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DOT/FAA/CT-90/28

FAA Technical Center  
Atlantic City International Airport  
N.J. 08405

# Study of the Engine Bird Ingestion Experience of the Boeing 737 Aircraft

(October 1986 - September 1989)

October 1991

Final Report

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16. Abstract  The Federal Aviation Administration (FAA) Technical Center initiated a study in October 1986 to determine the numbers, weight, and species of birds which are being ingested into medium and large inlet area turbofan engines and to determine what damage, if any, results. Bird ingestion data were collected for the Boeing-737 model aircraft which uses either the Pratt and Whitney JT8D medium inlet area turbofan engine or the CFM International CFM56 large inlet area turbofan engine. This final report analyzes the entire 3 years of data collection which extended from October 1986 through September 1989.					
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FOREWORD

This final report provides descriptive and statistical analyses of the data collected over a 3-year period on bird ingestion experiences for the B737 aircraft. The data described in this report were collected under separate contracts with the engine manufacturers.

The report was prepared by the University of Dayton under Department of Transportation, Federal Aviation Administration Contract DTFA03-88-C-00024. The technical project monitor for the FAA during the preparation of the report was Mr. Joseph Wilson. Portions of the engine damage/failure analysis (Section 6) were performed by Mr. Wilson. The principal investigator at the University of Dayton was Dr. Peter W. Hovey and computer support was provided by Mr. Donald A. Skinn.



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## EXECUTIVE SUMMARY

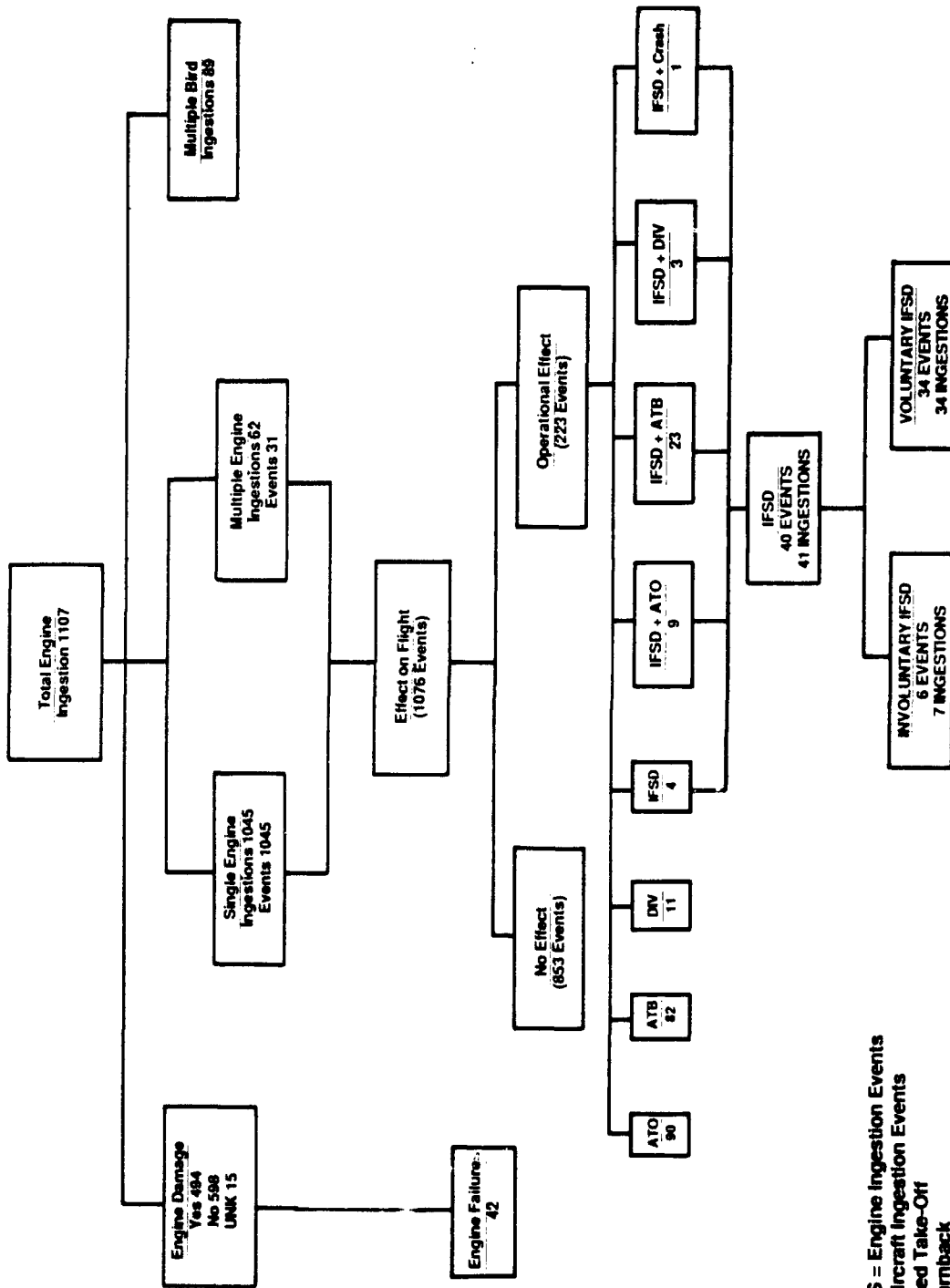
An investigation was initiated by the Federal Aviation Administration Technical Center in September 1986 to determine the numbers, weight, and species of birds which are ingested into medium and large inlet area turbofan engines during worldwide service operation and to determine what damage, if any, results. This report summarizes the 3-years of Boeing-737 (B737) data that were collected to support this effort. The first year of data is published under report number DOT/FAA/CT-89/16 [1]. The first and second years of data are summarized together and published under report number DOT/FAA/CT-89/29 [2].

Figure E-1 is an overall summary of the data that were collected during the 3 years of this investigation which extended from October 1986 through September 1989. A total of 8.91 million aircraft operations were flown by B737 commercial aircraft during the 3-year period. B737 aircraft equipped with Pratt and Whitney JT8D medium inlet area turbofan engines accounted for 71.8 percent of these flights. The remaining 28.2 percent of the flights were made by B737 aircraft having CFM International CFM56 large inlet area turbofan engines.

During the 3 years of data collection, birds were ingested by one or both engines during 1,076 aircraft operations which yields a probability of aircraft ingestion of  $1.21 \times 10^{-4}$ . One or more birds were ingested into both engines of the aircraft during 31 of the 1,076 aircraft ingestion events. Thus, a total of 1,107 engine ingestion events were reported during the data collection period. There were 17.82 million engine operations during this period which yields a probability of engine ingestion of  $6.21 \times 10^{-5}$ . A conclusion of these data is that bird ingestion events are rare, but probable events.

When the species of the ingested bird was reliably identified, the most commonly ingested birds were from the order charadriiformes (shorebirds)-- primarily gulls, lapwings, and plovers. The majority of ingested birds (155 of 167) weighed 40 ounces or less. The bird weight distribution of ingested birds in the United States was different from the distribution in foreign countries. The mean and median weights of ingested birds in the United States were smaller than abroad; however, the mode weight of ingested birds was smaller abroad than in the United States. The mean weight of foreign ingested birds was 31.8 percent larger than the mean weight of United States ingested birds due to the high ingestion rate of large birds abroad. Four birds larger than 4 pounds were ingested abroad; whereas, only 1 bird larger than 4 pounds was ingested in the United States. The bird ingestion rate within the United States was significantly lower than the foreign bird ingestion rate.

