

BSCE 12
28 Octobre 1977

BIRD STRIKE COMMITTEE EUROPE

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BSCE/12-WP/

BIRD STRIKES DURING 1975 TO EUROPEAN
REGISTERED CIVIL AIRCRAFT

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SUMMARY

The paper contains a consolidation of the Tabulated Data from 12 European countries of bird strikes reported throughout the World during 1975, to aircraft of over 5,700 kg (12,500 lb).

BIRD STRIKE ANALYSIS

EUROPEAN OPERATORS 1975

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,
(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.

TABLE 1 COUNTRY -1975

Country	Number of Incidents (Aeroplanes)	Number of Movements (Aeroplanes only)	Rate per 10,000 Movements
Austria	2	44,500*	0.5
Belgium	53	127,172	4.2
Denmark	64	168,590	3.8
Eire	16	70,120*	2.3
Finland	0	73,720	0
France	80	566,370	1.4
Italy ⁺	12	108,790*	1.1
Netherlands	202	197,370	10.2
Norway	26	202,670	1.3
Sweden	54	193,520*	2.8
Switzerland	72	181,316	4.0
UK	357	1,003,604	3.6
TOTAL	938	2,940,000	3.2

- Notes: 1.1 There are two movements per flight.
- *1.2 Movement data for Austria, Eire, Italy and Sweden is approximate (based on ICAO sources).
- +1.3 Data from Italy is for second half of year.
- 1.4 Data from Switzerland is for Swissair only.
- 1.5 Data from France and Norway does not include piston-engined aircraft.
- 1.6 Helicopters are excluded from this table.
- 1.7 Very limited data from Germany is used in Table 6.

TABLE 2 AIRCRAFT TYPE - 1975

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Type	Aircraft	No of Countries Reporting	No of Strikes	No of Movements	Strikes per 10,000 Movements	
<u>JET</u>	4 engine	Douglas DC8	9	92	145,360	6.3
		Boeing 747	10	36	76,880	4.7
		Boeing 707/720	6	63	199,790	3.1
		BAC VC10	1	7	29,420	2.4
		HS Comet 4	1	2	14,020	1.4
	3 engine	Lockheed 1011 Tristar	1	11	7,800*	14.1
		HS Trident	1	91	144,340	6.3
		Douglas DC10	10	29	58,320	5.0
		Boeing 727	5	9	101,650	0.9
	2 engine	VFW 614	1	1	1,480*	6.7
		Boeing 737	5	73	149,840	4.9
		DAO1 Mercure	1	13	30,870	4.2
		Douglas DC9	8	213	580,190	3.7
		A300B Airbus	2	4	14,320	2.8
		Fokker F28 Fellowship	1	6	22,100	2.7
		BAC 1-11	2	47	209,460	2.2
		SE210 Caravelle	6	40	231,950	1.7
		SN601 Corvette	1	1	10,000	1.0
		Cessna Citation	1	0	980	0
HS 125		2	10	60,000	1.7	
Lear		3	2	-	-	
Falcon 20		4	2	-	-	
<u>TURBOPROP</u>	HS Argosy	1	1	1,530*	6.5	
	Canadair CL44	2	4	9,360	4.3	
	BAC Viscount	1	74	288,660	2.6	
	BAC Vanguard/Merchantman	1	5	20,010	2.5	
	HP Herald	1	14	56,040	2.5	
	Fokker F27	6	34	140,080	2.4	
	HS 748	1	4	25,520	1.6	
	Beech 99	1	2	26,000	0.8	
	Nord 262	2	4	57,040	0.7	
	DHC6 Twin Otter	4	3	114,800	0.3	
	<u>PISTON</u>	Douglas DC6	2	1	2,360*	4.2
Convair 440		4	21	104,874	2.0	
Douglas DC3 Dakota		3	1	12,750	0.8	
ATL 98 Carvair		1	0	10,506	0	
DH114 Heron		1	0	3,620	0	
<u>UNKNOWN</u>		17	-	-	-	
<u>HELICOPTER</u>	S61	3	4	176,980	0.2	
	Others	4	1	27,560	0.4	
<u>TOTAL</u>			943			

