

WP/25

BIRD STRIKE COMMITTEE EUROPE

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BIRD STRIKES DURING 1982 TO EUROPEAN REGISTERED
CIVIL AIRCRAFT

(Aircraft over 5700 kg Maximum Weight)

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SUMMARY

The strikes reported throughout the World in 1982 by operators from eleven 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 1982 was slightly higher than the two previous years at 4.6 per 10,000 movements. Gulls (Larus spp.) were involved in one third of the incidents. The major effect was damage to 69 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. After consultation with other member countries, sets of Analysis Tables with explanatory Notes were circulated to all members of the BSCE, together with a request that each country produced an analysis of their bird strikes. These analyses were consolidated to form an annual report on Bird Strikes to European Registered Civil Aircraft, and reports covering the individual years 1972 to 1981 inclusive have been presented to annual BSCE meetings. This paper contains the 1982 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 eleven 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 1291 incidents contained in this analysis is 4.6 per 10,000 movements (two movements per flight). This is similar to the rate of 4.3 recorded during 1981 (4.5 in 1980).
- (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 is Eire with 7.7 per 10,000 movements, followed by Germany with 7.2.

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 little difference in the strike rate of 4, 3 and 2 engined jets.
- (ii) The damage rate for the rear engined aircraft HS Trident, BAC 1-11, Fokker F28, DC9 and Caravelle are lower than for aircraft with wing mounted engines (over 50% of damage occurs to engines). The aircraft with the greatest damage rate is the Boeing 747.

(b) Turboprop Aeroplanes

The average strike rate for all Turboprops is 2.9 compared with 4.8 for jets. The damage rate is also very much lower than for jets.

(c) Piston Aeroplanes

No strikes were recorded in the small number of piston engined aeroplane operations.

(d) Helicopters

The number of strikes reported to helicopters is very low, only 20. 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 2.0 per 10,000 hours, but somewhat greater than the 1.6 of 1981.

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, and that information is included in the report.

The total number of aerodromes at each aerodrome, reported from 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 Hamburg (5), and Amsterdam (14). This may in some cases be a reflection of the aerodrome movements and local bird populations.
- (e) Significant numbers of strikes have been reported at aerodromes outside Europe. Ten strikes were reported at Bangkok and Istanbul. Three of the strikes at Istanbul and Nairobi resulted in damage.

3.4 Bird Species (see Table 4)

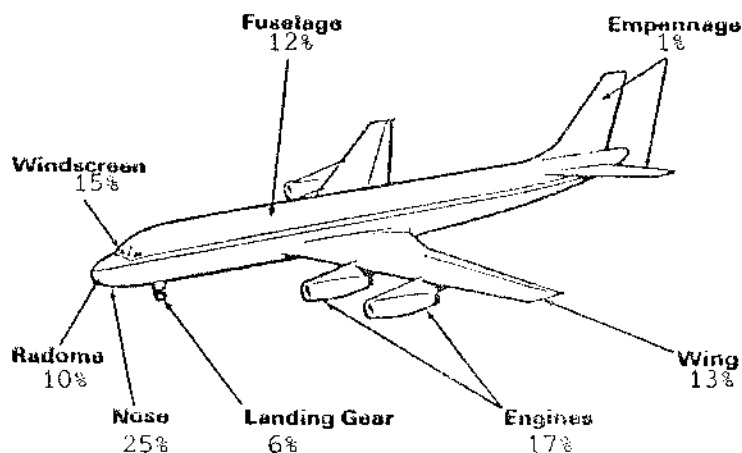
Some knowledge of the bird species involved was available in 63% of incidents. The identification standard ranged from examination of bird remains by a trained ornithologist to the fleeting glance of a pilot. Overall 33% of strikes involved gulls (*Larus* spp) of which the Black-headed gull (*Larus ridibundus*) was the most frequently identified. This is a significant decrease from the 41 to 45% of previous years. The reasons are not known. Next on the list was the combination of swift/swallow/martin at 13%, pigeons with 7% and the Lapwing (*Vanellus vanellus*) with 14%. Birds of Prey accounted for 9%. The percentage of gulls was lower than in 1981 but that of Lapwings was greater. Only 1% of birds was believed to be greater than 1.81 kg (4 lb).

