

BIRD STRIKES DURING 1983 TO EUROPEAN REGISTERED
CIVIL AIRCRAFT

(Aircraft over 5700 kg Maximum Weight)

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SUMMARY

The strikes reported throughout the World in 1983 by operators from fourteen European countries have been analysed. The analysis includes rates for countries, aircraft types and aerodromes based on aircraft movements. It also covers bird species, part of aircraft struck, effect of strike, and airlines affected.

The strike rate in 1983 was at 5.6 per 10,000 movements, somewhat higher than the two previous years. Gulls (*Larus* spp.) were involved in 35% of the incidents. The major effect was damage to 122 engines.

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This study is based on information supplied and the accuracy and detail are only as good as that reported. Any opinions expressed are those of the author.

1 INTRODUCTION

1.1 In order that a common basis for the analysis of bird strike data could be agreed, a Working Group of the Bird Strike Committee Europe was formed in 1972, led by the representative from the United Kingdom Civil Aviation Authority Airworthiness Division at Redhill. Reports covering the individual years 1972 to 1982 inclusive have been presented to BSCE meetings. This paper contains the 1983 analysis.

1.2 Appendix 1 contains the Tables of data relating to this paper.

2 SCOPE

For the following reasons, the analysis includes all civil aircraft of over 5700 kg (12 500 lb) maximum weight, and executive jets which weigh just less than 5700 kg, eg Lear and Citation.

- (a) the airworthiness requirements relating to bird strikes are different for the smaller class of aeroplanes,
- (b) much more is known about the reporting standards of operators of transport types, and their movement data is more readily available than that for air taxi or private owner aircraft.
- (c) aircraft of less than 5700 kg are in general, much slower with a different mode of operation, requiring less airspace, and a noticeably different strike rate would be expected.

3 DISCUSSION

3.1 Annual Rate/Country (See Table 1)

- (a) Information has been obtained from a total of fourteen European countries. A few of these were not able to provide full information, and their data therefore, appears in some tables and not in others.
- (b) The overall strike rate for the 1894 incidents contained in this analysis is 5.6 per 10,000 movements (two movements per flight). This is greater than the rate of 4.6 recorded during 1982 (4.3 in 1981).
- (c) The strike rate reported by each country is dependent upon two major factors -
 - reporting standard
 - the bird strike problem at airports within that country, and that country's airlines route structure.
- (d) The country with the highest reported strike rate and possibly the most efficient reporting is Ireland with 10.7 per 10,000 movements, followed by Switzerland with 9.1.

3.2 Aircraft Types (See Table 2)

(a) Jet Aeroplanes

- (i) For several years there appears to have been no consistent correlation between aircraft of similar design, eg DC8 and B707, DC10 and L1011. It may be that aircraft which appear similar to humans are not similar to birds, and there are other factors such as noise patterns, which can affect the strike rate. There is some difference in the strike rate of 4, 3 and 2 engined jets.
- (ii) The BAe146, DC10, A300 and A310 have above average strike rates.
- (iii) The aircraft with the greatest damage rate are the IL62, Mercure, A300, A310 and small sample of Cessna Citations.
- (iv) 26% of strikes to 4 engined jet powered aircraft cause damage while for three and two engined aircraft only 8% result in damage.

(b) Turboprop Aeroplanes

The average strike rate for all Turboprops is 4.0 compared with 5.8 for jets. The damage rate is the same as for jets.

(c) Piston Aeroplanes

Only two strikes were recorded to the small number of piston engined aeroplanes.

(d) Helicopters

The number of strikes reported to helicopters is very low, only 17. Because helicopters fly mainly at low altitude where birds are most frequently found, they are continuously exposed to the risk of a strike. Therefore flying hours have been used to determine a strike rate. For reasons which are not at present known, the rate is low at 1.2 per 10,000 hours, but somewhat less than the 2.0 of 1982. There was only one case of damage to a helicopter.

3.3 Aerodromes (See Table 3)

- (a) The aerodrome data is of particular importance as it may indicate where bird control measures need to be taken. Some countries were able to provide aerodrome movement data for their nationally registered aircraft, so that a national rate could be quoted.

The total number of strikes at each aerodrome, reported by all European sources has also been included.

- (b) Strikes reported on aerodromes are influenced by one or more of the following:
- (i) reporting standards
 - (ii) the prevailing bird situation which may vary according to place and time
 - (iii) the number of aircraft movements
 - (iv) the effectiveness of bird control measures
 - (v) local factors, perhaps beyond control of the aerodrome, eg a rubbish dump or bird roost site in the vicinity.
- (c) Because of factors outlined in (b), direct comparison of the reported strike rates for different aerodromes is likely to be misleading.
- (d) European Aerodromes with five or more damaging strikes are Brussels (5), Frankfurt (8) and Amsterdam (5). This may in some cases be a reflection of the aerodrome movements, local bird populations and reporting efficiency.
- (e) Significant numbers of strikes have been reported at aerodromes outside Europe. Fourteen strikes were reported at Bangkok and ten at Bombay. Three of the strikes at Nairobi resulted in damage.