The majority of aircraft ingestion events (972 of 1,076) involved a single bird and a single engine on the aircraft. The remaining 104 aircraft ingestion events involved multiple birds and/or multiple engines.



INGESTIONS = Engine Ingestion Events  
 EVENTS = Aircraft Ingestion Events  
 ATO = Aborted Take-Off  
 ATB = Air Turnback  
 DIV = Diversion  
 IFSD = In-Flight Engine Shutdown

Figure E-1. 737 Aircraft Engine Bird Ingestion Study Data Summary  
 (3 Years of Data, 10/86 to 9/89)

Engine damage occurred in 45 percent of all engine ingestion events and there were 175 engine ingestions that resulted in engine damage classified as moderately severe or worse.

The majority (578 of 718) of aircraft ingestion events, for which the phase of flight was known, occurred within the airport environment during takeoff and landing. The probability of engine damage is greater when the bird ingestion occurs during the takeoff and climb phases of flight than when it occurs during approach and landing. Aircraft airspeed at or above 140 knots also increases the probability of engine damage.

It was determined that 3.8 percent of all engine bird ingestion events resulted in an engine failure. Five engine failures were caused by birds that weighed less than or equal to 1 pound. Engine failures are also more likely to occur when multiple birds are ingested into an engine.

The following summary shows the most pertinent statistics extracted from the 3 years of data for the B737 aircraft:

Median Bird Weight* (oz)	Worldwide	10.0
Mode Bird Weight** (oz)	Worldwide	14.0

#### Probability of Ingestion Per Aircraft Operation

Worldwide	$1.21 \times 10^{-4}$
United States	$0.59 \times 10^{-4}$
Foreign	$1.94 \times 10^{-4}$

#### Most Commonly Ingested Bird

United States	Dove/Gull
Foreign	Gull/Lapwing/Vulture

\*Divides weight into two groups with half the weights below the median and half above.

\*\*The weight that has the highest frequency.

Engines Experiencing Moderate/Severe Damage	175
Multiple Bird, Engine Ingestion Events	89
Dual Engine Aircraft Ingestion Events	31
Dual Engine, Multiple Bird Aircraft Ingestion Events	11
Single Engine, Multiple Bird Aircraft Ingestion Events	73
Aircraft Ingestion Events By Phase-of-Flight	
Takeoff and Climb Phase-of-Flight	63.8%
Approach and Landing	33.4%
Airports Reporting Bird Ingestions	323
Ratio of Reported Events to Aircraft Operations	
United States	$0.59 \times 10^{-4}$
Foreign	$1.94 \times 10^{-4}$

## SECTION 1

### INTRODUCTION

#### 1.1 BACKGROUND.

Contention for airspace between birds and airplanes has created a serious bird/aircraft strike hazard. Past studies [1,2,3] have indicated that birdstrikes to engines are statistically rare events. The probability of a birdstrike during any given flight is extremely low; however, when the number of flights is considered, the number of birdstrikes becomes significant.

The windshield and the engines are particularly vulnerable to the birdstrike threat. Although penetration of the windshield by a bird is primarily a concern for military airplanes operating at high speeds in a low-altitude environment, such a penetration has occurred on a civilian airplane resulting in the death of the co-pilot. Ingestion of birds into turbine engines is a safety problem for commercial as well as military airplanes for it can cause significant damage to the engine resulting in degraded engine performance and very possibly failure.

In their studies of bird ingestions on commercial flights, both Hovey [1,2] and Frings [3] indicated that nearly all bird ingestion events have occurred in the vicinity of airports during the non-cruise phases of flight. This is understandable because these phases of flight naturally occur closer to the ground where bird concentrations are higher, resulting in a higher probability of birdstrike.

The solutions to the problem of engine damage resulting from bird ingestion are similar to those for windshield birdstrike, e.g., structural design consideration to withstand impact or bird avoidance. Bird avoidance can be facilitated by either of two approaches: (1) keeping airplanes out of airspaces with large bird concentrations, and (2) removing birds from these regions of airspace. The bird avoidance approach can have various degrees of success or failure for commercial air fleets because flight schedules place airplanes in specific areas at specific times and the effectiveness of airport bird control programs (if any) varies from airport to airport and country to country.

Structural design of engines to withstand bird ingestions can be accomplished provided that requirements with respect to bird weights and numbers can be identified. Bird ingestion data for medium/large inlet area turbofan engines and small inlet area turbine engines [4,5] are currently being collected by several engine manufacturers. Statistical evaluation of bird ingestion data from these data collection efforts and previous bird ingestion studies will be useful in re-evaluating certification test criteria specified in Federal Aviation Administration (FAA) regulation 14 CFR 33.77. As a result, future turbine engines can be designed to withstand more realistic bird threats.

## 1.2 OBJECTIVE.

The objective of this report is to determine the relationship of bird weight, number of birds ingested, geographic location, season, time of day, phase of flight, and engine type to the frequency of bird ingestion events and the extent of engine damage, if any, resulting from the ingested birds. The statistical analysis of reported bird ingestions experienced by commercial B737 airplanes worldwide over a 3-year reporting period is used to summarize the service threat and level of engine damage experienced by these airplanes. The findings of the analysis will be helpful in defining minimum engine design requirements for resistance to damage as a result of bird ingestions. Moreover, this study will provide a comparison between the experiences of a contemporary high bypass ratio turbofan engine (CFM56) and an older low bypass ratio turbofan engine with a smaller inlet (JT8D) exposed to similar aircraft-bird ingestion environments.

## 1.3 ORGANIZATION OF REPORT.

Section 2 defines, discusses, and differentiates airport operations and aircraft operations. Section 3 identifies the characteristics of bird species that have been ingested and reliably identified. Section 4 describes bird ingestion rates by location, engine type, and phase of flight. Section 5 provides a geographic placement of bird ingestion events throughout the world. Section 6 summarizes engine damage resulting from bird ingestions. Section 7 examines the probabilities of various bird ingestion events. Section 8 discusses the quality of the data collected in this study by examining the sources of the data and evaluating the consistency of the data from the first year to the third year. Section 9 provides a summary of the results obtained from this data analysis. Section 10 provides literature references. Section 11 is a glossary of terms.

## SECTION 2

### AIRCRAFT OPERATIONS AND AIRPORT OPERATIONS

Aircraft operations and airport operations data are used to determine bird ingestion rates. Operations data (and their sources) used to generate bird ingestion rates are discussed in this section. Definitions are provided to aid in understanding this data.

An aircraft operation as defined in the glossary is a nonstop flight from one airport (departure airport) to another airport (arrival airport) and consists of 7 phases of flight which include: (1) taxi-out, (2) takeoff, (3) climb, (4) cruise, (5) approach, (6) landing, and (7) taxi-in. An airport operation is considered either a departure from or an arrival at an airport. When all scheduled flights are considered, the number of airport operations is twice the number of aircraft operations.

The Official Airline Guide (OAG) is the data source for scheduled airport operations. Counts of airport operations involving B737 airplanes were extracted from OAG magnetic tapes and maintained by airport code. The counts were further categorized by month of year and hour of day so that seasonal and time of day analyses could be performed.

Table 2.1 presents the OAG airport operations counts by seasonal months for the 3-year period. The counts are also broken down by several geographic regions. Table 2.2 presents the same airport operations counts as Table 2.1; however, an adjustment for hemisphere has been made. It should be noted that the number of aircraft operations for each of these categories is one-half the number of airport operations. Frings [3] defines autumn in the Northern Hemisphere and spring in the Southern Hemisphere as the months September, October, and November. The collection period for each year of B737 data was October through the following September. Consistency with Frings is maintained in Table 2.1 and Table 2.2 by grouping operations counts for October and November with the operations counts of the following September.

