



Know the  
basics in  
90 minutes

# *Quicklook at* **Flying**





### About Quicklook at Flying

**I**N not much more than a century, flying has been transformed from small beginnings into a vast industry that has opened up endless possibilities and affected every human being.

How did the Wright brothers first achieve flight? What keeps an aircraft in the air? How safe is flying now? How has the flight industry developed? What does the future hold?

*Quicklook at Flying* takes us back to the pioneers of aviation and explains how the past has helped to shape flying as we know it today. It covers commercial and military aviation and the aircraft manufacturing business, giving an insight into the challenges faced by airlines. It explains how air travel is made safe and what happens when things go wrong.

You are taken into the workings of the industry: how pilots train, the world of navigation and air traffic control and the role of engineers and designers.

You are talked through your first flight in a light aircraft.

Quicklook at

# *Flying*

Paul Smiddy



Quicklook  
books

Published by Quicklook Books Limited

Weighbridge House, Grittleton SN14 6AP

First edition in e-book format 2010

This revised edition first published in hard copy 2012

Copyright Quicklook Books Limited (Company number 06641038) 2012

Cover photo from istockphoto.com. Photograph by carlosphotos

Books in the Quicklook series are available in hard copy and as e-books from  
[www.quicklookbooks.com](http://www.quicklookbooks.com)

Contact [info@quicklookbooks.com](mailto:info@quicklookbooks.com)

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form otherwise than as authorised by Quicklook Books Limited

Printed and bound by CPI Group (UK) Ltd, Croydon, CR0 4YY

Quicklook is a registered European trade mark (number 008147258)

ISBN 978-1-908926-06-7

# *Contents*

One	<b>The history of flight</b>	7
Two	<b>How aircraft fly</b>	15
Three	<b>Types of aviation</b>	23
Four	<b>The aircraft makers</b>	31
Five	<b>The airline industry</b>	39
Six	<b>Navigation and air traffic control</b>	45
Seven	<b>Your first flight</b>	51
Eight	<b>Learning to fly</b>	55
Nine	<b>Military and non-flying careers</b>	63
Ten	<b>Safety</b>	71
Eleven	<b>The future</b>	79
	Where to find out more	87
	About the author	89
	More titles in the Quicklook series	90

*To Jim Watson, who put me on the right glide slope and  
all other pilots who never made it back.*

# *The history of flight*



**S**OME say if God had meant Man to fly, He would have given us wings. I disagree with this: we were meant to fly, because in His wisdom, He gave us a raft of talented, hard-working and daring engineers and entrepreneurs in the 19th and early 20th centuries, who discovered how to take man aloft.

## **Travelling light**

The first moves into the air were by balloons – so-called lighter-than-air craft. A Portuguese pastor, Father Bartolomeu de Gusmao, made the first recorded demonstration of a hot-air balloon. In 1709 he launched his small vehicle in a room of the court of King John V of Portugal. The successful flight concluded with a collision with the window, the curtains then catching fire!

In 1783, two Frenchmen, Jean-François Pilâtre de Rozier and François Laurent d'Arlandes, made the first manned balloon flight in a Montgolfière (named after the two brothers who designed it). The equipment had previously been tested on a Noah's Ark of animals. Ten days later came the first solo flight – a respectable 36 kms. In 1784 came the first balloon flight in Britain, and a year later Blanchard & Jeffries were the first to cross the English Channel. (De Rozier was killed that year attempting the same feat).

All these balloons were kept aloft by hot air: the heat derived not always from burning wood, but from esoteric materials such as wool or even old shoes. By the early nineteenth century the attention shifted to lighter-than-air gases, particularly hydrogen. The dangers of this gas were soon brought home, when Blanchard's wife became the first woman balloonist to die – in 1809. Her balloon caught fire whilst she watched a fireworks display.

Passenger carrying became a commercial activity, and balloon meetings

became very popular events. Balloons had been used by the French in 1870 in their war with Prussia. In 1878 the British Army cottoned on, and by 1885 observation balloons were in use in the Boer War. In the First World War they were in widespread use by both sides: the static nature of trench warfare enhanced the balloon's utility as an observation vehicle and for artillery "spotting".

In the second half of the 19th Century, the desire for more control over the direction of flight led to the development of dirigibles (steerable airships). There was widespread activity across Europe, with France in the lead. Inevitably most were powered by steam engines – whose weight and relative inefficiencies constrained the capability of the whole machine. In 1884 two Frenchmen, Renard and Krebs, made a 8kms circular journey in their *La France* airship – the first fully controlled airship flight in the world. After some pursued the blind alley of electric power, internal combustion engine power took over from 1888.

At the turn of the century the grand patron of airship development appeared on the scene. Count Ferdinand von Zeppelin had witnessed the use of balloons in the US Civil War. Concerned by the lead established by arch-rival, France, in this arena, Zeppelin started to build his first airship in 1899, the prosaically named *Luftschiff Zeppelin 1*. This was on the shores of Lake Constance – destined to remain the epicentre of German airship development. LZ1 was huge by current standards (128m long), with a power/weight ratio beating any previous French efforts. Nonetheless it was still too under-powered for success.