3.4 Bird Species (See Table 4)

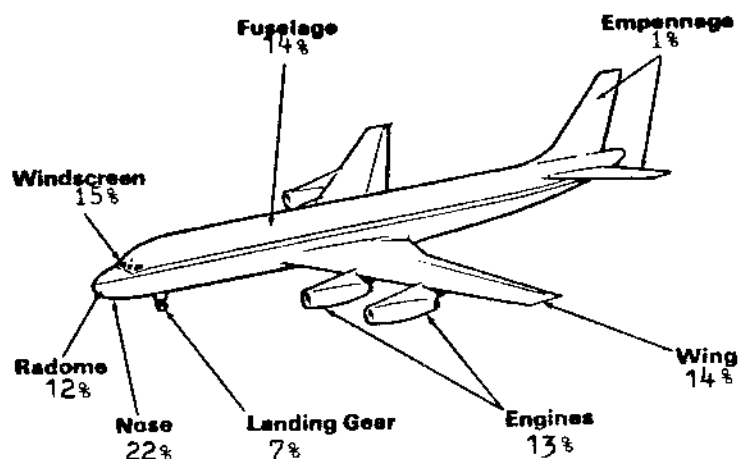
Some knowledge of the bird species involved was available in 65% of incidents. The identification standard ranged from examination of bird remains by a trained ornithologist to the fleeting glance of a pilot. Overall 35% of strikes involved gulls (*Larus* spp.) of which the Black-headed gull (*Larus ridibundus*) was the most frequently identified. This is similar to 1982. Next on the list was the combination of swift/swallow/martin at 18%, and the Lapwing (*Vanellus vanellus*) with 13%. Birds of Prey accounted for 8%. Only one incident was believed to involve a bird heavier than 1.81 kg (4 lb).

Gulls were involved in 50% of damaging incidents (but 35% of strikes) where the birds involved were known.

The birds struck during the last four years are summarised overleaf. There does not appear to be a clear trend.

Birds	YEAR							
	76	77	78	79	80	81	82	83
Gulls (Larus spp.)	44	41	41	41	41	45	33	35
Lapwing (Vanellus vanellus)	14	10	11	10	12	9	14	13
Birds of Prey (Falconiformes)	8	9	8	8	10	12	9	8
Pigeons (Columba spp.)	7	9	7	7	7	7	7	8
Swift/swallow/martin	11	12	13.5	18	15	11	13	18

3.5 Part of Aircraft Struck (See Table 5)



From the figure the parts most frequently reported as being struck can be seen.

It should be noted that there were 29 incidents where more than one engine was struck, of which 20 affected all engines (seven in both 1981 and 1982 involved all engines).

3.6 Effects of Strikes (See Table 6)

- (a) During 1983 a total of 120 engines were damaged such as to require repair or replacement. Of these 56 were on twin engined aircraft. It appears that 50% of reported engine strikes involved engine damage.
- (b) Only two windscreens were changed, a small number compared with the 264 windscreen strikes. None of these were known to involve penetration.

(c) There were 11 cases of radome damage, out of 211 radome strikes. In most cases the radome was only delaminated, but in a few cases it was shattered. The radome strength is limited by the need for dielectric properties enabling satisfactory operation of the weather radar.

3.7 Cost

The number of countries able to provide cost information was too small to warrant analysis.

3.8 Aircraft Operator Reporting (See Table 7)

This table provides a guide to the reporting efficiency and problems of individual airlines. It is probable that it is considerably affected by the airport(s) at which the airline has its main base.

4 CONCLUSIONS

- 4.1 The overall rate for the 1894 strikes reported during this period by European operators is 5.6 strikes per 10,000 movements. This rate is slightly higher than in previous years.
- 4.2 There does not appear, from the available data, to be any close correlation between the strike rate and the aeroplane type in terms of speed, engine type etc.
- 4.3 Some aircraft for reasons which are unknown, have a much higher strike rate eg BAe146, DC10, A300 and A310, whilst others have a higher rate of damage.
- 4.4 The percentage of strikes which cause damage is three times greater on 4 engined jet powered aircraft than on 3 or 2 engined aircraft.
- 4.5 There are some airports outside Europe where the number of bird strikes reported by European operators is high even though movements by European registered aircraft at these airports are believed to be low. Damage occurred at several of these airports.
- 4.6 Gulls (*Larus* spp.) were struck more frequently than other birds, being involved in 35% of incidents where the bird species were known. Less than 1% of birds struck were believed to be greater than 1.8 kg (4 lb).
- 4.7 The nose section including the windscreen and radome were reported as being struck in 49% of incidents, with engines being struck in 17%. There were 29 incidents where more than one engine was struck.
- 4.8 The major consequences were damage to 120 engines, and to 11 radomes. There were no aircraft written off, or occupants injured.