Gulls were involved in 29% of damaging incidents (but 33% of strikes) with birds of prey involved in 14% of damage (10% of strikes) and pigeons in 6% (7% of strikes).

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

Birds	Year						
	76	77	78	79	80	81	82
Gulls (<i>Larus</i> sp)	44	41	41	41	41	45	33
Lapwing (<i>Vanellus vanellus</i>)	14	10	11	10	12	9	14
Birds of Prey (<i>Falconiformes</i>)	8	9	8	8	10	12	9
Pigeons (<i>Columba</i> sp)	7	9	7	7	7	7	7
Swift/swallow/martin	11	12	13.5	18	15	11	13

3.5 Part of Aircraft Struck (see Table 5)



From the figure it can be seen that the parts most frequently reported as being struck are the nose and radome 35%, windscreen 15%, engines 17% and fuselage 12%.

It should be noted that there were 15 incidents where more than one engine was struck, of which seven affected all engines (nine in 1980 and seven in 1981 involved all engines).

3.6 Effects of Strikes (see Table 6)

- (a) During 1982 a total of 69 engines were damaged such as to require repair or replacement. Of these 33 were on twin engined aircraft. It appears that 28% of engine strikes involved engine damage.
- (b) Only three windscreens were changed, a small number compared with the 222 windscreen strikes. None of these were known to involve penetration.
- (c) There were 11 cases of radome damage, out of 148 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 rates 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 1291 strikes reported during this period by European operators is 4.6 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 There are indications that the damage rates for rear engine jets are lower than for jets with wing mounted engines. Turboprops suffer a lower damage rate than jets.
- 4.4 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.
- 4.5 Gulls (*Larus spp.*) were struck more frequently than other birds, being involved in 33% of incidents where the bird species were known. For reasons which are not known, this is considerably less than in 1981. About 1% of birds were believed to be greater than 1.8kg (4lb).
- 4.6 The nose section including the windscreen and radome were struck in 47% of incidents followed by engines with 17%. There were 15 incidents where more than one engine was struck.
- 4.7 The major consequences were damage to 67 engines, and to 11 radomes.

BIRD STRIKE ANALYSIS

EUROPEAN OPERATORS 1982

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

Notes:

- 0.1 The following are excluded from 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 world-wide.
- 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.
- 0.4 There are two movements per flight.
- 0.5 Where the number of incidents, or number of movements are small, and particularly where they are both small, the derived rate should be treated with caution.

Table 1. (continued)

100. Exchanges in million metric tons of fish

Reporting Country	Number of Fishing Vessels	Registered Fishermen	Total Tonnage Produced (in million metric tons)	Rates per 10,000 Movements	
				Damage	All
Belgium	10	100	100 000	0.10	2.1
Czechoslovakia	10	100	100 000	0.50	2.2
Denmark	10	100	100 000	-	2.9
France	10	100	100 000	-	7.7
Finland	10	100	100 000	0.51	3.6
France	10	100	100 000	0.65	3.0
Germany	10	100	100 000	3.66	7.2
Netherlands	10	100	100 000	1.05	4.9
Norway	10	100	100 000	-	-
Sweden	10	100	100 000	0.34	5.0
United Kingdom	10	100	100 000	0.32	4.6
Total	100 (total)	1000	1 000 000	0.89	4.6

