AIR CRASHES and MIRACLE LANDINGS

Christopher Bartlett

OpenHatch Books

AIR CRASHES
and
MIRACLE LANDINGS
Sixty Narratives

(How, When … And Most Importantly Why)

by

Christopher Bartlett

ISBN 978-0-9560723-2-0

First Published April 12, 2010
Reprinted with Revisions and Updates September, 2012
and March 17, 2013 (for AF447)
by
OpenHatch Books, London, UK
openhatchbooks.com
chrisbart.com

Front cover photo
by
Florian Trojer (jetvisuals.com)
depicting a routine & safe flight departure
from Innsbruck Airport, Austria,
in accordance with published procedures

For
all those who died
and
all those who survived.

Lessons
were learnt
for the benefit
of us all.

The Author

Christopher Bartlett initially trained as a mining engineer, a field wher ensuring compliance with safety standards is of prime importance. His passio however, has been flying, and notably air safety.

This was engendered as an Air Cadet during his youth, and as a member of th British Interplanetary Society, as well as in the course of sessions on fighte simulators at the Air Ministry. He completed his two years' military service in th British Royal Air Force.

After taking a degree in Modern Chinese and Japanese at the School of Orient and African Studies, London University, he became, amongst other things, professional translator of Japanese scientific and technical material. This include Japanese rocket tests. He also wrote for magazines in the Far East.

His fluency and understanding of English, French, and Japanese enabled him t undertake research based on material published in its original format and not opinions and facts that were not widely publicized. In addition, his coincident residence in countries when and where headline air crashes occurred ha enabled him to add local color and extra details to a number of these accounts.

CONTENTS

In Kindle version, CLICK ON ITEM.

ENDNOTES:
CLICKING ON THE ENDNOTE NUMBER TAKES ONE DIRECTLY TO IT.
(After reading the endnote, click on **back,** or the number to go back to tha
point in the narrative. Incidentally, using this feature, one can find the endnote
very informative in their own right, clicking on the ones of particular interest t
see to what they refer.)

Figures

Illustrations and diagrams are only included where needed for explanation.

To view images in color and detail, see
DIAGRAMS & PHOTOS FOR KINDLE READERS + LINKS FOR ALL READERS
on our website chrisbart.com

While covering the technical aspects of the various incidents described, an sometimes reading like a detective story, the book highlights the human factors which relate not only to aviation but also to many other facets of our daily live Readers should find reassurance in the fact that many of the incidents occurred long time ago and provided the lessons that have made flying so much safer toda

The intention was to explain not only how and why those accidents occurre but also to increase the reader's interest in the underlying causes of accidents i general. While the book at times suggests possible causes not emphasized or cite in the official reports, sufficient facts have been included for the reader to dra his or her own conclusions, which of course may differ from those of the author.

In the haste to publish after some five years' research, and with the boo continuously evolving (improving) after the initial proofreading, there wer unfortunately grammatical and typographical errors in the first edition. We hav therefore thoroughly proofread* this updated version after adding inter alia a account of the Colgan Air disaster and the latest (as of March 15, 2013) availabl information regarding the loss of Air France AF447 with its many lessons fo today's pilots lulled by automation. We have also revised some tongue-in-chee comments suggesting some 'heroes' benefited from circumstances, whic regrettably some readers misinterpreted to the extent of taking offense.

As it was not possible to consult all the individuals and organizations cited, th book may have unwittingly portrayed a few unfairly. That said, mention of a give airline, organization or individual may simply reflect their integrity an transparency.

Finally, as this quite a long complex book, the printed version is perhaps mor appropriate than the Kindle one. However, besides being cheaper and more easil available, the Kindle version is very good, as one reviewer said, for 'dipping into thanks in part to the detailed Table of Contents. Another Kindle reviewe appreciated 'the large format illustrations the author provides on his web sit [**chrisbart.com].**'

* The US spellings and grammar still seemed incorrect to one UK reviewer.

Interestingly, the US convention of placing of the full stop (period) inside th inverted comma (quote) originated because it tended to get 'lost' in the course o manual typesetting.

