

CAP 763

Aviation Safety Review 2005



Safety Regulation Group



CAP 763

Aviation Safety Review 2005

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Chapter 1 Introduction

- 1.1 This document has been produced as an update to previous Aviation Safety Reviews (CAPs 673, 701 and 735) and covers the ten year period between 1995 and 2004. It looks briefly at international civil aviation safety but a significant proportion of the document concentrates on civil aviation in the UK.
- 1.2 The chapters are split into key areas of interest: worldwide accidents, European Union (EU) fatal accidents, UK public transport and non-public transport operations, UK airspace, UK aerodromes and events of highest significance.
- 1.3 The Review is intended to provide statistical information for use by the aviation community. Different sections of the Review will be of interest to different sectors of the aviation industry. Airlines may be interested in the overall safety of UK public transport and the general aviation community may be interested in the safety of non-public transport operations. The Review will also be useful for the CAA in that it provides a useful basis on which to build further statistical analysis in the future.
- 1.4 There may be some differences between the data published in this Review and those published in previous Reviews. The reasons for these differences include:
- more accurate information has become available;
 - datasets differ slightly between the Reviews, e.g. UK licensed aerodromes instead of UK airfields; and
 - data is subsequently reclassified. This can occur as a result of the final investigation report being published, sometimes many months or even years after the event.
- 1.5 There are various terms used in the Review with respect to accidents and incidents, and the analysis of the data. Although a Definitions list is provided in Chapter 9, a deeper explanation is provided in Appendix 1, which may be of use to the reader before moving on to the statistical chapters.
- 1.6 The CAA has deliberately avoided drawing conclusions from the statistics and invites the reader to draw their own inferences. The CAA has highlighted its main safety concerns in the form of the Safety Plan, which is published on the CAA web site¹.
- 1.7 The data for this Review have been derived from various sources: International Civil Aviation Organization (ICAO), Airclaims, CAA Mandatory Occurrence Reporting Scheme database, CAA Air Transport Statistics Department, CAA aircraft register, British Gliding Association and the UK Airprox Board. All sources other than the CAA have been referenced in this document and are hereby acknowledged for the information supplied.
- 1.8 The CAA welcomes any comments regarding this Review and in particular on how future issues could be improved. If you have any comments then please email them to Safety.Analysis@srg.caa.co.uk.

1. See www.caa.co.uk/safetyplan

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Chapter 2 Worldwide Safety

1 Introduction

1.1 This chapter contains information on worldwide aviation safety. There are two main sections within this chapter, one relating to reportable accidents and the other relating to fatal accidents.

2 Reportable Accidents

2.1 This section uses data collated by the International Civil Aviation Organization (ICAO).

2.2 ICAO is a specialised agency of the United Nations and came into being in 1947 as a result of 52 States signing the Convention of International Civil Aviation (also known as the Chicago Convention). The Convention set the purpose of ICAO to be the development of international civil aviation in a safe and orderly manner and the establishment of international air transport services on the basis of equality of opportunity, with these services being operated soundly and economically.

2.3 An expert nominated by the UK CAA is a member of the ICAO Safety Indicators Study Group (SISG), which, on an annual basis, meets to analyse worldwide reportable accidents to large transport aircraft. Reportable accidents between 1997 and 2004 that have been analysed by the SISG are used throughout this section.

2.4 Reportable accidents worldwide involving large transport aircraft

2.4.1 Figure 2.1 shows the annual number of reportable accidents involving large transport aircraft worldwide. On average, there have been 170 accidents per year.

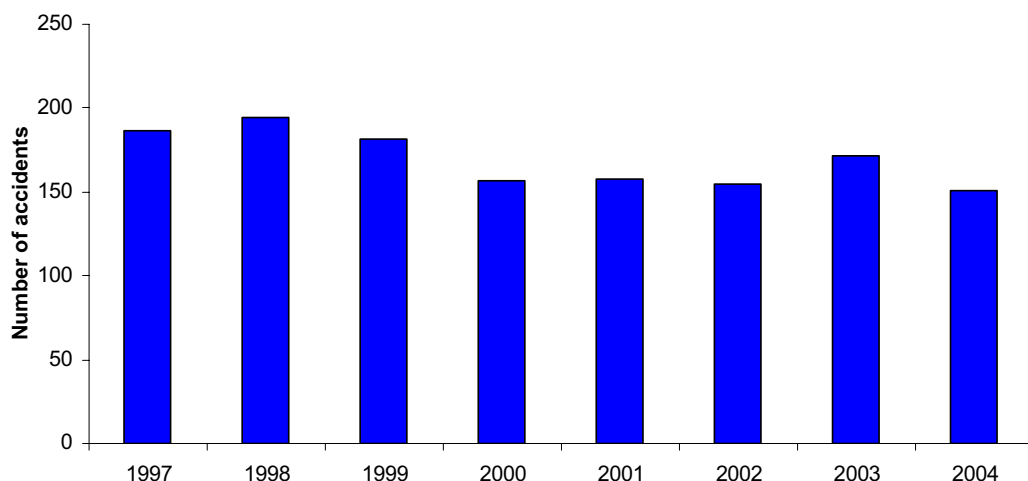


Figure 2.1 Reportable accidents worldwide involving large transport aircraft

2.5 Reportable accidents by class of aircraft

2.5.1 Figure 2.2 shows the reportable accidents between 1997 and 2004 broken down by class of aircraft. Unfortunately, the utilisation, in terms of hours or flights, which corresponds to this breakdown by class of aircraft is unavailable. This means that accident rates, which are a better measure of safety than numbers of accidents, cannot be produced. However, although 50% of worldwide accidents involved

western built jets, these aircraft generate a significant proportion of the total utilisation flown by worldwide large transport aircraft.

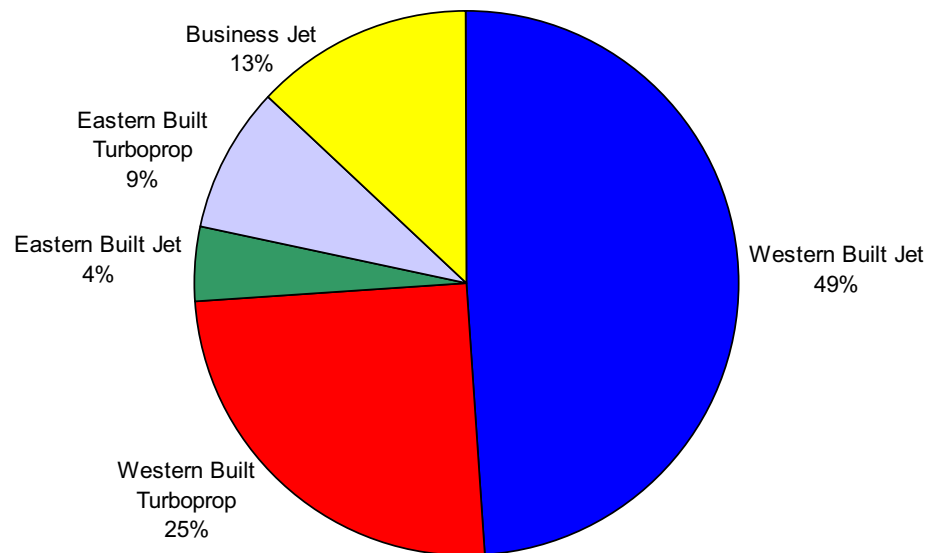


Figure 2.2 Reportable accidents by class of aircraft

2.6 Classification of reportable accidents

2.6.1 During the SISG analysis process, the majority of worldwide reportable accidents are assigned at least one occurrence category. The list of occurrence categories used by the SISG was produced by the CAST/ICAO Common Taxonomy Team (CICTT) to cover accidents and incidents. The list contains 28 different categories that are designed to cover the most important types of incidents/accidents. Figure 2.3 shows the top ten occurrence categories in terms of the percentage of accidents that have been assigned an individual category.

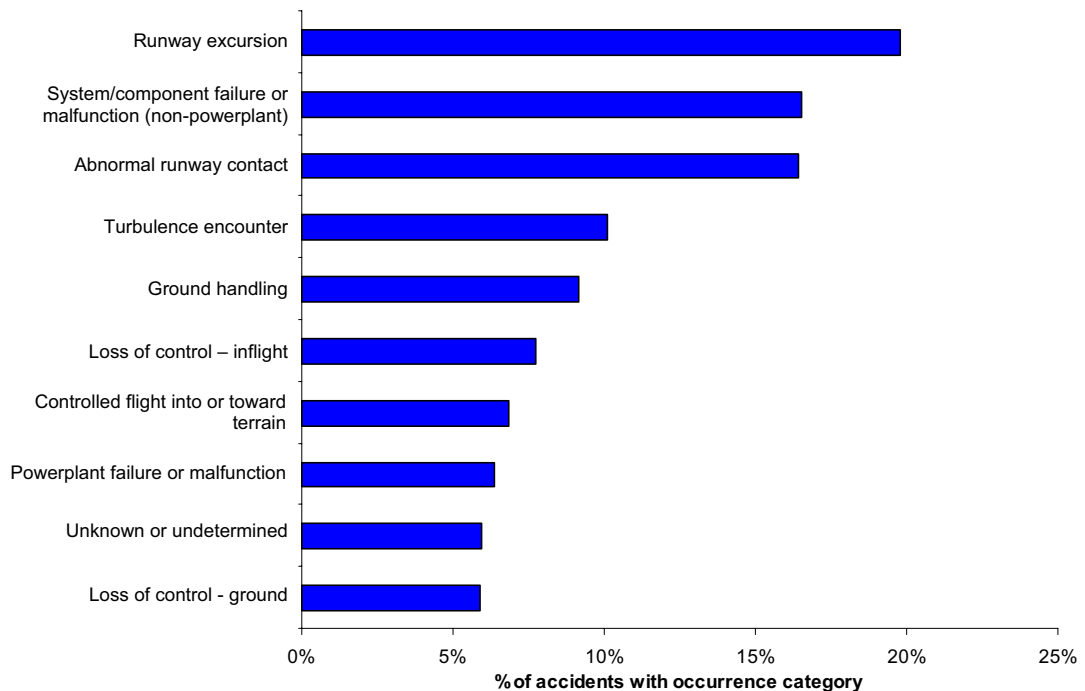


Figure 2.3 Reportable accidents by occurrence category

3 Fatal Accidents

3.1 This section uses data collated by the CAA.

3.2 The CAA has developed its own systematic review process to apply to worldwide fatal accidents to jet, business jet and turboprop aircraft of the type typically used in airline operations. This differs from the ICAO review in two aspects:

- a) it uses fatal accident data only, as these highlight issues likely to result in catastrophic loss; and
- b) accidents are not only classified by type of outcome but also the causal and circumstantial factors involved.

3.3 The raw accident data used in the review process originate from Airclaims² and is supplemented by accident briefs and reports from other sources. The utilisation data also originate from Airclaims.

2. Data is taken from the Airclaims Client Aviation System Enquiry (CASE) database

- 3.4 The CAA Accident Analysis Group (AAG), consisting of a number of experts covering a broad spectrum of knowledge, meets once a year to consider the fatal accidents from the previous year and allocates causal factors, circumstantial factors and consequences to these accidents. Causal factors are events or items that were judged to be directly instrumental in the causal chain of events leading to the accident whereas a circumstantial factor is one that was considered not to be directly in the causal chain, but could have contributed to the accident. The consequences are the outcomes of the accidents.
- 3.5 The taxonomy used by the AAG to review the worldwide fatal accidents includes 66 possible causal factors, 21 circumstantial factors and 15 consequences. Each fatal accident can be allocated as many factors and consequences as are appropriate.
- 3.6 The AAG review does not include fatal accidents known to have resulted from acts of terrorism or sabotage, fatalities to third parties not caused by the aircraft or its operation, military type operations or test flights.
- 3.7 The information in this section considers fatal accidents involving passenger and cargo operations, on aircraft with a maximum take-off weight of over 5,700kg, resulting in at least one on-board fatality.

3.8 Summary of fatal accidents

- 3.8.1 Figure 2.4 shows the annual number of fatal accidents, broken down by class of aircraft. The data is also broken down between western and eastern built aircraft later in this section. The fatal accident rate for jets and turboprops, using a three year moving average (3 yr ma), has also been shown on the chart. The rate has been restricted to jets and turboprops, as utilisation data are available for these classes of aircraft but not for business jets. Business jets are not included within the jets category.

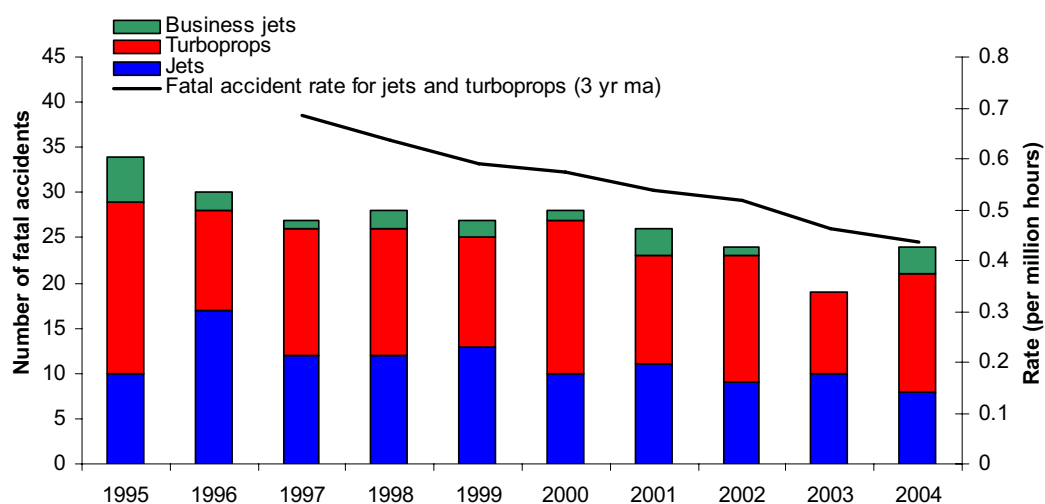


Figure 2.4 Number and rate of fatal accidents - worldwide

- 3.8.2 On average, jets were involved in 11 fatal accidents per year, turboprops in 14 and business jets in two.
- 3.8.3 Considering the total ten year period, jets were involved in 42% of the fatal accidents, turboprops in 51% and business jets in 7%.
- 3.8.4 Of the flights flown by jets and turboprops between 1995 and 2004, 70% were performed by jets and 30% by turboprops. In terms of hours flown between 1995

and 2004, 83% were generated by jets and 17% were generated by turboprops. The numbers of flights and hours flown by business jets are unknown.

3.8.5 Table 2.1 shows a summary of the number of fatal accidents and fatal accident rate between 1995 and 2004 broken down by class of aircraft.

Class of aircraft	Number of fatal accidents 1995-2004	Fatal accident rate (per million hours) 1995-2004
Jet	112	0.3
Turboprop	135	1.7
Total	247	0.6
Business jet	20	-

Table 2.1 Summary of fatal accidents and fatal accident rates *

* The fatal accident rate for business jets is not listed in the table as utilisation is not available for this class of aircraft. Therefore, the 'total' fatal accident rate only relates to jets and turboprops.

3.9 Summary of fatalities

3.9.1 Figure 2.5 shows the number of fatalities that resulted from the fatal accidents shown in Figure 2.4, also broken down by class of aircraft. The rate of fatalities for jets and turboprops, using a three year moving average (3 yr ma), has also been shown on the chart. As mentioned in paragraph 3.8.1, utilisation only exists for jets and turboprops, which is why the rate of fatalities has been restricted to these classes of aircraft.

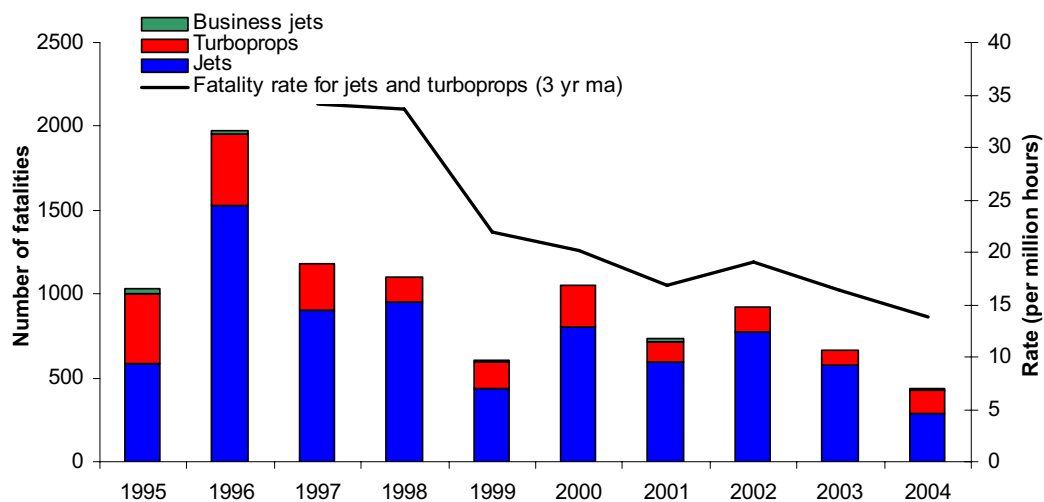


Figure 2.5 Number and rate of fatalities - worldwide

3.9.2 On average, fatal accidents involving jets resulted in 744 fatalities per year, those involving turboprops resulted in 216 and those involving business jets resulted in ten.

3.9.3 Considering the total ten year period, fatal accidents involving jets resulted in 77% of the total number of fatalities, those involving turboprops resulted in 22% and those involving business jets resulted in 1%.

3.9.4 The average number of fatalities per fatal accident involving jets, between 1995 and 2004, was 66. The largest number of fatalities in a single fatal accident involving jets

was 349, which resulted from a mid-air collision between an Ilyushin Il-76 on a ferry flight and a Boeing 747 on a passenger flight, in India, in 1996.

- 3.9.5 The average number of fatalities per fatal accident involving turboprops was 16. The largest number of fatalities in a single fatal accident involving turboprops was 298, which resulted from an Antonov An-32, on a cargo flight, overrunning the runway into a market whilst attempting to take-off, in the Democratic Republic of the Congo, in 1996. Only one of the six people on board the aircraft suffered fatal injuries but 297 people on the ground were killed.
- 3.9.6 The average number of fatalities per fatal accident involving business jets was five. The largest number of fatalities in a single fatal accident involving business jets was 18, which resulted from a Gulfstream III, on a passenger flight, impacting a hill during approach, in the USA, in 2001.
- 3.9.7 Table 2.2 shows a summary of the number of fatalities and rate of fatalities between 1995 and 2004 broken down by class of aircraft.

Class of aircraft	Number of fatalities 1995-2004	Rate of fatalities (per million hours) 1995-2004
Jet	7441	20.1
Turboprop	2157	27.6
<i>Total</i>	<i>9598</i>	<i>21.4</i>
Business jet	98	-

Table 2.2 Summary of fatal accidents and fatal accident rates*

* The fatal accident rate for business jets is not listed in the table as utilisation is not available for this class of aircraft. Therefore, the 'total' fatal accident rate only relates to jets and turboprops.

3.10 Fatal accident rates

3.10.1 Figure 2.6 shows the fatal accident rates for jets and turboprops, using a three year moving average. As mentioned in paragraph 3.8.1, a rate can only be produced for jets and turboprops as the utilisation for business jets is not available. A combined jet and turboprop fatal accident rate has already been shown in Figure 2.4.

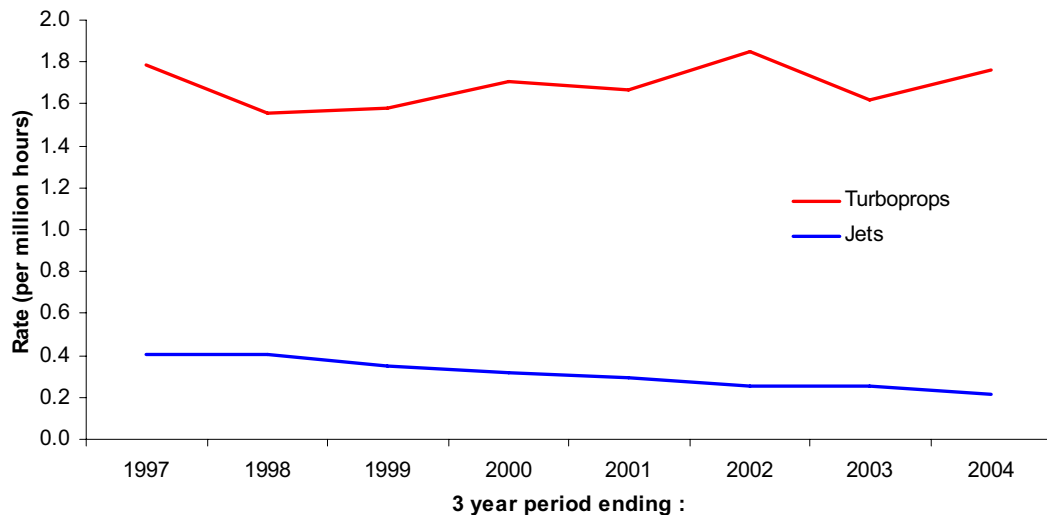


Figure 2.6 Rate of fatal accidents

3.11 95% confidence fatal accident rate by operator region

3.11.1 Figure 2.7 shows the 95% confidence fatal accident rates per million hours between 1995 and 2004, for jets and turboprops, broken down by operator region.

3.11.2 The use of 95% confidence is discussed in Appendix 1.

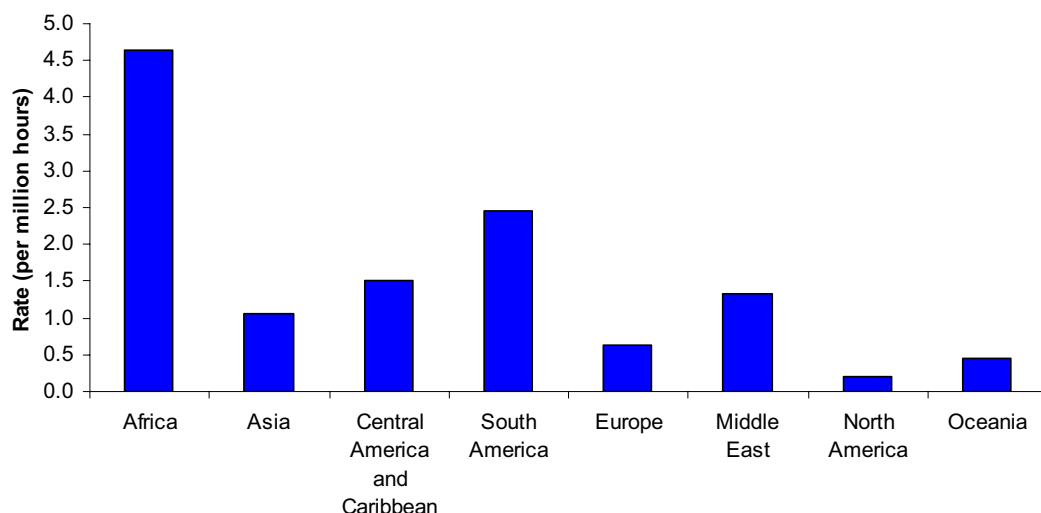


Figure 2.7 95% confidence fatal accident rates 1995-2004 by operator region*

* Europe, as presented in Figure 2.7, is not the same as the European Union as shown in Chapter 3. The countries that have been classified as 'Europe' are listed in Chapter 9. The countries within the Middle East and Oceania regions are also shown in Chapter 9.

3.11.3 In terms of the percentage of jet and turboprop fatal accidents involving each operator region:

- 26% fatal accidents involved European operators
- 22% involved Asian operators
- 21% involved African operators
- 13% involved South American operators
- 11% involved North American operators
- 4% involved Central American/Caribbean operators
- 3% involved Middle Eastern operators
- 1% involved Oceania (e.g. operators from Australia, New Zealand and South Pacific Islands)

3.11.4 The breakdown relating to the flights flown between 1995 and 2004 by each operator region is:

- 43% flights involved North American operators
- 27% involved European operators
- 13% involved Asian operators
- 5% involved South American operators
- 3% involved African operators
- 3% involved Oceania operators
- 3% involved Central American/Caribbean operators
- 2% involved Middle Eastern operators

3.12 Fatal accident rate by type of service

3.12.1 Figure 2.8 shows the fatal accident rates per million hours, for jets and turboprops, broken down by type of service. The rate is shown as a three year moving average.

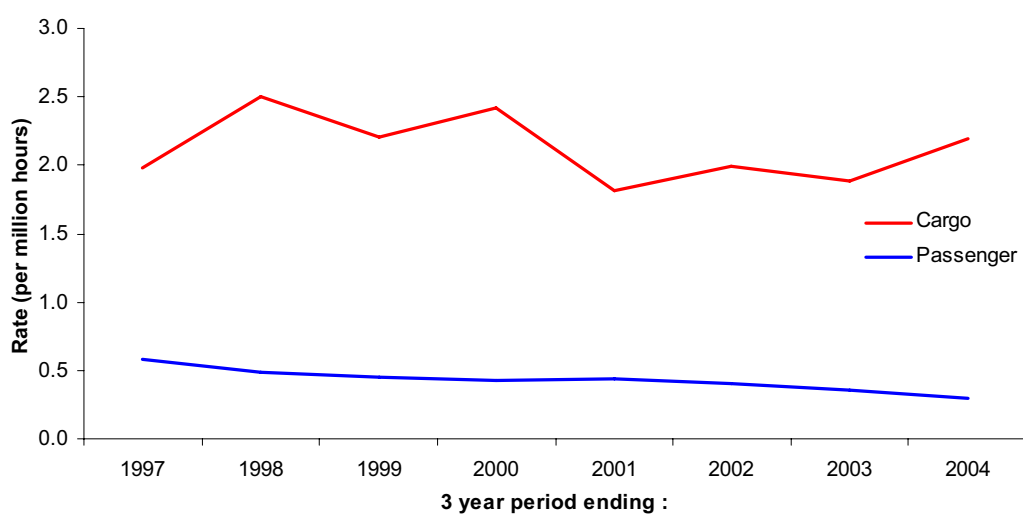


Figure 2.8 Fatal accident rates by type of service

3.12.2 Between 1995 and 2004, the breakdown of jet and turboprop flights flown by type of service was 93% on passenger operations and 7% on cargo operations. The

breakdown is similar for the hours flown: 92% were generated by passenger operations and 8% by cargo operations. In terms of the percentage of fatal accidents by type of service, 71% involved passenger operations and 29% involved cargo operations.

3.13 Fatal accident rate involving western built aircraft

3.13.1 Western built aircraft (jets and turboprops combined) have generated 95% of flights flown (and 94% of hours flown) by all jets and turboprops and have been involved in 67%³ of the fatal accidents. Figure 2.9 shows the fatal accident rates per million hours, for western built aircraft, using a three year moving average, broken down by class of aircraft.

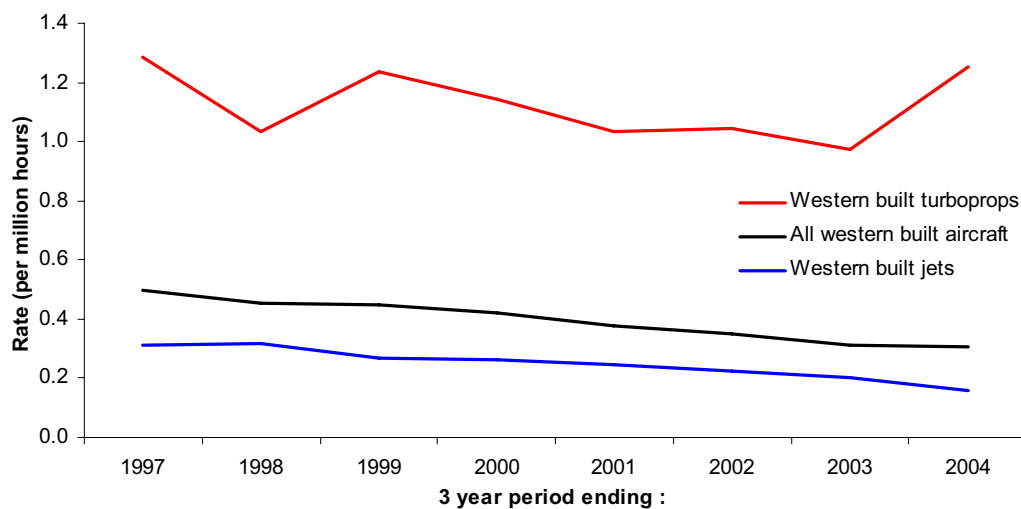


Figure 2.9 Western built aircraft fatal accident rates

3.13.2 Within the western built aircraft subset, 70% of flights flown between 1995 and 2004 were performed by western built jets and 30% by western built turboprops. The breakdown by hours flown between 1995 and 2004 is that 83% were performed by western built jets and 17% by western built turboprops. Over the same time period, the breakdown between the fatal accidents is that 50% involved western built jets and 50% involved western built turboprops.

3.13.3 A list of aircraft types considered to be 'western built aircraft' are listed in Appendix 3.

3. One of the fatal accidents was a mid air collision involving an eastern built aircraft and a western built aircraft. Mid-air collisions are normally considered as one accident but, when the accidents are broken down by class of aircraft, there will be double counting if the individual components are summed back together.

3.14 Fatal accident rate involving eastern built aircraft

3.14.1 Eastern built aircraft (jets and turboprops combined) have generated 5% of flights flown (and 6% of hours flown) by all jets and turboprops and were involved in 34%⁴ of the fatal accidents. Figure 2.10 shows the fatal accident rates per million hours, for eastern built aircraft, using a three year moving average, broken down by class of aircraft.

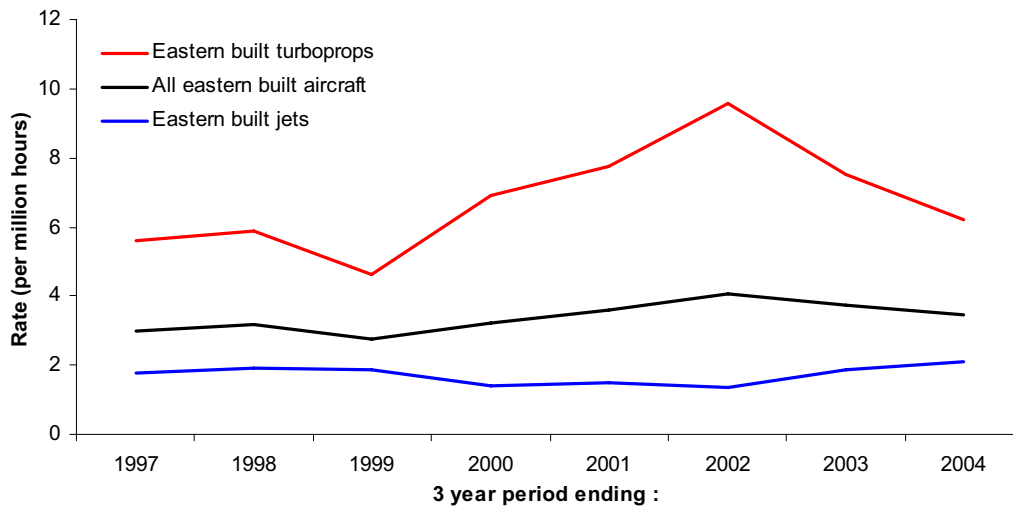


Figure 2.10 Eastern built aircraft fatal accident rates

3.14.2 Within the eastern built aircraft subset, 61% of flights flown between 1995 and 2004 were performed by eastern built jets and 39% by eastern built turboprops. The breakdown by hours flown between 1995 and 2004 shows that 67% were performed by eastern built jets and 33% by eastern built turboprops. Over the same time period, the breakdown between the fatal accidents is 36% involved eastern built jets and 64% involved eastern built turboprops.

3.14.3 The utilisation generated by eastern built aircraft is estimated to a greater extent than that for the western built aircraft, therefore some caution should be applied to the information relating to this class of aircraft.

3.14.4 A list of aircraft types considered to be 'eastern built aircraft' are listed in appendix 3.

3.15 Top five primary causal factors

3.15.1 Causal factors are events or items that the AAG judged to be directly instrumental in the causal chain of events leading to the fatal accident. The causal factors used by the AAG are listed in groups, such as 'Crew', and then sub-divided into specific factors, such as 'Fatigue'. Where sufficient information allowed, a single primary causal factor was allocated to an individual accident.

3.15.2 A primary causal factor was allocated to 85% of the jet and turboprop fatal accidents that occurred between 1995 and 2004. In the remaining 15% of fatal accidents, insufficient information was available to allocate a primary cause. The accidents were analysed in terms of the higher level causal factor grouping. These groupings of primary causal factors are shown in Figure 2.11.

4. One of the fatal accidents was a mid air collision involving an eastern built aircraft and a western built aircraft. Mid-air collisions are normally considered as one accident but, when the accidents are broken down by class of aircraft, there will be double counting if the individual components are summed back together.

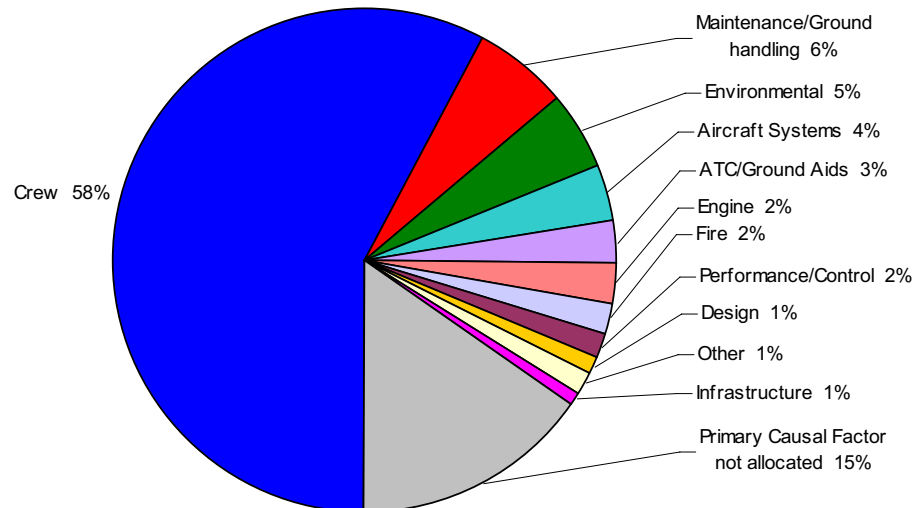


Figure 2.11 Primary causal factor groupings

3.15.3 The top five primary causal factor groupings are shown in more detail in Table 2.3. The five primary causal factor groupings displayed in the table were present in approximately 75% of fatal accidents.

Rank	Primary causal factor grouping	% of fatal accidents involving grouping
1	Crew	58%
2	Maintenance/Ground handling	6%
3	Environmental	5%
4	Aircraft Systems	4%
5	ATC/Ground Aids	3%
-	Primary Causal Factor not allocated	15%

Table 2.3 Top five primary causal factor groupings

3.16 Top five causal factors

3.16.1 All the causal factors of the jet and turboprop fatal accidents between 1995 and 2004 were analysed to establish the top five causal factors. It should be noted that more than one causal factor can be applied to an individual accident. The results are shown in Table 2.4.

Rank	Causal factor	% of fatal accidents involving factor
1	Crew - lack of positional awareness - in air	30%
2	Crew - omission of action/inappropriate action	28%
3	Crew - flight handling	25%
4	Crew - poor professional judgement/airmanship	18%
5	Engine - engine failure or malfunction	15%
-	Not allocated with a causal factor	11%

Table 2.4 Top five causal factors

3.16.2 At least one causal factor was allocated to 89% of the jet and turboprop fatal accidents and the five causal factors shown in Table 2.4 were present in approximately 70% of fatal accidents.

3.17 Top five circumstantial factors

3.17.1 A circumstantial factor is an event or item that the AAG judged not to be directly in the causal chain of events but its presence may be of interest in the understanding of fatal accidents.

3.17.2 At least one circumstantial factor was allocated to 83% of the jet and turboprop fatal accidents between 1995 and 2004. The accidents were analysed to establish the top five circumstantial factors and the results are shown in Table 2.5. It should be noted that more than one circumstantial factor can be applied to an individual accident. The five circumstantial factors displayed in the table were present in 75% of fatal accidents.

