



**Aviation
Safety
Review
1990-1999**

CAP701

Safety Regulation Group



CAP 701

**Aviation Safety Review
1990 - 1999**

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INTRODUCTION

This Aviation Safety Review examines UK civil aviation safety over the last ten years, and serves as an update to the statistics in the previous review (CAP 673, May 1997). It also provides an insight into the world-wide aviation safety picture. It brings together aviation safety related information into a single source document, to be used by the aviation community for statistical references.

The review has been divided into several sections which are relevant to different sectors of the aviation industry - aeroplanes and helicopters, public transport and non-public transport operations, police, ambulance and search and rescue services, foreign aircraft in UK airspace, and other privately operated aircraft such as gliders, microlights, gyroplanes, balloons and airships. The first section, however, attempts to put UK operations into context with world-wide activity and illustrates both accident and fatality trends as well as the diversity of fatal accident rates throughout the world.

In addition to the Safety Review material we have included, in chapter 17, the findings of a number of recent safety studies conducted by CAA. These cover Callsign Confusion, Level Busts, Loading Errors, Birdstrikes and Air Cargo Operations, all of which are subjects of current concern and by reproducing them here we seek to promulgate their safety messages as widely as possible.

Sources of information

Accident data for this review has been derived from the CAA Mandatory Occurrence Reporting Scheme database maintained by the Safety Investigation and Data Department and has been analysed by the Safety Analysis Unit. UK utilisation data and aircraft register data have been obtained from the CAA Aviation Data Unit and the Aircraft Register Department respectively. Other data has been obtained from Airclaims, British Gliding Association and British Balloon and Airship Club. All sources other than CAA have been referenced in this document and they are hereby acknowledged for the information supplied.

Finally, we are very keen to receive any comments on how future issues can be improved. If you have any comments, please contact the Head of Safety Analysis Unit:

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WORLD-WIDE SAFETY

Detailed in this section are safety statistics for world-wide air transport operations between 1990 and 1999, separated by the class of aircraft. An overview of large jets and turboprops (i.e. those aircraft above 5,700kg mtwa) is shown first, followed by Western Built Jets, Western Built Turboprops, Eastern Built Jets and Eastern Built Turboprops. There is less reliable information available for the Eastern Built Jets and Turboprops but they have been included to provide a more complete world-wide picture. Statistics shown under each of the aircraft classes include, where information is available, fatal accidents and fatalities, fatal accident rates and forecasts, and a comparison of regional operators.

The majority of the graphs use accident data from the CAA's Accident Analysis Group (AAG). This AAG was set up by the CAA to review world-wide fatal accidents in order to identify aviation risks. The AAG excludes accidents resulting from acts of terrorism and sabotage, or accidents involving test or military-type operations. The AAG allocates causal factors, circumstantial factors and consequences (see Chapter 18 for Definitions) for each fatal accident along with a confidence level. This confidence level reflects the confidence in the completeness of the information available and therefore the allocated factors. There is a selection of 64 possible causal factors, 15 circumstantial factors, 15 consequences and 4 levels of confidence.

Most of the information used in this section of the Aviation Safety Review is derived from Airclaims.

A. Large Jet and Turboprops

The annual number of fatal accidents to large jets and turboprops world-wide has remained fairly constant over the last ten years as shown in figure i. Between 1990 and 1999, there have been 421 fatal accidents resulting in 11,793 fatalities.

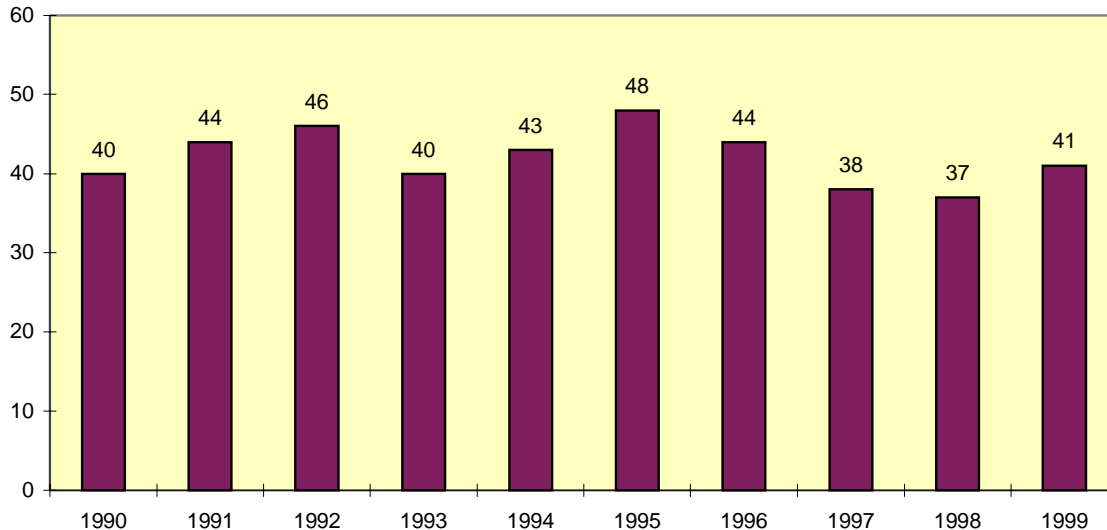


Figure i - World-wide Large Jet and Turboprop Fatal Accidents

The annual numbers of fatalities are shown in figure ii. In 1996, the number of fatalities was considerably larger than the annual average of 1,179 for the last ten years.

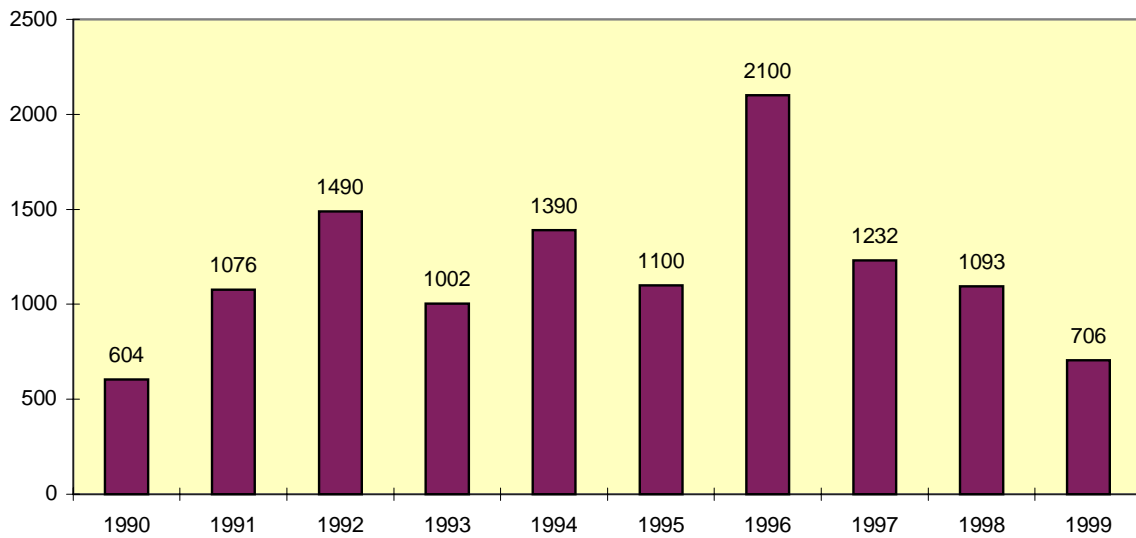


Figure ii - World-wide Large Jet and Turboprop Fatalities

The majority (85%) of large jet and turboprop accidents involve four classes of aircraft, Western Built Jets, Western Built Turboprops, Eastern Built Jets and Eastern Built Turboprops. This accounts for 356 fatal accidents over the 1990 to 1999 time period. Approximately 80% of these accidents were allocated a high or medium confidence level by AAG. This implies that the majority of the accident data was complete enough to provide full accident analysis. The remainder of large jet and turboprop fatal accidents involve Business Jets which are not discussed in this section. Figures iii, iv, v, vi and vii are based on AAG accident factor and consequence allocation using data involving the main four classes of aircraft.

Figure iii shows the five most common primary causal factors and the number of fatal accidents that involve each factor. (*Note: A primary causal factor is the single dominant causal factor in an accident, as judged by the AAG*) The figures shown in brackets are the percentage of accidents involving the factor, for example, 30% of Western Built Turboprop fatal accidents have a primary causal factor of “Lack of positional awareness - in air”. Nearly 60% of fatal accidents initiated with one of these five primary causal factors. The graph shows the overall trend combining the different classes of aircraft. Western Built Jets are an exception to the trend, having “Omission of action/inappropriate action” as the most common primary causal factor.

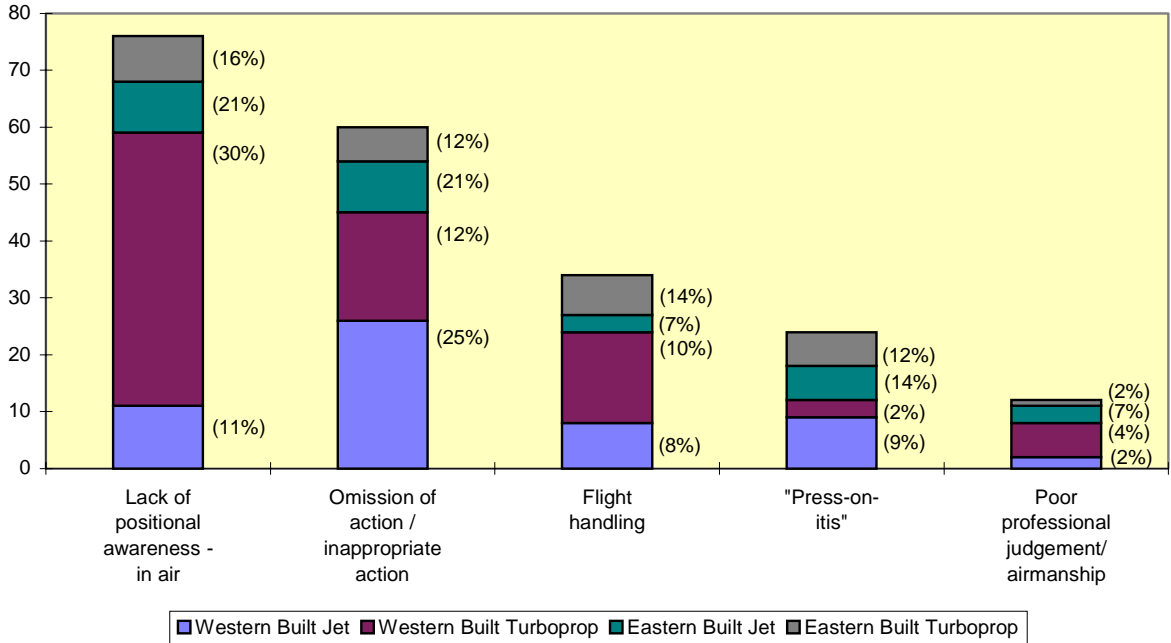


Figure iii - World-wide Large Jet and Turboprop Fatal Accidents Primary Causal Factors

Other causal factors, apart from the primary causal factor, can be allocated to an accident. When all of these factors are analysed in the same way as figure iii, the same five factors dominate.

Figure iv shows the number of causal factors allocated to the fatal accidents. It can be seen that the number of factors allocated shows a distribution of which 3 is the mode. Just under 9% of the accidents did not have any causal factors allocated because of the lack of information. The highest number of factors, which was 11, was allocated to a Western Built Jet fatal accident (American Airlines B757 accident in 1995 at Cali, Columbia).

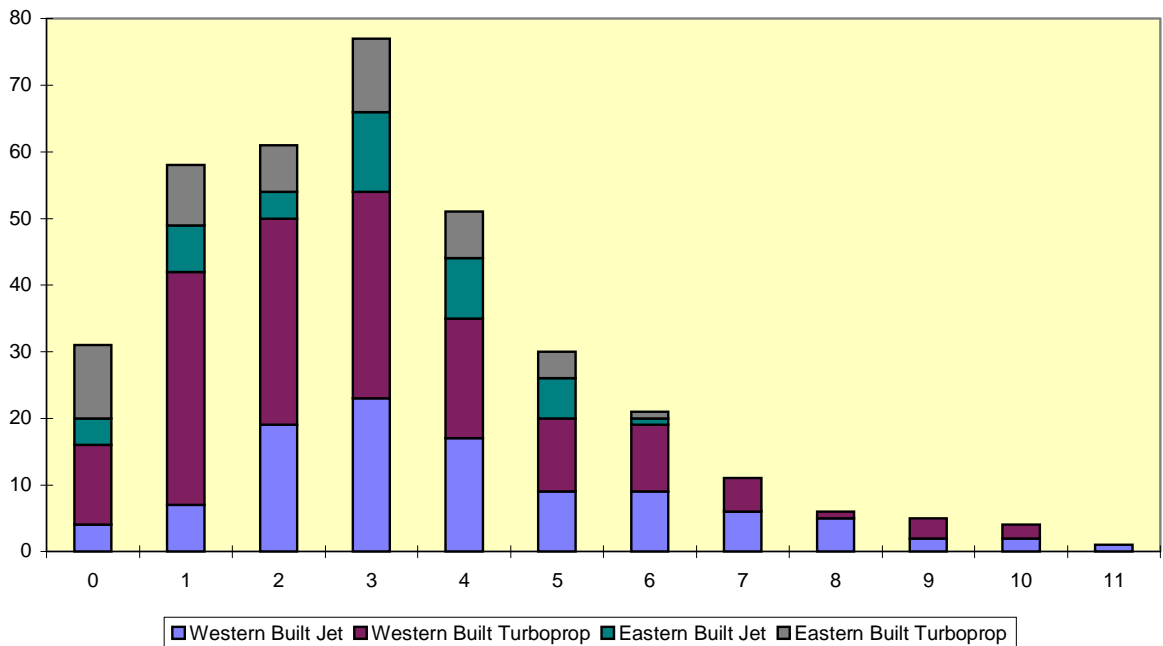


Figure iv - World-wide Large Jet and Turboprop Fatal Accidents Number of Causal Factors Allocated

Figure v shows the five most common circumstantial factors. These factors were not deemed to be instrumental in the accident but contributed to the final outcome. Over 90% of the accidents involved at least one of these five factors.

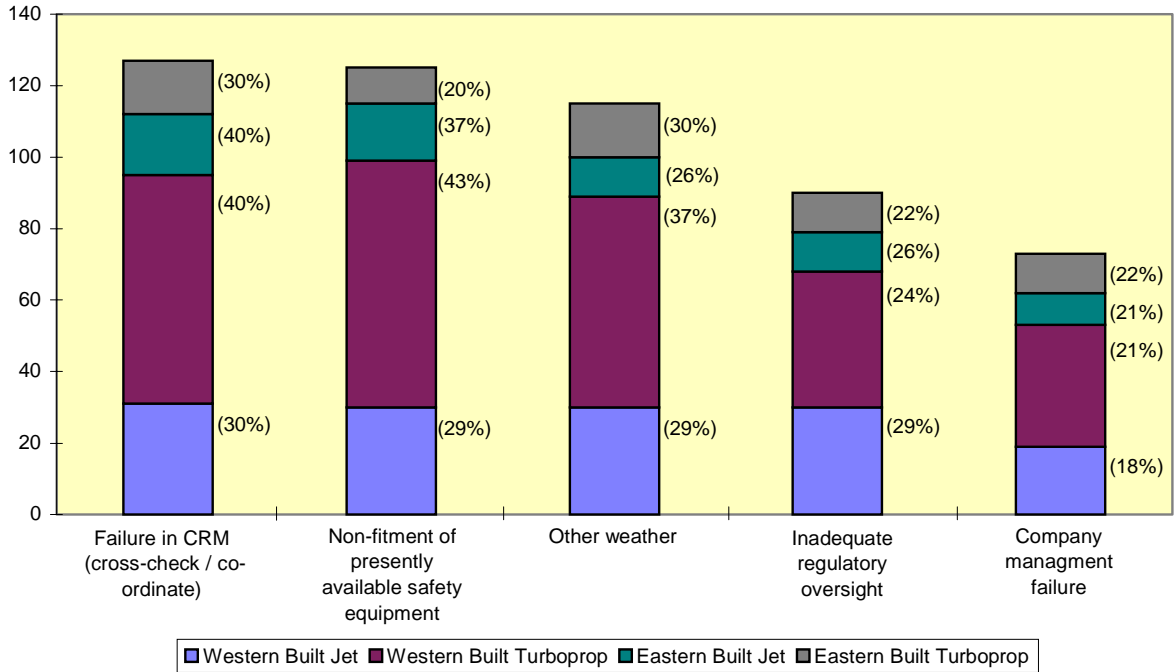


Figure v - World-wide Large Jet and Turboprop Fatal Accidents Circumstantial Factors

Figure vi shows the five most common consequences. The most common of which, with 46% of all fatal accidents, was “Collision with Terrain/Water/Obstacle”. The majority of aircraft classes follow the overall trend although Western Built Jets differ by having the most common consequences in the following order: “Collision with terrain/water”, “Loss of control in-flight”, “Post crash fire”, “Controlled Flight Into Terrain” and then “Overrun”.

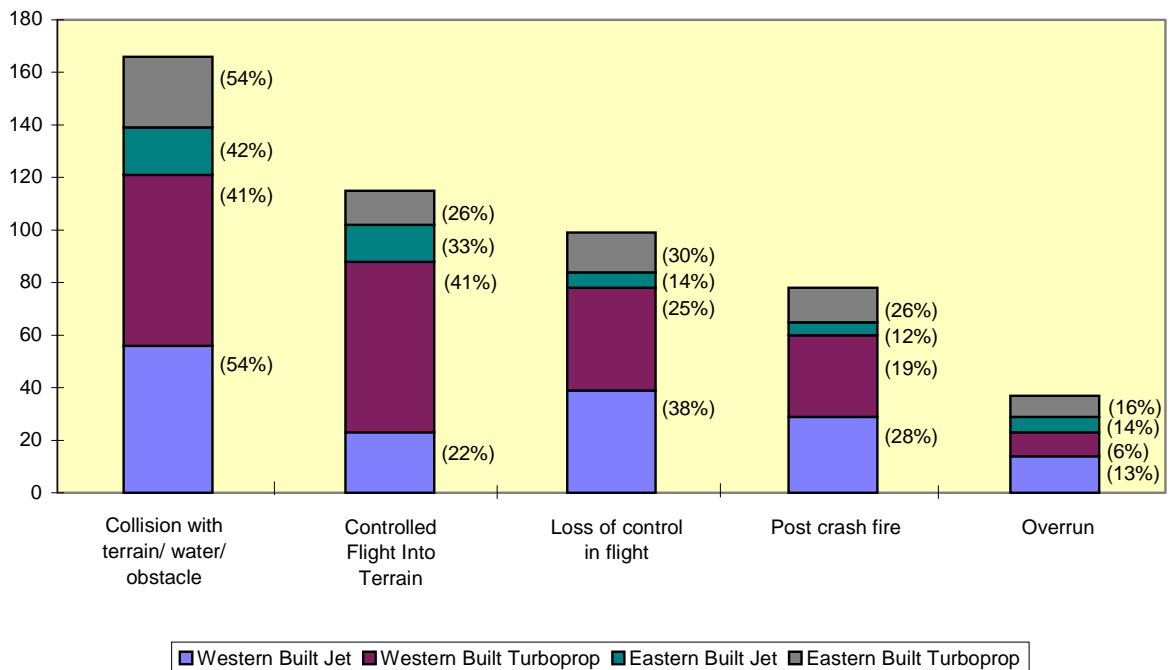
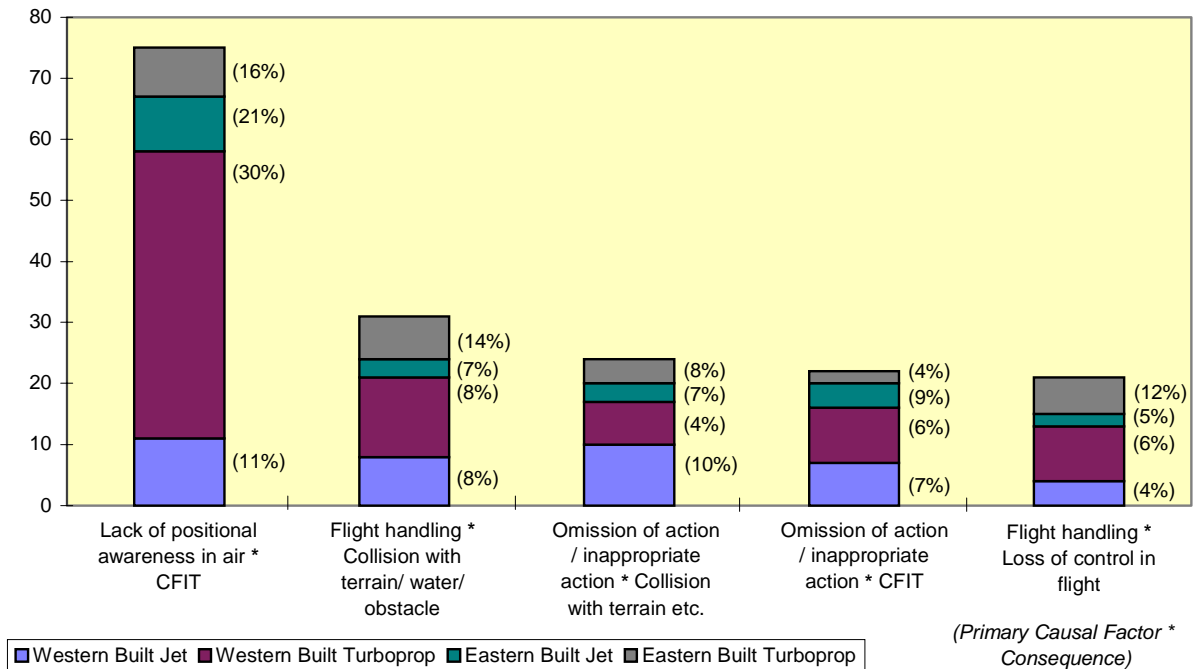


Figure vi - World-wide Large Jet and Turboprop Fatal Accidents Consequences

Figure vii shows the five most common primary causal factor and consequence combinations. These combinations were present in 47% of accidents. The most common combination is a “Lack of positional awareness in air” primary causal factor resulting in a Controlled Flight Into Terrain (CFIT) consequence. This combination was present in 21% of all fatal accidents, i.e. accidents involving the four main classes of aircraft.



**Figure vii - World-wide Large Jet and Turboprop Fatal Accidents
Primary Causal Factor and Consequence Combinations**

B. Western Built Jets

There have been 104 Western Built Jet fatal accidents between 1990 and 1999. Figure viii shows the annual number of fatal accidents since 1990. 1996 saw the highest annual number of fatal accidents. There were some very high profile accidents in 1996, including the Birgenair B757 accident off the Dominican Republic (captain had a faulty Air Speed Indicator), the Valujet DC-9 in the Florida Everglades (cargo hold caught fire), the TWA B747 off Long Island (fuel tank exploded) and the Saudi Arabian Airlines B747 off Delhi (mid-air collision).

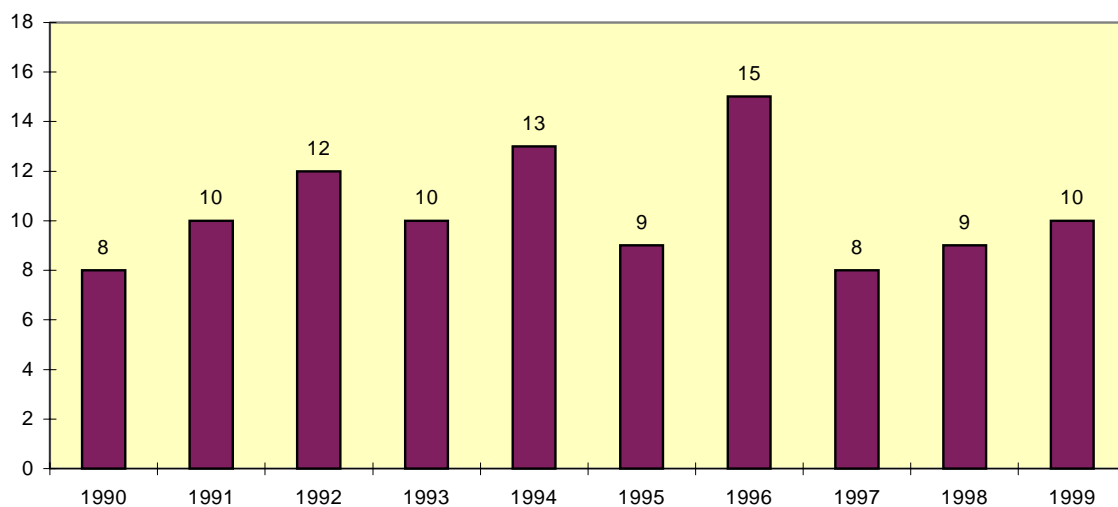


Figure viii - World-wide Western Built Jet Fatal Accidents

The 104 fatal accidents resulted in 6588 fatalities. Again, 1996 was a particularly bad year for fatalities, far exceeding the annual average of 659. This high level of fatalities in 1996 mirrors the high number of major fatal accidents.

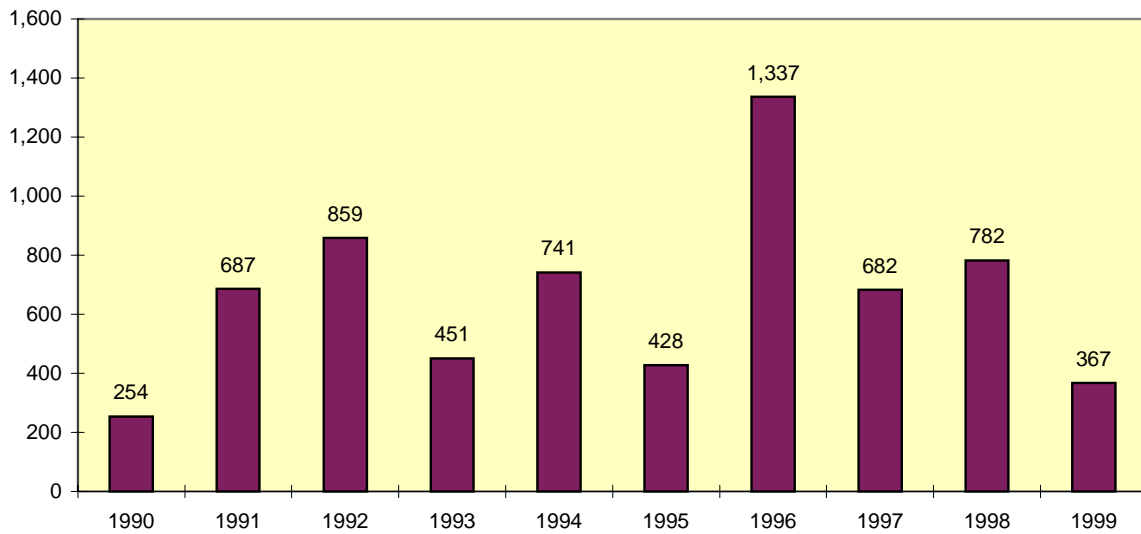


Figure ix - World-wide Western Built Jet Fatalities

The Western Built Jet fatal accident rate, per million flights, between 1990 and 2020 is shown in figure x. Using assumptions that, per annum, there will be 4% traffic growth and a maximum of 8 fatal accidents, a forecast for the accident rate between 2000 and 2020 is shown. These assumptions were based on recent Western Built Jet service history. Due to the random nature of accidents, a 90% confidence band was applied to the forecast and this is shown by the dashed lines.