Christopher Bartle

ACKNOWLEDGEMENTS

Many official reports, excellent articles, and books—not to mention films
varying accuracy—have contributed to this book's realization. Twenty thousand
more items available on the Internet provided background knowledge.
addition, I am sometimes citing from memory a detail or point made in no
irretrievable coverage in the local media in the countries where the inciden
occurred and I happened to be at the time.

Though it may seem ghoulish, reviewing Cockpit Voice Recorder (CVR
transcriptions included in official reports often seemed to give a real feel to wha
was happening in the cockpit, and a good idea of the cascading dilemmas facin
the pilots.

I wasted much time, without coming to definitive conclusions, in some case
where official reports were contested as conspiratorial, as can happen when a
parties—airline, manufacturer and investigating authority, and even victims—ar
from the same country. Once someone claims officials have tampered wit
evidence, have shredded it, and are lying to boot, there is no definitive answe
From a safety point of view, this may not matter overly as the conspirators, if any
know the truth, and stealthily, but eventually, take remedial measures.

In preparing the material, I was fortunate to come across Air Disaster[1] by th
Australian, Macarthur Job, reviewing in several volumes the most notable jet-ag
airliner disasters up to 1994. Job succeeds in putting them in perspective with
wealth of technical and human detail. Those captivating volumes would be a goo
starting point for anyone wishing to read about a number of the pre-199
accidents in much more detail than is possible here.

Similarly, Disasters in The Air—The Truth about Mysterious Air Disasters[2] b
Jan Bartelski was of great value in making me look again at the assumptions tha
had generally been made regarding some notorious disasters, and notably th
worst ever multi-aircraft disaster in which two 747 jumbos collided on the groun
in fog at Tenerife in 1977.

Some of the episodes of the excellent TV series entitled Air Cras
Investigation—also called 'MAYDAY' in some countries—broadcast on the Nationa
Geographic Channel, yielded some useful new insights when the author was hal
way through this book. Besides bringing events to life much as he has tried to d
here, the highly successful series has aroused the interest of many. The producer
obviously devoted considerable effort, and not least money, to interviewin
passengers in addition to aircrew, investigators, and experts.

At the other end of the spectrum, in that it is a textbook stuffed wit
concentrated information regarding all aspects of aviation safety, was Commerci
Aviation Safety[3] by Alexander T. Wells . Its depth of detail is such that it eve
mentions how cockpit noise affects pilots, and in so doing helps put other safet
aspects in perspective.

A Human Error Approach to Aviation Accident Analysis[4] by Douglas A
Wiegmann and Scott A. Shappell was a valuable introduction to the academ

work being done on accidents. Although purchased too late to be much help,
should mention Aviation Disasters[5] by David Gero, covering major civil airline
crashes since 1950. Much less discursive and opinionated than this book, it is
good tool for specialists wanting the cold bare facts concerning virtually ever
disaster.

There are a number of blogs covering commercial flying. They include Patric
Smith's aviation blog on salon.com; Just about flying … formerly called As
Captain Lim on askcaptainlim.com; and Professional Pilots Network o
pprune.org. Besides providing much essential material, the official reports by a
accident investigative bodies, such as the NTSB, AAIB, ATSB, BFU, and BEA
often made fascinating reading.

On a personal level, I would particularly like to pay tribute to the late Joh
Hawkins for encouraging me in the early stages. His experience both as
metallurgist, and as Managing Director and Chairman of numerous companies i
the British Alcan Group—developing high temperature alloys for aircraft includin
the supersonic Concorde—meant he was able to advise me about the evolution
these materials. He also informed me about some aviation incidents, whic
although in the public domain, did not make the headlines.

Others kindly read the manuscript and gave valuable advice. They include Keit
Lakin, Adrian Wojcieh, James Denny, Mike Pegler, Gerald Burke, Jonathan Evans
Hélène Bartlett, Go Sugimoto, and the talented members of the Three Pigeon
discussion group.