Table 2.3 presents two cross tabulations of airport operations by month and OAG destination-arrival code. The first tabulation includes all airports at which one or more B737 operations were scheduled during the reporting period. The second tabulation is a subset of the first and includes only those airports at which a bird ingestion event was reported during the 3-year period. The destination-arrival code is taken directly from the OAG tapes and its values are presented as a footnote in Table 2.3.

A tabulation of aircraft operations by engine type and geographic region is required to obtain bird ingestion rates for these parameters. Table 2.4 presents a tabulation of B737 aircraft operations by engine type and geographic region for the reporting period. The OAG operations data identify implicitly the geographic region through the airport code and also identify explicitly whether the airplane is a B737; however, the engine type of the airplane is not reliably identified in the OAG data. The aircraft operations presented in the ALL ENGINES column of Table 2.4 are derived by dividing the airport operations in the TOTAL column of Table 2.1 by 2. The aircraft operations for the CFM56 engine were provided by the engine manufacturer as



TABLE 2.1 SCHEDULED OAG AIRPORT OPERATIONS BY SEASONAL MONTH  
(OCTOBER 1986 THROUGH SEPTEMBER 1989)

Geographic Location	SEASONAL MONTHS					Total
	Mar-May	Jun-Aug	Sep-Nov	Dec-Feb		
<b>Contiguous US</b>						
Oct'86 - Sep'87	728,180	762,922	685,560	681,306		2,857,968
Oct'87 - Sep'88	758,076	775,265	758,049	756,956		3,048,346
Oct'88 - Sep'89	815,708	838,195	791,297	777,947		3,223,147
Three Year Total	2,301,964	2,376,382	2,234,906	2,216,209		9,129,461
<b>United States</b>						
Oct'86 - Sep'87	771,231	807,492	726,309	722,461		3,027,493
Oct'87 - Sep'88	801,058	819,890	800,388	798,613		3,219,949
Oct'88 - Sep'89	862,495	889,311	836,328	822,768		3,410,902
Three Year Total	2,434,784	2,516,693	2,363,025	2,343,842		9,658,344
<b>Foreign</b>						
Oct'86 - Sep'87	619,425	647,640	604,935	591,679		2,463,679
Oct'87 - Sep'88	688,874	722,608	668,398	650,891		2,730,771
Oct'88 - Sep'89	747,501	778,335	730,340	712,736		2,968,912
Three Year Total	2,055,800	2,148,583	2,003,673	1,955,306		8,163,362
<b>Northern Hemisphere</b>						
Oct'86 - Sep'87	1,235,767	1,296,951	1,181,268	1,166,794		4,880,780
Oct'87 - Sep'88	1,314,164	1,357,068	1,295,982	1,277,954		5,245,168
Oct'88 - Sep'89	1,413,677	1,456,381	1,370,619	1,344,256		5,584,933
Three Year Total	3,963,608	4,110,400	3,847,869	3,789,004		15,710,881
<b>Southern Hemisphere</b>						
Oct'86 - Sep'87	154,889	158,181	149,976	147,346		610,392
Oct'87 - Sep'88	175,768	185,430	172,804	171,550		705,552
Oct'88 - Sep'89	196,319	211,265	196,049	191,248		794,881
Three Year Total	526,976	554,876	518,829	510,144		2,110,825
<b>Worldwide</b>						
Oct'86 - Sep'87	1,390,656	1,455,132	1,331,244	1,314,140		5,491,172
Oct'87 - Sep'88	1,489,932	1,542,498	1,468,786	1,449,504		5,950,720
Oct'88 - Sep'89	1,609,996	1,667,646	1,566,668	1,535,504		6,379,814
Three Year Total	4,490,584	4,665,276	4,366,698	4,299,148		17,821,706

TABLE 2.2 SCHEDULED OAG AIRPORT OPERATIONS BY SEASON  
(OCTOBER 1986 THROUGH SEPTEMBER 1989)

<u>Geographic Location</u>	SEASONS OF THE YEAR -----				<u>Total</u>
	<u>Spring</u>	<u>Summer</u>	<u>Autumn</u>	<u>Winter</u>	
<b>Contiguous US</b>					
Oct'86 - Sep'87	728,180	762,922	685,560	681,306	2,857,968
Oct'87 - Sep'88	758,076	775,265	758,049	756,956	3,048,346
Oct'88 - Sep'89	<u>815,708</u>	<u>838,195</u>	<u>791,297</u>	<u>777,947</u>	<u>3,223,147</u>
Three Year Total	2,301,964	2,376,382	2,234,906	2,216,209	9,129,461
<b>United States</b>					
Oct'86 - Sep'87	771,231	807,492	726,309	722,461	3,027,493
Oct'87 - Sep'88	801,058	819,890	800,388	798,613	3,219,949
Oct'88 - Sep'89	<u>862,495</u>	<u>889,311</u>	<u>836,328</u>	<u>822,768</u>	<u>3,410,902</u>
Three Year Total	2,434,784	2,516,693	2,363,025	2,343,842	9,658,344
<b>Foreign</b>					
Oct'86 - Sep'87	614,512	636,805	609,848	602,514	2,463,679
Oct'87 - Sep'88	685,910	708,728	671,362	664,771	2,730,771
Oct'88 - Sep'89	<u>747,231</u>	<u>758,318</u>	<u>730,610</u>	<u>732,753</u>	<u>2,968,912</u>
Three Year Total	2,047,653	2,103,851	2,011,820	2,000,038	8,163,362
<b>Northern Hemisphere</b>					
Oct'86 - Sep'87	1,235,767	1,296,951	1,181,268	1,166,794	4,880,780
Oct'87 - Sep'88	1,314,164	1,357,068	1,295,982	1,277,954	5,245,168
Oct'88 - Sep'89	<u>1,413,677</u>	<u>1,456,381</u>	<u>1,370,619</u>	<u>1,344,256</u>	<u>5,584,933</u>
Three Year Total	3,963,608	4,110,400	3,847,869	3,789,004	15,710,881
<b>Southern Hemisphere</b>					
Oct'86 - Sep'88	149,976	147,346	154,889	158,181	610,392
Oct'87 - Sep'88	172,804	171,550	175,768	185,430	705,552
Oct'88 - Sep'89	<u>196,049</u>	<u>191,248</u>	<u>196,319</u>	<u>211,265</u>	<u>794,881</u>
Three Year Total	518,829	510,144	526,976	554,876	2,110,825
<b>Worldwide</b>					
Oct'86 - Sep'87	1,385,743	1,444,297	1,336,157	1,324,975	5,491,172
Oct'87 - Sep'88	1,486,968	1,528,618	1,471,750	1,463,384	5,950,720
Oct'88 - Sep'89	<u>1,609,726</u>	<u>1,647,629</u>	<u>1,566,938</u>	<u>1,555,521</u>	<u>6,379,814</u>
Three Year Total	4,482,437	4,620,544	4,374,845	4,343,880	17,821,706

TABLE 2.3 OAG AIRPORT OPERATIONS BY MONTH  
(OCTOBER 1986 THROUGH SEPTEMBER 1989)

