BRITISH MESSIER LIMITED GLOUCESTER ENGLAND
100/R/BM/3/57



A BRISTOL 173 TANDEM ROTOR HELICOPTER POWERED BY TWO ALVIS LEONIDES ENGINES

Blades-of-all-work

Survey and construction work, search and rescue, passenger transport, casualty evacuation—these are only a few of the countless jobs Bristol helicopters are doing in many parts of the world

More than 120 Sycamore single engined helicopters are today in use, and the Type 173 twin engine tandem rotor helicopter has been developed into the military Type 192 now being built

for the Royal Air Force. Such an aircraft clearly has great potential for commercial passenger services

BRISTOL

Helicopters

BRISTOL AIRCRAFT LIMITED

The Journal of THE HELICOPTER ASSOCIATION OF GREAT BRITAIN

President
The Rt Hon LORD BRABAZON OF TARA GBL MC PC Hon FRAeS

Past Presidents
J G Weir CMG CBE FRAeS
L Mensforth CBE MA MIMechE FRAeS MIPL
Marshal of the RAF Lord Douglas of Kirtleside GCB MC DFC

Vice Presidents
Norman Hill AMIMechE ARAeS MCAI
RAC Brie AFR AeS AFIAeS

Offices 4, The Sanctuary, Westminster, S W 1 Tel Abbey 5160

VOL 11 No 2

April, 1957

PRICE 10/6

THE COUNCIL

Chairman

G S Hislop Ph D BSc (Eng)
ARTC MIMechE
FRAeS

B H Arkell AFR AeS
J A J Bennett DSc Ph D
FRAeS

R A C Brie AFR AeS
AFIAeS

A E Bristow ARAeS
J A Cameron
L G Frise BSc FRAeS

W R Gellatly AFC
R Hafner FRAeS

J E Harper AFC
A McClements ARTC

F T Meacock AFR AeS
MCAI

J W Richardson AFR AeS
H Roberts Ph D BSc DIC

AFRAeS AMIMechE
D L Hollis Williams BSc

FRAeS

Hon Secretary

Lt Col J W Richardson
AFRAeS

Hon Treasurer

W G Leslie ACIS

Asst Secretary

Miss P Chute

Lecture Sub Committee

J A J Bennett DSc Ph D
FRAeS (*Chairman*)

R A C Brie AFR AeS
AFIAeS

A McClements ARTC
MIMechE

J W Richardson AFR AeS
R H Whitby DIC ARCS

BSc AFR AeS
D L Hollis Williams BSc

FRAeS

Journal Hon Editors

Administrative

B H Arkell AFR AeS

Technical

D M Davies MA AFR AeS
R H Whitby DIC ARCS

BSc AFR AeS
H Roberts Ph D BSc DIC

AFRAeS AMIMechE

Librarian

R W L Cure

Auditors

W B Keen & Co

The opinions expressed in papers read before the Association and in the discussions also recorded in this Journal are not necessarily those of the Executive Council or of the Association as a whole

CONTENTS

	<i>Page</i>
AUTOMATIC PILOTS FOR HELICOPTERS	45
Part I Theoretical Considerations By H COLLOMOSSE	46
Part II Flight Development By M C CURTIES	57
DISCUSSION	66
 ANALOGUE COMPUTER DEVELOP- MENT WITH REFERENCE TO HELICOPTER APPLICATIONS	
By B H VENNING	77
DISCUSSION	96
 NOTICES	104

OBJECTS OF THE ASSOCIATION

The objects of the Association are to collect compile and disseminate information of a technical and semi technical nature pertaining to Helicopters and all other types of Rotating Wing Aircraft. The Association aims to work in close co operation with existing Aeronautical Bodies on matters affecting its objects and it may act as an Advisory Body in the promotion of legislation calculated to be of benefit to the development of Rotating Wing Aircraft

Publications Advertisement Manager

S H Pilton Effingham House Arundel Street London WC2

World's highest rate of climb

Precise Control

Negligible Maintenance
no specialist ground crew

Assembles in minutes
survives rough handling



The

FAIREY

Ultra-Light

MILITARY HELICOPTER

One three ton truck carries the helicopter,
pilot fuel and spares *and* functions as a
deck for landing and take off forming an
entirely self sufficient mobile unit



THE FAIREY AVIATION COMPANY LIMITED HAYES MIDDLESEX
ENGLAND AUSTRALIA CANADA