Pre-Flight Briefing Manual

Multi-Engine Course

by

Mike Woodgate

First edition published 1994
by Woodgate Aviation Ltd.

Registered Office:
Clady, Audleystown Road, Strangford,
County Down BT30 7LP
Northern Ireland
Tel: 0396-881 247

Distribution Address:
L. R. Marsh, Series Editor,
5 Westerton of Mugdock, by Milngavie,
Glasgow G62 8LQ
Scotland
Tel: 041-956 5680

Designed by
Imprint Publishing Systems,
8 Braehead Avenue, Milngavie,
Glasgow G62 6DJ
Scotland

Printed and bound in Edinburgh by
Ritchie (UK) Ltd.

British Library Cataloguing-in-Publication Data. A Catalogue Record for this book is available from the British Library.

ISBN 1 874505 10 1

About the Author

Mike Woodgate was born in Harrow in 1938 and educated at Hurstpierpoint College, Sussex. He learned to fly in 1956, on a Miles Magister, at Chivenor, North Devon and acquired his Instructors Rating in 1962.

Following a period instructing at the Ulster Flying Club, during which time he gained a Commercial Pilot's Licence and became a PPL examiner, he then worked for a while as an airline pilot.

Subsequently he returned to full time instruction working at CSE (Oxford), training BEA students for the Instrument Rating and becoming Chief Flying Instructor at CSE's Oxford Air Training School, PPL Centre.

In 1969 he formed 'Woodgate Aviation', based at Belfast International Airport and as the company expanded and acquired a second base at Ronaldsway on the Isle of Man, the author successfully divided his career between flying training and managing and operating his own Air Taxi and Charter Company. In the former role he instructed both at basic and advanced levels, including FIC training, and in 1970 was made a member of the Civil Aviation Authority's 'Panel of Examiners'.

As a commercial pilot he flew the length and breadth of Europe in his fleet of Aztecs and latterly Chieftains, carrying passengers and freight, including live freight and undertaking such diverse activity as air ambulance and aerial survey as well as North Sea Oil Support work.

As a professional pilot, instructor and examiner he has not only flown over one hundred different types of aircraft, including some of the 'greats' in aviation like Tiger Moths and DC3s, but has also trained both professional and private pilots on most of them.

In this series of 'Pre-Flight Briefings', Mike Woodgate shares some of that extensive knowledge and experience, gained in over thirty years instructing and examining, for the benefit of today's student pilots, pilots and their instructors.

Series Editor

Acknowledgements

I should like to thank the **Civil Aviation Authority** for permitting reproduction of the copyright material contained on Page 62.

I am also greatly indebted to **David P Davies DSC, OBE, F.R.Ae.S.**, author of *'Handling the Big Jets'* for providing detailed comment when the manuscript was still in draft. His advice and guidance – both aeronautical and editorial – was very gratefully received and undoubtedly improved the final version. I however remain wholly responsible for any errors, omissions or deficiencies in the text.

Mike Woodgate
Strangford
County Down
July 1994

Contents

Introduction 1

Section 1: 3
General Handling: Normal Operations

Section 2: 47
Loading

Section 3: 57
Performance

Section 4: 67
Multi-Engine Principles of Flight

Section 5: 79
General Handling: Asymmetric Operations

Appendix 1: 95
Aircraft 'V' Speeds

Appendix 2: 97
CAA: Mandatory Multi-Engine Conversion Training Syllabus
for the Professional Licence; Exercise Numbers

Appendix 3: 99
CAA: Multi-Engine Aircraft
Licensing, Testing and Revalidation Requirements

Nothing in this publication must be taken as superseding the legislation, rules, regulations, procedures and information contained in the Air Navigation Order, and the Air Navigation (General) Regulations, Rules of the Air and Air Traffic Control Regulations, the UK Air Pilot, NOTAMS, Aeronautical Information Circulars, or the recommendations, restrictions, limitations and operating procedures published in aircraft engines or systems manuals and Certificates of Airworthiness, or any Civil Air Publication or similar document published by the Civil Aviation Authority.

Introduction

The **Multi-Engine Course** is the second publication in the **Pre-Flight Briefing Manual** series and as with all the titles in the series has been written primarily for practising flying instructors. In the case of the **Multi-Engine Course** this includes flying instructors training the private pilot licence holder in accordance with the B-Rating syllabus, flying instructors training the professional pilot licence holder in accordance with the Mandatory Multi-Engine Conversion Training syllabus and flying instructors undertaking (or considering undertaking) FIC training in order to gain a multi-engine aeroplane endorsement in their AFI or FI ratings. However the text has been expanded and designed to be just as accessible to pilots under training for a multi-engine rating as well as multi-engine rated pilots who wish to prepare for 1179 flight tests.