Finally, I would like to thank Ting Baker for rectifying proofreading mistakes i
the first edition and in the updates.

Each of the fifteen narrative chapters covers a specific type of incident i chronological order. While indicating the evolution over time, this means th accounts of most significance and interest may well be nested within the chapte rather than found at the beginning.

Chapters 1–13 cover regular accidents (with regular having the sense it has i 'regular' coffee in US usage). By that, we mean accidents not due to militar action, hijacks, or on-board explosives. This should not be confused with th specialist academic term normal accident used by Professor Charles B. Perrow the well-known author of Normal Accidents: Living with High Risk Technologie (1984, rev. ed. 1999, Princeton), implying accidents are inherent in comple systems such as nuclear power stations (i.e. Chernobyl).

Chapter 14 covers accidents resulting from military decisions, while Chapter 1 looks at two cases where terrorists hijacked aircraft, first in Algeria and later i the US, with the intention of using them as flying bombs.

Chapter 16, the last chapter, is somewhat academic, drawing conclusions fro the narratives and looking at future strategies for improving safety in aviatio such as ADS-B, a new air traffic control system based on GPS rather than fixe airways between radio beacons.

Chapter 1: Loss of Power over Water

Not so long ago, airliners flying long distances over water always had three, if n four, engines. Nowadays, the authorities allow airlines with good records to fl twin-engine aircraft on routes where the nearest diversion airfield can be as muc as two or more hours' flying-time away.

Such flights are called ETOPS, standing for **E**xtended range **T**win-engin **OP**eration**S**. Airlines prefer ETOPS as they usually save money—two large engine being cheaper to buy and maintain than four smaller ones. ETOPS have becom possible because well-maintained jet engines are today very powerful and, abov all, reliable. Airbus had thought they had come up with a winner in the form of th four-engine A340 long-distance airliner only to see sales wither with the arrival o the cheaper-to-run Boeing 777 twinjet just when ETOPS had gained fu acceptance.

Should an engine on one of the newer twin-engine airliners fail on takeoff, th pilots may well be better off, as regards reserve power and even handling, than two engines failed on the same side on an older four-engine aircraft. However, the fuel runs out, even the most reliable engine becomes a heap of useless metal.

The Hudson River 'miracle' ditching shown on the back cover of the printe version of this book has been included in this chapter because it shows tha bringing a modern jet airliner safely down on water is feasible, given suitab conditions.

Also included is the remarkable feat whereby the pilot of an Airbus managed t glide a distance of some 80 miles and touch down safely on an island in the Azore after running out of fuel over the Atlantic.

Chapter 2: Loss of Power Over Land

An airliner with its high landing speed and great mass almost invariably has t reach an airport or landing strip to effect a safe landing. Unlike loss of power ove water where the aircraft is often at a very great height giving the pilots time t consider their options, loss of power over land may occur at any height but ofte near the ground where the pilots' options are very limited.

Chapter 3: Runway Overruns

An aircraft can overrun the runway either on landing or on taking off. Normall there is a fair amount of clear ground beyond, so in most cases the consequence are not disastrous.

However, it may be another story if for some reason the aircraft veers off to th side and into an unforgiving building or is going so fast that it ends up eve beyond the airport boundary. An overrun on landing may result from combination of coming in too fast, touching down too far down the runway, on on that is too short, or on one contaminated by ice or standing water.

As many other types of accident decrease, landing overruns in bad weather ar becoming one of the greatest dangers. Recent fatal accidents in Brazil an Thailand, and a close shave at Toronto for an Air France A340 demonstrate this.

In theory, an overrun on takeoff will only occur if the captain decides to abor the takeoff before the aircraft reaches the takeoff decision speed, V_1. After tha the aircraft should be able to take off safely even should an engine fail. Compar regulations stipulate that once the aircraft attains takeoff decision speed (V_1) wit no decision to abort, the takeoff must proceed—precisely to avoid the possibility o an overrun.

Chapter 4: Mid-air Collisions & TCAS

A collision in the air between two aircraft is relatively rare, but is often fatal, a the industry slang 'aluminum shower' implies.