TABLE 2A SUMMARY OF AEROPLANE TYPE

Jet			752	2,065,160	3.6
Turboprop			145	752,970	1.9
Piston			23	130,490	1.8
<u>TOTAL</u>			920	2,940,000	3.1

- Notes: -
- 2.1 There are two movements per flight.
 - *2.2 Rates for aircraft types with less than 10,000 movements are included in the Table, but are subject to greater error.
 - 2.3 Rates for types where ICAO data has been used are only approximate (ICAO data on Charter Operators is not comprehensive).

Aerodrome	National Registered Aircraft			Incidents to other European Aircraft	TOTAL INCIDENTS
	Incidents	Movements	Rate per 10,000		
<u>Austria</u> Vienna	3	-	-	-	3
<u>Belgium</u> Brussels	8	52,662	1.5	3	11
Antwerp	1	5,924	1.7*	-	1
<u>Denmark</u> Copenhagen-Kastrup	16	66,785	2.4	12	28
Odense	3	2,900	10.3*	-	3
Sonderborg	2	3,540	5.6*	-	2
Alborg	3	2,140	14.0*	-	3
<u>Eire</u> Dublin	5	-	-	-	5
<u>Finland</u> Helsinki	-	-	-	1	1
<u>France</u> Paris, Orly	10	150,077	0.7	9	19
Paris, Le Bourget	2	84,256	0.2	10	12
Paris Roissy CDG	2	85,797	0.2	2	4
Nice	6	56,888	1.0	3	9
Lyons, Bron	3	67,205	0.4	-	3
Marseilles	3	83,790	0.4	-	3
Toulouse	5	56,751	0.9	-	5
St Etienne	4	30,189	1.3	-	4
Bastia	2	25,115	0.8	-	2
Ajaccio	4	48,887	0.4	-	4
Pau	2	40,535	0.5	-	2
Beauvais	2	40,537	0.5	-	2
Metz	2	29,455	0.7	-	2
Bordeaux	-	-	-	2	2
<u>Italy</u> Rome, Fuimicino	1	-	-	3	4
Milan	1	-	-	3	4
Venice	8	-	-	5	13
Pisa	1	-	-	1	2
<u>Netherlands</u> Amsterdam	44	75,543	5.8	2	46
Rotterdam	4	-	-	1	5
<u>Norway</u> Oslo, Fornebu	3	51,263	0.6	6	9
Trondheim	-	-	-	5	5
Stavanger	1	18,843	0.5	1	2

TABLE 3 AERODROME - EUROPEAN REPORTERS 1975 (contd)

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Aerodrome	National Registered Aircraft			Incidents to other European Aircraft	TOTAL INCIDENTS
	Incidents	Movements	Rate per 10,000		
<u>Sweden</u>					
Stockholm, Arlanda	6	-	-	1	7
Stockholm, Bromma	2	-	-	-	2
Halmstad	4	-	-	-	4
Borlange	2	-	-	-	2
Visby	4	-	-	-	4
Sundsvall	2	-	-	-	2
Norrkoping	1	-	-	2	3
Malmo	4	-	-	2	6
Goteborg	5	-	-	4	9
<u>Switzerland</u>					
Zurich	23	52,891	4.3	6	29
Basle	7	9,802	7.1	3	10
Geneva	4	32,394	1.2	3	7
<u>United Kingdom</u>					
Belfast (Aldergrove)	27	20,460	13.2	1	28
Glasgow	31	30,160	10.3	2	33
Tees-side	5	6,590	7.6*	-	5
Wick	2	2,670	7.5*	-	2
Blackpool	5	6,750	7.4*	-	5
Luton	12	18,260	6.6	-	12
Ronaldsway I of M	8	12,830	6.2	-	8
Birmingham	11	19,290	5.7	-	11
Prestwick	17	29,700	5.7	-	17
Stansted	9	16,530	5.4	-	9
Leeds/Bradford	5	9,260	5.4	-	5
Liverpool	6	11,860	5.1	-	6
Glamorgan/Rhoose	4	7,880	5.1*	1	5
Edinburgh	8	16,960	4.7	1	9
East Midlands	7	15,280	4.6	-	7
London Heathrow	45	131,790	3.4	9	54
Newcastle	4	12,530	3.2	-	4
Aberdeen	11	35,160	3.1	-	11
Manchester	9	36,330	2.5	-	9
London Gatwick	9	69,320	1.3	-	9
Belfast Harbour	4	-	-	-	4
<u>Alphabetic list of other aerodromes where more than one strike has been reported by European operators</u>					
Algiers (Algeria)					3
Bahrain (Bahrain)					2
Bamako (Mali)					2
Bangkok (Thailand)					2
Bangui (C African Rep)					2
Bermuda (Bermuda)					3
Dar-es-Salaam (Tanzania)					3
Djibouti (Somalia)					2
Dusseldorf (Germany)					6