ALL AIRPORTS WITH SCHEDULED B737 OPERATIONS

MONTH	OAG DESTINATION-ARRIVAL CODES**					(Total)
	(0)	(1)	(2)	(3)	(4)	
OCT	641,872	776,446	11,516	212	8,986	1,439,032
NOV	630,484	750,104	11,174	146	9,064	1,400,972
DEC	653,862	766,540	12,090	108	10,228	1,462,828
JAN	661,904	791,504	12,556	174	9,682	1,475,820
FEB	607,282	733,084	11,566	174	8,394	1,360,500
MAR	669,266	805,420	12,456	180	8,934	1,496,256
APR	661,436	783,124	11,738	212	8,130	1,464,640
MAY	693,966	814,452	12,124	264	8,882	1,467,688
JUN	685,538	803,792	13,042	182	9,100	1,511,654
JUL	708,036	831,962	13,700	290	10,008	1,563,996
AUG	720,400	845,508	13,336	350	10,032	1,589,626
SEP	700,354	804,790	12,440	364	8,746	1,483,634
TOTAL	8,034,400	9,526,726	147,738	2,656	110,186	17,821,706

AIRPORTS EXPERIENCING BIRD INGESTIONS DURING REPORTING PERIOD

MONTH	OAG DESTINATION-ARRIVAL CODES**					(Total)
	(0)	(1)	(2)	(3)	(4)	
OCT	379,101	583,063	8,114	212	5,729	976,219
NOV	375,091	565,046	7,694	146	5,691	953,668
DEC	388,795	592,400	8,241	108	6,348	995,892
JAN	393,810	596,904	8,554	174	6,079	1,005,521
FEB	362,694	554,557	7,880	174	5,315	930,620
MAR	399,580	609,354	8,394	180	5,790	1,023,298
APR	395,009	592,728	7,998	212	5,359	1,001,306
MAY	417,352	619,000	8,422	264	5,860	1,050,898
JUN	414,714	610,088	9,002	182	5,997	1,039,983
JUL	426,309	629,996	9,227	290	6,550	1,072,372
AUG	432,244	640,835	8,968	350	6,528	1,088,925
SEP	421,085	608,490	8,491	364	5,842	1,044,272
TOTAL	4,805,784	7,202,461	100,985	2,656	71,088	12,182,974

- \*\* -0 Any Carrier. Operation begins and ends out of the US.
- 1 Domestic Carrier. Operation begins and ends in the US.
- 2 Domestic Carrier. Departure or arrival, but not both, in the US.
- 3 Foreign Carrier. Operation begins and ends in the US.
- 4 Foreign Carrier. Departure or arrival, but not both, in the US.

TABLE 2.4 SCHEDULED AIRCRAFT OPERATIONS BY ENGINE TYPE

<u>GEOGRAPHIC LOCATION</u>	<u>JT8D</u>	<u>CFM56</u>	<u>ALL ENGINES</u>
<b>United States</b>			
Oct'86 - Sep'87	1,160,091	353,656	1,513,747
Oct'87 - Sep'88	1,082,543	527,431	1,609,974
Oct'88 - Sep'89	1,007,797	697,654	1,705,451
	-----	-----	-----
Three Year Total	3,250,431	1,578,741	4,829,172
<b>Foreign</b>			
Oct'86 - Sep'87	1,057,633	174,206	1,231,839
Oct'87 - Sep'88	1,062,971	302,415	1,365,386
Oct'88 - Sep'89	1,025,228	459,228	1,484,456
	-----	-----	-----
Three Year Total	3,145,832	935,849	4,081,681
<b>Worldwide</b>			
Oct'86 - Sep'87	2,217,724	527,862	2,745,586
Oct'87 - Sep'88	2,145,514	829,846	2,975,360
Oct'88 - Sep'89	2,033,025	1,156,882	3,189,907
	-----	-----	-----
Three Year Total	6,396,263	2,514,590	8,910,853

actual flights flown during the reporting period and are considered reliable. Similar data were not available for the JT8D engine. The JT8D aircraft operations were therefore derived by subtracting the CFM56 aircraft operations from the total aircraft operations for both engines.

The engine manufacturers provided the FAA with a listing of monthly operations counts for their respective engine types; however, the counts did not agree with the OAG counts. Monthly percentages for each engine type were calculated from the engine manufacturer's data and subsequently applied to the JT8D and CFM56 engine totals in Table 2.4 to estimate monthly aircraft operations for the reporting period. Figure 2.1 is a histogram showing the estimated aircraft operations for each engine type.

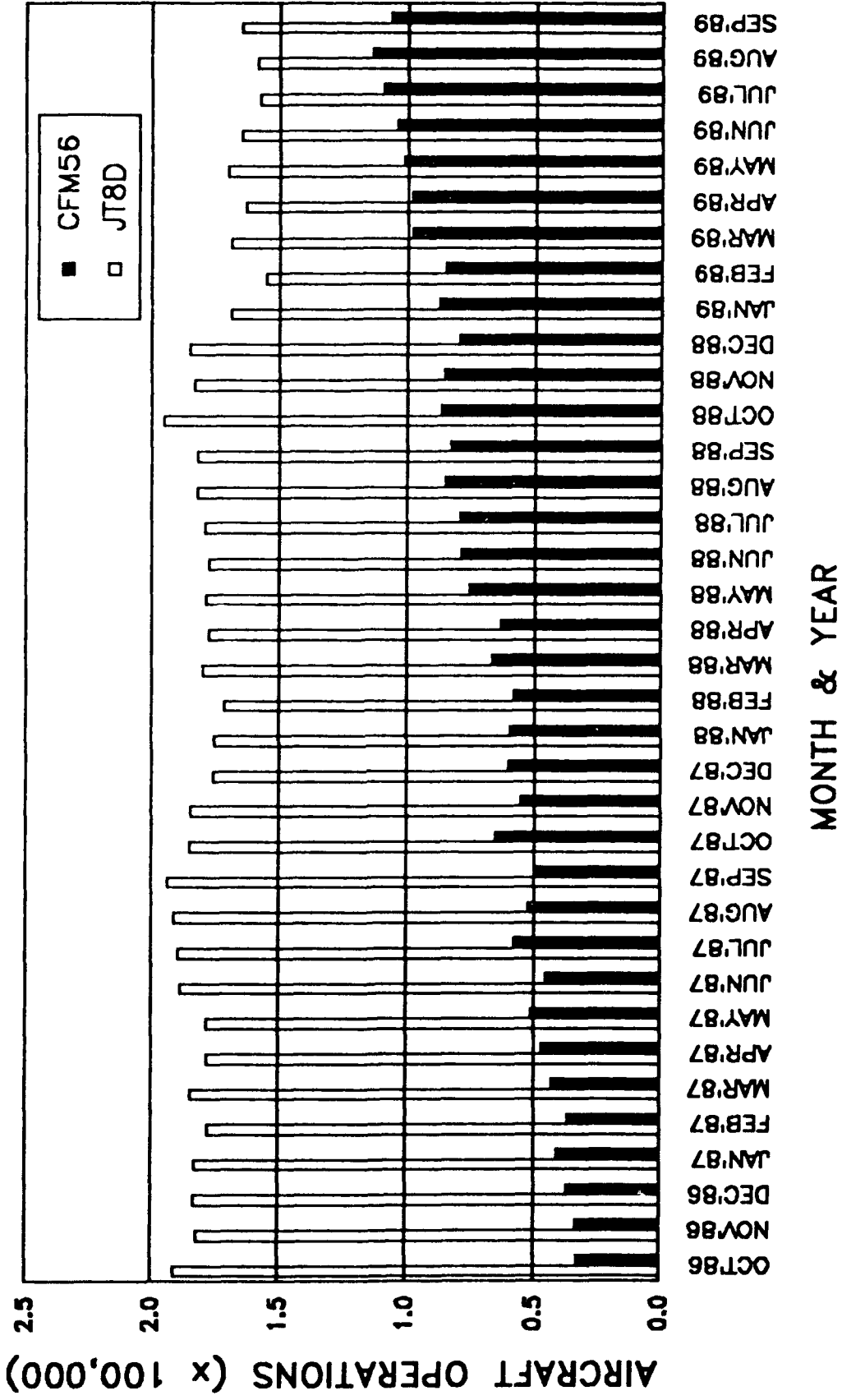


Figure 2.1. Histogram of Monthly Aircraft Operations by Engine Type.