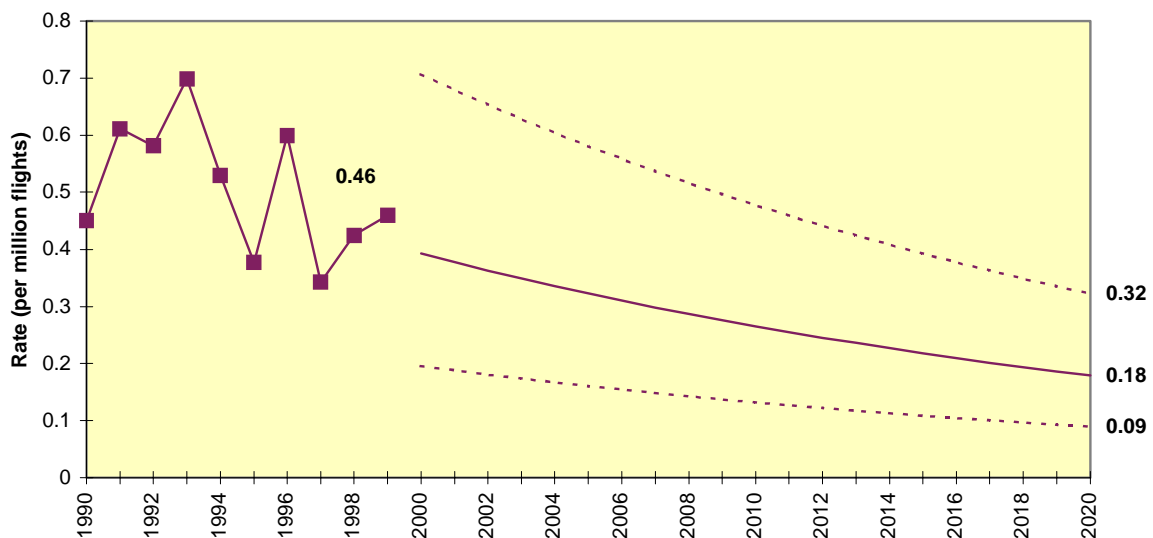


Figure x - World-wide Western Built Jet Fatal Accident Rate

The Western Built Jet fatal accident rate by operator region is shown below. The rate is derived from information between 1990 and 1999. African operators have the highest rate, followed by South American operators and Asian operators. Australasian operators suffered no fatal accidents. Operators in countries that are full members of the Joint Aviation Authorities (JAA) have been separated out and have a lower fatal accident rate than European operators as a whole.

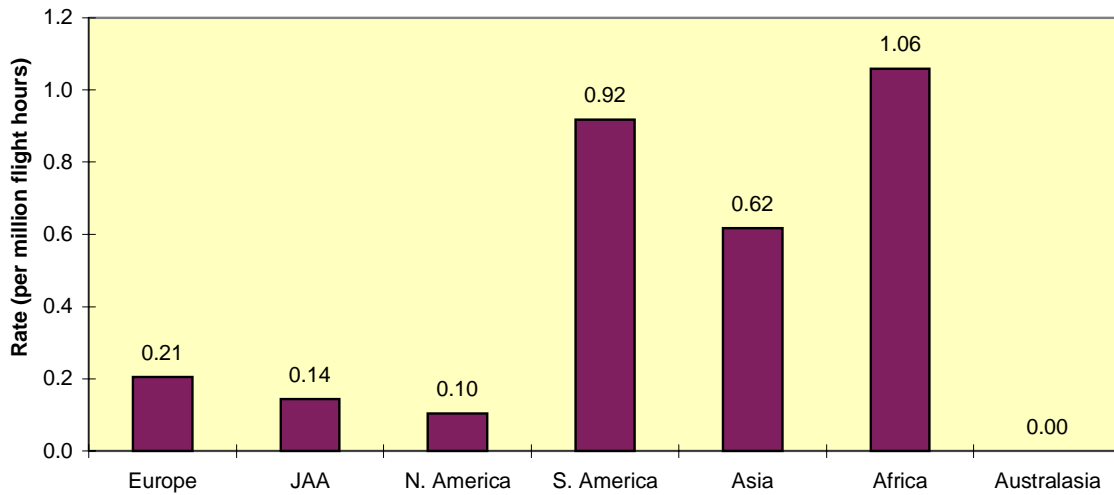


Figure xi - World-wide Western Built Jet Fatal Accident Rate by Operator Region

C. Western Built Turboprops

There have been 159 Western Built Turboprop fatal accidents between 1990 and 1999. Figure xii shows the annual number of fatal accidents since 1990. 1995 had the highest number of fatal accidents at 21.

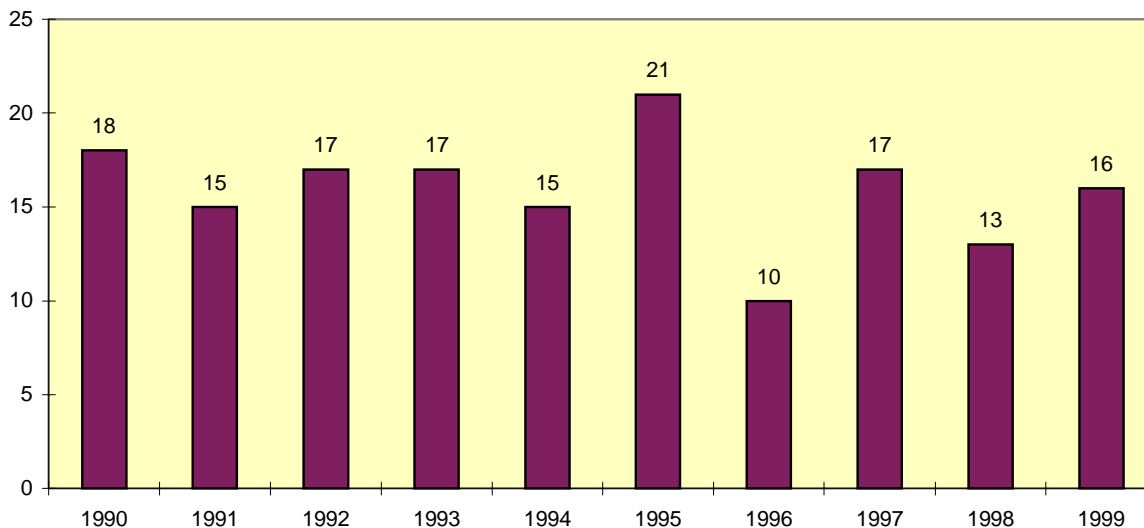


Figure xii - World-wide Western Built Turboprop Fatal Accidents

The 159 fatal accidents resulted in 1992 fatalities. Again, 1995 showed a particularly bad year for fatalities, far exceeding the annual average of 1999, mirroring the high number of fatal accidents. One of the fatal accidents in 1995 was a Lockheed Electra filled with refugees which crashed on take-off after a suspected shift in the Centre of Gravity, killing 141 people.

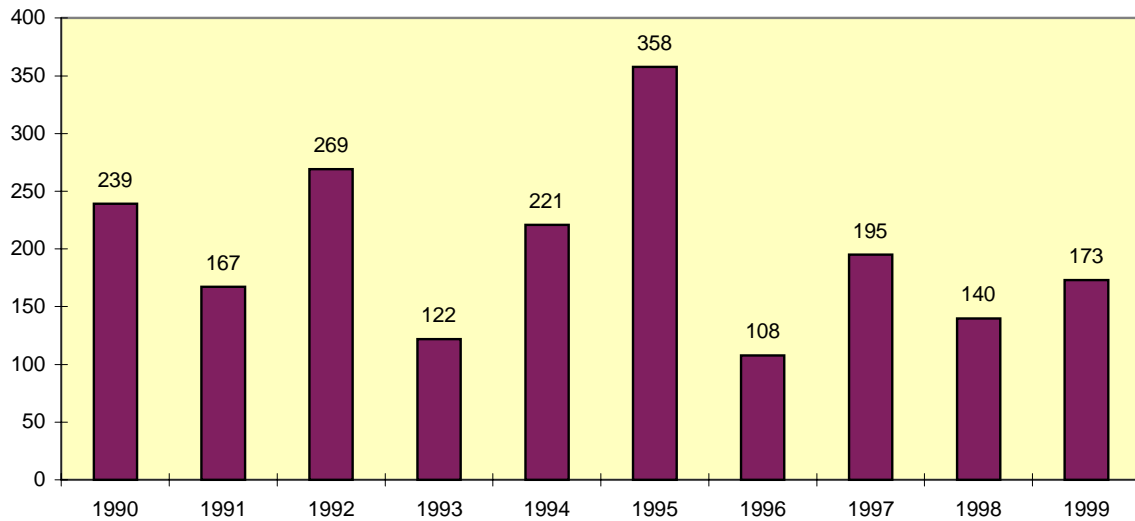


Figure xiii - World-wide Western Built Turboprop Fatalities

The Western Built Turboprop fatal accident rate, per million flights, between 1990 and 2020 is shown in figure xiv. The accident rates generated for Western Built Turboprops are based on airline operations only. Using assumptions that, per annum, there will be 1.4% traffic growth and a maximum of 11 fatal accidents, a forecast for the accident rate between 2000 and 2020 is shown. These assumptions were based on recent Western Built Turboprop service history. Due to the random nature of accidents, a 90% confidence band was applied to the forecast and this is shown by the dashed lines. The fatal accident rate in 1999 was 2.6 times higher than the equivalent Western Built Jet fatal accident rate. Based on the earlier assumptions, the predicted fatal accident rate in 2020 will be 5.4 times higher than the equivalent Western Built Jet fatal accident rate.

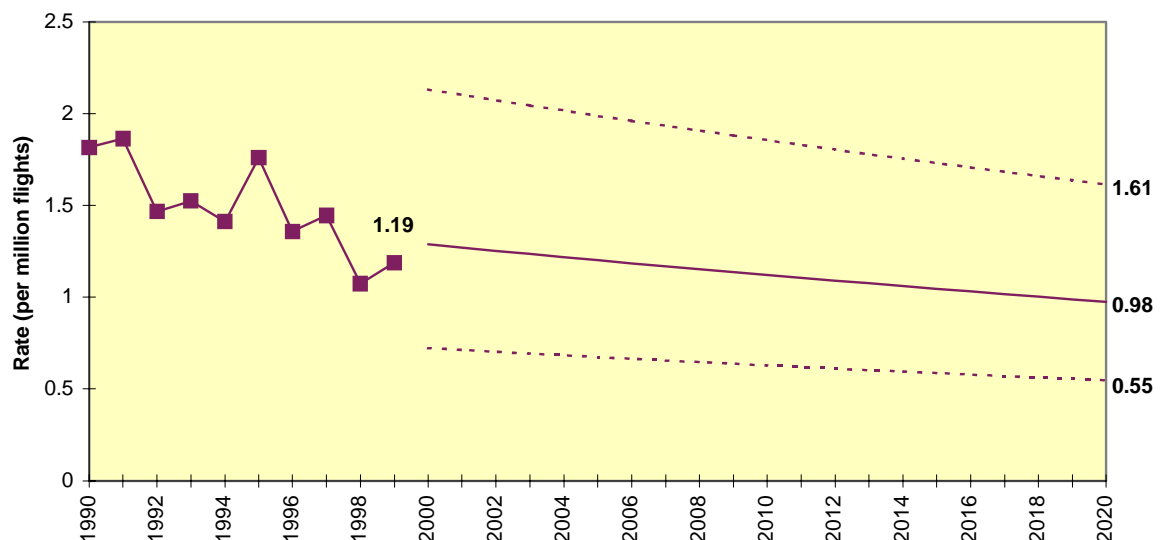


Figure xiv - World-wide Western Built Turboprop Fatal Accident Rate

The Western Built Turboprop fatal accident rate by operator region is shown below. The rate is derived from information between 1990 and 1999. Asian operators have the highest rate, followed by African, South American and Australasian operators. European, Joint Aviation Authorities countries and North American operators have a similar rate which is approximately nine times smaller than the Asian operators rate.

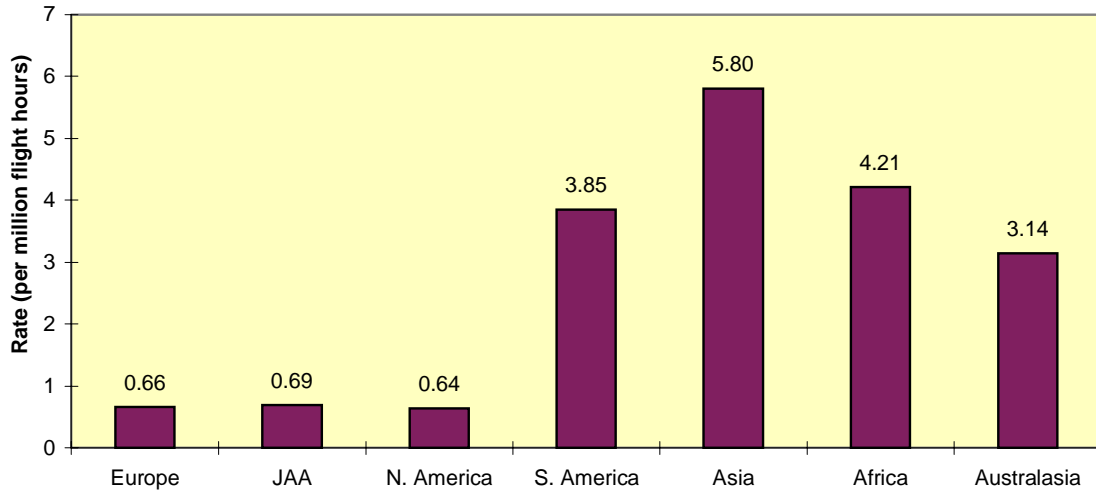


Figure xv - World-wide Western Built Turboprop Fatal Accident Rate by Operator Region

D. Eastern Built Jets

Due to the limited amount of information available for Eastern Built Jets, only the number of fatal accidents and associated fatalities between 1990 and 1999 are shown in this section.

Figure xvi shows there have been 43 Eastern Built Jet fatal accidents recorded between 1990 and 1999. There has been a decreasing trend in the annual number of accidents in recent years.

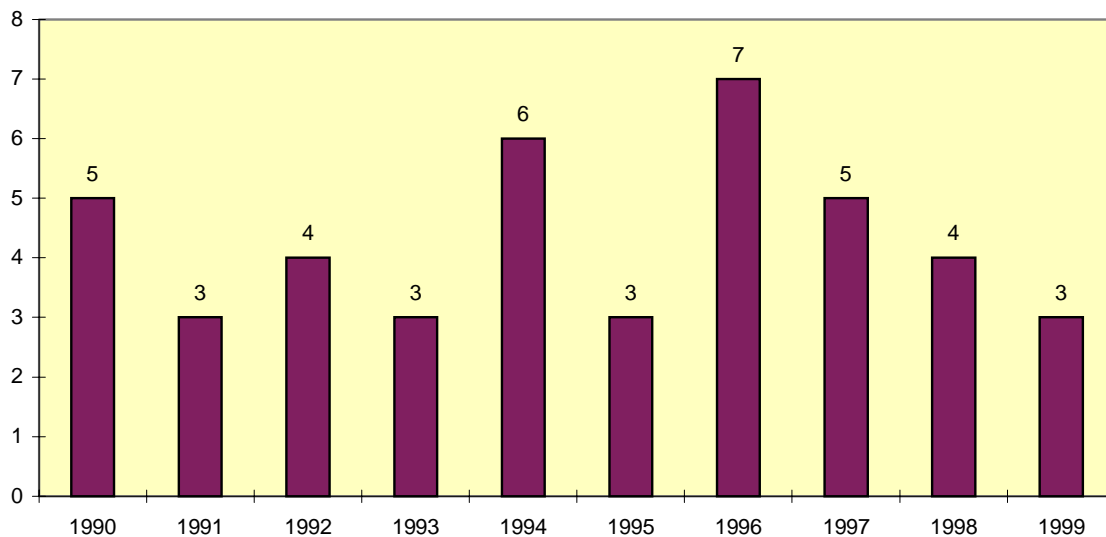


Figure xvi - World-wide Eastern Built Jet Fatal accidents

The 43 fatal accidents resulted in 1832 fatalities. There was a relatively high number of fatalities in 1994 which was mainly as a result of two major fatal accidents. Both accidents involved Tupolev 154s, one in China (where an autopilot failure led to excessive vibration and the eventual inflight break up of the aircraft) and the other in Russia (where an engine caught fire shortly after take-off and there was a loss of control). Together, these two accidents caused 285 fatalities. In recent years the number of fatal accidents and fatalities has decreased quite substantially.

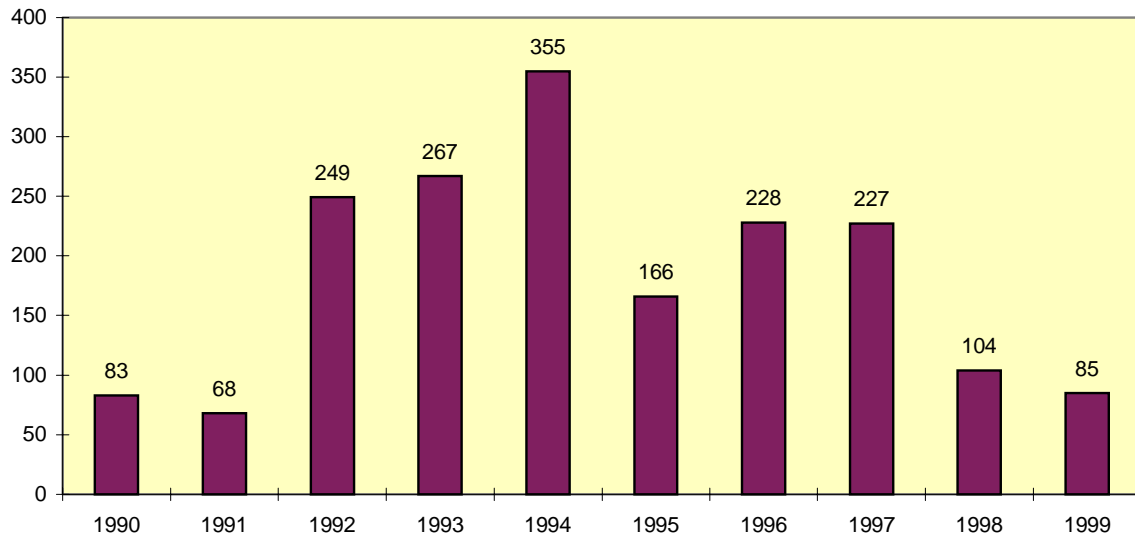


Figure xvii - World-wide Eastern Built Jet fatalities

E. Eastern Built Turboprops

Due to the limited amount of information available for Eastern Built Turboprops, only the number of fatal accidents and associated fatalities between 1990 and 1999 are shown in this section. Figure xviii shows the number of fatal accidents and figure xix shows the number of fatalities. There have been 50 Eastern Built Turboprop fatal accidents between 1990 and 1999 and 1992 saw the highest number which was 9.

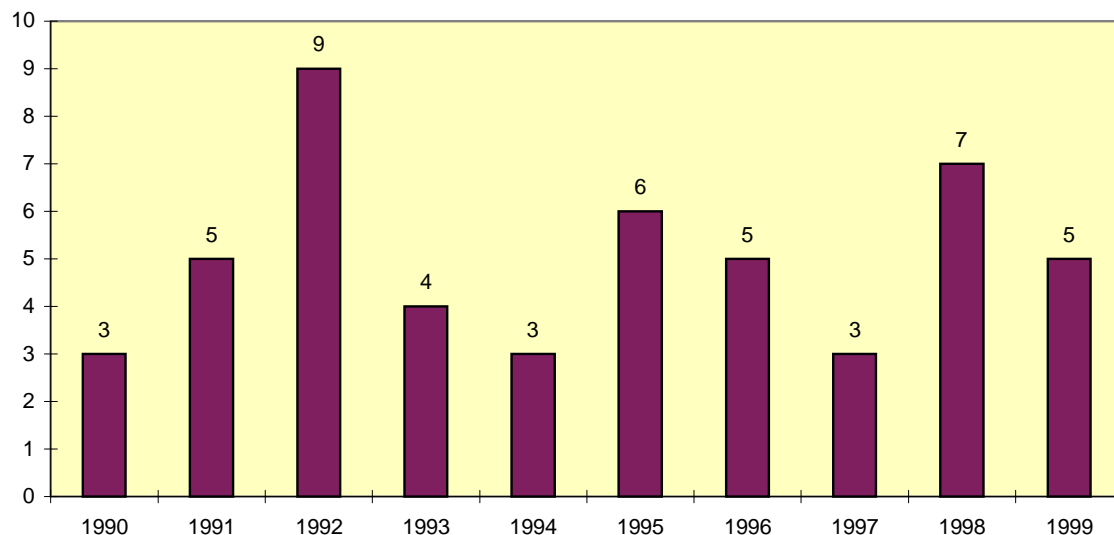


Figure xviii - World-wide Eastern Built Turboprop Fatal Accidents

The 50 fatal accidents resulted in 1084 fatalities. There were 372 fatalities in 1996 which far exceeds the annual average of 108. The number of fatalities in 1996 was dominated by a single accident in Kinshasa, Zaire where a Scibe Airlift Antonov 32 failed to take-off and overran into a market, killing 297 people on the ground. The number of fatalities has been decreasing since 1996 but the corresponding number of fatal accidents has been fluctuating between 3 and 7 (the average number of fatal accidents is 5 per year).

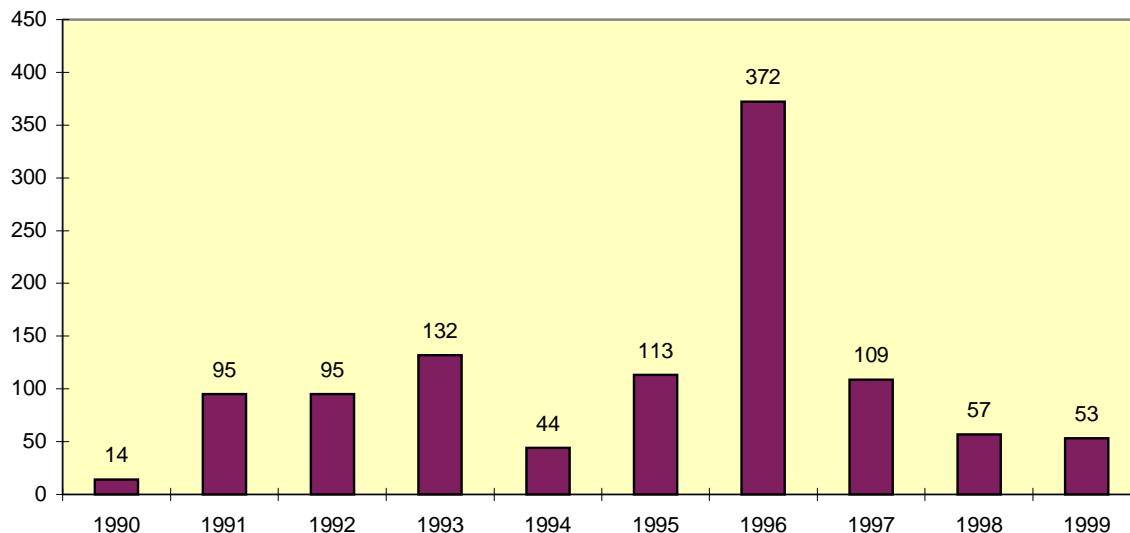


Figure xix - World-wide Eastern Built Turboprop Fatalities

F. Summary

The following tables provide a summary of the information pertaining to the four aircraft classes which have been discussed in previous sections.

	Class of Aircraft			
	Western Built Jet	Western Built Turboprop	Eastern Built Jet	Eastern Built Turboprop
Fatal accidents 1990-1999	104	159	43	50
Fatalities 1990-1999	6588	1992	1832	1084

Table i - Number of Fatal Accidents & Fatalities

	Class of Aircraft			
	Western Built Jet	Western Built Turboprop	Eastern Built Jet	Eastern Built Turboprop
Fatal Accident Rate in 1990	0.45	1.82	-	-
Fatal Accident Rate in 1999	0.46	1.19	-	-
Predicted Fatal Accident Rate in 2020	0.18	0.98	-	-
<i>Note: Fatal Accident Rates are shown per million flights</i>				

Table ii - Worldwide Fatal Accident Rates

	Class of Aircraft			
	Western Built Jet	Western Built Turboprop	Eastern Built Jet	Eastern Built Turboprop
JAA	0.14	0.69		
Europe	0.21	0.66	-	-
North America	0.10	0.64	-	-
South America	0.92	3.85	-	-
Asia	0.62	5.80	-	-
Africa	1.06	4.21	-	-
Australasia	0.00	3.14	-	-
<i>Note: Fatal Accident Rates are shown per million flight hours</i>				

Table iii - Fatal Accident Rates by Operator Region

1 UK AIRLINE (PASSENGER) AEROPLANES > 5,700KG MTWA

This chapter contains information on UK registered or operated aeroplanes over 5,700kg maximum take-off weight authorised engaged in Airline (Passenger) operations.

1.1 Fatal accidents

Between 1990 and 1999 there have been no fatal accidents, (excluding UK third party only fatal accidents). During the last ten years, UK airlines have carried approximately 706 million passengers with no passenger fatalities.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
NIL							

Table 1 - List of Fatal accidents

1.2 Reportable accidents

All 132 reportable accidents (as defined in Chapter 18) are shown in Figure 1. The average number of reportable accidents per annum during passenger services was 13.

(Note: It is estimated that 97% of UK public transport aeroplane flights over the last ten years were made by passenger aircraft.)

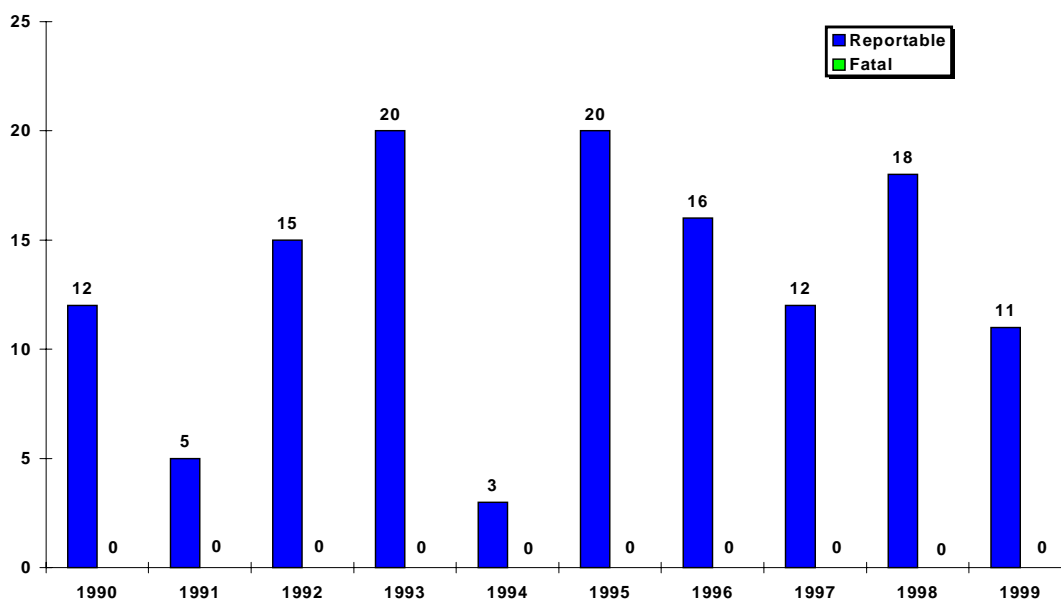


Figure 1 - Fatal & Reportable accidents

1.3 Fatal accident rate

The fatal accident rate is shown in Figure 2 using a three year moving average. The rate is zero for the period 1990 - 1999.

1.4 Reportable accident rate

The reportable accident rate is shown in Figure 2 using a three year moving average. Despite an increase of around 64% in revenue hours flown during the 10 year period, the reportable accident rate has remained fairly constant with an average rate of 8.5 reportable accidents per million revenue hours flown. However, in recent years there appears to be a downward trend.

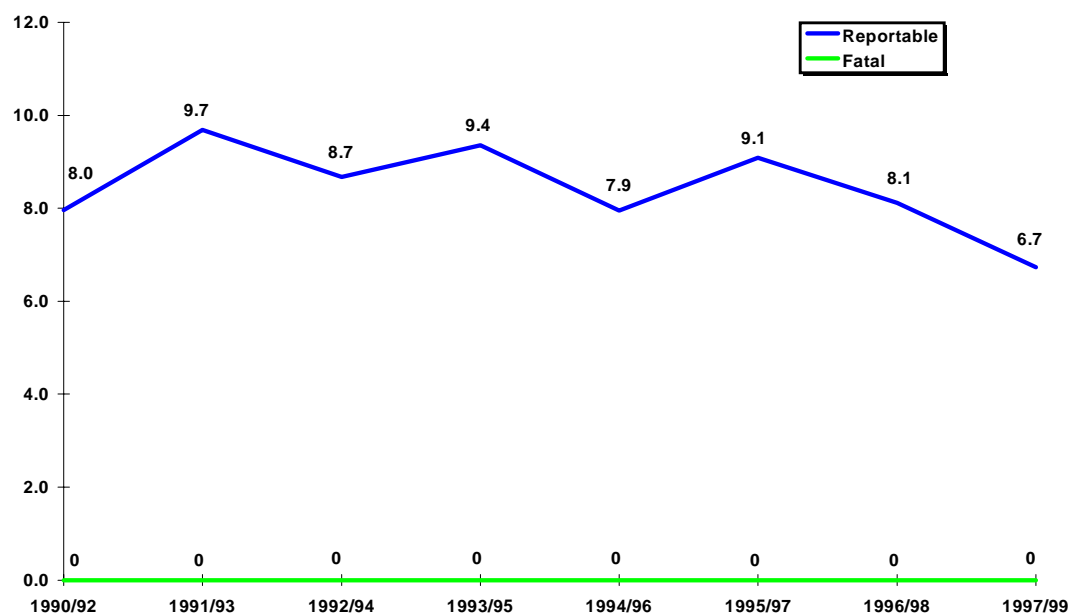


Figure 2 - Fatal & Reportable accident rate

1.5 Injuries sustained in reportable accidents

The injuries sustained in all reportable accidents are shown in Table 2 for passenger service. There have been zero fatal injuries, 18 serious injuries and 106 minor injuries on passenger services.