Rank	Circumstantial factor	% of fatal accidents involving factor
1	Crew - failure in CRM (cross-check/co-ordinate)	33%
2	Aircraft systems - non-fitment of presently available safety equipment	32%
3	Environmental - poor weather	29%
4	Infrastructure - inadequate regulatory oversight	26%
5	Environmental - poor visibility or lack of external visual reference	26%
-	Not allocated with a circumstantial factor	17%

Table 2.5 Top five circumstantial factors

3.18 Top five consequences

- 3.18.1 A consequence is an event or item that the AAG judged to be an outcome of the fatal accident.
- 3.18.2 At least one consequence was allocated to 99% of the jet and turboprop fatal accidents between 1995 and 2004. The accidents were analysed to establish the top five consequences and the results are shown in Table 2.6. It should be noted that more than one consequence can be applied to an individual accident. The five consequences displayed in the table were present in nearly 90% of fatal accidents.

Rank	Consequence	% of fatal accidents involving consequence
1	Collision with terrain/water/obstacle (non-CFIT)	48%
2	Post crash fire	33%
3	Loss of control in flight	29%
4	Controlled flight into terrain (CFIT)	26%
5	Runway excursion	11%
-	Not allocated with a consequence	1%

Table 2.6 Top five consequences

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Chapter 3 Aviation Safety in the European Union

1 Introduction

- 1.1 This chapter contains information on aviation safety within the original 15 European Union (EU) Member States prior to its expansion in 2004; namely Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and United Kingdom.
- 1.2 The information has been restricted to the original 15 EU Member States as these have all had a significant length of time within a European aviation regulatory framework. All of the original Member States have been full members of the Joint Aviation Authorities since at least 1994. It would not be reasonable at this stage to compare these established countries with those that have joined the EU in the enlargement process in 2004, many of whom have only joined the Joint Aviation Authorities in recent years.
- 1.3 In this chapter, aviation safety has been measured by using the number of fatal accidents and 95% confidence fatal accident rates for aircraft registered in individual EU Member States.
- 1.4 The source of the utilisation and fatal accident data is Airclaims.

2 Background

- 2.1 Typically, when producing fatal accident rates for large transport aircraft in individual countries, the rate is produced with consideration to the aircraft operators based within that country. The country in which an aircraft operator is based is known as the State of the Operator. However, an operator based within one country may be using aircraft that are registered in different countries, e.g. a UK operator could use aircraft that are registered in the USA.
- 2.2 The main reason that accident rates are typically produced by State of the Operator is that suitable utilisation, in terms of hours and flights, is only commercially available in this format.
- 2.3 However, a country also has responsibility for the aircraft on its aircraft register despite the fact these aircraft may be operated elsewhere. It is not unusual to have aircraft registered in one country being operated in a number of countries around the world, e.g. a UK registered aircraft could be operated by a French operator. The country in which an aircraft is registered is known as the State of Registry.
- 2.4 A CAA study was initiated to produce measures of safety for the original 15 EU Member States, by State of Registry rather than State of the Operator. Unfortunately, utilisation data was not commercially available in this format over a suitable time period, so an estimation process was developed to convert the available State of the Operator utilisation into State of Registry utilisation.
- 2.5 The study looked at two classes of aircraft; western built jets (excluding business jets) and western built turboprops (with maximum take-off weight of above 5,700kg). Only data relating to airline operations were considered and only the main aircraft register for each EU Member State was used. This meant that, for example, British Overseas Territories that used a separate aircraft register to the UK were excluded.

3 Safety of EU Member States by State of Registry

3.1 The number of fatal accidents and the 95% confidence fatal accident rate, between 1987 and 2004, for western built jets and western built turboprops registered in each of the original 15 EU Member States are shown below.

3.2 Fatal accidents

3.2.1 Figure 3.1 shows the number of fatal accidents involving western built jets and turboprops registered in each of the original 15 EU Member States.

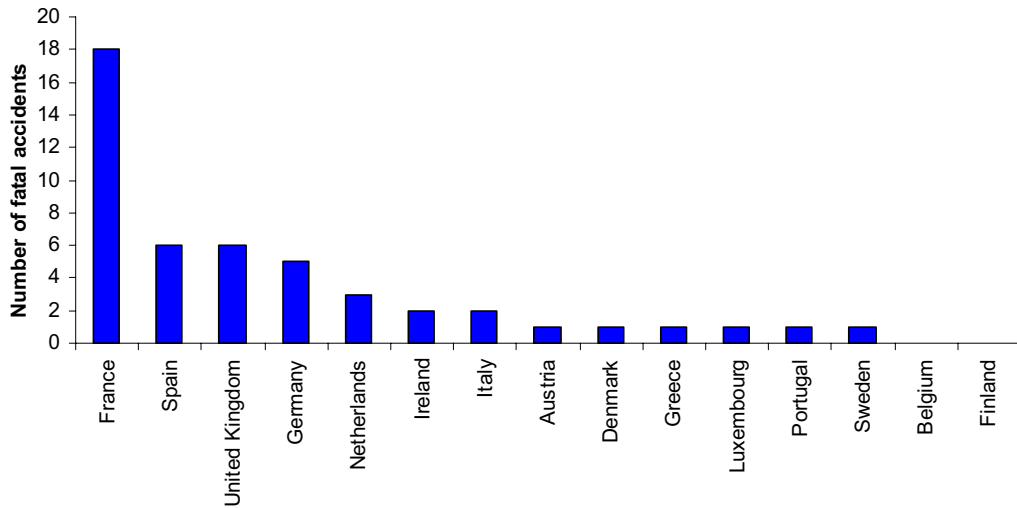


Figure 3.1 Fatal accidents

3.3 95% confidence fatal accident rates

3.3.1 Figure 3.2 shows the 95% confidence fatal accident rates, per million flight hours. The 95% confidence fatal accident rate for Luxembourg has been removed from the chart as it was far higher than that of the other Member States and resulted in a distortion of the chart. The 95% confidence fatal accident rate for Luxembourg is 3.9 per million flight hours. The reason for this high rate for Luxembourg is that among the aircraft registered in this country there has been only one fatal accident and the fleet has generated a low amount of flight hours.

3.3.2 It can be seen that the UK and Germany have the lowest 95% confidence fatal accident rate of the original 15 EU Member States at 0.38 and 0.43 per million hours respectively.

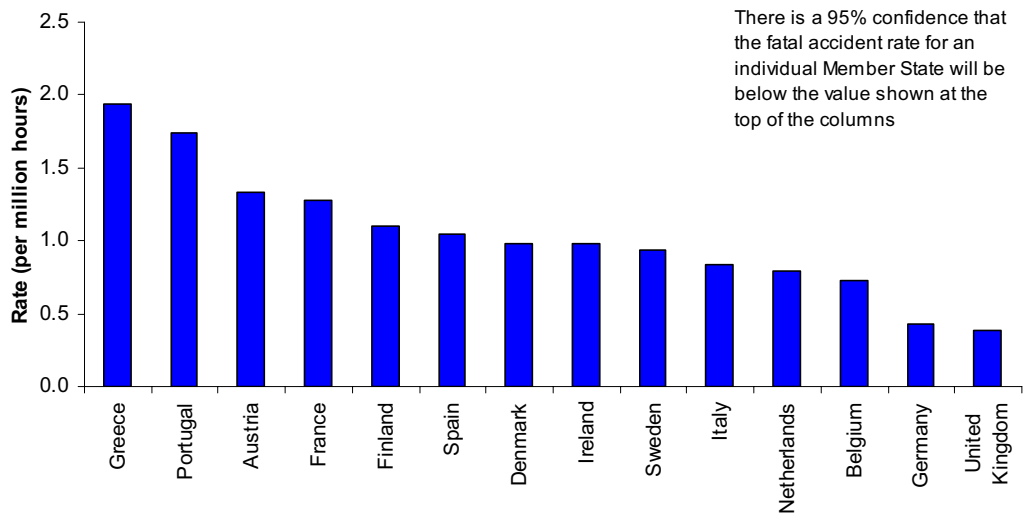


Figure 3.2 95% confidence fatal accident rates (excluding Luxembourg)

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Chapter 4 Safety of UK Public Transport Aircraft Worldwide

1 Introduction

- 1.1 This chapter contains information on the safety of UK registered or operated aircraft on public transport operations worldwide.
- 1.2 The full definition of public transport is shown in Chapter 9, but essentially public transport operations have been limited to passenger, cargo, ambulance, police and Search and Rescue (SAR) operations in this Review.
- 1.3 Aeroplane public transport operations have been broken down by size of aircraft. Public transport operations involving small aeroplanes are split evenly between airline and air taxi operations. The majority of large aeroplanes (on average, 97% of flights) are involved in airline operations. Also shown within this chapter, are helicopter and balloon public transport operations.
- 1.4 More details regarding the types of occurrences shown in this chapter can be found in Appendix 1.
- 1.5 The source of the utilisation data is either the CAA aircraft register or CAA's Air Transport Statistics Department. The occurrence data are from the Mandatory Occurrence Reporting (MOR) scheme database.

2 Large Aeroplanes

- 2.1 This section contains information relating to UK registered or operated aeroplanes with a maximum take-off weight authorised (MTWA) of over 5,700kg on public transport flights.
- 2.2 It should be noted that there are some aeroplanes where the weight of the original type was below 5,700kg MTWA, but where subsequent series aircraft have exceeded this weight, e.g. Embraer EMB 110 Bandeirante. For consistency, all series of the types have been included under the original weight limit. A list of public transport aircraft types are listed in Appendix 3 showing the weight groups and classes of aircraft that have been used for analysis purposes.
- 2.3 **Reportable accidents by aircraft class**
 - 2.3.1 Between 1995 and 2004 there have been 162 reportable accidents involving large aeroplanes. Figure 4.1 shows the annual breakdown of these accidents by class of aircraft. The classes of aircraft that form the large aeroplane category are jets, business jets, turboprops and pistons. All of these classes of aircraft have been involved in reportable accidents except pistons.
 - 2.3.2 Although jets and turboprops have been involved in the most accidents over the ten year period, this needs to be put in perspective with the amount of utilisation that they have generated. Later in this section, the reportable accidents will be shown as a rate, which provides a more accurate picture as to the relative safety of different classes of aircraft.

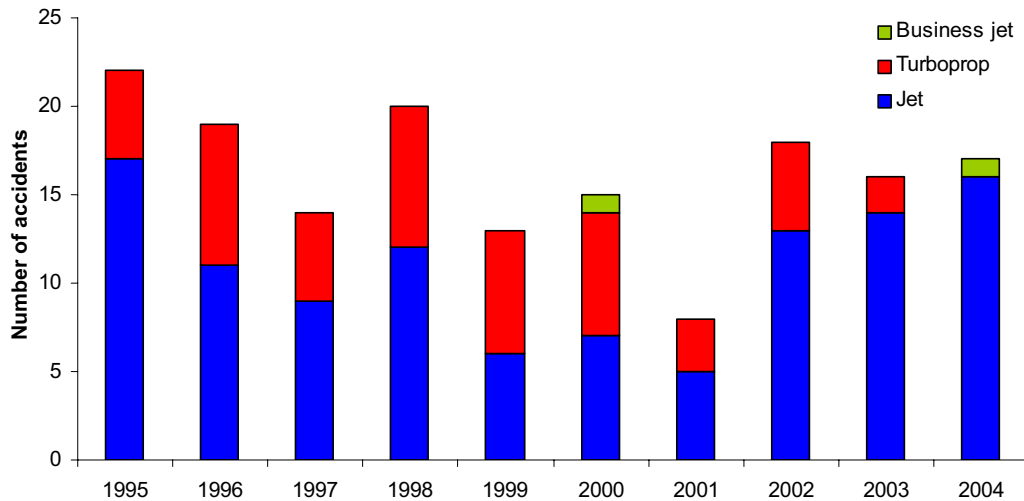


Figure 4.1 Number of reportable accidents by class of aircraft

2.4 Type of reportable accidents

2.4.1 Table 4.1 shows the major types of reportable accidents over the ten year period involving large aeroplanes. Nearly 80% of reportable accidents fall under these accident categories. A significant proportion of accidents are as a result of ground collisions.

Accident category	% of reportable accidents 1995-2004
Ground collision	35%
Tailscape	12%
Hard landing	9%
Landing gear related	9%
Departed runway	6%
Engine related	6%

Table 4.1 Types of reportable accident

2.5 Fatal accidents

2.5.1 Between 1995 and 2004 there have been five fatal accidents involving large aeroplanes resulting in eight fatalities to those on board the aircraft. Details of these fatal accidents are shown in Table 4.2.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
12 Jan 1999	Fokker F27	Guernsey, Channel Islands	Cargo	Stalled on approach and struck houses	2	2
14 Sep 1999	Boeing 757	Girona, Spain	Passenger	Departed runway during landing and fuselage broke up	245	1
02 May 2000	Learjet	Lyon, France	Passenger	Engine problems, fire on landing	5	2
25 May 2000	Shorts SD330	Paris, France	Cargo	MD80 on take-off struck flight deck of SD330	2	1
27 Feb 2001	Shorts SD360	Firth of Forth, Scotland	Cargo	Ditched following double engine flameout after take-off	2	2

Table 4.2 Details of fatal accidents

2.6 Utilisation data

2.6.1 Between 1995 and 2004, UK operators (airlines and air taxi operations) have completed 10.2 million flights and flown 22.5 million hours on revenue operations involving large aeroplanes. The annual breakdown of these figures is shown in table 4.3.

Year	Hours ('000)	Flights ('000)
1995	1,751	833
1996	1,856	871
1997	1,988	922
1998	2,140	978
1999	2,289	1,032
2000	2,442	1,088
2001	2,505	1,136
2002	2,408	1,083
2003	2,473	1,078
2004	2,637	1,138

Table 4.3 Hours and flights flown by UK airlines and air taxi operators

2.6.2 Taking the hours flown between 1995 and 2004, the breakdown, by class of aircraft, is 88.59% of hours were flown by jets, 10.88% by turboprops, 0.50% by business jets and 0.03% by pistons.

2.6.3 Between 1995 and 2004, UK airlines have carried 927 million passengers on large aeroplanes. This figure is restricted to airlines because air taxi operators are not

required to report the numbers of passengers they carry. The annual breakdown of these figures is shown in table 4.4.

Year	Passengers carried (millions)
1995	73
1996	74
1997	80
1998	87
1999	93
2000	100
2001	100
2002	101
2003	104
2004	115

Table 4.4 Passengers carried by UK airlines

2.6.4 Table 4.5 shows the number of flights and hours flown by UK airlines involving large aeroplanes broken down by type of operation. This figure is also restricted to airlines because air taxi operators are not required to report these data.

Year	Passenger		Cargo	
	Hours ('000)	Flights ('000)	Hours ('000)	Flights ('000)
1995	1,677	767	39	34
1996	1,785	807	38	34
1997	1,920	862	39	33
1998	2,067	911	42	38
1999	2,216	967	43	38
2000	2,368	1,023	41	35
2001	2,430	1,069	37	32
2002	2,333	1,015	40	35
2003	2,395	1,019	55	40
2004	2,560	1,082	59	41

Table 4.5 UK airline utilisation by type of operation

2.7 Reportable and fatal accident rates

2.7.1 Figure 4.2 shows the reportable and fatal accident rates for large aeroplanes over the ten year period, using a three year moving average.

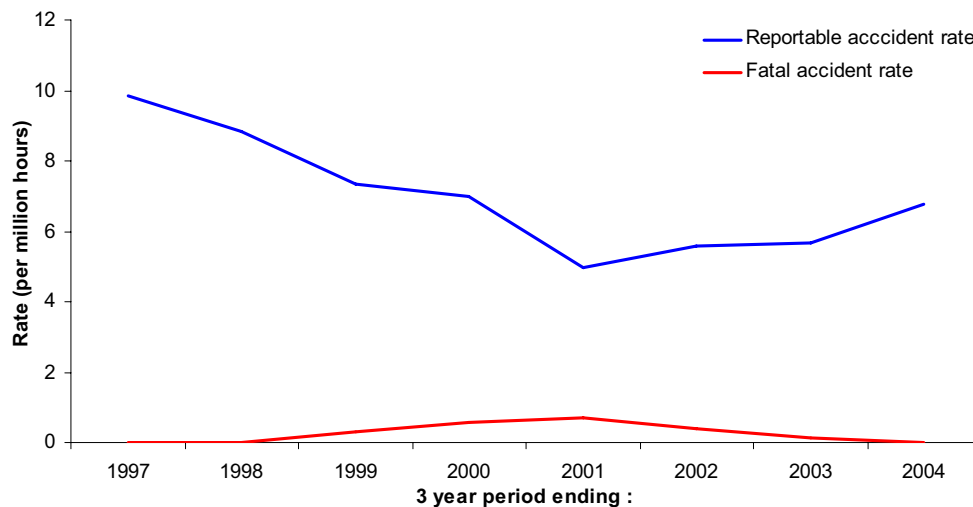


Figure 4.2 Rate of fatal and reportable accidents

2.7.2 Table 4.6 shows the relative fatal and reportable accident rates for the different classes of aircraft in this sector of the aviation industry.

Class of aircraft	Fatal accident rate (per million hours) 1995-2004	Reportable accident rate (per million hours) 1995-2004
Business jet	8.9	17.8
Jet	0.1	5.5
Piston	0.0	0.0
Turboprop	1.2	20.4
All classes of aircraft	0.2	7.2

Table 4.6 Relative fatal and reportable accident rates

2.7.3 Comparing Table 4.6 to Figure 4.1 shows that although jets were involved in the majority of accidents, the actual rate of accidents is low because jets generate a large amount of hours (see paragraph 2.6.2). Alternatively, business jets were involved in very few accidents but the resulting accident rate is high because they generate a relatively low amount of hours.

2.8 Injury tables

2.8.1 The injuries sustained to people on board the large aeroplanes involved in reportable accidents are shown in Table 4.7. There have been eight fatalities, 14 serious injuries and 97 minor injuries between 1995 and 2004. The 40 minor injuries in 1999 were all sustained in the Boeing 757 fatal accident in Girona, Spain.

	Injury	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Crew	Fatal					2	3	2				7
	Serious	2					1		3	1	1	8
	Minor	2	1	4		1	4			5		17
	Total	4	1	4	0	3	8	2	3	6	1	32
Passenger	Fatal					1						1
	Serious				1	2	1			1	1	6
	Minor	5		6	15	40	13		1			80
	Total	5	0	6	16	43	14	0	1	1	1	87

Table 4.7 Injuries sustained in reportable accidents

2.9 Serious incidents

2.9.1 There have been 130 serious incidents, as classified by the UK Air Accidents Investigation Branch (AAIB), involving large aeroplanes over the ten year period. Figure 4.3 shows the annual number of serious incidents, broken down by class of aircraft.

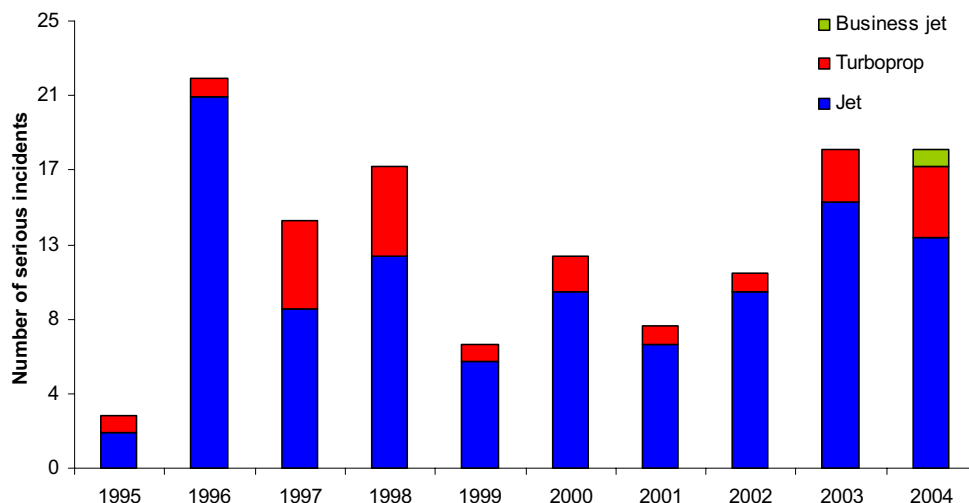


Figure 4.3 Number of serious incidents

2.10 Occurrences

2.10.1 There have been nearly 32,000 occurrences involving large aeroplanes reported between 1995 and 2004. This figure includes accidents, serious incidents and incidents reported through the MOR scheme. Only 1% of these occurrences are accidents or serious incidents.

2.10.2 The CAA has had an established occurrence grading system since 1998 that differentiates between occurrences in terms of severity (see Appendix 2). Between 1998 and 2004 only 1% of large aeroplane occurrences have been classified as being events of highest significance. More details regarding events of highest significance between 2002 and 2004 are shown in Chapter 7. Figure 4.4 shows the number of occurrences per year together with the rate of occurrences, shown as a three year moving average (3 yr ma).

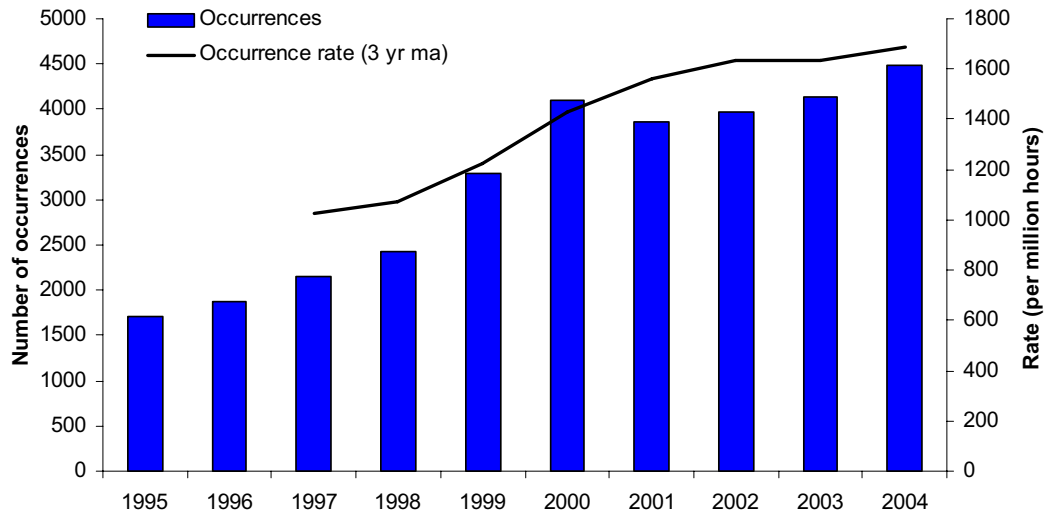


Figure 4.4 Number and rate of occurrences*

* Versions of this chart for other classes of aircraft have the figures for accidents, serious incidents and incidents separated out. However, this is not possible for large aeroplanes because the numbers of accidents and serious incidents are too small compared with the number of incidents.

2.10.3 Figure 4.5 shows the rate of events of highest significance, broken down by quarter, between January 2001 and December 2004.

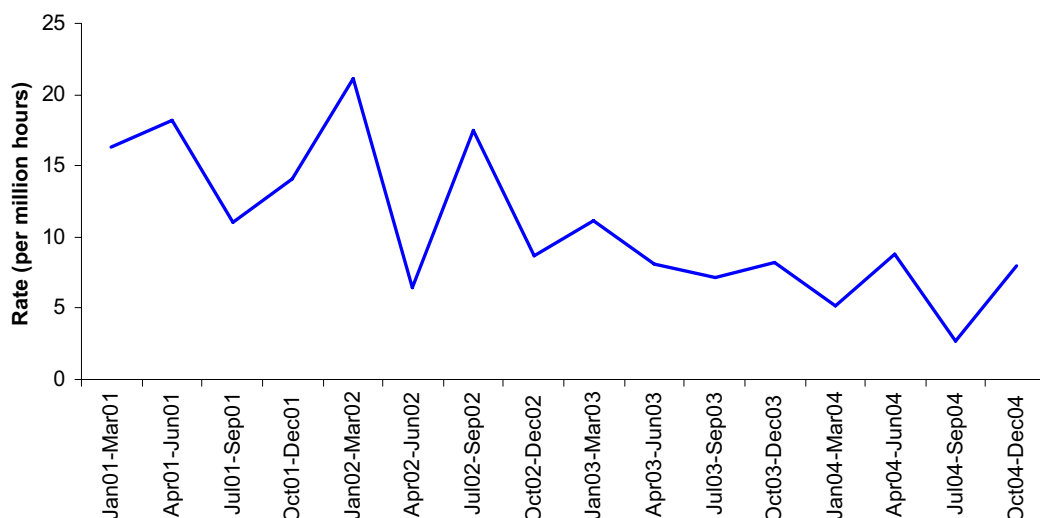


Figure 4.5 Rate of events of highest significance

2.10.4 Using the data between 1995 and 2004, there has been approximately one occurrence per 300 flights. In terms of events of highest significance, there has been approximately one per 27,000 flights.

- 2.10.5 Table 4.8 shows the rates of occurrences and events of highest significance for the different classes of aircraft in this sector of the aviation industry. It should be noted that an individual occurrence may involve more than one class of aircraft.

Class of aircraft	Events of highest significance rate (per million hours) 1998-2004	Occurrence rate (per million hours) 1995-2004
Business jet	65	838
Jet	14	1,303
Piston	0	1,944
Turboprop	33	2,477
All classes of aircraft	16	1,429

Table 4.8 Relative occurrence rates

3 Small Aeroplanes

- 3.1 This section contains information relating to UK registered or operated aeroplanes with a MTWA of under 5,700kg on public transport flights.
- 3.2 It should be noted that there are some aeroplanes where the weight of the original type was below 5,700kg MTWA, but where subsequent series aircraft have exceeded this weight, e.g. Embraer EMB 110 Bandeirante. For consistency all series of the types have been included under the original weight limit. A list of public transport aircraft types are listed in Appendix 3 showing the weight groups and classes of aircraft that have been used for analysis purposes.
- 3.3 One of the specific types of operation within this aviation sector is that of the emergency services, i.e. police support, ambulance and SAR. Since this type of operation is very different from the vast majority of small aeroplane public transport operations, emergency services data are separated out where possible. The emergency services use both small aeroplanes and helicopters. Only the aeroplane operations are shown in this section; helicopter operations are covered later in this chapter.
- 3.4 It is not always possible to identify occurrences involving emergency services operations, therefore some caution should be attached to data relating to these operations. However, every attempt has been made to provide as accurate a picture as possible.

3.5 Reportable accidents

3.5.1 Between 1995 and 2004 there have been 22 reportable accidents involving small aeroplanes. Figure 4.6 shows the annual breakdown of these accidents by type of operation. The 'non-emergency services' category refers to other public transport operations, e.g. passenger and cargo operations.

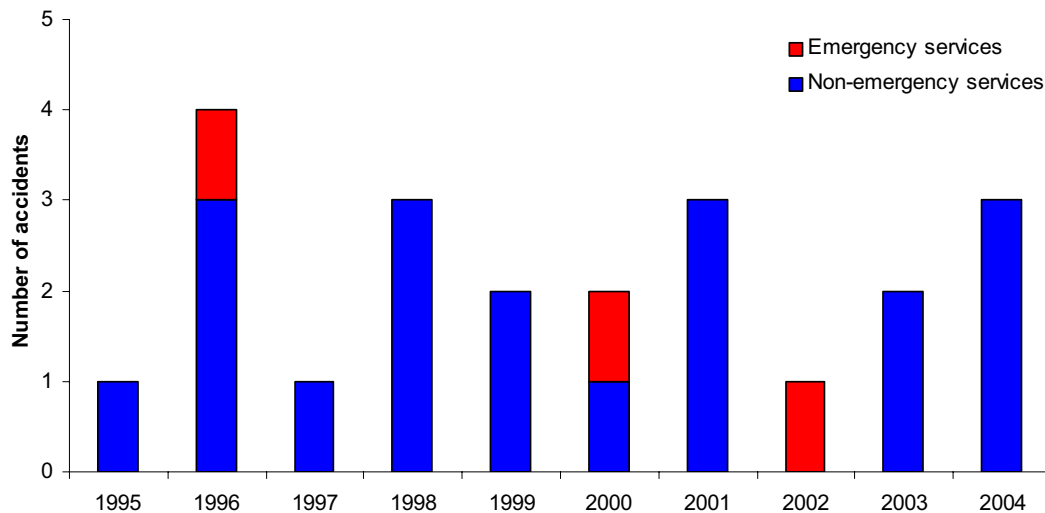


Figure 4.6 Number of reportable accidents by type of operation

3.5.2 The breakdown of reportable accidents by class of aircraft is shown in Figure 4.7. The classes of aircraft that form the small aeroplane category are business jets, turboprops and pistons.

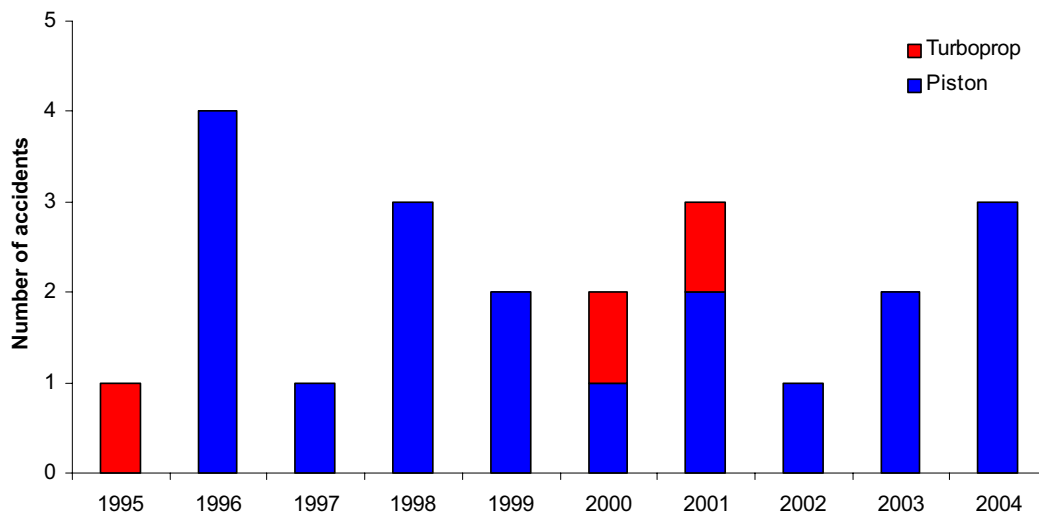


Figure 4.7 Number of reportable accidents by class of aircraft

3.5.3 Although piston engined aircraft have been involved in most of the accidents over the ten year period, this needs to be seen in relation to their degree of utilisation. Later in this section, the reportable accidents will be shown as a rate, which provides a different measure with which to compare the relative safety of different classes of aircraft.

3.6 Fatal accidents

3.6.1 In total, there have been five fatal accidents between 1995 and 2004 involving small aeroplanes resulting in 27 fatalities to those on board the aircraft. Details of these accidents are shown below, broken down by the type of operation they involve.

3.6.2 Between 1995 and 2004 non-emergency services have been involved in three fatal accidents resulting in 21 fatalities. Details of these accidents are shown in Table 4.9.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
24 May 1995	EMB 110 Bandeirante	Nr Leeds, W. York.	Passenger	Lost control and crashed in adverse weather	12	12
06 Mar 1997	Piper PA34 Seneca	Southend, Essex	Cargo	Crashed after reporting artificial horizon problems	2	1
03 Sep 1999	Cessna 404 Titan	Glasgow, Scotland	Passenger	Crashed shortly after take-off following engine failure	11	8

Table 4.9 Details of non-emergency services fatal accidents

3.6.3 Between 1995 and 2004 emergency services have been involved in two fatal accidents resulting in six fatalities. Details of these accidents are shown in Table 4.10.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
19 May 1996	BN2 Islander	Tingwall, Shetland Islands	Ambulance	Crashed during second approach at night	3	1
14 Jun 2000	Piper PA31	River Mersey, England	Ambulance	Lost control on approach and flew into sea	5	5

Table 4.10 Details of emergency services fatal accidents

3.7 Utilisation data

3.7.1 Between 1995 and 2004, UK operators (airlines and air taxi operations) have completed 675,000 flights and flown 419,000 hours on all revenue operations involving small aeroplanes. The annual breakdown of these figures is shown in Table 4.11.

Year	Hours ('000)	Flights ('000)
1995	51	78
1996	44	71
1997	43	69
1998	45	73
1999	40	67
2000	39	63
2001	36	61
2002	38	66
2003	38	60
2004	44	68

Table 4.11 Hours and flights flown by UK airlines and air taxi operators

- 3.7.2 Taking the hours flown between 1995 and 2004, 69% of hours were flown by pistons, 29% by turboprops, and 2% by business jets.
- 3.7.3 Between 1995 and 2004, UK airlines have carried 2.9 million passengers on small aeroplanes. Air taxi operators are not required to report the numbers of passengers they carry. The annual breakdown of these figures is shown in Table 4.12.

Year	Passengers carried ('000)
1995	366
1996	333
1997	312
1998	294
1999	280
2000	270
2001	275
2002	269
2003	225
2004	229

Table 4.12 Passengers carried by UK airlines

3.8 Reportable and fatal accident rates

- 3.8.1 Figure 4.8 shows the reportable and fatal accident rates for small aeroplanes on all public transport operations, over the ten year period, using a three year moving average.
- 3.8.2 It was not possible to identify hours flown on all emergency services operations, therefore an emergency services accident rate could not be calculated.

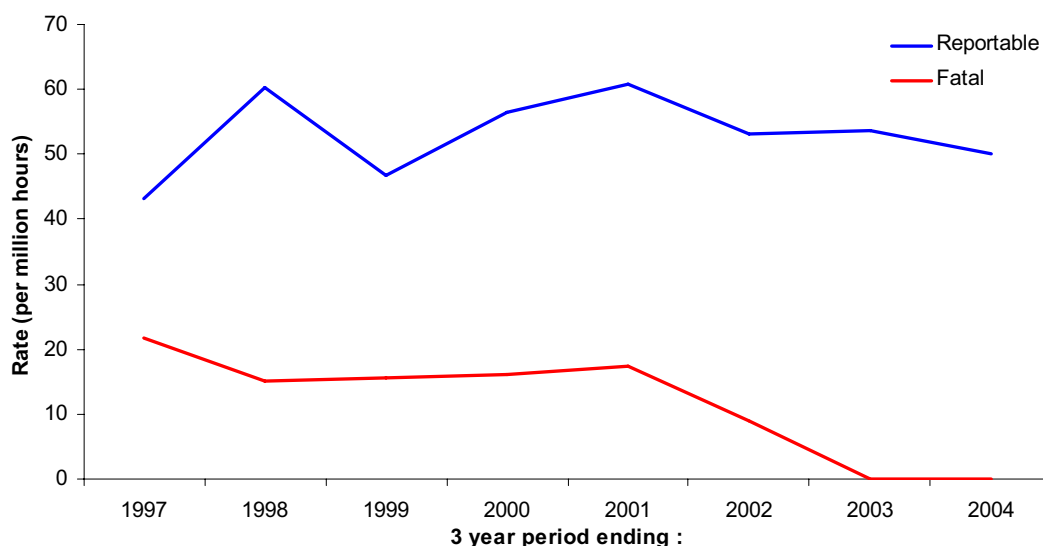


Figure 4.8 Rate of fatal and reportable accidents

3.8.3 Table 4.13 shows the relative fatal and reportable accident rates for the different classes of aircraft in this sector of the aviation industry, for all operations.

Class of aircraft	Fatal accident rate (per million hours) 1995-2004	Reportable accident rate (per million hours) 1995-2004
Business jet	0.0	0.0
Piston	13.8	65.7
Turboprop	8.1	24.4
All classes of aircraft	11.9	52.5

Table 4.13 Relative fatal and reportable accident rates

3.9 Injury tables

3.9.1 The injuries sustained to people on board the small aeroplanes involved in reportable accidents are shown in the tables below. In total there have been 27 fatalities, six serious injuries and two minor injuries between 1995 and 2004. The injury tables have been broken down by the type of operation they involve.

3.9.2 The injuries sustained in reportable accidents involving non-emergency services operations are shown in Table 4.14. There have been 21 fatalities, five serious injuries and one minor injury.

	Injury	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Crew	Fatal	3				2						5
	Serious			1								1
	Minor											0
	Total	3	0	1	0	2	0	0	0	0	0	6
Passenger	Fatal	9		1		6						16
	Serious					3					1	4
	Minor										1	1
	Total	9	0	1	0	9	0	0	0	0	2	21

Table 4.14 Injuries sustained in non-emergency services reportable accidents

3.9.3 The injuries sustained in reportable accidents involving emergency services operations are shown in Table 4.15. There have been six fatalities, one serious injury and one minor injury.

	Injury	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Crew	Fatal		1				1					2
	Serious											0
	Minor											0
	Total	0	1	0	0	0	1	0	0	0	0	2
Passenger	Fatal						4					4
	Serious		1									1
	Minor		1									1
	Total	0	2	0	0	0	4	0	0	0	0	6

Table 4.15 Injuries sustained in emergency services reportable accidents

3.10 Serious incidents

3.10.1 There have been nine serious incidents, as classified by the UK AAIB, involving small aeroplanes over the last ten years. Figure 4.9 shows the annual number of serious incidents, broken down by class of aircraft.

