

BIRD STRIKE COMMITTEE EUROPE

MILITARY AIRCRAFT

BIRD STRIKE ANALYSIS

1979

Compiled by

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Inspectorate of Flight Safety (RAF)

## MILITARY AIRCRAFT BIRDSTRIKE ANALYSIS 1979

### INTRODUCTION

1. This is the second analysis in the abbreviated format using only Table 3, 'Bird Species', and Tables 7 and 7A, 'Part of Aircraft Struck' and 'Effect of Strike'. Regrettably some countries are still not submitting their data in a useable format while others are not forwarding any data at all. For statistics to be of use in the compilation of this analysis the data must be presented in a corresponding format. Incomplete data cannot be utilized and it is regretted that the statistics forwarded by United States Air Force (Europe) (USAF) (E)) and Etat Major de L'Armee de L'Air (EMAA) have had to be excluded. Data from the following countries has been used in the Analysis:

- a. Royal Air Force (RAF)
- b. Swedish Air Force (SAF)
- c. German Air Force (GAF)
- d. Belgian Air Force (BAF)
- e. Royal Danish Air Force (RDAF)
- f. Royal Norwegian Air Force (RNoAF)

### BIRD SPECIES

2. Gulls of all species featured in 25.9% of the incidents in which the bird was positively identified; this compares with 35% and 31% in the 1977 and 1978 analyses respectively. Again the Lapwing takes second place with 9.9% of the total compared with 12% and 15% in the previous years. Of the total number of strikes used in the analysis (1048) the bird was identified in only 42.5% of the incidents.

### PARTS OF AIRCRAFT STRUCK AND EFFECT

3. The distribution of strikes is again similar to previous analyses apart from the windscreen strikes which are back down to 13.7% as in 1977, and an increase in fuselage strikes which has risen from 16.5% to 22.5%. One RAF Jaguar was lost when the canopy shattered and fragments were ingested causing a loss of power at low level; one major and one minor injury was caused by the ejection. More than half the strikes caused no damage at 56.7% which is down on the 65% of 1978.

TABLE 3 BIRD SPECIES

COMMON NAME	LATIN NAME	APPROX WT (GMS)	CATEGORY	NUMBER OF STRIKES	% BASE ON: 44
Gull (Various)	Larus Sp	400-1800	B	45	10.1
Lapwing	Vanellus vanellus	200	B	44	9.9
Blackheaded gull	Larus ridibundus	400	B	37	8.3
Swift	Apus apus	18-40	A	27	6.1
Woodpigeon	Columba palumbus	500	B	26	5.8
Swallow	Hirundo rustica	18-40	A	25	5.6
Herring gull	Larus argentatus	1000	B	21	4.7
Skylark	Alauda arvensis	40	A	20	4.5
Columbiformes	-	200-500	B	20	4.5
Buzzard	Buteo buteo	1000	B	18	4.0
Turtle Dove	Streptopelia turtur	160	B	13	2.9
House martin	Delichon urbica	20	A	12	2.7
Passeriformes	-	18-1800	A/B	12	2.7
Common gull	Larus canus	400	B	10	2.2
Thrush	Turdus philomelus	70	A	9	2.0
Starling	Sturnus vulgaris	100	A	7	1.6
Linnet	Acanthis cannabina	30	A	6	1.3
Sparrow	Passer montanus	40	A	6	1.3
Redwing	Turdus iliacus	60	A	6	1.3
Snow bunting	Plectrophenax nivalis	35	A	6	1.3
Kestrel	Falco tinnunculus	200	B	5	1.1
Chaffinch	Fringilla coelebs	25	A	4	0.9
Corvid	Corvus Sp.	250-550	B	4	0.9
Crow	Corvus corone	550	B	4	0.9
Golden plover	Pluvialis apricaras	170	B	4	0.9
Oyster catcher	Haematopus ostralegus	550	B	3	0.7
Rock	Corvus frugilegus	500	B	3	0.7
Fieldfare	Turdus pilaris	70	A	3	0.7
Duck	Anas Sp.	-	B	3	0.7
Mallard	Anas platyrhynchos	1000	B	3	0.7
Partridge	Perdix perdix	400	B	3	0.7
Lesser black-backed gull	Larus fuscus	800	B	2	0.4
Meadow pipit	Anthus pratensis	23	A	2	0.4
Woodcock	Scolopax rusticola	300	B	2	0.4
Kite	Milvus milvus	1000	B	2	0.4
Long-eared owl	Asio otus	300	B	2	0.4
Lark	Alaudidae	-	A	2	0.4
Curlew	Numenius arquata	800	B	2	0.4
Anseriformes	-	200-2000	B/C	2	0.4
Greater black-backed gull	Larus marinus	1600	B	1	0.2
Gannet	Sula bassana	3500	B	1	0.2
Blackbird	Turdus merula	100	A	1	0.2
Bullfinch	Pyrrhula pyrrhula	30	A	1	0.2
Blue tit	Parus caeruleus	11	A	1	0.2
Strigiforme	-	170-380	B	1	0.2