	Injury	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Crew	Fatal											0
	Serious	2	1	2	3	1	2	1				12
	Minor	11	1			2	2	1	4			21
	Total	13	2	2	3	3	4	2	4	0	0	33
Passenger	Fatal											0
	Serious	1		1						1	3	6
	Minor	4				2	5		6		68	85
	Total	5	0	1	0	2	5	0	6	1	71	91

Table 2 - Injuries sustained in reportable accidents during passenger services

1.6 Operational data

Between 1990 and 1999 UK public transport aeroplanes have completed 7.5 million flights, flown 16.5 million revenue hours and carried 706 million revenue passengers as shown in Table 3.

	Flights ('000)	Revenue hours ('000)	Revenue passengers carried ('000)
1990	680.7	1328.5	55,315
1991	634.0	1270.2	52,470
1992	676.0	1422.9	59,705
1993	664.9	1438.5	62,573
1994	688.2	1516.5	68,938
1995	737.1	1641.0	72,613
1996	776.8	1750.4	74,216
1997	833.5	1887.5	80,265
1998	877.1	2028.1	86,657
1999	934.5	2174.3	93,126

Table 3 - Operational data

2 UK AIRLINE (CARGO) AEROPLANES > 5,700KG MTWA

This chapter contains information on UK registered or operated aeroplanes above 5,700kg maximum take-off weight authorised engaged in Airline (Cargo) operations.

2.1 Fatal accidents

Since 1990 there have been 2 fatal accidents, (excluding UK third party only fatal accidents) during cargo services.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
25-Feb-94	Viscount 813	Nr. Uttoxeter, UK	Cargo	Three engines flamed out, forced landing/crashed	1	1	
12-Jan-99	Fokker F27	Guernsey	Cargo	Stalled on approach and struck houses	2		

Table 4 - List of Fatal accidents

2.2 Reportable accidents

All 15 reportable accidents are shown in Figure 3. The average number of reportable accidents per annum during cargo services was 1.5. It is estimated that about 3% of UK public transport aeroplane flights over the last ten years were solely cargo.

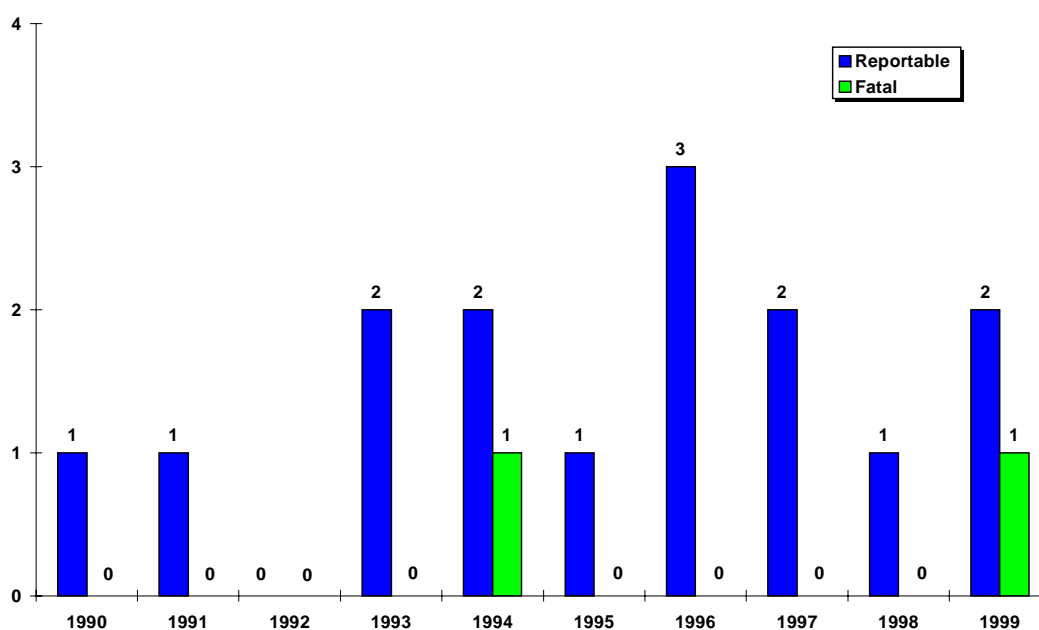


Figure 3 - Fatal & Reportable accidents

2.3 Fatal accident rate

The fatal accident rate is shown in Figure 4 using a three year moving average. It has remained fairly constant despite a significant increase in cargo aeroplane utilisation. Between 1990 and 1999, the average fatal accident rate was 4.35 fatal accidents per million revenue hours flown.

2.4 Reportable accident rate

The reportable accident rate is shown in Figure 4 using a three year moving average. Despite an increase of around 8.5% in revenue hours flown during the 10 year period, the reportable accident rate grew significantly from 18.7 in 1990/92 to 51.6 in 1995/97, with the average rate being 40.4 reportable accidents per million revenue hours flown.

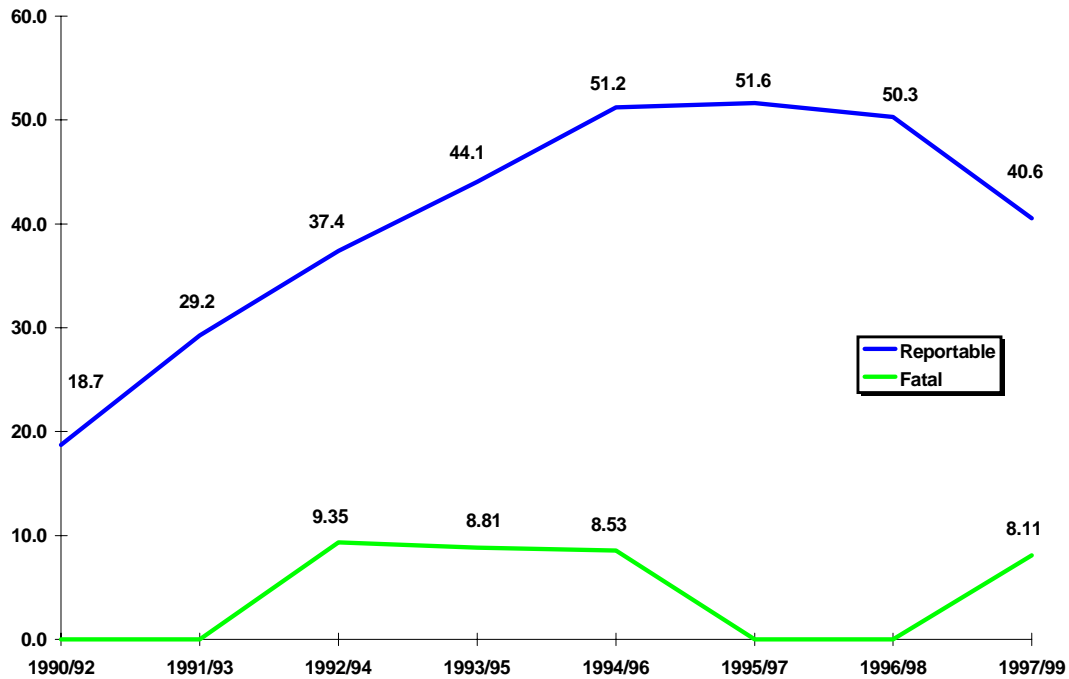


Figure 4 - Fatal & Reportable accident rate

2.5 Injuries sustained in reportable accidents

The injuries sustained in all reportable accidents are shown in Table 5 for cargo services. Since 1990 there have been 3 fatal injuries, 1 serious injury and zero minor injuries on cargo services.

	Injury	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Crew	Fatal					1					2	3
	Serious					1						1
	Minor											0
	Total	0	0	0	0	2	0	0	0	0	0	2

Table 5 - Injuries sustained in reportable accidents during cargo services

2.6 Operational data

Between 1990 and 1999, UK public transport cargo aeroplanes have completed 0.3 million flights and flown 0.4 million revenue hours.

	Flights ('000)	Revenue hours ('000)
1990	27.9	38.8
1991	26.4	35.5
1992	26.7	32.7
1993	29.1	34.4
1994	33.6	39.9
1995	33.8	39.2
1996	33.6	38.1
1997	33.4	39.0
1998	37.8	42.2
1999	37.4	42.1

Table 6 - Operational data

3 UK AIRLINE AEROPLANES < 5,700KG MTWA

This chapter contains information on UK registered or operated aeroplanes at or below 5,700kg maximum take-off weight authorised engaged in Airline operations (see Chapter 4 for Air Taxi operations). The statistics have not been divided into passenger and cargo services as the reporting of utilisation data for specific services in this category is not required. Police, ambulance and search and rescue (SAR) flights are not included - see Chapter 7.

3.1 Fatal accidents

Between 1990 and 1999 there have been 4 fatal accidents to aeroplanes in this category, as shown below. These accidents resulted in 6 crew fatalities and 16 passenger fatalities, (1 on a cargo flight).

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
24-May-95	Emb. Bandeirante	Nr. Leeds/Bradford	Passenger	Lost control in adverse weather	12		
19-May-96	Islander	Tingwall	Passenger	Crashed during second approach at night	1	1	1
06-Mar-97	Piper PA34	Nr. Southend	Cargo	Crashed after reporting artificial horizon problems	1	1	
03-Sep-99	Cessna 404 Titan	Nr. Glasgow	Passenger	Crashed and caught fire shortly after take-off	8	3	

Table 7 - List of Fatal accidents

3.2 Reportable accidents

There have been 10 reportable accidents to aeroplanes as shown in Figure 5.

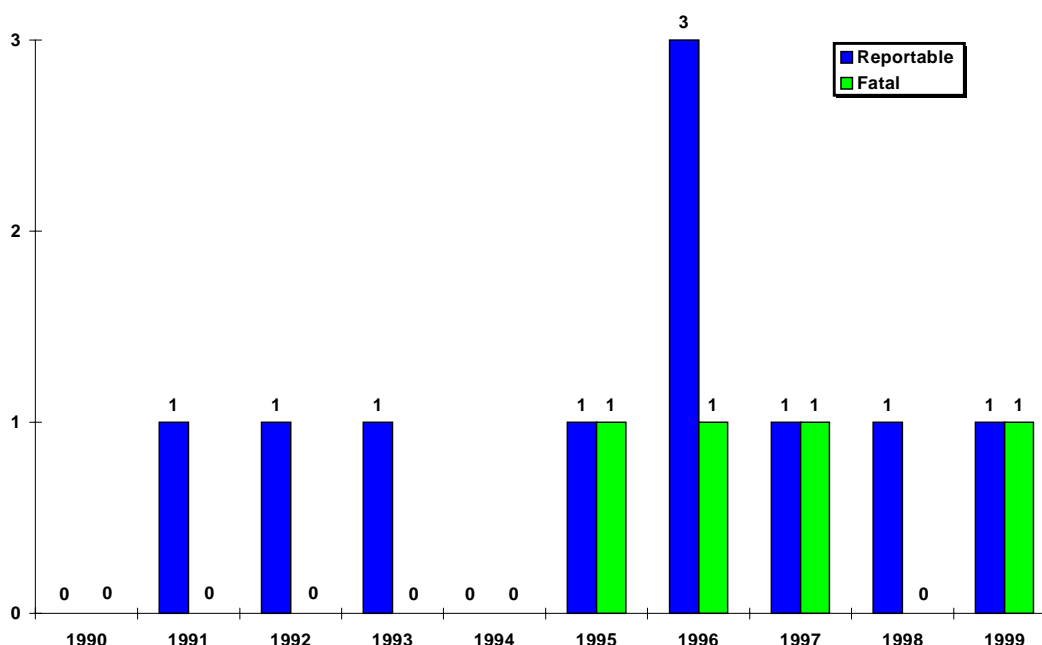


Figure 5 - Fatal & Reportable accidents

3.3 Fatal accident rate

The fatal accident rate, as shown in Figure 6 using a three year moving average, has increased in recent years. The average fatal accident rate for aeroplanes during the period 1990-1999 inclusive was 36.4 reportable accidents per million revenue hours flown.

3.4 Reportable accident rate

The reportable accident rate, as shown in Figure 6 using a three year moving average, has steadily increased over the decade. The average reportable accident rate for aeroplanes during this period was 90.9 reportable accidents per million revenue hours flown.

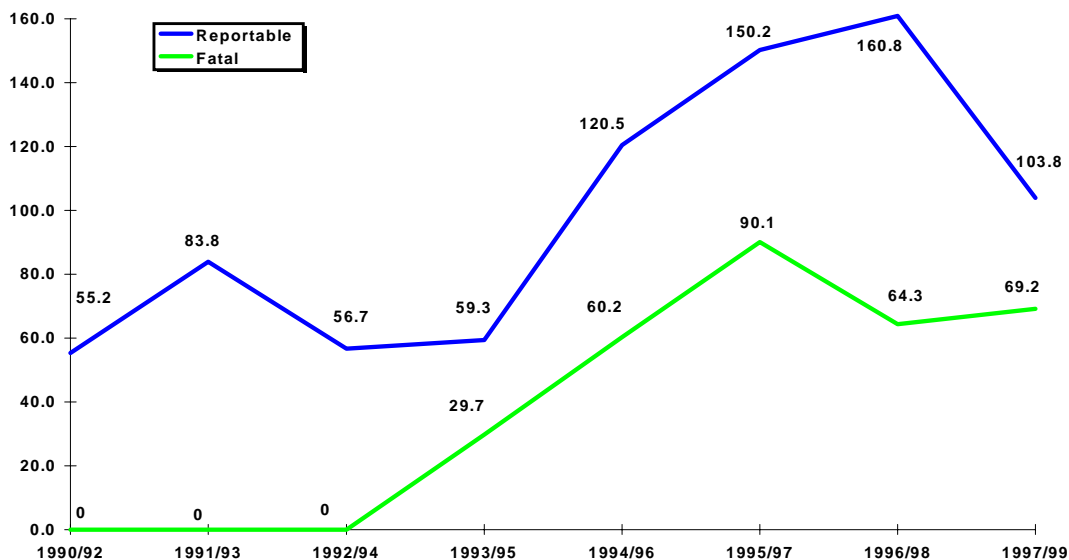


Figure 6 - Fatal & Reportable accident rate

3.5 Injuries sustained in reportable accidents

The injuries sustained in reportable accidents to UK aeroplanes are shown in Table 8. There have been 16 passenger and 6 crew fatalities and 5 serious injuries in aeroplane accidents.

Injury		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Crew	Fatal						3	1			2	6
	Serious								1			1
	Minor											0
	Total	0	0	0	0	0	3	1	1	0	2	7
Passenger	Fatal						9		1		6	16
	Serious							1			3	4
	Minor							1				1
	Total	0	0	0	0	0	9	2	1	0	9	21

Table 8 - Injuries sustained in reportable accidents to aeroplanes

3.6 Operational data

Between 1990 and 1999, UK Airlines below 5700kg have completed 0.11 million revenue hours, 0.35 million stage flights and carried 3.3 million passengers as shown in Table 9.

	Flights ('000)	Revenue hours ('000)	Revenue passengers carried ('000)
1990	40.6	12.1	425
1991	35.1	11.1	332
1992	38.7	13.0	336
1993	35.5	11.7	309
1994	34.6	10.6	299
1995	37.5	11.4	336
1996	36.2	11.2	329
1997	32.5	10.7	312
1998	31.0	9.2	294
1999	30.3	9.0	280

Table 9 - Operational data

4 UK AIR TAXI AEROPLANES < 15,000KG MTWA

This chapter contains information on UK registered or operated aeroplanes at or below 15,000kg maximum take-off weight authorised engaged in Air Taxi operations. The statistics in this chapter have not been divided into passenger and cargo services as the reporting of utilisation data for specific services in this category is not required.

4.1 Fatal accidents

There has been 1 fatal accident which resulted in 2 crew fatalities.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
13-Jan-93	Emb. Bandeirante	Nr. Sellafield	Cargo	Crashed on high ground in adverse weather	2		

Table 10 - List of Fatal accidents

4.2 Reportable accidents

There have been 12 reportable accidents, as shown in Figure 7.

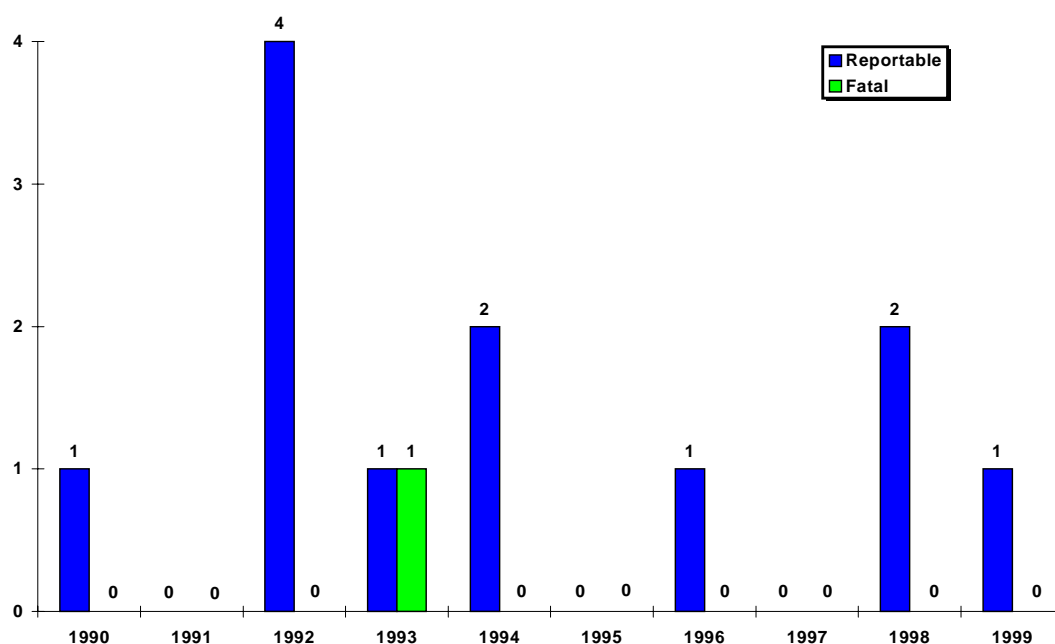


Figure 7 - Reportable accidents

4.3 Fatal accident rate

The fatal accident rate is shown in Figure 8 using a three year moving average. Although the average reportable accident rate for aeroplanes during the period 1990-1999 inclusive was 1.5 fatal accidents per million revenue hours flown, it dropped to zero in the latter half of the decade.

4.4 Reportable accident rate

The reportable accident rate is shown in Figure 8, using a three year moving average. The average reportable accident rate for aeroplanes during the period 1990-1999 inclusive was 15.2 reportable accidents per million revenue hours flown.

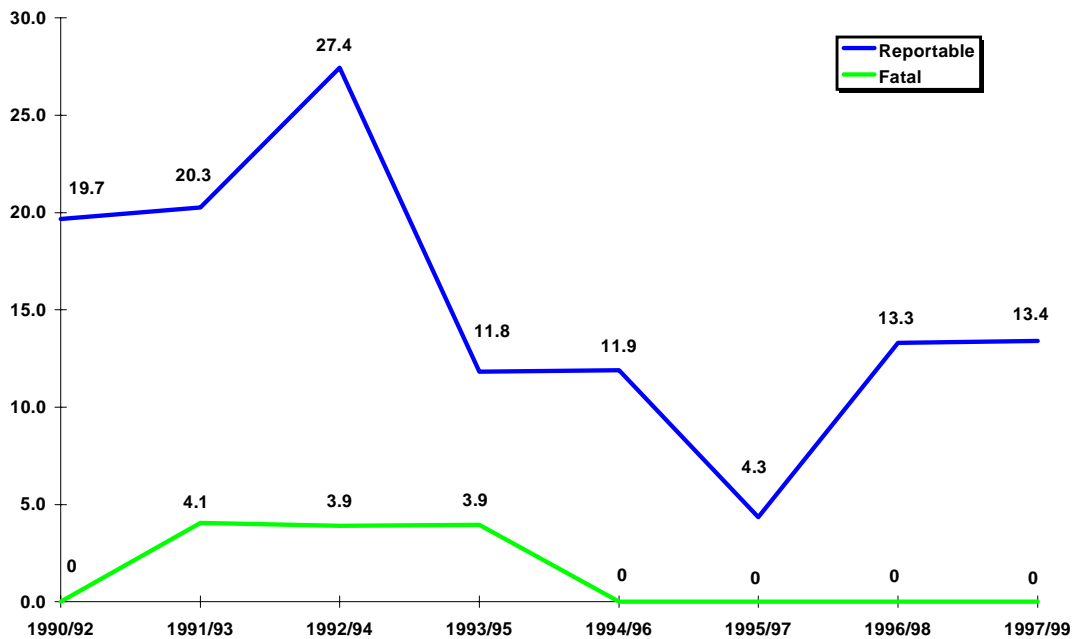


Figure 8 - Fatal & Reportable accident rate

4.5 Injuries sustained in reportable accidents

The injuries sustained in reportable accidents to UK Air Taxi aeroplanes are shown in Table 11. There have been 2 crew but no passenger fatalities in air taxi accidents. No other injuries have been sustained.

	Injury	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Crew	Fatal				2							2
	Serious											0
	Minor											0
	Total	0	0	0	2	0	0	0	0	0	0	2

Table 11 - Injuries sustained in reportable accidents to aeroplanes

4.6 Operational data

Between 1990 and 1999, UK Air Taxi aeroplanes have completed 0.8 million revenue hours and 0.8 million stage flights.

	Flights ('000)	Revenue hours ('000)
1990	87.0	86.3
1991	83.2	82.2
1992	77.7	85.9
1993	79.1	78.6
1994	86.2	90.6
1995	79.9	84.5
1996	73.1	77.1
1997	77.1	68.8
1998	84.2	79.6
1999	84.1	75.6

Table 12 - Operational data

5 UK PUBLIC TRANSPORT HELICOPTERS

This chapter contains information on UK registered or operated helicopters engaged in public transport operations. The statistics in this chapter have not been divided into passenger and cargo services as the proportion of UK helicopter cargo flights is very low. Similarly, no attempt has been made to split the helicopters by weight group as they all fall into a much narrower band than aeroplanes. Police, ambulance and search and rescue (SAR) flights are not included - see Chapter 7.

5.1 Fatal accidents

Between 1990 and 1999 there have been 3 fatal accidents involving 4 crew and 18 passenger fatalities (excluding third party only fatal accidents), all passenger flights, of which 2 were during North Sea operations.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
25-Jul-90	Sikorsky S61	Brent Spar oil rig	Passenger	Tail rotor struck rig structure, helicopter sank	6	4	3
14-Mar-92	SA332 Super Puma	North Sea	Passenger	Crashed into sea and sank, in severe winds	11	1	5
22-Oct-96	SA355 Twin Squirrel	Middlewich	Passenger	Crashed following disorientation at night	5		

Table 13 - List of Fatal accidents

5.2 Reportable accidents

The total number of reportable accidents from 1990 to 1999 for helicopters in public transport operations is 26. It should be noted that the majority of public transport flights by UK helicopter operators are North Sea operations.

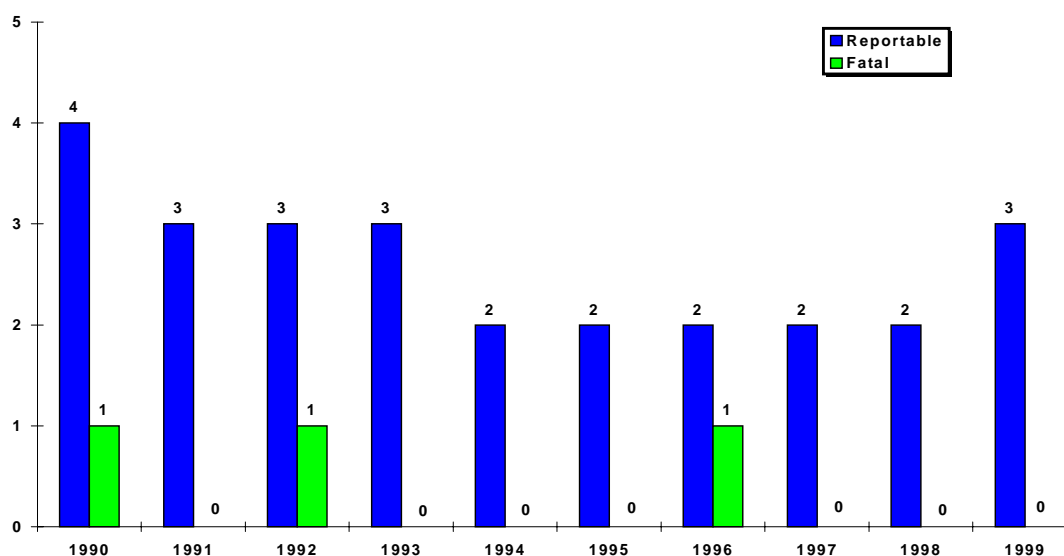


Figure 9 - Fatal & Reportable accidents

5.3 Fatal accident rate

The fatal accident rate is shown in Figure 10 using a three year moving average. As there are very few fatal helicopter accidents, it is difficult to draw many conclusions from fatal accident rates. Between 1990 and 1999 inclusive, the average rate was 2.1 fatal accidents per million revenue hours flown.

5.4 Reportable accident rate

The reportable accident rate is shown in Figure 10 using a three year moving average. The average rate was 18.3.

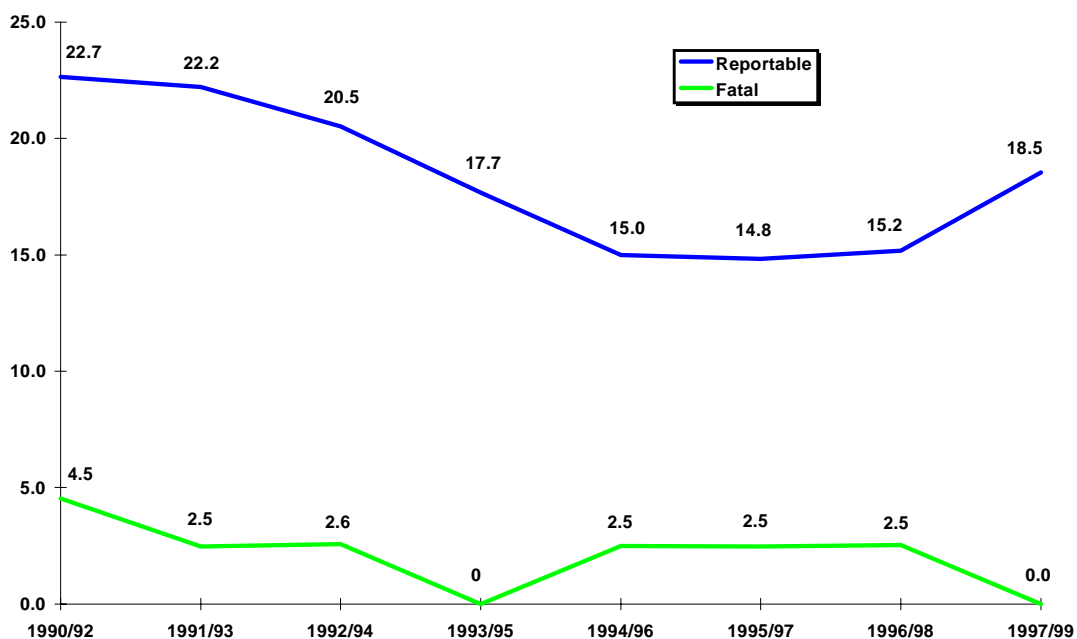


Figure 10 - Fatal & Reportable accident rate

5.5 Injuries sustained in reportable accidents

The injuries sustained in reportable accidents to UK helicopters in public transport operations are shown in Table 14. Since 1990 there have been 22 fatal injuries, 10 serious injuries and 14 minor injuries.