APPENDIX 1

BIRD STRIKE ANALYSIS

EUROPEAN OPERATORS 1983

CIVIL AIRCRAFT OVER 5700 kg (12,500 lb) MAXIMUM WEIGHT

Notes:

0.1 The following are not included in this Analysis:

(a) aircraft of maximum weight 5700 kg (12,500 lb) and under, except for those few executive jets, which have been included, eg Lear and Citation.

(b) all military type and operated aircraft.

0.2 All Tables are for strikes reported worldwide.

0.3 The Total columns of many of the tables are different, as some countries have not been able to provide full information for every table.

TABLE 1 NATIONAL REPORTING - 1983

(A high rate may be due to efficient reporting)

Reporting Nation	Number of Incidents Worldwide	Damaging Incidents	Number of Movements Worldwide	Rates per 10,000 Movements	
				Damage	All
Austria	26	N/A	54,200*	N/A	4.8
Belgium	29	8	106,736	0.7	2.7
Czechoslovakia	17	7	46,916*	1.5	3.6
Denmark	47	N/A	166,448	N/A	2.8
Finland	29	4	134,882	0.3	2.1
France	222 (23)	57 (5)	466,381	1.2	4.8
Germany	389 (15)	63 (5)	469,696*	1.3	8.3
Ireland	64 (7)	N/A	59,810*	N/A	10.7
Italy	185	3	200,452*	0.1	9.2
Netherlands	77	9	189,557	0.4	4.1
Norway	(70)	N/A	N/A	-	-
Sweden	68	6	181,476	0.3	3.8
Switzerland	169 (3)	6 (1)	188,972*	0.3	9.1
United Kingdom	487 (34)	30	994,970	0.3	4.9
<u>TOTAL</u>	1,809 (152)	193 (11)	3,260,416	0.6	5.5

Notes:

- 1.1 There are two movements per flight.
- 1.2 * Movement data from ICAO Sources.
- 1.3 Helicopters are excluded from this Table.
- 1.4 The figures in brackets are strikes for which no movement data is available.
- 1.5 Damage rate excludes those countries who did not supply damage information.

Aircraft Type	Number of Countries Reporting	Number of Incidents			Number of Movements	Strike Rate per 10,000 Movements	
		Damage	All	All		Damage	All
JET							
BAE 146	1	-		12	10,710	-	11.2
IL 62	1	3		7	9,306	3.2	7.5
Boeing 707/720	4	6		20	29,658	2.0	6.7
Boeing 747	11	35	(1)	116	174,385	2.0	6.6
McDonnell Douglas DC-8	8	2	(2)	21	33,694	0.6	6.2
Concorde	2	1		1	4,987	-	2.0
All 4 engined Jets		47	26% (3)	177	262,748	1.8	6.7
McDonnell Douglas DC10	11	18	(6)	141	118,637	1.5	11.9
Lockheed 1011 Tristar	2	2		37	46,506	0.4	7.9
HS Trident	1	-		56	74,958	-	7.5
Boeing 727	5	9		193	324,466	0.3	5.9
TU134	1	4		8	25,626	1.6	3.1
YAK40	1	-		-	6,314	-	-
All 3 Engined Jets		33	8% (6)	435	596,507	0.5	7.3
A300 Airbus	4	25	(1)	138	150,668	1.7	9.2
A310 Airbus	4	(1) 3	(2)	17	21,192	1.4	8.0
Boeing 737	9	43	(12)	412	622,589	0.7	6.6
DA01 Mercure	1	8		28	47,958	1.7	5.8
Boeing 757	1	-		12	21,600	-	5.6
HS125	3	3	(1)	9	50,246	0.6	1.8
SE 210/212 Caravelle	4	8		40	72,904	1.1	5.5
BAC 1-11	2	3		99	199,016	0.2	5.0
McDonnell Douglas DC-9	11	(1) 5	(50)	268	621,450	0.1	4.3
Cessna 500/550 Citation	2	2		2	5,440	3.7	3.7
Fokker F28	2	3	(3)	35	128,868	0.2	2.7
DA20 Jet Falcon	4	-	(3)	-	1,924	-	-
Learjet 35	6	(1) -	(6)	-	5,464	-	-
SN 601 Corvette	1	-		-	3,628	-	-
Mitsubishi MU300	1	-		-	300	-	-
HFB 320 Hansa	1	-	(2)	-	-	-	-
All 2 Engined Jets		(3) 103	10% (80)	1,068	1,953,247	0.5	5.5
ALL JETS		(3) 183	11% (89)	1,680	2,812,502	0.65	6.0
=====							
TURBOPROP							
IL 18	1	-		2	5,670	-	3.5
DHC 7	3	-	(1)	11	32,814	-	3.4
BAC Viscount	1	1		8	28,664	-	2.8
BAC Merchantman	1	-		1	1,782	-	-
Short Belfast	1	-		1	1,322	-	-
HS Argosy	1	-		-	2,040	-	-
L188 Electra	1	-	(1)	-	-	-	-
All 4 Engined Turboprops		1	4% (2)	23	72,292	-	3.2
BAE Jetstream	3	(1) 21	(2)	78	96,792	2.2	8.1
HS 748	1	2		28	51,514	0.4	5.4
Short SD3-30	2	-	(7)	23	74,038	-	3.1
HP Herald	1	1		9	31,736	-	2.8
Fokker F27	4	5		50	191,222	0.3	2.6
Nord 262	2	(1) -	(1)	1	7,670	-	-
DHC6 Twin Otter	2	-	(2)	-	466	-	-
SA227 Swearingen Metro	2	-	(3)	-	7,092	-	-
All 2 Engined Turboprops		(2) 29	15% (13)	189	460,530	0.6	4.1
ALL TURBOPROPS		(3) 30	14% (15)	212	532,822	0.6	4.0