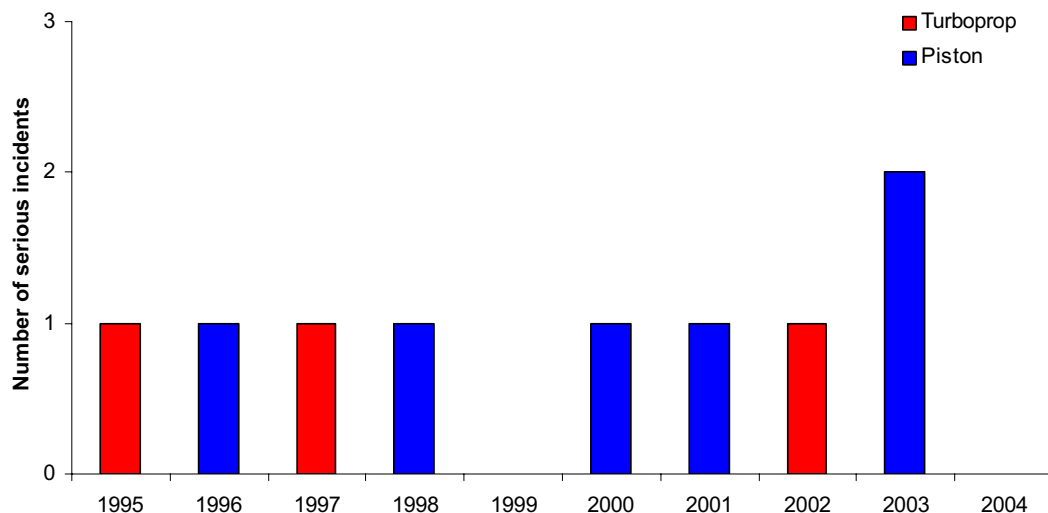


Figure 4.9 Number of serious incidents

3.11 Occurrences

3.11.1 There have been approximately 500 occurrences involving small aeroplanes reported between 1995 and 2004. This figure includes accidents, serious incidents and incidents reported through the MOR scheme. Only 6% of these occurrences are accidents or serious incidents.

3.11.2 The CAA has had an established occurrence grading system since 1998 that differentiates between occurrences in terms of severity. Between 1998 and 2004 only 2% of small aeroplane occurrences have been classified as being events of highest significance. More details regarding events of highest significance between 2002 and 2004 are shown in Chapter 7. Figure 4.10 shows the number of annual occurrences, broken down by type of occurrence. Also displayed is the rate of occurrences, shown as a three year moving average (3 yr ma).

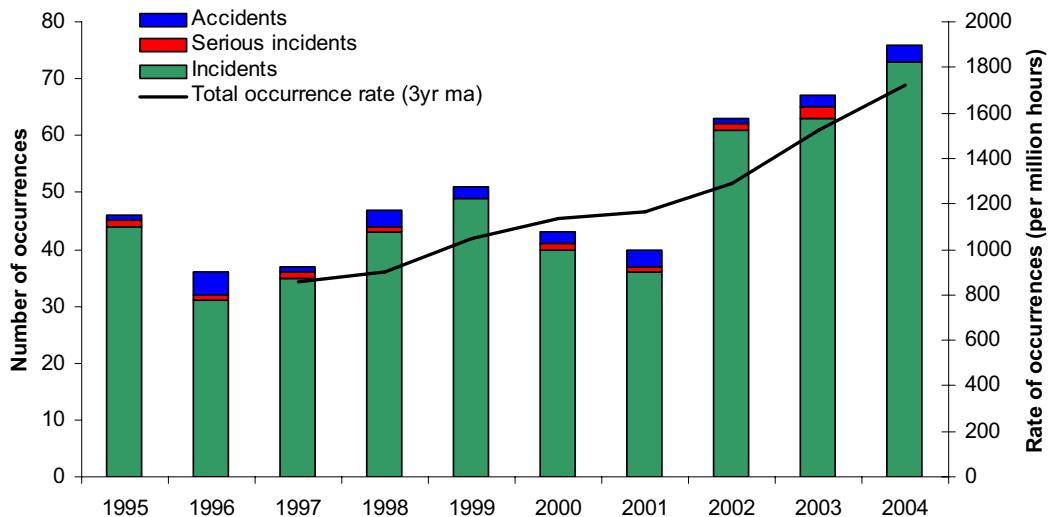


Figure 4.10 Number and rate of occurrences

3.11.3 Figure 4.11 shows the rate of events of highest significance, broken down by quarter, between January 2001 and December 2004.

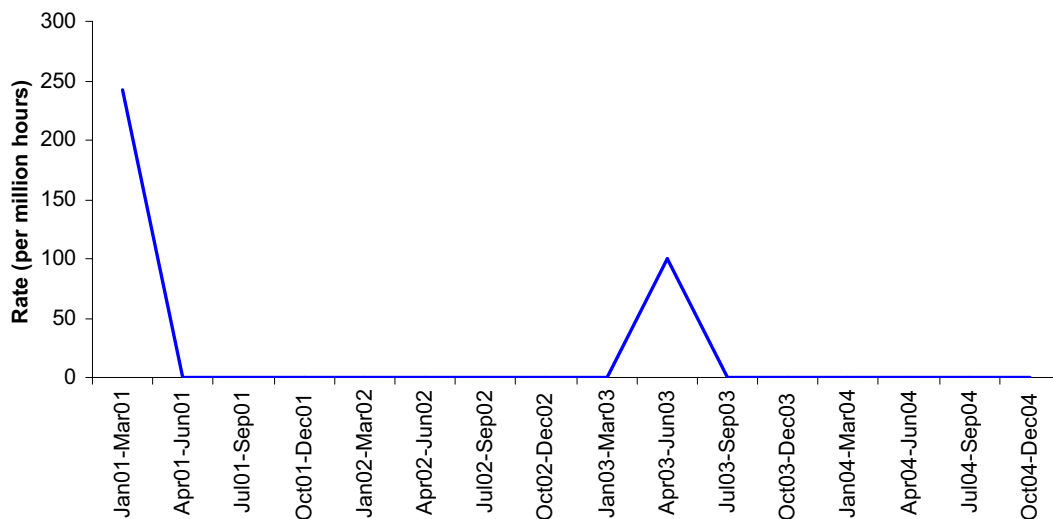


Figure 4.11 Rate of events of highest significance

3.11.4 Using the data between 1995 and 2004, there has been approximately one occurrence per 1,300 flights. In terms of events of highest significance, there has been approximately one per 51,000 flights.

3.11.5 Table 4.16 shows the rates of occurrences and events of highest significance for the different classes of aircraft in this sector of the aviation industry.

Class of aircraft	Events of highest significance rate (per million hours) 1998-2004	Occurrence rate (per million hours) 1995-2004
Business jet	0	759
Piston	42	1,204
Turboprop	12	1,242
All classes of aircraft	32	1,208

Table 4.16 Relative occurrence rates

4 Helicopters

- 4.1 This section contains information relating to all UK registered or operated helicopters on public transport flights.
- 4.2 As well as showing the complete picture for all public transport helicopter operations, the safety record of two key helicopter roles within the public transport sector has been illustrated. These key roles relate to offshore operations, and emergency services operations.
- 4.3 Offshore operations refer to an aircraft being used for the purpose of carrying passengers or cargo to oil/gas platforms or drilling/support ships in the North Sea or Irish Sea.
- 4.4 Emergency services operations refer to an aircraft being used for the purpose of police support, ambulance or Search and Rescue (SAR). Emergency services operations involving aeroplanes are included in Section 3 of this chapter.
- 4.5 It is not always possible to identify occurrences involving helicopters on offshore operations or emergency services operations and therefore some caution should be attached to data relating to these operations. However, every attempt has been made to provide as accurate a picture as possible.

4.6 Reportable accidents

4.6.1 Between 1995 and 2004 there have been 31 reportable accidents involving helicopters. Figure 4.12 shows the annual breakdown of these accidents by type of operation. The 'other' category refers to reportable accidents involving non-offshore passenger or cargo operations.

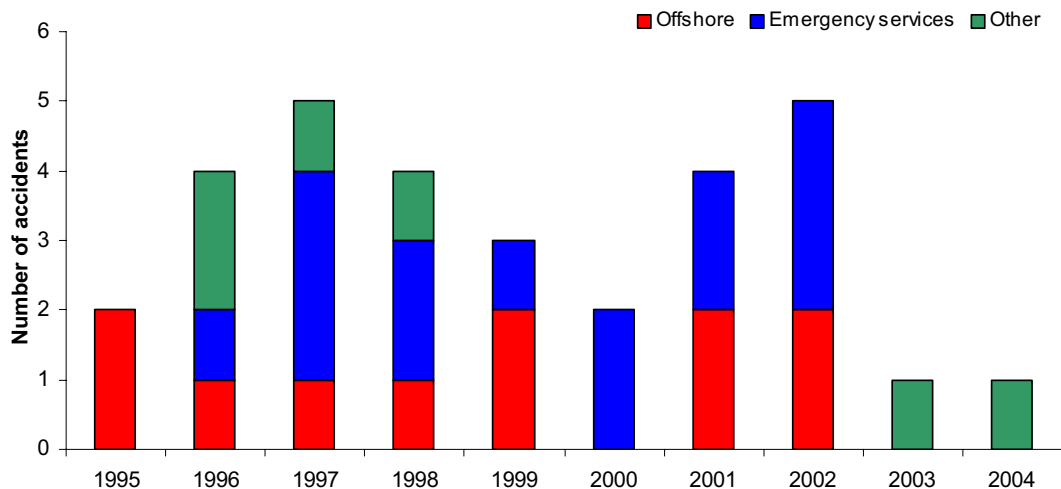


Figure 4.12 Number of reportable accidents by type of operation

4.6.2 Within the offshore category, the type of reportable accidents observed included lightning strikes, helicopters rolling over, and technical failures. Within the emergency services category, the types of reportable accidents were tail rotor/main rotor strikes, technical failures, loss of control in poor weather, and forced landings. Within the 'other' category, there were accidents involving loss of control, ground collisions, main rotor blade strikes, aircraft part separation and hard landings.

4.6.3 The breakdown of reportable accidents by class of aircraft is shown in Figure 4.13. The classes of aircraft that form the helicopter category are single pistons, single turbine and twin turbine. All of these classes of aircraft have been involved in reportable accidents except single pistons.

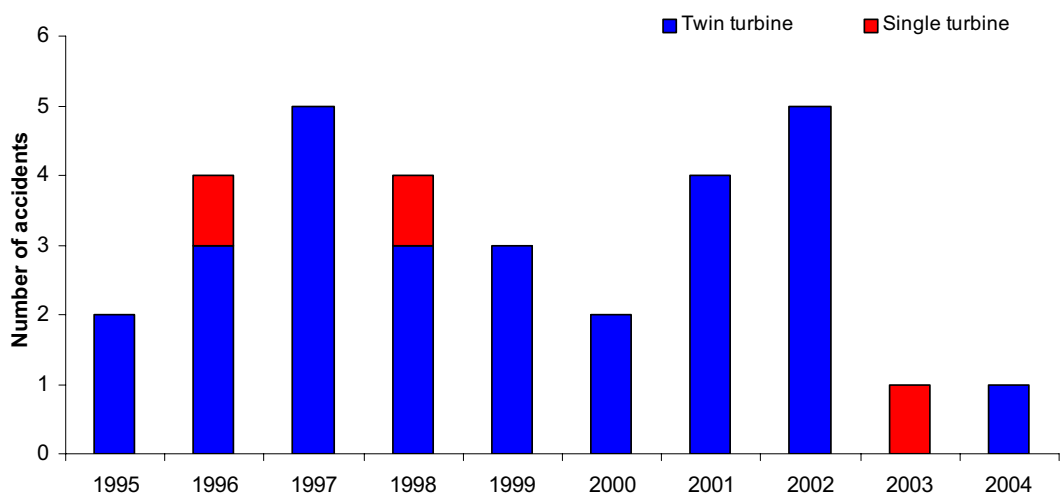


Figure 4.13 Number of reportable accidents by class of aircraft

4.6.4 The number of accidents does not necessarily provide the best measure of safety. Later in this section, the reportable accidents will be shown as a rate, which provides a more accurate picture as to the relative safety of different classes of aircraft.

4.7 Fatal accidents

4.7.1 In total, for all public transport helicopter operations between 1995 and 2004, there have been four fatal accidents resulting in 20 fatalities. Details of the four fatal accidents are shown below, broken down by the type of operation they involve.

4.7.2 Between 1995 and 2004 offshore operations have been involved in one fatal accident resulting in 11 fatalities. Details of this accident are shown in Table 4.17.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
16 Jul 2002	Sikorsky S76	North Sea, off Norfolk	Passenger	Crashed into sea and was destroyed following failure of main rotor blade	11	11

Table 4.17 Details of offshore fatal accidents

4.7.3 Between 1995 and 2004 emergency services operations have been involved in two fatal accidents resulting in four fatalities. Details of the accidents are shown in Table 4.18.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
26 Jul 1998	AS355 Twin Squirrel	Rochester, Kent	Ambulance	Struck overhead power cables and crashed into field	3	3
09 Oct 1998	AS355 Twin Squirrel	Welford, Northants.	Police	Entered fog and crashed into woodland shortly after take-off	3	1

Table 4.18 Details of emergency services fatal accidents

4.7.4 Between 1995 and 2004 'other' public transport operations have been involved in one fatal accident resulting in five fatalities. Details of this accident is shown in Table 4.19

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
22 Oct 1996	AS355 Twin Squirrel	Middlewich, Ches	Passenger	Crashed into farmland following disorientation at night	5	5

Table 4.19 Details of 'other' fatal accidents

4.8 Utilisation data

4.8.1 Between 1995 and 2004, UK operators (airlines and air taxi operations) have completed 2.6 million flights and flown 1.3 million hours on all revenue operations involving helicopters. The annual breakdown of these figures is shown in Table 4.20.

Year	Hours ('000)	Flights ('000)
1995	136	284
1996	135	273
1997	135	263
1998	127	254
1999	117	250
2000	118	254
2001	128	250
2002	136	261
2003	132	263
2004	130	261

Table 4.20 Total hours and flights flown

- 4.8.2 Taking the hours flown between 1995 and 2004, 90% of hours were flown by twin turbine helicopters, 9% by single turbine helicopters and 1% by single piston helicopters.
- 4.8.3 It was not possible to separate out hours flown by helicopters on offshore operations. However, the typical helicopter types used on offshore operations were identified and all air taxi hours for these types were used to generate accident rates for offshore operations. The helicopter types identified as being used for offshore operations were Bell 214, AS332 Super Puma, AS365 Dauphin, Sikorsky S61 and Sikorsky S76. Using these helicopter types, between 1995 and 2004 it is estimated that UK operators have completed 1.7 million flights and flown 795,000 hours on offshore operations. The annual breakdown of these figures is shown in Table 4.21.

Year	Hours ('000)	Flights ('000)
1995	90	190
1996	89	183
1997	89	172
1998	85	171
1999	72	162
2000	69	165
2001	75	152
2002	82	160
2003	73	152
2004	71	151

Table 4.21 Offshore hours and flights flown

4.9 **Reportable and fatal accident rates**

4.9.1 Figure 4.14 shows the fatal accident rate, over the ten year period, for all public transport operations. The fatal accident rate for offshore operations (see paragraph 4.8.3 for caveats on data), as a subset of all public transport operations, is also shown. All rates are shown using a three year moving average.

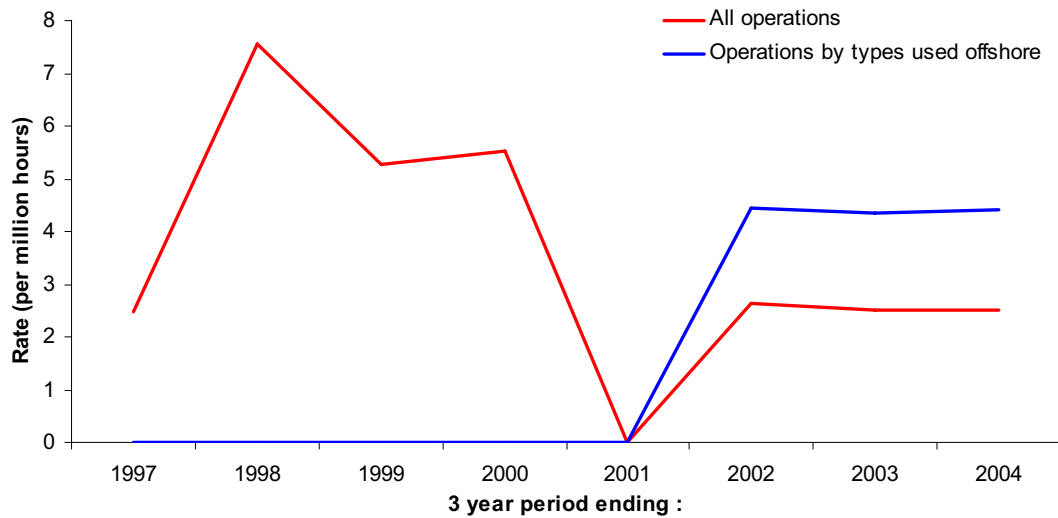


Figure 4.14 Rate of fatal accidents

4.9.2 It was not possible to identify hours flown on all emergency services operations, therefore accident rates for emergency services could not be calculated.

4.9.3 Figure 4.15 shows the reportable accident rates, over the ten year period, for all public transport operations and offshore operations. All rates are shown using a three year moving average.

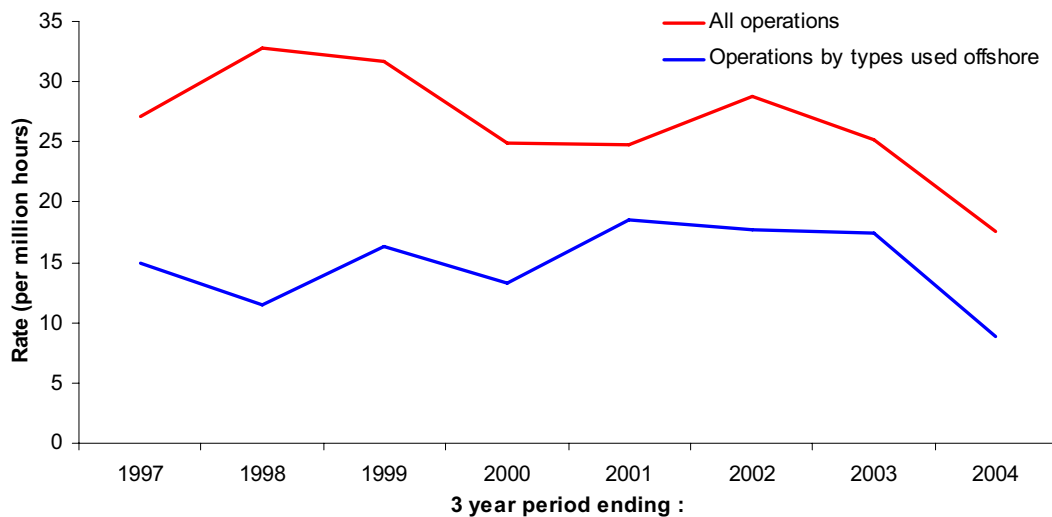


Figure 4.15 Rate of reportable accidents

4.9.4 Table 4.22 shows the relative fatal and reportable accident rates for the different classes of aircraft in this sector of the aviation industry, for all operations.

Class of aircraft	Fatal accident rate (per million hours) 1995-2004	Reportable accident rate (per million hours) 1995-2004
Single piston	0.0	0.0
Single turbine	0.0	25.3
Twin turbine	3.4	24.0
All classes	3.1	24.0

Table 4.22 Relative fatal and reportable accident rates

4.10 Injury tables

4.10.1 The injuries sustained to people on board helicopters involved in reportable accidents are shown in the tables below. In total there have been 20 fatalities, six serious injuries and 17 minor injuries between 1995 and 2004. The injury tables have been broken down by the type of operation they involve.

4.10.2 The injuries sustained in reportable accidents involving offshore operations are shown in Table 4.23. There have been 11 fatalities, zero serious injuries and zero minor injuries. All of the fatal injuries relate to the Sikorsky S76 accident in the North Sea in July 2002.

	Injury	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Crew	Fatal								2			2
	Serious											0
	Minor											0
	Total	0	0	0	0	0	0	0	2	0	0	2
Passenger	Fatal								9			9
	Serious											0
	Minor											0
	Total	0	0	0	0	0	0	0	9	0	0	9

Table 4.23 Injuries sustained in offshore reportable accidents

4.10.3 The injuries sustained in reportable accidents involving emergency services operations are shown in Table 4.24. There have been four fatalities, three serious injuries and 12 minor injuries.

	Injury	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Crew	Fatal				1							1
	Serious				1							1
	Minor			2			1	2	1			6
	Total	0	0	2	2	0	1	2	1	0	0	8
Passenger	Fatal				3							3
	Serious				1				1			2
	Minor						2	3	1			6
	Total	0	0	0	4	0	2	3	2	0	0	11

Table 4.24 Injuries sustained in emergency services reportable accidents

4.10.4 The injuries sustained in reportable accidents involving 'other' public transport operations are shown in Table 4.25. There have been five fatalities, three serious injuries and five minor injuries.

	Injury	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Crew	Fatal		1									1
	Serious		1									1
	Minor				1					3		4
	Total	0	2	0	1	0	0	0	0	3	0	6
Passenger	Fatal		4									4
	Serious		2									2
	Minor				1							1
	Total	0	6	0	1	0	0	0	0	0	0	7

Table 4.25 Injuries sustained in 'other' reportable accidents

4.11 Serious incidents

4.11.1 There have been ten serious incidents, as classified by the UK AAIB, involving helicopters over the last ten years. Figure 4.16 shows the annual number of serious incidents broken down by type of operation. All of these serious incidents involved twin turbine helicopters.

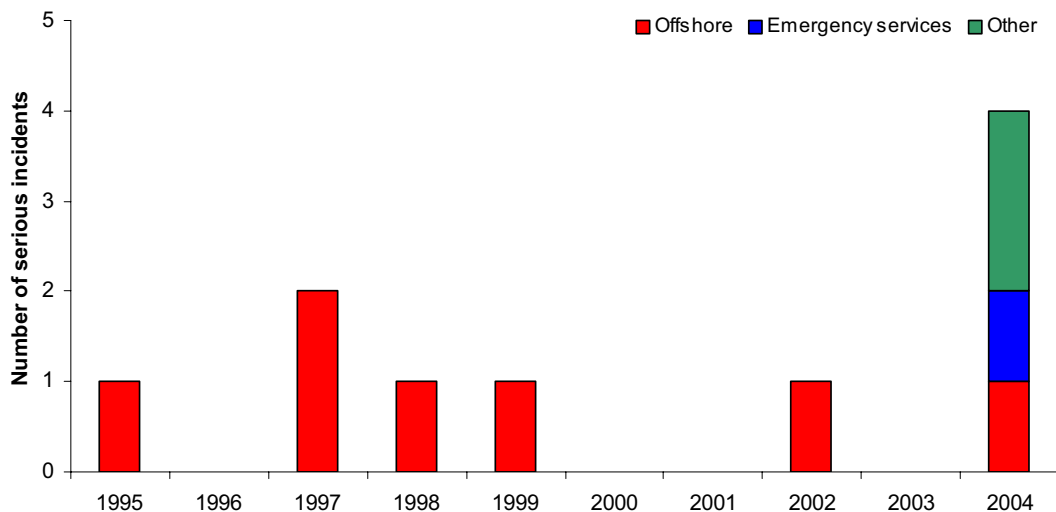


Figure 4.16 Number of serious incidents

4.12 Occurrences

4.12.1 There have been approximately 2,200 occurrences involving helicopters between 1995 and 2004. This figure includes reportable accidents, serious incidents and incidents reported through the MOR scheme. Only 2% of these occurrences are accidents or serious incidents.

4.12.2 The CAA has had an established occurrence grading system since 1998 that differentiates between occurrences in terms of severity (see appendix 2). Between 1998 and 2004 only 2% of helicopter occurrences have been classified as being events of highest significance. More details regarding events of highest significance between 2002 and 2004 are shown in Chapter 7. Figure 4.17 shows the number of annual occurrences, broken down by type of occurrence. Also displayed is the rate of all occurrences, shown as a three year moving average (3 yr ma). The rate has been produced using the utilisation data shown later in this section.

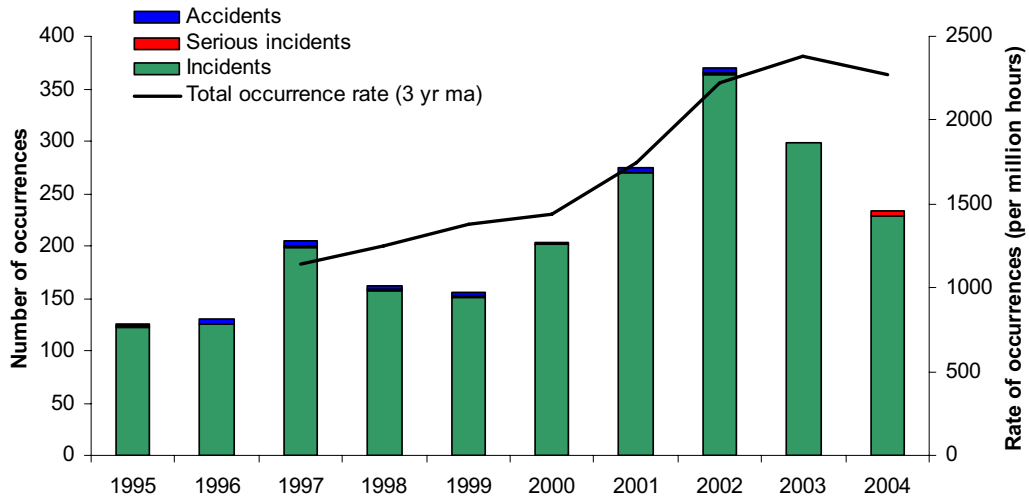


Figure 4.17 Number and rate of occurrences

4.12.3 Figure 4.18 shows the rate of events of highest significance, broken down by quarter, between January 2001 and December 2004.

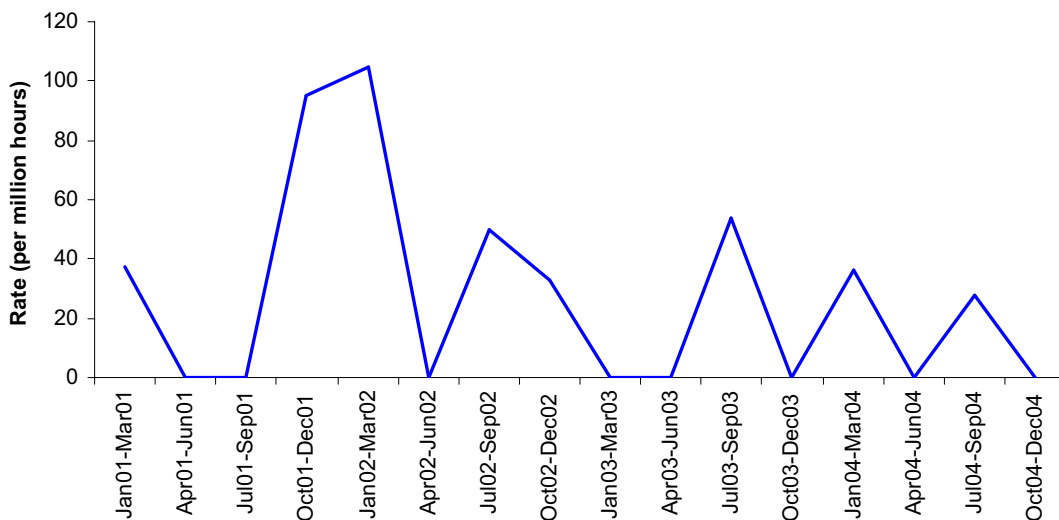


Figure 4.18 Rate of events of highest significance

4.12.4 Using the data for all operations between 1995 and 2004, there has been approximately one occurrence per 1,200 flights. In terms of events of highest significance, there has been approximately one per 64,000 flights.

4.12.5 Table 4.26 shows the rates of occurrences and events of highest significance for the different classes of aircraft in this sector of the aviation industry.

Class of aircraft	Events of highest significance rate (per million hours) 1998-2004	Occurrence rate (per million hours) 1995-2004
Single piston	0	287
Single turbine	13	245
Twin turbine	34	1,818
All classes	32	1,669

Table 4.26 Relative occurrence rates

4.12.6 The occurrences involving offshore operations have been further analysed and Table 4.27 shows the types of occurrences between 1995 and 2004. The most relevant factor to an individual occurrence has been applied in each case. It should be noted that this list reflects occurrences from the whole ten year period and may not show the most recent trends.

Category of occurrence	Number of occurrences (% of total)	Sub-category of occurrence	Number of occurrences in sub-category (% of number in category)
ATC	73 (6.6%)		
		Airprox	24 (33%)
		Level bust	6 (8%)
		Communications related	18 (25%)
		Other	25 (34%)
Aerodrome	79 (7.1%)		
		Loading	40 (51%)
		Layout/markings	6 (8%)
		Vessel motion	6 (8%)
		Turbine exhaust	8 (10%)
		Foreign object damage	5 (6%)
		Other	14 (18%)
Operations	79 (7.1%)		
		Pilot error	44 (56%)
		Passenger error	16 (20%)
		Other	19 (24%)
Aircraft	768 (69.4%)		
		Technical	715 (93%)
		Maintenance error	53 (7%)
Other	108 (9.8%)		
		Meteorological	83 (77%)
		Birdstrike	4 (4%)
		Other	5 (5%)
		Unknown	16 (15%)

Table 4.27 Occurrence types for offshore operations

- 4.12.7 In table 4.27, 93% of the aircraft related occurrences involved technical problems. 20% of these technical problems resulted from engine related occurrences and a further 17% involved chip warnings (although nearly 2% involved false chip warnings).
- 4.12.8 Also in Table 4.27, 77% of 'other' occurrences resulted from meteorological problems. 54% of these meteorological problems resulted from inaccurate weather information and 23% involved lightning.

5 Balloons

5.1 This section contains information on UK registered or operated balloons on public transport flights.

5.2 Reportable accidents

5.2.1 Between 1995 and 2004 there have been 26 reportable accidents involving balloons. Figure 4.19 shows the annual breakdown of these accidents.

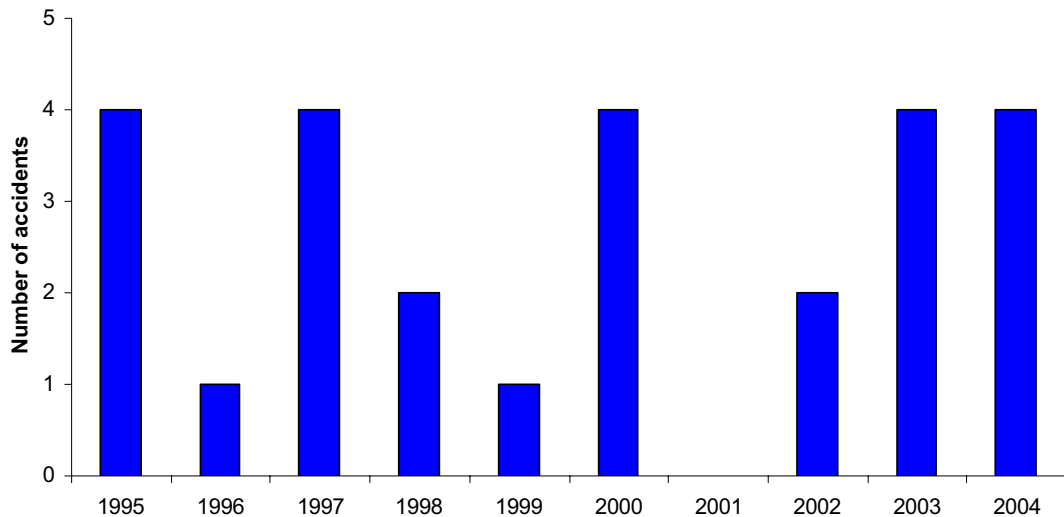


Figure 4.19 Number of reportable accidents

5.3 Fatal accidents

5.3.1 There has been a single fatal accident involving a balloon between 1995 and 2004. Details of this accident are shown in Table 4.28.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
20 Jul 1997	Cameron A-210	Humberside, England	Passenger	Struck power cables on landing	13	1

Table 4.28 Details of fatal accidents

5.4 Utilisation data

5.4.1 Balloon public transport operators no longer report their utilisation data and data only exists up to, and including, 1999. Therefore, average annual figures have been produced, shown in Table 4.29, using 1995-1999 data. These figures are only provided to give an indication of the size of operation for public transport balloon operators.

	Annual average
Hours ('000)	9
Flights ('000)	9
Passengers ('000)	68

Table 4.29 Average utilisation

5.5 Reportable and fatal accident rates

5.5.1 It is not possible to determine the hours flown by public transport balloons, and therefore appropriate accident rates cannot be produced.

5.6 Injury tables

5.6.1 The injuries sustained in the reportable accidents involving balloons are shown in Table 4.30. In total there have been one fatality, 18 serious injuries and 27 minor injuries over the time period.

	Injury	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Crew	Fatal											0
	Serious		1									1
	Minor											0
	Total	0	1	0	0	0	0	0	0	0	0	1
Passenger	Fatal			1								1
	Serious	1		9	1	1	1		1	1	2	17
	Minor		1	21	2	3						27
	Total	1	1	31	3	4	1	0	1	1	2	45

Table 4.30 Injuries sustained in reportable accidents

5.7 Serious incidents

5.7.1 There have not been any serious incidents, as classified by the UK AAIB, involving balloons over the last ten years.

5.8 Occurrences

5.8.1 There have been approximately 100 occurrences involving balloons between 1995 and 2004. This figure includes reportable accidents, serious incidents and incidents reported through the MOR scheme. 15% of these occurrences are accidents and serious incidents.

5.8.2 The CAA has had an established occurrence grading system since 1998 that differentiates between occurrences in terms of severity. Between 1998 and 2004 none of the public transport occurrences involving balloons have been classified as being events of highest significance. Figure 4.20 shows the number of annual occurrences.

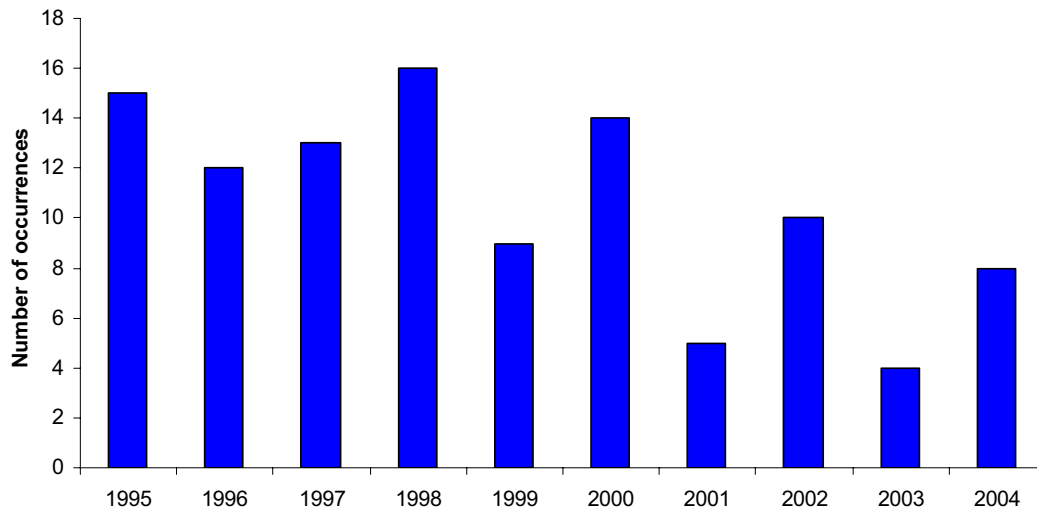


Figure 4.20 Number of occurrences

Chapter 5 Safety of UK Non-Public Transport Aircraft Worldwide

1 Introduction

- 1.1 This chapter contains information on the safety of UK registered or operated aircraft on non-public transport operations worldwide.
- 1.2 The full definition of non-public transport is shown in Chapter 9 but, in this Review, non-public transport operations means any operation that cannot be established to be passenger, cargo, ambulance, police and Search and Rescue (SAR) operations. This means that in cases where the nature of flight is stated to be 'unknown' or 'not applicable', the occurrence will be classed as occurring on a non-public transport flight.
- 1.3 Non-public transport operations involving aeroplanes have been broken down by size of aircraft. Also shown within this chapter, are non-public transport helicopters and 'other' types of aircraft such as microlights, gliders and gyroplanes.
- 1.4 More details regarding the types of occurrences shown in this chapter can be found in Appendix 1.
- 1.5 Accidents or incidents involving military operations have been excluded from the data.
- 1.6 The source of the utilisation is either the CAA aircraft register or the British Gliding Association (BGA) with regard to gliders. The occurrence data are derived from the Mandatory Occurrence Reporting (MOR) scheme database and BGA in the case of gliders.