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Alphabetic list of other aerodromes where more than one strike has been reported by European operators (contd)

Aerodrome	TOTAL INCIDENTS
Entebbe (Uganda)	3
Freetown/Lungi (Sierra Leone)	3
Guernsey (Channel Islands)	3
Hamburg (Germany)	8
Jersey (Channel Islands)	3
Johannesburg (S Africa)	3
Kano (Nigeria)	2
Monastir (Tunisia)	4
Nairobi (Kenya)	2
New York JFK (US)	7
Palma (Spain)	3
Prague (Czechoslovakia)	2
Rangoon (India)	2
Singapore (Malaysia)	2
Santiago (Chile)	2
Other Aerodromes with single incidents	111
En-route	18
Unknown	173
TOTAL	934

Note: Rates for aerodromes with less than 10,000 movements are included but are subject to greater error.

TABLE 4 BIRD SPECIES - 1975

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ENGLISH NAME	SCIENTIFIC NAME	APPROX WEIGHT	CATEGORY	NUMBER OF STRIKES	% BASED ON 476
Black backed gull	Larus sp	-	B	2	0.4
Herring gull	Larus argentatus	1.1 Kg	B	10	2.1
Black-headed gull	Larus ridibundus	300g	B	26	5.5
Common gull	Larus canus	-	B	1	-
"Gull"	Larus sp.	-	B	198	-
TOTAL GULLS	-	-	-	<u>237</u>	51.6
Lapwing	Vanellus vanellus	200g	B	75	15.7
Pigeon	Columba sp.	450g	B	26	5.5
Swallow	Hirundo rustica	15g	A	23	4.8
Swift	Apus apus	30g	A	17	3.6
"Sparrow"	-	18-40g	A	17	3.6
Rook/Crow	Corvus spp.	400-550g	B	10	2.1
Common buzzard	Buteo buteo	800g-2Kg	B	9	1.9
Birds of Prey	-	-	B	9	1.9
Starling	Sturnus vulgaris	85g	A	7	1.5
Partridge	Perdix perdix	300-400g	B	6	1.3
Pheasant	Phasianus colchicus	1.2 Kg	B	6	1.3
Skylark	Alavda arvensis	40g	A	5	1.0
Kestrel	Falco tinnunculus	200-800g	B	5	1.0
Duck	Anas sp.	-	B	4	0.8
Owl	O.strigiformes	170-380g	B	3	0.6
Heron	Ardea sp.	-	B	3	0.6
Hooded crow	Corvus corone	550g	B	3	0.6
Blackbird	Turdus merula	100g	A	3	0.6
Curlew	Numenius arquata	800g	B	3	0.6
Crane	Grus sp.	-	C	2	0.4
Mallard	Anas platyrhynchos	900g	B	2	0.4
Martin	Hirundinisae	20-25g	A	2	0.4
Golden Plover	Pluvialis apricaria	200g	B	2	0.4
Kite	Milvus sp.	1 Kg	B	2	0.4
Redwing	Turdus iliacus	85g	A	1	-
Artic skua	Stercorarius parasiticus	450g	B	1	-
Long-eared owl	Asio otus	260g	B	1	-
Jackdaw	Coleus monedular	230g	B	1	-
Canary	Serinus canaria	12g	A	1	-
Common Heron	Ardea cinerea	1.5-2Kg	B	1	-
Unknown	-	-	-	467	-
TOTAL	-	-	-	943	-