The situation regarding the air traffic controllers largely responsible fo preventing those collisions is a difficult one.

On the one hand, they do not enjoy the prestige or sometimes very high salarie (plus little extras on the side) of the pilots; on the other hand, their task is ver technical and demanding. One thing the pilots and controllers have in common the ability to bring flight operations to an expensive halt by going on strike.

In some countries, the air traffic controllers have relentlessly wielded tha power to the exasperation of authorities and travelers alike.

In 1981, US President Reagan took a stand by firing 11,000 controllers who ha failed to return to work, whereupon some 3,000 supervisors joined 2,00 nonstriking controllers and 900 military controllers in staffing airport tower Before long, about 80 percent of flights were operating normally and airfreigh remained virtually unaffected. In the end, the controllers were obliged to re-enro on new terms.

In France where ATC strikes were endemic, the Government once tried to fac them down but was less successful. Their attempt to use military controllers t

keep the system going during a strike was short-lived as it was not long befor
two aircraft under military air traffic control collided near Nantes on France
Atlantic coast, forcing the Government to bring the civilian controllers back t
work, with them saying, ‘We said you could not manage without us!’

The chapter concludes with one of the saddest disasters ever, when an aircra
full of children collided with a cargo plane late at night between Switzerland an
Germany. One of the fathers, who had lost his wife as well as his two children
subsequently stabbed the air traffic controller he thought responsible for the
deaths.

Chapter 5: Ground Collisions

Ground collisions can be very dangerous, and especially so on taking off when th
(two) aircraft are likely to be heavily laden with fuel and moving fast. Indeed th
worst-ever multi-aircraft disaster on Tenerife described in this chapter is a case i
point.

An airliner fuselage is so thin—just about that of a credit card—that a fierc
fuel-fed external fire may penetrate it in 90 seconds. That is therefore the tim
allotted in most regulations for evacuation.

Newly developed technologies, and even very simple ones, are reducing the ris
of ground collisions, but they continue to represent a very significant risk.

The chapter includes a case where an aircraft operated by one of the bes
airlines mistakenly took off on an out-of-use runway and collided with constructio
equipment parked halfway down.

Chapter 6: No Controllability

Only on rare occasions are pilots unable to control the aircraft because th
control systems cease working for some cataclysmic reason. This is different fro
‘loss of control’ where the controls are working but where say the aircraft stal
due to flying too slowly or with the wrong flap setting.

Since aircraft manufacturers design essential controls and control lines on th
belt and braces principle with each one in duplicate if not triplicate, somethin
major has to happen for them all to fail. Nevertheless, there are several example
in this chapter, ranging from incidents involving the DC-10 to the worst-eve
single aircraft disaster where the failure of the rear bulkhead of a Japanes
Boeing 747 blew off part of the tail, with the aircraft flying around drunkenly fo
thirty minutes before crashing into mountains.

The fear that an aircraft will become uncontrollable on being struck by
shoulder-launched surface-to-air missile fired by terrorists, has led the U
authorities to carry out studies to see whether it would be possible to train pilo
to fly the aircraft using engine power alone—something the DHL pilots of a
Airbus cargo plane succeeded in doing at Baghdad.

Chapter 7: Fire & Smoke

Fire evokes a very powerful primal fear, and pilots have good technical reasons t
be extremely concerned at any sign of its outbreak. In the early days of flying, th
engines ran on gasoline (petrol), which was much more inflammable than th

kerosene (paraffin) used for jet engines today.

With hindsight, in many cases, such as the Swissair flight described here making the earliest possible landing regardless of other considerations would have been the best option in the case of a suspected fire.

Yet, if aircrew shut down an engine on the mistaken assumption it is on fire, and the remaining engine(s) cannot keep the aircraft in the air, the outcome is almost certain to be disastrous. One such instance of hasty action is the British Midland Boeing 737 crash at Kegworth in England, cited in virtually every commercial pilot's training as a classic example of what not to do.

The chapter concludes with the disaster that befell the most beautiful airliner ever—the supersonic Concorde.