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% BASED  
ON: 445

	Eider	Somateria mollissima	2000	C	1	0.2
	Charadriiforme	-	50-1600	A/B	1	0.2
10.1	Sandmartin	Reparia reparia	18	A	1	0.2
9.9	Ringed plover	Charadrius hiaticula	60	A	1	0.2
8.3	White swan	Cygnus olor	9000-12000	D	1	0.2
6.1	Bean goose	Anser fabalis	3300	C	1	0.2
5.8	Warwing	Bombycilla garrulus	60	A	1	0.2
5.6	Teal	Anas crecca	300	B	1	0.2
4.7	Red grouse	Lagopus lagopus	600	B	1	0.2
4.5	Pheasant	Phasianus colchicus	1200	B	1	0.2
4.5	Honey buzzard	Pernis apivorus	750	B	1	0.2
4.0	Red-footed falcon	Falco vespertinus	145	B	1	0.2
2.9	Chiffchaff	Phylloscopus collybita	9	A	1	0.2
2.7	White wagtail	Motacilla alba	20	A	1	0.2
2.7						
2.2						
2.0	UNKNOWN				445	
1.6					603	
1.3	TOTAL STRIKES				1048	

The bird categories based on current civil airworthiness criteria are:

- 1 CAT A - below 0.11 Kg ( $\frac{1}{4}$ lb)
- 1 CAT B - 0.11 Kg to 1.81 Kg ( $\frac{1}{4}$  - 4lb)
- 1 CAT C - 1.82 Kg to 3.63 Kg (4 - 8lb)
- 1 CAT D - over 3.63 Kg (8lb)

2 Those birds not positively identified are included as unknown.

3 Percentages are based on total of identified birds.

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TABLE 7 PART OF AIRCRAFT STRUCK

PART	WEIGHT UNKNOWN	CAT A	CAT B	CAT C & D	TOTAL	% BASED ON 890
Nose (excluding radome and windscreen)	76	20	49	1	146	16.4
Radome	13	3	14	1	31	3.5
Windscreen	65	24	32	1	122	13.7
Fuselage (excluding the above)	125	22	52	1	200	22.5
Engine:-						
1 engine struck	47	12	27	-	86	9.7
2 out of 3 struck						
2 out of 4 struck	2	-	-	-	2	0.2
3 out of 4 struck	1	-	-	-	1	0.1
all struck (on multi-engined aircraft)	2	-	-	-	2	0.2
Wing + Air Intakes	85	9	46	-	140	15.7
Rotor/Propeller	17	3	12	1	33	3.7
Landing Gear	28	2	20	-	50	5.6
Empennage	12	1	6	-	19	2.1
Underwing Stores/Tanks	41	2	15	-	58	6.5
Part Unknown	25	2	7	-	34	-
TOTAL	539	100	280	5	924	99.9

## NOTES:-

- 7.1 The Total in Table 7 and 7A may be higher than other tables, as one bird can strike several parts.
- 7.2 The percentages should be based on incidents where the part struck is known.
- 7.3 Multiple strikes should be counted as one strike, unless for example both wings or both landing gears are struck, when two incidents should be recorded.