	Injury	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Crew	Fatal	2		1				1				4
	Serious				1			1				2
	Minor		1	1						1		3
	Total	2	1	2	1	0	0	2	0	1	0	9
Passenger	Fatal	4		10				4				18
	Serious	4	1	1				2				8
	Minor	3	3	4						1		11
	Total	11	4	15	0	0	0	6	0	1	0	37

Table 14 - Injuries sustained in reportable accidents

5.6 Operational data

Between 1990 and 1999, UK public transport helicopters have completed 1.3 million revenue hours and 3 million stage flights.

	Flights ('000)	Revenue hours ('000)
1990	409.9	166.3
1991	356.8	145.4
1992	303.7	129.7
1993	294.5	129.9
1994	275.9	130.3
1995	284.1	135.8
1996	271.8	134.4
1997	262.7	134.2
1998	253.3	126.5
1999	249.2	116.9

Table 15 - Operational data

Notes: 1) With the liberalisation of Air Transport Licensing within the EC during 1993, most non-scheduled helicopter operations are now recorded as air taxi, thus for consistency airline and air taxi data have been combined to show a total for public transport.

2) Passengers carried on air taxi flights are not recorded.

6 UK PUBLIC TRANSPORT BALLOONS

This chapter contains information on UK registered public transport operated balloons.

6.1 Public Transport Balloons

There have been 40 reportable accidents involving UK balloons in public transport operations, with one fatal accident which resulted in one passenger fatality as shown in Tables 16 & 17. Additionally, 33 people have been seriously injured in balloon accidents over the last 10 years.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
20-Jul-97	Cameron A-210	Humberside	Passenger	Struck power cables on landing	1	8	4

Table 16 - List of Fatal accidents

Over 600,000 passengers were carried and over 87,000 flights completed between 1990 and 1999.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Hours flown	7,347	8,545	8,863	9,956	10,239	10,789	11,666	10,611	7,590	8,963
Flights	6,854	8,604	8,292	9,494	9,512	10,269	8,961	9,362	7,244	8,584
Passengers carried	34,572	45,886	48,622	60,800	66,290	71,953	66,545	78,486	58,919	70,440
Fatal accidents	0	0	0	0	0	0	0	1	0	0
Reportable accidents	0	3	10	8	7	4	1	4	2	1
Fatal accidents per million hours	0.0	0.0	0.0	0.0	0.0	0.0	0.0	94.2	0.0	0.0
Reportable accidents per million hours	0.0	351.1	1128.3	803.5	683.7	370.7	85.7	377.0	263.5	111.6
Fatal injuries	0	0	0	0	0	0	0	1	0	0
Serious injuries	0	2	9	5	4	1	0	10	1	1
Minor injuries	0	4	12	3	10	0	1	21	2	3

Table 17 - Public Transport Balloons
Source: British Balloon and Airship Club and CAA

7 UK POLICE, AMBULANCE AND SEARCH AND RESCUE SERVICES

This chapter contains information on UK registered aeroplanes and helicopters engaged in police, ambulance and search and rescue (SAR) services. Under Article 7 of the Air Navigation Order - a flight by an aircraft, registered in the UK, in the service of a police authority shall be deemed to be flight for the purpose of Public Transport, therefore, limited operational data for police flights is available and included. However, such information for ambulance and SAR services is not available so this chapter will only consider accident numbers for these types of operation. Third party accidents have been excluded from these statistics.

7.1 Fatal accidents

Since 1990, there have been 3 fatal accidents in this category, 2 Police and 1 Ambulance, all helicopters. There have been 5 fatalities, 5 serious injuries and 2 minor injuries since 1990.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
24-Jan-90	Bell 206	Giffnock	Police	Engine flamed out in snow and aircraft struck building	1	3	
26-Jul-98	SA355 Twin Squirrel	Nr. Rochester	Ambulance	Aircraft struck overhead power cables and crashed into field	3		
10-Oct-98	SA355 Twin Squirrel	Husbands Bosworth	Police	Crashed into woodland shortly after take-off	1	2	

Table 18 - List of Fatal accidents

7.2 Reportable accidents

Since 1990, there have been 15 reportable accidents during police, ambulance or SAR services of which 13 involved helicopters.

	Police		Ambulance		SAR	
	Aeroplane	Helicopter	Aeroplane	Helicopter	Aeroplane	Helicopter
1990	1	3	0	0	0	0
1991	0	0	0	1	0	0
1992	1	0	0	0	0	0
1993	0	1	0	1	0	0
1994	0	0	0	0	0	0
1995	0	0	0	0	0	0
1996	0	1	0	0	0	0
1997	0	1	0	1	0	1
1998	0	1	0	1	0	0
1999	0	1	0	0	0	0
Total	2	8	0	4	0	1

Table 19 - Reportable accidents

7.3 Operational data for police flights

Limited operational data for police flights is shown in Table 20. Since 1994, police operators have performed 0.2 million flights and flown 0.1 million hours.

	Flights ('000)	Hours Flown ('000)
1994	21.9	12.9
1995	36.6	19.7
1996	39.1	21.2
1997	41.9	23.2
1998	41.5	22.5
1999	42.5	23.9

Table 20 - Operational data for police flights

8 UK NON-PUBLIC TRANSPORT AIRCRAFT > 5,700KG MTWA

This chapter contains information on UK registered or operated aeroplanes and helicopters above 5,700kg maximum take-off weight authorised engaged in non-public transport operations. Utilisation data is not available for this category.

8.1 Fatal accidents

There have been 6 fatal accidents all of which involved aeroplanes. These accidents resulted in 8 crew fatalities and no passenger fatalities.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
31-Jan-90	HS125	Columbia	Business	Crashed following double engine failure	1	1	
06-Oct-92	Jetstream 32	Prestwick	Training	Wing dropped after take-off, aircraft crashed and caught fire	2		
11-Jun-93	Hunter	Peak District	Unknown	Crashed into high ground in poor weather	1		
28-Dec-93	Skyvan	Spain	Parachuting	Aircraft struck trees and crashed with one engine shut down	1		
21-Jul-96	Mosquito	Manchester Barton	Demo-race	Crashed during air display	2		
06-May-98	Hunter	Dunsfold	Practice	Aircraft crashed after declaring Mayday and engine failure	1		

Table 21 - List of Fatal accidents

8.2 Reportable accidents

There have been 18 reportable accidents involving aeroplanes as shown in Figure 11.

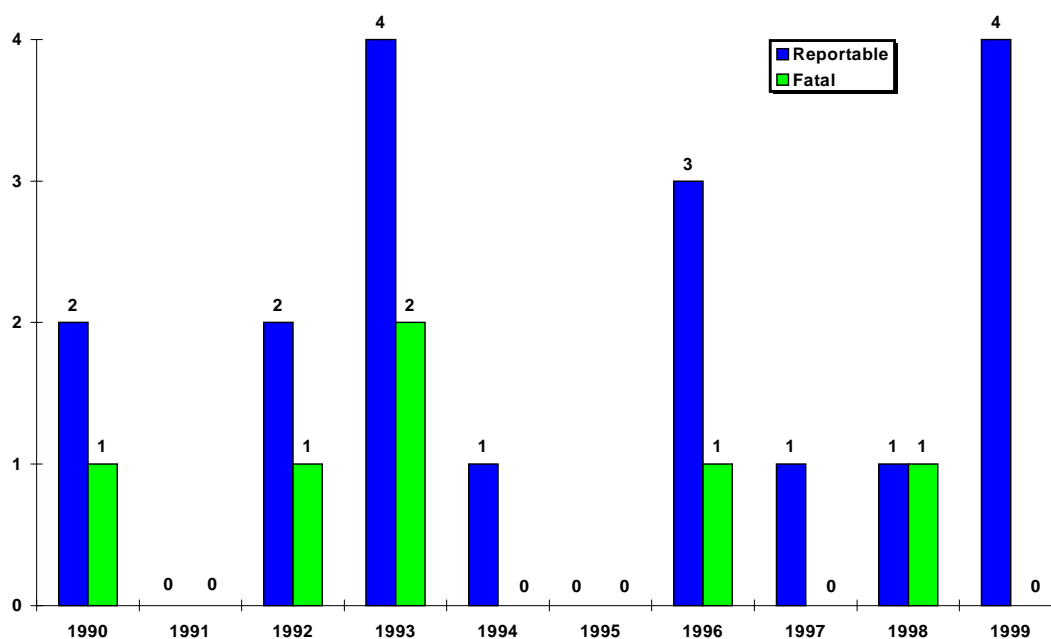


Figure 11 - Fatal & Reportable accidents to Aeroplanes

Between 1990 and 1999 there have been 2 reportable accidents involving large helicopters, both ground events.

8.3 Injuries sustained in reportable accidents

The injuries sustained in reportable accidents to aeroplanes are shown in Table 22. There have been 8 fatal injuries, 1 serious injury and 3 minor injuries.

	Injury	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Crew	Fatal	1		2	2			2		1		8
	Serious	1										1
	Minor				2			1				3
	Total	2	0	2	4	0	0	3	0	1	0	12

Table 22 - Injuries sustained in reportable accidents to aeroplanes

There were no fatal accidents involving helicopters in this category and no injuries, however, very few UK civil operated helicopters are above 5700kg mtwa.

9 UK NON-PUBLIC TRANSPORT AEROPLANES < 5,700KG MTWA

This chapter contains information on UK registered aeroplanes at or below 5,700kg maximum take-off weight authorised engaged in operations other than public transport. Accidents to airships, balloons, gliders, microlights and gyroplanes, are excluded from these statistics - see Chapter 11 for more information about these.

9.1 Fatal accidents

Between 1990 and 1999, there have been 119 fatal accidents to aeroplanes in non-public transport operations as shown in Figure 12. The annual numbers of fatal accidents appear to be fairly constant with only small fluctuations around the average of 11.9.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
09-Feb-90	Christen Eagle 2	Nr. Chelmsford, Essex	Private	Failed to recover from a low level aerobatic manoeuvre	1		
18-Mar-90	FNR RF5	Rattlesden, Suffolk	Private	Aircraft stalled and hit ground shortly after take-off	1	1	
24-Mar-90	Cessna 150FM	Nr. Mere, Wiltshire	Private	Stalled in low level turn during precision flying practice	2		
13-Apr-90	Beech 33 Bonanza	Bayeux, France	Private	Loss of control in IMC and severe turbulence - a/c broke up in air	4		
28-Apr-90	D62 Condor	Tibenham, Norfolk	Towing	Tug engine problems - wing struck ground during forced landing	1		
03-May-90	Grob G109	Wolford Heath, Warks	Private	Mid-air collision with Robin	2		1
19-May-90	Tigermoth/PA28	Nr. Reigate, Surrey	Private	Climbing Tigermoth collided with descending PA28 under instruction	4		
27-May-90	Socata TB10	Stoneykirk, Scotland	Private	Took off with flaps retracted in steep nose-high attitude, struck bank	4		
07-Jul-90	Piper PA28-140	Cranfield, Beds	Private	Stalled whilst turning to reposition correctly on finals	3		
17-Jul-90	Cessna 150FL	Skegness, Lincs	Private	Failed to recover from a low level stall turn	2		
20-Oct-90	Partenavia P68B	Nr. East Midlands Airport	Commercial	Crashed after take-off due to disorientation at night in poor weather	1		
20-Nov-90	Piper PA28-161	Nr. Dunbar, Scotland	Private	Struck high ground at night during appr to Edinburgh	1		
27-Dec-90	Cessna 150FF	Burlington Cross, Hants	Private	Short of fuel, lost control during precautionary landing in field	2		
10-Mar-91	Cessna 175C	Nr. Chilgrove, W Sussex	Private	Disorientation during go-around in bad weather - struck high ground	1		
31-Mar-91	PA38 Tomahawk	Coventry, W Midlands	Private	Crashed after failing to recover from formation pull-up and steep turn	2		
18-Apr-91	Piper PA28-181	Stannore, Middlesex	Private	Ran out of fuel and crashed	1		
15-May-91	Cessna 182Q	Nr. Llangollen, N Wales	Private	Crashed into high ground at 1500ft amsl	3		
19-May-91	Provost T51	Aldermaston, Berks	Private	Crashed during a low level turn whilst practising for an air display	1		
20-May-91	Piper PA28-161	Nr. Lancaster, Lancs	Private	Crashed at 850ft amsl in low cloud and hill fog	2		
30-Jun-91	DH89 Dragon Rapide	Audley End, Essex	Display	Spun during low level slow flight display	1		
06-Jul-91	Taylor Titch	Winterbourne, Nr. Bristol	Private	Stalled in steep low level turn and struck ground	1		
17-Aug-91	Christen Eagle 2	Nr. Pangbourne, Berks	Private	Failed to recover from inverted spin during aerobatics	2		
29-Aug-91	Cessna 152	Carno, Wales	Private	Struck by RAF Jaguar while carrying out low level photography	2	1	
21-Nov-91	Piper PA23 Aztec	Nr. Venice, Italy	Private	Crashed in sea off Venice at night	1		
16-Dec-91	Cessna P210N	Chichester, W Sussex	Private	Crashed in fog near touchdown point while attempting visual appr	1		
13-Feb-92	PA28-200R Arrow	Skiddaw, Cumbria	Private	Entered adverse weather at night, crashed into high ground	1		
03-Apr-92	Grob G115	Loch Muick, Ballater, Sco.	Instruction	Loss of control in adverse weather, crashed into Loch	2		
07-Apr-92	PA28-140 Cherokee	Conssett, Co Durham	Private	Struck radio mast cable 1932ft amsl in poor weather, crashed	1		
09-May-92	Pitts Special	Albenga, Italy	Display	Crashed after spin during flying display	1		
27-Jun-92	Spitfire XIV	Woodford, Manchester	Display	Failed to recover from loop at flying display and struck ground	1		
12-Jul-92	PA28-161 Warrior	Oxford Airport	Instruction	Lost control on finals due to wake turbulence from other helicopter	2		
15-Jul-92	Piper PA34-200T	Nr. Bowland, Lancs	Private	Struck 1400ft high ground in poor weather and visibility	1		
22-Aug-92	Socata TB20	Isle of Jura, Scotland	Private	Struck high ground in poor weather while flying off intended track	4		
04-Oct-92	Cessna 172D	Sheepwash, Devon	Private	Third attempt to take-off at maximum weight, struck hedge, crashed	1	2	1
17-Nov-92	Pitts Special	Chesham, Bucks	Instruction	Entered unintentional spin after aerobatic manoeuvre below TMA	1	1	
06-Dec-92	Cessna 182N	Nr. Wycombe, Bucks	Private	Crashed into trees during night visual appr with low cloud base	2		
28-Jan-93	Cessna 182N	Belfast Lough, N Ireland	Private	Crashed into water during night IMC appr to Belfast City Airport	1		
18-Mar-93	AS202 Bravo	Nr. Maybole, Ayr, Scotl.	Instruction	Entered spin and struck ground while flying low	2		
21-Mar-93	Socata TB20	Nr. Swindon, Wiltshire	Private	Lost electrical power, attempted precautionary ldg in poor weather	3		
08-Apr-93	Wassmer 52	Nr. Teignmouth, Devon	Private	Struck tree and crashed on high ground in bad weather	3		
22-Jun-93	Taylor Titch	Haut Rine, France	Private	Struck high ground in poor weather	1		
20-Jul-93	Beech 33 Debonair	Nr. Ashford, Kent	Private	Stalled while low flying and crashed in field	2		
15-Aug-93	Piper PA31 Navajo	Nr. Guildford, Surrey	Positioning	Sudden descent into ground at very high speed	1		
05-Sep-93	Pulsar	Co. Clare, Ireland	Private	Stalled in tight turn and dived to ground during low flypast	1		
15-Sep-93	PA28-161 Warrior	Nr. Sanquhar, Ayresshire	Instruction	Lost control after inadvertant entry into cloud	1		
03-Oct-93	Stolph Starduster 2	Nr. Bridport, Devon	Private	Wing failure just after take-off due to detached flying wire	1	1	
15-Nov-93	Auster J1N	Nr. Biggin Hill, Kent	Private	Crashed in garden while low flying involving steep manoeuvres	2		
08-Jan-94	Mooney M20J	The Wrekin, Shropshire	Private	Hit top of isolated hill in poor weather	2		
17-Jan-94	Cessna 182F	Nr. Keswick, Cumbria	Private	Dived into ground at high speed from cruise at 4500ft	1		
20-Jan-94	Piper PA34 Seneca 2	Nr. Bloxwich	Private	Lost control at 6000ft, broke up during recovery from ensuing dive	4		
06-Apr-94	Mooney M20J	Nr. Grenoble, France	Private	Struck high ground in poor weather	1		
25-Jun-94	Steen Skybolt	Nr. Penzance, Cornwall	Private	Lost control during aerobatics	2		
01-Aug-94	MS 733 Alcyon	Parham, Suffolk	Private	Stalled at 200ft after take-off and failed to recover from spin	2		
09-Oct-94	AA5B	Nr. Binbrook, Lincs	Private	Hit ground when nearing destination	1		
03-Nov-94	Cessna 180K	Nr. Ballymena, N Ireland	Private	Crashed on hillside in poor weather	1	1	
20-Nov-94	Cessna 182FQ	Nr. Worthing, Sussex	Private	Struck high ground in poor weather while attempting to land	2	1	
26-Dec-94	Robin HR100	Nr. Stapleford, Essex	Private	Struck power lines during a long flat approach	4		

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
04-Mar-95	Harvard T6	Nr. Malden, Essex	Private	Failed to recover from an inadvertent spin while practising routine	1	1	
13-Mar-95	Harvard T6	Nr. Andover, Hants	Private	Heavy landing, aircraft bounced and overturned - pilot asphyxiated	1	1	
21-Mar-95	Cessna 150	Nr. Knottingley, Yorks	Training	Crashed at high speed	1		
29-Apr-95	Piper PA28 Archer	N Sea, Nr. Clacton	Private	Crashed in sea following reported engine failure	1		
05-May-95	Kitfox Speedster	Nr. Dolphinton, Lanarks	Private	Entered spin and crashed after low flypast	1		
16-Jun-95	MS880B Rallye	Nr. Dunkeswell	Private	Stalled and crashed after maximum weight take-off	2	1	
09-Jul-95	Pulsar	Nr. Corby, Northants	Private	Climbed steeply and stalled after take-off	2		
20-Jul-95	Fokker DR1 Replica	Stourhead, Wilts	Demo-race	Lost control whilst about to start air display	1		
11-Aug-95	Beech 58 Baron	Nr. Thruxton, Hants	Private	Inadvertent stall - distraction due to cabin door opening	4		
13-Oct-95	Cessna 336	Nr. Douglas, Isle of Man	Private	Collided with cloud covered high ground	1		
23-Nov-95	Cessna 150	NW France, Sea	Private	Crashed into sea	1		
02-Mar-96	Jodel D9	Shoreham	Private	Engine failed during go-around, aircraft stalled and crashed	1		
11-Mar-96	Piper PA23	Nr. Granada	Unknown	Wreckage found in mountainous area	2		
04-May-96	Slingsby 67	Old Warden	Demo-race	Struck trees during recovery from intentional spin during display	1		
05-May-96	AA5	Nr. Westcott	Private	Mid-air collision with glider	1		
31-May-96	Cessna 152	Lydd	Instruction	Crashed on approach following low orbit	2		
06-Jun-96	Cessna 152	Nr. Evesham	Private	Crashed into field after high speed descent	1		
15-Jun-96	Robin 1180	Nr. Buxton	Private	Crashed on waste ground adjacent to industrial estate	4		
22-Jul-96	Robin 400	Nr. Bristol	Private	Entered spin and crashed after reporting control difficulties	1		
29-Jul-96	Kis	Nr. Calais	Private	Crashed into sea while returning from RSA rally	2		
31-Jul-96	Piper PA28	Canterbury	Private	Hit tree on take-off and crashed into scrub, caught fire	1		1
26-Aug-96	MS Rallye	Manchester Barton	Private	Stalled shortly after take-off and entered spin	2		
01-Sep-96	Seafury (Replica)	Crosland	Private	Crashed shortly after take-off	1		
25-Sep-96	Piper PA28	Irish Sea	Unknown	Ditched in sea 2miles SW of Southport pier	2		
16-Oct-96	Piper PA28	Nr. Perth	Private	Wreckage found on steep hillside	2		
26-Oct-96	Robin 400	Dover VOR	Instruction	Mid-air collision with a Robin 1180	2		
30-Oct-96	Socata TB10	Cardiff	Private	Propeller struck ground on landing, pilot died later	1		
21-Nov-96	Cessna 172	Compton Abbas	Unknown	Stalled after go-around and crashed	1		
09-Mar-97	Piper PA28	Nr. Biggin Hill, Kent	Private	Struck trees on approach in fog	2		
06-May-97	Cessna 150	Nr. Cumbernauld	Commercial	Dived onto road from low level and caught fire	1		
25-Jul-97	Pitts Special	Meppershall	Private	Spun in after take-off	1		
03-Aug-97	Cessna 421	Nr. Shobdon	Private	Crashed on approach and caught fire	3	1	
20-Aug-97	Tigermoth	Cardiff	Private	Appeared to stall during turn and crashed in field near airport	1	1	
29-Sep-97	FNR RF5	North Weald	Private	Right wing extension folded at joint, aircraft inverted and crashed	1		
20-Oct-97	Robin 200	Cromarty	Instruction	Ditched in sea during nighttime navex, student drowned	1		1
06-Nov-97	Piper PA28	Bournemouth	Practice	First solo flight completed one circuit then crashed in sea	1		
27-Nov-97	AA5	Shobdon	Practice	Clipped tree and landed inverted	1		
21-Dec-97	Cessna 152	Nr. Creetown	Private	Lost control and crashed after reporting suction pump failure	1		
19-Apr-98	Tigermoth	English Channel	Private	Aircraft missing with one POB, believed to have ditched	1		
17-May-98	Taylor Mono	Andrewsfield	Private	Aircraft crashed shortly after take-off	1		
23-May-98	Cessna 152	Snowdonia	Private	Aircraft crashed on mountainside	2		
29-May-98	Rockwell 114	Nr. Dijon	Private	Overran runway, struck a wall and overturned	2	2	
26-Jul-98	Jodel D112	Bentworth	Private	Aircraft ran out of fuel, stalled and spun into field	2		
09-Aug-98	D31 Turbulent	Swanton	Display	Crashed during air display, aircraft destroyed	1		
15-Aug-98	Fairchild M62	Woburn Abbey	Private	Crashed after engine failure shortly after take-off	1	1	
28-Aug-98	Cessna 150	Ardglass	Private	Crashed during local VFR flight	1		
20-Oct-98	Slingsby T67	Mow Cop	Private	Crashed in unknown circumstances, aircraft destroyed	2		
24-Dec-98	Jet Provost	Nr. Clacton	Private	Entered flat spin from steep climb and crashed into sea	1		
04-Feb-99	Cessna 150	Turweston	Training	Spun and crashed during simulated engine failure after take-off	1	1	
12-Feb-99	Cessna 172	Berwyn Mount	Private	Crashed in mountainous area	3		
29-Apr-99	Mooney 20	Selby	Private	Stalled and spun after engine power loss	4		
09-May-99	Jodel DR1050	Black Isle	Private	Crashed on rising ground in poor weather	2		
06-Jun-99	Cuby II	Giants Causeway	Private	Wings folded during turbulence	2		
03-Jul-99	CST Racer	Bembridge	Private	Engine stopped during a low level roll. Dived into ground	1		
15-Jul-99	Piper PA31	Nr. Rome, Italy	Unknown	Crashed in mountainous region	2		
26-Jul-99	Beech Be58 Baron	Nr. Kulusuk	Private	Crashed in low cloud during ferry flight	2		
01-Aug-99	Jet Provost	Woolaston	Private	Crashed in field	2		
02-Aug-99	Piper PA23	Beddgelert	Private	Crashed on mountainside	1		
18-Sep-99	AA5	Luton	Private	Loss of control on landing, struck parked SD330	3		
25-Sep-99	Bf 109	Sabadell, Spain	Private	Crashed on landing and caught fire	1		
06-Oct-99	Rans S6	Nr. Monewden	Private	Crashed into field shortly after take-off	1		
18-Dec-99	Piper PA28	Bournemouth	Private	Stalled and spun at 500ft during turn after take-off	3		

Table 23 - List of Fatal accidents

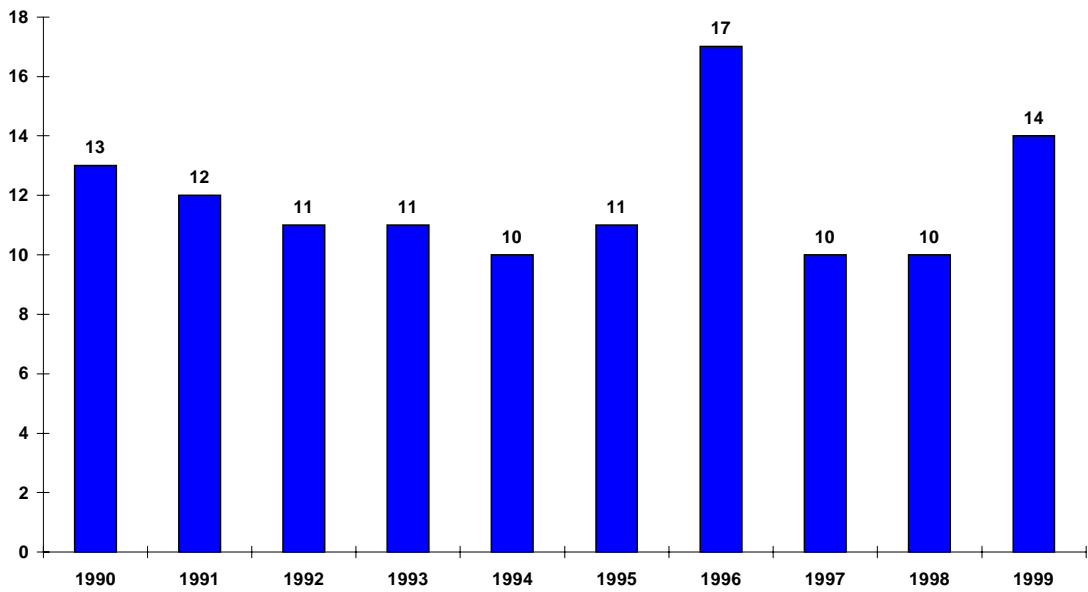


Figure 12 - Fatal accidents

9.2 Reportable accidents

Since 1990 there have been 1,963 reportable accidents to aeroplanes in non-public transport operations as shown in Figure 13, giving an annual average number of reportable accidents of 196. The annual number of reportable accidents has shown a decreasing trend over the last ten years.

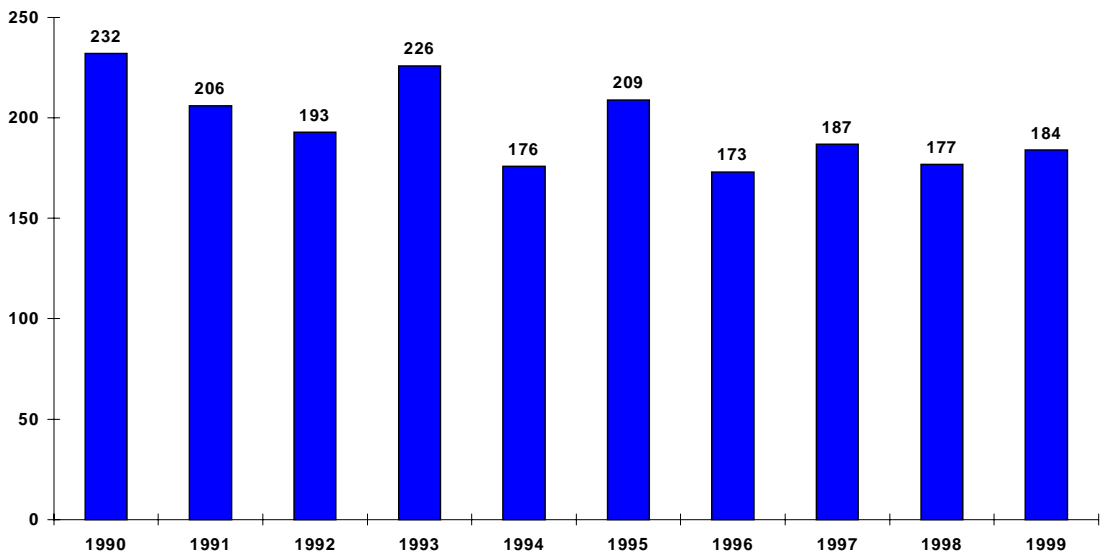


Figure 13 - Reportable accidents

9.3 Fatal accident rate

The fatal accident rate is shown in Figure 14 using a three year moving average. The overall rate for the period 1990 - 1999 was 13.9 fatal accidents per million estimated hours flown. The rate has remained fairly constant during this period.