The **Multi-Engine Course** manual, although primarily concerned with aspects of **flight** training as opposed to **ground** or **technical** training does include sections on aircraft loading, aircraft performance and principles of flight (including propeller theory), insofar as those aspects have special significance for multi-engine aircraft flying operations and are directly related to flight considerations.

In addition to being of relevance to a range of readers at various stages of multi-engine flying experience, the manual is intended to be applicable to a wide range of multi-engine aeroplanes in the group B category (i.e. not exceeding 5700kg MTWA) including turbo-charged types or variants. For obvious reasons in both the pre-flight briefing exercises and the technical sections the emphasis is on general operational considerations and broadly based principles and procedures rather than aircraft type or aircraft specific ones. However for purely illustrative purposes, throughout the manual, the PA31 Chieftain has been selected as a type representative of the category. Further to lend authenticity and demonstrate practical relevance, data which has been used in the worked examples, in the Loading and Performance Sections, has been drawn from the Operations Manual of an actual air charter company. However none of the data used nor the company documentation shown should be used for flight planning purposes either for the PA31 or any multi-engine aircraft, and instructors and pilots should always refer to the pilots operating handbook, flight manual, aircraft check list, company operations manual and other relevant sources of information relating to their specific aircraft type.

The **Multi-Engine Course** manual is divided into 5 Sections. Sections 1 and 5 comprise the full and detailed pre-flight briefings covering the syllabi of both the PPL B Rating and the Mandatory Multi-Engine Conversion Training required for the inclusion of the first multi-engine type rating in a Professional Pilots' Licence. Section 1 is concerned solely with normal, two engine operation and covers in detail the general handling exercises which require to be undertaken before the commencement of asymmetric flight training. Section 5 covers all aspects of the asymmetric flying syllabus using the same format as Section 1 – namely each flight exercise commences with a statement of the aim of that exercise, followed by 'Instructor Notes'. The relevant briefing points including all the elements which should be included in the air exercise are then specified sequentially and in full.

Sections 2, 3 and 4 cover the theoretical instruction syllabus areas of Loading, Performance and multi-engine Principles of Flight respectively, all aspects of which should have been covered before the student progresses to asymmetric flight training.

Supplementary material is provided after section 5 and includes an appendix which concisely details the licensing, testing and revalidation requirements as they apply to multi-engine aircraft ratings, private and professional, in the U.K.

Whilst primarily attempting to address the needs of practising flying instructors for comprehensive yet concise briefing material covering all areas of multi-engine flying training syllabi the manual has also been designed to be of relevance to a wider readership.

It is hoped that whether you are a professional or private pilot undergoing multi-engine training or simply a multi-engine rated pilot wishing to brush up on flying technique you will also find the contents of this manual of benefit.

SECTION 1

GENERAL HANDLING: NORMAL OPERATIONS

Introduction to the Section 1 Briefing Notes

In this section full and detailed briefings for each exercise concerned with general handling during normal operation have not been provided. This is because both instructors and students are expected to be familiar with certain basic features and items that are recurrent or exact duplications of what would be undertaken in single engine aircraft flying training.

Rather this NORMAL OPERATION section emphasises those aspects of multi-engine flying training, both theoretical and practical, which are:

(a) Unique to multi-engine flying training.
(b) Substantially different from single engine flying training.
(c) Relevant to more complex aircraft types and hence whilst they might have been encountered by the student in some high performance or complex single engine aircraft types are more likely to be experienced for the first time during multi-engine conversion training.

Essentially in the pre flight briefings for general handling normal operations adequate instruction must be given to show the difference in both systems management and handling technique in flight between single engine and multi-engine aircraft.

Although 'Exercise 22' is the conventionally used designation for multi engine normal operation conversion training in the PPL syllabus and F1 and F2 in the Professional syllabus, for convenience, greater clarity and easy reference the Exercise 22 designation has been used here and then further sub-divided into exercise part numbers which relate to the comparable exercises in the single engine basic syllabus.

Exercise 22 Part No:

1. Technical Notes, Flight Manual and Check List.

1E. Emergency Drills and Procedures, Passenger Briefing.

2. Pre-Flight Preparation and Engine Starting.

4A. Effect of Controls.

4B. Engine Handling.

5. Taxying.

6. Straight and Level.

7. Climbing.

8. Descending.

9. Turning.

10. Stalling.

12. The Take Off.

13A. The Circuit, Approach and Landing.

13B. The Go Around.

13D. The Cross Wind Take Off and Landing.

13E. The Flapless Landing.

13F. The Short Field Take Off and Landing.

19. Instrument Flying; Normal Operations.