Britain's first airship, *Nulli Secundus*, did not fly until 1907. The colourful Samuel F ("Colonel") Cody was its flight engineer.

Dirigibles gradually acquired more rigid frames, and by the outbreak of the First World War, their military potential was appreciated. Germany started the conflict with its *L3* (158m long, with 630hp), and finished with the *L70* (211m/1715hp). Zeppelins were used for offensive purposes – to bomb Britain. British airships were generally only used for naval observation. The North Sea class were for example 80m long with 480 hp.

The superior German design was copied by the British for its post-war airships, when passenger transport, with designed ranges of more than 3000 miles over the extended British Empire, became the main intended use. The



development of airships in the UK came to an abrupt end on 4 October 1930 when the *R101* flew into the ground at Beauvais in Northern France in bad weather, killing all 48 on board. This machine had been designed and manufactured by the British Government. This fraught process was subject to several delays, and political pressures led to a premature maiden (& final) flight.

Despite the undoubted romance of inter-continental travel by airship, the tragic demise of the *R101* destroyed popular faith in the airship concept in Great Britain. This was unfortunate for the team behind the rival *R100*, built by private enterprise, which showed much more promise. Germany continued to use the airship as an international ambassador for its technological skills, and also for spying. The *Graf Zeppelin* (range an astonishing 6,250 miles) made several leisurely flights over England's manufacturing heartland in order to make clandestine photographs of likely targets for subsequent war.

However 6 May 1937 saw another defining aviation disaster: the *Hindenburg* (even longer than the *Graf Zeppelin* at 245m) exploded into flames as it tried to moor at Lakehurst, New Jersey, after a transatlantic crossing. Anyone who has seen the newsreel footage will be amazed that 62 people of the 97 on board managed to survive. The craft had been designed to be inflated by helium, but had had to use the much more flammable (but cheaper) hydrogen. This tragedy sounded the death knell for passenger airship travel. Recently there has been some revived interest in the use of airships for carrying freight, and for observation.

## **Fixed Wing Flying**

From an inspired 13th century Friar (Roger Bacon) onwards, many intellectuals over the ages were fascinated by the concept of flight by flying machines. They were typically inspired by the flight of birds. Most, including Leonardo da Vinci, raced down the blind alley of trying to replicate flight by the flapping of wings.

The unsung hero of successful aircraft development was a Yorkshire nobleman, Sir George Cayley. A gifted engineer (inventing, inter alia, the self-righting lifeboat), he was the first to identify the four key forces of aerodynamics (lift, weight, drag, and thrust). By 1853 he had constructed a glider

that embodied many valid aeronautical concepts. This made a successful flight across the Dale near his house. Soon afterwards his coachman (alleged to have been press ganged into the role) is said to have become the first human to make a fixed wing flight.

A German, Otto Lilienthal, had been making great strides in glider design. His wing shapes were much more fashioned after birds' than Cayley's. Again he was still over-focussed on replicating flapping wings. However he successfully flew in several designs of gliders from his hill near Berlin. He died in a crash in 1896: his designs relied for stability in the pilot hanging below the wing, and this was insufficient to cope with strong gusts.

Other work by a Scot, Percy Pilcher, and a French-born American, Octave Chanute, takes us to the acknowledged founders of powered flight: the Wright brothers. Orville and Wilbur, bicycle makers from Ohio, had been inspired by Lilienthal. Three years' work on gliders in North Carolina was supplemented with original aerodynamic research. On 17 December 1903, Orville made the first powered flight – only 12 seconds and 120 feet, but a beginning! The Wrights soon stimulated military interest, and sold their first aircraft to the US Army in August 1909. This was despite causing the first aircraft fatality when Orville killed his passenger on a demonstration flight for the Army in 1908.

The Wrights' flights in Europe must have caused a degree of anguish; Alberto Santos-Dumont making the first European flight in October 1906. Europe's designers made rapid progress and Louis Blériot managed to cross the English Channel on 25 July 1909. The pace of development was frenetic. The first floatplane (that could take off from water) flew in 1910. The following year saw an Italian lieutenant innovate by dropping grenades on Turkish troops in Libya. In 1914, the first air to ground radio communication was achieved. That year Igor Sikorsky (who later became a founding father of the helicopter) broke distance records with a 1490 mile trip around Russia.

The First World War obviously accelerated the pace of development even further. The Royal Flying Corps started out with observation aircraft such as the BE2. This weighed 972 kgs and could trundle along at no more than 72 mph. Fighters and bombers soon evolved. By the close of

## *About the author*

**P**AUL SMIDDY is, by his own admission, hopelessly obsessed with flying. He spent most of his childhood surrounded by model aircraft or listening to the stories of his great uncle – one of Britain’s earliest pioneer aircraft designers.