100. Exchanges in million metric tons of fish

101. Exchanges in million metric tons of fish

102. Exchanges in million metric tons of fish

103. Exchanges in million metric tons of fish

104. Exchanges in million metric tons of fish

105. Exchanges in million metric tons of fish

106. Exchanges in million metric tons of fish

107. Exchanges in million metric tons of fish

108. Exchanges in million metric tons of fish

109. Exchanges in million metric tons of fish

110. Exchanges in million metric tons of fish

Aircraft Type	Number of Countries Reporting	Number of Incidents		Number of Movements	Strike Rate per 10,000 Movements	
		Damage	All		Damage	All
<u>JET</u>						
BAE 146	1	-	4	1,936	-	20.7
Boeing 707/720	5	3	32	43,662	0.7	7.3
McDonnell Douglas DC-8	4	4	14	20,626	1.9	6.8
Boeing 747	8	27	74	147,409	1.8	5.8
Illyushin 62	1	1	4	9,224	-	4.3
Concorde	2	-	-	6,626	-	-
All 4 engined Jets	-	35	128	229,483	1.5	5.4
McDonnell Douglas DC10	7	6	60(2)	70,289	0.8	6.5
HS Trident	1	1	60	95,454	-	6.3
Lockheed 1011 Tristar	2	4	28	50,148	0.8	5.8
Boeing 727	5	10	111	372,272	0.3	3.8
All 3 Engined Jets	-	21	259(2)	588,163	0.35	4.4
Cessna Citation	2	-	3	3,534	-	8.3
Boeing 737	6	26	381(6)	567,394	0.5	6.7
DA01 Mercure	1	1	27	47,100	-	5.7
A300 Airbus	6	9	67(2)	125,722	0.7	5.3
BAC 1-11	2	4	95	212,314	0.2	4.8
McDonnell Douglas DC-9	5	9	136(39)	323,590	0.3	4.2
SE 210/212 Caravelle	3	5	28	78,758	0.6	3.8
HS125	1	1	10	52,338	-	1.9
Tupolev 134	1	1	4	25,612	-	1.6
Fokker F28	3	1	26(3)	174,453	-	1.6
VFW 614	1	-	(1)	-	-	-
Learjet	5	1(1)	1(1)	5,680	-	-
HFB 320 Hansa	1	-	(1)	-	-	-
SN601 Corvette	3	-	(2)	3,978	-	-
DA20 Jet Falcon	6	-(3)	-(4)	2,728	-	-
All 2 Engined Jets	-	58(4)	805(59)	1,670,301	0.35	4.1
ALL JETS	-	114(4)	1192(61)	2,487,947	0.46	4.4
<u>TURBOPROP</u>						
BAC Viscount	1	-	16	44,678	-	1.4
DHC 7	2	-	5(1)	28,946	-	1.8
Short Belfast	1	-	2	1,098	-	-
BAC Merchantman	1	1	1	2,018	-	-
Illyushin 18	1	-	1	5,286	-	-
HS Argoay	1	-	-	2,600	-	-
Canadair CL44	1	-	-	226	-	-
All 4 Engined Turboprops	-	1	25(1)	84,852	-	2.1
Fokker F27/227	6	3	48	132,583	0.2	3.1
HS 748	2	1	23	77,662	-	3.0
Short SD 330/360	3	-	11(2)	39,332	-	3.0
HP Herald	1	-	4	39,706	-	3.0
Nord 262	2	-(1)	2(8)	13,130	-	3.0
C160 Transall	1	-	-(2)	-	-	3.0
Swearingen Metro	1	-	-	834	-	3.0
BAE Jetstream 31	1	-	-(2)	-	-	3.0
DHC 6 Twin Otter	2	-	-(3)	470	-	3.0
All 2 Engined Turboprops	-	4(1)	88(17)	303,717	0.13	3.0
ALL TURBOPROPS	-	5(1)	113(18)	388,569	0.17	3.0