Notes:-

- 4.1 Bird weights and scientific names are based on information supplied by Pest Infestation Control Laboratory, MAFF, Worplesdon, and the average weight has been assumed.
- 4.2 The bird Categories based on current Civil Airworthiness requirements are:-
 CAT A - below 110g ($\frac{1}{4}$ lb)
 CAT B - 110g to 1.81 Kg ($\frac{1}{4}$ lb to 4 lb)
 CAT C - 1.82 Kg to 3.63 Kg (4 lb to 8 lb)
 CAT D - over 3.63 Kg (8 lb)
- 4.3 Those birds not positively identified are tabled as Unknown.
- 4.4 Percentages are based on incidents where birds are identified.

TABLE 5 PART OF AIRCRAFT STRUCK - 1975

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PART	WEIGHT UNKNOWN	CAT A	CAT B	CAT C & D	TOTAL	% BASED ON 842
Fuselage	58	20	50	-	128	15.2
Nose (excluding radome and windscreen)	84	36	82	-	202	24.0
Radome	13	6	19	1	39	4.6
Windscreen	59	19	29	-	107	12.6
Engine:-						
1 engine struck	85	6	80	1	172	20.4
2 out of 3 struck	2	0	2	-	4	0.5
2 or more of 4 struck	-	-	-	-	-	-
all engines struck	-	-	2	-	2	0.2
Wing/Rotor	45	4	85	-	134	15.9
Landing Gear	10	2	36	1	49	5.8
Empennage	-	0	5	-	5	0.6
Part unknown	64	12	84	1	161	-
TOTAL	420	105	474	4	1003	

TABLE 6 EFFECT OF STRIKE

EFFECT	WEIGHT UNKNOWN	CAT A	CAT B	CAT C	CAT D	TOTAL	% BASED ON 829
Loss of life/aircraft	-	-	1	-	-	1	0.1
Flight Crew Injured	-	-	1	-	-	1	0.1
Engine damage requiring repair on:-							
2 engined aircraft	12 (7)	0	17 (4)	-	-	29 (11)	3.5
Others	14 (6)	1	10 (3)	-	-	25 (9)	3.0
Windscreen cracked or broken	2	-	-	-	-	2	0.2
Radome changed	1	-	3	-	-	4	0.5
Deformed structure	6	1	8	1	-	16	1.9
Skin torn/light glass broken	6 (3)	-	8	-	-	14 (3)	1.7
Skin dented	16 (12)	1	25	-	-	42 (12)	5.1
Propeller/Rotor/transmission damaged	-	-	2	-	-	2	0.2
Aircraft system lost	- (1)	-	7	-	-	7 (1)	0.8
Nil damage	313	88	281	4	-	686	82.7
Unknown						N/A	N/A
TOTAL	370 (29)	91	363 (7)	5	0	829 (36)	

5.1 The totals in Table 5 are higher than others, as one bird can strike several parts.

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.

6.1 If, for example, skin is torn in two places, or both windscreens are broken, two incidents are recorded.

6.2 The figures in brackets are from Germany.

TABLE 7 EFFECT - AIRSPEED - WEIGHT OF BIRD

EFFECT	AIRSPEED		0-80		81-100		101-150		151-200		201-250		over 250	
	WEIGHT		A&B	C&D	A&B	C&D	A&B	C&D	A&B	C&D	A&B	C&D	A&B	C&D
Loss of Life/Aircraft							1							
Pilot Crew Injured							1							
Engine Prematurely Changed					3		15		4		1			
Windscreen Cracked/Broken														
Radome Changed					1				1					
Deformed Structure	1				1		3	1						
Skin Torn/light glass broken					1		5							
Skin Dented	1				3		16		3					
Propeller/Rotor Damaged							1		1		1			
Aircraft System Lost							3		2					
TOTAL	2				9		45	1	11		2			

Note:

The TOTALS of Table 7 are very low as it includes only damaging strikes where bird weight and airspeed are known.