PISTON						
Bristol 170 Freighter	1	-	-	286	-	-
Douglas DC3 Dakota	1	-	2	5,646	-	3.5
ALL PISTON		-	2	5,932	-	3.4
=====						
UNKNOWN (assumed fixed wing)			(41)	-	-	-
TOTAL (including unknown)		(6) 213	(145) 1,894	3,351,256	0.6	5.6

Helicopter Type	Number of Countries Reporting	Number of Strikes		Number of Hours	Strike Rate per 10,000 Hours	
		Damage	Total		Damage	Total
Sikorsky S61N	3	1	11(6)	51,715	-	1.2
Westland WG30	1	-	-	1,480	-	-
Boeing Chinook	1	-	-	9,465	-	-
Aerospatiale Puma	1	-	-	25,901	-	-
ALL HELICOPTERS		1	11(6)	92,965	-	1.2

- Notes:
- 2.1 Because of the low altitude of operation at heights where birds normally fly, and difficulty in collection of movement data, helicopters are quoted in hours.
 - 2.2 The figures in brackets are for aircraft for which hours data is unavailable.
 - 2.3 Where the number of incidents, or the number of movements is small and particularly where they are both small any derived rate should be treated with caution.
 - 2.4 Damage data not supplied by Austria, Denmark, Ireland and Norway.

TABLE 3 AERODROMES - 1983

(A high rate may be due to efficient reporting)

Country/Aerodrome	Incidents	Movements	Rate per 10,000 Movements	Incidents To Other European Aircraft	Total Damage	All
AUSTRIA						
Graz	1	-	-	-	-	1
Klagenfurt	3	-	-	-	-	3
Linz	2	-	-	1	-	3
Salzburg	3	-	-	3	-	6
Vienna	17	-	-	6	-	23
BELGIUM						
Brussels	19 (5)	-	-	11	5	30
Ostend	1 (1)	-	-	-	-	1
CZECHOSLOVAKIA						
Bratislava	3 (2)	-	-	-	2	3
Liberec	1	-	-	-	-	1
Prague	4 (2)	-	-	-	2	4
DENMARK						
Aalborg	-	-	-	3	-	3
Beldringe	1	-	-	-	-	-
Billund	1	-	-	-	-	-
Copenhagen	14	60,164	2.3	20 (1)	1	34
Esbjerg	6	-	-	-	-	-
Ronne	4	-	-	-	-	-
Vagar	1	-	-	-	-	-
FINLAND						
Helsinki-Vantaa	14 (1)	84,466	1.7	1	1	15
Kajaani	1	3,556	2.8	-	-	1
Kemi	2	11,314	1.8	-	-	2
Kuopio	3	41,398	0.7	-	-	3
Kuusamo	1	1,546	6.5	-	-	1
Lappeenranta	2	8,044	2.5	-	-	2
Mariehamn	9 (1)	6,614	13.6	-	1	9
Oulu	2	19,578	1.0	-	-	2
Pori	2	17,772	1.1	-	-	2
Tempere-Pirkkala	3	20,438	1.5	-	-	3
Turku	2	31,472	0.6	-	-	2
Varkaus	1	3,758	2.7	-	-	1
FRANCE						
Basle-Mulhouse	3	6,722	4.4	-	-	3
Bastia	3	6,984	4.3	-	-	3
Beauvais-Tille	2	61	327.8	2	-	4
Biarritz	-	-	-	1	-	1
Bordeaux	7	15,845	4.4	-	-	7
Brest	5	5,837	8.5	-	-	5
Calvi-Ste Catherine	3	2,368	12.6	-	-	3
Grenoble	3	3,617	8.3	-	-	3
Istres-Le Tube	1	1,117	17.9	-	-	2
Lourdes-Tarbes	3	928	32.3	-	-	3
Lyon-Satolas	15	38,995	3.8	-	-	15
Marseille-Marignane	11	35,462	3.1	4	-	15
Montpellier-Frejorgues	9	9,332	9.6	-	-	9
Nice-Cote D'Azur	3	31,092	0.9	4	-	7
Nimes-Garons	4	2,658	15.0	-	-	4
Perpignan	9	3,693	24.3	-	-	9
Paris Le Bourget	2	6,191	3.2	3	-	5
Paris Charles de Gaulle	25	63,310	3.9	20	-	45
Paris Orly	32	114,701	2.8	-	-	32
Saint Brieve	2	1,803	11.1	-	-	2
Strasbourg-Entzheim	4	10,711	3.7	-	-	4
Toulouse-Blagnac	23	17,141	13.4	1	-	24