2 Large Aeroplanes

- 2.1 This section contains information on UK registered or operated aircraft with a maximum take-off weight authorised (MTWA) of over 5,700kg on non-public transport flights worldwide.
- 2.2 It should be noted that there are some aeroplanes where the weight of the original type was below 5,700kg MTWA, but where subsequent series aircraft have exceeded this weight, e.g. Embraer EMB-110 Bandeirante. For consistency, all series of the types have been included under the original weight limit. A list of aircraft types, typically used for public transport operations, are shown in Appendix 3 showing the weight groups and classes of aircraft that have been used for analysis purposes. Although this list is limited to public transport aircraft it may still be a useful reference for this section.
- 2.3 Utilisation data are not available for this category of aircraft, therefore accident rates cannot be produced.
- 2.4 **Reportable accidents**
 - 2.4.1 Between 1995 and 2004 there have been 19 reportable accidents involving large aeroplanes. Figure 5.1 shows the annual breakdown of these accidents.

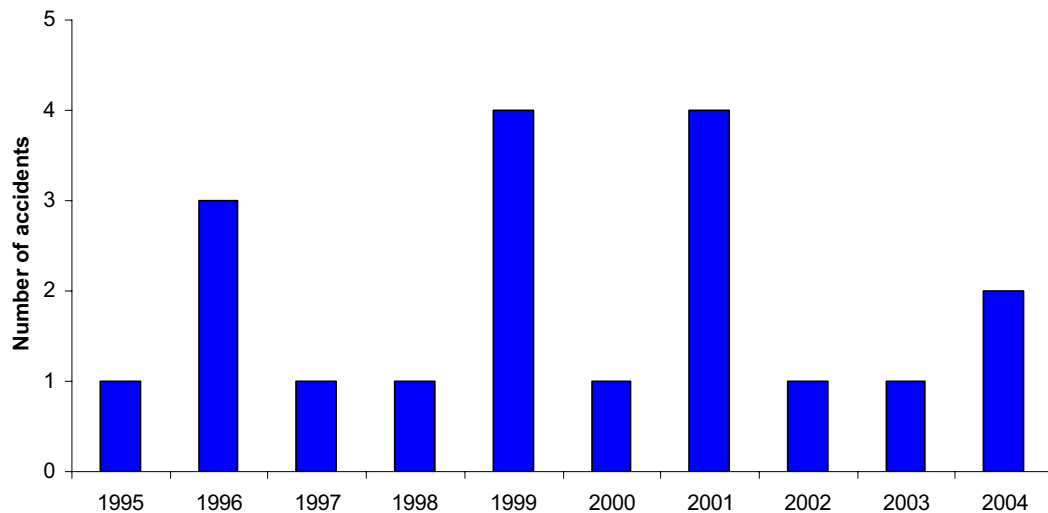


Figure 5.1 Number of reportable accidents

2.4.2 Approximately half of the reportable accidents involved ex-military aircraft. The remainder of the accidents involved jets, business jets and turboprops.

2.5 Fatal accidents

2.5.1 Between 1995 and 2004 there have been three fatal accidents involving large aeroplanes resulting in five fatalities. Details of these accidents are shown in Table 5.1.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
21 Jul 1996	Mosquito	Manchester Barton, Gtr. Manchester	Air display	Crashed after suffering loss of control during flying display	2	2
05 Jun 1998	Hunter	Dunsfold, Surrey	Display practice	Crashed during attempt to land after engine failure and in-flight fire	1	1
02 Jun 2001	Vampire	Biggin Hill, Gtr. London	Air display	Crashed after suffering loss of control during flying display	2	2

Table 5.1 Details of fatal accidents

2.6 Injury tables

2.6.1 The injuries sustained in the reportable accidents involving large aeroplanes are shown in Table 5.2. There have been five fatalities, zero serious injuries and zero minor injuries between 1995 and 2004.

	Injury	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Crew	Fatal		2		1			2				5
	Serious											0
	Minor											0
	Total	0	2	0	1	0	0	2	0	0	0	5
Passenger	Fatal											0
	Serious											0
	Minor											0
	Total	0	0	0	0	0	0	0	0	0	0	0

Table 5.2 Injuries sustained in reportable accidents

2.7 Serious incidents

2.7.1 There have been 15 serious incidents, as classified by the UK Air Accidents Investigation Branch (AAIB), involving large aeroplanes over the last ten years. Figure 5.2 shows the annual number of serious incidents.

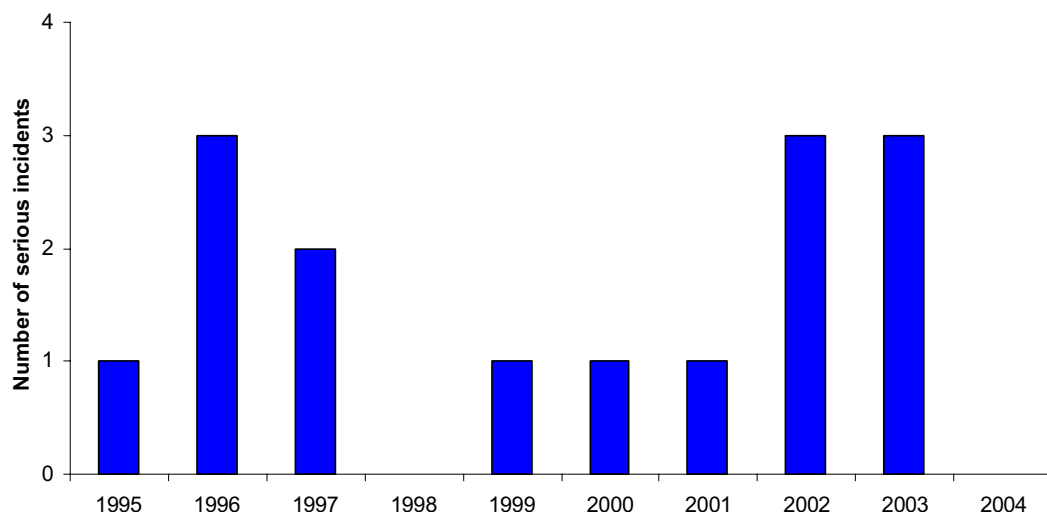


Figure 5.2 Number of serious incidents

2.7.2 The majority of the serious incidents involved jets although turboprops and business jets also featured.

2.8 Occurrences

2.8.1 There have been nearly 6,700 occurrences involving large aeroplanes between 1995 and 2004. This figure includes accidents, serious incidents and incidents reported through the MOR scheme. Only 1% of these occurrences are accidents and serious incidents.

2.8.2 The CAA has had an established occurrence grading system since 1998 that differentiates between occurrences in terms of severity (see Appendix 2). Between 1998 and 2004 only 0.3% of occurrences have been classified as being events of highest significance. More details regarding events of highest significance between 2002 and 2004 are shown in Chapter 7. Figure 5.3 shows the number of occurrences per year.

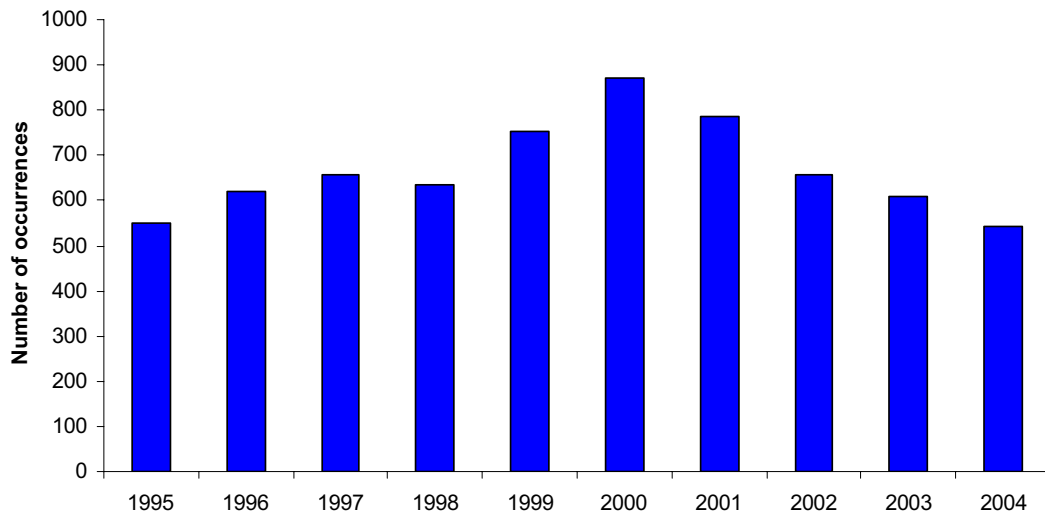


Figure 5.3 Number of occurrences

- 2.8.3 68.1% of the occurrences involved jet aircraft, 25.2% involved turboprops, 5.9% involved business jets, 0.5% involved ex-military aircraft and 0.3% involved pistons. It should be noted that an individual occurrence can involve more than one class of aircraft.

3 Small Aeroplanes

- 3.1 This section contains information on UK registered or operated aircraft with a MTWA of under 5,700kg on non-public transport flights worldwide.
- 3.2 It should be noted that there are some aeroplanes where the weight of the original type was below 5,700kg MTWA, but where subsequent series aircraft have exceeded this weight, e.g. Embraer EMB-110 Bandeirante. For consistency, all series of the types have been included under the original weight limit. A list of aircraft types, typically used for public transport operations, are shown in Appendix 3 showing the weight groups and classes of aircraft that have been used for analysis purposes. Although this list is limited to public transport aircraft it may still be a useful reference for this section.
- 3.3 Data pertaining to landplanes, seaplanes, amphibians and self launching motor gliders are shown in this section. Data relating to other types of glider can be found later in this chapter.
- 3.4 The requirements for reporting of mandatory occurrences (Air Navigation Order 2005) mainly relate to turbine powered aircraft, which predominantly have a MTWA of over 5,700kg and are typically used for public transport purposes. Therefore, information relating to incidents has not been shown in this section.

3.5 Reportable accidents

- 3.5.1 Between 1995 and 2004 there have been over 1,600 reportable accidents involving small aeroplanes. These accidents exclude situations where there were third party injuries but no damage to the aircraft. Figure 5.4 shows the annual breakdown of these accidents.

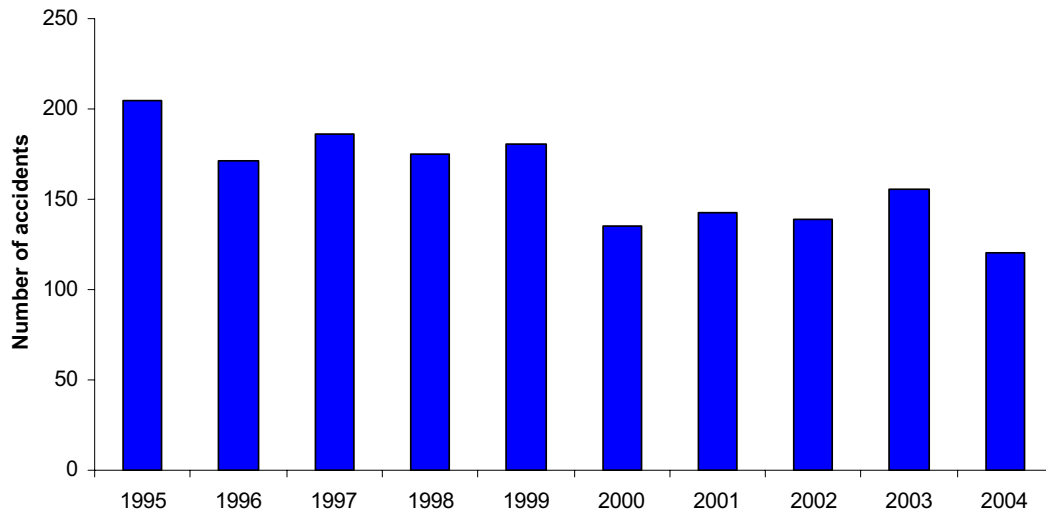


Figure 5.4 Number of reportable accidents

3.5.2 Single piston aircraft were involved in 90% of the reportable accidents and 9% involved twin piston aircraft. The remainder of the accidents involved single turboprops, single jets and twin turboprops.

3.6 **Categorisation of reportable accidents**

3.6.1 A group was set up by CAA to review general aviation reportable accidents and serious incidents involving small aeroplanes, microlights and gyroplanes. This group allocated causal and contributory factors together with consequences, to each accident or serious incident. The output of the study was an action plan to reduce accidents and serious incidents involving this class of aircraft.

3.6.2 Although the group only looked at two years of data (1997 and 2001), the results indicated that the factors remained constant and, furthermore, reinforced the results of a previous study⁵. The group also looked at samples from intervening years to check that the factors were similar each time, thereby reinforcing the hypothesis that the results from only two years of data were representative of the entire period.

3.6.3 Figure 5.5 shows the results of combining the causal and contributory factors of the study. Only the top ten factors have been included in the chart. The first four factors in the chart were included in 72% of all general aviation reportable accidents and serious incidents. It should be noted that more than one factor could be applied to an individual accident or serious incident.

5. CAP 667 - Review of General Aviation Fatal Accidents 1985 - 94.

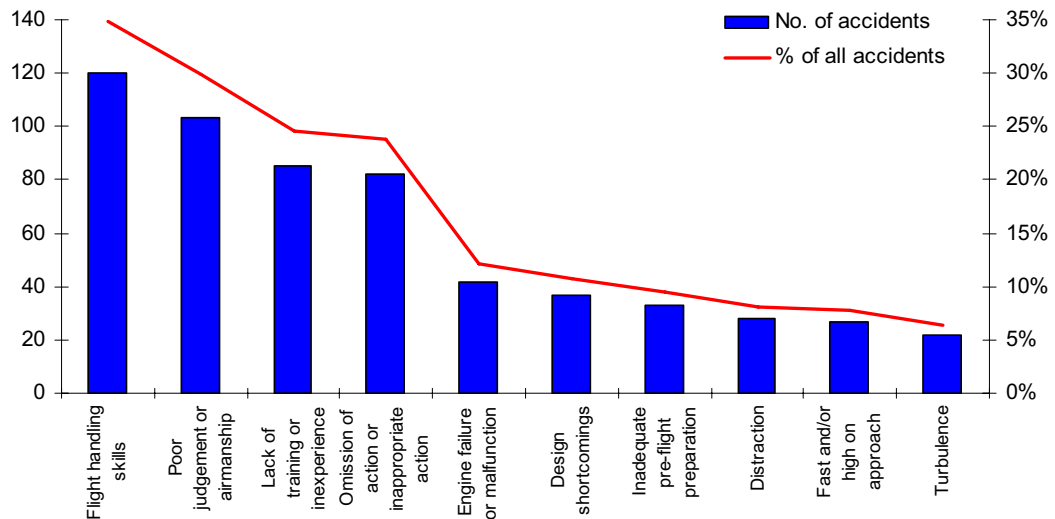


Figure 5.5 Main causal and contributory factors of reportable accidents and serious incidents

3.6.4 Figure 5.6 shows the results with respect to the consequences allocated to general aviation reportable accidents and serious incidents. Only the top ten consequences have been shown and again, it should be noted that more than one consequence could be applied to an individual accident or serious incident.

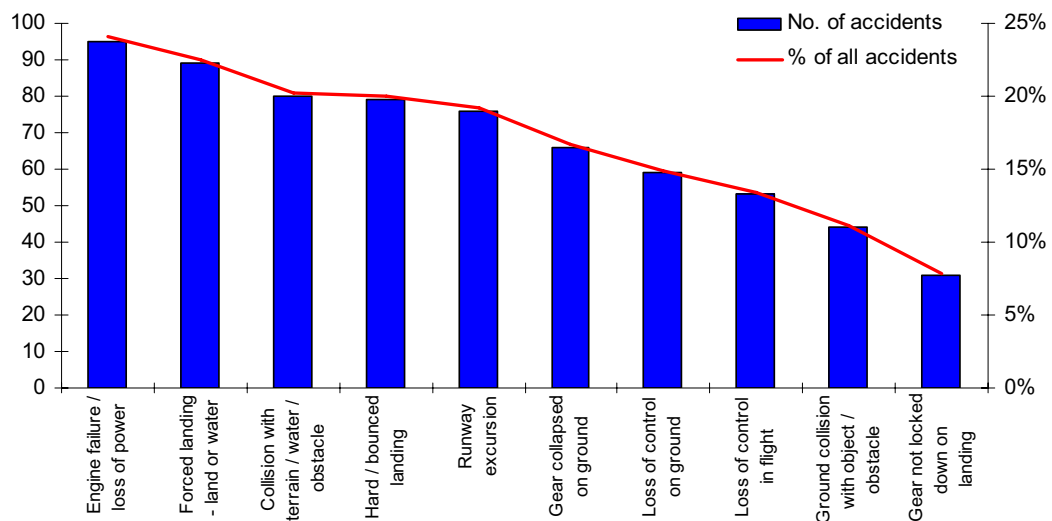


Figure 5.6 Main consequences of reportable accidents and serious incidents

3.7 Fatal accidents

3.7.1 Between 1995 and 2004 there have been 102 fatal accidents involving small aeroplanes resulting in 169 fatalities. Details of these accidents are shown in Table 5.3. There are a small number of mid-air collisions within the table and it should be noted that for these accidents the numbers of people on board and fatal injuries applies to the sum total of both aircraft. Also, fatal mid-air collisions involving other classes of aircraft, e.g. gliders, have been discounted if the fatalities only involved the other class of aircraft.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
04 Mar 1995	Harvard	nr. Maldon, Essex	Private	Failed to recover from inadvertent spin	2	1
13 Mar 1995	Harvard	nr. Andover, Hants.	Private	Heavy landing, aircraft bounced and overturned	2	1
21 Mar 1995	Cessna 150	Sherburn in Elmet, N York.	Training	Pilot incapacitated in flight. Aircraft spun and crashed	1	1
29 Apr 1995	Piper PA28	North Sea, off Clacton, Essex	Private	Crashed in sea following engine failure	1	1
05 May 1995	Denny Kitfox	nr. Dolphinton, Scotland	Private	Entered spin and crashed after low flypast	1	1
16 Jun 1995	MS Rallye	Dunkeswell, Devon	Private	Stalled and crashed after maximum weight take-off	3	2
09 Jul 1995	Pulsar	nr. Corby, Northants.	Private	Climbed steeply and stalled after take-off	2	2
20 Jul 1995	Fokker DR1 Replica	Stourhead, Wilts.	Display	Lost control whilst about to start air display	1	1
11 Aug 1995	Beech 58	Thrupton, Hants.	Private	Inadvertent stall - distraction due to cabin door opening	4	4
13 Oct 1995	Cessna 336	nr. Douglas, Isle of Man	Private	Collided with cloud covered high ground	1	1
21 Oct 1995	Cessna 207	Brunton, Northumb.	Parachuting	Jumpmaster fell from aircraft when aircraft changed attitude	7	1
23 Nov 1995	Cessna 150	English Channel, off NW France	Private	Crashed into sea	1	1
02 Mar 1996	Jodel D9	Shoreham, W Sussex.	Private	Engine failed during go-around, aircraft stalled and crashed	1	1
11 Mar 1996	Piper PA23	nr. Granada, Spain	Unknown	Crashed in mountains	2	2
04 May 1996	Grumman AA5	nr. Westcott, Bucks.	Private	Mid-air collision with glider	3	1
05 May 1996	Slingsby 67	Old Warden, Beds.	Display	Struck trees during recovery from intentional spin	1	1
31 May 1996	Cessna 152	Lydd, Kent	Private	Crashed on approach following low orbit	2	2
06 Jun 1996	Cessna 152	nr. Evesham, Hereford and Worcs.	Private	Crashed into field after high speed descent	1	1
15 Jun 1996	Robin 1180	nr. Buxton, Derbys.	Private	Crashed on waste ground adjacent to industrial estate	4	4
22 Jul 1996	Robin 400	nr. Bristol, England	Private	Entered spin after reporting control difficulties	1	1
29 Jul 1996	Kis	nr. Calais, France	Private	Crashed into sea while returning from RSA rally	2	2
31 Jul 1996	Piper PA28	Canterbury, Kent	Private	Hit tree on take-off and crashed into scrub, caught fire	2	1
26 Aug 1996	MS Rallye	Manchester Barton, Gtr. Manchester	Private	Stalled shortly after take-off and entered spin	2	2
01 Sep 1996	Seafury (Replica)	Crosland, W York.	Private	Crashed shortly after take-off	1	1

Table 5.3 Details of fatal accidents

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
25 Sep 1996	Piper PA28	Irish Sea, off Southport, Lancs.	Training	Failed to recover from spin training and struck sea near Southport	2	2
16 Oct 1996	Piper PA28	nr. Perth, Scotland	Private	Wreckage found on steep hillside	2	2
26 Oct 1996	Robin 400	nr. Dover, Kent	Training	Mid-air collision with a Robin 1180	4	2
21 Nov 1996	Cessna 172	Compton Abbas, Dorset	Private	Stalled after go-around and crashed	1	1
09 Mar 1997	Piper PA28	nr. Biggin Hill, Kent	Private	Struck trees on approach in fog	2	2
06 May 1997	Cessna 150	nr. Cumbernauld Scotland	Photography	Dived onto road from low level and caught fire	1	1
25 Jul 1997	Pitts Special	Meppershall, Beds.	Private	Spun in after take-off	1	1
03 Aug 1997	Cessna 421	nr. Shobdon, Hereford and Worcs.	Private	Crashed on approach and caught fire	4	3
26 Sep 1997	Fournier RF5	North Weald, Essex	Private	Right wing extension folded at joint, aircraft inverted	1	1
29 Oct 1997	Robin 200	Cromarty Firth, Scotland	Training	Ditched in sea during nighttime navex, student drowned	2	1
27 Nov 1997	Grumman AA5	Shobdon, Hereford and Worcs.	Private	Clipped tree and landed inverted	1	1
21 Dec 1997	Cessna 152	nr. Creetown, Wales	Private	Lost control and crashed after reporting suction pump failure	1	1
19 Apr 1998	DH Tiger-moth	English Channel	Private	Missing with one POB, believed to have ditched	1	1
17 May 1998	Taylor Mono	Andrewsfield, Essex	Private	Crashed shortly after take-off	1	1
23 May 1998	Cessna 152	Snowdonia, Wales	Private	Crashed on mountainside	2	2
29 May 1998	Rockwell 114	nr. Dijon, France	Private	Overran runway, struck a wall and overturned	4	2
26 Jul 1998	Jodel D112	Bentworth, Hants.	Private	Ran out of fuel, stalled and spun into field	2	2
09 Aug 1998	Druine D31 Turbulent	Swanton Morley, Norfolk	Display	Crashed during air display, aircraft destroyed	1	1
15 Aug 1998	Fairchild M62	Woburn Abbey, Beds.	Private	Crashed after engine failure shortly after take-off	2	1
28 Aug 1998	Cessna 150	nr. Ardglass, N Ireland	Private	Crashed during local VFR flight	1	1
20 Oct 1998	Slingsby 67	Mow Cop, Staffs.	Training	Crashed on rising ground for unknown reasons	2	2
24 Dec 1998	Jet Provost	North Sea, off West Mersea, Essex	Private	Entered flat spin from steep climb and crashed into sea	1	1
21 Jan 1999	Cessna 152	Mattersey, Notts.	Photography	Mid-air collision during aerial photography	4	4
04 Feb 1999	Cessna 150	Turweston, Bucks.	Training	During simulated engine failure, spun and crashed	2	1

Table 5.3 Details of fatal accidents (Continued)

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
12 Feb 1999	Cessna 172	Berwyn Mount, Wales	Private	Crashed in mountainous area	3	3
29 Apr 1999	Mooney 20	Selby, W York.	Private	Stalled and spun after engine power loss	4	4
09 May 1999	Jodel DR1050	Black Isle, Scotland	Private	Crashed on rising ground in poor weather	2	2
06 Jun 1999	Cuby II	Giants Causeway, N Ireland	Private	Wings folded during turbulence	2	2
03 Jul 1999	CST Racer	Bembridge, Isle of Wight	Racing	Engine stopped during a low level roll. Dived into ground	1	1
15 Jul 1999	Piper PA31	nr. Rome, Italy	Positioning	Crashed in mountainous region	2	2
26 Jul 1999	Beech 58	nr. Kulusuk, Greenland	Ferry	Crashed in low cloud during ferry flight	2	2
01 Aug 1999	Jet Provost	Woolaston, Glos.	Private	Struck ground during steep low level turn	2	2
02 Aug 1999	Piper PA23	nr. Beddgelert, Wales	Private	Crashed on mountainside	1	1
18 Sep 1999	Grumman AA5	Luton, Beds.	Private	Loss of control on landing, struck parked SD330	3	3
25 Sep 1999	ME 109	Sabadell, Spain	Private	Crashed on landing and caught fire	1	1
18 Dec 1999	Piper PA28	Bournemouth, Dorset	Private	Stalled and spun at 500ft during turn after take-off	3	3
04 Mar 2000	DH Chipmunk	Cosford, Shrops.	Towing	Pilot incapacitated during take-off, aircraft struck telegraph pole and inverted	1	1
24 Mar 2000	Europa	Upwood, Cambs.	Test	Lost control after unintentional take-off during taxi test run	1	1
08 Apr 2000	Spitfire	Goodwood, W Sussex.	Training	Lost control during turn onto final approach, left wing struck ground and detached	2	2
19 Apr 2000	Cessna 150	North Weald, Essex	Private	Mid-air collision with Russian registered Yak 50	3	3
27 May 2000	Mooney 20	Monisery Mtns, Spain	Private	Crashed in mountainous region	1	1
01 Jun 2000	Piper PA34	Newmarket, Cambs.	Private	Lost control and crashed after propeller struck ground on take-off	3	1
16 Jul 2000	Nipper	Cumberworth, Lincs.	Private	Engine failure after take-off. Forced landing	1	1
18 Aug 2000	Aero L29 Delfin	Eastbourne, E Sussex.	Display	Crashed into sea during air display	1	1
11 Sep 2000	Jodel D112	Swansea, Wales	Private	Crashed in mountainous region, possible power loss	1	1
03 Dec 2000	Piper PA28	Lambourn Downs, Berks.	Private	In-flight structural failure of left wing	4	4
09 Dec 2000	Jet Provost	Welton le Wold, Lincs.	Test	Entered uncontrollable spin. Both crew ejected at low level	2	1
13 Dec 2000	Cessna 152	Torrison, Scotland	Private	Crashed in mountainous region. Wreckage found 2 months later	2	2
24 Feb 2001	Rockwell 114	Sharphorne, W Sussex.	Private	Right wing detached during steep turn and descent	4	4

Table 5.3 Details of fatal accidents (Continued)

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
27 Mar 2001	Piper PA28	Verdun, France	Private	Crashed shortly after take-off	1	1
27 Apr 2001	Socata TB10	Sherburn, W York.	Private	Lost control during return due open baggage door	1	1
12 May 2001	Sea Fury	Sywell, Northants.	Private	Lost control on landing and turned over	1	1
12 May 2001	Piper PA24	Osea Island, Essex	Private	Spun into ground	2	2
12 May 2001	Cessna 182	Leicester, Leics.	Private	Stalled and crashed shortly after take-off	2	2
03 Jun 2001	Bell King Cobra	Biggin Hill, Kent	Display	Lost control and crashed during air display	1	1
03 Jun 2001	Spitfire	Rouen, France	Display	Crashed during attempted return following engine problem.	1	1
04 Jun 2001	Robin DR250	Monte Tobbio, Italy	Private	Crashed in mountainous region	2	2
23 Jun 2001	Cessna 182	St Mawgan, Cornwall	Private	Departed runway on landing, struck light, overturned and caught fire	4	1
15 Aug 2001	Piper PA28	Halesworth, Suffolk	Private	Engine failure. Crashed during forced landing	1	1
14 Sep 2001	Piper PA25	Aston Down, Glos.	Private	Mid-air collision with glider	2	2
28 Dec 2001	Robin 2160	Goodwood, W Susx.	Private	Failed to pull out of roll during aerobatics	1	1
07 Feb 2002	Cessna 150	Hannington, Hants.	Private	Struck power cables in poor weather	1	1
01 Apr 2002	Piper PA38	Cwmbran, Wales	Private	Struck an electricity pylon on high ground in poor visibility	2	2
02 Jun 2002	Aero L39 Albatross	Duxford, Cambs.	Training	Overran on landing and came to rest on M11 motorway	2	1
03 Jul 2002	Piper PA32	Sintra Mountains, Portugal	Private	Crashed into mountain range in poor weather conditions	4	4
03 Nov 2002	Slingsby 67	Banbury, Oxon.	Training	Failed to recover from a spinning exercise and crashed	2	2
05 Jan 2003	Yak 52	Towcester, Northants.	Private	Dived vertically into the ground during aerobatics	2	2
15 Feb 2003	Scheibe SF25 Falke	Chipping, Lancs.	Private	On take-off the tailwheel became entangled with a launch cable	2	2
29 Mar 2003	Cessna 421	Humberside, N Lincs.	Training	Crashed following touch and go landing	3	1
18 May 2003	Piper PA31	Caribbean	Private	Ditched after failure of one engine and loss of fuel	2	2
01 Feb 2004	Piper PA25	Crowland, Lincs.	Towing	Tug aircraft failed to pull out of dive from approx 300ft following glider release.	1	1
29 Feb 2004	Piper PA25	West Chiltington, W Susx.	Towing	Crashed after pilot became incapacitated.	1	1
13 Mar 2004	Cessna 310	Hotham, E York.	Training	Crashed in a field	2	2
27 Jun 2004	Cessna 206	Beacon, Devon	Parachuting	Engine lost power in climb. During attempted forced landing aircraft struck trees and crashed	6	4

Table 5.3 Details of fatal accidents (Continued)

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
04 Jul 2004	Piper PA28	Liverpool Bay, England	Private	Ditched off Wallasey following engine problem	2	2
28 Aug 2004	Socata TB10	Bournemouth, Dorset	Private	During attempt to return to airfield, aircraft struck fence and crashed	3	1
16 Oct 2004	Mooney 20	Jersey, Channel Islands	Private	Stalled and nose dived after engine problems	1	1
22 Oct 2004	Cessna 406	Inverness, Scotland	Positioning	Crashed in bad weather	1	1

Table 5.3 Details of fatal accidents (Continued)

3.8 Utilisation data

3.8.1 Between 1995 and 2004, UK registered small aeroplanes have flown an estimated 8.4 million hours. The annual breakdown of these figures is shown in Table 5.4.

3.8.2 The utilisation in Table 5.4 relates to the hours generated by all UK registered aeroplanes below 5,700kg MTWA. This means that the hours flown on public transport operations involving this type of aircraft will be included. However, the hours flown are dominated by non-public transport activities, therefore it is reasonable to consider the dataset to be reflective of this category of aircraft.

Year	Estimated hours ('000)
1995	834
1996	831
1997	854
1998	852
1999	833
2000	797
2001	784
2002	841
2003	856
2004	873

Table 5.4 Hours flown by UK registered aircraft

3.9 Reportable and fatal accident rates

3.9.1 Figure 5.7 shows the reportable and fatal accident rates involving small aeroplanes over the ten year period, using a three year moving average. These rates have been produced using the utilisation data outlined in Table 5.4 and the caveats therein.

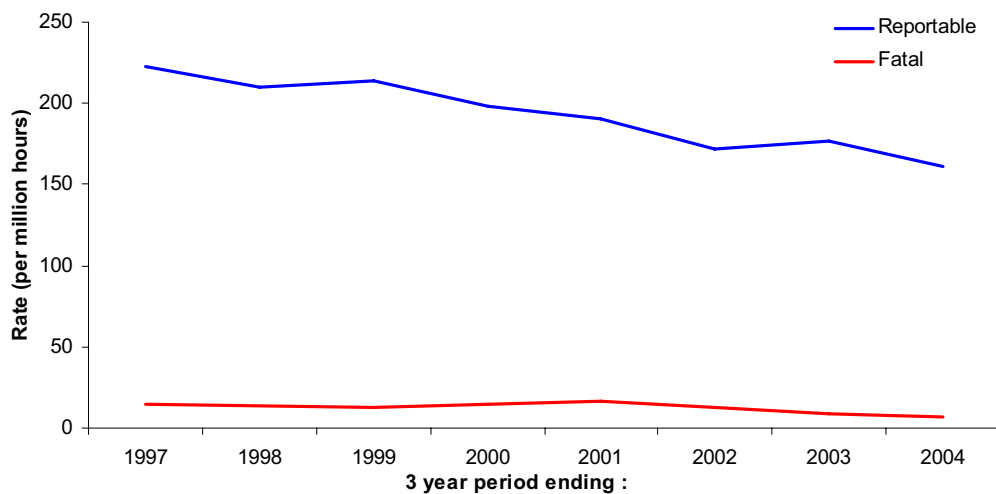


Figure 5.7 Rate of fatal and reportable accidents

3.9.2 Considering the whole ten year period, the overall fatal accident rate is 12.2 per million hours and the reportable accident rate is 192.8 per million hours.

3.10 Injury tables

3.10.1 The injuries sustained in the reportable accidents involving small aeroplanes are shown in Table 5.5. If more than one aircraft was involved in the accident then the total number of injuries on all aircraft will be shown. There have been 169⁶ fatalities, 106 serious injuries and 256 minor injuries between 1995 and 2004.

	Injury	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Crew	Fatal	10	19	9	11	19	14	17	6	4	8	117
	Serious	6	3	9	8	9	8	10	5	5	10	73
	Minor	15	21	17	11	24	7	21	20	20	8	164
	Total	31	43	35	30	52	29	48	31	29	26	354
Passenger	Fatal	7	7	2	3	12	5	4	4	3	5	52
	Serious	2	4	8	3	5	5	2	1	1	2	33
	Minor	4	16	12	15	14	3	6	8	10	4	92
	Total	13	27	22	21	31	13	12	13	14	11	177

Table 5.5 Injuries sustained in reportable accidents

6. This figure includes one fatality on a glider that collided in mid-air with a glider-tug aerotow combination. This accident is not listed as a fatal accident in this section as there were not any fatalities on the aeroplane involved. However, as this accident is considered a glider fatal accident it is therefore listed in section 5.6 of this chapter.

3.11 Serious incidents

3.11.1 There have been 35 serious incidents, as classified by the UK AAIB, involving small aeroplanes over the last ten years. Figure 5.8 shows the annual number of serious incidents.

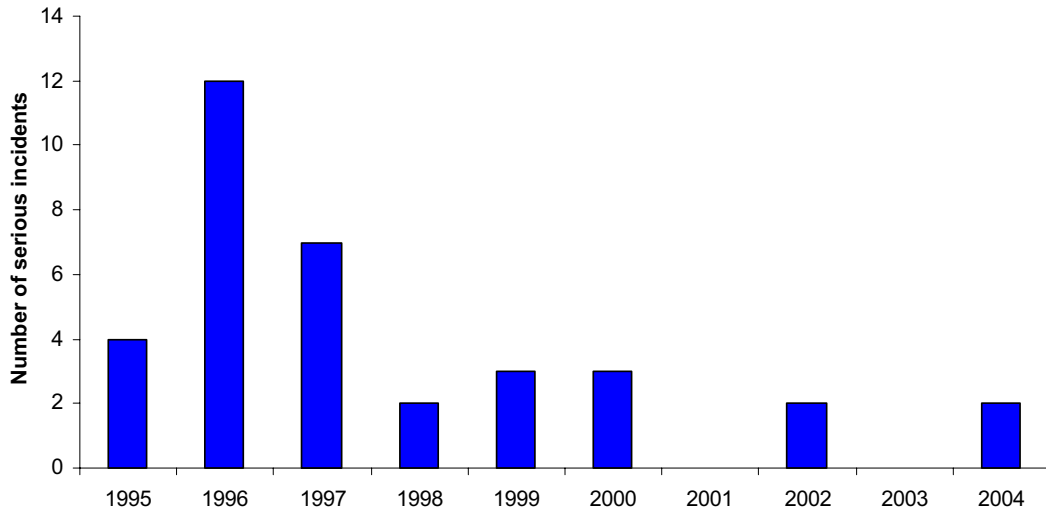


Figure 5.8 Number of serious incidents

3.11.2 Nearly 80% of the serious incidents involved single piston aircraft and just over 10% involved twin pistons. Also involved were single jets, twin turboprops, triple piston engined aircraft and business jets.