Chapter 8: Pilot Sick, Suicidal, or Inappropriate Response

With the airlines and the strict regulatory authorities ensuring aircrew undergo regular (often six monthly) health checks, pilots must feel their careers hang by a thread.

Though it is reassuring to know that with the more sophisticated tests we have nowadays, the likelihood of a pilot having a heart attack while flying is exceedingly small, it has happened as the account that begins this chapter shows. There is nevertheless the danger that pilots can suddenly fall ill, and airlines insist they eat different menus to avoid their risking simultaneous food poisoning.

There have been cases where pilots have inappropriately responded to disengagement of the autopilot and in 'fighting to save the aircraft' have made the crash. The recent Colgan Air crash in the US is an example narrated here.

Chapter 9: 'Fly-by-Wire'

'If the idiots (i.e. the pilots) had kept their hands off the controls, it wouldn't have crashed,' an Airbus executive reputedly said on learning about the crash of one of their fly-by-wire airliners.

The term fly-by-wire is confusing. Traditionally it meant replacing the direct mechanical or mechanical-hydraulic links between the cockpit controls and the movable flight control surfaces with indirect links actuated electrically and electronically.

Now the term also means computers, as opposed to the pilots, fly the aircraft—of course with the pilots telling them what they want to do.

Where Boeing and Airbus once greatly differed was to what extent the computer should be the final arbiter.

Airbus's computer would not let the pilots do things outside the flight envelope whereas, Boeing's computer on the other hand tended to give the pilot more leeway. Boeing's argument was partly that in programming the computer to allow only what is definitely acceptable, one must exclude a gray area where a pilot might just get away with it—and save the aircraft.

While this chapter cites several early accidents involving the A320, the aircraft has become one of the most successful ever.

It also covers in detail the loss in 2009 of an Air France Airbus A330 en route from Rio de Janeiro to Paris, where it now seems an inappropriate response by

the pilots rather than the fly-by-wire system was largely responsible. It is one th most important narratives in the book in that it demonstrates how automation ha been so perfected with pilots 'outside the loop', that their ability to fly the aircra using their cognitive and analytical skills has atrophied.

Chapter 10: Metal Fatigue & Structural Failure

In the wake of the disasters that befell the world's first jetliner, the British d Havilland Comet, fuselage designs now avoid creating points where flexing an stress can concentrate to produce metal fatigue.

The phenomenon can be simply demonstrated by taking a thick copper wir and repeatedly bending it back and forth about a particular point. It first benc relatively easily, but then suddenly becomes brittle and snaps.

Since the fuselage of an airliner inevitably expands and contracts according t the air pressure differential between the inside and outside every time it goes u and down, the number of flights (called cycles) rather than naked historical age the critical factor in the aging of metal aircraft.

Thus, an aircraft flying one-hour short-haul routes will be much more vulnerabl than one flying long-haul routes with flights lasting 10 hours or more.

Chapter 11: Invisible Dangers—Turbulence

Pilots go out of their way to avoid storms not only for their passengers' comfo but also for the safety of the aircraft. However, for turbulence to be visible o their radar it must contain raindrops or snow. Clear air turbulence is much les evident and can sometimes cause the aircraft to drop or rise alarmingly.

Chapter 12: Controlled Flight into Terrain (CFIT)

The term Controlled Flight into Terrain (CFIT) describes what used to be a ver frequent type accident, namely an aircraft under control inadvertently flying int the ground or a mountain.

Fortunately, the incidence of such disasters dropped sharply with th introduction of the Ground Proximity Warning System (GPWS) that uses dat from the radio altimeter system (giving the actual height of the aircraft above th ground) to warn the pilots if they are getting dangerously close to it or sinking to fast.

While saving many lives, GPWS had the drawback of not being able to war pilots if they were flying into a cliff or steep mountainside lying straight ahea The recently developed Enhanced Ground Proximity Warning System (EGPWS) able to take into account the height of the terrain ahead even if it is rising steepl It manages to do this by using GPS to determine the aircraft's precise locatio and accessing a database with the height of the terrain lying ahead.