GERMANY

Berlin	-	-	-	2	-	2
Braunschweig	2	-	-	-	-	2
Bremen	5	6,721	7.4	-	-	5
Cologne/Bonn	14	19,493	7.2	2	-	16
Dusseldorf	50 (4)	50,440	9.9	1	4	51
Frankfurt	58 (8)	114,709	5.1	4	8	62
Hamburg	19 (4)	36,043	5.3	3	4	22
Hannover	9 (1)	18,094	5.0	-	1	9
Munster	1	-	-	-	-	1
Munich	33 (1)	56,952	5.8	3	1	36
Nurnberg	5	13,764	3.6	-	-	5
Saarbrucken	1	4,115	2.4	-	-	1
Stuttgart	18 (4)	26,407	6.8	-	4	18
Paderborn	1	-	-	-	-	1
Oberpfaffenhofen	1	-	-	-	-	1

GREECE

Athens	-	-	-	3	-	3
Corfu	-	-	-	9	-	9
Reus	-	-	-	2 (1)	1	2
Rhodes	-	-	-	1	-	1
Thessalonika	-	-	-	1	-	1
Zakinthos	-	-	-	2	-	2

IRELAND

Dublin	38	-	-	2	-	40
Cork	8	-	-	2	-	10
Shannon	10	-	-	1 (1)	1	11

ITALY

Bari	3	5,398	5.5	-	-	3
Cagliari	5	12,718	3.9	-	-	5
Catania	-	-	-	1	-	1
Genoa	-	-	-	1	-	1
Milan-Linate	30	78,238	3.8	15 (2)	2	45
Milan-Malpensa	4	14,563	2.7	4 (1)	1	8
Naples	3	19,016	4.2	3	-	6
Olbia	5	6,784	7.4	2	-	7
Rome-Fiumicino	29	134,438	2.1	11	-	40
Ronchi	3	5,586	5.4	-	-	3
Venice	13	16,032	8.1	8	-	21

NETHERLANDS

Amsterdam	27 (3)	69,976	3.8	12 (2)	5	39
Eindhoven	1	7,356	1.4	-	-	1
Enschede	-	1,564	-	-	-	-
Groningen	-	1,134	-	-	-	-
Maastricht	1	4,432	2.3	-	-	1
Rotterdam	-	4,866	-	1 (1)	1	1

NORWAY

Alesund	3	12,225	2.4	-	-	3
Alta	1	7,230	-	1	-	2
Bergen	5	32,053	1.6	-	-	5
Bodo	4	28,141	1.4	1	-	5
Kristiansand	2	12,256	1.6	-	-	2
Moide	2	6,357	3.1	-	-	2
Oil Rigs	5	-	-	-	-	5
Oslo-Fornebu	17	67,790	2.5	8	-	25
Stavanger	5	32,085	1.6	1	-	6
Tromso	5	18,707	2.7	3	-	8

PORTUGAL

Faro	-	-	-	1	-	1
Lisbon	-	-	-	9 (1)	1	9

SPAIN

Alicante	-	-	-	5	-	5
Barcelona	-	-	-	8	-	8
Gerona	-	-	-	2	-	2
Ibiza	-	-	-	9	-	9
Madrid	-	-	-	3	-	3
Mahon	-	-	-	2	-	2
Malaga	-	-	-	12	-	12
Minorca	-	-	-	4	-	4
Palma de Mallorca	-	-	-	8	-	8
Vitoria	-	-	-	1 (1)	1	1