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TABLE 7A EFFECT OF STRIKE

EFFECT	WEIGHT UNKNOWN	CAT A	CAT B	CAT C	CAT D	TOTAL	% BASED ON 1117
Loss of Life/Aircraft	1					1	0.1
Flight Crew Injury							
Major	1)						
Minor	1)						
Slight							
Premature Engine Change:-							
on single engined A/C	13	-	10	-	-	23	2.0
1 on a 2 engined A/C	11	2	12	-	-	25	2.2
1 on a 3 engined A/C	-	-	-	-	-	-	-
1 on a 4 engined A/C	-	1	3	-	-	4	0.4
2 on a 3 engined A/C	-	-	-	-	-	-	-
2 on a 4 engined A/C	1	1	-	-	-	2	0.2
3 on a 4 engined A/C	-	-	-	-	-	-	-
all engines on a multi	1	-	-	-	-	1	0.1
Windscreen Cracked/Broken	20	2	10	-	-	32	2.9
Radome Changed	8	1	12	-	1	22	2.0
Deformed Structure	10	2	12	-	-	24	2.1
Skin Torn	37	5	21	-	-	63	5.6
Skin Dented	91	14	44	-	-	149	13.3
Propeller/Rotor Damaged	10	2	3	-	1	16	1.4
Aircraft System Lost	2	-	-	-	1	3	0.3
Underwing Stores/Tanks damaged	30	2	15	-	-	47	4.2
Miscellaneous	53	3	16	-	-	72	6.4
Nil Damage	369	121	143	-	-	633	56.7
Unknown	3					3	
<b>TOTAL</b>	<b>660</b>	<b>156</b>	<b>303</b>	<b>-</b>	<b>3</b>	<b>1120</b>	<b>99.9</b>

## NOTES:-

- 7A.1 Multiple strikes should be counted as one strike, unless for example both wings are damaged, or both windscreens are broken, in which case two incidents should be recorded.
- 7A.2 Definition of Injury requiring medical treatment:  
 Major - causing absence of 21 days or over.  
 Minor - causing absence of 7 to 21 days.  
 Slight - injury not in above 2 categories.
- 7A.3 Injuries as a consequence of a strike, eg ejection injuries should be included.
- 7A.4 Aircraft system lost includes for example electrical, hydraulic, brake, air conditioning, de-icing.

WP.15A

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### INTRODUCTION

1. This third report in the abbreviated format still shows that there is a marked reluctance on the part of representatives to forward information. Only 4 nations forwarded useable data, compared with an eventual, but belated 6 for 1979. Further simplification of the requirements will be made in an effort to encourage greater participation in this analysis. As stated in previous reports, incomplete data cannot be used, neither is a computer printout an acceptable substitute for the standard simple forms. Data from the following nations has been used in this analysis:

- a. Royal Air Force (RAF)
- b. United States Air Force in Europe (USAFE)
- c. Royal Danish Air Force (RDAF)
- d. Belgian Air Force (BAF)

### BIRD SPECIES

2. The order of species in the hit list has not changed significantly over the past years; gulls again headed the list and featured in 36.8% of incidents in which the bird was positively identified, a percentage comparable with 1977 (35%) and an increase over 1979 (25.9%). Whilst still maintaining its place second on the list, the Lapwing has shown a slight decline in the number of incidents (8.5%) compared to 12%, 15% and 9.9% for the years 1977, 1978 and 1979 respectively. A total of 1048 birdstrikes were used in the analysis and of these the bird involved was identified in 42.5% of the incidents. This proportion of 'identified' birdstrikes is identical to that for 1979.

### PARTS OF AIRCRAFT STRUCK AND EFFECT

3. Analysis of parts of the aircraft struck by birds shows a general similarity to previous years, with the exceptions that the windscreen and engines sustained significantly higher rates of strikes than for 1979. The windscreen accounted for 21% of the strikes (13.7% in 1979), and the strikes on one engine almost doubled from 9.7% in 1979 to 17.6% in this period. As reported at the 15th Meeting of BSCE, the effect of birdstrikes in 1980 has been disastrous for military aviation; a total of 10 aircraft were reported lost, but this figure could be higher if more data was available. The aircraft losses also cost at least 3 lives. The only common factor to emerge from most of these reported losses is that the aircraft were at very low level, either immediately after or during take-off, or during high speed low level flight. Despite these serious losses, the proportion of aircraft escaping any damage following a birdstrike is 62.1% compared to 65% for 1978 and 56.7% for 1979.