At the age of 16, Paul learned to fly gliders with the Air Cadets. A year later, after gaining a RAF Flying Scholarship, Paul obtained his private pilot’s license at Doncaster Airport, which he put to good use flying Chipmunks and Bulldogs with the RAFVR whilst at university.

For the last 25 years, although slightly distracted by a highly successful career in finance, Paul’s aviation obsession has been a major part of his life. A Liveryman of the Guild of Air Pilots and Air Navigators, he has been an active private pilot all of his life, flying to destinations all over Europe, USA and the Caribbean, among others.

In 2001, Paul flew in the London-Sydney Air Race. While he maintains that it was less of a race than a test of patience, it nevertheless sparked in Paul a new passion: competitive flying. From 2003, he has been a member of the Great Britain Flying Team, participating in the rally flying discipline in European and World Championships across Europe and South Africa.

Paul has a house in Northern France, flying to which has given him plenty of opportunity to study wave patterns in the English Channel. He has also contributed to a number of magazines on matters of both flying and finance. Of course, he chooses flying wherever possible.

# *More titles in the Quicklook series*

You can find out more about our wide range of titles at **quicklookbooks.com**



## **Quicklook at Police**

The British police have pioneered many aspects of policing. We explore how and why and how the service is shaping up to the 21st century. We find out about the many different skills and departments and how they fit together.

## **Quicklook at Pensions**

This clear, layman friendly, book is a must read for anyone looking for a “spin free” guide to pensions.

## **Quicklook at Management**

Every organisation needs to be managed. Part art, part science, part seat of the pants, there are many approaches. This up to date book covers the main ideas.

## **Quicklook at Education**

This guide to the vital subject of education covers the system from pre-school to post graduate, exams and qualifications, the teaching professions and theories of learning.

## **Quicklook at Movies**

This brings the world of film to life as we explore the characters that shaped and starred in it, the technology which developed it, the many different types of film and the booms and busts of an industry sometimes as dramatic as anything on screen.

## **Quicklook at Business**

This is the most comprehensive short guide to the business world that you are likely to find.

## **Quicklook at Marketing**

Marketing affects us all. It is crucial to business success. What is it and how does it work? Experienced marketing expert Patrick Forsyth unwraps its mysteries. You launch a new product.

## **Quicklook at Defence**

Defence is vital and often in the news. How does it operate in a time of new challenges and tight budgets? Command a crisis operation.

## **Quicklook at Human Resources**

This is a must for anyone interested in a job or the world of work.

## **Quicklook at Accountancy**

All of the basics are covered, from the key elements of accounts and the ways in which they are used. Accountancy is the backbone of most organisations. It is itself a huge industry. We look at the main players, how it works and the many career options.

## **Quicklook at India**

An emerging superpower, India embraces many different peoples, languages and religions. Nowhere has older or deeper cultures, or so much diversity.

## **Quicklook at Dogs**

There are over seven million dog owners in the UK. Find out why we share such a strong bond with our canine companions.

## **Quicklook at Wine**

Wine is a luxury enjoyed by many, but understood by few. This book gets you to grips with the subject, from grapes to glass.

## **Quicklook at Vets**

Millions of us care for animals and vets are familiar and reassuring figures. Find out about the tremendous scope of their work.

## **Quicklook at Flying**

How has flying developed? How does a plane work? What is happening in aviation now? What will happen in the future? What does it take to be a pilot?

## **Quicklook at Property**

Property (real estate) is the ultimate base for wealth and the economy. It comes in many forms. Many jobs depend on it. Learn how the world of property operates.

## **Quicklook at Medicine**

Medicine provides more and more remedies, often vital to life. What is becoming possible? How is it done? How does the body work? Find out about the medical professions. Be a GP for a day.

## **Quicklook at Law**

English Law has spread its influence to many countries. Why? How does it work? How is it changing? How does the legal profession operate? Get inside a Court case.

## Quicklook at **Flying**

In not much more than a century, flying has become a vast industry which has shrunk the world and affected every human being.

*Quicklook at Flying* takes us back to the pioneers of aviation and explains how the past has helped to shape flying as we know it today. It covers commercial, private and military aviation and the aircraft manufacturing business. It gives an insight into the challenges faced by airlines. We look at safety issues.

Discover how pilots train, the world of air traffic control and the roles of designers.

● You also take a flight on a light aircraft.

Quicklook publishes layman-friendly books which take you to the heart of a big subject in a clear, short guide. They are available from good bookshops and from **quicklookbooks.com**

## About the author

Paul Smiddy learned to fly gliders at the age of 16. He has been an active private pilot all his life and has followed his passion for all aspects of aviation throughout.



He has been a member of the Great Britain Flying Team and undertaken trans-continental flights in light aircraft.

Paul regularly writes about flying for various publications.

RRP **£7.99**