## SECTION 3

### CHARACTERISTICS OF INGESTED BIRDS

This section provides a description of the birds that were ingested during the data collection period and an analysis of the extent of the bird ingestion threat. The bird-related features that are described in this section include species, weight, seasonal trends, time-of-day trends, and geographic location.

A detailed breakdown of aircraft ingestion events in the United States is presented in Figures 3.1 and 3.2. Figure 3.1 is a contour map of the contiguous United States with the height of the contours being proportional to the number of aircraft ingestion events in each state while Figure 3.2 is a bar chart with the same information plus Alaska and Hawaii. Texas and California have the greatest number of ingestions followed by Hawaii, New York, and Florida.

Table 3.1 provides a tally of all the species that were positively identified by an ornithologist during the collection period. The counts in the US, Foreign, and Overall columns of Table 3.1 indicate the number of aircraft ingestion events in which each bird species was ingested. The species are listed by order and family and it is apparent that the gulls, doves and lapwing/plover families of the order charadriiformes (shorebirds) are the most commonly ingested birds worldwide. The order columbiformes (doves/pigeons) appear to be a bird ingestion problem for the United States while the order falconiformes (hawks/vultures) pose a significant threat abroad.

One of the disappointing features of the B737 bird ingestion data base is the low bird identification rate. The bird species was positively identified in only 157 out of 1,076 aircraft ingestion events that were recorded giving a 14.6 percent identification rate. The identification rate for engine ingestion events in which an engine sustained damage (20.2 percent) was almost two times greater than the identification rate for events which caused no engine damage (11 percent); which could indicate that the group of identified birds is biased to include more birds in the size and weight ranges that tend to damage engines when ingested. Any conclusions about the population of ingested birds should be viewed with the caution that the sample might be more representative of the population of birds that damage engines than of all birds that are ingested.

The species-related descriptions of ingested birds in this report probably provide a conservative view in that the birds that caused damage are better represented in the sample than birds that did not cause damage. The bird features that influence damage cannot be discerned, however, because of the possible bias in the identifications. That is, the differences between the birds that cause damage and the birds that don't cause damage cannot be readily identified since there is less information about the birds that didn't cause damage.