TABLE 3 AERODROMES - 1982

Country/Aerodrome	Incidents	Movements	Rate per 10,000 Movements	Incidents To Other European Aircraft	Total	
					Damage	All
<u>AUSTRIA</u>						
Graz	-	-	-	1	-	1
Vienna	-	-	-	10	2	10
<u>BELGIUM</u>						
Antwerp	1	-	-	-	-	1
Brussels	(1)9	-	-	4	1	13
<u>CZECHOSLOVAKIA</u>						
Bratislava	1	-	-	2	-	3
Prague	1	-	-	-	-	1
<u>DENMARK</u>						
Aalborg	1	-	-	2	-	3
Billund	2	-	-	-	-	2
Copenhagen	15	61,484	2.4	27	-	42
Esbjerg	2	-	-	1	-	3
Odense	3	-	-	-	-	3
Ronne	-	-	-	3	-	3
Stauning	1	-	-	-	-	1
Thisted	1	-	-	-	-	1
Tirstrup	-	-	-	4	-	4
<u>EIRE</u>						
Cork	6	-	-	2	-	8
Dublin	32	-	-	-	-	32
Shannon	4	-	-	1	-	5
<u>FINLAND</u>						
Helsinki-Vantaa	7	79,506	0.9	-	-	7
Joensuu	(1)1	14,618	-	-	-	1
Kemi	2	7,874	2.5	-	-	2
Kuopio	3	37,080	0.8	-	-	3
Lappeenranta	(1)1	9,490	-	-	1	1
Mariehamn	12	6,682	18.0	-	-	12
Oulu	2	22,066	0.9	-	-	2
Pori	(1)2	19,368	1.0	-	1	3
Turku	2	26,496	0.8	-	-	2
Vaasa	(1)6	16,044	3.7	-	1	7
<u>FRANCE</u>						
Bastia	2	4,921	4.0	-	-	2
Beauvais	-	-	-	2	1	3
Biarritz	2	1,960	10.2	-	-	2
Bordeaux	5	11,716	4.3	-	-	5
Bourges	-	-	-	2	1	3
Brest	-	-	-	1	-	1
Calvi	3	2,761	10.9	-	-	3
Grenoble	3	3,576	8.2	-	-	3
Lille	4	4,659	8.6	-	-	4
Lourdes-Tarbes	9	3,445	26.1	5	-	14
Lyon-Satolas	12	27,942	4.3	-	-	12
Montpellier	2	2,843	7.0	-	-	2
Mulhouse/Basle	-	-	-	3	1	4
Nantes	3	6,503	4.6	-	-	3
Nice	5	20,608	2.4	2	-	7
Paris Le Bourget	4	6,422	6.2	-	-	4
Paris Charles de Gaulle	11	64,419	3.4	12	-	23
Paris Orly	20	83,456	2.4	5	1	25
Pau-Pont Long Uzein	3	2,003	14.5	-	-	3
Reims	-	-	-	1	1	2
St. Yan	14	46,620	3.0	-	-	14
Toulouse-Blagnac	18	12,236	14.7	-	-	18

SWITZERLAND						
Geneva	-	-	-	3	1	3
Zurich	-	-	-	6	-	6
UNITED KINGDOM						
Aberdeen	8	65,915	1.2	-	-	8
Belfast	16	23,337	6.9	2	-	18
Birmingham	(1)20	20,474	9.8	1	1	21
Blackpool	1	6,117	-	-	-	1
Bournemouth-Hurn	(1)4	10,141	3.9	-	1	4
Bristol Filton	3	-	-	-	-	3
Bristol-Lulsgate	2	4,922	4.1	-	-	2
Cambridge	2	3,461	5.8	-	-	2
Cardiff-Wales	4	6,002	6.7	-	-	4
East Midlands	7	16,416	4.3	-	-	7
Edinburgh	7	20,556	3.4	-	-	7
Gatwick	19	75,603	2.5	1	-	20
Glasgow	(2)16	38,559	4.1	-	2	16
Guernsey	5	-	-	-	-	5
Hatfield	7	-	-	-	-	7
Heathrow	(1)38	125,845	3.0	14	2	52
Inverness	1	8,737	1.1	-	-	1
Jersey	4	-	-	-	-	4
Kirkwall	2	8,449	2.4	-	-	2
Lasham	2	-	-	-	-	2
Leeds/Bradford	4	8,982	4.5	-	-	4
Liverpool	3	17,308	1.7	1	-	4
Luton	(1)13	20,068	6.5	-	1	13
Manchester	(2)28	43,363	6.5	2	2	30
Newcastle	17	12,461	13.6	-	-	17
Norwich	8	11,305	7.1	-	-	8
Prestwick	3	3,769	8.0	-	-	3
Ronaldsway I of M	7	8,040	8.7	-	-	7
Scatza	2	5,225	3.8	-	-	2
Stansted	8	11,027	7.3	2	-	10
Sumburgh	8	15,723	5.1	-	-	8
Tees-side	2	7,384	2.7	-	-	2
Oil Rigs	9	-	-	-	-	9
YUGOSLAVIA						
Belgrade	-	-	-	2	-	2
Dubrovnik	-	-	-	1	-	1
Zagreb	-	-	-	4	-	4
USSR						
Moscow Sheramatyevo	-	-	-	2	-	2

List of Aerodromes where more than one strike has been reported by European Operators