9.4 Reportable accident rate

The reportable accident rate is shown in Figure 14 using a three year moving average. The Reportable accident trend has shown a decrease during the 1990s. The average rate over the period was 232 reportable accidents per million estimated hours flown.

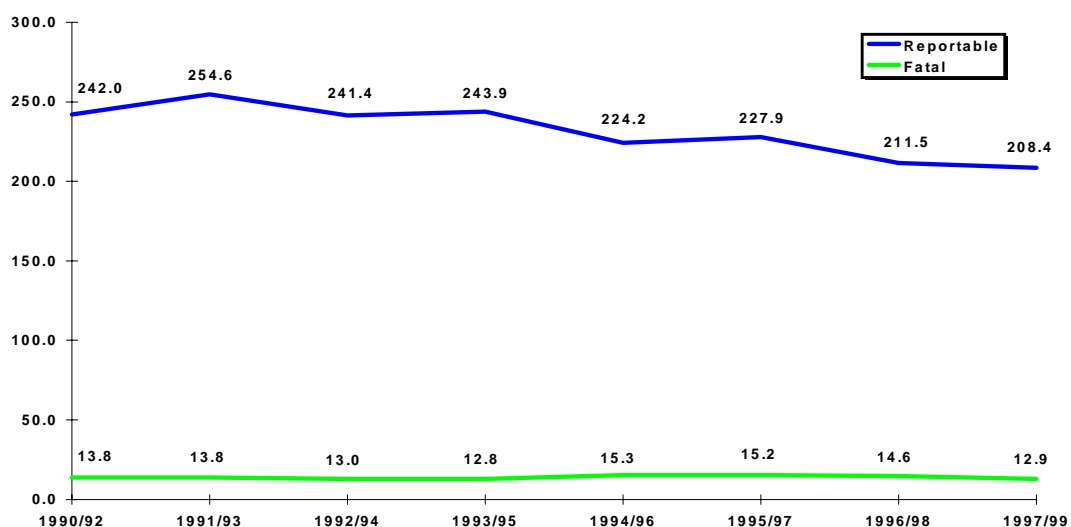


Figure 14 - Fatal & Reportable accident rate

9.5 Injuries sustained in reportable accidents

The injuries sustained in reportable accidents are shown in Table 24. There have been 199 fatalities (excluding third party only fatal accidents) and 117 serious injuries. The annual numbers of fatalities seem to have been fairly constant over the last ten years, although there were peaks in 1990, 1996 and 1999.

	Injury	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Crew	Fatal	16	13	11	11	13	10	20	11	11	18	134
	Serious	9	7	4	11	4	6	3	8	9	10	71
	Minor	36	32	28	18	11	15	21	17	12	21	211
	Total	61	52	43	40	28	31	44	36	32	49	416
Passenger	Fatal	12	5	6	7	7	6	7	2	3	10	65
	Serious	7	4	5	4	3	2	4	8	3	6	46
	Minor	12	17	19	12	9	5	16	12	14	14	130
	Total	31	26	30	23	19	13	27	22	20	30	241

Table 24 - Injuries sustained in reportable accidents

9.6 Operational data

Since 1990, UK non-public transport aeroplanes have flown an estimated 8.5 million hours, as shown in Table 25.

	Estimated hours flown ('000)
1990	962
1991	844
1992	801
1993	810
1994	854
1995	841
1996	794
1997	862
1998	883
1999	884

Table 25 - Operational data

10 UK NON-PUBLIC TRANSPORT HELICOPTERS < 5,700KG MTWA

This chapter contains information on UK registered helicopters at or below 5,700kg maximum take-off weight authorised engaged in non-public transport operations. Accidents to gyroplanes are excluded from these statistics - see Chapter 11 for more information.

10.1 Fatal accidents

The number of fatal accidents to helicopters in non-public transport operations are shown in Figure 15. There have been 30 fatal accidents giving an average of 3 fatal accidents per year. There is no obvious trend in the number of fatal accidents. Since 1990, there have been 49 fatalities giving an average of 5 fatalities per year. There were no fatal accidents in 1999.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
28-Mar-90	Robinson R22B	Nr. Chinnor, Oxfordshire	Private	Struck trees on rising ground when hill tops were cloud covered	1	0	0
27-Jun-90	Agusta A109	Nr. Rocester, Staffs	Private	Struck power lines while low flying along a river valley and crashed	2	4	0
13-Jul-90	Bell 206B	Stanley, Co. Durham	Private	Struck power lines shortly after take-off and crashed	2	0	0
31-Aug-90	Hughes 369HS	Felsted, Essex	Private	Attempted forced landing after engine rundown due failure of PC line	1	0	0
10-Mar-91	Robinson R22B	Halifax, W Yorkshire	Private	Struck power cables on take-off	1	1	0
08-Sep-91	Robinson R22B	Welford, Warwickshire	Instruction	Main rotor struck tail boom in flight, aircraft crashed	1	0	0
23-Feb-92	Robinson R22M	Royton, Oldham, Lancs	Private	Engine lost power, rotor stopped and aircraft fell vertically to ground	2	0	0
28-Mar-92	Rotorway Exec	Coalport, Shropshire	Private	Main rotor blade failure due to disbonding - tail boom detached	1	0	0
29-May-92	Robinson R22B	Nr. Latimer, Bucks	Private	Crashed in poor weather at night - possible distraction, engine problem	2	0	0
14-Aug-92	Bell 206B	Crowthorne, Berkshire	Other airline	Tail rotor drive disconnect after nut detached - helicopter crashed	2	3	0
17-Sep-92	Schweizer 269C	Gmunden, Austria	Private	Fell down hillside while attempting to land on sloping site	1	2	0
23-Jun-93	Bell 206B	Nr. Kendal, Cumbria	Survey	Struck by RAF Tornado, severed tail rotor	2	0	0
20-Nov-93	Robinson R22B	Nr. Brecon, Wales	Private	Crashed on snow covered hillside after diverting from planned route	1	0	0
15-Jan-94	Bell 206B	Luton, Bedfordshire	Instruction	Loss of control while practising hovering - helicopter rolled over	1	0	0
22-May-94	Bell 206B	Nr. Gwytherin, Clwyd	Commercial	Struck high ground in poor weather	3	1	0
08-Jun-94	Robinson R22B	Nr. Martin, Hants	Instruction	Crashed in field after main rotor struck tail boom	2	0	0
07-Dec-94	SA350 Squirrel	Nr. Ballachulish, Scotland	Survey	Underslung load hook struck ground, flew up into tail rotor, lost control	2	0	0
05-May-95	SA350 Squirrel	Loch Gilphead, Scotland	Commercial	Crashed in field after pilot reported loss of control	1	0	0
19-Oct-96	Hughes 369	Nr. Cheadle	Private	Crashed in field after pilot reported loss of control	1	0	0
12-Dec-96	Sikorsky S76	Carlingford	Instruction	Crashed on high ground in bad weather	3	0	0
16-Dec-96	Bell 206	Nr. Ledbury	Unknown	Reportedly struck tree on take-off in poor visibility	3	0	0
16-Jan-97	Robinson R22B	Nr. Redhill	Training	Crashed during night circuit training exercise, suspected engine problems	1	0	0
16-Mar-97	Bell 206	Nr. Ware, Hertfordshire	Private	Suspected engine problems, forced landing	1	0	0
13-Jul-97	Bell 206	Nr. Forfar, Scotland	Private	Contacted fence and rolled over onto side during precautionary landing	1	0	5
11-Aug-97	Bell 206	Nr. Lancaster	Survey	Crashed whilst engaged in pipeline survey	2	0	0
14-Nov-97	Bell 206	Nr. Midhurst	Private	Crashed on hillside in poor weather at night	1	0	0
28-Jan-98	SA355 Twin Squirrel	Nr. Bicester	Private	Crashed on rising ground and caught fire	1	0	0
09-Mar-98	Robinson R22	Ampport	Private	Crashed near Ampport, approx 1nm SE of airfield	1	0	0
19-Apr-98	Robinson R44	Gumley	Private	Crashed in copse in poor weather - fire after impact	4	0	0
01-Aug-98	Rotorway Executive	Nr. Cambridge	Test	Crashed in a field during test flight	2	0	0

Table 26 - List of Fatal accidents

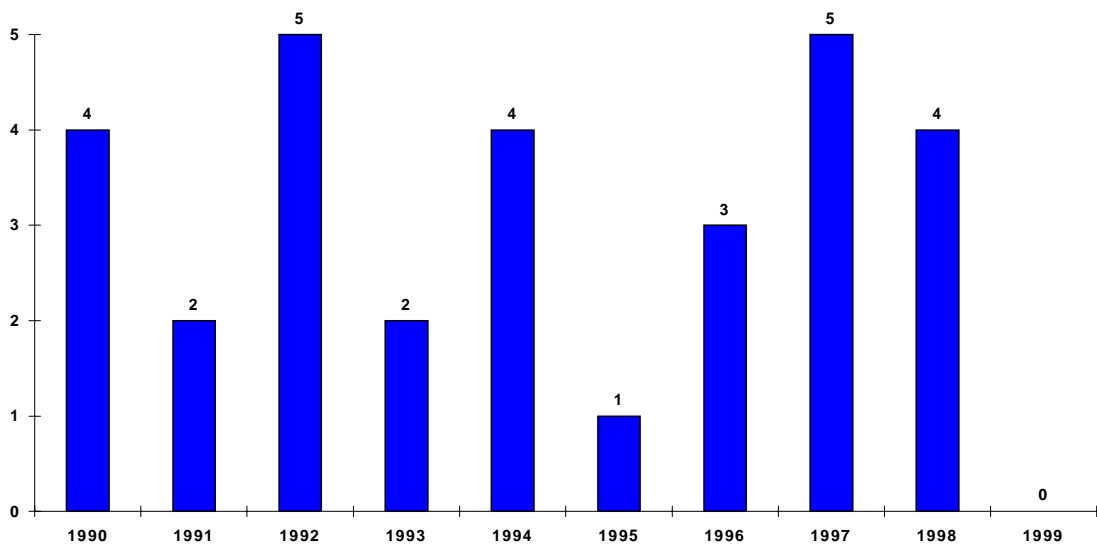


Figure 15 - Fatal accidents

10.2 Reportable accidents

There have been 226 reportable accidents for helicopters in non-public transport operations as shown in Figure 16. The actual annual number of accidents shows very little deviation from the average of 23.

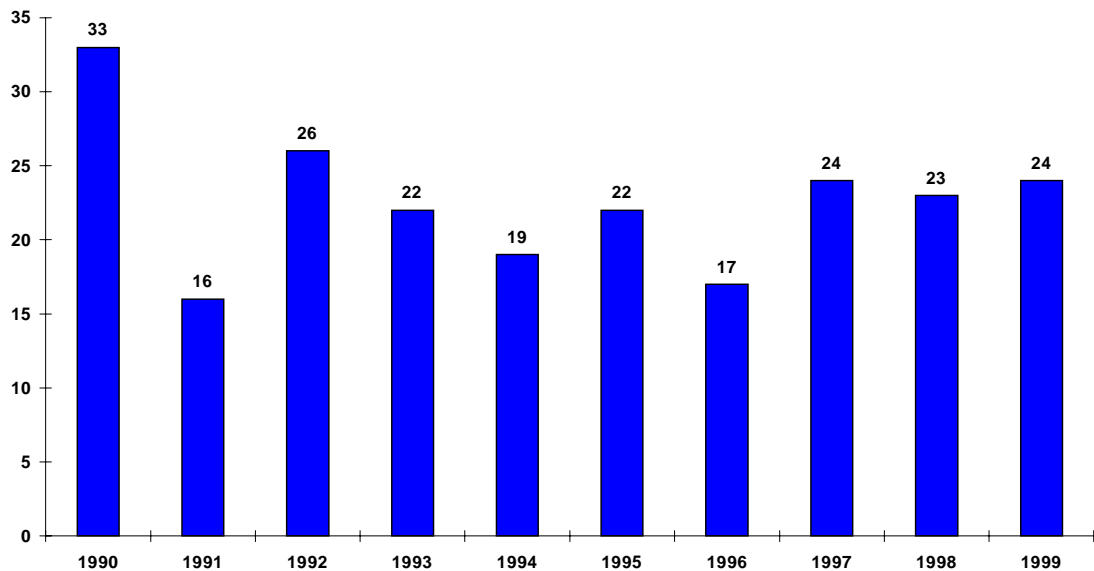


Figure 16 - Reportable accidents

10.3 Fatal accident rate

The fatal accident rate is shown in Figure 17, using a three year moving average. The average rate for the period 1990 - 1999 was 20.6 fatal accidents per million estimated hours flown.

10.4 Reportable accident rate

The reportable accident rate is shown in Figure 17 using a three year moving average. There has been a decreasing trend in the rate over the last ten years. The average rate was 142 reportable accidents per million estimated hours flown, which was lower than the rate of 232 for non-public transport aeroplanes below 5700kg mtwa.

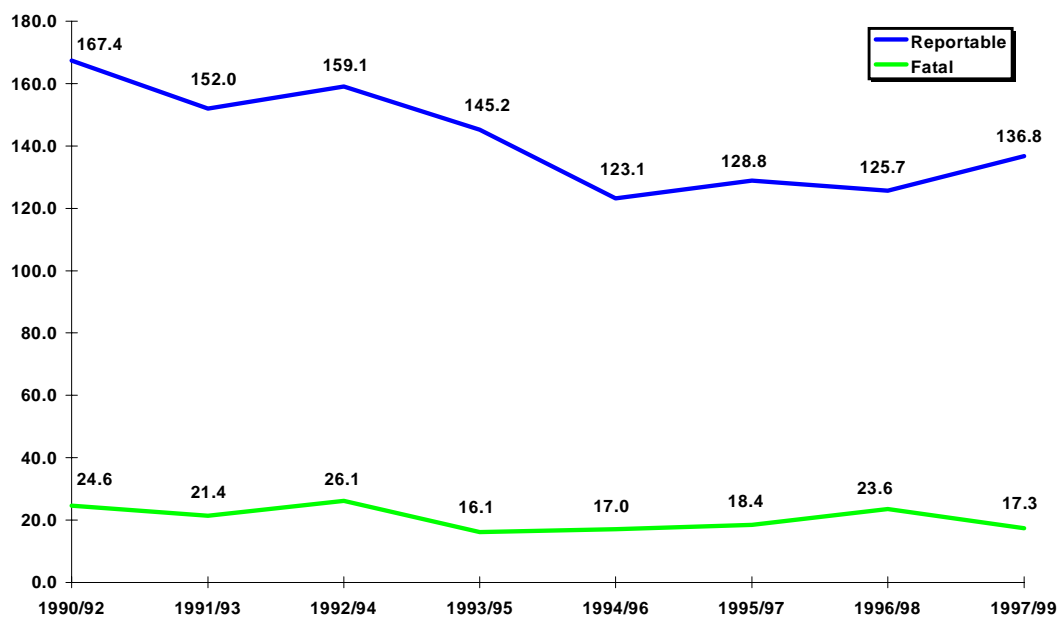


Figure 17 - Fatal & Reportable accident rate

10.5 Injuries sustained in reportable accidents

The injuries sustained in reportable accidents are shown in Table 27. There have been 49 fatal injuries, 29 serious injuries and 56 minor injuries giving a total of 134 injuries.

	Injury	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Crew	Fatal	3	2	4	2	6	1	4	4	4		30
	Serious	2		1	3	2	1		2			11
	Minor	1	3	4	4	2	2	1	2	1	8	28
	Total	6	5	9	9	10	4	5	8	5	8	69
Passenger	Fatal	3		4	1	2		3	2	4		19
	Serious	3	2	6	3	2			2			18
	Minor	1	1	3	5	4			7	3	4	28
	Total	7	3	13	9	8	0	3	11	7	4	65

Table 27 - Injuries sustained in reportable accidents

10.6 Operational data

Since 1990, UK non-public transport helicopters have flown an estimated 1.6 million hours as shown in Table 28.

	Estimated hours flown (‘000)
1990	164
1991	144
1992	140
1993	137
1994	144
1995	153
1996	174
1997	162
1998	173
1999	184

Table 28 - Operational data

11 UK AIRSHIPS, BALLOONS, GLIDERS, GYROPLANES AND MICROLIGHTS,

This chapter contains information on UK registered or operated airships, balloons, gliders, gyroplanes and microlights. Please note that data in this chapter was provided by the CAA unless otherwise stated.

11.1 Airships

Between 1990 and 1999, there have been no fatal accidents involving UK registered airships, and four reportable accidents. These resulted in one minor injury, as shown in Table 29.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Aircraft registered	53	50	51	54	47	47	44	40	40	42
Fatal accidents	0	0	0	0	0	0	0	0	0	0
Reportable accidents	2	1	0	0	1	0	0	0	0	0
Injuries (minor)	0	1	0	0	0	0	0	0	0	0

Table 29 - Airships

11.2 Balloons (Non-public transport)

There has been 1 fatal accident, (see Table 30), where the pilot was killed and 32 reportable accidents. There were 20 serious injuries in balloon accidents, as shown in Table 31.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
10-Jun-94	Thunder Ax3	Nr. Preston	Private	Struck power cables during descent	1		

Table 30 - List of Fatal accidents

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Fatal accidents	0	0	0	0	1	0	0	0	0	0
Reportable accidents	0	5	1	3	5	3	5	2	4	4
Fatal injuries	0	0	0	0	1	0	0	0	0	0
Serious injuries	0	3	0	2	3	4	4	1	2	1
Minor injuries	0	1	1	2	8	0	1	0	1	2

Table 31 - Balloons (Non-public transport)

11.3 Gliders

The BGA accident year covers 1st October to 30th September so the data included here relates to the period October 1989 to September 1999.

There have been 496 reportable accidents involving UK gliders, of which 34 were fatal. These have resulted in 42 fatalities as shown in Tables 32 and 33. The average rate of 21.5 fatal accidents per million hours is comparable with that for non-public transport helicopters.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
15-Oct-89	Unknown	Nr. Dover	Private	Possible inadvertent stall/spin after launch	1		
04-Aug-90	SZD Puchacz	Usk	Instruction	Failed to recover from intentional spin	1	1	
07-Aug-90	ASW20L	Long Mynd	Gliding	Crashed due to non-connection of the elevator	1		
11-Aug-90	Fauvette	Lyveden	Private	Stalled after premature lift off due to signalling confusion	1		
17-Feb-91	SZD Pirat	Oban	Private	Stalled in turn at 300ft and spun in	1		
25-May-91	Astir Club	Sutton Bank	Gliding	Spun and dived out of control during launch	1		
07-Jul-91	Vega 133	Willington	Gliding	Broke-up in flight after loss of control in cloud	1		
14-Jul-91	Libelle Club	Stratford	Club-group	Spun in during launch	1		
28-Jul-91	SZD Puchacz	Rivar Hill	Club-group	Spun in off winch tow, struck car and crashed	1	1	
17-May-92	SZD Pirat & Junior	Ringmer	Private	Mid-air collision between two gliders	2		
05-Sep-92	Cirrus Std	Shrivenham	Private	Crashed during winch launch due seat cushions slipped	1		
27-Jun-93	IS30	Knettishall	Practice	After aerobatic manoeuvres, glider inverted and struck ground	2		
13-Aug-93	SZD Puchacz	Camphill	Instruction	Spun in after winch launch and crashed	2		
16-Oct-93	BG135	Lleweni Park	Unknown	Entered inverted spin and failed to recover on winch launch	1		
30-May-94	LS7	Dunstable	Private	Struck ground in nose down attitude after abandoned aerotow	1		
09-Jun-94	Skylark 4	Halesland	Private	Dived vertically into ground after winch launch release	1		
26-Aug-94	Discus B	Nr Hereford	Private	Crashed whilst approaching to land in a field	1		
15-Apr-95	Olympia 463	Nr. Buxton	Private	Inflight structural failure	1		
05-May-95	SZD Puchacz	Husbands Bosworth	Club-group	Failed winch launch, aircraft spun in	1	1	
07-May-95	Discus B/T S/S	Parham	Club-group	Partially deployed airbrakes on downwind leg and spun in	1		
12-Jun-95	Cirrus Std	Talgarth	Private	Entered steep turn and struck ground after release at 150ft	1		
09-Jul-95	Carman JP15-36	Pershore	Private	Crashed after cable break at 150-200ft	1		
13-Jul-96	Olympia 460	Seighford	Private	Crashed during winch launch due structural failure	1		
21-Aug-96	KA6 & KA8	Astondown	Private	Mid-air collision between two gliders	1		1
23-Aug-96	KA6 & other glider	Gap, France	Private	Mid-air collision between two gliders	3		
15-Jun-97	Astir	Ringmer	Towing	Struck ground while carrying out 360deg turn after cable break	1		
26-Jul-97	ASK23	Long Mynd	Gliding	Launch cable snagged wing and glider spun in	1		
02-May-98	LS3A & KA8	Seighford	Gliding	Mid-air collision between two gliders	2		
09-Jul-98	ASK13	Nr. Dunstable	Gliding	Crashed on hillside	1	1	
10-Jul-98	2x Ventus 2	Mildenhall	Gliding	Mid-air collision between two gliders	1		
27-Jul-98	2x Kestral 19	Bidford	Gliding	Mid-air collision between two gliders	1	1	
05-Aug-98	KA6	Aston Down	Gliding	Entered spin and crashed into corn field	1		
19-Aug-98	Pegasus 101	Great Saxham	Gliding	Crashed on farmland, circumstances unknown	1		
31-May-99	ASW20 & Grob Twin Akro	Great Hucklow	Gliding	Mid-air collision between two gliders	3		

Table 32 - List of Fatal accidents

(BGA Year - Oct - Sept)	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99
Aircraft on register	2030	2024	2145	2258	2113	2317	2282	2285	2379	2386
Movements	452,273	452,000	433,577	443,387	410,631	453,308	468,459	403,676	397,400	383,657
Hours flown	169,729	149,000	153,420	155,816	149,740	170,023	173,619	173,001	148,392	156,210
Fatal accidents	4	5	2	2	4	5	3	2	6	1
Reportable accidents	58	48	58	59	51	42	46	44	43	47
Fatal accidents per million hours	23.6	33.6	13.0	12.8	26.7	29.4	17.3	11.6	40.4	6.4
Reportable accidents per million hours	342	322	378	379	341	247	265	254	290	301
Fatal injuries	4	5	3	4	4	5	5	2	7	3
Serious injuries	12	5	6	5	7	6	7	4	4	6
Minor/no injuries	10	49	64	59	53	44	49	42	45	48

Table 33 - Gliders

Source: British Gliding Association (and CAA)

Note: The fatal accident in 1994 where the pilot of a KA8 died of a heart attack has not been included.

11.4 Gyroplanes

There have been 32 reportable accidents to UK gyroplanes, of which 6 were fatal. These reportable accidents resulted in 7 fatalities and 3 serious injuries, as shown below.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
01-Dec-90	Air Command	Letchworth	Private	Rotor RPM lost in flight	2		
02-Mar-91	Air Command	Pocklington	Practice	Levelled at 30ft, rolled left, inverted and struck ground	1		
19-Apr-91	Bensen	Kilkerran	Practice	Lost control and crashed during approach	1		
11-Dec-93	Bensen	Nr. Wimborne	Private	Lost control and crashed during climb	1		
20-Apr-96	Air Command	Long Marston	Private	Lost control and tumbled vertically to ground	1		
13-Jun-98	Bensen	Coll, Lewis	Private	Entered steep climb, stalled and crashed inverted	1		

Table 34 - List of Fatal accidents

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Aircraft on register	228	210	218	229	246	257	261	261	265	244
Hours flown (estimated)	6,112	2,752	3,953	4,325	5,237	5,637	5,315	5,485	5,977	5,588
Fatal accidents	1	2	0	1	0	0	1	0	1	0
Reportable accidents	4	3	1	4	5	2	6	2	3	2
Fatal accidents per million hours	164	727	0	231	0	0	188	0	167	0
Reportable accidents per million hours	654	1,090	253	925	955	355	1,129	365	502	358
Fatal injuries	2	2	0	1	0	0	1	0	1	0
Serious injuries	1	0	0	0	1	0	0	1	0	0
Minor injuries	0	1	0	1	1	1	1	0	0	0

Table 35 - Gyroplanes

Note: Hours flown data estimated from reported hours and number of gyroplanes on UK register.

11.5 Microlights

There have been 164 reportable accidents involving UK microlights, of which 22 were fatal. These accidents have resulted in 26 fatalities and 43 serious injuries, as shown below.

Date	Aircraft	Location	Operation	Description of accident	Fatal	Serious	Minor
21-Apr-90	Microlight	Chirk	Private	Crashed and burnt out after take-off	1		
25-Jul-90	Microlight	Preston	Private	Entered vertical dive and crashed	1		
01-Nov-90	Microlight	C Mortimer	Private	Crashed in trees during attempted go-around	1		
14-Aug-91	Microlight	Aldboume	Private	Struck power cables and crashed in field	1	1	
08-Sep-91	Microlight	Nr. Gateshead	Practice	Stalled in steep climb and spiralled to ground	1	1	
04-May-92	Microlight	Sunken Island	Private	Observed in pitching manoeuvre and then crashed	2		
27-Jun-92	Microlight	Aldford	Private	Loss of control during landing, crashed into field	1		
17-Oct-92	Microlight	English Channel	Private	Ditched and sank following Mayday call	1		
27-Jun-93	Microlight	Sandown	Private	Engine malfunction reported, aircraft returned and crashed	2		
21-Jul-94	Microlight	Stradbroke	Private	Loss of engine power, crashed in cornfield	2		
28-Apr-95	Microlight	Nr. Bromyard	Private	Crashed following structural failure of tailplane	1		
01-Jul-95	Microlight	Conway	Private	Crashed onto beach - undetermined cause	1		
31-Aug-95	Microlight	Nr. Sandtoft	Practice	Loss of control led to airframe failure in flight	1		
17-Jul-96	Microlight	Nr. Rhyl	Test	Wings folded on test flight and aircraft fell from approx 400ft	1		
04-Aug-96	Microlight	Bruton	Private	Engine stopped, microlight struck cables during forced landing	1		
07-Aug-96	Microlight	Nr. Durban	Demo-race	Encountered severe turbulence and broke up in flight	1		
15-Apr-97	Microlight	Walsall	Private	Struck tree during go-around	1	1	
12-Aug-97	Microlight	Netherthor	Private	Crashed on take-off	1		
27-Oct-97	Microlight	Roydon	Practice	Spiralled into field after wings folded in flight	1		
26-Jul-98	Microlight	Louth, Lincs	Private	Crashed in cornfield	2		
28-Mar-99	Microlight	Newnham	Private	Loss of control during go around	1		
21-Aug-99	Microlight	Radwell	Private	Loss of control in flight	1	1	

Table 36 - List of Fatal accidents

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Aircraft on register	3,030	3,167	3,313	3,299	3,225	3,165	3,185	3,262	3,386	3,488
Hours flown (estimated)	80,738	90,405	100,909	108,652	125,930	123,209	102,772	115,543	119,229	132,356
Fatal accidents	3	2	3	1	1	3	3	3	1	2
Reportable accidents	3	11	27	19	14	27	16	14	16	17
Fatal accidents per million hours	37.2	22.1	29.7	9.2	7.9	24.3	29.2	26.0	8.4	15.1
Reportable accidents per million hours	37.2	122	268	175	111	219	156	121	134	128
Fatal injuries	3	2	4	2	2	3	3	3	2	2
Serious injuries	0	6	5	2	7	5	6	4	2	6
Minor injuries	0	4	6	4	2	7	6	5	8	7

Table 37 - Microlights

Note: Hours flown data estimated from reported hours and number of microlights on UK register.

12 FOREIGN AIRCRAFT IN UK AIRSPACE

This chapter contains information on foreign registered and operated aeroplanes and helicopters in UK airspace.

12.1 Fatal accidents

Between 1990 and 1999, there have been 16 fatal accidents involving foreign registered aircraft not operated by UK Operators in the UK and its airspace. These fatal accidents resulted in 23 crew and 7 passenger fatalities. Two involved Public Transport Cargo aircraft with 9 crew fatalities.