Chapter 13: Miscellaneous Accidents

This chapter examines how fatigue and old injuries may have impaired th judgment of Germany's World War I fighter ace, the Red Baron. It also analyze the crash of an Airbus flying from Moscow to Hong Kong after the captain allowe his teenage son to sit in his seat.

In addition, it includes a unique case where a passenger with only rudimentar experience of piloting tried unsuccessfully to take the controls of a Boeing 73 after the pilots had fallen unconscious due to lack of oxygen as the autopilot too them up to their cruising height and then on for an hour to their destination.

Chapter 14: Decisional Accidents—Military Action

The shooting down of an airliner by the military almost invariably involves a wid variety of players and factors, not to mention cover-ups and military hubri making it difficult to narrate such events adequately.

There have been three much-publicized cases where airliners have bee brought down by military action. In the first two cases narrated here, Sovie fighters brought down a Korean Airlines aircraft that had strayed. In the thir case, a US warship, the USS Vincennes, shot down an Iranian airliner on designated civilian route.

With the military in the USA very likely now having been given the nod—unde certain conditions—to shoot down an airliner if they think doing so might prever a repeat of 9/11, this could lead the ill-intentioned to simulate such hijackings i the hope that one or more hapless airliners would be shot down accordingly.

Chapter 15: Airliners Morph into Flying Bombs

As early as September 6, 1970, three airliners on their way to America wer hijacked and made to land at a desert landing strip in Jordan called Dawson Field. With no ground facilities to keep the air-conditioning going and the Middl Eastern sun beating down on the fuselages, conditions inside for the passenger were almost unbearable. Adding to their misery were the inadequate toile facilities—designed to work for half a day, not the several days they were confine there. In the end, the occupants were allowed off, and the three empty airliner were blown up.

Subsequently, extra precautions were taken and this meant fewer hijackings However, the protocols for dealing with hijacks remained very much the sam from then on until 9/11. The general idea was to play along with the hijackers i the hope that, with time, achieving an acceptable outcome without loss of li would be possible—which was usually the case.

Passengers never really considered the possibility that the hijackers migh intend to use their fuel-laden aircraft as a flying bomb, even though seven year before 9/11, terrorists had hijacked an Air France airliner with the intention crashing it on a Paris landmark, possibly the Eiffel Tower. The chapter begins wit this Air France incident, which should have been a warning regarding 9/11.

Following that, the chapter describes the events of 9/11, but as there are man excellent accounts and movies covering them, the narrative concentrates on th timeline—timing was everything, and was notably the reason why the fourt group of hijackers failed in their mission.

Chapter 16: Questions & Answers

This somewhat academic chapter briefly covers the nature of air cras investigations, the role of lawyers in the unfortunate blame game, and ne

analytical techniques for predicting accidents together with academic theorie initially conceived in the context of the nuclear power industry.

Topics such as corruption, engineering ethics, whistle-blowing, cost-benefit- how much it is worth spending on safety measures to save a human life- emerging technologies, and even the location of the safest seat are also touche on.

sample content of Air Crashes and Miracle Landings: 60 Narratives: (How, When ... and Most Importantly Why)

- *read The Last Mission for free*
- *read online De la sabidurÃa egoÃsta (Taurus Great Ideas) pdf, azw (kindle), epub*
- download Ruby Cookbook (2nd Edition) pdf
- read online Das Dritte Reich und die Deutschen in der Sowjetunion

- http://test1.batsinbelfries.com/ebooks/Jet-Set--The-People--the-Planes--the-Glamour--and-the-Romance-in-Aviation-s-Glory-Years.pdf
- http://test1.batsinbelfries.com/ebooks/De-la-sabidur--a-ego--sta--Taurus-Great-Ideas-.pdf
- http://twilightblogs.com/library/Well-Stressed--Manage-Stress-Before-It-Turns-Toxic.pdf
- http://crackingscience.org/?library/Das-Dritte-Reich-und-die-Deutschen-in-der-Sowjetunion.pdf