OTHER AERODROMES

Bangkok (Thailand)	10	Dar es Salaam (Tanzania)	2
Istanbul (Turkey)	(3)10	Douala (Cameroun)	2
Nairobi (Kenya)	(3)9	Entebbe (Uganda)	(1)2
Banjul (Gambia)	(1)8	Freetown (Sierra Leone)	2
New York J.F.K (US)	(2)6	Hong Kong (Hong Kong)	2
Delhi (India)	(2)5	Lagos (Nigeria)	2
Malta (Malta)	4	Larnaca (Cyprus)	2
Alger (Algerie)	4	Mombasa (Kenya)	2
Dakar (Senegal)	(1)3	Monastir (Tunisia)	2
Karachi (Pakistan)	(2)3	Panama (Panama)	2
Khartoum (Sudan)	(1)3	Tripoli (Lebanon)	2
Agadir (Morocco)	2	Tunis (Tunisia)	2
Atlanta (US)	(1)2		
Bamako (Mali)	2		

En Route	47
Unknown	14

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. (French data missing from this table).

TABLE 4 BIRD SPECIES - 1982

Scientific Name	English Name	Weight	Weight Category	Number of Incidents		% Based on 862
				Damage	Total	
<u>PROCELLARIIFORMES</u>						
Fulmarus glacialis	Fulmar	750 g	B	1	-	-
<u>CICONIIFORMES</u>						
Ardea sp.	Heron	500 g - 4.5 kg	B	4	2	0.5
Ardea cinerea	Grey heron	up to 1.5 kg	B	2	1	-
Bubulcus ibis	Cattle egret	345 g	B	1	-	-
Ciconia sp.	Stork	up to 3 kg	C	1	1	-
Ciconia ciconia	White stork	3.4 kg	C	2	1	-
<u>ANSERIFORMES</u>						
Anas sp.	Duck	250 g - 1.3 kg	B	4	-	0.5
Anas platyrhynchos	Mallard	900 g	B	6	2	0.7
Anser sp.	Goose	1.8 - 4.0 kg	C	1	-	-
Cygnus olor	Mute swan	10 kg	D	1	-	-
<u>FALCONIFORMES</u>						
Accipiter sp.	Hawk	up to 1 kg	B	9	2	1.0
Accipiter gentilis	Goshawk	1 kg	B	3	-	0.3
Accipiter nisus	Sparrow hawk	190 g	B	1	-	-
Buteo sp.	Buzzard	up to 880 g	B	6	-	0.7
Buteo buteo	Common buzzard	800 g	B	15	3	1.7
Aquila sp.	Eagle	1.1 - 4.2 kg	D	2	1	-
Falco sp.	Falcon	105 g - 1.3 kg	B	22	-	2.5
Falco tinnunculus	Kestrel	215g	B	13	-	1.5
Milvus sp.	Kite	690g - 1.1 kg	B	7	3	0.8
Milvus migrans	Black kite	780 g	B	10	2	1.2
Gyps bengalensis	White backed vulture	5.3 kg	D	1	1	-
Neophron percnopterus	Egyptian vulture	2.1 kg	D	1	1	-
<u>GALLIFORMES</u>						
Pardix perdix	Grey partridge	400 g	B	9	2	1.0
Phasianus colchicus	Pheasant	1.1 kg	B	4	2	0.5
Tetrao tetrix	Black grouse	1.1 kg	B	3	-	0.3
<u>GRUIFORMES</u>						
Grus grus	Crane	up to 5 kg	D	1	1	-
<u>CHARADRIIFORMES</u>						
Larus sp.	Gull	280 g - 1.7 kg	B	190	13	22.0
Larus ridibundus	Black headed gull	275 g	B	59	4	6.8
Larus canus	Common gull	420 g	B	18	-	2.1
Larus argentatus	Herring gull	1.0 kg	B	17	2	2.0
Larus fuscus	Lesser black backed gull	820 g	B	3	1	0.3
Sterna sp.	Turn	45 - 570 g	B	36	3	4.2
Vanellus vanellus	Lapwing	215 g	B	118	7	13.7
Vanellus senegallus	Wattled plover	220 g	B	1	-	-
Charadrius hiaticula	Ringed plover	55 g	A	1	-	-
Haematopus ostralegus	Oystercatcher	500 g	B	3	-	0.3
Pluvialis apricaria	Golden plover	185 g	B	3	-	0.3
Numenius arquata	Curlew	770 g	B	5	-	0.6
Gallinago gallinago	Common snipe	125 g	B	1	-	-
Fregata magnificens	Frigate Bird	1.4 kg	B	1	1	-
<u>COLUMBIFORMES</u>						
Columba sp.	Pigeon	up to 465 g	B	30	1	3.5
Columba livia var	Homing pigeon	400 gr	B	7	-	0.8
Columba livia	Rock dove	395 g	B	4	2	0.5
Columba oenas	Stock dove	345 g	B	1	-	-
Columba palumbus	Woodpigeon	465 g	B	14	1	1.6
Streptopelia turtur	Turtle dove	145 g	B	1	-	-
<u>STRIGIFORMES</u>						
Strix sp.	Owl	160 - 380 g	B	2	-	-
Strix Aluda	Tawny owl	480 g	B	3	-	0.3
Tyto alba	Barn owl	315 g	B	1	-	-
Nasio flammeus	Short eared owl	355 g	B	1	-	-