**TABLE 7 PART OF AIRCRAFT STRUCK**

PART	WEIGHT UNKNOWN	CAT A	CAT B	CAT C & D	TOTAL	% BASED ON 1144
Nose (excluding radome and wind-screen)	77	24	21	1	123	10.8
Radome	27	6	7	1	41	3.6
Windscreen	187	15	37	2	241	21.0
Fuselage (excluding the above)	110	15	40	2	167	14.6
Engine:						
1 engine struck	133	18	47	3	201	17.6
2 out of 3 struck						
2 out of 4 struck	1	-	1	-	2	0.2
3 out of 4 struck	-	-	1	-	1	0.1
all struck (on multi-engined aircraft)	-	-	-	-	-	-
Wing + Air Intakes	102	19	66	2	189	16.5
Rotor/Propeller	10	2	12	-	24	2.1
Landing Gear	20	10	25	2	57	5.0
Empennage	21	2	6	1	30	2.6
Underwing Stores/Tanks	38	9	21	-	68	6.0
Part Unknown	38	8	16	-	62	
<b>TOTAL</b>	<b>764</b>	<b>128</b>	<b>300</b>	<b>14</b>	<b>1206</b>	<b>100.1</b>

**NOTES:**

- 7.1 The Total in Table 7 and 7A may be higher than other tables, as one bird can strike several parts.
- 7.2 The percentages should be based on incidents where the part struck is known.
- 7.3 Multiple strikes should be counted as one strike, unless for example both wings or both landing gears are struck, when two incidents should be recorded.

TABLE 7A EFFECT OF STRIKE

EFFECT	WEIGHT UNKNOWN	CAT A	CAT B	CAT C	CAT D	TOTAL	% BASED ON 1045
Loss of Life			2			2	
Flight Crew Injury							
Major	1		1			2	
Minor			1			1	
Slight			3			3	
Loss of Aircraft	1		3	-	1	5	0.5
Premature Engine Change:							
on single engined A/C	16	7	8	-	-	31	3.0
1 on a 2 engined A/C	30	1	17	-	1	49	4.7
1 on a 3 engined A/C	-	-	-	-	-	-	-
1 on a 4 engined A/C	-	-	5	-	-	5	0.5
2 on a 3 engined A/C	-	-	-	-	-	-	-
2 on a 4 engined A/C	-	-	-	-	-	-	-
3 on a 4 engined A/C	-	-	-	-	-	-	-
all engines on a multi	-	-	-	-	-	-	-
Windscreens Cracked/Broken	13	1	7	-	-	21	2.0
Radome Changed	2	2	-	-	1	5	0.5
Deformed Structure	15	-	11	-	-	26	2.5
Skin Torn/Light glass broken	17	2	15	2	-	36	3.4
Skin Dented	87	13	39	1	-	140	13.4
Propeller/Rotor Damaged	4	1	3	-	-	8	0.8
Aircraft System Lost	1	-	-	-	-	1	0.1
Underwing Stores/Tanks damaged	21	3	7	-	-	31	3.0
Miscellaneous	20	9	8	1	-	38	3.6
Nil Damage	445	63	140	1	-	649	62.1
Unknown	14	1	4	1	-	20	
<b>TOTAL</b>	<b>686</b>	<b>103</b>	<b>267</b>	<b>6</b>	<b>3</b>	<b>1065</b>	<b>100.1</b>

NOTES:

- 7A.1 Multiple strikes should be counted as one strike, unless for example both wings are damaged, or both windscreens are broken, in which case two incidents should be recorded.
- 7A.2 Definition of Injury requiring medical treatment:  
    Major - causing absence of 21 days or over  
    Minor - causing absence of 7 to 21 days  
    Slight - injury not in above 2 categories
- 7A.3 Injuries as a consequence of a strike, eg ejection injuries should be included.
- 7A.4 Aircraft system lost includes for example electrical, hydraulic, brake, air conditioning, de-icing.