4 Small Helicopters

4.1 This section contains information on UK registered or operated helicopters with a MTWA of under 2,730kg on non-public transport flights.

4.2 The requirements for reporting of mandatory occurrences (Air Navigation Order 2005) mainly relate to turbine powered aircraft, which predominantly have a MTWA of over 2,730kg and are typically used for public transport purposes. Therefore, information relating to incidents has not been shown in this section.

4.3 Reportable accidents

4.3.1 Between 1995 and 2004 there have been 215 reportable accidents involving small helicopters. Figure 5.9 shows the annual breakdown of these accidents.

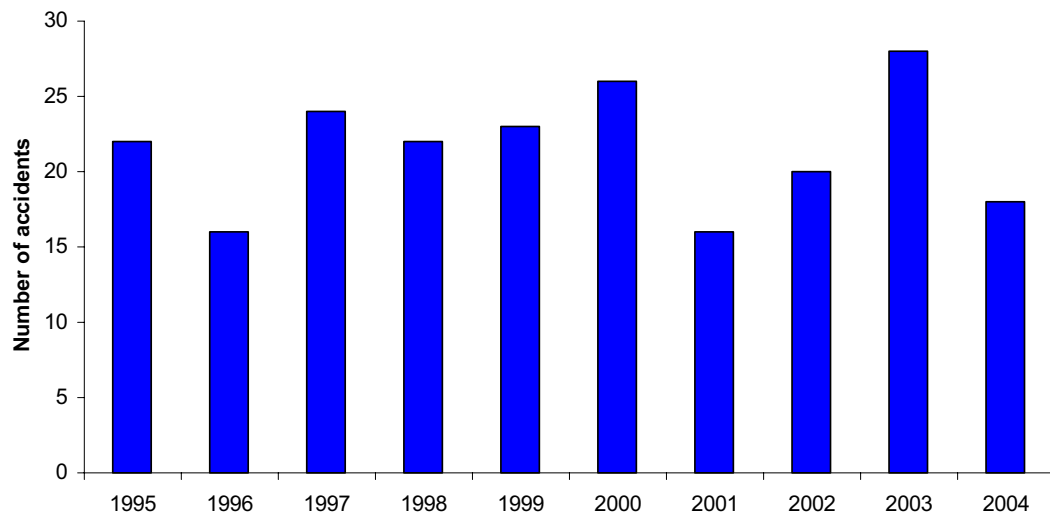


Figure 5.9 Number of reportable accidents

4.3.2 Single piston helicopters were involved in 67% of the reportable accidents, 29% involved single turbine helicopters and 4% involved twin turbine helicopters.

4.4 Fatal accidents

4.4.1 Between 1995 and 2004 there have been 27 fatal accidents involving small helicopters resulting in 51 fatalities. Fatal mid-air collisions involving other classes of aircraft, e.g. microlights, have been discounted if the fatalities only involved the other class of aircraft. Details of these accidents are shown in Table 5.6.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
05 May 1995	AS350 Squirrel	Loch Gilphead, Scotland	Underslung load operations	Crashed in field after pilot reported loss of control	1	1
19 Oct 1996	Hughes 369	nr. Cheadle, Staffs.	Private	Crashed in field after pilot reported loss of control	1	1
16 Dec 1996	Bell 206	nr. Ledbury, Hereford and Worcs.	Private	Reportedly struck tree on take-off in poor visibility	3	3
16 Jan 1997	Robinson R22	nr. Redhill, Surrey	Training	Crashed during night circuit training exercise, suspected engine problems	1	1
16 Mar 1997	Bell 206	nr. Albury, Herts.	Private	Suspected engine problems, forced landing	1	1
13 Jul 1997	Bell 206	nr. Forfar, Scotland	Private	Contacted fence and rolled over onto side during precautionary landing	6	1
11 Aug 1997	Bell 206	nr. Lancaster, Lancs.	Survey	Crashed whilst engaged in pipeline survey	2	2
14 Nov 1997	Bell 206	nr. Midhurst, W Sussex.	Private	Crashed on hillside in poor weather at night	1	1

Table 5.6 Details of fatal accidents

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
28 Jan 1998	AS355 Twin Squirrel	nr. Bicester, Oxon.	Private	Crashed on rising ground and caught fire	1	1
09 Mar 1998	Robinson R22	Amport, Hants.	Private	Engine stopped, crashed. Main Rotor drive sprag clutch failed	1	1
19 Apr 1998	Robinson R44	Gumley, Leics.	Private	Crashed in copse in poor weather - fire after impact	4	4
01 Aug 1998	Rotorway Executive	nr. Cambridge, Cambs.	Test	Crashed in a field during test flight	2	2
01 Feb 2000	Robinson R44	Chorley, Lancs.	Private	Lost control after inadvertently entering cloud	3	3
08 Mar 2000	Hughes 269	Hare Hatch, Berks.	Private	Crashed following in-flight breakup	3	3
28 May 2000	Robinson R44	Alps, France	Private	Struck power cable in poor weather	2	2
02 Dec 2000	Robinson R22	Sherburn in Elmet, W York.	Private	Main rotor blade struck canopy after apparent loss of engine power	2	2
21 Jan 2001	AS350 Squirrel	Enniskilen, N Ireland	Private	Lost control after inadvertently entering cloud	5	3
05 May 2001	Robinson R22	Beaune, France	Private	Crashed, circumstances unknown	2	2
24 May 2002	Bolkow 105	Brough of Birsay, Orkney Isles	Commercial	Crashed into sea after underslung load became unstable and struck the tail rotor.	1	1
13 Jul 2002	Robinson R22	Warwick, Warks.	Private	Broke up in-flight and crashed in a field	2	2
17 Jan 2003	Bell 206	Cudham, Kent	Private	Crashed shortly after take-off following pilot spatial disorientation	2	2
19 Jul 2003	Hughes 369 / 500	Knockholt, Kent	Private	Entered a descending left turn from which it did not recover before striking the ground.	3	3
30 Jul 2003	Robinson R44	Teviothead, Scotland	Private	After encountering low cloud, the main rotor struck the tailboom during rapid descent	1	1
02 Dec 2003	AS355 Twin Squirrel	Hurstbourne Tarrant, Hants.	Test	Crashed during air test	3	3
19 Sep 2004	Robinson R44	Kentallen, Scotland	Private	Struck hillside close to landing site at night in bad weather.	2	1
24 Oct 2004	Enstrom 280	North Sea, off Asane, Norway	Private	Ditched in sea	3	1
11 Nov 2004	Robinson R22	Stratford upon Avon, Warks.	Training	Descended rapidly and crashed in a field	1	1

Table 5.6 Details of fatal accidents (Continued)

4.5 Utilisation data

- 4.5.1 Between 1995 and 2004, UK registered small helicopters have flown an estimated 1.5 million hours. The annual breakdown of these figures is shown in Table 5.7.
- 4.5.2 The utilisation data in Table 5.7 relate to the hours generated by all UK registered helicopters below 2,730kg MTWA. It is not possible to ascertain the number of hours flown on non-public transport flights and, as a result, the hours flown by all UK registered helicopters have been used. This solution is not ideal as public transport operations involving this type of aircraft will also be included. However, the majority of the hours flown will involve non-public transport activities and, in the absence of more appropriate data, it is therefore reasonable to consider the dataset to be generally representative of this category of aircraft.

Year	Estimated hours ('000)
1995	117
1996	124
1997	138
1998	150
1999	152
2000	153
2001	150
2002	166
2003	170
2004	180

Table 5.7 Hours flown by UK registered aircraft

4.6 Reportable and fatal accident rates

- 4.6.1 Figure 5.10 shows the reportable and fatal accident rates involving small helicopters over the ten year period, using a three year moving average. These rates have been produced using the utilisation data outlined in Table 5.7 and the caveats therein.

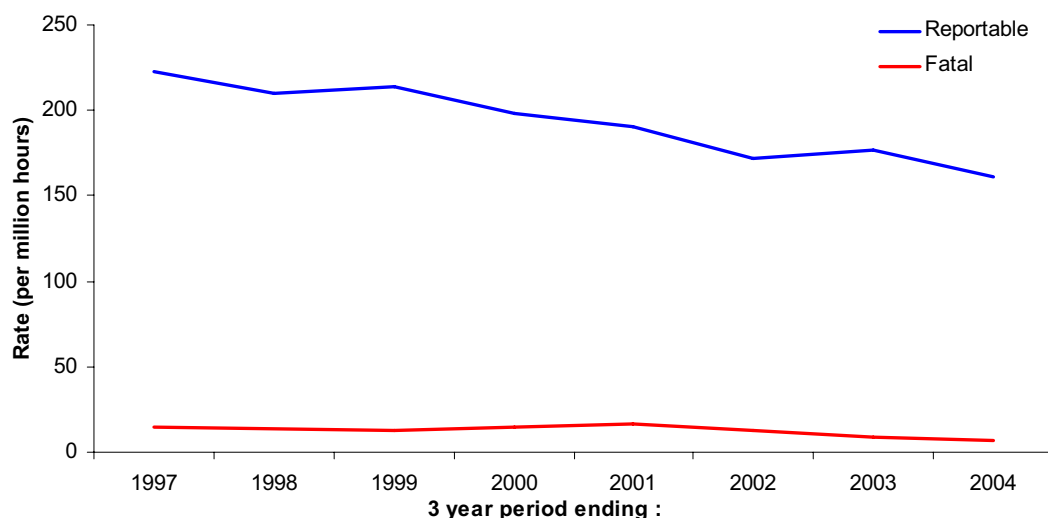


Figure 5.10 Rate of fatal and reportable accidents

4.6.2 Considering the whole ten year period, the overall fatal accident rate is 18.0 per million hours and the reportable accident rate is 143.3 per million hours.

4.7 Injury tables

4.7.1 The injuries sustained in the reportable accidents involving small helicopters are shown in Table 5.8. There have been 51⁷ fatalities, 20 serious injuries and 72 minor injuries over the time period of this report.

	Injury	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Crew	Fatal	1	2	4	4		7	2	2	4	2	28
	Serious	1		2			1		2		6	12
	Minor	2	1	3	3	9	4	4	5	10	8	49
	Total	4	3	9	7	9	12	6	9	14	16	89
Passenger	Fatal		2	2	4		3	3	1	5	3	23
	Serious			2	2		2	2				8
	Minor			7		3	4	1	2	3	3	23
	Total	0	2	11	6	3	9	6	3	8	6	54

Table 5.8 Injuries sustained in reportable accidents

4.8 Serious incidents

4.8.1 There have been eight serious incidents, as classified by the UK AAIB, involving small helicopters over the last ten years. Figure 5.11 shows the annual number of serious incidents.

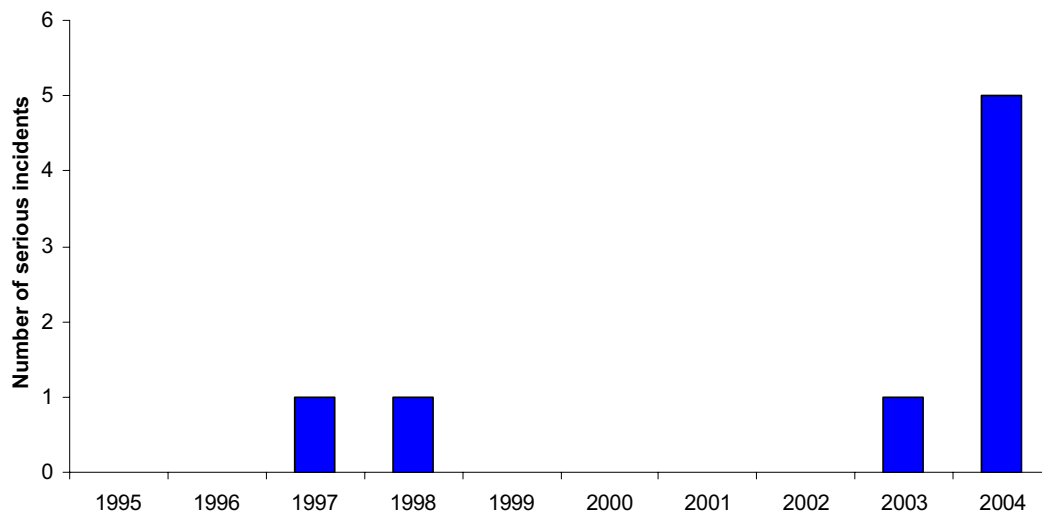


Figure 5.11 Number of serious incidents

7. This figure includes two fatalities on a microlight that collided in mid-air with a helicopter. This accident is not listed as a fatal accident in this section as there were not any fatalities on the helicopter involved. However, this accident is considered a microlight fatal accident and is therefore listed in section 5.8 of this chapter.

5 Other Aircraft

5.1 This section contains information on UK registered or operated airships, balloons, gliders, gyroplanes and microlights on non-public transport flights.

5.2 Responsibility for the safety of all of these aircraft types, excluding gyroplanes, has been delegated, by the CAA, to their representative bodies. For airships and balloons this is the British Ballooning and Airship Club (BBAC), for gliders this is the British Gliding Association (BGA) and for microlights this is the British Microlight Aircraft Association (BMAA).

5.3 The information within this section is mainly limited to accident and injury data. Also, where possible, utilisation data has been added.

5.4 Airships

5.4.1 Between 1995 and 2004 there has only been one reportable accident involving a UK registered airship. This accident, a mid-air collision with another non-UK registered airship, did not result in any injuries. Table 5.9 summarises the safety data for airships.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Aircraft registered in UK	43	40	40	40	42	33	28	31	30	29	-
Fatal accidents											0
Reportable accidents									1		1
Injuries (all)											0

Table 5.9 Airships

5.5 Balloons (non-public transport)

5.5.1 Between 1995 and 2004 there have been 23 reportable accidents involving UK registered balloons on non-public transport flights. None of these accidents resulted in fatal injuries. Table 5.10 summarises the safety data for this category of aircraft.

5.5.2 Table 5.10 only shows information relating to UK registered or operated balloons on non-public transport flights. Information relating to public transport balloons is in Chapter 4.

5.5.3 It is not possible to separate the utilisation data for balloons on the UK aircraft register into those balloons used for public transport and those used for non-public transport, therefore this information has been excluded from table 5.10.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Fatal accidents											0
Reportable accidents	3	5	2	4	4	1		1	2	1	23
Fatal injuries											0
Serious injuries	4	4	1	2	1	1		1	1		15
Minor injuries		1		1	2				1		5

Table 5.10 Non-public transport balloons

5.6 Gliders

5.6.1 The data relating to gliders have been provided by the British Gliding Association (BGA). The BGA year covers 1st October to 30th September. Paragliders and hang-gliders are not included within these data.

5.6.2 Between 1st October 1994 and 30th September 2004 there have been 430 reportable accidents involving UK gliders, 38 of which resulted in fatalities. Table 5.11 summarises the safety and utilisation data for UK gliders.

BGA year (Oct-Sep)	94/95	95/96	96/97	97/98	98/99	99/00	00/01	01/02	02/03	03/04	Total
Aircraft registered in UK	2,318	2,282	2,285	2,376	2,386	2,578	2,519	2,572	2,594	2,641	-
Movements ('000)	907	937	807	793	767	785	653	699	688	633	7609*
Hours flown ('000)	170	174	173	148	156	144	129	145	137	149	1,525
Fatal accidents	5	3	2	6	1	3	7	1	3	7	38
Reportable accidents	43	46	44	44	40	56	36	41	40	40	430
Fatal injuries	5	5	2	7	3	3	8	2	3	9	47**
Serious injuries	7	7	4	4	6	6	5	5	15	5	64
Minor/no injuries	45	49	42	46	41	69	32	45	34	37	440

Table 5.11 Gliders

* Derived from the BGA's number of launches recorded, x2.

** This figure includes one fatality on an aeroplane that collided in mid-air with a glider in 2001 and also one parachutist fatality following a collision with a glider in 2002.

5.6.3 Details of the 38 fatal accidents between 1st October 1994 and 30th September 2004 are shown in Table 5.12. There are a number of mid-air collisions within the table and it should be noted that for these accidents the numbers of people on board and fatal injuries applies to the sum total of both aircraft.

5.6.4 Excluded from the data is an accident at Long Mynd, Shropshire in 1998 where a glider struck and killed a person walking on a track alongside the landing strip. This is considered a third party fatality only accident, which are excluded from this Review.

Date	Aircraft type	Location of accident	Description of accident	People on board	Fatal injuries
15 Apr 1995	Olympia 463	nr. Buxton, Derbys.	Inflight structural failure	1	1
05 May 1995	SZD Puchacz	Husbands Bosworth, Leics.	Failed winch launch, aircraft spun in	2	1
07 May 1995	Discus B/T S/S	Parham, W Sussex.	Partially deployed airbrakes on downwind leg and spun in	1	1
12 Jun 1995	Cirrus Standard	Talgarth, Wales	Entered steep turn and struck ground after release at 150ft	1	1
09 Jul 1995	Carman JP15-36	Pershore, Hereford and Worcs.	Crashed after cable break at 150-200ft	1	1
13 Jul 1996	Olympia 460	Seighford, Staffs.	Crashed during winch launch due to structural failure	1	1
21 Aug 1996	KA6 and KA8	nr. Aston Down, Glos.	Mid-air collision between two gliders	2	1
23 Aug 1996	KA6 and other glider	Gap, France	Mid-air collision between two gliders	3	3

Table 5.12 Details of fatal accidents involving gliders

Date	Aircraft type	Location of accident	Description of accident	People on board	Fatal injuries
15 Jun 1997	Astir	Ringmer, E Susx.	Struck ground while carrying out 360 deg turn after cable break	1	1
26 Jul 1997	ASK23	Long Mynd, Shrops.	Launch cable snagged wing and glider spun in	1	1
02 May 1998	LS3A and KA8	Seighford, Staffs.	Mid-air collision between two gliders	2	2
09 Jul 1998	ASK13	nr. Dunstable, Beds.	Crashed on hillside	2	1
10 Jul 1998	2x Ventus 2	Mildenhall, Suffolk	Mid-air collision between two gliders	2	1
27 Jul 1998	2x Kestral 19	Bidford, Warks.	Mid-air collision between two gliders	2	1
05 Aug 1998	KA6	Aston Down, Glos.	Entered spin and crashed into cornfield	1	1
19 Aug 1998	Pegasus 101	Great Saxham, Suffolk	Crashed on farmland, circumstances unknown	1	1
31 May 1999	ASW20 and Grob Twin Akro	Great Hucklow, Derbys.	Mid-air collision between two gliders	3	3
18 Jun 2000	Slingsby Swallow	Riggewell, Suffolk	Crashed on take-off	1	1
31 Jul 2000	Nimbus 4DT	Arcania, Spain	Spiral dive following loss of control. Wing separated	2	1
04 Aug 2000	ASW 22	Segovia mountains, Spain	Crashed in mountainous region	1	1
03 Feb 2001	Ventus 2CT	Benalla, Australia	Pitched nose down and spiralled into ground	1	1
01 Apr 2001	SZD Junior	Long Stratton, Norfolk	Spiralled into ground on downwind leg to airfield	1	1
23 Jun 2001	D5 Kestrel	Husbands Bosworth, Leics.	Wingtip struck ground during low level turn	1	1
15 Jul 2001	ASW15	Bidford, Warks.	Mid-air collision between glider and PA18 tug/glider tow	3	1
15 Jul 2001	Cirrus Standard	Usk, Wales	Stalled and spun in shortly after winch launch	1	1
26 Aug 2001	LS8	Syerston, Notts.	Spun into ground after loss of control during winch launch	1	1
14 Sep 2001	Cirrus	Aston Down, Glos.	Mid-air collision between glider and PA25 tug.	2	2
01 Jun 2002	KA8	Hinton in the Hedges, Northants.	Mid-air collision between glider and freefall parachutist	2	2
21 Feb 2003	SZD-50-3 Puchacz	Great Hucklow, Derbys.	Spiralled into ground after impacting launch cable of another glider	2	1
11 Jun 2003	ASW19	Camphill, Derbys.	During launch, left wing hit ground and aircraft tipped onto nose	1	1
29 Jun 2003	Discus 'B	'High Ellington, N York.	Lost control and impacted ground in steep nose down attitude	1	1

Table 5.12 Details of fatal accidents involving gliders (Continued)

Date	Aircraft type	Location of accident	Description of accident	People on board	Fatal injuries
18 Jan 2004	Puchacz	Husbands Bosworth, Leics.	Entered spin at 1500ft and crashed nose-down into a field	2	2
26 Apr 2004	Skylark IV/ Ventus CT	Lasham, Hants.	Mid-air collision between two gliders	2	1
16 May 2004	ASK18	Halesland, Somerset	Crashed on take-off following winch cable failure	1	1
26 May 2004	KA7	Strubby, Lincs.	Crashed after reported wing separation	2	2
09 Jul 2004	ASW20L	La Motte Du Caire, France	Ground collision shortly after take-off by hoist system	1	1
07 Aug 2004	LS7	Dunstable, Beds.	Climbed too steeply during winch launch, stalled and nose dived to ground	1	1
07 Aug 2004	Std. Cirrus	Nympsfield, Glos.	Collided with tree following early release from winch launch	1	1

Table 5.12 Details of fatal accidents involving gliders (Continued)

5.7 Gyroplanes

5.7.1 Between 1995 and 2004 there have been 31 reportable accidents involving UK registered gyroplanes, eight of which resulted in fatalities. Table 5.13 summarises the safety and utilisation data for UK registered gyroplanes. Gyrogliders are not included within these data.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Aircraft registered in UK	257	261	261	265	244	233	242	244	247	251	-
Estimated hours flown ('000)	1.8	1.5	1.5	1.4	1.4	1.3	1.6	2.5	2.1	1.9	16.9
Fatal accidents	0	1	0	1	0	1	1	2	1	1	8
Reportable accidents	2	6	2	3	2	2	2	2	6	4	31
Fatal injuries		1		1		1	1	3	1	1	9
Serious injuries			1						1		2
Minor injuries	1	1							3		5

Table 5.13 Gyroplanes

5.7.2 Details of the eight fatal accidents between 1995 and 2004 are shown in Table 5.14.

Date	Aircraft type	Location of accident	Type of Operation	Description of accident	People on board	Fatal injuries
20 Apr 1996	Air Command	Long Marston, Warks.	Private	Lost control and tumbled vertically to ground	1	1
13 Jun 1998	Bensen	Coll, Isle of Lewis	Private	Entered steep climb, stalled and crashed inverted	1	1
16 Apr 2000	Bensen	Carlisle, Cumbria	Private	Crashed during attempt to land in field next to runway end	1	1
01 Jun 2001	Cricket	Henstridge, Somerset	Private	Crashed on approach	1	1

Table 5.14 Details of fatal accidents involving gyroplanes

Date	Aircraft type	Location of accident	Type of Operation	Description of accident	People on board	Fatal injuries
23 Mar 2002	Bensen	Kirkbride, Cumbria	Private	Shortly after take-off entered rolling manoeuvres and crashed	1	1
17 May 2002	RAF 2000 Autogyro	Braintree, Essex	Private	Lost control, started to break up and fell vertically to the ground	2	2
29 Jun 2003	Bensen	Shipdham, Norfolk	Private	Control lost after rotor blades struck rudder in flight	1	1
15 Dec 2004	Ken Brock KB-2	Sutton Bank, N York.	Private	Crashed into trees after failing to gain height following take-off	1	1

Table 5.14 Details of fatal accidents involving gyroplanes (Continued)

5.8 Microlights

5.8.1 Between 1995 and 2004 there have been 251 reportable accidents involving UK registered microlights, 23 of which resulted in fatalities. Table 5.15 summarises the safety and utilisation data for UK registered microlights.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Aircraft registered in UK	3,195	3,217	3,296	3,431	3,532	3,461	3,515	3,604	3,810	4,051	-
Estimated hours flown ('000)	81	68	76	75	85	80	89	101	113	100	866*
Fatal accidents	3	3	3	1	3	0	3	1	2	4	23
Reportable accidents	29	18	16	22	23	18	26	29	38	32	251
Fatal injuries	3	3	3	2	3	-	4	1	2	7	28
Serious injuries	5	5	4	2	7	2	3	11	5	9	53
Minor injuries	8	6	5	9	7	8	3	5	9	4	64

Table 5.15 Microlights

* Total differs from the sum of column entries due to rounding to nearest 1000.

5.8.2 Details of the 23 fatal accidents between 1995 and 2004 are shown in Table 5.16. There is a mid-air collision within the table and it should be noted that for this accident the numbers of people on board and fatal injuries applies to the sum total of both aircraft

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
28 Apr 1995	Sirocco 377GB	nr. Bromyard, Hereford and Worcester	Private	Crashed following structural failure of tailplane	1	1
01 Jul 1995	Chaser S 447	nr. Conwy, Wales	Private	Crashed onto beach - undetermined cause	1	1
31 Aug 1995	Mercury	nr. Sandtoft, N Lincs.	Training	Loss of control led to airframe failure in flight	1	1
17 Jul 1996	Gemini Flash IIA	nr. Rhyl, Wales	Test	Wings folded on test flight and aircraft fell from approx. 400ft	1	1
04 Aug 1996	MW5(K) Sorcerer	Bruton, Somerset	Private	Struck cables during forced landing after engine stopped	1	1

Table 5.16 Details of fatal accidents involving microlights

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
07 Aug 1996	Chaser S 508	nr. Durban, South Africa	Competition	Encountered severe turbulence and broke up in flight	1	1
15 Apr 1997	Gemini Flash II	Walsall, W Midlands	Private	Struck tree during go-around	2	1
12 Aug 1997	Spectrum	Netherthorp e, S Yorks.	Private	Crashed on take-off	1	1
27 Oct 1997	Gemini Flash IIA	Roydon, Essex	Training	Spiralled into field after wings folded in flight	1	1
26 Jul 1998	Kolb Twinstar Mk3	Louth, Lincs.	Private	Crashed in cornfield	2	2
28 Mar 1999	MW6S (Mod)	Newnham, Herts.	Private	Loss of control during go-around	1	1
21 Aug 1999	Pegasus XLQ	Radwell, Herts.	Private	Loss of control in flight	2	1
06 Oct 1999	Rans S6-ESD	Monewden, Suffolk	Private	Crashed into field following engine failure shortly after take-off	1	1
13 Jan 2001	Mainair Blade	Enson, Staffs.	Private	Engine stopped due fuel starvation. Overturned on landing	2	1
14 Feb 2001	Rans S4	Davidstow Moor, Cornwall	Private	Loss of control during climb out, entered spin and crashed	1	1
23 Jun 2001	Aviasud Mistral	Nash, Shrops.	Private	Stalled and spun into ground from low level after engine failure	2	2
02 Jan 2002	Mainair Blade	Alby, Norfolk	Training	Wing tip struck ground and aircraft overturned	2	1
13 Apr 2003	Chaser S	Clitheroe, Lancs.	Private	Crashed following an apparent loss of control in flight	1	1
07 May 2003	Pegasus XLQ	Stock, Essex	Private	Crashed into a tree during go-around	1	1
27 Jan 2004	Sirocco 377GB	Ashby de la Zouch, Leics.	Private	Crashed following an in-flight structural failure of the tailplane	1	1
06 Jul 2004	Hybred 44XLR	Welham Green, Herts.	Private	Mid-air collision with Robinson R22	4	2
21 Aug 2004	Pegasus Quik	Eastchurch, Kent	Private	Crashed in a field following possible in-flight break-up	2	2
03 Sep 2004	Ikarus C42 FB UK	Pyrenees, Spain	Private	Crashed in the Pyrenees Mountains	2	2

Table 5.16 Details of fatal accidents involving microlights (Continued)

5.9 **Comparison of fatal accident rates**

5.9.1 Figure 5.12 shows the fatal accident rates for all the types of aircraft listed in the 'UK non-public transport - other' section. The rates have been shown over the ten year period, using a three year moving average.

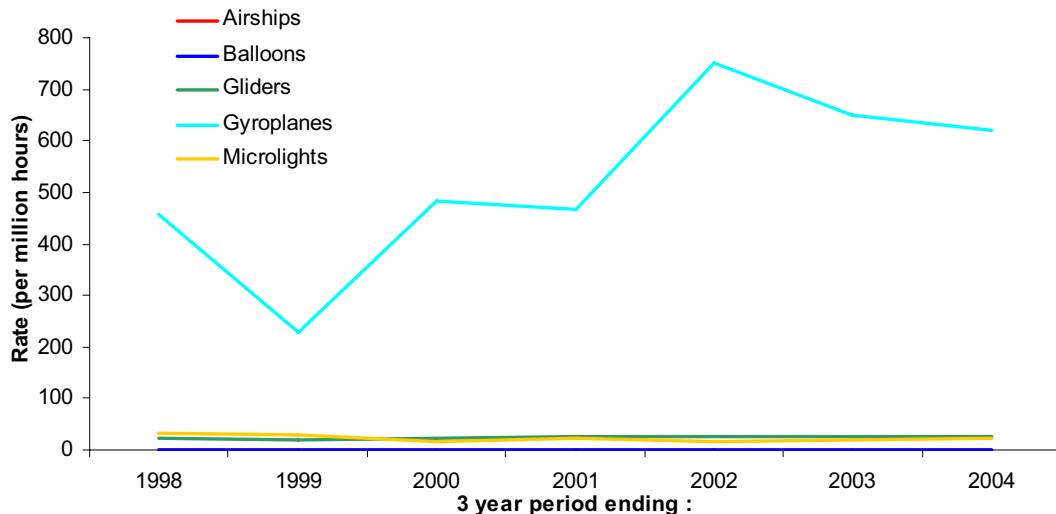


Figure 5.12 Comparison of UK non-public transport - 'other' fatal accident rates

5.9.2 Figure 5.12 has been recreated using a logarithmic scale and is shown below as figure 5.13. The logarithmic scale has the benefit of more clearly showing the trends the fatal accident rates of microlights and gliders. The airship and balloon fatal accident rates are no longer visible as they are zero for the whole ten year period.

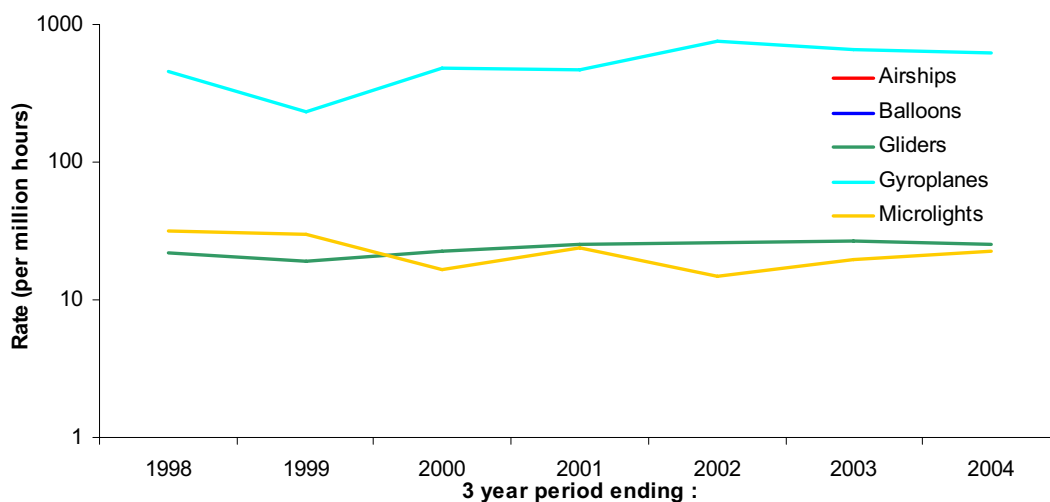


Figure 5.13 Logarithmic comparison of UK non-public transport - 'other' fatal accident rates

Chapter 6 Safety of UK Airspace and Aerodromes

1 Introduction

- 1.1 This chapter contains information on the safety of UK airspace and aerodromes involving any aircraft whether it is registered inside or outside the UK.
- 1.2 The information on UK airspace has been broken down into occurrences involving foreign registered aircraft in UK airspace and those involving Air Traffic Control (ATC) in UK airspace. There is a separate section dedicated to Airprox occurring in UK airspace.
- 1.3 The information on UK aerodromes has been broken down into types of occurrences, e.g. ground collisions and loading errors.
- 1.4 More details regarding the types of occurrences shown in this chapter can be found in Appendix 1.
- 1.5 The source of the utilisation is the CAA's Air Transport Statistics Department and the accident/incident data are from the Mandatory Occurrence Reporting (MOR) scheme database.

2 Foreign Registered Aircraft in UK Airspace

- 2.1 This section contains information on foreign registered/operated aircraft in UK airspace. In some cases the registration/operator of the aircraft is not listed, therefore the statistics in this section may be underestimated as a result.
- 2.2 In this section there are references to large and small aeroplanes. Large aeroplanes are those aircraft types with a MTWA of over 5,700kg. Small aeroplanes are those with a MTWA of below 5,700kg.

2.3 Reportable accidents

- 2.3.1 Between 1995 and 2004 there have been 198 reportable accidents in UK airspace involving foreign registered/operated aircraft. The annual breakdown of these accidents is shown in Figure 6.1. Some of the accidents included in this section also involved UK registered aircraft where, for example, there was a collision between a UK registered and a foreign registered aircraft.

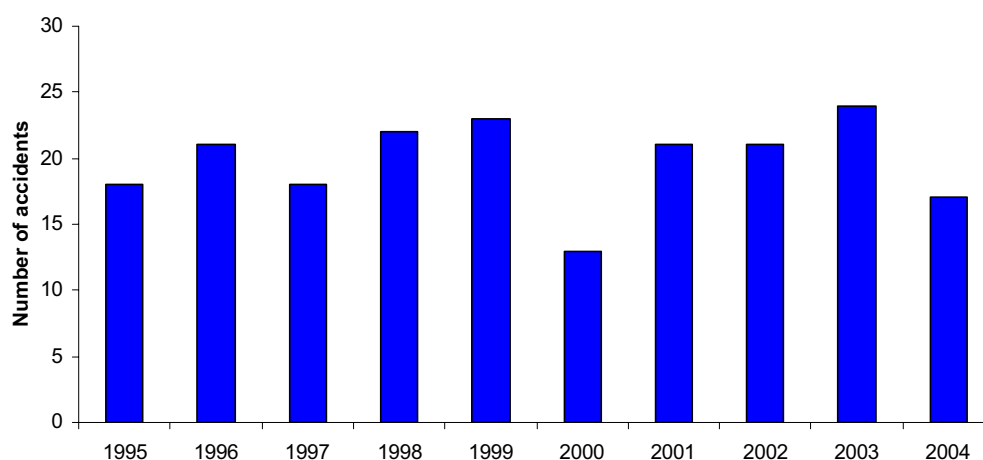


Figure 6.1 Number of reportable accidents

2.3.2 The 198 reportable accidents involved different classes and operation of aircraft. Figure 6.2 shows the breakdown of the total number of reportable accidents by class/operation of aircraft.

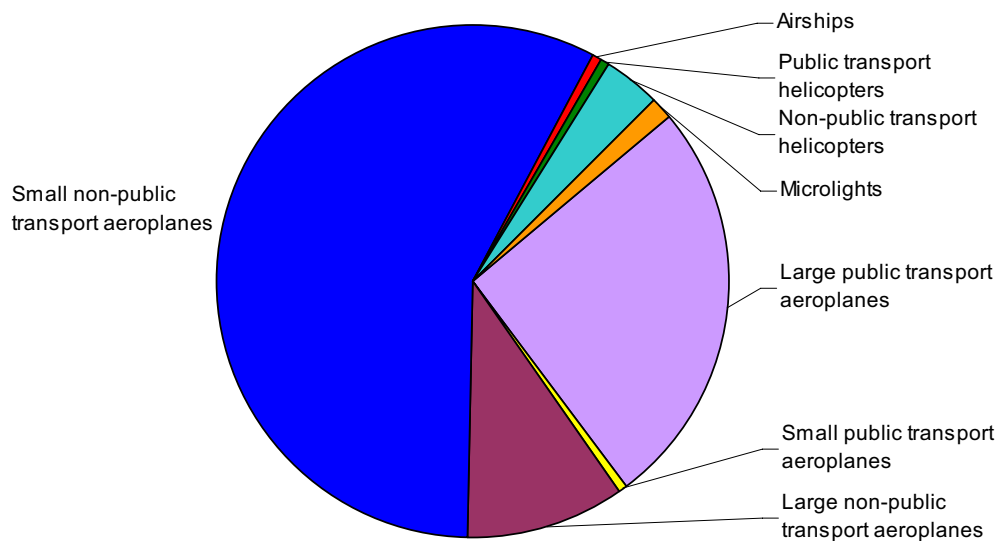


Figure 6.2 Class of aircraft involved in reportable accidents

2.4 Fatal accidents

2.4.1 Between 1995 and 2004 there have been 19 fatal accidents in UK airspace involving foreign registered/operated aircraft, resulting in 38 fatalities. Details of these accidents are shown in the tables below, broken down by the class of aircraft/operation they involve. There is a mid-air collision within the tables and it should be noted that for this accident, the number of people on board, and fatal injuries, applies to the sum total of both aircraft.