TABLE 8 COST - 1975 Belgium, Denmark, France, Netherlands
Switzerland and U.K. only.

Type	Aircraft Movements	Damaging Strikes	Cost
Where cost is known	1,291,468	95	£107,1380
Where cost is unknown	1,646,274	-	
LIKELY TOTAL COST	2,937,742		£2.44 million

Notes: 8.1 The cost from those countries able to supply cost information has been factored by the TOTAL of aircraft movements for all the countries covered by this Analysis.

TABLE 9 WEATHER - STRIKES ON OR NEAR AERODROME

Weather Condition / Time of Day	Dawn	Day	Dusk	Night
Precipitation	4	29	4	7
Mist/Fog*	0	7	0	2
Cloud: †	< 1/2 > 1/2	< 1/2 > 1/2	< 1/2 > 1/2	< 1/2 > 1/2
base below 1000 ft		6 4	1 1	1 1
base 1000-5000 ft	2	1	1	2
above 5000 ft		1 1		2
cloudy/below cloud/ overcast	7	133	13	12
Clear	8	166	9	37
TOTAL in each time band	21	348	28	64
% in each time band	4.5	75.5	6.0	13.9

- Notes: 9.1* Visibility less than 1000 metres
 9.2 † Cloud cover less than half i.e. 1 to 4 octas
 9.3 † Cloud cover more than half i.e. 5 to 8 octas
 9.4 Clear includes CAVOK

TABLE 10 AIRCRAFT OPERATOR REPORTING STRIKES

Operator	Number of Strikes	Number of Movements	Strikes per 10,000 Movements
<u>Austria</u>			
Austrian Airlines	2	44,500	0.5
<u>Belgium</u>			
Sabena	50	96,094	5.2
Sobelair	0	8,570	0
Trans European Airways	1	7,152	1.4
Delta Air Transport	2	12,048	1.7
Bias	0	2,956	0
Young Cargo	0	352	0
<u>Denmark</u>			
Maersk Air	8	19,540	4.1
SAS	34	86,414	3.9
Sterling Airways	13	42,010	3.1
Conair	5	7,010	7.1
Cimber Air	4	13,482	3.0
Others	1	23,802	0.4
<u>Eire</u>			
Aer Lingus	16	70,120	2.3
<u>Finland</u>			
Finnair	0	70,431	0
Kar-air	0	2,285	0
Others	0	1,273	0
<u>France</u>			
UTA	13	28,072	4.6
Air Inter	36	131,698	2.7
Euralair	1	9,000	1.1
Air Afrique	1	6,772	1.5
Air France	19	323,032	0.6
Air Alpes	3	60,000	0.5
Uni Air	1	12,852	0.8
Others	7	-	-
<u>Italy</u>			
Alitalia	11	108,790	1.0
VIP Air	1	-	-
<u>Norway</u>			
SAS	21	87,354	2.4
Braathen Safe	4	65,826	0.6
Wideroe	1	89,618	0.1
<u>Sweden</u>			
SAS	28	83,520	3.3
Transair	4	10,000	4.0
Linjeflug	20	100,100	2.0
Syd Aero AB	1	-	-
Swedair	1	-	-
<u>Switzerland</u>			
Swissair	72	181,316	4.0
<u>UK</u>			
British Airways (except Overseas)	188	371,540	5.1
British Airways Overseas	43	83,790	5.1
British Caledonian	20	68,900	2.9
Britannia Airways	19	38,800	4.9
British Midland	16	39,410	4.1

continued

TABLE 10 AIRCRAFT OPERATOR REPORTING STRIKES (contd)