Date	Aircraft	Registered in	Location	Operation	Description of accident	Fatal	Serious	Minor
05-Apr-90	Cessna 210	Netherlands	Campsie Fell	Business	Hit high ground NE of Glasgow after reporting icing problems	2		
23-Nov-90	Piper PA28	Denmark	North Channel	Commercial	Believed to have ditched after reporting vacuum problem	1		
11-Apr-91	Nieuport	USA	North Weald	Practice	Stalled in steep turn and crashed onto airfield	1		
15-Feb-92	Cessna 172	USA	Thurrock	Business	Struck cables during forced landing after engine failure	2	2	
09-Dec-92	Beech Bonanza	Cayman Islands	Nr. Luton	Business	Struck ground during ILS approach to Luton	1		
20-Mar-94	Yak 52	Russia	Nr. Wellesbourne	Private	Failed to recover from aerobatic manoeuvre and crashed	2		
28-Apr-94	Piper PA28	France	English Channel	Unknown	Aircraft and pilot missing	1		
30-Oct-94	Cessna 175	Ireland	Irish Sea	Private	Ditched in Irish Sea after radio contact lost	2		
21-Dec-94	Boeing 737	Algeria	Coventry	Positioning	Descended below glidepath, struck house short of runway	5		
14-Jul-96	P38 Lightning	USA	Duxford	Demo-Race	Crashed during air display, striking 7 other parked aircraft	1		
23-Nov-96	AA5	USA	Denham	Practice	Engine failed at 150-200ft and aircraft crashed	1		
08-Aug-97	Maule MX-7	USA	Brunton	Private	Stalled following go-around, crashed and caught fire	2		
12-Jun-98	Piper PA31	Morocco	Nr. Jersey	Ferry	Both engines lost power and aircraft ditched in sea	1		
27-Jul-98	Catalina	Bermuda	Southampton	Private	Aircraft struck boat wake during water landing and sank	2		6
28-Nov-98	DHC7	Cayman Islands	Ashburton	Test	Crashed during test flight, destroyed by impact and fire	2		
22-Dec-99	B747	Korea (South)	Nr. Stansted	Cargo	Crashed shortly after take-off	4		

Table 38 - List of Fatal accidents

12.2 Reportable accidents

Since 1990, there have been 165 reportable accidents involving foreign registered aircraft in the UK and its airspace, as shown in Figure 22. Of these accidents, 49 (30%) occurred during public transport flights. Aeroplanes were involved in 160 accidents whilst the other 5 involved helicopters.

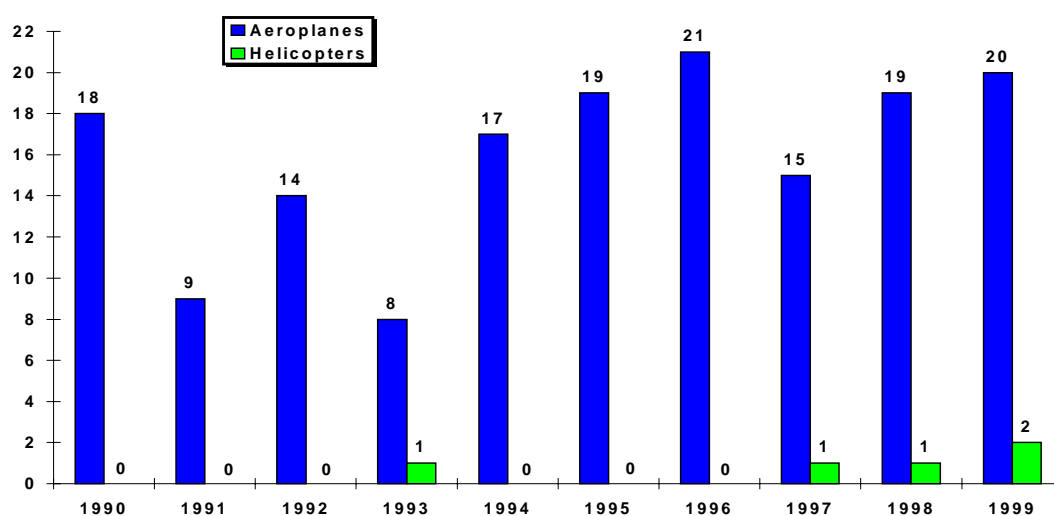


Figure 18 - Reportable accidents

12.3 Injuries sustained in reportable accidents

The injuries sustained in reportable accidents to foreign registered aeroplanes and helicopters are shown in Table 39. Since 1990, there have been 30 fatalities, 4 serious injuries and 9 minor injuries.

	Injury	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Total
Crew	Fatal	3	1	1	0	8	0	2	1	3	4	23
	Serious	0	0	1	0	0	0	0	0	0	2	3
	Minor	0	0	0	0	0	0	0	0	2	1	3
	Total	3	1	2	0	8	0	2	1	5	7	29
Passenger	Fatal	0	0	2	0	2	0	0	1	2	0	7
	Serious	0	0	1	0	0	0	0	0	0	0	1
	Minor	0	0	0	0	0	0	0	0	4	2	6
	Total	0	0	3	0	2	0	0	1	6	2	14

Table 39 - Injuries sustained in reportable accidents

12.4 Operational data

Since 1990, foreign Public Transport operators have made around 4 million air transport movements to or from UK airports as shown in Table 40. The operational data for non-public transport flights is not currently available.

	Air transport movements ('000)	Terminal passengers ('000)
1990	340	32,412
1991	335	29,798
1992	362	32,464
1993	374	34,196
1994	403	36,783
1995	418	38,828
1996	453	41,791
1997	467	44,726
1998	506	47,559
1999	551	53,192

Table 40 - Operational data

13 UK AIRSPACE

This chapter contains information on events occurring in UK airspace. It includes foreign and UK registered aircraft.

13.1 Airprox reports

Between 1990 and 1999, there were 2,142 Airprox reports in UK airspace. Of these 841 (39%) were deemed to be risk bearing (A+B), as shown in Table 41.

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Airprox (inc. Military aircraft events)										
Risk of collision (A)	25	22	26	15	15	17	37	36	23	23
Safety not assured (B)	67	71	52	79	62	57	58	64	43	49
No risk (C)	150	117	139	123	134	130	113	105	132	134
Risk not determined (D)	2	2	4		1	4	3	3	3	2
Total Airprox reports	244	212	221	217	212	208	211	208	201	208
Airprox involving Commercial Air Transport										
Risk of collision (A)	6	1	5	3	5	3	6	9	1	4
Safety not assured (B)	18	18	11	14	20	21	24	20	14	12
No risk (C)	80	66	77	55	66	67	77	67	83	83
Total Airprox reports	104	85	93	72	91	91	107	96	98	99

Table 41 - Airprox reports
Source: UK Airprox Board (UKAB)

13.2 Airprox involving Commercial Air Transport (CAT)

There were 936 Airprox events involving Commercial Air Transport during this period, of which 215 were considered risk bearing. With over 10 million hours flown by these aircraft in UK airspace the risk bearing Airprox rates, per million hours flown are shown below.

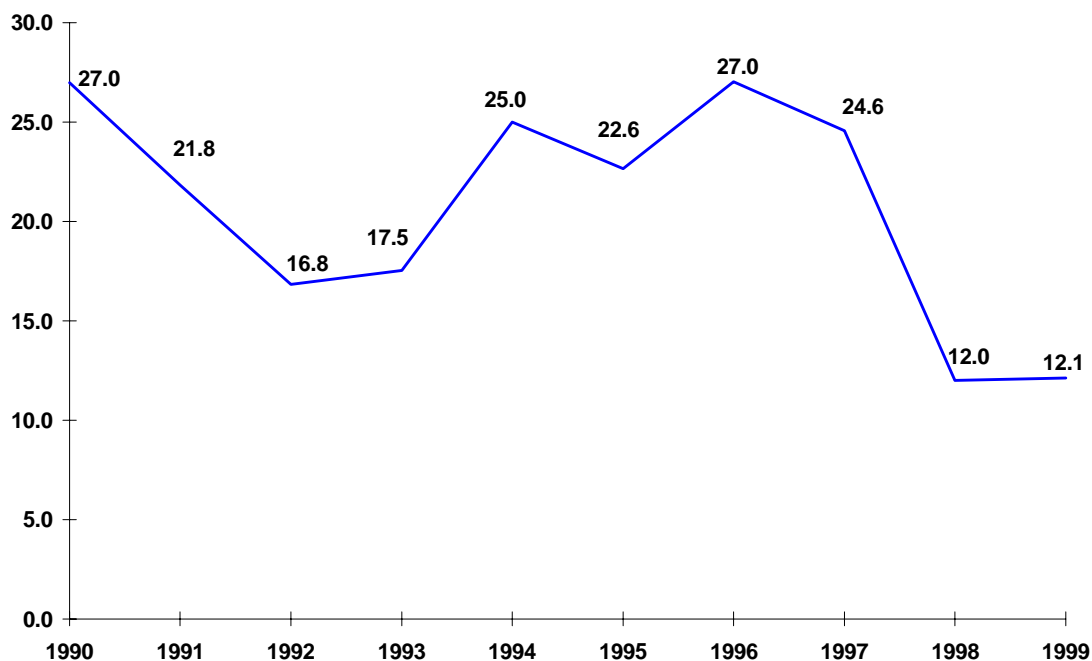


Figure 19 - Risk Bearing Airprox involving commercial air transport

13.3 Air Traffic Control (ATC) occurrences

Between 1990 and 1999, there have been 9,805 events involving UK ATC. The significant aspects, excluding UK Airprox, are shown in Table 42. Reports of these types of occurrence have increased significantly during the 10 year period.

Occurrence Type	1990	1991	1992	1993	1994*	1995	1996	1997	1998*	1999*
Conflict	50	105	136	146	130	190	286	292	278	279
ATC overload	17	49	23	19	30	30	20	19	64	57
Infringement	154	281	265	269	264	274	311	368	305	404
Loss of separation	153	140	191	243	283	246	329	330	342	354
Level bust	50	63	132	123	235	148	173	257	443	455

Table 42 - ATC occurrences

*Note: These occurrences are not necessarily mutually exclusive e.g. An occurrence may involve a loss of separation and a level bust. *Level bust data collection exercises were carried out in these years which may have increased the number of reports.*

13.4 Ground occurrences

The reported occurrences at UK airfields and airports are shown in Table 43. Since 1990 the number of ramp occurrences and loading error reports has increased markedly.

Occurrence type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Collision on aerodrome	20	30	37	43	39	56	68	31	36	51
Dangerous goods	28	16	17	7	8	8	11	14	17	23
Ramp occurrence	65	107	98	121	128	154	185	191	192	276
Loading errors	55	30	49	35	54	40	32	44	62	118
Jet/propeller blast	9	4	17	8	10	13	6	19	6	11
Unsupervised passenger(s) on ramp	5	4	6	5	6	10	16	34	23	38
Aerodrome vehicle driver problems	26	56	33	61	44	68	86	55	59	75

Table 43 - Ground occurrences

Note: These occurrences are not necessarily mutually exclusive e.g. An unsupervised passenger may be subject to jet blast. Collision on aerodrome includes collisions between aircraft and between aircraft and vehicles, but does not include vehicles only colliding.

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14 RISK TO PASSENGERS TRAVELLING ON UK REGISTERED PUBLIC TRANSPORT AIRCRAFT

This chapter indicates the risk to passengers aboard passenger services operated by UK registered aircraft, over the past decade.

14.1 Airline Aeroplanes >5700kg mtwa

PASSENGER RISK EXPOSURE	Accidents			Non-Accident Flights
	with Fatalities	with Injuries (excl. Fatal)	without Injuries	
Accidents	0	24	108	-
Flights	0	24	108	7.5 million
Fatal	0	-	-	-
Serious Injury	0	6	-	-
Minor Injury	0	85	-	-
No Injury	0	1843	9304	-
Total Pax aboard	0	1934	9304	706 million

Table 44 - Airline Large Aeroplane Passenger Risk

Although 706 million passengers flew on UK registered Airline large aeroplanes during the last decade there were no fatalities and just 6 serious injuries, giving a zero passenger fatality rate and a passenger serious injury rate of 1 in 118 million. A further 85 received minor injuries of which 68 occurred in one event, the Boeing 757 overrun at Gerona airport in September 1999.

14.2 Airline Aeroplanes <5700kg mtwa

PASSENGER RISK EXPOSURE	Accidents			Non-Accident Flights
	with Fatalities	with Injuries (excl. Fatal)	without Injuries	
Accidents	3	0	5	-
Flights	3	0	5	0.35 million
Fatal	15	-	-	-
Serious Injury	4	0	-	-
Minor Injury	1	0	-	-
No Injury	0	0	21	-
Total Pax aboard	20	0	21	3.3 million

Table 45 - Airline Small Aeroplane Passenger Risk

There were 3 fatal accidents in 350,000 flights made by UK registered Airline smaller aeroplanes over this 10 year period. These involved 15 passenger fatalities from the 3.3 million passengers who travelled on these aeroplanes; giving a passenger fatality rate of 1 in 220,000.

14.3 Air Taxi Aeroplanes <15000kg mtwa

PASSENGER RISK EXPOSURE	Accidents			Non-Accident Flights
	with Fatalities	with Injuries (excl. Fatal)	without Injuries	
Accidents	0	0	10	-
Flights	0	0	10	0.8 million
Fatal	0	-	-	-
Serious Injury	0	0	-	-
Minor Injury	0	0	-	-
No Injury	0	0	31	-
Total Pax aboard	0	0	31	Not available

Table 46 - Air Taxi Aeroplane Passenger Risk

No injuries were suffered by passengers aboard UK Air Taxi aeroplanes in 800,000 flights over 10 years. Unfortunately, total passengers flown are not recorded but can be assumed to be in excess of the number of flights.

14.4 Public Transport Helicopters

PASSENGER RISK EXPOSURE	Accidents			Non-Accident Flights
	with Fatalities	with Injuries (excl. Fatal)	without Injuries	
Accidents	3	3	13	-
Flights	3	3	13	3 million
Fatal	18	-	-	-
Serious Injury	5	3	-	-
Minor Injury	7	4	-	-
No Injury	0	2	95	-
Total Pax aboard	30	9	95	est. 18 million

Table 47 - Public Transport Helicopter Passenger Risk

Note: Estimated passengers carried has been derived by extrapolation from CAA statistics

Six flights in 3 million resulted in injuries to passengers on UK Public Transport Helicopters, which includes North Sea Operations and ad-hoc Charter flights. Eighteen passengers died and 8 received serious injuries. Unfortunately, total passengers flown have not been recorded since 1993, however, using an estimated 18 million passengers for the 10 year period the passenger fatality rate will be approximately 1 in 1,000,000.

14.5 Public Transport Balloons

PASSENGER RISK EXPOSURE	Accidents			Non-Accident Flights
	with Fatalities	with Injuries (excl. Fatal)	without Injuries	
Accidents	1	30	9	-
Flights	1	30	9	87,000
Fatal	1	-	-	-
Serious Injury	7	23	-	-
Minor Injury	4	49	-	-
No Injury	0	147	55	-
Total Pax aboard	12	219	55	0.6 million

During the ten year period there has been one fatal accident, with one passenger fatality and seven passengers seriously injured, on UK Public Transport balloons. This gives a passenger fatality rate of 1 in 600,000.

15 RISK TO AIRCREW ON PUBLIC TRANSPORT AIRCRAFT AND ALL OCCUPANTS ON NON-PUBLIC TRANSPORT AIRCRAFT

This chapter indicates the risk to crew aboard all public transport services operated by UK registered aircraft and the risk to all occupants aboard UK registered non-public transport (includes General Aviation) aircraft, over the past decade.

15.1 Airline (Passenger and Cargo) Aeroplanes

CREW RISK EXPOSURE	Accidents			Non-Accident Flights
	with Fatalities	with Injuries (excl. Fatal)	without Injuries	
Accidents	6	24	126	-
Flights	6	24	126	8.15 million
Fatal	10	-	-	-
Serious Injury	2	12	-	-
Minor Injury	0	21	-	-
No Injury	0	131	851	-
Total Crew aboard	12	164	851	Not available

Table 49 - Airline Aeroplane Crew Risk

Ten crew, partly from small airliner passenger operations and partly cargo operations, were killed in six accidents during the decade from a total of over 8 million flights.

15.2 Air Taxi (Passenger and Cargo) Aeroplanes

CREW RISK EXPOSURE	Accidents			Non-Accident Flights
	with Fatalities	with Injuries (excl. Fatal)	without Injuries	
Accidents	1	0	11	-
Flights	1	0	11	0.8 million
Fatal	2	-	-	-
Serious Injury	0	0	-	-
Minor Injury	0	0	-	-
No Injury	0	0	11	-
Total Crew aboard	2	0	11	Not available

Table 50 - Air Taxi Aeroplane Crew Risk

The two crew fatalities occurred in a 1993 cargo air taxi accident. There were no other injuries in 800,000 flights.

15.3 Public Transport (Passenger and Cargo) Helicopters

CREW RISK EXPOSURE	Accidents			Non-Accident Flights
	with Fatalities	with Injuries (excl. Fatal)	without Injuries	
Accidents	3	4	19	-
Flights	3	4	19	3 million
Fatal	4	-	-	-
Serious Injury	0	2	-	-
Minor Injury	1	2	-	-
No Injury	0	0	30	-
Total Crew aboard	5	4	30	Not available

Table 51 - Public Transport Helicopter Crew Risk

UK Public Transport helicopters were involved in 26 accidents, in 3 million flights, three of them involving four crew deaths.

15.4 Public Transport Balloons

CREW RISK EXPOSURE	Accidents			Non-Accident Flights
	with Fatalities	with Injuries (excl. Fatal)	without Injuries	
Accidents	1	30	9	-
Flights	1	30	9	87,000
Fatal	0	-	-	-
Serious Injury	1	2	-	-
Minor Injury	0	3	-	-
No Injury	0	28	11	-
Total Crew aboard	1	33	11	Not available

Table 52 - Public Transport Balloons

Although there was one fatal accident, with one passenger fatality, (see section 14.5), no crew were killed on Public Transport balloons between 1990 and 1999.

15.5 Emergency Services

CREW RISK EXPOSURE	Accidents			Non-Accident Flights (Police only)
	with Fatalities	with Injuries (excl. Fatal)	without Injuries	
Accidents	3	1	11	-
Flights	3	1	11	(0.2 million)
Fatal	5	-	-	-
Serious Injury	5	0	-	-
Minor Injury	0	2	-	-
No Injury	0	1	37	-
Total Crew aboard	10	3	37	Not available

Table 53 - Emergency Service Occupants Risk

There were five fatalities and five serious injuries to occupants of “Emergency Services” aircraft, ie. Air Ambulance, Police and Search & Rescue. Utilisation data for these services are not recorded other than Police flight hours which are AOC operations.

15.6 Non-Public Transport Aeroplanes <5700kg mtwa

Total Number of Accidents	1963
Total Number of Accidents involving Injury	366
Total Number of Accidents involving Fatalities	119
Total Hours flown	8.5 million

	Injuries			Total
	Fatal	Serious	Minor	
Crew	134	71	211	416
Passengers	65	46	130	241

Table 54 - Non-public Transport Aeroplane Occupants Risk

Non-public transport aeroplanes were involved in almost 2000 accidents from 1990 to 1999, of which 366 (19%) involved injuries and 119 (6%) involved 199 fatalities.

As the number of people flying in non-public transport aircraft is not recorded no individual risk exposure is possible, however, with 8.5 million aircraft hours flown the statistical fatal accident rate is 1 in 71,500 hours flown.

15.7 Non-Public Transport Helicopters <5700kg mtwa

Total Number of Accidents	226
Total Number of Accidents involving Injury	64
Total Number of Accidents involving Fatalities	30
Total Hours flown	1.6 million

	Injuries			Total
	Fatal	Serious	Minor	
Crew	30	11	28	69
Passengers	19	18	28	65

Table 55 - Non-public Transport Helicopter Occupants Risk

Non-public transport helicopters were involved in over 200 accidents from 1990 to 1999, of which 64 (28%) involved injuries and 30 (13%) involved 49 fatalities.

As the number of people flying in non-public transport aircraft is not recorded no individual risk exposure is possible, however, with 1.6 million aircraft hours flown the statistical fatal accident rate is 1 in 53,000 hours flown.

15.8 Other Aviation Activities

	Accidents		Injuries		Hours Flown
	Fatal	Reportable	Fatal	Serious	
Balloons	1	32	1	20	N/A
Gliders	34	496	42	62	1.6 million
Gyroplanes	6	32	7	3	0.05 million
Microlights	22	164	26	43	1.1 million

Table 56 - Other General Aviation Occupants Risk

Fatal accident rates (statistical) for the above, where known, are:

Gliders	1 fatal accident in 47,000 hours flown,
Gyroplanes	1 fatal accident in 8,000 hours flown
Microlights	1 fatal accident in 50,000 hours flown.

16 RISK TO THIRD PARTIES

This chapter indicates the risk created by aviation to persons either indirectly or not involved in aviation activities, over the past decade.

16.1 Third Parties involved in Aviation

Table 57 shows accidents where there were injuries to people on the ground in the UK whilst involved in the operation of an aircraft. All are aircraft ground service personnel save one, a stewardess aboard a Norwegian aircraft, who was injured when she fell from the aircraft whilst the steps were being manoeuvred into place.

The table does not attempt to show all accidents to ground personnel on or around an aerodrome as these are dealt with by the HSE. (CAP 642 -Airside Safety Management refers)

Date	Aircraft	Location	Type of opn.	Description of accident	Fatal	Serious	Minor
01-Apr-90	DHC7	Heathrow	Passenger	Ground handler fell under MLG wheels	1		
21-May-90	Bell 206B	Nr. Invervie, Scotland	Other	Experienced ground handler inexplicably walked into tail rotor	1		
18-Apr-92	Sikorsky S76A	Heather A Platform, N Sea	Passenger	Main rotor blade struck and killed HLO	1		
09-Sep-92	B737	Newcastle	Passenger	Stewardess fell from aircraft - steps not in place		1	
22-Sep-92	SA365 Dauphin	Viking Bravo oil rig	Passenger	Main rotor blade struck and killed deck hand	1		
03-Nov-92	ATP	Glasgow	Passenger	Ground crew injured when aircraft struck by towbar			1
23-Dec-92	DHC 8	Glasgow	Passenger	Engineer crushed against aircraft by baggage lorry		1	
11-Mar-93	Fokker F27	Edinburgh	Passenger	Tug and GPU driven into propeller. Tug driver killed	1		
31-Mar-93	B747	Heathrow	Passenger	Engineer struck by debris when aircraft struck Jetty			1
23-Jul-94	A300	Gatwick	Passenger	Aircraft rolled forward - brake failure. Gnd crew injured jumping clear			1
10-Dec-95	B747	Heathrow	Passenger	De-icing vehicle struck aircraft. Operator injured			1
19-May-96	BAe 146	Exeter	Passenger	Caterer fell when steps blown away by prop wash from other aircraft		1	
11-Dec-99	PA28	Manchester	Private	Marshaller walked into prop		1	

Note: The injury to the (foreign) Stewardess is included here because it resulted from UK ground crew action

Table 57 - Accidents/Injuries to Third Parties involved in Aviation

There were also four accidents abroad where three ground personnel were killed or seriously injured whilst servicing UK aircraft. These are mentioned for completeness, but not detailed in this publication as they fall outside the jurisdiction of the CAA.

Many people are engaged in aviation activities without being directly involved in the operation of an aircraft. The table below shows that they too can be at risk, however, 4 fatalities and 2 serious injuries in ten years appears to be a very low risk considering the thousands of people in and around aviation.

Date	Aircraft	Location	Type of opn.	Description of accident	Fatal	Serious	Minor
26-Aug-91	EMB110 Bandeirante	Tilstock, Whitchurch, Shr.	Parachuting	Parachutist struck stabiliser on exit. Parachute failed deploy	1		
05-Feb-93	Cessna 206	Brunton	Parachuting	Parachute failed to deploy	1		
25-Dec-94	Bell 206	Nr. Windermere	Passenger	Passenger walked into tail rotor whilst boarding		1	
13-May-95	Me 109	Duxford	Private	Blown off wing during engine start		1	
21-Oct-95	Cessna 207	Brunton	Parachuting	Jumpmaster fell from aircraft at low altitude	1		
19-Nov-97	Sikorsky S61	Nr. Bressay	SAR	Winchman engulfed by large wave and washed overboard	1		

Note: The Winchman fatality is include here because he was not attached to the aircraft when swept overboard from a ship

Table 58 - Accidents/Injuries to Third Parties indirectly involved in Aviation

16.2 Third Parties not involved in Aviation

The following Table shows the risk to people on the ground in the UK who were not involved in aviation or the activity from which they received their injuries.

Date	Aircraft	Location	Type of opn.	Description of accident	Fatal	Serious	Minor
18-Aug-91	Balloon	Meadowpark	Private	Boy's arm broken by tether vehicle when balloon blown by wind gust		1	
21-May-93	Robin 400	Rochester	Private	Struck coach on motorway during forced landing. Pilot seriously injured		1	3
26-May-93	Citation 2	Southampton	Private	Overran runway and struck motorists on motorway			3
30-Jun-95	Robinson R22	Private strip, Nr. Bourton	Private	Child struck by main rotor blade during rotors rundown	1		
14-Jul-96	Microlight	Wantage	Private	Struck person on ground during forced landing		1	
18-Aug-96	Tigermoth	Clacton	Private	Struck person on beach during forced landing		1	
15-Jun-97	Luscombe	Compton Abbas	Private	Struck person on ground during start-up		1	
03-Jul-98	ASK 21 Glider	Long Mynd	Private	During landing struck person walking along footpath beside strip	1		

Table 59 - Accidents/Injuries to Third Parties not involved in Aviation

Tables 60/61 give an indication of events where aviation related items have descended upon third parties or their property. In the last 10 years there has been only one injury as a result of these events. In 1994 a person on the ground was injured by falling debris when an ice block struck tiles on the roof of an adjacent building.

The term "Falling Aircraft", below, indicates events where a whole aircraft has struck or ended up on third party property, eg. the Air Algeria B737 on 21 December 94 (Chapter 12 refers).

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Icefalls	29	23	23	25	26	23	33	36	29	34
Falling Aircraft Parts	13	7	17	13	16	10	19	14	17	7
Falling Aircraft	6	5	2	3	3	2	5	4	3	2

Table 60 - Events where Aviation has impinged on Third Parties

Table 61, below indicates the general location of these events, however, aircraft forced to land in an emergency on open ground, eg. private farmland, have been ignored unless a third party was directly involved, because this is considered normal safe practice and icefalls onto open ground rarely leave any trace so information is incomplete.

	Ice	Parts	A/C
Residential Buildings	110	14	7
Private Gardens/Outbuildings	84	19	2
Commercial & Other Property	29	7	9
On/near vehicles/people	38	8	8
Crossing/on Roads	-	-	9
Open Ground	20	85	-

Table 61 - Location of Falling Objects

17 SAFETY INFORMATION

This chapter deals with current safety information topics, which includes three DataPlus publications and one paper produced by the NLR research institution of the Netherlands (In conjunction with the Directorate-General Civil Aviation (RLD) of the Netherlands and the UK CAA).

17.1 CALLSIGN CONFUSION (DataPlus 98/DP1, May 1998)

Introduction

The Aircraft Callsign Confusion Evaluation Safety Study (ACCESS) has finished collecting the callsign confusion data for 1997, and has also raised operator, pilot and controller awareness. The results of the detailed analysis should be available for publication in July/August 1998 for consideration and follow-on action by SRG, NATS, Eurocontrol and the airline industry. In the interim the results of the initial analysis were as follows:

In 1997, 5,625 Mandatory Occurrence Reports (MORs) were recorded on CAA's MORs database, of which 1,499 (27%) were ATC related. Of these 175 (12%) involved callsign confusion.

Initial analysis

The ACCESS initiative collected a total of **482** safety reports of callsign confusion in 1997. These were submitted by operators, pilots and controllers, of which:

- **175** (36%) were filed as MORs.
- **307** (64%) were ACCESS reports relating mainly to the potential safety aspects of callsign confusion which did not fit the stricter reporting criteria for MORs.
- **217** (45%) involved actual confusion of any party, including 99 where ATC were actually confused.
- **353** (73%) involved increased reported controller workload by reducing controllers' thinking time, and increasing RTF usage time.

Operator analysis

For analysis purposes, operators were divided into UK, Irish and Foreign groupings. Of the 482 callsign confusion reports:

- **319** (66%) involved confusion (actual or potential) which occurred between callsigns of the **same** operator.
- **223** (46%) involved solely UK operators, **173** (36%) involved solely foreign operators, and **22** (5%) involved solely Irish operators.
- **64** (13%) of the reports involved a combination of operator origins.