Angelholm	10 (3)	5,200	19.2	-	3	10
Goteborg-Landvetter	3	30,900	0.1	2	-	5
Halmstad	4	3,500	11.4	-	-	4
Jonkoping	2	6,100	3.3	-	-	2
Karlstad	4	2,900	13.8	-	-	4
Malmo-Sturup	6	10,900	5.5	2	-	8
Stockholm-Arlanda	6 (1)	83,500	0.7	7	-	13
Stockholm-Bromma	6	35,000	1.7	-	-	6
Umea	3	10,500	2.9	-	-	3
Visby	2	5,800	3.5	-	-	2

SWITZERLAND

Basle-Mulhouse	2	-	-	-	-	2
Geneva	16 (1)	-	-	4	1	20
Zurich	43	-	-	10 (2)	2	53

UNITED KINGDOM

Aberdeen	18 (1)	68,313	2.6	-	1	18
Belfast-Aldergrove	12	22,696	5.3	1	-	13
Birmingham	21	23,116	9.1	2	-	23
Blackpool	4	8,874	4.5	-	-	4
Bournemouth-Hurn	4 (1)	17,363	2.3	-	1	4
Bristol Lulsgate	2 (1)	5,267	3.8	-	1	2
Cardiff-Wales	4	6,867	5.8	-	-	4
East Midlands	7	20,099	3.5	-	-	7
Edinburgh	22	22,320	9.9	2	-	24
Gatwick	22 (3)	80,711	2.7	-	3	22
Glasgow	37 (3)	40,931	9.0	-	3	37
Hatfield	9	-	-	-	-	9
Heathrow	38 (1)	135,193	2.8	13	-	51
Humberside	2	7,708	2.6	-	-	2
Kirkwall	4	8,472	4.7	-	-	4
Leeds/Bradford	8	9,849	8.1	-	-	8
Liverpool	3	18,381	1.6	1	-	4
Luton	16 (2)	20,789	7.7	-	2	16
Lydd	4	3,446	11.6	-	-	4
Manchester	32 (1)	41,443	7.7	2	1	34
Newcastle	24 (1)	13,263	18.1	-	1	24
Norwich	12	14,520	8.3	-	-	12
Prestwick	-	-	-	1 (1)	1	1
Ronaldsway I of M	4	11,458	3.5	2	-	6
Stansted	4	11,977	3.3	2	-	6
Sumburgh	3	11,523	2.6	-	-	3
Tee-side	5	10,428	4.8	-	-	5
Oil Rigs	6	-	-	-	-	6

LIST OF AERODROMES WHERE MORE THAN ONE STRIKE, OR ONE STRIKE WITH DAMAGE HAS BEEN REPORTED BY EUROPEAN OPERATORS

Bangkok	14	Melbourne	3 (1)
Bombay	10 (1)	Moscow	3
Istanbul	9 (1)	Abu Dhabi	2
Nairobi	9 (3)	Accra	2 (1)
Guernsey	8	Addis Ababa	2
Colombo	7	Djerba	2
Karachi	7	Mane Island	2
New York JFK	7 (1)	Motevideo	2 (1)
Delhi	6 (1)	Muscat	2 (1)
Las Palmas	6 (1)	Toronto	2 (1)
Tel Aviv	5	Algiers	1 (1)
Dar Es Salaam	4 (2)	Bujumbaru	1 (1)
Jersey	4	Burgas	1 (1)
Kilimanjaro	4 (1)	Cairo	1 (1)
Malta	4	Djibouti	1 (1)
Mombasa	4 (1)	Doha	1 (1)
Tanger	4	Los Angeles	1 (1)
Budapest	3	Port Santo	1 (1)
Casablanca	3	San Juan	1 (1)
Dakar	3 (2)	Sofia	1 (1)
Dalaman	3	Tripoli	1 (1)

En Route	30
Unknown	25

- Notes:
- 3.1 Because of variability in reporting, bird population, aircraft movement pattern, control measures and features beyond control, any comparison between the rates calculated for different aerodromes is likely to be misleading.
 - 3.2 The figures in brackets are incidents with damage. (Not supplied by Austria, Denmark, France, Ireland and Norway.)
 - 3.3 UK data on Strikes New Aerodromes (between 500 ft and 2,500 ft) have been excluded (21 incidents) as have 232 passes found on aerodromes with impact damage.