Operator	Number of Strikes	Number of Movements	Strikes per 10,000 Movements
<u>UK (contd)</u>			
British Island Airways	13	48,260	2.7
Dan Air	6	73,040	0.8
British Airtours	5	12,310	4.1
Short Bros	5	-	-
Laker	4	18,000	2.2
Air Anglia	4	19,020	2.1
Transmeridian	3	5,390	5.6*
Monarch	2	13,800	1.5
Invicta	2	6,170	3.2*
British Airways Helicopters	2	10,620 hrs	1.8
Alidair	2	7,310	2.7*
Tradewinds	1	3,760	2.6*
McAlpine	1	7,330	1.4*
Air Bridge Carriers	1	4,710	2.1*
Others	4	-	-

Notes:

- 10.1 The movements of Operators who did not report any strikes are not included.
- 10.2 Leased aircraft are included against the operator.

SERIOUS BIRD STRIKE INCIDENTS WORLD WIDE 1975

(Executive jets and aircraft over 5700 kg)

28.1.75 Private US Lear 23

Believed struck starlings (passenger report) at 1,500 ft on take-off. At 21,000 ft right engine suffered complete compressor stall and was shutdown. Continued on one engine, on descent to destination. at 17,000 ft the left engine also stalled. Left engine re-started at 7,500 ft on base leg to airfield, right engine started on finals. Found ICVs and several first stage blades severely bent.
(Source - Flight Safety Foundation)

14.6.75 Private NA265-80 Sabreliner N67KM at Watertown, S Dakota, USA

Whilst taking off from 7,000 ft long runway aircraft struck gulls during rotation. Both engines immediately "banged" and lost power, and aircraft was crash landed in a field beyond the end of the runway. The wings were torn off and caught fire and the fuselage came to rest approx 750 ft beyond the end of the runway. Both pilots, and one of the 4 passengers sustained serious injuries (the pilots were not using their shoulder harnesses). A total of 13 dead small inland type gulls (Franklin's full - Larus pipixcan) were found on the runway, they were estimated to weigh somewhat less than 450g (1 lb), and to have a wingspan of 2 to 2½ ft. There was light rain, cloudbase 1,000 ft, visibility 1¼ miles. The two CF700 2D-2 engines were inspected, No 1 core had severe damage and compressor was not rotatable, several variable IGV's and stator vanes were torn from inner and outer bands. The fan was undamaged. Bird feathers were found in a number of locations and charred remains were found in combustion and turbine area. No 2 engine had suffered damage, probably as a result of the crash landing, however bird debris was found in the combustion area. The airport is surrounded by lakes, but gulls are rare on the airport except in spring and autumn.
(Source ICAO Subsequent Notification)

19.6.75 Private UK Grumman Gulfstream 1

Struck "plover" whilst at 3,500 ft on approach to Cologne/Bonn airport whilst flying above cloud. Hole 7in x 5in just above front centre of radome.
(Source - UK Bird Strike Reporting Scheme)

1.7.75 Air Malawi BAC 1-11 7Q-YKG at Nairobi

Struck Marabu Stork (Leptoptilos crumeniferus) on approach to Nairobi. A 10 inch square hole was made in port side of fuselage forward of front passenger door. Skin was damaged for approx 6 feet. Manufacturer's assistance required for repair.
(Source - CAA Reporting Scheme)

17.10.75 Boeing 747

Aborted take-off on cargo flight due to hitting 30 or 40 birds at 155 kts (aircraft weight 772,000 lbs and V1 of 161 kts). Birds rose from runway directly in front of aircraft (flight was first to use runway 13R). No 2 engine was shutdown because of over-temp condition and failure to go into reverse. No 1 was shutdown after taxiing off runway. No severe vibration was felt. No 1 engine had severe fan blade damage, one blade tip approx 8 in long had separated and exited through inlet cowl at 4 o'clock position making 2 holes in outboard flap canoe fairing. No 2 engine also had severe fan blade damage, one blade tip approx 8 in long separated from fan, but was recovered, no tips exited through cowl. Airport Manager stated birds would not be scared away due to rain and low ceiling.