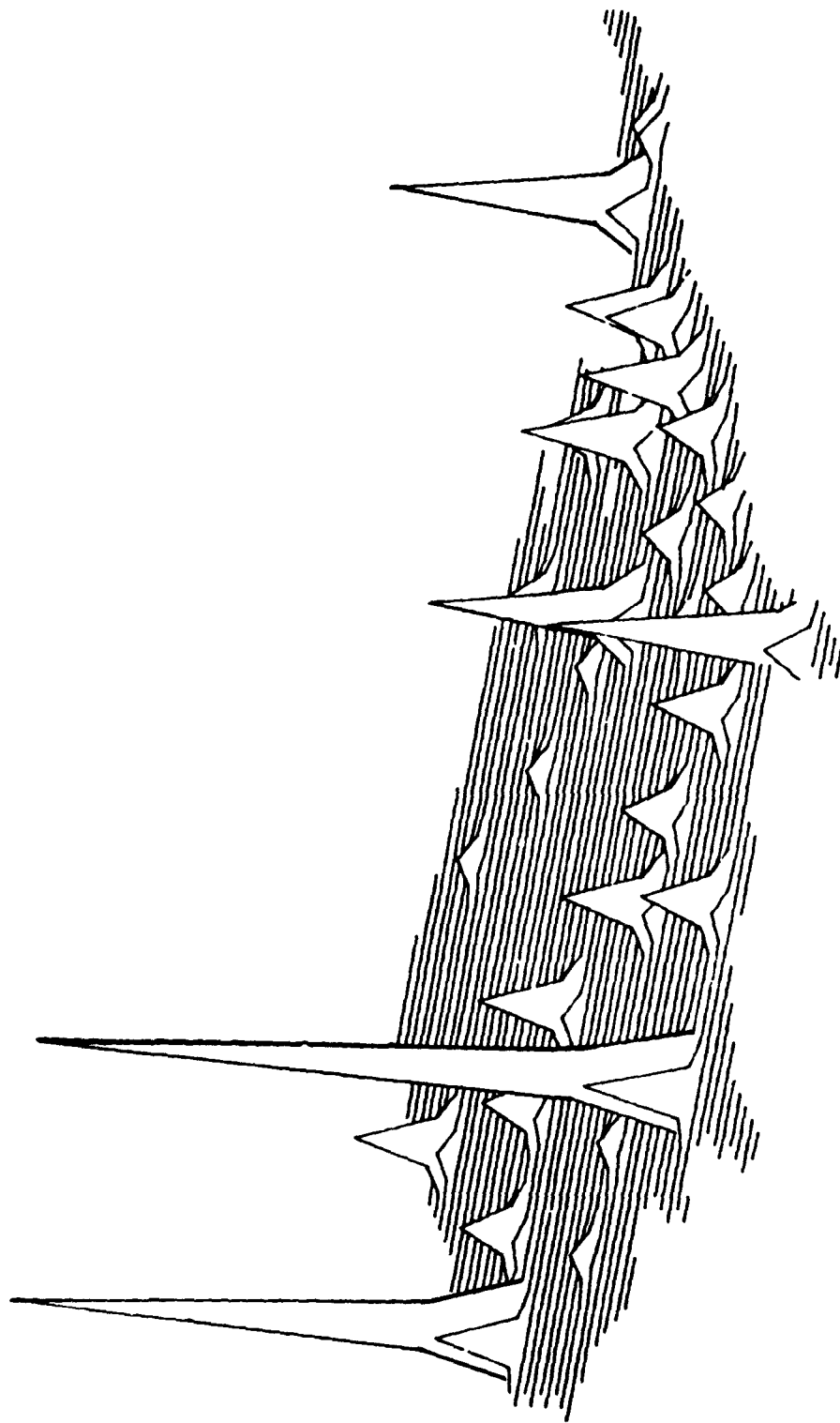


Figure 3.1 Contour Map of Domestic Aircraft Ingestion Events



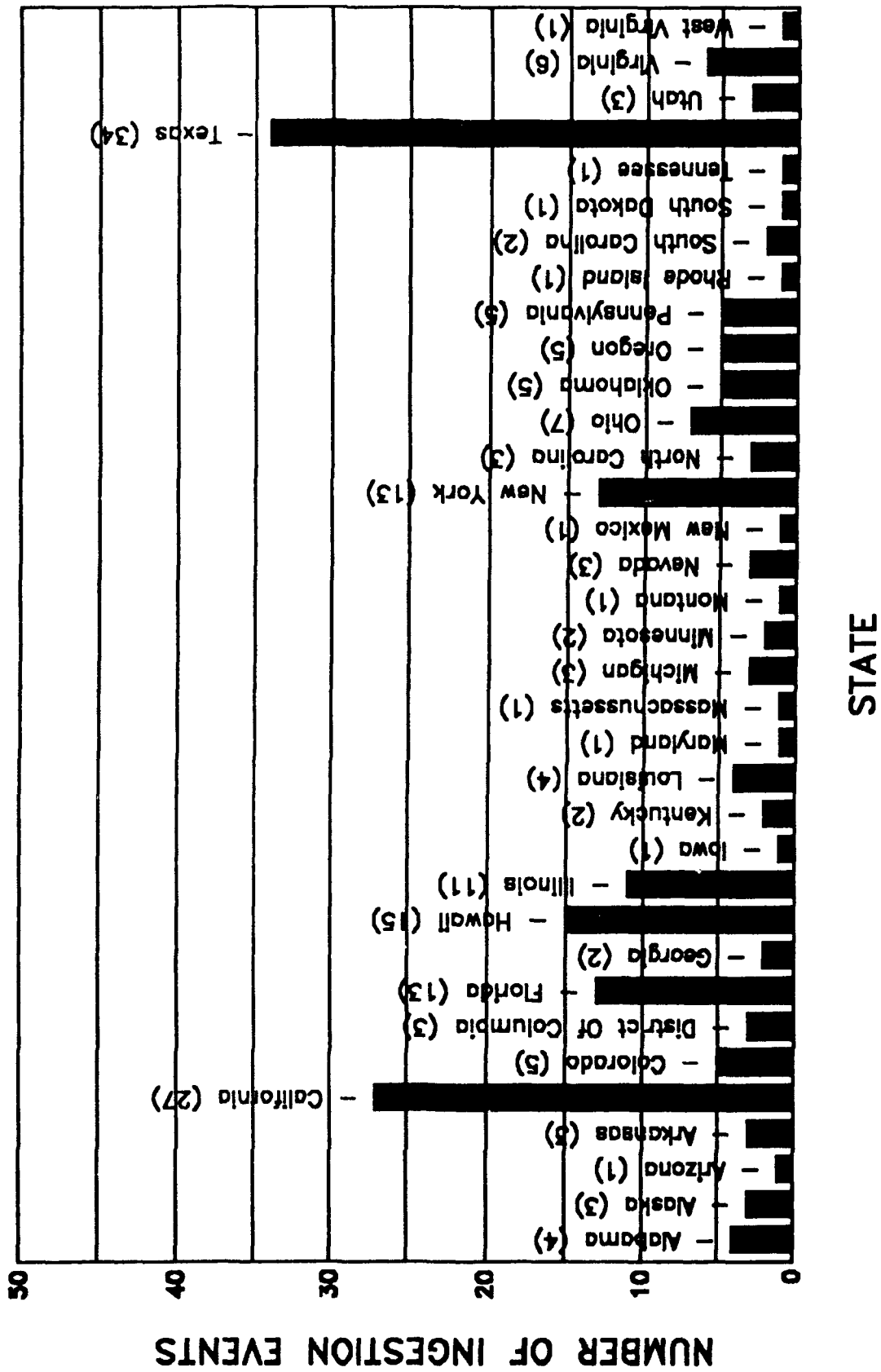


Figure 3.2 Histogram of Bird Ingestion Events by State.

TABLE 3.1  
TALLY OF POSITIVELY IDENTIFIED BIRD SPECIES  
BROKEN DOWN BY US, FOREIGN, AND OVERALL  
(AIRCRAFT INGESTION EVENTS)

Latin Name	Common Name	Species Code	US	Foreign	Overall
Nycticorax nycticorax	Black-crowned night heron	1I24	1	0	1
Bubulcus ibis	Cattle egret	1I35	1	0	1
Egretta alba	Great egret	1I52	2	0	2
Hagedashia hagedash	Hadada ibis	6I12	0	3	3
Chen caerulescens	Snow goose	2J26	0	2	2
Branta canadensis	Canada goose	2J30	1	0	1
Anas americana	American wigeon	2J71	1	0	1
Anas platyrhynchos	Mallard	2J84	1	0	1
Pandion haliaetus	Osprey	2K1	1	0	1
Milvus migrans	Black kite	3K28	0	7	7
Gyps bengalensis	Indian white-backed vulture	3K46	0	1	1
Aegypius monachus	Eurasian black vulture	3K55	0	1	1
Circus cyaneus	Northern marsh harrier	3K78	0	1	1
Accipiter striatus	Sharp-shinned hawk	3K105	1	0	1
Geraonaetus melanoleucus	Gray eagle-buzzard	3K161	0	1	1
Buteo swainsonii	Swainson's hawk	3K171	1	1	2
Buteo buteo	Common buzzard	3K180	1	1	2
Falco sparverius	American kestrel	5K26	0	1	1
Falco tinnunculus	Eurasian kestrel	5K27	2	0	2
Falco berigora	Brown falcon	5K39	0	5	5
Alectoris rufa	Red-legged partridge	4L41	0	1	1
Alectoris barbara	Barbary partridge	4L42	0	1	1
Francolinus francolinus	Black francolin	4L44	0	1	1
Perdix perdix	Hungarian partridge	4L85	0	3	3
Phasianus colchicus	Ring-necked pheasant	4L161	0	0	0
Porsana carolina	Sora	7M84	1	0	1
Haematopus ostralegus	Common oystercatcher	4N1	1	0	1
Vanellus vanellus	Common lapwing	5N1	0	1	1
Vanellus spinosus	Spur-winged plover	5N4	0	5	5
Vanellus melanopterus	Black-winged plover	5N10	0	1	1
Vanellus coronatus	Crowned lapwing	5N11	0	1	1
Vanellus vanellus	Gray-headed lapwing	5N20	0	2	2
Vanellus miles	Masked plover	5N24	0	2	2
Pluvialis apricaria	Eurasian golden plover	5N25	2	1	3
Charadrius vociferus	Killdeer	5N33	2	1	3
Numenius americanus	Long-billed curlew	6N12	1	0	1
Bartramia longicauda	Upland sandpiper	6N13	1	0	1
Gallinago gallinago	Common snipe	6N47	0	0	0
Burhinus capensis	Cape dikkop	9N4	0	1	1
Stercorarius pomarinus	Pomarine jaeger	13N4	1	2	3
Larus delawarensis	Ring-billed gull	14N12	3	0	3
Larus canus	Common gull	14N13	0	2	2
Larus argentatus	Herring gull	14N14	4	6	10

TABLE 3.1 (CONCLUDED)  
TALLY OF POSITIVELY IDENTIFIED BIRD SPECIES  
BROKEN DOWN BY US, FOREIGN, AND OVERALL  
(AIRCRAFT INGESTION EVENTS)