2.4.2 There has been one fatal accident to a large public transport aeroplane between 1995 and 2004 resulting in four fatalities. Details of this accident are shown in Table 6.1.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
22 Dec 1999	B747	Stansted, Essex	Cargo	Crashed on take off and was destroyed by impact/fire	4	4

Table 6.1 Details of fatal accidents - large public transport aeroplanes

2.4.3 There have been four fatal accidents to large non-public transport aeroplanes between 1995 and 2004 resulting in nine fatalities. Details of these accidents are shown in Table 6.2.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
14 Jul 1996	P38 Lightning	Duxford, Cambs.	Air Display	Crashed during air display, striking 7 other parked aircraft	1	1
27 Jul 1998	Catalina	Southampton, Hants.	Private	Struck boat wake during water landing, water flooded into fuselage and aircraft sank	18	2
28 Nov 1998	DHC7	Ashburton, Devon	Test	Stalled and entered spin before crashing to the ground	2	2
04 Jan 2002	CL600 Challenger	Birmingham, W Mids.	Business	After take-off, aircraft rolled left and wingtip clipped ground. Aircraft cartwheeled and caught fire	4	4

Table 6.2 Details of fatal accidents - large non-public transport aeroplanes

2.4.4 There have been 14 fatal accidents to small non-public transport aeroplanes between 1995 and 2004 resulting in 24 fatalities. Details of these accidents are shown in Table 6.3.

Date	Aircraft type	Location of accident	Type of operation	Description of accident	People on board	Fatal injuries
23 Nov 1996	Grumman AA5	Denham, Middx.	Training	Pitched nose down and descended vertically to ground impact, following engine failure	1	1
08 Aug 1997	Maule MX 7	Brunton, Northumb.	Private	Stalled following go around, crashed and caught fire	2	2
19 Apr 2000	Yak 50	North Weald, Essex	Private	Mid-air collision with Cessna 150*	3	3
30 Nov 2000	Aerostar	Fortingall, Scotland	Private	Lost control during climb and crashed, following reported icing problems	1	1
23 Dec 2000	Beech 200	Blackbushe, Hants.	Private	Crashed into factory after taking-off in fog with thrust asymmetry	5	5
06 Jun 2001	Beech 58	Isle of Man	Private	Crashed in sea following reported compass problem	1	1
19 Jun 2001	Rockwell 114	Southampton, Hants.	Private	Failed to climb after take-off and crashed during attempted return to airfield	2	2
22 Jul 2001	Wassmer WA40	Litchfield, Hants.	Private	Crashed following left wing and tailplane detachment in flight	1	1
11 Aug 2001	Yak 52	Compton Abbas, Dorset	Private	Stalled and spun into ground during practice aerobatic manoeuvre	1	1
07 Apr 2003	Cessna 310	Sandtoft, N Lincs.	Private	Lost control after door opened during take-off	1	1
31 May 2003	Ryan M1/M2 NYP	Coventry, W Mids.	Air Display	Structural failure of right wing shortly after take-off	1	1
01 Aug 2003	Cessna 182	Marlow, Bucks.	Private	Entered spiral dive and crashed	1	1
06 Dec 2003	Socata TBM700	Oxford, Oxon.	Private	Entered an uncontrolled roll during approach and crashed beside the runway threshold	3	3
30 Mar 2004	Cessna 310	Trawden, Lancs.	Private	Crashed following fire in the nose baggage compartment	1	1

Table 6.3 Details of fatal accidents - small non-public transport aeroplanes

* The Cessna 150 was a UK registered aircraft and so this accident also appears in Chapter 5 of this document.

2.5 Injury tables

2.5.1 The injuries sustained in the reportable accidents in UK airspace involving foreign registered/operated aircraft are shown in Table 6.4. There have been 38 fatalities, ten serious injuries and 54 minor injuries over the time period of this report. The injuries

have been broken down by class/operation of aircraft in the same way as the previous section. Small public transport aeroplanes, public transport helicopters and airships are not listed because the accidents involving these classes/operations of aircraft did not result in any injuries.

Class/operation	Injury	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Large public transport aeroplanes	Fatal					4						4
	Serious					1						1
	Minor	2	3		1	1						7
	Total	2	3	0	1	6	0	0	0	0	0	12
Large non-public transport aeroplanes	Fatal		1		4				5			10
	Serious											0
	Minor		3		8				2			13
	Total	0	4	0	12	0	0	0	7	0	0	23
Small non-public transport aeroplanes	Fatal		1	2			9	5		6	1	24
	Serious					1		4	1			6
	Minor			1	4	1	4	4	4	4	3	25
	Total	0	1	3	4	2	13	13	5	10	4	55
Non-public transport helicopters	Fatal											0
	Serious											0
	Minor				4	1					2	7
	Total	0	0	0	4	1	0	0	0	0	2	7
Microlights	Fatal											0
	Serious				2	1						3
	Minor							2				2
	Total	0	0	0	2	1	0	2	0	0	0	5

Table 6.4 Injuries sustained in reportable accidents

2.6 Serious incidents

2.6.1 There have been 39 serious incidents, as classified by the UK Air Accidents Investigation Branch (AAIB), in UK airspace involving foreign registered/operated aircraft over the last ten years. Figure 6.3 shows the annual number of serious incidents, broken down by whether they involved public transport or non-public transport flights.

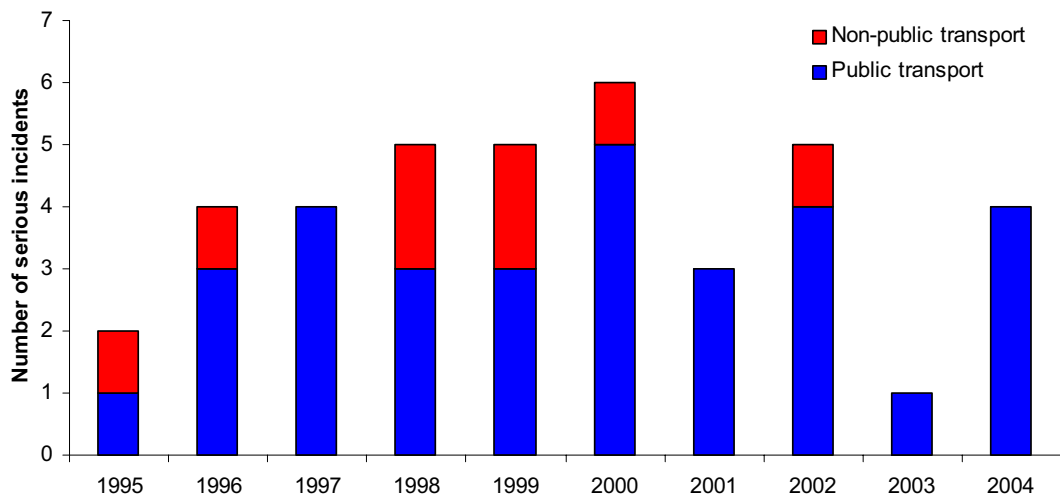


Figure 6.3 Number of serious incidents

2.7 Occurrences

2.7.1 There have been nearly 4,700 occurrences in UK airspace involving foreign registered/operated aircraft between 1995 and 2004 involving at least one foreign registered/operated aircraft on a public transport flight, within UK airspace. This figure includes reportable accidents, serious incidents and incidents reported through the MOR scheme. Only 2% of these occurrences are accidents and serious incidents.

2.7.2 The CAA has had an established occurrence grading system since 1998 that differentiates between occurrences in terms of severity (see Appendix 2). Between 1998 and 2004 only 1% of occurrences have been classified as being events of highest significance. More details regarding events of highest significance between 2002 and 2004 are shown in Chapter 7. Figure 6.4 shows the number of annual occurrences.

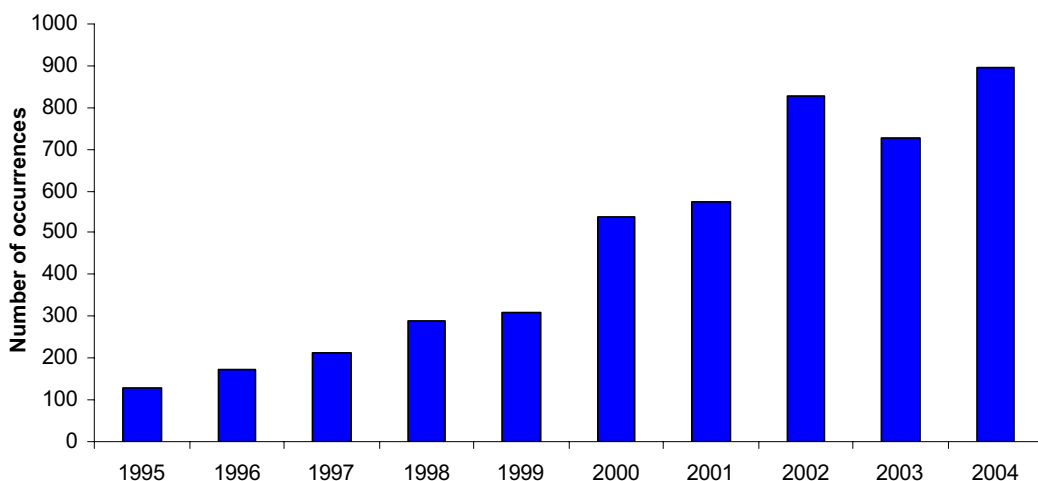


Figure 6.4 Number of public transport occurrences

3 ATC Occurrences in UK Airspace

- 3.1 This section looks at occurrences with an Air Traffic Control (ATC) involvement that occurred within UK airspace, excluding Airprox, which are reviewed separately by the UK Airprox Board and will be covered in the next section.
- 3.2 The type of occurrences in this section do not necessarily involve a failing of ATC but they have an impact, or potential impact, on ATC. The types of occurrences included in this section are, for example, level busts, losses of separation, runway incursions, ATC engineering problems, airspace infringements and communication problems.
- 3.3 It is difficult to collate every occurrence that should be considered an 'ATC occurrence' as there is not a strict definition of such an occurrence. Therefore, the results in this section should be considered indicators rather than absolute figures.
- 3.4 A general overview of all ATC occurrences, and especially those involving public transport operations is shown first in this section. This is followed by more specific information on runway incursions and level busts. Finally, there is a summary of different types of ATC occurrence.

3.5 Utilisation

- 3.5.1 Between 1995 and 2004, the UK has seen 6.2 million departure flights from the UK to overseas, 6.2 million arrivals to the UK from overseas, 4.7 million internal flights within the UK and 2.3 million flights over the UK that do not land in the UK. Table 6.5 shows the breakdown of departures, arrivals, internal flights and overflights in the UK. These data reflect IFR flights as recorded by Eurocontrol⁸.

	Departures from the UK ('000)	Arrivals to the UK ('000)	Internal flights within the UK ('000)	Flights over the UK ('000)	Total
1995	494	488	419	177	1578
1996	517	511	433	190	1651
1997	548	543	442	202	1735
1998	593	589	467	219	1867*
1999	634	633	473	242	1982
2000	673	672	477	261	2083
2001	676	675	489	260	2,100
2002	674	675	481	241	2,072*
2003	698	699	484	261	2,142
2004	733	733	500	276	2,242

Table 6.5 UK departures, arrivals, internal flights and overflights

* Totals differ from the sum of column entries due to rounding to nearest 1000.

3.6 All ATC occurrences

- 3.6.1 There have been over 16,500 ATC occurrences (excluding Airprox) between 1995 and 2004 that have occurred in UK airspace, involving at least one civil aircraft. These occurrences have been categorised as to whether they occurred in controlled airspace, uncontrolled airspace or whether the type of airspace is not known. Figure 6.5 shows the annual distribution of the ATC occurrences.

8. Data from Eurocontrol (see www.eurocontrol.int/statfor/public/standard_page/daio.html)

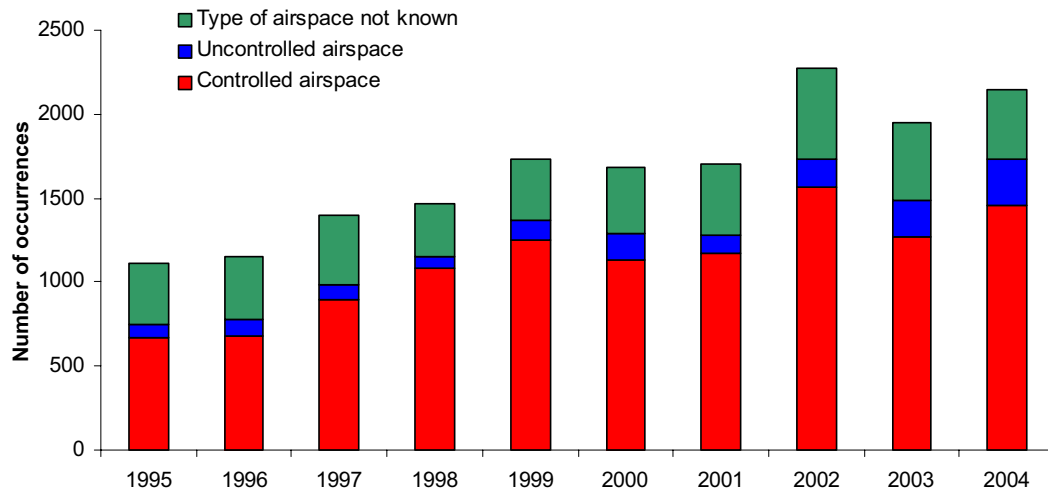


Figure 6.5 ATC occurrences in UK airspace

3.7 ATC occurrences involving public transport aircraft

3.7.1 Nearly 8,400 of the ATC occurrences involved at least one aircraft that had been identified as having been on a public transport flight at the time of the occurrence. These occurrences have again been categorised as to whether they occurred in controlled airspace, uncontrolled airspace or whether the type of airspace is not known. Figure 6.6 shows the annual distribution of these occurrences.

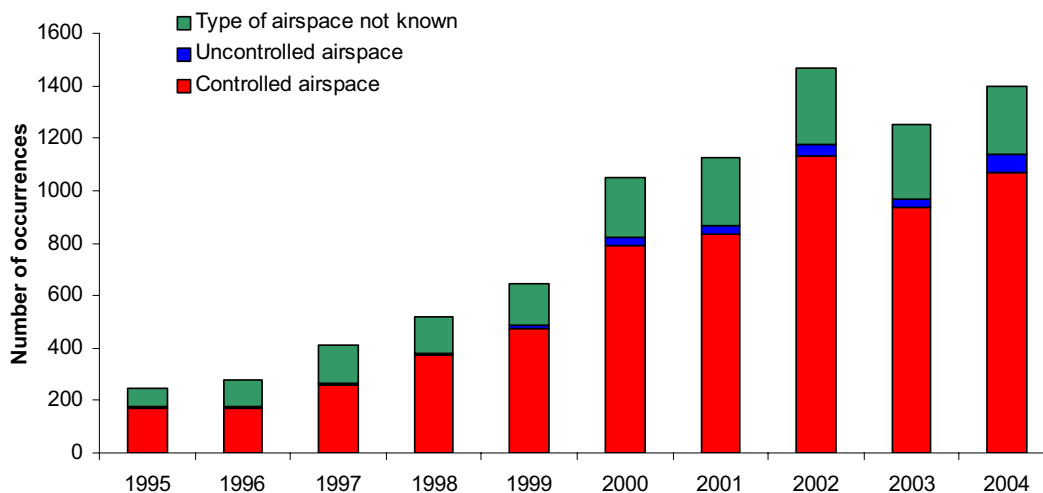


Figure 6.6 ATC occurrences involving public transport aircraft

3.8 Runway incursions

3.8.1 Runway incursions are a specific type of ATC occurrence that has been a subject of further analysis within the CAA in recent years. A runway incursion occurs when there is an unauthorised or unplanned presence of an aircraft, vehicle or person on the protected area of a surface designated for aircraft landings and departures.

3.8.2 A CAA group has been set up to analyse runway incursions at UK licensed aerodromes, as well as the Channel Islands, from 2002. This group allocates a risk category to each runway incursion based upon a risk severity matrix produced by the

US Federal Aviation Administration (FAA). Figure 6.7 shows the annual number of runway incursions and allocated risk category.

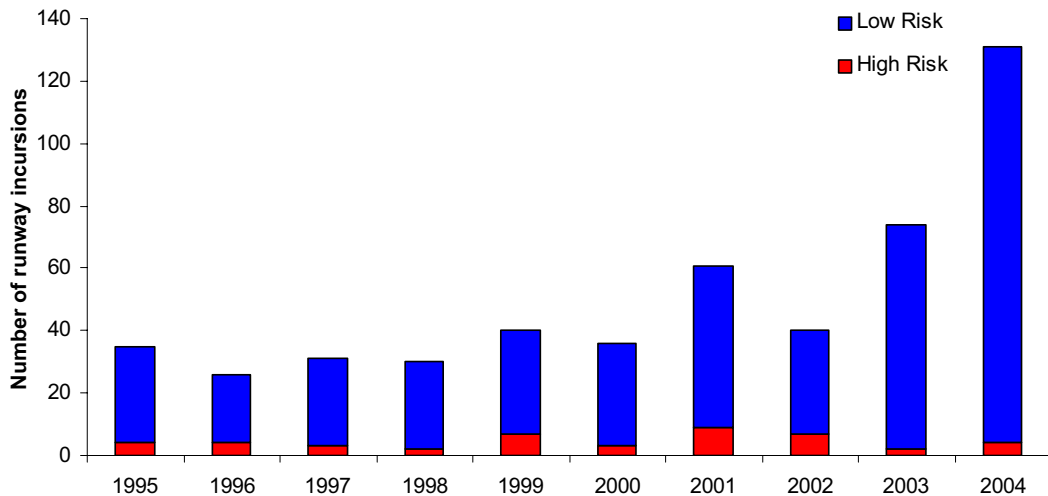


Figure 6.7 Runway incursions at UK licensed aerodromes

3.8.3 It should be noted that there are a number of runway incursions in this section that resulted in an Airprox. However, as the figures are very small (only 0.7% of the total) these Airprox/runway incursion occurrences have been kept in the dataset⁹.

3.9 Level busts

3.9.1 Level busts are another type of ATC occurrence that has been a subject of further CAA analysis in recent years. A level bust, sometimes referred to as an 'altitude deviation' occurs when an aircraft fails to fly at its cleared level, as assigned by ATC. This deviation from a cleared altitude can lead to subsequent problems, such as a loss of separation with another aircraft. A level bust was the cause of the worst mid-air collision in history (Boeing 747 and Il-76 near Delhi in 1996 resulting in 349 fatalities).

3.9.2 The CAA has constituted a group to monitor the number of level busts and one of the outputs of this group has been the publication of a Flight Operations Department Communication (FODCOM)¹⁰. A more in depth study of level busts has also been published in recent years¹¹. Figure 6.8 shows the annual number of level busts in UK airspace reported through the MOR scheme, broken down by whether or not they resulted in a loss of separation with another aircraft.

9. Data from Eurocontrol (see www.eurocontrol.int/statfor/public/standard_page/daio.html)

10. FODCOM 13/2005 Level Bust Prevention - Best Practice (see www.caa.co.uk/FOD200513)

11. CAP710 Level Bust Working Group 'On the Level' Project Report, 2000 (see www.caa.co.uk/CAP710)

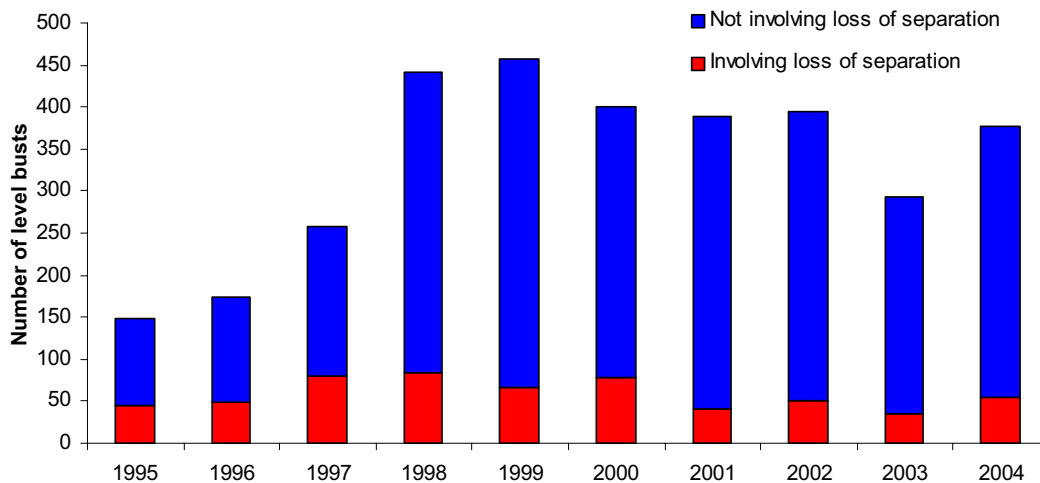


Figure 6.8 Level busts in UK airspace

3.9.3 It should be noted that there are a number of level busts in this section that resulted in an Airprox. However, as the figures are small (only 5% of the total) these Airprox/level bust occurrences have been kept in the dataset.

3.10 Other types of ATC occurrences

3.10.1 Apart from runway incursions and level busts there are other significant types of ATC occurrence, as shown in Table 6.6. It should be noted that these occurrences are not necessarily mutually exclusive, e.g. a loss of separation could arise from a call sign confusion incident. These occurrences involved at least one civil aircraft.

Occurrence Type	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
ATS Engineering/ Equipment	304	420	512	432	529	592	555	826	587	560	5317
Call-sign Confusion	91	90	182	147	105	96	83	108	137	106	1145
Infringements	240	282	348	270	350	303	273	350	419	405	3240
Loss of Separation	176	223	241	257	270	274	208	223	198	246	2316

Table 6.6 Other significant ATC occurrences

4 Airprox in UK Airspace

4.1 The definition of an Airprox is a situation in which, in the opinion of a pilot or controller, the distance between aircraft as well as their relative positions and speed was such that the safety of the aircraft involved was or may have been compromised.

4.2 Airprox within UK airspace are reviewed separately by the UK Airprox Board (UKAB) which is an independent organisation sponsored jointly by the CAA and the MOD. UKAB determine what happened in each Airprox, assess the risk level involved and make Safety Recommendations, where appropriate, to reduce the risk of recurrence of such incidents.

- 4.3 UKAB allocate risk categories to each Airprox based on what actually took place and not on what may or may not have happened. There are four risk categories as shown in Table 6.7.

Risk category	Name	Description
Risk A	Risk of collision	An actual risk of collision existed
Risk B	Safety not assured	The safety of the aircraft was compromised
Risk C	No risk of collision	No risk of collision existed
Risk D	Risk not determined	Insufficient information was available to determine the risk involved, or inconclusive or conflicting evidence precluded such determination

Table 6.7 UKAB risk categories

- 4.4 The figures in this section are taken with kind permission from 'Analysis of Airprox in UK Airspace - Report No 13 - July 2004 to December 2004'. Further information can be obtained from the UKAB Internet website www.airproxboard.org.uk/, which is regularly updated.

4.5 **Airprox by user group**

- 4.5.1 The number of UK Airprox each year involving at least one civil aircraft is shown in Table 6.8. The first row shows the number of Airprox involving only civil aircraft and the second row shows the number of Airprox between civil and military aircraft.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Civil ~ Civil	108	117	115	129	113	100	97	109	87	109
Civil ~ Mil	81	76	78	53	81	78	73	77	67	69

Table 6.8 Number of UK Airprox involving at least one civil aircraft

4.6 **UK Airprox involving Commercial Air Transport aircraft**

- 4.6.1 The number of UK Airprox each year involving at least one Commercial Air Transport (CAT) aircraft is shown in Table 6.9. The figures have been broken down by the risk categories described in Table 6.7. A definition of CAT is shown in Chapter 9.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Risk A	3	6	9	1	4	6	0	1	0	1
Risk B	21	24	20	14	12	8	14	6	11	7
Risk C	64	75	67	82	83	84	64	70	53	67
Risk D	3	2	0	1	0	1	4	4	0	4
Total	91	107	96	98	99	99	82	81	64	79

Table 6.9 Risk category allocated to CAT Airprox in UK Airspace

4.7 Rate of UK Airprox involving Commercial Air Transport aircraft

4.7.1 The rate of UK Airprox each year involving at least one CAT aircraft is shown in Figure 6.9. A combined rate for Airprox with risk categories A and B is shown as well as a total rate for all CAT Airprox.

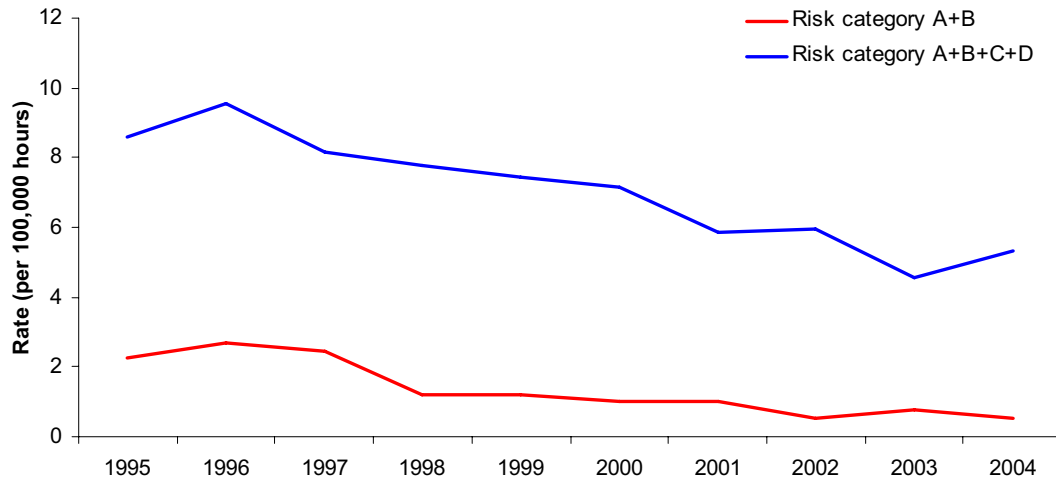


Figure 6.9 Rate of UK Airprox involving CAT aircraft

4.8 UK Airprox involving general aviation

4.8.1 The number of UK Airprox each year involving general aviation aircraft is shown in Table 6.10. The figures have been broken down by the risk categories described in Table 6.7. UKAB defines general aviation as follows:

- Executive and company aircraft (hired for special reward);
- Private and flying club aircraft;
- Gliders, sport aviation and airships; or
- Aerial work.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Risk A	11	28	20	18	17	19	24	9	10	13
Risk B	38	39	46	30	41	33	27	58	38	42
Risk C	73	61	54	66	74	54	60	57	70	71
Risk D	1	2	3	2	2	2	1	3	0	4
Total	123	130	123	116	134	108	112	127	118	130

Table 6.10 Risk category allocated to general aviation Airprox in UK airspace

4.9 Rate of UK Airprox involving general aviation

4.9.1 The rate of UK Airprox each year involving general aviation aircraft is shown in Figure 6.10. A combined rate for Airprox with risk categories A and B is shown as well as a total rate for all general aviation Airprox.

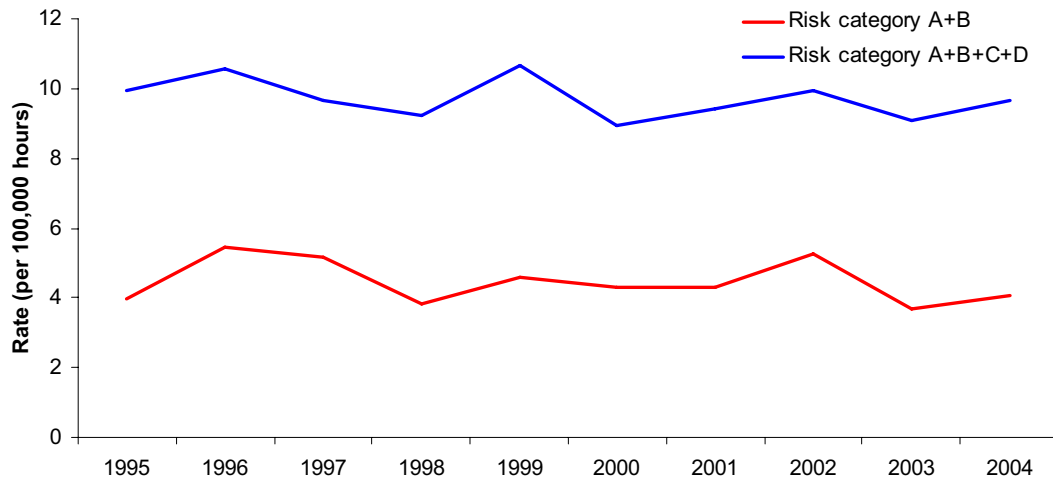


Figure 6.10 Rate of UK Airprox involving general aviation

4.10 UK Airprox involving military aviation

4.10.1 The reader is referred to the UKAB website and/or publications for information concerning military aviation Airprox occurring in UK airspace.

5 UK Aerodromes

5.1 This section provides information on selected aerodrome related occurrences at UK licensed aerodromes involving civil aircraft. A list of aerodromes that are licensed by the CAA is provided in the UK Aeronautical Information Package¹² (AIP). The current list of aerodromes has been used as a definitive list to cover the whole ten year period of this report.

5.2 Some caution should be applied to the data as in some cases the occurrence location can be that where a problem is found and not necessarily the location where the problem occurred. For example, damage consistent with a collision may be discovered at a UK licensed aerodrome but it is quite possible that the collision may have actually occurred elsewhere. However, every attempt has been made to provide as accurate a picture as possible.

5.3 It is also difficult to ascertain every occurrence that should be considered as an 'aerodrome occurrence' as there is not a strict definition of such an occurrence. There is also some crossover between aerodrome occurrences and ATC occurrences, e.g. runway incursions involving airport vehicles. As a result, the information in this section should be considered an indication as to the scale of aerodrome occurrences rather than an absolute figure.

5.4 The types of occurrences included as an aerodrome occurrence are those that relate to airport personnel or infrastructure. There are occurrences that occur at an airport that are not necessarily related to the airport itself, e.g. engine fire on an aircraft

12. This information is provided, free of charge, by National Air Traffic Services at the following website www.ais.org.uk

parked on the apron, and these are excluded from this section. Security occurrences involving events such as bomb threats, prohibited items on aircraft, people being allowed on incorrect flights and stowaways have been excluded but those involving unsupervised passengers on the apron, or people, non-airport vehicles and animals being unescorted on the airfield have been included.

5.5 Utilisation

5.5.1 Between 1995 and 2004, there have been over 35 million aircraft movements at UK airports¹³. Table 6.11 shows the annual breakdown of total aircraft movements and the percentage of those that are commercial aircraft movements.

	Total aircraft movements ('000)	% that are commercial movements
1995	3,710	50%
1996	3,259	59%
1997	3,396	59%
1998	3,535	61%
1999	3,539	63%
2000	3,542	65%
2001	3,603	65%
2002	3,456	67%
2003	3,604	66%
2004	3,670	68%

Table 6.11 Aircraft movements at UK reporting airports

5.6 All aerodrome occurrences

5.6.1 There have been over 4,300 aerodrome occurrences that have occurred at UK licensed aerodromes. Figure 6.11 shows the annual distribution of the aerodrome occurrences.

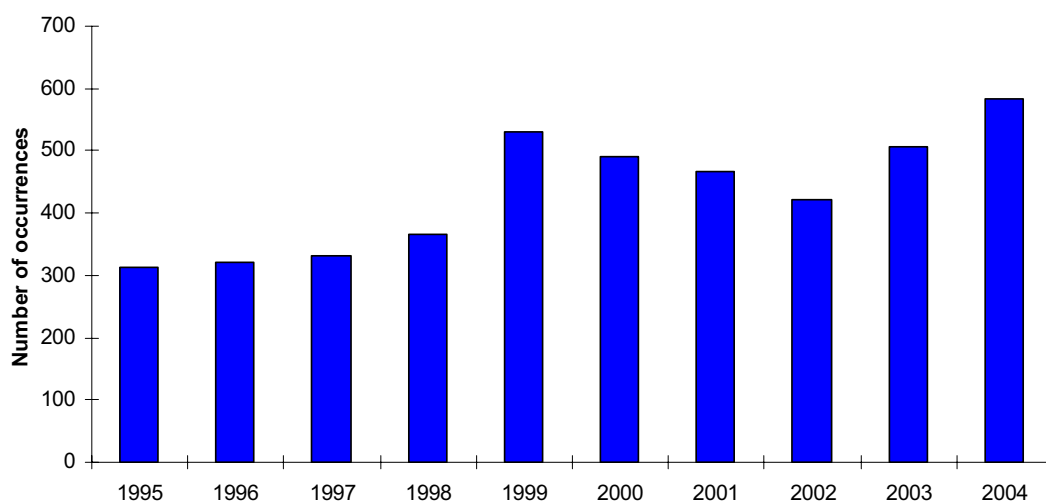


Figure 6.11 Aerodrome occurrences at UK licensed aerodromes

13. Using UK reporting airports as published in CAA Airport Statistics
(see www.caa.co.uk/default.aspx?categoryid=80&pagetype=88&pageid=3&sglid=3)

- 5.6.2 An aerodrome occurrence covers a wide variety of events, such as those related to:
- the state of the ramp, runway or taxiway;
 - collisions whilst manoeuvring around the airfield;
 - aerodrome staff or their tasks, e.g. loading, de-icing, refuellers etc.; or
 - jet or rotor blast.

5.7 Ground collisions and other damage

- 5.7.1 Between 1995 and 2004 there have been approximately 800 cases reported to the CAA where an aircraft has been damaged, mainly through collisions, on licensed aerodromes. An example of non-collision damage could be a tow bar shearing on pushback, causing damage to the nose landing gear or engines ingesting foreign objects on the ramp.
- 5.7.2 The occurrences are limited to those that occur during taxi, ground handling or whilst the aircraft is parked. Excluded are cases where the aircraft has collided with objects during take-off or landing.
- 5.7.3 The occurrences have been broken down into four areas, in Table 6.12; collisions or other damage caused by other aircraft, by vehicles, by airport equipment or infrastructure, or by other/unknown cause.

Collision or other damage caused between:	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Aircraft/Aircraft	6	4	10	4	10	9	3	7	11	10
Aircraft/Vehicle	43	58	19	33	42	31	35	44	41	32
Aircraft/Aerodrome Equipment or Infrastructure	29	21	18	19	32	29	23	20	27	24
Aircraft/Other or Unknown	3	9	10	9	11	7	10	5	10	7
Total	81	92	57	65	95	76	71	76	89	73

Table 6.12 Collisions or other damage at UK licensed aerodromes

5.8 Loading errors

- 5.8.1 A recent study was undertaken on the subject of loading errors involving UK registered aeroplanes. The study looked at occurrences worldwide but for the purposes of this report only loading errors at UK licensed aerodromes are shown.
- 5.8.2 A loading error can involve cargo, passengers or loadsheets. A cargo loading error may involve cargo that is loose, incorrectly stowed or undeclared. A passenger loading error may involve passengers boarding the wrong aircraft or being put in an unsuitable seating arrangement by the airline staff. There can also be scenarios where loadsheets show incorrect information, or aircraft are not loaded in accordance with the loadsheet, which can lead to centre of gravity problems.
- 5.8.3 Issues that have been excluded are fuel load problems, problems caused by cargo shippers not labelling or packaging items correctly, problems caused by passengers placing prohibited items in their baggage and damage caused during the loading process unless it is caused by unsecured cargo.

5.8.4 Between 1995 and 2004 there have been over 600 loading errors involving UK registered aeroplanes at UK licensed aerodromes. Figure 6.12 shows the annual number of loading errors together with the rate using a three year moving average (3 yr ma).