(Source Flight Safety Facts and Reports October 1975)

12.11.75 Overseas National DC10-30 N1032F at Kennedy Airport, New York

The aircraft was taking off from a different runway from that in use by other aircraft when, shortly after passing 100 knots the captain saw a flock of approx 100 birds rise off the runway ahead of the aircraft. The captain alerted the crew to "watch the EGT's". The aircraft struck the flock of birds, and No 3 engine disintegrated, scattering parts around a wide area, and setting fire to a nearby vehicle maintenance store. The flight data recorder ceased to record soon after the aircraft attained an indicated airspeed of 168 knots (V, was 178 knots). The take-off was abandoned, but was affected by the loss of No 2 brake system and braking torque reduced to 50%, No 3 thrust reversers were inoperative, at least three tyres disintegrated, No 3 spoiler panels on each wing could not deploy and the runway surface was wet. The wing was on fire due to rupture of the No 3 engine fuel supply line, and the aircraft finally came to rest on the grass beyond the last taxiway at the end of the runway. The landing gear collapsed and ultimately most of the aircraft was consumed by fire. All 139 persons on board who were employees of Overseas National successfully escaped from the aircraft.

Approximately 20 dead gulls were found on the runway, identified as Herring gulls (*Larus argentatus*), Ring-billed gulls (*Larus delawarensis*) and Great-black-backed gulls (*Larus marinus*). The largest bird weighed 5 lbs and the average weight of the other birds was between 3 and 4 lbs. There was evidence of at least six significant bird strikes on the lip assembly of No 3 engine inlet cowl. The ingestion caused massive fan blade damage to the GE CF6-50 engine and, ultimately, fan rotor imbalance. When the fan rotor assembly became unbalanced the epoxy abrasion resistant shroud around the inside of the cowling began to pulverize and entered the HP compressor. It then exploded, the overpressure within the compressor section caused the compressor cases to separate and structural integrity of the engine to be lost.

A number of recommendations were made concerning bird control measures and engine modifications. All CF6-6 and -50 engines have now been modified in that the epoxy rub shroud has been replaced by alloy honeycomb material. (Source NTSB Aircraft Accident Report NTSB-AAR-76-19)

20.11.75 Private U.K. HS125 G-BCUX at Dunsfold, Surrey

The aircraft took off with two pilots and seven passengers on board, becoming airborne shortly before the half way point. At a height of between 50 and 100 feet and after the undercarriage had been retracted, at a speed of approx 150 kts the aircraft encountered a flock of lapwings (*Vanellus vanellus*). Both engines ingested birds and although there were no instrument indications the aircraft commander sensed an immediate loss of power on both engines. Ground witnesses saw balls of flame of varying length behind each of the engines. The aircraft was force landed straight ahead with undercarriage and flaps lowered, touching down with only 130 metres of runway remaining at a speed of approx 120 kts. It overran the end of the runway and continued across grass fields and through three hedges before crossing a main road at a speed of approx 85 kts. In so doing it struck and demolished a passing car killing the driver and five children. The undercarriage was torn off and the aircraft continued for a further 150 metres before coming to rest. Fire broke out, but all nine occupants safely evacuated the aircraft before it was largely destroyed by the fire.

A total of 11 dead lapwings were found on the aerodrome, the largest of which weighed 303 grams and had a wingspan of 610 mm. The accident took place 5 minutes after sunset and the aircraft's landing and high intensity supplemental strobe lights were in use. Approximately 40% of the aerodrome had "long grass", but there were many birds uniformly abundant in the short grass areas. Equipment for playing bird distress calls was available, however the lapwing tape had been taken to a laboratory for examination the day before the accident, as it was believed to be faulty. Subsequently examination showed that both engines had ingested birds, causing a surge condition, however the damage was such that both engines were capable of being test run.

(Source Accidents Investigation Branch Aircraft Accident Report 1/77)

29.12.75 Israeli Boeing 707 Freighter 4X-ATX at Tel Aviv Airport

During a daylight landing on runway 12, with landing lights OK, struck a flock of black headed gulls (*Larus ridibundus*) average weight 300 gms. Two engines and both wings were damaged.

(Source - Lloyds List and BSCE Member)