TABLE 4 BIRD SPECIES - 1983

Scientific Name	English Name	Weight	Weight Category	Number of Incidents		% Based on 1227
				Damage	Total	
PELICANIFORMES						
Pelecanidae	Pelican	up to 6 kg	D	-	1	-
CICONIIFORMES						
Ardea cinerea	Grey heron	1.5 kg	B	-	1	-
Botaurus stellaris	Bittern	950 g - 1.7 kg	B	-	1	-
Bubulcus ibis	Cattle egret	345 g	B	-	1	-
Ciconia sp	Stork	up to 3 kg	C	1	1	-
ANSERIFORMES						
Anas sp	Duck	250 g - 1.3 kg	B	-	6	0.5
FALCONIFORMES						
Buteo sp	Buzzard	260 g - 1.3 kg	B	1	18	1.5
Buteo buteo	Common buzzard	800 g	B	-	5	0.4
Accipiter sp	Hawk	up to 1 kg	B	-	16	1.3
Accipiter nisus	Sparrow hawk	190 g	B	-	1	-
Accipiter gentilis	Goshawk	1 kg	B	-	1	-
Milvus sp	Kite	780 g - 1.0 kg	B	1	6	0.5
Milvus migrans	Black kite	780 g	B	2	12	1.0
Falco sp	Falcon	105 g - 1.3 kg	B	1	17	1.4
Falco columbarius	Merlin	195 g	B	-	1	-
Falco tinnunculus	Kestrel	200 g	B	-	26	2.1
GALLIFORMES						
Lyrurus tetrix	Black grouse	1.1 kg	B	-	1	-
Perdix perdix	Grey partridge	400 g	B	2	14	1.1
Phasianus colchicus	Pheasant	1.1 kg	B	3	9	0.7
CHARADRIIFORMES						
Haematopus ostralegus	Oystercatcher	500 g	B	2	5	0.4
Vanellus vanellus	Lapwing	215 g	B	6	160	13.0
Charadrius hiraticula	Ringed plover	54 g	A	1	1	-
Pluricallis apricaria	Golden plover	185 g	B	1	8	0.6
Gallinago sp	Snipe	125 g	B	-	6	0.5
Scolapax rusticola	Woodcock	304 g	B	-	1	-
Numenius arquata	Curlew	770 g	B	-	5	0.4
Larus sp	Gull	280 g - 1.7 kg	B	23	257	20.9
Larus marinus	Greater black-backed gull	1.8 g	B	-	3	-
Larus fuscus	Lesser black-backed gull	820 g	B	1	12	1.0
Larus argentatus	Herring gull	1.0 kg	B	2	24	1.9
Larus ridibundus	Black-headed gull	275 g	B	1	132	10.0
Larus canus	Common gull	420 g	B	-	20	1.6
Sterna sp	Tern	120 g	B	-	6	0.5
Rissa tridactyla	Kittiwake	390 g	B	-	1	-
COLUMBIFORMES						
Columba sp	Pigeon	up to 465 g	B	3	37	3.0
Columba livia	Rock dove	395 g	B	-	4	-
Columba palumbus	Woodpigeon	465 g	B	-	53	4.3
STRIGIFORMES						
Strix sp	Owl	170 - 380 g	B	-	9	0.7
Athene noctua	Little owl	166 g	B	-	2	-
Bubo bubo	Eagle owl	2.8 kg	C	-	1	-
Asio flammeus	Short eared owl	355 g	B	-	4	-
Strix Aluco	Tawny owl	480 g	B	-	1	-
Tyto alba	Barn owl	315 g	B	-	4	-
APODIFORMES						
Apus apus	Swift	40 g	A	-	43	3.5

PASSERIFORMES

Caprimulegus europaeus	Nightjar	70 g	A	-	1	-
Alauda arvensis	Skylark	40 g	A	-	5	0.4
Hirundo rustica	Swallow	19 g	A	-	88	7.2
Hirundinidae	Swift/swallow	19 - 40 g	A	1	84	6.8
Delichon urbica	House martin	20 g	A	-	11	0.9
Anthus Pratensip	Meadow pipit	18 g	A	-	1	-
Motacilla sp	Wagtail	20 g	A	-	2	-
Sturnus vulgaris	Starling	80 g	A	-	18	1.5
Corvus sp	Crow	up to 530 g	B	-	23	1.9
Pica pica	Magpie	220 g	B	-	4	-
Corvus frugilegus	Rook	430 g	B	-	6	-
Corvus corax	Raven	1.1 kg	B	-	2	-
Turdus sp	Thrush	60 - 120 g	A	-	3	-
Turdus merula	Blackbird	106 g	A	-	6	0.5
Turdus pilarus	Fieldfare	100 g	B	-	1	-
Passeriform	Sparrow	18-40 g	A	-	27	2.2
Passer domesticus	House sparrow	18 g	A	-	6	0.5
Fringilla coelebs	Chaffinch	23 g	A	-	1	-
Carduelis cannabina	Linnet	18 g	A	-	1	-
Emberiza citrinella	Yellow hammer	27 g	A	-	2	-
BAT					1	-
UNKNOWN				38	576	-
TOTAL				92	1803	-

Notes: 4.1 Bird weights and Scientific Names are based on 'Average Weights of Birds' by T Brough of Aviation Bird Unit, Worplesdon Laboratory, Agricultural Science Service, MAFF, Worplesdon, England. The average weight has been assumed.