Table 5 Part of Aircraft Struck - 1982 Data

Bird Weight Part struck	Bird Weights				Total	% Based on 1463
	Unknown	Below 110 g	110 g to 1.81 kg	Over 1.81 kg		
Fuselage	73	23	80	1	177	12.1
Nose (excluding radome and windscreen)	193	59	107	2	361	24.7
Radome	72	18	57	1	148	10.1
Windscreen	102	39	78	3	222	15.2
Propeller	-	-	14	-	14	1.0
1 engine struck	87	29	114	4	234	16.0
2 out of 3 struck	-	-	1	-	1	0.1
2 or more of 4 struck	3	-	4	-	7	0.5
all engines struck	1	1	5	-	7	0.5
Wing/Rotor	70	15	107	2	194	13.3
Landing Gear	14	13	55	3	85	5.8
Empennage	4	-	9	-	13	0.9
Part unknown	18	28	131	-	177	-
TOTAL	637	225	762	16	1640	100%

Notes: 5.1 The totals in Table 5 are higher than other tables, as several parts can be struck in one incident.

5.2 The percentages are based on incidents where the part struck is known.

5.3 Where both landing gear, or both wings are struck, two incidents are recorded.

5.4 110 gm = 1/4 lb, 1.81 kg = 4 lb, 3.63 kg = 8 lb.

<u>APODIFORMES</u>							
Apus apus	Swift	40 g	A	36	-	4.2	
<u>PASSERIFORMES</u>							
Corvus sp	Crow	up to 530 g	B	18	1	2.1	
Corvus corone corone	Carrion/hooded crow	530 g	B	2	-	-	
Corvus frugilegus	Rook	430 g	B	6	1	0.7	
Pica pica	Maggie	220 g	B	1	-	-	
Hirundinidae	Swift/swallow/martin	15-40g	A	68	3	7.9	
Passer domesticus	House sparrow	28 g	A	2	-	-	
Hirundo rustica	Swallow	19 g	A	34	-	3.9	
Delica urbica	House martin	17 g	A	5	-	0.6	
Riparia riparia	Sand martin	13 g	A	2	-	-	
Passeriform	Sparrow	15-40 g	A	14	-	1.6	
Turdus merula	Blackbird	106 g	A	2	-	-	
Alauda arvensis	Skylark	40 g	A	16	-	1.8	
Carduelis cannabina	Linnet	19 g	A	2	-	-	
Caprimulegus europaeus	Nightjar	70 g	A	1	-	-	
Malothrus ater	Brown-headed cow bird	45 g	A	1	-	-	
Motacilla alba	Pied wagtail	23 g	A	1	-	-	
Chiroptera	Bat			1	-	-	
UNKNOWN				45	495		
TOTAL				65	1367		

Notes: 4.1 Bird weights and Scientific Names are from '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.