Callsign analysis

- **405** (84%) involved only **numeric** callsigns.
- **50** (10%) involved only **alphanumeric** callsigns.
- **17** (4%) involved a combination of alphanumeric and numeric callsigns.
- **10** (3%) of the reports did not contain sufficient information to compare callsigns.
- **134** (28%) involved two or more identical callsign suffixes, of which 3 were alpha-numeric and the remainder were numeric callsigns. The most common identical callsign suffixes were:

101 202 333 37 837 762 924

Scale of the Problem

In an attempt to measure the scale of the callsign confusion problem, it has been compared with another ATC related safety problem of similar importance and magnitude - level violations. There were 251 MORs involving level violations in 1997, compared with 175 MORs involving callsign confusion. In addition, the 307 ACCESS reports have been included. The report rates for both level violations and callsign confusion, measured against total aircraft movements in UK airspace, are shown in Figure 1:

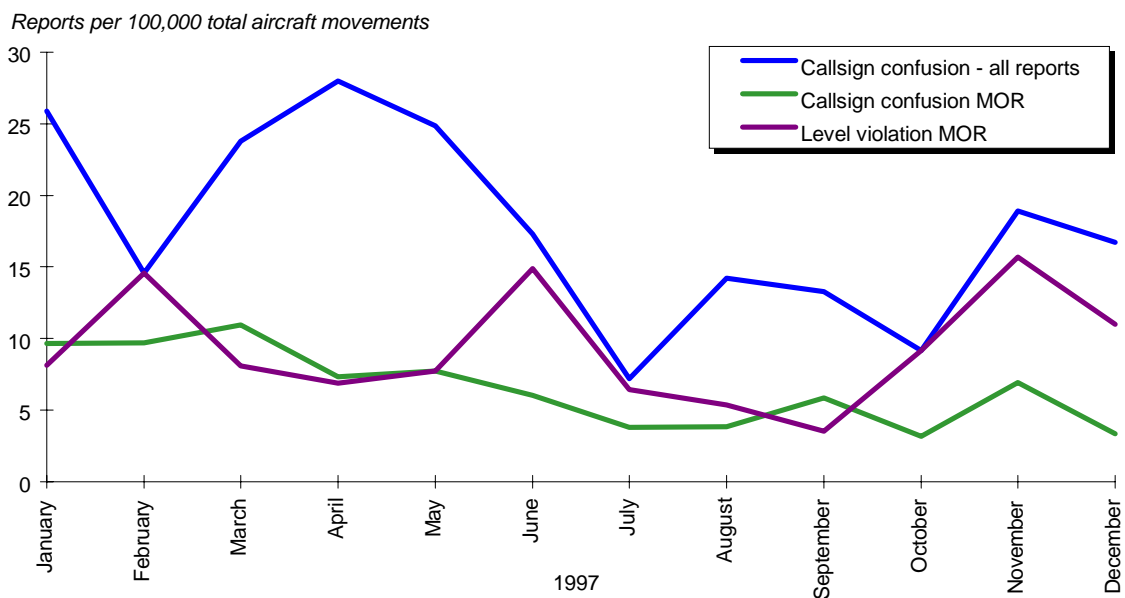


Figure 1 Comparison of Report Rates for Callsign Confusion v. Level Violations

Source of total aircraft movements: Traffic Statistics - Quarterly Report on NATS Units, NATS, January 1998.

17.2 LEVEL BUSTS (DataPlus 98/DP2, July 1998)

Introduction

Following concern over the continued increase in numbers of level busts in UK airspace, the Safety Regulation Group (SRG) established the Level Bust Working Group (LBWG). The LBWG was formed at the beginning of 1997 to define the most effective ways of minimising hazards associated with level busts. The main group, consisting of CAA, NATS and industry representatives, is served by four subgroups: Analysis, Flight Operations, ATC and Awareness. As part of the work carried out for the Analysis subgroup, this DataPlus contains an analysis of level busts recorded in UK airspace since 1994. It is a natural progression of the previous Data Plus (96/DP1) on this subject which covered all busts recorded during 1994.

Trends

The total number of reported level busts for each year since 1994 were 142, 171 and 252 respectively. Fig. 1 shows this increasing trend together with the three year moving average from 1992 to 1997.

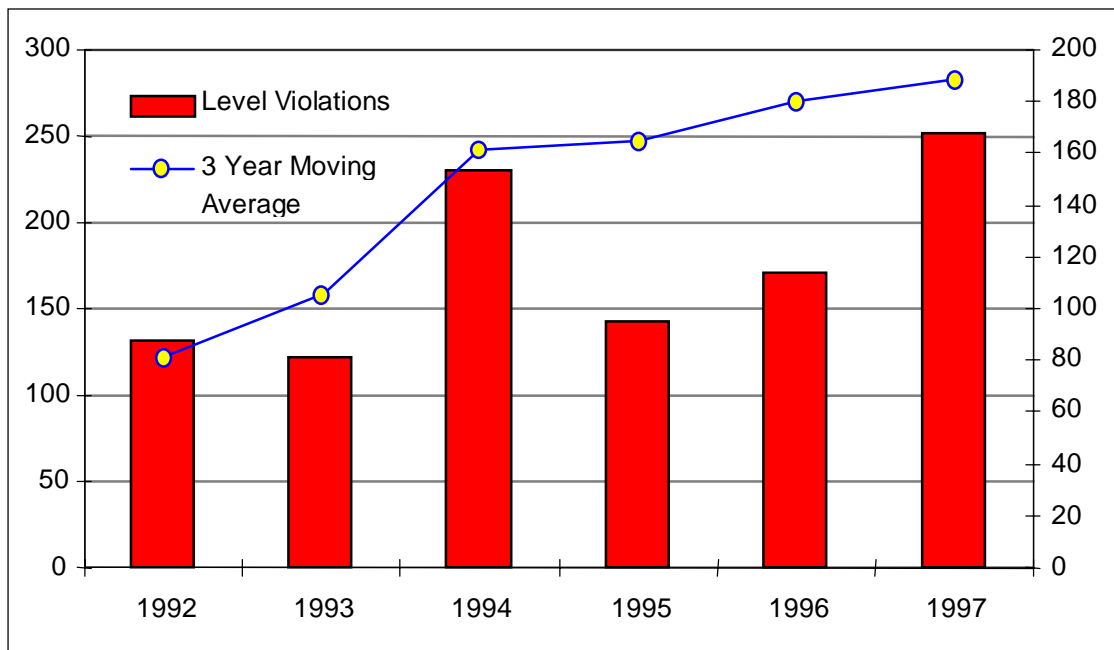


Fig.1 Yearly breakdown of all level busts 1992-97

Whilst the large jump observed in 1994 can be attributable to the CAA safety survey conducted during that year, which excited higher reporting rates, it nevertheless shows a steady upward trend of level bust occurrences. Fig. 2 shows a monthly breakdown of numbers of level busts for 1995 to 1997.

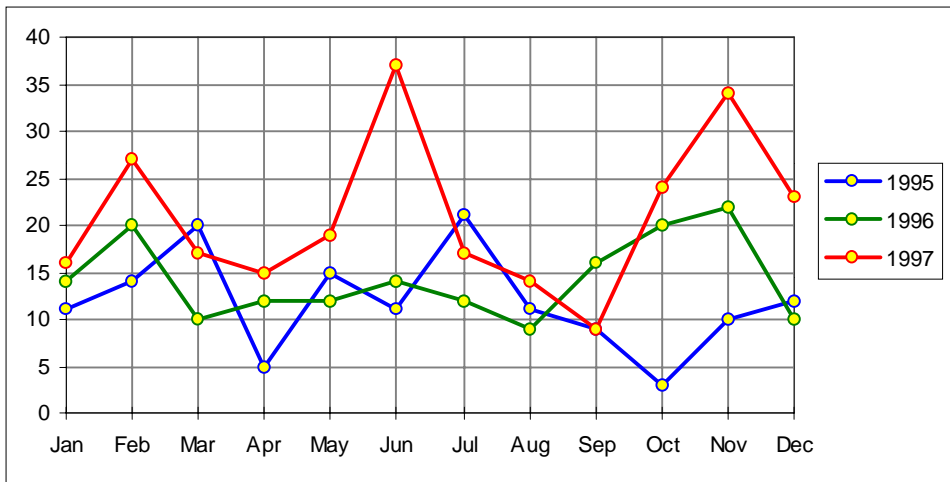


Fig.2 Monthly breakdown of all level busts 1995-97

There are two main periods during the year where numbers of busts peak: first around February and then later on in November. The large peak in June 1997 was predominantly due to a higher than normal number of busts caused by incorrect altimeter setting, turbulence and auto-pilot capture problems. Records show that on five days towards the end of June the QNH at Heathrow was below 1000 mb i.e. a differential in excess of 300 feet from 1013.2 mb. Nearly a third of the recorded level busts occurred during this period. Furthermore, the overall weather conditions for June were unusually inclement. Also, of note are the larger peak to trough differences observed in 1997.

Fig. 3 shows a monthly breakdown for the first four month period of each year since 1994. In 1998 there is a steep upward trend which is unlike any of the previous three years where a general fall towards April was observed. The reported number of busts to date in 1998 is greater than it has ever been. This is most probably due to a higher degree of alertness of the problem among reporters and the additional encouragement for them to report, as the LBWG Awareness campaign has gained momentum.

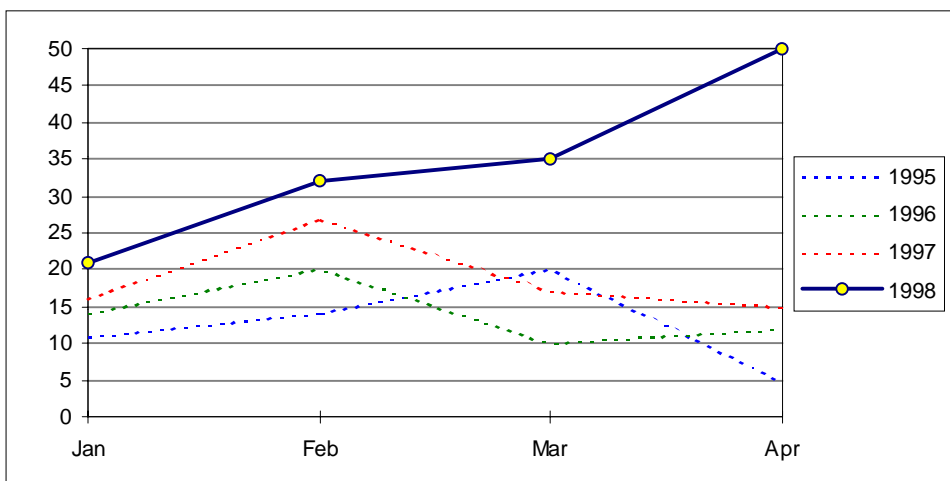


Fig.3 First four months of the year 1995-98

The 1994 survey revealed an inexplicable fall in the monthly rate of level busts in LATCC airspace during the higher traffic months of the UK Summer. A similar trend was also observed in 1997 and is shown in Fig.4:

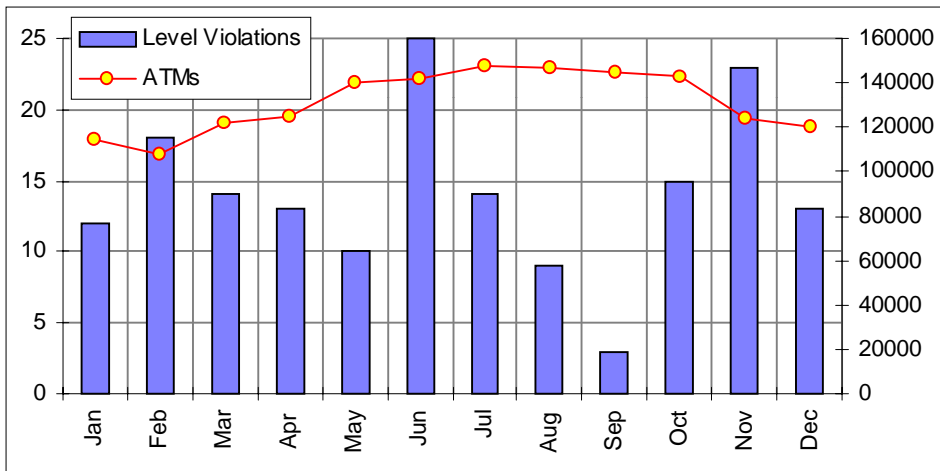


Fig.4 Level busts and traffic levels in LATCC airspace 1997

Note: Of the 252 level busts reported in 1997, 169 occurred in LATCC airspace, where the traffic densities are greatest. As this proportion is considered to give a fair representation of level busts and the traffic statistics are easily obtainable, LATCC airspace was chosen to illustrate the trends.

With the exception of June, the level bust rate fell continuously from 16.7 per 100,000 air transport movements (ATMs) in February to just 2.1 in September. Thereafter the rate rose sharply to a year high of 18.5 in November before dropping off again in December.

A Climb Out Problem

The breakdown of level busts by phase of flight has essentially remained the same for each year since 1994. The climb phase of flight attracts more busts than all the other phases put together. This is probably related to aircraft performance and the higher rate and frequency of level change in the climb profile compared to the descent. Fig. 5 shows a three year (1995 to 1997) total breakdown:

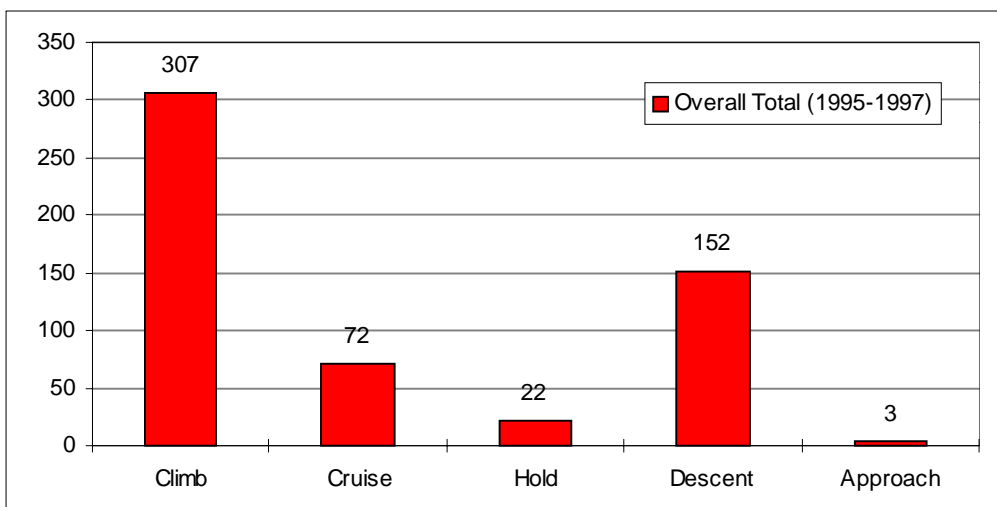


Fig.5 Level busts by phase of flight 3 year total

The majority of level busts reported since 1994 occurred in the climb phase between 3000 ft and FL90 and in TMA airspace as shown in Fig. 6 and Fig. 7. The proportions for each year have remained fairly constant with one noticeable exception which shows that in 1997 there was a greater proportion of busts reported below 6000 ft. This is probably related to the increasing number recorded during Standard Instrument Departures (SIDs).

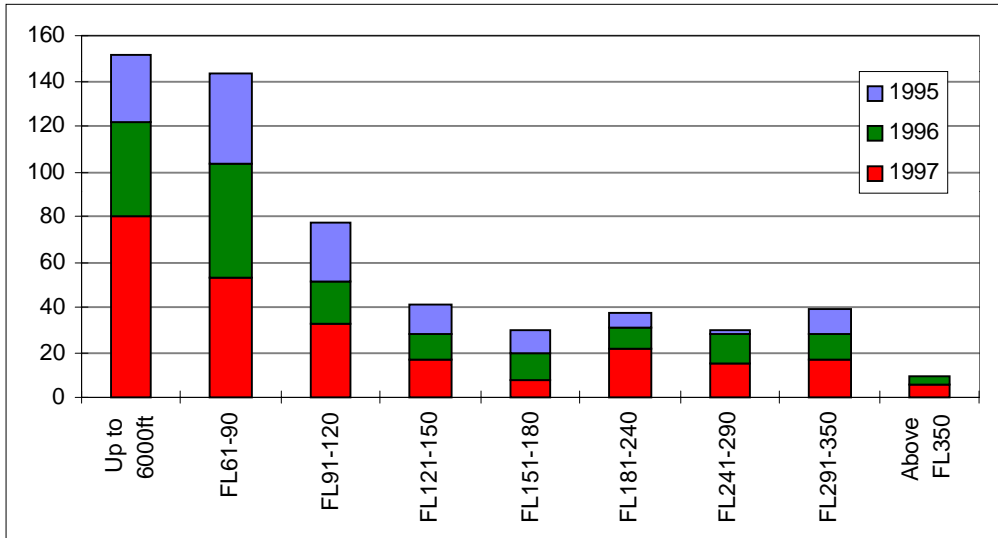


Fig.6 Level busts by flight levels 1995-97

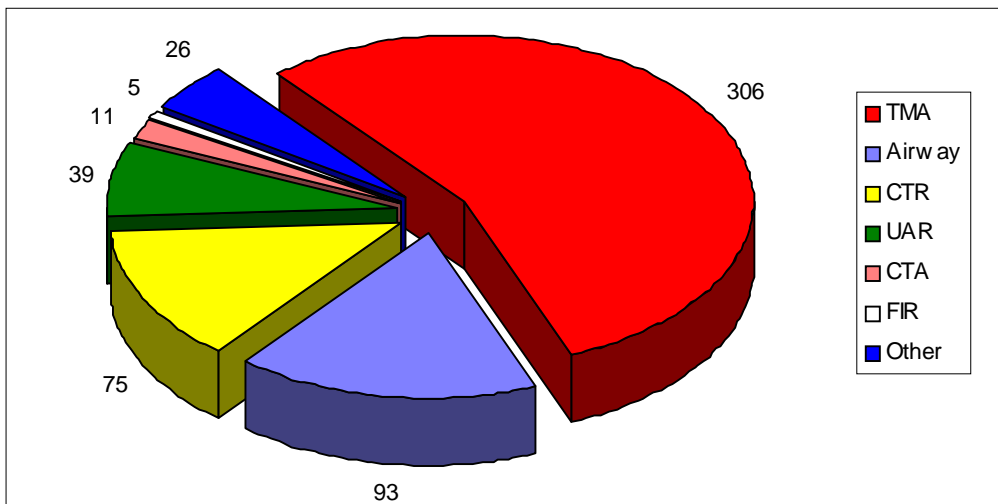


Fig.7 Level busts by airspace type 3 year total

Operators and Aircraft Involved

Since 1994 over half of the level busts have involved jet transport aircraft. Fig. 8 shows a three year (1995 to 1997) total breakdown by aircraft weight group. A separate category has been added for military aircraft (where weight group is unknown).

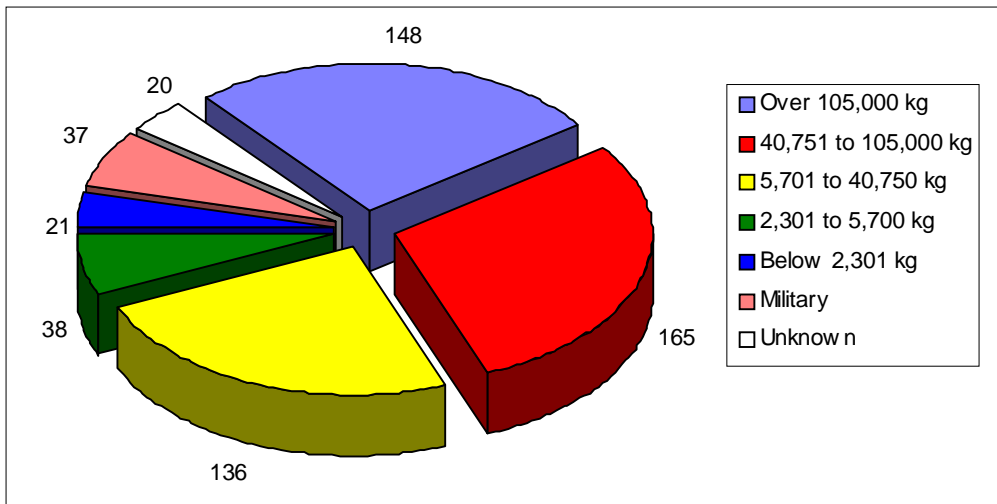


Fig.8 Level busts by aircraft weight group 3 year total

In the three years since the last survey, the B737 was the aircraft type most commonly involved in level busts. It represented 22% of the jet transport aircraft level bust total. The B747 (14%), BAe 146 (11%), B757 (11%) and A320 (6%) were the next most common. However, when the amount of flying by each type is considered, the B747 emerges as the aircraft with the most prevalent level bust rate (amongst those mentioned above). The B737 compares quite favourably with the A320 but the BAe 146's rate is higher. The BAe 146 was seen to have a notable increase in the number of level busts during 1997 (three times greater than in 1996).

Fig. 9 shows a breakdown of level busts, for 1997 only, by region of origin based on aircraft registration. It should be noted that an aircraft registered to one particular country may well be operated by an airline from a different country.

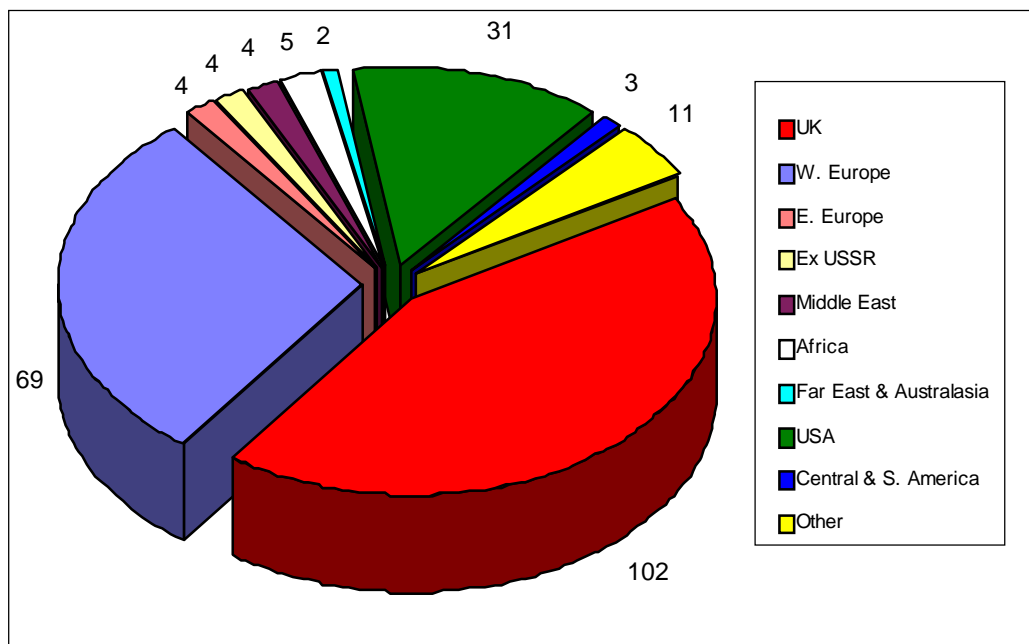


Fig.9 Level busts by region of origin (based on aircraft registration) 1997 only

As in the 1994 survey, approximately 60% of level busts involved aircraft registered outside of the UK. Even allowing for a small proportion of these being operated by UK airlines, foreign operators are responsible for more than half of all level busts in UK airspace.

Military Involvement

There has been a continuous rise in the number of level busts involving military aircraft and a sharp increase in 1997 when the number doubled to 20 occurrences compared to 10 and 7 in 1996 and 1995 respectively. The military level bust occurrences were split approximately 50:50 between UK and foreign. Six of the 37 violations since 1994 were AIRPROX occurrences and a further 13 involved a loss of ATC separation.

Mid-Air Collision Risk (AIRPROX) and Loss of ATC Separation Level Busts

In the three years since 1994 there have been 54 Aircraft Proximity (AIRPROX) occurrences involving level busts, of which 43 were reported by controllers and 11 by pilots. There were a further 123 occurrences involving loss of ATC separation. Fig. 10 shows a yearly breakdown:

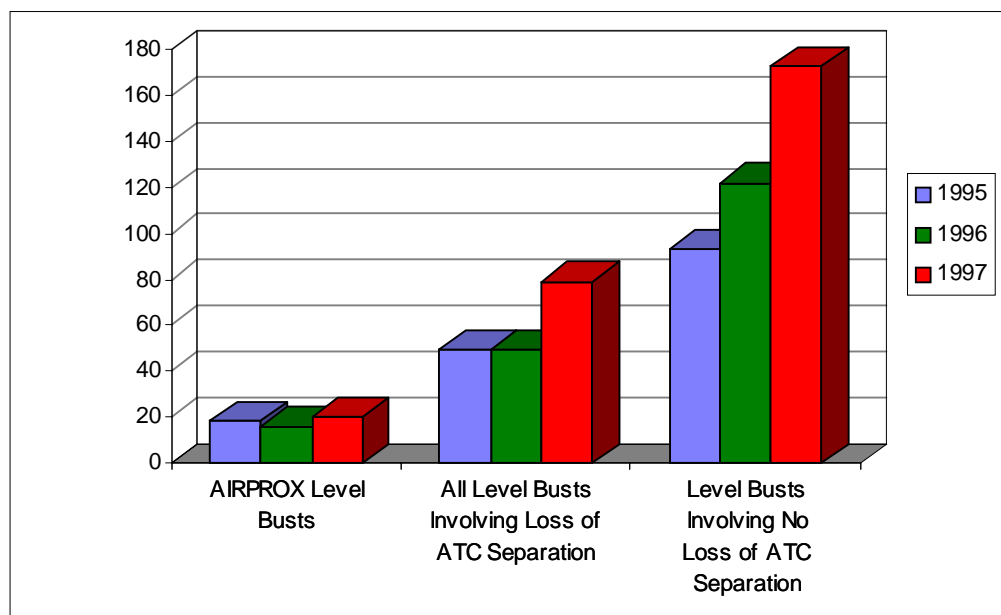


Fig.10 Level busts involving AIRPROX and loss of ATC separation incidents 1995-97

The most noticeable change over the three years is the sharp increase in 1997 in the number of incidents involving loss of ATC separation. Numbers of level busts involving AIRPROX also increased in 1997. This followed two consecutive years where numbers had fallen.

TCAS Involvement

There have been 24 level busts since 1994 with some form of TCAS involvement:

- 7 level busts caused TCAS alerts to trigger on other aircraft
- 6 level busts actually resulted from TCAS alerts
- 3 level busts preceded the TCAS alerts but did not cause them
- 2 level busts followed TCAS alerts but were not caused by them
- There were 6 unknown circumstances

Causal Factors

The major causal factor for level busts in every year since 1994 has been *pilots not complying with correctly read-back ATC vertical clearances* (some 33% of the total). There also continues to be large numbers of occurrences involving the following causal factors:

- Altimeter setting errors
- Pilots exceeding the limits of published SID levels
- Technical/ equipment malfunctions for example auto-pilot altitude capture
- Crew distraction and lack of monitoring
- Pilot read-back errors not detected by ATC

The Next Step

Clearly the level bust problem is not going to reduce by itself. The question of how serious this situation currently is becomes increasingly difficult to gauge. As the rate of reports increases it is difficult to say whether this is due to more diligent and self aware reporting or if there is a genuine deteriorating trend. Perhaps the most important question is **why did the level bust occur?** In the majority of reports what happened is satisfactorily explained but, for a variety of reasons, why it happened rarely is.

With this in mind SRG has commissioned an independent confidential project. This initiative called '**On the Level**', to be launched soon*, will involve the collection of de-identified information from pilots and controllers involved, to better understand the reasons **why** level busts occur. 'On the Level' will produce a report on its findings in 1999.

Note: This project will not in any way affect the current reporting procedures i.e. the CAA Mandatory Occurrence Reporting Scheme (MORS) or company Air Safety Reporting (ASR) programmes.

For more level bust information see CAA website:

<http://www.caa.co.uk/srg/levelbust>

* Since this Dataplus was issued, this project has commenced.