Latin Name	Common Name	Species Code	US	Foreign	Overall
Larus marinus	Great black-backed gull	14N21	0	1	1
Larus glaucescens	Glaucous-winged gull	14N22	1	1	2
Larus cirrocephalus	Gray-headed gull	14N29	0	1	1
Larus maculipennis	Brown-headed gull	14N35	0	2	2
Larus ridibundus	Common black-headed gull	14N36	1	9	10
Larus philadelphia	Bonaparte's gull	14N38	0	1	1
Columba livia	Common rock dove	2P1	8	3	11
Columba guinea	African speckled pigeon	2P4	0	1	1
Pterocles gutturalis	Common wood-pigeon	2P9	0	2	2
Streptopelia turtur	Common turtle dove	2P50	0	1	1
Streptopelia chinensis	Spotted dove	2P65	1	0	1
Geopelia striata	Zebra dove	2P102	1	0	1
Geopelia humeralis	Bar-shouldered dove	2P103	1	0	1
Zenaidura macroura	American mourning dove	2P105	1	0	1
Cacatua roseicapilla	Galah	1Q15	6	0	6
Ruwenzoriornis johnstoni	Ruwenzori tuiaco	2R15	0	1	1
Coccyzus americanus	Yellow-billed cuckoo	2R51	0	2	2
Tyto alba	Common barn owl	1S2	1	0	1
Speotyto cunicularia	Burrowing owl	2S102	0	1	1
Chordeiles minor	Nighthawk	5T5	1	2	3
Chaetura pelagica	Chimney swift	1U33	1	0	1
Apus apus	Common swift	1U55	0	3	3
Aeronautes saxatalis	White-throated swift	1U71	1	0	1
Eremophila alpestris	Horned lark	17Z74	4	1	5
Progne subis	Purple martin	18Z12	1	0	1
Sturnus vulgaris	Common starling	21Z75	2	0	2
Corvus corone	Carrion crow	22Z94	0	1	1
Catharus ustulatus	Swainson's thrush	41Z246	1	0	1
Turdus merula	Common blackbird	41Z269	0	1	1
Turdus philomelos	Common song thrush	41Z282	0	1	1
Icteria virens	Yellow-breasted chat	61Z69	1	0	1
Sturnella neglecta	Western meadowlark	64Z68	1	1	2
Zonotrichia albicollis	White-throated sparrow	68Z218	1	0	1
			64	93	157

TABLE 3.2 WEIGHT DISTRIBUTION OF INGESTED BIRDS\* BY ORIGIN

Weight Range (Oz)	United States			Foreign			Worldwide		
	Multiple Bird Events	Single Bird Events	Total Bird Events	Multiple Bird Events	Single Bird Events	Total Bird Events	Multiple Bird Events	Single Bird Events	Total Bird Events
( 0 < x ≤ 4)	2	27	29	1	9	10	3	36	39
( 4 < x ≤ 8)	0	7	7	8	16	24	8	23	31
( 8 < x ≤ 12)	0	1	1	5	19	24	5	20	25
( 12 < x ≤ 16)	3	11	14	2	8	10	5	19	24
( 16 < x ≤ 20)	0	1	1	1	5	6	1	6	7
( 20 < x ≤ 24)	0	2	2	1	1	2	1	3	4
( 24 < x ≤ 28)	0	2	2	0	4	4	0	6	6
( 28 < x ≤ 32)	0	0	0	0	4	4	0	4	4
( 32 < x ≤ 36)	0	2	2	1	1	2	1	3	4
( 36 < x ≤ 40)	1	5	6	3	2	5	4	7	11
( 40 < x ≤ 44)	0	1	1	0	0	0	0	1	1
( 44 < x ≤ 48)	0	0	0	0	4	4	0	4	4
( 52 < x ≤ 56)	0	2	2	0	0	0	0	2	2
( 76 < x ≤ 80)	0	0	0	0	1	1	0	1	1
( 84 < x ≤ 88)	0	0	0	0	1	1	0	1	1
(124 < x ≤ 128)	1	0	1	0	0	0	1	0	1
(188 < x ≤ 192)	0	0	0	0	1	1	0	1	1
(212 < x ≤ 216)	0	0	0	0	1	1	0	1	1
TOTAL	7	61	68	22	77	99	29	138	167

\* Counted by Engine Ingestion Events

Table 3.2 is a frequency table of weights for the positively identified birds. The bird weights are derived from the species identification and when possible are adjusted for the age and sex of the ingested bird. The modes in Table 3.2 therefore represent the weights of the more commonly identified bird species that were ingested. Figure 3.3 provides the same information in the form of a histogram. Most of the ingested birds (75.4 percent) that were identified in this study weighed less than or equal to 20 ounces; however, 8.4 percent weighed more than 20 ounces and less than or equal to 32 ounces and 16.2 percent of the identified birds weighed more than 2 pounds.

Summary statistics calculated from the raw data for the United States, foreign, and worldwide bird weight distributions are presented in Table 3.3. Note that the weight of 1 ingested bird per event is included in the bird weight distribution for multiple bird engine ingestion events. The mean, median, and mode are three different concepts for the typical or average value which measures the central tendency of the distribution. The mean bird weight is the sum of the weights for all ingestion events divided by the number of events included in the sum. The median weight divides the weights into two groups with half the weights below the median and half above. The mode of the bird weights is the weight that has the highest frequency in the data set. The median and mode are more relevant measures of the average for the bird ingestion problem. The mean weight would be important if damage were related to the cumulative weight of all birds ingested by a single engine since the mean is based on the total weight of the ingested birds.

A pattern suggestive of a sine function is seen in Figure 3.4 which is a bar chart of monthly bird ingestions for the data collection period. The cyclic pattern in aircraft ingestion events reflects seasonal bird activity. The start of a cyclic pattern is also seen in the ingestion rate data which indicates that the trends are due to the changing bird population and not changes in air traffic activity. Time trends in bird ingestions are further investigated on a seasonal basis in the following paragraphs.

The seasonal bird ingestion rates for the Northern and Southern Hemispheres, the United States and foreign countries, and the whole world are presented in the bar chart of Figure 3.5. Here the ingestion rates are not being compared by engine type so the ingestion rate R is simply calculated as:

$$R = \text{Ing} \cdot \frac{10000}{\text{Ops}} \quad (3.1)$$

where Ing is the number of ingestions and Ops is the number of aircraft operations in the time period being considered. The rate is expressed as ingestions per 10,000 aircraft operations.

Seasonal trends were investigated using a Chi-squared goodness-of-fit (GOF) analysis. The Chi-squared value for testing the hypothesis that the number of aircraft ingestion events does not vary with the seasons is 101.4. The critical value for testing at the five percent level of significance is 7.81 while the 0.5 percent level is 12.8; therefore, the high value of the test statistic is a very strong indication that ingestions do vary with the seasons.