TABLE 6 Effect of Strike - 1982

Effect	Bird Weights					Total	% Based on 642
	Unknown	Below 110 g	110 g 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	11	-	22	-	-	33	5.1
Others	11	3	18	2	2	36	5.6
Windscreen cracked or broken	1	-	2	-	-	3	0.5
Vision obscured*	1	-	1	-	-	2	0.3
Radome changed	2	-	8	1	-	11	1.7
Deformed structure	2	-	5	1	-	8	1.2
Skin torn/light glass broken	9	1	9	-	-	19	2.9
Skin dented*	8	1	12	2	-	23	3.6
Propeller/Rotor/transmission damaged	1	-	5	-	-	6	0.9
Aircraft system lost	-	1	4	1	1	7	1.1
Take off abandoned*	-	1	8	-	-	9	1.4
Nil damage	123	100	253	7	2	485	75.5
Unknown	233	3	6	1	-	243	-
TOTAL	402	110	352	16	5	885	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 damage

Table 7 Aircraft Operators

Operator	Number of Incidents	Number of Movements	Rate Per 10,000 Movements
<u>BELGIUM</u>			
Sabena	21	76,858	2.7
T.E.A.	5	21,682	2.3
<u>CZECHOSLOVAKIA</u>			
CSA	9	-	-
<u>DENMARK</u>			
Cimber Air	-	10,210	-
Conair	6	6,418	0.9
Maersk Air	14	8,770	16.0
SAS	20	83,308	2.4
Sterling Airways	7	53,242	1.3
<u>EIRE</u>			
Aer Lingus	48	-	-
Avair	3	-	-
<u>FINLAND</u>			
Finnair Oy	50	137,824	3.6
<u>FRANCE</u>			
Air France	53	271,516	2.0
Air Inter	75	159,068	4.7
U.T.A.	12	20,436	5.9
T.A.T. & Air Alpes	6	80,184	0.8
Air Alsace	2	-	-
CAL	1	-	-
Taxis	8	-	-
<u>NORWAY</u>			
SAS	42	-	-
Braathen	8	-	-
Wideroe	3	-	-
A/S Mørefly	2	-	-
Scanair	1	-	-
Busy Bee	1	-	-
Helicopter Service	1	-	-

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Conair	6	6,418	0.9
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Sterling Airways	7	53,242	1.3
<u>EIRE</u>			
Aer Lingus	48	-	-
Avair	3	-	-
<u>FINLAND</u>			
Finnair Oy	56	137,824	3.6
<u>FRANCE</u>			
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T.A.T.G. Air Alpes	6	80,184	0.8
Air Alsace	2	-	-
CAL	1	-	-
Taxis	8	-	-
<u>NORWAY</u>			
SAS	42	-	-
Braathen	8	-	-
Wideroe	3	-	-
A/S Morefly	2	-	-
Scanair	1	-	-
Busy Bee	1	-	-
Helicopter Service	1	-	-

<u>SWEDEN</u>			
SAS	63	71906	8.8
Linjeflyg AB (LIN)	22	99000	2.2
Rikspolisstyrelsen	1	5739	-
Swedair Ab	1	1030	-
<u>NETHERLANDS</u>			
KLM	68	114656	5.9
NLM	11	57238	1.9
Martin Air	3	2991	10.1
Transavia	7	4810	14.6
<u>UNITED KINGDOM</u>			
Air Bridge Carriers	1	4618	-
Air Europe	16	21840	7.3
Air UK	24	65168	3.7
Bristow Helicopters	2	37409 hrs	0.5
Britannia Airways	82	74882	10.9
Brittish Air Ferries	3	18182	1.6
British Airways	158	375438	4.2
British Airways Helicopters	14	29626 hrs	4.7
British Caledonian Airways	48	72426	6.6
British Caledonian Helicopters	1	5997 hrs	-
British Island Airways	1	5268	-
British Midland Airways	23	58806	3.9
Brymon Airways	-	11086	-
Dan-Air Services	39	102932	3.8
Eastern Airways	1	5452	-
Express Air Services	-	6210	-
Guernsey Airlines	3	2182	13.7
Heavylift Cargo Airlines	2	1098	18.2
Instone Airlines	-	644	-
Inter City Airlines	2	5328	3.7
Laker Airways	-	1172	-
Lease Air (Genair)	1	4970	-
Logonair	1	7742	-
Manx Airlines	1	1480	-
Monarch Airlines	5	21346	2.3
Orion Airways	8	16806	4.8
Redcoat Air Cargo	-	226	-
Tradewinds Airways	3	2190	13.7

Note: 7.1 Leased aircraft are included against the operator.