TABLE 3 BIRD SPECIES

COMMON NAME	LATIN NAME	APPROX WT (GMS)	CATEGORY	NUMBER OF STRIKES	% BASED ON: 354
Gull (Various)	Larus Sp.	400-1800	B	85	24.0
Lapwing	Vanellus vanellus	200	B	30	8.5
Swift	Apus apus	18-40	A	22	6.2
Black-headed gull	Larus ridibundus	400	B	19	5.4
Skylark	Alauda arvensis	40	B	18	5.1
Herring gull	Larus argentatus	1000	B	16	4.5
Woodpigeon	Columba palumbus	500	B	16	4.5
Starling	Sturnus vulgaris	100	A	15	4.2
Buzzard	Buteo buteo	1000	B	11	3.1
Columbiformes	-	200-500	B	11	3.1
Passeriformes	-	18-1800	A/B	11	3.1
Swallow	Hirundo rustica	18-40	A	9	2.5
Sparrow	Passer montanus	28	A	8	2.3
Common gull	Larus canus	400	B	8	2.3
Homing pigeon	Columba livia	420	B	6	1.7
Crow	Corvus corone	550	B	6	1.7
Corvid	Corvus Sp	250-550	B	5	1.4
Thrush	Turdus philomelus	70	A	5	1.4
Kestrel	Falco tinnunculus	200	B	5	1.4
Maggie	Pica pica	210	B	4	1.1
Golden plover	Pluvialis apricaria	170	B	4	1.1
Anseriformes	-	200-2000	B/C	3	0.8
Oystercatcher	Haematopus ostralegus	550	B	3	0.8
Corn bunting	Miliaria calandra	45	A	3	0.8
Rook	Corvus frugilegus	500	B	2	0.6
Jackdaw	Corvus monedula	210	B	2	0.6
Griffon vulture	Gyps fulvus	8000	D	2	0.6
Linnet	Acanthis Cannabina	30	A	2	0.6
Blackbird	Turdus merula	100	A	2	0.6
Pheasant	Phasianus colchicus	1200	B	2	0.6
Accipitridae	-	82-8000	B	2	0.6
Charadriiforme	-	50-1600	A/B	1	0.3
Greylag goose	Anser anser	3300	B	1	0.3
Goosander	Mergus merganser	1500	B	1	0.3
Gannet	Sula bassana	3500	B	1	0.3

% BASED  
ON: 354

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White stork	<i>Ciconia ciconia</i>	3400	B	1	0.3
Greater black-backed gull	<i>Larus marinus</i>	1600	B	1	0.3
Lesser black-backed gull	<i>Larus fuscus</i>	800	B	1	0.3
Swainsons hawk	<i>Buteo swainsoni</i>	990	B	1	0.3
Partridge	<i>Perdix perdix</i>	400	B	1	0.3
Snow bunting	<i>Plectrophenax vivianis</i>	35	A	1	0.3
Dunnoek	<i>Prunella modularis</i>	22	A	1	0.3
Meadow Pipit	<i>Anthus pratensis</i>	23	A	1	0.3
Fieldfare	<i>Turdus pilaris</i>	70	A	1	0.3
Chaffinch	<i>Fringilla coelebs</i>	23	A	1	0.3
Greenfinch	<i>Carduelis chloris</i>	29	A	1	0.3
Sandmartin	<i>Hirundo repens</i>	18	A	1	0.3
House martin	<i>Delichon urbica</i>	20	A	1	0.3
Total Identified				354	
Unknown				638	
TOTAL STRIKES				992	

The bird categories based on current civil airworthiness criteria are:

- 3.1 CAT A - below 0.11 Kg ( $\frac{1}{4}$ lb)
- CAT B - 0.11 Kg to 1.81 Kg ( $\frac{1}{2}$ -4lb)
- CAT C - 1.82 Kg to 3.63 Kg (4-8lb)
- CAT D - over 3.63 Kg (8lb)
- 3.2 Those birds not positively identified are included as unknown.
- 3.3 Percentages are based on total of identified birds.