Reference:

'Level Violations Recorded in UK Airspace During 1994' [Data Plus 96/DP1, March 96]

(See section 13.3 for recent data)

17.3 LOADING ERRORS (DataPlus 98/DP3, December 1998)

Introduction

A recent serious event involving loose cargo on a B767 has focused attention on general problems concerning loading errors. Loading errors involving aircraft weight and balance problems are not new - they have contributed to fatal accidents in commercial aviation throughout the world. In 1997, a Fine Air DC-8 freighter crashed shortly after take-off from Miami Airport after pitching nose-up and stalling. This fatal accident was the result of the cargo being loaded incorrectly, which moved the centre of gravity rearwards without the flight crew's knowledge.

In the last 12 months there has been a noticeable increase in the number of loading related Mandatory Occurrence Reports (MORs) reported to the CAA by UK operators.

Whilst this concern has already been brought to the attention of UK AOC holders in the CAA Flight Operations Department Communication 10/98, the purpose of this DataPlus is to focus attention on some of the recent UK MORs involving current loading issues.

Summary of recent UK occurrences

Preliminary analysis of 52 aeroplane loading error MORs received in 1998 by the Safety Data Department (up to the end of November) indicates five main causal factors:

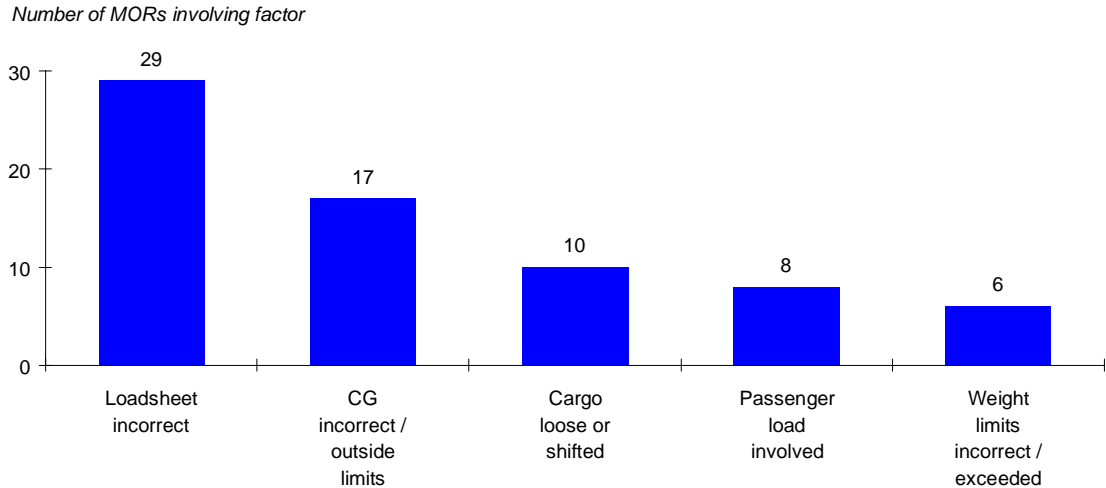


Figure 1 - Analysis of loading error MORs by the main causal factors involved

The following excerpts have been taken from recent MORs to highlight the main factors - it should be noted that these factors are not mutually exclusive.

Load sheet incorrect:

Saab 340 2 January 1998

It was alleged that for the sixth consecutive time, load figures bore no resemblance to the actual passengers on board.

DC10 3 February 1998

The load sheet presented showed an error of 15 tonnes.

FK 100 25 April 1998

The load sheet showed freight divided between holds 3 and 4. On arrival it was found that the freight was actually in holds 2, 3 and 4.

ATR 72 4 June 1998

The take-off was rejected as the aircraft passed through 90kts, due to a loading error. Instead of having 15 bags in the front hold and 10 bags in the rear hold, all 25 bags were found in the front hold.

ATP 27 June 1998

The passenger weight on the load sheet was underestimated by 1971kg. The error was detected before departure.

Centre of Gravity (CG) incorrect/outside limits:

SD360 17 June 1998

Aircraft handling was compromised by unsafe trim condition and MTOW exceedance due to loading error. During flight the aircraft exhibited abnormal handling characteristics - with landing flap selected the elevators were ineffective. The CG was found to be significantly outside limits and the aircraft had taken off 159kg overweight.

ATP 1 September 1998

At rotation a slight mid/aft trim change was felt. The crew were subsequently informed that 431kg of unrecorded freight had been loaded in the rear hold.

Cargo loose or shifted:

A320 16 March 1998

On arrival, the crew were informed that a container had not been secured properly in the rear hold and had moved rearwards during the flight.

A321 19 June 1998

On arrival, a container was found unsecured and having moved forward 18 inches. Further movement was only prevented by an aft cargo net and a broken case castor.

B767 25 November 1998

Severe damage to the cargo bay floor and APU starter cable was discovered on arrival, due to movement of containers in flight - none of which had been secured on departure.

Passenger load involved:

DHC8 30 January 1998

Gross loading error resulted in over-rotation on take-off. All passengers had been seated (incorrectly) aft of row 5, as advised to by the aircraft dispatcher.

Weight limits incorrect/exceeded:

Saab 340 30 April 1998

Gross overload of freight led to take-off over MTOW. On rotation and initial climb the aircraft was unstable in pitch, making large control inputs necessary. It was found that extra mail bags had been loaded without consulting or advising the flight crew. These mail bags had also not been secured correctly.

B747 1 June 1998

Aircraft used the full length of the runway on take-off, only leaving the ground in the last 300m of runway. The rate of climb was slow and the aircraft reached top of climb 4 minutes late. Cruise performance corresponded to the aircraft being 10,000kg over reported gross weight. However, the aircraft was not weighed on arrival despite requests from the crew, so the overload was not confirmed.

Trends

Whilst investigation of these MORs revealed few identifiable trends, there had been occasions when pilots found their aircraft to have been unexpectedly nose or tail heavy on rotation. On closer examination it was found that where cargo had been loaded in the wrong holds there was probably little the flight crew could have done (if the load sheet did not accurately indicate where the loads had been positioned). But where passengers in part-full aircraft had sat in cabin areas other than those needed to trim the load within limits, the out-of-trim condition could have been corrected.

Other issues evident on several occasions were:

- Lack of communication between the loading crew and the flight crew.
- Head counts of passengers were wrong, often due to late arrival or removal of passengers.
- Cargo was found unsecured on arrival, and often cargo had shifted during the flight.
- Load sheets were not corrected after a late change in cargo or passenger loading.
- Load sheet errors were not detected until the aircraft exhibited abnormal handling characteristics.

Operator action

To minimise loading errors, operators should review their loading practices in conjunction with their existing Operations Manual. We suggest that attention should be focused on the 5 'C's for successful and safe aircraft loading:

<p>Cargo secure, and in correct hold</p>
<p>Counting passenger head counts and gender</p>
<p>Checking load sheets, especially after last minute changes</p>
<p>Calculation load sheets, weight and balance</p>
<p>Communication between loading crew and flight crew</p>

Conclusion

Loading errors are not rare events in the UK and some of the recent incidents could have resulted in much more serious consequences under different circumstances.

Loading errors are not limited to a few operators or aircraft - errors occur across the board, within the UK and globally.

Better communication and checking can reduce the number of these potentially catastrophic hazards.

17.4 BIRDSTRIKES (DataPlus 99/DP1, July 1999)

Introduction

The following are just three examples of the 8500 *serious* birdstrike events reported to ICAO over the last 8 years. They actually received a total of 78,000 birdstrike reports from 190 member states during this period.

A DC-9 at Kansas City on 4th March 99 encountered a flock of large birds while on final approach. Several birds were ingested into both engines, causing substantial damage to the engines and resulting in a severe power loss. Aircraft landed safely.

Boeing 747 at Montreal on 20th Nov 98 As the aircraft climbed through 750ft during a go-around a large flock of Snow Geese was encountered (approx 40 birds) with numerous impacts. A smell of smoke became evident on the flight deck and the nr 4 engine failed with a high EGT and reported flaming from jetpipe. "Mayday" declared and aircraft landed immediately with fire services in attendance. Nr 3 engine thrust lever jammed in idle during taxi. Subsequent investigation identified extensive damage to nrs 2, 3 & 4 engines, radome, landing gear, both wing leading edges and external lights.

Hercules at Eindhoven on 5th July 96

As the aircraft flared for touchdown it suffered multiple bird strikes to the cockpit, wings and nrs 1, 2 and 3 engines. It veered left, crashed and burned. 34 of the 41 people onboard were killed by the ensuing fire.

In 1996 alone more than 200 engines were reported damaged by birds, worldwide.

Closer to home, approx. 1000 birdstrikes to UK registered aircraft are reported each year and during just four months from September to December 98, British Airways recorded 132 birdstrikes across their fleet, including 11 on their Boeing 777's.

The bird hazard to all aircraft, both old and new, is very real.

Analysis

This analysis focuses on birdstrike reports recorded on the UK CAA **Mandatory Occurrence Reporting Scheme (MORS)** database (CAP 382 refers). This encompasses all events involving UK registered aircraft worldwide or any aircraft in UK airspace, but which only records those resulting in "significant damage to the aircraft or loss or malfunction of any essential service".

Between 1981 and 1998 there were 393 such events. For example in **1994 a Cessna 406 at Inverness** flew into a flock of Geese at 150ft on approach. Bird remains were found on the left propeller, nacelle, tailplane and both pilot's windscreens. In **1998 a BAe 146 at Belfast struck** a Cormorant at 2000ft during climb out which penetrated the aircraft just above the right-hand flight deck window. The aircraft returned due to depressurisation and landed safely. The nrs 1 and 4 fire handles had been displaced 2cm and fuselage frames damaged by the impact.

Of the 393 reports 273 (70%) involved public transport passenger aircraft, 330 (84%) involved aircraft above 5700kg maximum takeoff weight authorised (mtwa) and 376 (96%) involved fixed wing aircraft (aeroplanes).

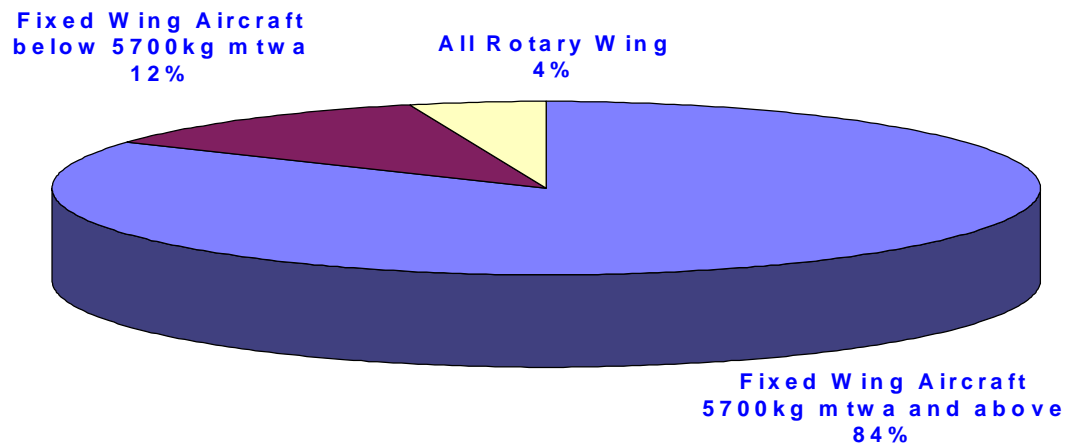


Fig 1. All Birdstrikes 81-98 by Class of Aircraft

Rotary wing and small fixed wing aircraft only account for 16% of UK reported birdstrikes.

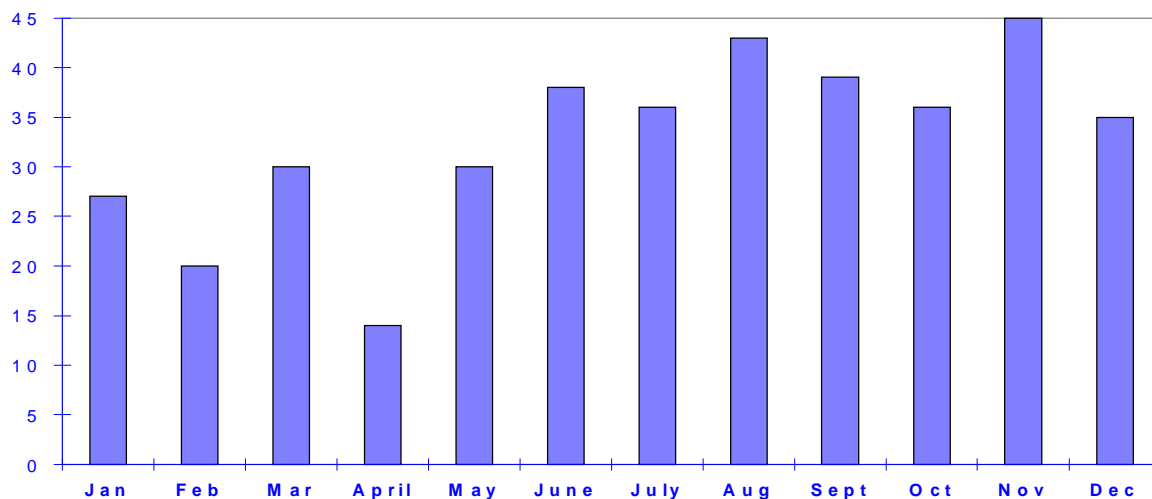


Fig 2. All Birdstrikes 81-98 by Month

The birdstrike year appears to fall into two distinct periods, January to May with 24 strikes, on average, per month and June to December with 39 per month.

Aeroplanes

291 of the 376 aeroplane birdstrikes involved Jets, 277 (74%) above 40 tonnes mtwa, ie. Fokker 100 to Boeing 747 size. 282 involved twins (Islander to Airbus A300) and 66 involved four engined aeroplanes (Viscount to Boeing 747).

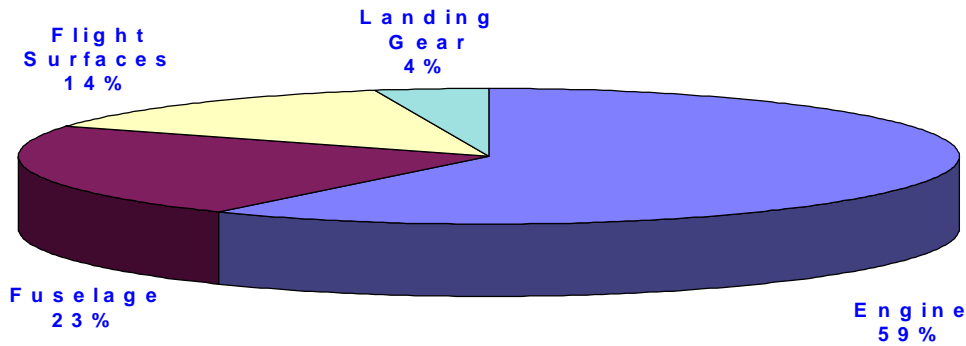


Fig 3. Aeroplane Birdstrike Damage Areas

Although engines are generally the most vulnerable area for birdstrikes, particularly with the large aeroplanes, aeroplanes smaller than 5700kg are more susceptible to flight surface and fuselage strikes. (ie. 42 out of the 53 reported).

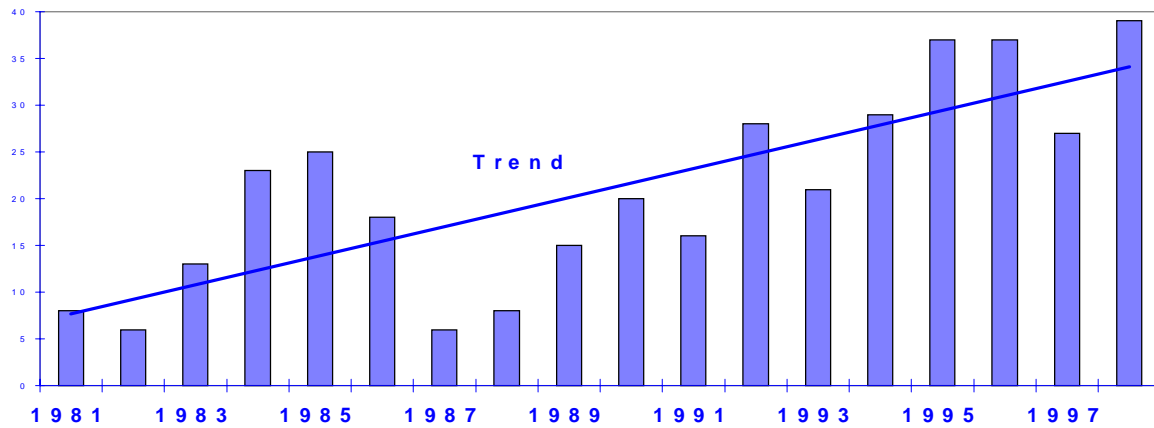


Fig 4. Birdstrikes on Aeroplanes by Year

Since the low point in 1987 there has been a marked increase in the number of recorded birdstrikes, even when related to traffic growth.

Of the 330 recorded birdstrikes to aeroplanes above 5700kg mtwa, 162 involved UK registered aeroplanes abroad, with most events at Amsterdam, Genoa and Palma. 168 were in UK airspace with Heathrow, Gatwick, Manchester and Belfast at the top of the list. Of course this takes no account of the number of airport movements.

British Airways data reveals that they have had a problem at one particular foreign airport, with 32 birdstrikes in the last four months of 1998; mostly minor damage so they don't appear on MORS. However, recent very positive action by the airport operator, at BA's request, has virtually eliminated this hazard.

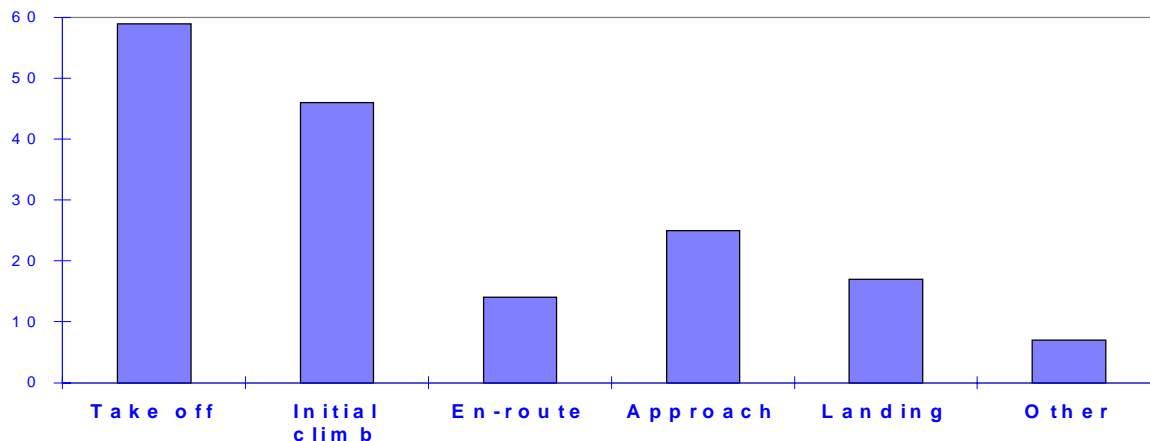


Fig 5. Birdstrikes on Aeroplanes above 5700kg mtwa in UK airspace 81 - 98 by Flight Phase

In UK airspace take-off and initial climb are, by far, the most exposed phases of a flight.

Helicopters

Only 17 birdstrikes to helicopters have been recorded between 1981 and 1998, one a year. However, 11 of these were to the fuselage with 8 involving collisions with or penetration of the windscreen or a cabin window. For example, in **1993 a Super Puma** was struck by a large bird on take off damaging the centre windscreen and sending pieces of glazing into the cockpit. In **1998** a large gull penetrated the right hand upper canopy of a **Bolkow 105**.

Even attempts to avoid strikes can lead to damage as in **1995** when a **Hiller UH12** struck power cables whilst manoeuvring to avoid birds.

Consequences

There were no fatal accidents involving UK aircraft or airspace during this period, however, there were 47 abandoned take-offs, 33 precautionary landings, 26 diversions and 88 returns to the original aerodrome. All very costly to the Operators.

Conclusion

Control of this hazard is a multi-disciplinary activity involving Aerodrome, ATC and Airline operations; Local Councils (including Waste Disposal) and Landowners; Engine Manufacturers and Aviation Regulators.

It requires acceptance by all parties that there is an hazard and adequate procedures must be enforced.

These procedures should cover such actions as the control of landfill and waste disposal site operations close to aerodromes, the control of agriculture on the aerodrome, including specifying grass lengths, the employment of proven bird deterrent methods (bird distress calls, Very pistol shell crackers etc.), reporting all bird sightings on or near the aerodrome, monitoring day-to-day bird movements and consideration of the affects that architectural, landscaping and water abstraction system changes may have on the local bird population.

(A more comprehensive guide to Bird Control can be found in CAP 680 - Aerodrome Bird Control)

In the words of ICAO, “Bird Strike threat is best countered by effective wildlife control augmented by land-use management”.

However, success ultimately depends upon the continued vigilance by motivated, well trained and suitably equipped staff.

There is no magic cure.

Acknowledgements

“ICAO Journal” Oct 98

British Airways “Flywise” Oct to Dec 98

Airclaims “CASE” Database

Lloyds List Casualty Reporting System Airfield Wildlife Management Ltd

17.5 SAFETY ASPECTS OF AIR CARGO OPERATIONS (Joint NLR / RLD / CAA Paper, March 1999)

The National Aerospace Laboratory (NLR) of the Netherlands, the UK Civil Aviation Authority and Directorate General of Civil Aviation (RLD) of the Netherlands found that there is an increased accident risk at night for cargo operations. This international study of differences between world-wide air cargo operations and passenger transport has found four main areas of study that may increase understanding of the statistically higher accident probability among cargo flights.

An earlier study commissioned by the UK Civil Aviation Authority (CAA) of fatal accidents to Western-built jets between 1980 and 1996 inclusive concluded that “cargo operations have a fatal accident risk at least four times that for passenger flights (possibly considerably higher)”. As a follow-up to the CAA study, the co-operative analysis shows that compared to passenger operations, a higher proportion of cargo flights operate at night, aircraft are significantly older, the average fleet size is lower, and flight crews have lower average experience.

Although accidents with cargo aircraft do not necessarily generate the same massive media attention as accidents where fare-paying passengers are involved, the impact of those accidents on society can be as important as passenger accidents. This co-operative investigation focuses on examining factors that are presumed to be associated with an increased operational risk of cargo operations.

The study identified, quantified and analysed the most significant differences between cargo operations and passenger operations, and produced the following findings:

- An association exists between night operations and increased probability of an accident for cargo operations (a probability more than four times higher than for cargo aircraft operated during daytime);
- A steady increase has occurred in the average age of Western-built cargo aircraft, from 14 years to 22 years, since 1980;
- There is a statistically significant difference in the lower average experience of the pilot-in-command for cargo accidents (10,948 flight hours) — with large differences in age between captains and copilots — compared with the average experience of the pilot-in-command for passenger accidents (12,459 flight hours);
- No significant difference exists in the relative number of non-precision approaches for cargo operations compared with passenger operations; and,
- The distribution of types of causal factors in fatal accidents was approximately the same for both types of operations.

Data analysis also revealed a relatively high accident rate for the ad-hoc type of cargo operators (those characterised by a very high percentage of unscheduled flights on routes not served by major operators, typically with a few aircraft used strictly for cargo operations). No significant differences were detected between cargo operations and passenger operations in the diversity of aircraft types within the fleets and the quality of safety oversight.

Cargo operations, for the purpose of this study, were those in which no fare-paying passengers were carried and the flight essentially was for the purpose of carrying cargo or freight (including mail). Passenger operations, as defined in the study, were those in which the flight was conducted with an aircraft that was equipped primarily for the transportation of fare-paying passengers (that is, the upper half of the aircraft fuselage did not contain any significant cargo area although generally some cargo was carried in the lower half of the fuselage). Combi-flights, in which part of the passenger cabin was used to carry cargo, were excluded.

Authors:

Alfred L.C. Roelen and Gerard W.H. van Es, National Aerospace Laboratory (NLR) – Netherlands

Hok Goei, Directorate General of Civil Aviation (RLD)

Adrian G. Sayce and Sarah Doherty, U.K. Civil Aviation Authority

18 DEFINITIONS

Aeroplane

An aeroplane, as defined in Schedule 1 of the Air Navigation Order, is a (fixed wing) power-driven heavier than air aircraft. It includes landplanes, seaplanes, amphibians and self-launching motor gliders.

Airline

Public transport flights which are subject to a UK Air Transport Licence, excluding positioning flights and Air Taxi operations.

Air Taxi

Small airlines, none of whose aircraft capacities exceed 20 seats, or sole use charter flights utilising aircraft of less than 15 tonnes mtwa.

Air Transport Movement (ATM)

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

Airprox

A situation in which, in the opinion of a pilot or 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. Airproxes were originally divided into, Airprox (C) - reported by the controller and Airprox (P) - reported by the pilot(s). Each Airprox is given a classification as follows:

- A Risk of collision - actual risk of collision has existed.
- B Safety not assured - safety of the aircraft has been compromised.
- C No risk of collision - no risk of collision has existed.
- D Risk not determined - insufficient information was available to determine the risk involved.

It should be noted that a risk-bearing Airprox is one where the classification was A or B.

ATC overload

A situation where the traffic in a sector is markedly in excess of that planned and/or the controller feels unable to safely control traffic, particularly in the event of an emergency occurring.

Call sign confusion

Aural or visual confusion by controller or pilot resulting from the similarity of airline Radio Telephone Frequency (RTF) call signs.

Cargo service

A service, other than a passenger service, provided for the transport of goods or property, including mail. Also known as Freight services.

Causal Factor

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

Circumstantial Factor

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

Collision on aerodrome

Any unplanned contact between two or more aircraft or between an aircraft and a vehicle or ground installation. In the Mandatory Occurrence Reporting Scheme this only includes Occurrences where the aircraft involved was prepared for flight.

Commonwealth of Independent States (CIS) countries

Armenia	Azerbaijan	Belarus	Georgia
Kazakstan	Kyrgyzstan	Rep. of Moldova	Russian Federation
Tajikistan	Turkmenistan	Ukraine	Uzbekistan

Conflict

Two or more aircraft getting too close to one another without necessarily incurring loss of separation.

Consequences

Outcome of an accident.

Europe

This list includes both present and former countries within the European region:

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

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'.

Fatal injury (as defined in ICAO Annex 13 - Aircraft Accident and Incident Investigation)

An injury which is sustained by a person in a reportable accident which results in death within thirty days of the date of the accident.

Flight

From the moment when, after the embarkation of its crew for the purposes of taking off, the aeroplane/rotorcraft first moves under its own power until the moment when it next comes to rest after landing.

Gliders

Self sustaining motor gliders are included as these are registered with the British Gliding Association. Self launching motor gliders are not included as they are CAA registered and appear in the aeroplane statistics. Hang gliders and paragliders are not included.

Joint Aviation Authorities (JAA) (Full Member States)

Austria	Belgium	Denmark	Finland
France	Germany	Greece	Iceland
Ireland	Italy	Luxembourg	Malta
Monaco	Netherlands	Norway	Portugal
Spain	Sweden	Switzerland	United Kingdom

Level bust

An occurrence where an aircraft exceeds 300 feet above or below its assigned level.

Loading problem

An occurrence where aircraft are incorrectly loaded and/or where the appropriate loading paperwork is incorrect, misleading or missing.

Loss of separation

An occurrence where the standard ATC separation between aircraft is less than the prescribed minima.

Minor injury

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

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.

Occurrence

An incident or accident as described in Appendix B of CAP382 - The Mandatory Occurrence Reporting Scheme.

Public Transport

Operations involving transport of passengers and/or cargo on scheduled or non-scheduled services, or other revenue services including air taxi and pleasure flights. Commercial operations are not included.

Ramp occurrence

An occurrence on airfield manoeuvring areas, excluding taxiways and runways.

Reportable accident (as defined in the UK Civil Aviation - Investigation of Air Accidents and Incidents - Regulations)

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, antennae, tyres, brakes, fairings, small dents or puncture holes in the aircraft skin; or

- c) the aircraft is missing or completely inaccessible.

Reportable accidents include fatal accidents.

Serious injury (as defined in ICAO Annex 13 - Aircraft Accident and Incident Investigation)

An injury which is sustained by a person in a reportable accident and which -

- a) requires their stay in hospital for more than 48 hours commencing within seven days from the date on which 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 nerve, muscle or tendon damage or severe haemorrhage;
- d) involves injury to any internal organ;
- e) involves second or third degree burns or any burns affecting more than five per cent of the body surface; or
- f) involves verified exposure to infectious substances or injurious radiation.

Third party accident

An accident which involves injury to third parties only such as people on the ground, in another aircraft or vehicle. A list of injuries to third parties can be found in Chapter 16.