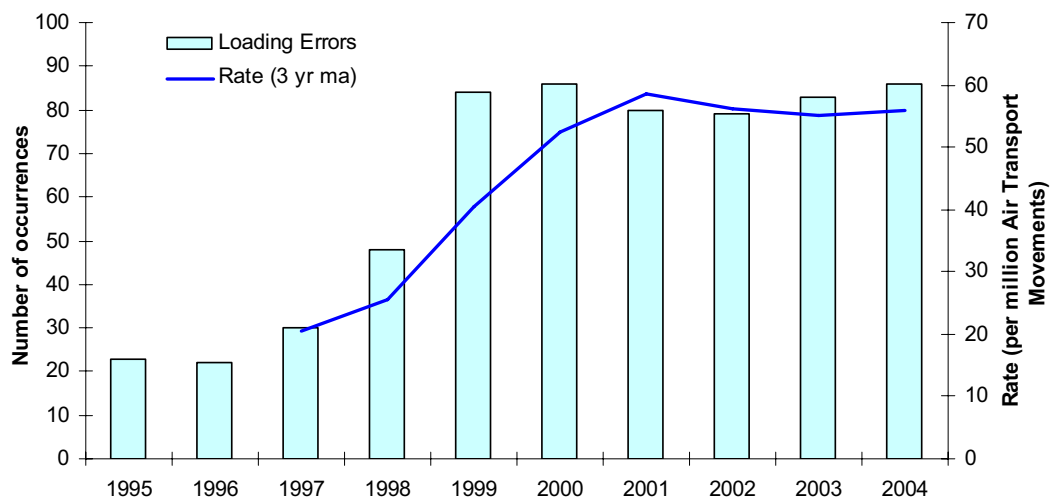


Figure 6.12 Number of loading errors

5.9 Other aerodrome occurrences

5.9.1 Apart from ground collisions and loading errors there are other types of aerodrome occurrence, as shown in Table 6.13. It should be noted that these occurrences are not necessarily mutually exclusive. Examples of each category are shown below:

- Dangerous goods occurrences can refer to leakage of such goods, inappropriate carriage (in hold or cabin), or incorrect documentation;
- Jet blast or propeller/rotor wash occurrences can refer to hazards caused as a result or actual damage or injuries that result;
- Inadequate supervision of passengers can refer to passengers on the ramp without escorts or being escorted in a hazardous manner;
- Ramp state can refer to a ramp that is contaminated, wet, littered with foreign objects, obstructed, inadequately marked or inadequately lit;
- Runway/taxiway state can refer to runways or taxiways that are contaminated, wet, littered with foreign objects, obstructed, inadequately marked or inadequately lit;
- Aerodrome Staff/Operations:
 - 'Ramp staff' refers to problems involving marshallers, loaders, refuellers and other similar ground handling staff;
 - 'Vehicle drivers' refers to collisions or near collisions involving vehicles or other driving problems;
 - 'AD management' refers to occurrences where the actions of aerodrome managers contributed to the event, e.g. lack of supervision of ground staff, or cases where aerodrome managers have not taken sufficient action to prevent a hazardous environment;
 - 'Animal/bird control' refers to actual or potential bird strike scenarios or actual or potential collisions with animals.

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Dangerous goods	11	14	15	23	29	27	21	19	22	35
Jet blast, propeller wash or rotor wash	12	7	19	6	10	5	6	7	15	10
Inadequate supervision of passenger(s) on ramp	4	17	24	16	32	27	13	14	14	15
Ramp state	39	37	37	31	64	42	39	41	61	84
Runway/taxiway state	102	73	81	88	100	103	134	81	111	139
Aerodrome staff/operations										
<i>Ramp staff</i>	153	157	162	187	290	228	219	184	226	214
<i>Vehicle drivers</i>	77	96	62	67	83	75	81	75	86	120
<i>AD management</i>	14	16	14	15	43	16	21	12	38	33
<i>Animal/bird control</i>	9	13	6	7	17	26	19	15	17	28

Table 6.13 Other types of occurrence

Chapter 7 Events of Highest Significance

1 Introduction

- 1.1 The occurrence reports received through the Mandatory Occurrence Reporting (MOR) scheme are subject to a grading scheme. This grading scheme has been developed to improve high level analysis of occurrences, which assists in focusing the activities of the CAA on key safety areas.
- 1.2 Occurrences that, through the grading scheme, have been judged to be events of highest significance are detailed in this section. Details of some of these occurrences have also been repeated in earlier chapters where applicable, e.g. fatal UK non-public transport aeroplane accidents. Rates of events of highest significance are also shown in Chapter 4.
- 1.3 In the last published Aviation Safety Review (CAP 735¹⁴) the events of highest significance were listed for 2000 and 2001. This Review brings the list up to date by adding the events of highest significance for 2002 through to 2004.
- 1.4 Only 1.4% of reportable occurrences between 1 January 2002 and 31 December 2004 met the criteria to be judged as events of highest significance.
- 1.5 The occurrences within this chapter have been broken down by type. Although it is possible that a single occurrence could fit into more than one category, it will only be shown once under the category deemed to be most appropriate. There is a category titled 'other foreign occurrences' and this refers to occurrences that are reported to CAA because of a UK interest. A UK interest may result from:
- a foreign aircraft occurrence in UK airspace;
 - an occurrence involving an aircraft type for which the UK has a manufacturing interest; and
 - an occurrence involving fatalities to UK citizens on foreign aircraft.
- It should be noted that the list of 'other foreign occurrences' is not exhaustive but only a reflection of those occurrences that have been reported to the CAA.
- 1.6 The number of major injuries has been shown against each occurrence. A major injury is defined as a fatal or serious injury.
- 1.7 UK Airprox have been removed from the tables below as the responsibility for the investigation of these rests with the UK Airprox Board. Further analysis of Airprox can be found in Chapter 6 and in UK Airprox Board publications¹⁵.

14. Can be viewed at www.caa.co.uk/CAP735

15. Can be viewed at www.caa.co.uk/default.aspx?categoryid=423&pagetype=90&pageid=5638

2 Events of Highest Significance - 2002

2.1 UK public transport aircraft - all aeroplanes

Aircraft type	Narrative	Location	Major Injuries	Approx. date
CL600RJ Regional Jet	Wing contacted runway on landing in strong gusting wind conditions	Birmingham Airport, England	-	Jan02
B757	Engine failure during climb culminating in severe damage to the engine	Fuertaventura, Canary Islands	-	Jan02
BAe146	Overran runway due loss of braking action and struck snow bank	Arvidsjaur, Sweden	-	Feb02
B747	Uncontained engine failure	Sydney, Australia	-	Mar02
A321	Tail scrape during landing flare	Nottingham East Midlands Airport, England	-	Mar02
B737	Smoke/fire on flight deck caused by overheating of static flexible hose on pitot-static probe	Edinburgh, Scotland	-	Mar02
BAe146	Sudden and severe pitch oscillations in cruise, in light turbulence and icing	France	-	Mar02
Learjet	Control difficulties. Yaw interface unit and rudder servo replaced	Rome, Italy	-	Mar02
B757	After normal touch down, the nose dropped sharply and nose landing gear made heavy ground contact	Gibraltar Airport	-	May02
EMB 145	Significant deviation from cleared altitude	Bristol Airport, England	-	Jul02
B737	Smoke/fire in cockpit/cabin due to arcing between steel hose and wiring in ceiling panel	Clacton, Essex	-	Nov02
HS748	GPWS warning followed by severe icing and stall warning	Italian Alps	-	Nov02
Concorde	Section of lower rudder separated in flight	En Route	-	Nov02

Table 7.1 UK aeroplane public transport significant events in 2002

2.2 UK public transport aircraft - helicopters

Aircraft type	Narrative	Location	Major Injuries	Approx. date
AS365 Dauphin	Contacted water when condensation obscured windscreen	Kyle of Lochalsh, Scotland	-	Jan02
Eurocopter EC135	Entered thick cloud and crashed after inadvertent autopilot disconnection	Muirkirk, Scotland	1 Serious	Feb02
AS332 Super Puma	During a severe turbulence encounter tail rotor blades struck tail pylon	North Sea	-	Feb02
Sikorsky S61	Burning smell followed by engine fire warnings. Aircraft made forced landing and was then destroyed by fire	Poole, Dorset	-	Jul02
Sikorsky S76	Crashed into the sea and was destroyed following the failure of a main rotor blade	North Sea	11 Fatal	Jul02
Sikorsky S76	Pilot disorientation during a night time take-off resulted in temporary loss of control	North Sea	-	Dec02

Table 7.2 UK public transport helicopter significant events in 2002

2.3 UK non-public transport aircraft - aeroplanes

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Cessna 172	Passenger opened the door and jumped from aircraft	Brize Norton, Oxon.	1 Fatal (suicide)	Jan02
Piper PA34	Inadvertent wheels up landing	Oxford, Oxon.	-	Jan02
Cessna 172	Overran runway, hit hedge and overturned during precautionary landing following rough running engine	Nayland, Essex	-	Feb02
Cessna 150	Struck power cables in poor weather	Hannington, Hants.	1 Fatal	Feb02
Piper PA23	Engine caught fire prior to take-off	Blackpool, Lancs.	-	Feb02
Piper PA38	Struck an electricity pylon on high ground in poor visibility	Cwmbran, Wales	2 Fatal	Apr02
Grumman AA5	Landed hard, bounced and struck tree during go-around	Morpeth, Northumb.	1 Serious	Apr02
Piper PA28	Entered cloud and struck trees on hillside after pilot became lost	Glyn-Neath, Wales	-	May02
Aero L39 Albatros	Overran on landing, past through a fence and came to rest on motorway	Duxford, Cambs.	1 Fatal	Jun02
Pitts Special	Wheels contacted crop beside runway during flare. Aircraft decelerated rapidly and overturned	Meppershall, Beds.	-	Jun02
Piper PA32	Crashed into mountain range during poor weather conditions.	Sintra Mountains, Portugal	4 Fatal	Jul02
DH Tigermoth	Crashed following loss of control during aerobatic manoeuvre	White Waltham, Berks.	1 Serious	Jul02
Socata TB9	Mid-air collision with Flight Design CT2K microlight	Cambridge, Cambs.	-	Jul02
Jet Provost	Oxygen hose became disconnected - pilot lost consciousness for a while before regaining control	Humberside, N Lincs.	-	Aug02
Avid	Pilot heard a sharp crack during take-off. Aircraft went into an uncommanded left roll, crashed and was destroyed	Penkridge, Staffs.	1 Serious	Aug02
Miles 65	Propeller separated in flight	Old Warden, Beds.	-	Aug02
Cessna 172	Stalled during attempted go-around. Left wing struck ground and aircraft cartwheeled into hangar	Deanland, E Susx.	1 Serious	Sep02
Slingsby 67	Failed to recover from a spinning exercise and crashed	Banbury, Oxon.	2 Fatal	Nov02

Table 7.3 UK non-public transport (aeroplanes) significant events in 2002 *

* See also mid air collision involving Piper PA28 and microlight listed under 'UK non-public transport (other)' as the Piper PA28 suffered minor damage and the microlight was destroyed.

2.4 UK non-public transport aircraft - helicopters

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Robinson R22	Severe vibration during flight. Main rotor blade found cracked at root	Northampton, Northants.	-	May02
AS350 Squirrel	During post engine start checks the helicopter rolled onto its side	Fairoaks, Surrey	-	May02
Hughes 369 /500	Pilot hit by rotating rotor blade	Nelson, Lancs.	1 Serious	May02
Bolkow 105	Crashed in sea after underslung load became unstable and struck the tail rotor	Brough of Birsay, Orkney Isles	1 Fatal	May02
Robinson R22	Broke up in-flight and crashed in a field	Warwick, Warks.	2 Fatal	Jul02

Table 7.4 UK non-public transport (helicopters) significant events in 2002

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Gazelle	Loss of control on take-off. Main rotor struck ground	Gaydon, Warks.	-	Jul02
Robinson R22	Entered uncontrollable yaw/rotation in the hover and struck a parked helicopter	Cranfield, Beds.	-	Aug02
Robinson R44	Rolled over during autorotative landing following loss of power due to lack of fuel	Woolferton, Shrops.	1 Serious	Oct02

Table 7.4 UK non-public transport (helicopters) significant events in 2002 (Continued)

2.5 UK non-public transport aircraft - other

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Mainair Blade microlight	Wing tip struck ground and aircraft overturned	Alby, Norfolk	1 Fatal 1 Serious	Jan02
Jabiru microlight	Departed runway and overturned during crosswind landing	Sandtoft, N Lincs.	1 Serious	Mar02
X'AIR V2 microlight	Clipped a tree on take-off	March, Cambs.	1 Serious	Mar02
Bensen	Shortly after take-off, entered rolling manoeuvres and crashed	Kirkbride, Cumbria	1 Fatal	Mar02
RAF 2000 Autogyro	Lost control, started to break up and fell vertically to ground	Braintree, Essex	2 Fatal	May02
KA8 glider	Mid-air collision between glider and freefall parachutist	Hinton in the Hedges, Northants.	2 Fatal	Jun02
EV-97 Eurostar microlight	Crashed during attempted forced landing after entering IMC	Lecht Ski Area, Scotland	2 Serious	Jun02
Team Minimax 91 microlight	Crashed after unintentional take-off	Headon, Notts.	-	Jun02
Jabiru microlight	Engine failure. Forced landing on mountainside	Brynmaur, Wales	-	Jun02
Thruster T600 microlight	Mid-air collision with Piper PA28	Manchester, Gtr. Manchester	1 Serious	Jun02
Slingsby Sport Vega glider	Struck trees while attempting to land	Colchester, Essex	1 Serious	Jun02

Table 7.5 UK non-public transport (other) significant events in 2002*

* See also mid air collision involving Flight Design CT2K microlight and Socata TB9 listed under 'non-public transport (aeroplanes)' as the microlight suffered minor damage and the Socata TB9 suffered substantial damage.

2.6 UK Air Traffic Services (controlled airspace) and aerodromes¹⁶

Narrative	Location	Major Injuries	Approx. date
B777 taxied in close proximity to B737 on push-back	Heathrow Airport	-	Jan 02
With LVPs in force, B737 taxiing from stand had to brake hard to avoid collision with large truck with no lights on, crossing apron	Belfast Airport	-	May 02
Table 7.6 UK Air Traffic Services (controlled airspace) and aerodromes significant events in 2002			
Complete loss of Track Data Block (primary and secondary) on LACC radar display on B747 2nm Northwest of REFSO descending through FL330, with other traffic 6nm to the South	North Sea	-	Aug 02
Severe wake turbulence during approach. Preceding B777 was 6nms ahead	Gatwick Airport	-	Sep 02

2.7 UK Air Traffic Services (uncontrolled airspace)¹⁷

Narrative	Location	Major Injuries	Approx. date
Alleged infringement of the cable hazard area by Agusta A109	Husbands Bosworth, Leics.	-	Oct02

Table 7.7 UK Air Traffic Services in uncontrolled airspace significant events in 2002

2.8 UK registered aircraft using foreign Air Traffic Services and aerodromes

Narrative	Location	Major Injuries	Approx. date
Foreign Airprox involving an A320 and a military transport aircraft	Egypt	-	Mar02
Foreign Airprox involving a B737 and a glider/light aircraft	Switzerland	-	Mar02
Near collision between an A320 and a MD82 whilst taxiing to stand	Milan, Italy	-	Apr02
Foreign Airprox involving a BAe146 and a light aircraft	France	-	Jun02
Foreign Airprox involving a ZLIN Z37A and a Yak	France	-	Jul02
Foreign Airprox involving a B767 and a DHC8	USA	-	Aug02
Foreign Airprox involving a DC10 and unknown visual traffic	Balearic Islands	-	Aug02
Foreign Airprox involving a BAe146 and several gliders	France	-	Aug02
Foreign Airprox involving a BAe146 and a glider	France	-	Aug02
Whilst a BAe146 was holding on runway, a B737 landed on the runway after the displaced threshold	Marseilles, France	-	Aug02
Foreign Airprox involving a B737 and an airliner	Spain	-	Sep02
Foreign Airprox involving a DC10 and a B777	Morocco	-	Sep02
Foreign Airprox involving a B737 and two military aircraft	Greece	-	Sep02
Load sheet incorrect. Actual baggage weight was higher than listed weight	Dublin, Ireland	-	Sep02

Table 7.8 Foreign Air Traffic Service and aerodrome significant events in 2002

16. Excluding Airprox
17. Excluding Airprox

2.9 Other foreign occurrences

Aircraft type	Narrative	Location	Major Injuries	Approx. date
CL600 Challenger	Shortly after becoming airborne aircraft rolled left and wingtip clipped ground. Aircraft cartwheeled and caught fire	Birmingham Airport, England	5 Fatal	Jan02
ATR 42	Propeller blade separated and caused damage to engine	Colombia	-	Jan02
BN2 Islander	Ditched following double engine failure	British Virgin Islands	-	Jan02
BAC 111	Struck several buildings shortly after take-off, crashed and caught fire. There were 75 fatalities on the ground as well as on board fatalities	Kano, Nigeria	73 Fatal 4 Serious	May02
Piper PA24	Engine stopped on final approach due to fuel starvation	Gamston, Notts., England	1 Serious	May02
HS748	Crashed in bad weather while attempting to land	George, South Africa	3 Fatal	Jun02
Jetstream 31	Main passenger door separated in flight	Athens, Greece	-	Jun02
TU154/B757	Mid-air collision	Uberlingen, Germany	71 Fatal	Jul02
BN2 Islander	Crashed in unknown circumstances	Kalimantan, Indonesia	10 Fatal	Jul02
Fokker 100	Forced landing following double engine flameout due to fuel leak/fuel exhaustion	Aracatuba, Brazil	-	Aug02
BN2 Islander	Crashed into a shallow pond and inverted following engine failure after take-off	Tarakan, Indonesia	6 Fatal 3 Serious	Nov02
Gazelle	Crashed into sea off New York State	Atlantic Ocean	1 Fatal	Nov02
Fokker F27 Friendship	Crashed into sea following take-off	Manila, Philippines	14 Fatal	Nov02
ATR 72	Entered icing conditions and subsequently lost control	Penghu Islands, Taiwan	2 Fatal	Dec02

Table 7.9 Other foreign significant events in 2002

3 Events of Highest Significance - 2003

3.1 UK public transport aircraft - all aeroplanes

Aircraft type	Narrative	Location	Major Injuries	Approx. date
EMB 135	On landing, aquaplaned on slush covered runway and overran runway	Norwich Airport, England	-	Jan03
A320	EGPWS 'soft' warnings, leading to 2 missed approaches	Addis Ababa, Ethiopia	-	Mar03
A321	Damaged by hail during cruise	Vienna, Austria	-	May03
B777	Air Driven Unit bay access door separated during climb, damaging two cabin windows	Reigate, Surrey	-	Jun03
B737	Narrowly missed work in progress at the end of runway during take-off	Manchester Airport, England	-	Jul03
B767	Smell of burning in rear galley. Bulk Cargo Heat flexi pipes found to be holed	En Route	-	Aug03
Saab F340	Tailscape on landing due to incorrect loading	Kirkwall Airport, Orkney Islands	-	Sep03
DHC8	Two cabin attendants injured during turbulence encounter	Aberdeen, Scotland	-	Oct03
B747	Engine damaged during crosswind landing	Philadelphia Airport, USA	-	Dec03

Table 7.10 UK aeroplane public transport significant events in 2003

3.2 UK public transport aircraft - helicopters

Aircraft type	Narrative	Location	Major Injuries	Approx. date
No events in 2003				

Table 7.11 UK public transport helicopters significant events in 2003

3.3 UK non-public transport aircraft - aeroplanes

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Yak 52	Dived vertically into the ground during aerobatics	Towcester, Northants.	2 Fatal	Jan03
Piper PA38	Aircraft missing, presumed ditched	English Channel	1 Fatal (suicide)	Jan03
Scheibe SF25 Falke	Crashed after tailwheel became entangled with a launch cable on take-off	Chipping, Lancs.	2 Fatal	Feb03
Cessna 421	Crashed following touch and go landing	Humberside, N Lincs.	1 Fatal 1 Serious	Mar03
Piper PA31	Ditched in sea after engine failure and loss of fuel	Caribbean	2 Fatal	May03
Luscombe	Clipped a hedge on approach. Wheels dug in to soft ground short of runway and aircraft overturned	Guestling, E Susx.	-	May03

Table 7.12 UK non-public transport (aeroplanes) significant events in 2003

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Maule M5	After landing in strong gusting winds, the left wing lifted and the right wing tip contacted the runway	Manston, Kent	-	Jun03
Piper PA34	Inadvertent wheels up landing	Wycombe, Bucks.	-	Jun03
Piper PA38	Crashed in poor weather	Llanberis, Wales	1 Serious	Jul03
Piper PA28	Landed short of runway	Leicester, Leics.	-	Jul03
Europa	Landed heavily then veered off the runway into a crop field	Shotteswell, Warks.	-	Jul03
Pik 20E	Collided with sloping ground during climbing turn	Castiolo, Italy	1 Serious	Jul03
Cessna 152	Developed a high sink rate on final approach and landed short of threshold	Crosland, W York.	-	Aug03
Jodel DR220	In-flight fire following engine problems/low fuel pressure warning	Bidford on Avon, Warks.	-	Aug03

Table 7.12 UK non-public transport (aeroplanes) significant events in 2003 (Continued)

3.4 UK non-public transport aircraft - helicopters

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Bell 206	Crashed shortly after take-off following pilot spatial disorientation	Cudham, Kent	2 Fatal	Jan03
Bell 206	Struck power cables in low cloud	Pathhead, Scotland	-	Apr03
Robinson R22	During pre-flight checks the helicopter lifted into a hover and began to rotate before rolling onto its side	Cranfield, Beds.	-	May03
Robinson R44	Hard landing following airframe vibration and loss of control during test flight. Tail rotor driveshaft failure	Northampton, Northants.	-	Jul03
Hughes 369/500	Entered a descending left turn from which it did not recover before striking the ground	Knockholt, Kent	3 Fatal	Jul03
Robinson R44	After encountering low cloud, the main rotor struck the tailboom	Teviothead, Scotland	1 Fatal	Jul03
Gazelle	Struck power cables during approach	Mouswald, Scotland	-	Nov03
AS355 Twin Squirrel	Crashed during air test	Hurstbourne Tarrant, Hants.	3 Fatal	Dec03

Table 7.13 UK non-public transport (helicopters) significant events in 2003

3.5 UK non-public transport aircraft - other

Aircraft type	Narrative	Location	Major Injuries	Approx. date
SZD-50-3 Puchacz glider	Spiralled into ground after impacting launch cable of another glider	Great Hucklow, Derbys.	1 Fatal 1 Serious	Feb03
EV-97 Eurostar microlight	Struck a dyke at the end of the runway on landing	Pointon, Lincs.	-	Apr03
Chaser S microlight	Crashed following an apparent loss of control in flight	Clitheroe, Lancs.	1 Fatal	Apr03
Table 7.14 UK non-public transport (other) significant events in 2003				
Pegasus 101A glider	Entered a vertical dive from 900ft	Broadhembury, Devon	1 Fatal (suicide)	Apr03
Pegasus XLQ microlight	Crashed into a tree during go-around	Stock, Essex	1 Fatal	May03
Cameron N-90 balloon	Struck a power line during landing	Kingswood, Gos.	1 Serious	May03
ASW19 glider	During launch, left wing hit ground and aircraft tipped onto nose	Camphill, Derbys.	1 Fatal	Jun03
Discus 'B' glider	Lost control and impacted ground in steep nose down attitude	High Ellington, N York.	1 Fatal	Jun03
Bensen	Control lost after rotor blades struck rudder in flight	Shipdham, Norfolk	1 Fatal	Jun03
Skyranger 912 microlight	Rolled left at low level and struck ground in a steeply banked nose down attitude	Manchester, Gtr. Manchester	1 Serious	Jul03
Raven X microlight	Engine stopped and aircraft struck trees during forced landing	Exford, Somerset	1 Serious	Jul03
Cameron A-250 balloon	Fire while refuelling cylinders resulted in ground crew injury	Sheffield Park, E Susx.	-	Aug03

3.6 UK Air Traffic Services (controlled airspace) and aerodromes¹⁸

Narrative	Location	Major Injuries	Approx. date
Runway incursion by bird scaring vehicle in LVPs	Manchester Airport	-	Feb03
B747 off centre-line during low visibility approach. ATC instructed B747 to go-around but aircraft failed to comply	Manchester Airport	-	Aug03

Table 7.15 UK Air Traffic Services (controlled airspace) and aerodromes significant events in 20033.7 UK Air Traffic Services (uncontrolled airspace)¹⁹

Narrative	Location	Major Injuries	Approx. date
Vans RV6 allegedly entered notified parachute drop zone on 2 days running	Langar, Notts.	-	May03
Piper PA28 allegedly entered notified active parachute drop zone	Langar, Notts.	-	May03

Table 7.16 UK Air Traffic Services in uncontrolled airspace significant events in 2003

18. Excluding Airprox

3.8 UK registered aircraft using foreign Air Traffic Services and aerodromes

Narrative	Location	Major Injuries	Approx. date
Foreign Airprox involving a B777 and a military transport	Bahrain	-	Mar03
Foreign Airprox involving a B777 and military jets	Cyprus	-	Mar03
Foreign Airprox involving a B727 and an unidentified aircraft	Spain	-	Mar03
Foreign Airprox involving a B767 and an unidentified Cessna	USA	-	Apr03
During A321's cleared self manoeuvre off stand, it had to stop due to risk of collision with an A320	Seville, Spain	-	May03
Foreign Airprox involving B737 and an unknown aircraft	Spain	-	May03
B757 received and actioned a TCAS RA against a B737	Greece	-	Aug03
Foreign Airprox involving a B737 and a single engine retractable gear light aircraft	Spain	-	Sep03
Foreign Airprox involving an A321 and an A320	Ireland	-	Oct03
Foreign Airprox involving a B737 and an A320	France	-	Nov03

Table 7.17 Foreign Air Traffic Service and aerodrome significant events in 2003

3.9 Other foreign occurrences

Aircraft type	Narrative	Location	Major Injuries	Approx. date
BAe146	Crashed on approach in fog and was destroyed by fire	Diyarbakir, Turkey	75 Fatal	Jan03
Cessna 210	Crashed on frozen lake after possible instrument failure	Goose Bay, Canada	2 Fatal	Feb03
Cessna 310	Door opened during take off and control was lost	Sandtoft, N Lincs., England	1 Fatal	Apr03
SD330	Go-around attempted due to engine surge/right yaw. Throttles stuck and aircraft struck terrain	Dubois, USA	-	Apr03
Cessna C560 Citation 5	Overran runway on landing	Leeds Bradford Airport, England	-	May03
Ryan M1/M2 NYP	Structural failure of right wing shortly after take-off	Coventry, West Mids., England	1 Fatal	May03
Robinson R22	Crashed following in-flight structural failure of main rotor blade	Bankstown, Australia	2 Fatal	Jun03
Piper PA31	Crashed into the sea short of the runway threshold after engine failure	Larnaca, Cyprus	-	Jun03
Cessna 182	Entered into a spiral dive and crashed into field after possible pilot incapacitation	Marlow, Bucks., England	1 Fatal	Aug03
Jetstream 32	Landed short of runway during simulated engine failure	Lulea, Sweden	-	Sep03
HS125	Entered spin and impacted terrain	Beaumont, USA	3 Fatal	Sep03
A330	Uncontained engine failure after take-off	Miami, USA	-	Oct03
Fairchild FH227	Crashed following loss of control due to engine failure after take-off	Buenos Aires, Argentina	5 fatal	Oct03

Table 7.18 Other foreign significant events in 2003

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Skyvan	Crashed into a field following engine failure after take-off	Ogle, Guyana	2 Fatal 1 Serious	Nov03
Socata TBM700	Entered an uncontrolled roll to the left during approach and crashed beside the runway threshold	Oxford Airport, England	3 Fatal	Dec03
Bell 407	Crashed in bad weather	Antarctica	1 Serious	Dec03

Table 7.18 Other foreign significant events in 2003 (Continued)

4 Events of Highest Significance - 2004

4.1 UK public transport aircraft - all aeroplanes

Aircraft type	Narrative	Location	Major Injuries	Approx. date
A340	Slow to rotate with nearly full backstick applied. On landing two pallets found in wrong place.	Los Angeles Airport, USA	-	Jun04
DHC8	Tailscape on landing after manual approach	London City Airport, England	-	Nov04
Gulfstream 4	After normal approach, crew had difficulty in slowing aircraft down in crosswind. Aircraft departed runway and hit trees	Teterboro Airport, USA	-	Dec04

Table 7.19 UK aeroplane public transport significant events in 2004

4.2 UK public transport aircraft - helicopters

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Sikorsky S61	During winch transfer of a pilot to a tanker, underside of main rotor contacted a mast	Tanker off Shetland Isles	-	Sep04

Table 7.20 UK public transport helicopter significant events in 2004

4.3 UK non-public transport aircraft - aeroplanes

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Piper PA25	Failed to pull out of dive following glider release	Crowland, Lincs.	1 Fatal	Feb04
Cessna 182	Poor workmanship of significant repairs following major incident noted during C of A renewal	-	-	Feb04
Piper PA25	Crashed after pilot became incapacitated	West Chilington, W Susx.	1 Fatal	Feb04
Cessna 310	Crashed in a field in a steep attitude at high speed	Hotham, E York.	2 Fatal	Mar04
Cessna 206	Engine lost power in climb. During attempted forced landing aircraft struck trees and crashed	Beacon, Devon	4 Fatal 2 Serious	Jun04
Piper PA28	Ditched in the sea following engine problem	Liverpool Bay, England	2 Fatal	Jul04
Socata TB10	During attempt to return to airfield, aircraft struck fence and crashed	Bournemouth, Dorset	1 Fatal 2 Serious	Aug04

Table 7.21 UK non-public transport (aeroplanes) significant events in 2004

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Mooney 20	Stalled and nose dived after engine problems	Jersey, Channel Islands	1 Fatal	Oct04
Cessna 406 Caravan 2	Crashed in bad weather	Inverness, Scotland	1 Fatal	Oct04

Table 7.21 UK non-public transport (aeroplanes) significant events in 2004 (Continued)

4.4 UK non-public transport aircraft - helicopters

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Agusta A109E	Entered turn and crashed into woodland on approach	Bournemouth, Dorset	2 Fatal	Mar04
Robinson R44	Struck hillside close to landing site at night in bad weather	Kentallen, Scotland	1 Fatal 1 Serious	Sep04
Enstrom 280	Ditched in sea	North Sea, off Asane, Norway	1 Fatal	Oct04
Robinson R22	Crashed in a field in reducing visibility while following another helicopter	Stratford upon Avon, Warks.	1 Fatal	Nov04

Table 7.22 UK non-public transport (helicopters) significant events in 2004*

* See also mid air collision involving Robinson R22 and Hybred 44XLR microlight listed under 'non-public transport (other)' as the Robinson R22 made a force landing with 1 serious injury and the microlight was destroyed with 2 fatalities

4.5 UK non-public transport aircraft - other

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Puchacz glider	Entered spin at 1500ft and crashed nose-down into a field	Husbands Bosworth, Leics.	2 Fatal	Jan04
Sirocco 377GB microlight	Crashed following an in-flight structural failure of the tailplane	Ashby de la Zouch, Leics.	1 Fatal	Jan04
Skylark IV glider/Ventus CT glider	Mid-air collision between two gliders	Lasham, Hants.	1 Fatal	Apr04
ASK18 glider	Crashed on take-off following winch cable failure	Halesland, Somerset	1 Fatal	May04
Astir glider	Attempted to land in field but overshot from downwind approach and crashed into river bed	Loch Laggan, Scotland	-	May04
KA7 glider	Crashed after reported wing separation	Strubby, Lincs.	2 Fatal	May04
Paraglider	Crashed in high wind following launch from cliff top	Isle Of Wight	1 Fatal	Jun04
Hybred 44XLR microlight	Mid-air collision with Robinson R22	Welham Green, Herts.	2 Fatal 1 Serious	Jul04
ASW20L glider	Ground collision shortly after take-off by hoist system	La Motte Du Caire, France	1 Fatal	Jul04
Std. Cirrus glider	Collided with tree following early release from winch launch	Nymphsfield, Glos.	1 Fatal	Aug04
LS7 glider	Climbed too steeply during winch launch, stalled and nose dived to ground	Dunstable, Beds.	1 Fatal	Aug04

Table 7.23 UK non-public transport (other) significant events in 2004

Aircraft type	Narrative	Location	Major Injuries	Approx. date
Pegasus Quik microlight	Crashed in a field following possible in-flight break-up	Eastchurch, Kent	2 Fatal	Aug04
Ikarus C42 FB UK microlight	Crashed in the Pyrenees mountains	Pyrenees, Spain	2 Fatal	Sep04
Ken Brock KB-2	Crashed into trees after failing to gain height following take-off	Sutton Bank, N York.	1 Fatal	Dec04

Table 7.23 UK non-public transport (other) significant events in 2004 (Continued)**4.6 UK Air Traffic Services (controlled airspace) and aerodromes²⁰**

Narrative	Location	Major Injuries	Approx. date
B737 was given clearance to cross runway ahead of an A321 which had commenced its take-off on same runway	Manchester Airport	-	Feb04
Conflict when a Robinson R22 allegedly failed to follow ATC taxi instructions to hold taxiway and crossed runway below and in front of a departing Cessna 152	Shoreham Airport	-	Oct04
During CAT3 approach with LVPs in force, B757 banked hard right during flare. B757's protection was affected by departing aircraft	Manchester Airport	-	Nov04
B747 descended well below approach path	Stansted Airport	-	Dec04

Table 7.24 UK Air Traffic Services (controlled airspace) and aerodromes significant events in 2004**4.7 UK Air Traffic Services (uncontrolled airspace)²¹**

Narrative	Location	Major Injuries	Approx. date
Cessna 172 flew over parachute drop zone and passed very close to a parachutist	Peterborough, Cambs.	-	Apr04
Alleged infringement of the cable hazard area by unidentified single engine aircraft	Rivar Hill, Wilts.	-	Apr04
Alleged infringement of cable hazard area by unidentified high wing single engine aircraft at approximately 800ft	Kenley, Gtr. London	-	Sep04
Conflict between a Bolkow 105 and a military jet	Strensham, Hereford and Worcs.	-	Dec04

Table 7.25 UK Air Traffic Services in uncontrolled airspace significant events in 2004**4.8 UK registered aircraft using foreign Air Traffic Services and aerodromes**

Narrative	Location	Major Injuries	Approx. date
Foreign Airprox involving a B757 and a Cessna 152	Spain	-	Mar04
Foreign Airprox involving a B737 and a glider	Italy	-	Mar04
A321 lined up on runway awaiting take-off clearance, but clearance was not issued and an inbound aircraft was instructed to go around	Tenerife, Canary Islands	-	Apr04
As a B737 passed over runway threshold it struck an ILS test aerial on top of a vehicle	Brescia, Italy	-	Jun04

Table 7.26 Foreign Air Traffic Service and aerodrome significant events in 2004

20. Excluding Airprox

21. Excluding Airprox

Narrative	Location	Major Injuries	Approx. date
Foreign Airprox involving a B737 and a light aircraft	Spain	-	Jul04
Foreign Airprox involving an A319 and a B767	France	-	Oct04

Table 7.26 Foreign Air Traffic Service and aerodrome significant events in 2004 (Continued)

4.9 Other foreign occurrences

Aircraft type	Narrative	Location	Major Injuries	Approx. date
B757	Uncontained engine failure	Raleigh, USA	-	Jan04
Fokker 50	Crashed on approach	Sharjah, United Arab Emirates	43 Fatal 2 Serious	Feb04
Cessna 310	Disappeared off radar and crashed after crew reported smoke in cockpit	Trawden, Lancs., England	1 Fatal	Mar04
B747	Failure of one engine and loss of thrust on the other engines	Dover, Kent, England	-	Apr04
HS748	Crashed into the sea shortly after take-off	Libreville, Gabon	19 Fatal	Jun04
Cessna 172	Stalled on take-off and landed heavily	Lundy Island, England	-	Jul04
BAe146	Uncontained engine failure causing secondary damage to other engine	Germany	-	Aug04
Jetstream 32	Crashed into wooded terrain during approach	Kirksville, USA	13 Fatal 2 Serious	Oct04
Jetstream 31	Crashed into airport fire station whilst landing in heavy rain	Caracas, Venezuela	4 Fatal 3 Serious	Nov04
Gulfstream 2	Crashed short of runway in dense fog whilst on approach	Houston, USA	3 Fatal	Nov04
SD360	Overran runway on landing and struck boundary fence	Oshawa, Canada	-	Dec04

Table 7.27 Other foreign significant events in 2004

Chapter 8 Summary

1 Conclusions

- 1.1 This Aviation Safety Review has been produced with the simple objective of providing a statistical overview of occurrences.
- 1.2 The CAA has deliberately avoided drawing conclusions from the statistics and invites the reader to draw their own inferences.
- 1.3 The CAA has highlighted its main safety concerns in the form of the Safety Plan, which is published on the CAA web site²².

2 Summary Tables

- 2.1 The key statistics from each chapter have been summarised below.