4.2 The bird Categories based on current Civil Airworthiness requirements are:

- A below 110 g (1/4 lb)
- B 110 g to 1.81 kg (1/4 lb to 4 lb)
- C over 1.81 kg to 3.63 kg (4 lb to 8 lb)
- D over 3.63 kg (8 lb)

4.3 Those birds not positively identified are tabled as Unknown, except where there is evidence that they are Large (C or D).

4.4 Percentages are based on incidents where birds are identified.

4.5 Damage data not supplied by Austria, Denmark, France, Ireland and Norway.

TABLE 6 **EFFECT OF STRIKE - 1983**

Effect	Bird Weights					Total	% Based on 1852
	Unknown	Below 110 gm	110 gm to 1.81 kg	1.81 kg to 3.63 kg	Over 3.63 kg		
Loss of life/aircraft	-	-	-	-	-	-	-
Flight crew injured	-	-	-	-	-	-	-
Engine repairs on:							
2 engined aircraft	22	2	32	-	-	56	3.0
Others	26	6	34	-	-	66	3.6
Windscreen cracked or broken	1	-	1	-	-	2	-
Vision obscured*	1	-	1	-	-	2	-
Radome changed	6	-	5	-	-	11	0.6
Deformed structure	-	-	3	-	-	3	-
Skin torn/light glass broken	11	1	15	-	-	27	1.5
Skin dented*	6	-	14	-	-	20	1.1
Propeller/Rotor/transmission damaged	-	-	-	-	-	-	-
Aircraft system lost	1	2	10	-	-	13	0.7
Take off abandoned*	3	-	10	-	-	13	0.7
Nil damage	1,123	159	353	4	-	1,639	88.5
Unknown	46	10	32	1	-	89	-
TOTAL	1,246	180	510	5	-	1,941	100%

- Notes:
- 6.1 If, for example, skin is torn in two places, or both windscreens are broken, two incidents are recorded.
 - 6.2 The percentages are based on known effects.
 - 6.3* Not counted as damaging strikes.
 - 6.4 Aircraft systems lost include hydraulics, pitot and de-icing.

NORWAY			
SAS	49	-	-
Braathens SAFE	14	-	-
Wideroe	3	-	-
Helicopter Service	7	-	-
Fred Olsen	1	-	-
Others	3	-	-
SWEDEN			
Linjeflyg AB	34	112,000	3.0
SAS	33	68,482	4.8
Kungs Air	1	994	10.1
SWITZERLAND			
Swissair	164	179,276	9.1
Alisarda	3	-	-
Balair	2	10,410	1.9
UNITED KINGDOM			
Air Atlantique	2	5,646	3.5
Air Bridge Carriers	1	3,822	-
Air Europe	8	22,246	3.6
Air Ecosse	1	6,526	-
Air UK	20	62,394	3.2
Bristow Helicopters	3	46,348 hrs	0.6
British Aerospace	9	-	-
Britannia Airways	91	77,420	11.7
British Air Ferries	3	11,160	2.7
Birmingham Executive	1	2,370	-
British Airways	163	359,878	4.5
British Airways Helicopters	7	29,958 hrs	2.3
British Caledonian Airways	55	84,460	6.5
British Caledonian Helicopters	-	4,270 hrs	-
British Island Airways	-	7,872	-
British Midland Airways	21	72,376	2.9
Brymon Airways	3	12,248	2.4
Channel Express	1	6,074	-
Dan-Air Services	41	98,772	4.1
Ford	3	-	-
Genair (Lease Air)	9	23,790	3.8
Guernsey Airlines	2	4,858	4.1
Heavylift Cargo	1	1,322	-
Instone	-	286	-
Inter City Airlines	1	3,576	-
Janus	5	N/A	-
Loganair	6	7,144	8.4
MAM	3	-	-
Manx Airlines	7	15,512	4.5
McAlpine	1	-	-
Monarch Airlines	7	19,222	3.6
North Scottish Helicopters	-	1,797 hrs	-
Orion Airways	13	20,256	6.4
Peregrine	2	-	-
Tradewinds Airways	-	1,954	-
Private Operators	7	-	-
Unknown	34	-	-
TOTAL (Operators with known movements)	1366	-	-

Notes: 7.1 Leased aircraft are included against the operator.

7.2 Where the number of incidents, or number of movements is small and particularly where they are both small, the derived rate should be treated with caution.