2.2 Worldwide safety

Reportable accidents	Average number of annual accidents	170	
Fatal accidents	Average number of annual fatal accidents	Jets	11
		Turboprops	14
		Business Jets	2
	Average number of annual fatalities	Jets	744
		Turboprops	216
		Business Jets	10
	3 year moving average fatal accident rate in 2000/2004 (per million hours)	Jets	0.2
		Turboprops	1.8

Table 8.1 Key statistics from worldwide safety chapter

2.3 European Union safety

Fatal accidents	Member State with highest number of fatal accidents 1987-2004	France (18 accidents)
	Member State with lowest number of fatal accidents 1987-2004	Belgium and Finland (0 accidents)
95% confidence fatal accident rate	Member State with highest 95% confidence fatal accident rate 1987-2004	Luxembourg (3.9 per million hours)
	Member State with lowest 95% confidence fatal accident rate 1987-2004	UK (0.38 per million hours)

Table 8.2 Key statistics from European Union safety chapter

22. See www.caa.co.uk/safetyplan

2.4 Safety of UK public transport aircraft worldwide

Large aeroplanes	Number of occurrences 1995-2004	32,000
	Number of reportable accidents 1995-2004	162
	Number of fatal accidents 1995-2004	5
	3 year moving average reportable accident rate in 2000/2004 (per million hours)	6.8
	3 year moving average fatal accident rate in 2002/2004 (per million hours)	0.0
Small aeroplanes	Number of occurrences 1995-2004	500
	Number of reportable accidents 1995-2004	22
	Number of fatal accidents 1995-2004	5
	3 year moving average reportable accident rate in 2002/2004 (per million hours)	50.1
	3 year moving average fatal accident rate in 2002/2004 (per million hours)	0.0
Helicopters - all operations	Number of occurrences 1995-2004	2,200
	Number of reportable accidents 1995-2004	31
	Number of fatal accidents 1995-2004	4
	3 year moving average reportable accident rate in 2002/2004 (per million hours)	17.6
	3 year moving average fatal accident rate in 2002/2004 (per million hours)	2.5
Balloons	Number of occurrences 1995-2004	100
	Number of reportable accidents 1995-2004	26
	Number of fatal accidents 1995-2004	1

Table 8.3 Key statistics from UK public transport chapter

2.5 Safety of UK non-public transport aircraft worldwide

Large aeroplanes	Number of occurrences 1995-2004	6,700
	Number of reportable accidents 1995-2004	19
	Number of fatal accidents 1995-2004	3
Small aeroplanes	Number of reportable accidents 1995-2004	1,600
	Number of fatal accidents 1995-2004	102
	3 year moving average reportable accident rate in 2002/2004 (per million hours)	161.5
	3 year moving average fatal accident rate in 2002/2004 (per million hours)	6.6
Small helicopters	Number of reportable accidents 1995-2004	214
	Number of fatal accidents 1995-2004	27
	3 year moving average reportable accident rate in 2002/2004 (per million hours)	125.8
	3 year moving average fatal accident rate in 2002/2004 (per million hours)	17.4
Airships	Number of reportable accidents 1995-2004	1
	Number of fatal accidents 1995-2004	0
Balloons	Number of reportable accidents 1995-2004	23
	Number of fatal accidents 1995-2004	0
Gliders	Number of reportable accidents 1995-2004	430
	Number of fatal accidents 1995-2004	38

Table 8.4 Key statistics from UK non-public transport chapter

Gyroplanes	Number of reportable accidents 1995-2004	31
	Number of fatal accidents 1995-2004	8
Microlights	Number of reportable accidents 1995-2004	251
	Number of fatal accidents 1995-2004	23

Table 8.4 Key statistics from UK non-public transport chapter (Continued)

2.6 Safety of UK airspace and aerodromes

Foreign registered aircraft in UK airspace	Number of occurrences 1995-2004	4,700
	Number of reportable accidents 1995-2004	198
	Number of fatal accidents 1995-2004	19
ATC occurrences in UK airspace	Number of occurrences 1995-2004, excluding Airprox All Involving public transport	16,500 8,400
	Runway incursions 1995-2004	504
	Level busts 1995-2004	3,330
Airprox in UK airspace	Airprox Civil - Civil Civil - Military	1,084 733
UK aerodromes	Number of occurrences 1995-2004	4,300
	Ground collisions and damage 1995-2004	775
	Loading errors	621

Table 8.5 Key statistics from UK airspace and aerodromes chapter

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Chapter 9 Definitions

Accident

See reportable accident.

Airline

Commercial air carrier carrying revenue paying passengers and cargo.

(Source - CAA)

Air taxi

Small airlines, none of whose aircraft capacities exceeds 20 seats, or sole use charter flights utilising aircraft of less than 15 tonnes MTWA, i.e. small scale scheduled, charter and air taxi operations.

(Source - CAA)

Air Transport Movement (ATM)

A landing or a take-off of aircraft engaged on the transport of passengers, cargo or mail on commercial terms. All scheduled movements, including those operated empty, loaded charter and air taxi movements are included.

(Source - CAA)

Airprox

A situation in which, in the opinion of a pilot or a controller, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved was or may have been compromised.

(Source - UK Airprox Board)

Causal factor

An event or item that was directly instrumental in the causal chain of events leading to the accident.

(Source - CAA)

Circumstantial factor

An event or item that was not directly in the causal chain of events but could have contributed to the accident.

(Source - CAA)

Commercial Air Transport (CAT)

Scheduled or non-scheduled passenger flights in airliners and helicopters, or cargo flights.

(Source - UK Airprox Board)

Commerical aircraft movement

These consist of the following movements:

- air transport movements (see definition above);
- air taxi movements (involving aircraft of less than 15 tonnes MTWA operating on a non-scheduled service);
- empty positioning movements (involving aircraft moving into position for scheduled or charter transport flights or returning to base after such flights); and
- local movements (commercial flights undertaken for press, survey, agricultural and fisheries flying, or public entertainment purposes, and flights performed under a Police Air Operator's Certificate.

(Source - CAA)

Consequence

Outcome of the accident.

(Source - CAA)

Emergency services

An aircraft being used for the purpose of police support, ambulance or Search and Rescue (SAR).

(Source - CAA)

Europe

The countries included in the Europe region are listed below:

Albania	France	Monaco
Armenia	Georgia	Netherlands
Austria	Germany	Norway
Azerbaijan	Gibraltar	Poland
Belarus	Greece	Portugal
Belgium	Greenland	Romania
Bosnia-Herzegovina	Hungary	Russia
Bulgaria	Iceland	Serbia
Croatia	Ireland	Slovakia
Cyprus	Italy	Slovenia
Czech Republic	Latvia	Spain
Czechoslovakia	Liechtenstein	Sweden
Denmark	Lithuania	Switzerland
Estonia	Luxembourg	Turkey
Faroe Islands	Macedonia	Ukraine
Federation of Serbia and Montenegro	Malta	United Kingdom
Finland	Moldova	

(Source - Airclaims)

Fatal accident

A reportable accident which results in fatal injury to any person in or upon the aircraft or by direct contact with any part of the aircraft, as defined in 'reportable accident'.

(Source - CAA)

Fatal injury

An injury which is sustained by a person in an accident and which results in his death within 30 days of the date of the accident.

(Source - UK Civil Aviation - Investigation of Air Accidents and Incidents - Regulations 1996)

Incident

An occurrence, other than an accident, associated with the operation of an aircraft which affects or would affect the safety of operation.

(Source - UK Civil Aviation - Investigation of Air Accidents and Incidents - Regulations 1996)

Major injury

A fatal or serious injury.

(Source - CAA)

Middle East

The countries included in the Middle East region are listed below:

Bahrain	Kuwait	Republic of Yemen
Iran	Lebanon	Saudi Arabia
Iraq	Oman	Syria
Israel	Palestine	United Arab Emirates
Jordan	Qatar	Yemen

(Source - Airclaims)

Minor injury

An injury, other than fatal or serious, which is sustained by a person in a reportable accident.

(Source - CAA)

Non-public transport

All operations by UK operators other than public transport (as defined) including aerial applications, aerial survey, construction work, line inspections, club and group, business and executive, commercial operations, test, training, positioning and private flying.

(Source - CAA)

Offshore

An aircraft being used for the purpose of carrying passengers or cargo to oil or gas platforms in the North Sea or Irish Sea, or to drilling or support ships.

(Source - CAA)

Oceania

The countries included in the Oceania region are listed below:

American Samoa	Marshall Islands	Palau
Australia	Micronesia	Papua New Guinea
Cook Islands	Nauru	Solomon Islands
Fiji	New Caledonia	Tonga
French Polynesia	New Zealand	Vanuatu
Guam	Northern Marianas Islands	Western Samoa
Kiribati	Pacific Islands (Trust Territ)	

(Source - Airclaims)

Occurrence

Accidents, serious incidents and other incidents.

(Source - CAA)

Primary causal factor

The dominant causal factor of the accident as judged by the CAA's Accident Analysis Group.

(Source - CAA)

Public transport

Operations involving transport of passengers and/or cargo, or other revenue services including police, ambulance and Search and Rescue flights. Commercial operations are not included.

(Source - CAA)

Reportable accident

An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

- a) a person suffers a fatal or serious injury as a result of:
 - i) being in or upon the aircraft;
 - ii) direct contact with any part of the aircraft, including parts which have become detached from the aircraft; or
 - iii) direct exposure to jet blast;except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew, or
- b) the aircraft sustains damage or structural failure which:
 - i) adversely affects the structural strength, performance or flight characteristics of the aircraft, and
 - ii) would normally require major repair or replacement of the affected componentexcept for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tyres, brakes, fairings, small dents or puncture holes in the aircraft skin; or
- c) the aircraft is missing or completely inaccessible.

(Source - UK Civil Aviation - Investigation of Air Accidents and Incidents - Regulations 1996)

Serious incident

An incident involving circumstances indicating that an accident nearly occurred.

(Source - UK Civil Aviation - Investigation of Air Accidents and Incidents - Regulations 1996)

Serious injury

An injury which is sustained by a person in an accident and which:

- a) requires hospitalisation for more than 48 hours, commencing within seven days from the date the injury was received;
- b) results in a fracture of any bone (except simple fractures of fingers, toes or nose);
- c) involves lacerations which cause severe haemorrhage, nerve, muscle or tendon damage;
- d) involves injury to any internal organ;
- e) involves second or third degree burns, or any burns affecting more than 5% of the body surface; or
- f) involves verified exposure to infectious substances or harmful radiation.

(Source - UK Civil Aviation - Investigation of Air Accidents and Incidents - Regulations 1996)

Significant event

An occurrence that has been allocated an occurrence grade by CAA with a severity classification of 'severe' or 'high' (see Appendix 2 details on occurrence grading).

(Source - CAA)

State of registry

The State on whose register the aircraft is entered.

(Source - ICAO)

State of the operator

The State in which the operator's principal place of business is located or, if there is no such place of business, the operator's permanent residence.

(Source - ICAO)

Third party accident

An accident that involves injury to third parties only such as people on the ground, in another aircraft or vehicle.

(Source - CAA)

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Chapter 10 Glossary

AAG	Accident Analysis Group
AAIB	Air Accidents Investigation Branch
AIP	Aeronautical Information Package
AOC	Air Operators Certificate
ATC	Air Traffic Control
ATM	Air Transport Movement Air Transport Management
BBAC	British Ballooning and Airship Club
BGA	British Gliding Association
BMAA	British Microlight Aircraft Association
CAA	Civil Aviation Authority
CAST	Commercial Aviation Safety Team
CFIT	Controlled Flight Into Terrain
CICTT	CAST/ICAO Common Taxonomy Team
CRM	Crew Resource Management
EU	European Union
FDM	Flight Data Monitoring
FODCOM	Flight Operations Department Communication
ICAO	International Civil Aviation Organization
MOR	Mandatory Occurrence Report
SAR	Search And Rescue
SISG	Safety Indicators Steering Group
UK	United Kingdom

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Appendix 1 Types of Occurrence

1 Introduction

1.1 This Review uses many different types of occurrence, such as incidents, serious incidents and accidents. Although a definitions list is provided in Chapter 9, this appendix discusses the terms in more detail. The relationship between the different types of data and some of their limitations are also shown.

2 Background

2.1 In the 1930s H.W. Heinrich suggested that for every major injury accident there were approximately 30 minor injury accidents and 300 non-injury accidents²³. This information was presented as a pyramid, known as a Heinrich Pyramid, with major injury accidents as the pinnacle and non-injury accidents at the base. Heinrich proposed that if the events at the bottom of the pyramid are identified and, where possible, corrected then the consequent effect would be the prevention of an event at the top of the pyramid. This concept is still valid today and may be extended to include incidents and even unreported events as shown in Figure A1.1. It is important to note that the certainty as to the completeness of each part of the pyramid decreases as one moves down the pyramid, primarily because the level of subjectivity increases. However, trends and comparisons are still valid and the data are extremely useful for determining areas of potential safety improvement.

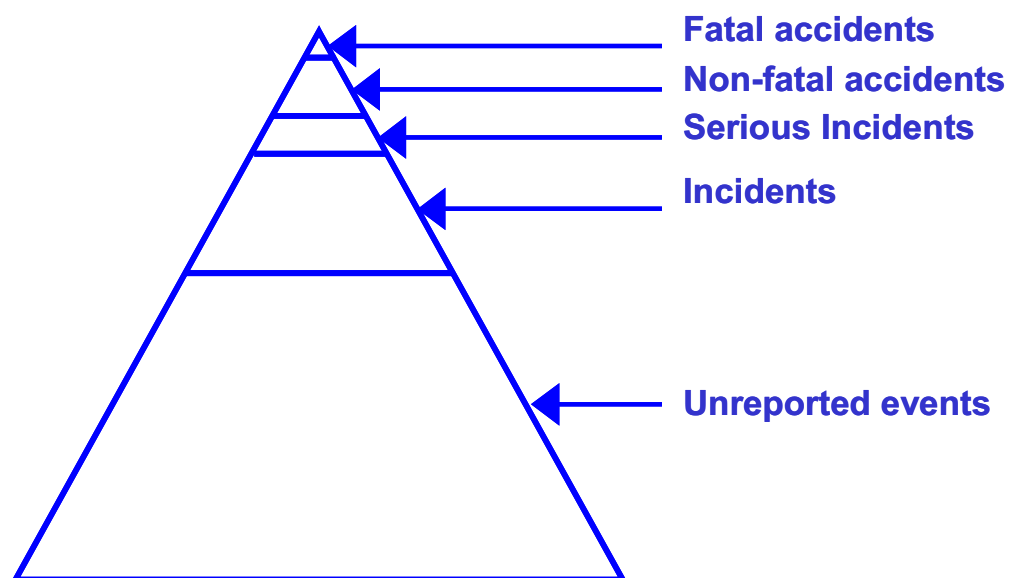


Figure A1.1 Heinrich Pyramid

2.2 Within the UK, fatal accidents, non-fatal accidents, serious incidents and incidents are reported to the CAA through the Mandatory Occurrence Reporting (MOR) scheme.

23. H.W. Heinrich, Industrial Accident Prevention, 1931

The Heinrich Pyramid predicts that there are a large amount of events that are unreported to the CAA. 'Unreported events' are normally brought to the attention of airlines through their own reporting processes or through Flight Data Monitoring.

3 Data Types and Limitations

3.1 Occurrence

3.1.1 An occurrence is an umbrella term that covers both accidents and incidents. In the Review an occurrence can be a fatal accident, a non-fatal accident, a serious incident or an incident. All of these occurrences are reported through the CAA's MOR scheme.

3.1.2 The MOR scheme was established in 1976 with the objectives of ensuring that the CAA is advised of hazardous or potentially hazardous occurrences, to disseminate knowledge of these occurrences so that lessons can be learnt and to allow an assessment of the safety implications of each occurrence so that necessary action can be taken. The main emphasis of the scheme is that the information reported to CAA should be used to improve flight safety and not to attribute blame.

3.1.3 In the UK, criteria for reportable occurrences has been established in law since 1976. The European Union (EU), recognising the value of such a scheme in helping improve safety, produced a European Directive²⁴ that, with some modifications, mandates the MOR scheme for all EU Member States. The Directive was transposed into Article 142²⁵ of the Air Navigation Order (ANO) 2005.

3.1.4 The revised definition of a reportable occurrence from Article 142 of the ANO is as follows:

'occurrences which endanger or which, if not corrected, would endanger an aircraft, its occupants or any other person'

The types of persons required to report these occurrences are also outlined in Article 142.

3.1.5 The definition of occurrence is necessarily subjective, given the complexity of the aviation industry. To assist industry, a list of examples is included in CAP 382²⁶ but the MOR database can never be a complete account of all incidents. However, the CAA believe that the reporting culture in the UK is good and improving, hence the data can be used to assist industry and CAA to address safety issues. The subjectivity in the scheme also means that each dataset must be viewed in context. For example, an increase in the number of reports, either in general or related to a specific issue, may at first glance appear to be a sign of decreasing safety levels. However, it must be borne in mind that an increase may be as a result of an improved reporting culture or increased awareness of an issue, often due to a CAA and industry campaign.

3.1.6 As with the previous MOR scheme, the Directive also encourages voluntary reporting outside the mandatory requirements.

3.1.7 The Civil Aviation (Investigation or Accidents and Incidents) Regulations²⁷ require that accidents and serious incidents are reported to the Air Accidents Investigation Branch (AAIB). The AAIB can also elect to investigate incidents if it is felt to be appropriate.

24. Directive 2003/42/EC of the European Parliament and of the Council on occurrence reporting in civil aviation (can be viewed at www.europa.eu.int/eur-lex/lex/LexUriServ.do?uri=OJ:L:2003:167:0023:0036:EN:PDF)

25. Can be viewed at www.opsi.gov.uk/si/si2005/20051970.htm - 142

26. CAP 382 The Mandatory Occurrence Reporting Scheme - Information and Guidance (can be viewed at www.caa.co.uk/CAP382)

27. Can be viewed at www.legislation.hmso.gov.uk/si/si1996/Uksi_19962798_en_1.htm

All occurrences reported to AAIB are forwarded to CAA for inclusion in the MOR database.

3.2 **Incident**

3.2.1 An incident is defined as an occurrence, other than an accident, that affects or could potentially affect aviation safety.

3.2.2 Serious incidents (see next section), as classified by AAIB, are a subset of incidents.

3.3 **Serious incident**

3.3.1 A serious incident is defined as an incident that nearly resulted in an accident.

3.3.2 In the UK, the AAIB determine whether an incident should be classified as a serious incident.

3.3.3 The definition of a serious incident is subjective and this means that it is difficult to compare between countries or categories of operation. However, serious incidents can also be a useful measure of safety, as long as they are not used comparatively. Although serious incidents are classed as near-accidents, they tend to be potential severe accidents. An example of a serious incident could be a near collision with high ground, whereas a near collision with a vehicle on an aerodrome whilst taxiing would not be considered a serious incident.

3.3.4 As mentioned in the previous section, serious incidents are a subset of incidents.

3.4 **Reportable accident**

3.4.1 The full definition of a reportable accident from the UK Civil Aviation - Investigation of Air Accidents and Incidents - Regulations 1996 is as follows:

'An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

a) a person suffers a fatal or serious injury as a result of:

- being in or upon the aircraft;*
- direct contact with any part of the aircraft, including parts which have become detached from the aircraft; or*
- direct exposure to jet blast*

except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew, or

b) the aircraft sustains damage or structural failure which:

- adversely affects the structural strength, performance or flight characteristics of the aircraft, and*
- would normally require major repair or replacement of the affected component*

except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tyres, brakes, fairings, small dents or puncture holes in the aircraft skin; or

c) the aircraft is missing or completely inaccessible.

3.4.2 An aircraft occurrence is typically designated by the AAIB as being a reportable accident if, as a result, a person has been fatally or seriously injured and/or the aircraft

has sustained significant damage. An additional case that is defined as an accident is an aircraft that is missing or completely inaccessible. In all cases, the aircraft must be in flight or in the process of being prepared for a flight at the time of the accident.

- 3.4.3 The definition of a fatal injury is discussed in paragraph 3.5.4 but a serious injury also has its own definition. For an injury to be 'serious', a person must have been hospitalised for more than 48 hours (within 7 days of the accident), fractured major bones, suffered significant lacerations, suffered internal organ damage, received serious burns or been subject to exposure to infectious substances or significant radiation.
- 3.4.4 The scale of severity of an accident can range from a complete loss of the aircraft and all of those persons on board, to a more minor event, for example a ground collision between an aircraft and an aerodrome vehicle that results in damage to the aircraft but not any injuries. This wide range of severity means that reportable accidents are not necessarily a good measure of safety particularly when comparisons are made between, for example, countries. Two countries may have equal rates of accidents but one country's accidents may be all catastrophic accidents, perhaps resulting in loss of life, whereas the other country's accidents may be all ground collisions with no loss of life.
- 3.4.5 Another potential problem with the use of reportable accidents as a measure of safety is that the definition is subjective to some extent. This means that an occurrence may be classed as an accident in one country but not in another country. This could result in distortions in the true accident rate of a country, which can then cause problems when comparing accident rates between different countries.
- 3.4.6 This Review excludes accidents that result from violent causes, e.g. sabotage, war, hijack etc. from its statistics.

3.5 **Fatal accident**

- 3.5.1 Fatal accidents are a subset of reportable accidents.
- 3.5.2 The definition of a fatal accident derived from the definition of a reportable accident in the UK Civil Aviation - Investigation of Air Accidents and Incidents - Regulations 1996 is as follows:
- A reportable accident which results in fatal injury to any person in or upon the aircraft or by direct contact with any part of the aircraft, as defined in 'reportable accident'.*
- 3.5.3 The exceptions to the definition are when the fatal injury results from natural causes, is self inflicted or when the injury involves a stowaway hiding outside the areas normally available to passengers and crew.
- 3.5.4 A fatal injury is defined as an injury that results in death within thirty days of the accident. Fatal injuries are further sub-divided into onboard fatalities and third party fatalities. If the fatality occurs to persons outside the aircraft then these are treated as third party fatalities. Accidents involving only UK third party fatalities are excluded from the Review.
- 3.5.5 Fatal accidents are a good measure of safety in that they are tightly defined, which means that useful comparisons between different groups of accidents can be made. However, it can be difficult to identify trends within fatal accident data as they are relatively rare so the resulting dataset can be small.

3.6 **95% confidence levels**

- 3.6.1 The majority of the statistics covered in the Review are actual numbers, or rates, of occurrences that have been recorded over time.

- 3.6.2 However, within Chapters 2 and 3, a statistical method has been used which applies a level of confidence to the data.
- 3.6.3 Where the aircraft population is relatively small and the associated fatal accident rate is very low, the fatal accident rate may be misleading because of the small sample size of the population used. Such a fatal accident rate would be considered to have a low level of statistical confidence.
- 3.6.4 To overcome this problem, and establish a consistent level of confidence for fatal accident rates of different populations, an accepted approach is to employ the Poisson distribution. This is used to determine the fatal accident rate that, to a given level of confidence, is unlikely to be exceeded.
- 3.6.5 A level of confidence commonly employed in statistical comparisons is 95%. Lowering the confidence level employed results in the calculated fatal accident rate being closer to its historical value but does mean that there is a greater chance of the fatal accident rate being exceeded.
- 3.6.6 With small samples, the 95% confidence fatal accident rate can be large relative to the historical value but, as the sample increases, the gap between the historical value and the 95% confidence fatal accident rate decreases, i.e. there is a greater confidence in the fatal accident rate as a whole.
- 3.6.7 The concept of 95% confidence levels can be better explained with an example:
- Between 1995 and 2004 the fleet in country A has accumulated a total of one million flying hours and has been involved in one fatal accident. Over the same time period, the fleet in country B has accumulated a total of ten million flying hours and has been involved in ten fatal accidents.
 - The historical fatal accident rate for country A is calculated to be 1 per million hours. The historical fatal accident rate for country B is also calculated to be 1 per million hours. These fatal accident rates are shown in Figure A1.2.

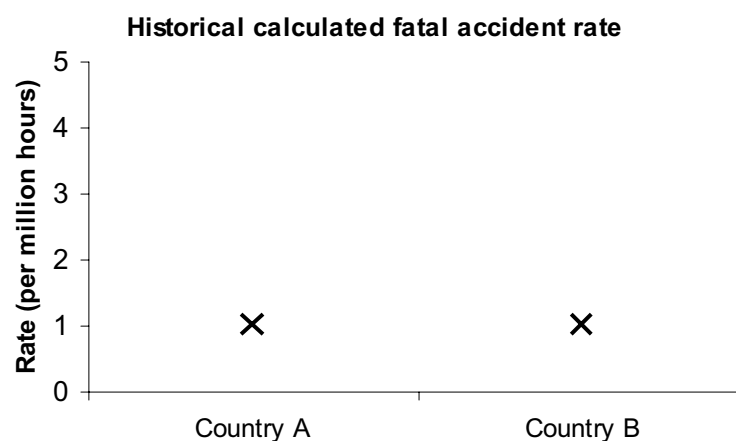


Figure A1.2 Historical fatal accident rates

- Although the historical fatal accident rates are identical, is it really true that the safety level in both countries is identical? The fleet in country A has only accumulated one million flying hours and although has been involved in one fatal accident, it may be that another accident is imminent. Because the amount of

utilisation generated is relatively low, the uncertainty in the true level of safety for country A is high. The fleet in country B has accumulated a greater amount of utilisation and has also been involved in more accidents. As there is more data available for country B, there can be more certainty in the level of safety achieved. To establish a consistent level of confidence for both countries, the Poisson distribution is used to generate 95% confidence fatal accident rates.

- The 95% confidence fatal accident rate for country A is calculated to be 4.7 per million hours (i.e. there is a 95% confidence that the fatal accident rate for country A will fall below 4.7 per million hours). The 95% confidence fatal accident rate for country B is calculated to be 1.7 per million hours (i.e. there is a 95% confidence that the fatal accident rate for country A will fall below 1.7 per million hours). These fatal accident rates are shown in Figure A1.3 along with the historical fatal accident rates from Figure A1.2.

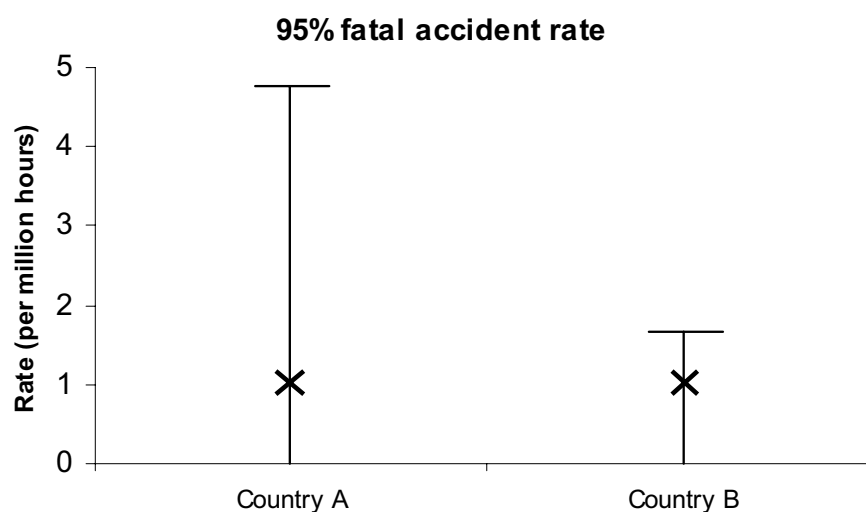


Figure A1.3 95% confidence fatal accident rates

- It can be seen that the fatal accident rates for the countries have changed from identical point values to differing ranges of values. The uncertainty in the safety level in country A is illustrated by the 95% confidence fatal accident rate starting at 4.7 per million hours. The greater certainty in the safety level in country B is illustrated by the 95% confidence fatal accident rate starting closer to the original historical rate.

Appendix 2 Occurrence Grading

1 Introduction

- 1.1 The CAA has had an established occurrence grading system since 1998 that differentiates between occurrences in terms of severity and probability. This system has been developed to improve the analysis of occurrence reports and provide better management information within the CAA.

2 Occurrence Grading Criteria

- 2.1 The CAA use the severity categories described in Table A2.1 when allocating an occurrence grade:

Severity	A (Severe)
	B (High)
	C (Medium)
	D (Low)
	E (Non-reportable)

Table A2.1 Occurrence grading severity categories

- 2.2 Each occurrence is assessed on arrival and allocated an occurrence grade using agreed criteria to assess the severity of the occurrence. This grade may be re-evaluated on receipt of supplementary information or following investigation.
- 2.3 When assessing the severity of an occurrence, the criteria used depends on whether, or not, the occurrence is Air Traffic Management (ATM) related.
- 2.4 Non-ATM related occurrences are assessed in terms of the numbers of injuries that resulted, the ability to continue safety flight and landing and/or the effect on flight crew workload, aircraft strength/integrity, and/or aircraft performance/handling. For example, a severe (A) Non-ATM occurrence would be one where there was a catastrophic, or potentially catastrophic, event or an inability to continue safe flight and landing. There may also be multiple fatalities/serious injuries involved in a severe MOR.
- 2.5 ATM occurrences are assessed in terms of the proximity of the aircraft involved, the ability of the pilot/controller to correct the situation, the workload of the controllers and/or ATC system failures. For example, a severe (A) ATM occurrence would be one where there were aircraft in very close proximity or even a mid-air collision.
- 2.6 Occurrences are assigned an occurrence grade 'E' if they are not considered reportable in accordance with the European Directive on occurrence reporting in civil aviation (see Appendix 1 for more details).
- 2.7 For analysis purposes, occurrences are considered to be events of highest significance if they have been assessed to have a severe (A) or high (B) severity.

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Appendix 3 Aircraft Types

1 Worldwide Aircraft Types

- 1.1 Within the fatal accident section of the worldwide safety chapter, the text refers to western built aircraft and eastern built aircraft.
- 1.2 Tables A3.1 and A3.2 show the types of aircraft that are considered western built aircraft and those that are considered eastern built aircraft. It should be noted that business jets are excluded from these tables.

Jets		
Aerospatiale Caravelle	Boeing (MDC) DC-8	Bombardier (Canadair) Regional Jet
Airbus A300	Boeing (MDC) DC-9	Dassault Aviation Mercure
Airbus A310	Boeing (MDC) MD-11	Embraer 170
Airbus A318	Boeing (MDC) MD-80	Embraer ERJ-135
Airbus A319	Boeing (MDC) MD-90	Embraer ERJ-140
Airbus A320	Boeing 707	Embraer ERJ-145
Airbus A321	Boeing 717	Fairchild/Dornier 328Jet
Airbus A330	Boeing 720	Fokker 100
Airbus A340	Boeing 727	Fokker 70
BAe (BAC) One-Eleven	Boeing 737	Fokker F28
BAe (HS) Trident	Boeing 747	General Dynamics (Convair) 880
BAe 146 / Avro RJ	Boeing 757	General Dynamics (Convair) 990
BAe/Aerospatiale Concorde	Boeing 767	Lockheed L-1011 TriStar
Boeing (MDC) DC-10	Boeing 777	VFW 614
Turboprops		
Aerospatiale 262	Bombardier (Shorts) 360	General Dynamics (Convair) 640
ATR ATR42	Bombardier (Shorts) SC.5 Belfast	Gulfstream Aerospace Gulfstream I
ATR ATR72	Bombardier (Shorts) SC.7 Skyvan	Handley Page Herald
BAe (AW) Argosy	CASA/IPTN 212	Handley Page Jetstream
BAe (Bristol) Britannia	CASA/IPTN CN-235	IAI Arava
BAe (HS) 748	Embraer EMB-120 Brasilia	Jetstream Jetstream 31
BAe (HS) ATP	Fairchild (Swearingen) Metro	Jetstream Jetstream 41
BAe (Vickers) Vanguard	Fairchild F-27	Lockheed Hercules
BAe (Vickers) Viscount	Fairchild FH-227	Lockheed L-188 Electra
Beech 1900	Fairchild/Dornier 228	NAMC YS-11
Bombardier (Canadair) CL-44	Fairchild/Dornier 328	Saab 2000
Bombardier (DHC) Dash 7	Fokker 50	Saab 340
Bombardier (DHC) Dash 8	Fokker F.27	Transall C-160
Bombardier (DHC) DHC-5 Buffalo	General Dynamics (Convair) 580	
Bombardier (Shorts) 330	General Dynamics (Convair) 600	

Table A3.1 Western built aircraft types

Jets		
Antonov An-124	Ilyushin Il-76	Tupolev Tu-204
Antonov An-225	Ilyushin Il-86	Yakovlev Yak-40
Antonov An-72	Ilyushin Il-96	Yakovlev Yak-42
Antonov An-74	Tupolev Tu-134	
Ilyushin Il-62	Tupolev Tu-154	
Turboprops		
Antonov An-12	Antonov An-30	Let L-410 Turbolet
Antonov An-140	Antonov An-32	Let L-610
Antonov An-22	Antonov An-38	SAC Y-8
Antonov An-24	Antonov An-8	XAC Y-7
Antonov An-26	Ilyushin Il-114	
Antonov An-28	Ilyushin Il-18	

Table A3.2 Eastern built aircraft types

2 UK Aircraft Types

- 2.1 Within the chapters relating to UK aircraft (Chapters 4 and 5) and UK airspace (Chapter 6), a distinction is made between small aeroplanes and large aeroplanes. Small aeroplanes are defined to have an MTWA of less than 5,700kg whereas large aeroplanes are defined as having an MTWA of over 5,700kg.
- 2.2 There are some aeroplanes where the weight of the original type was below 5,700kg MTWA, but where subsequent series aircraft have exceeded this weight, e.g. Bandeirante. For purposes of consistency, all series of the types have been included under the original weight limit.
- 2.3 It is not practical to list all the aircraft types that are included within the Review broken down as to whether they are considered 'large' or 'small' because the lists would be too large. However, it is possible to show those types typically used for public transport.
- 2.4 Tables A3.3 and A3.4 shows public transport aircraft types that have been considered 'large' and 'small' for analysis purposes, broken down by class of aircraft.

Jets		
Airbus A300	BAe 146	Embraer RJ135
Airbus A310	Boeing 707	Embraer RJ145
Airbus A319	Boeing 727	Fokker 100
Airbus A320	Boeing 737	Fokker 70
Airbus A321	Boeing 747	Lockheed L1011 Tristar
Airbus A330	Boeing 757	McDonnell-Douglas DC10
Airbus A340	Boeing 767	McDonnell-Douglas DC8
Avroliner RJ	Boeing 777	McDonnell-Douglas DC9
BAC/Aerospatiale Concorde	Bombardier Regional Jet RJ700	McDonnell-Douglas MD-80
BAe (BAC) 111	Canadair Regional Jet	
Turboprops		
ATR 42	DHC-8 Dash 8	Lockheed L-188 Electra
ATR 72	Dornier 228	Saab Fairchild 340
BAe (H.P) Jetstream 31/32	Dornier 328	Shorts Belfast
BAe (HS) 748	Fairchild Hillier FH227B	Shorts SD330
BAe ATP	Fairchild SA-227 Metro III	Shorts SD360
BAe Jetstream 41	Fokker 50	V953C Merchantman
Beech 1900	Fokker F27	Viscount 800
DHC-7 Dash7	Handley Page Herald	
Pistons		
Douglas DC3	Douglas DC6	Scottish Aviation Twin Pioneer
Business Jets		
Airbus A319 CJ	Cessna 550	Dassault Mystere-Falcon 50
BAe (HS) 125	Cessna 560	Dassault Mystere-Falcon 900
Beech 400 Beechjet	Cessna 650	Gulf American Gulfstream IV
Boeing BBJ	Cessna 750	Learjet
Canadair Challenger	Dassault Mystere-Falcon 20	
Canadair Global Express	Dassault Mystere-Falcon 2000	

Table A3.3 'Large' public transport aircraft types

Business jets		
Cessna 500	Cessna 525	Raytheon Premier 1
Turboprops		
Beech King Air	DHC-6 Twin Otter	Rockwell Turbo Commander
Beech Super King Air	Embraer EMB110 Bandeirante	
Cessna 441	Reims-Cessna 406	
Pistons		
Beech Baron 55/58	Cessna 337	Partenavia P68
Cessna 150	Cessna 340	Pilatus BN Islander
Cessna 152	Cessna 401	Pilatus BN Trislander
Cessna 172	Cessna 402	Piper PA-23
Cessna 180	Cessna 404	Piper PA-28
Cessna 182	Cessna 411	Piper PA-31
Cessna 206	Cessna 414	Piper PA-34
Cessna 210	Cessna 421	Tiger Moth
Cessna 310	DH 104 Dove	Piper PA-32
Cessna 320	DHC-2 Beaver	
Cessna 336	Dragon Rapide	

Table A3.4 'Small' public transport aircraft types