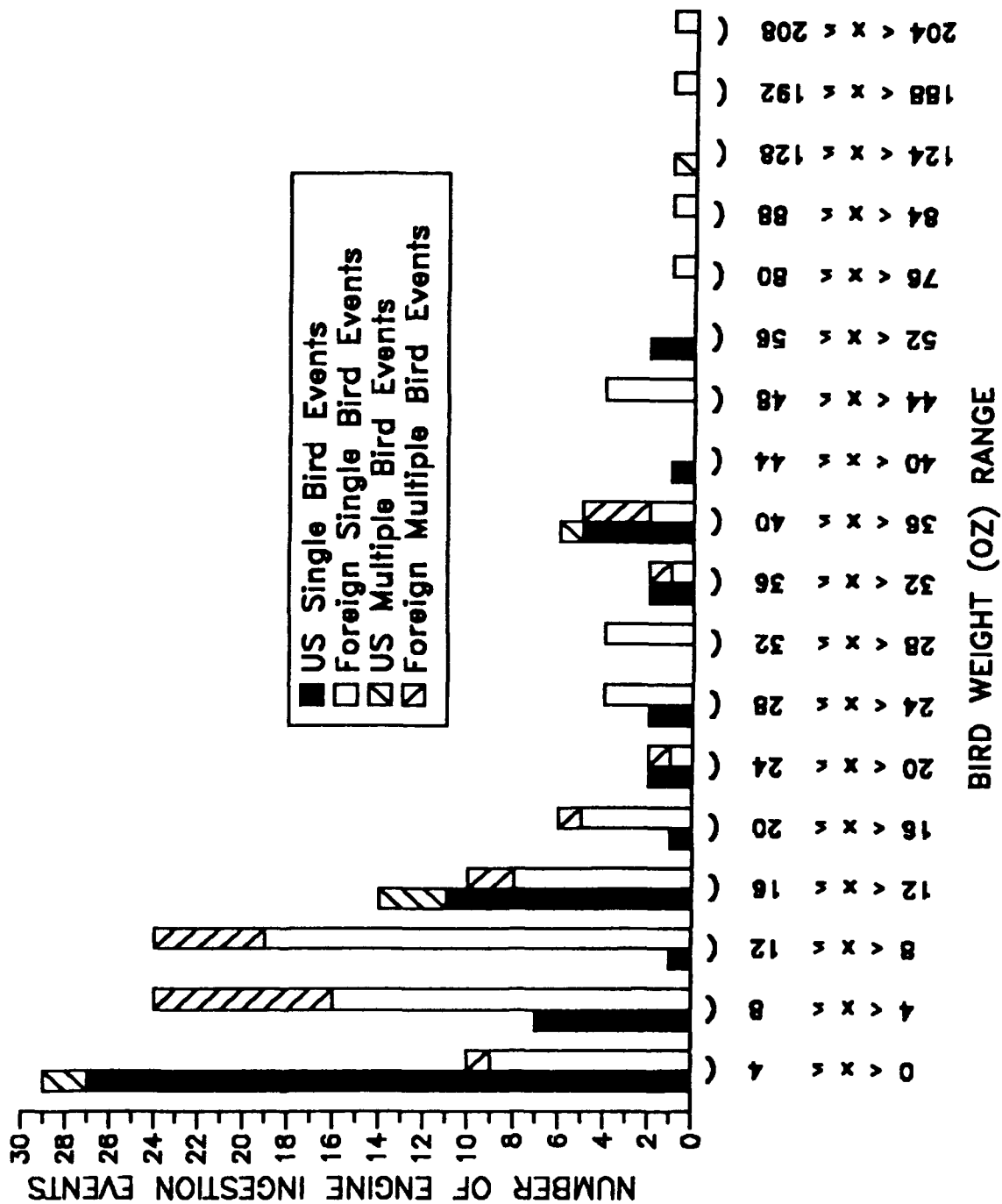


Figure 3.3. Histogram of Number of Birds Ingested by Weight Class.

TABLE 3.3 SUMMARY STATISTICS FOR INGESTED BIRD WEIGHTS

STATISTIC	United States			Foreign			Worldwide		
	Multiple Bird Events	Single Bird Events	Total Bird Events	Multiple Bird Events	Single Bird Events	Total Bird Events	Multiple Bird Events	Single Bird Events	Total Bird Events
NUMBER OF EVENTS**	7	61	68	22	77	99	29	138	167
MODE(S)	14.	4.	14.	11.5 40.	9.7	9.7	14.	4.	14.
MEDIAN	14.	6.	6.	10.1	10.	10.1	11.5	9.7	10.
MEAN (AVERAGE)	30.9	13.6	15.4	15.3	21.7	20.3	19.0	18.1	18.3
STD DEVIATION	44.58	14.87	20.10	12.29	33.52	30.19	24.19	27.15	26.59

\* Bird Weights Given in Ounces

\*\* Counted by Engine Ingestion Events

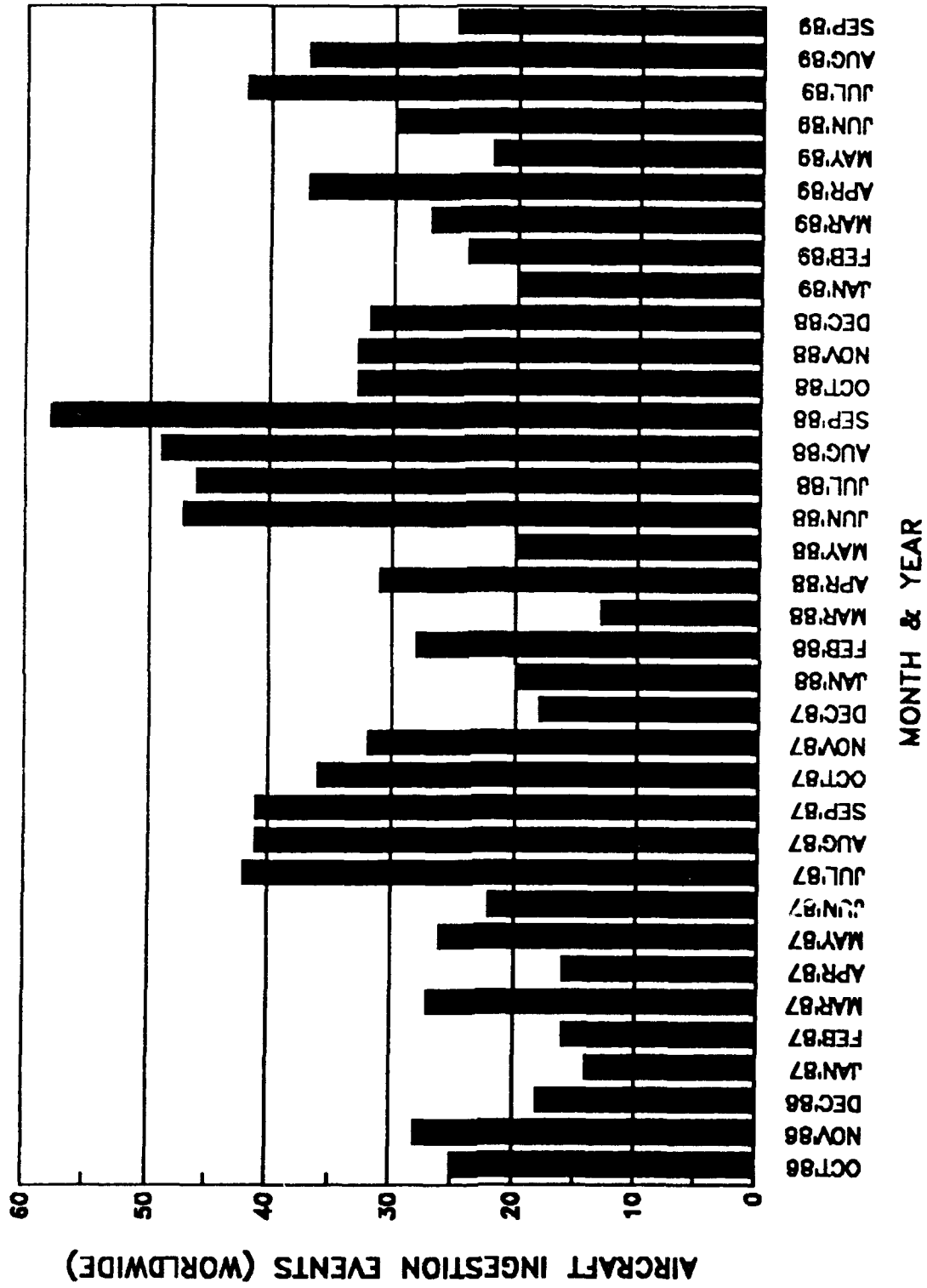


Figure 3.4 Bar Chart of Worldwide Aircraft Ingestion Events.



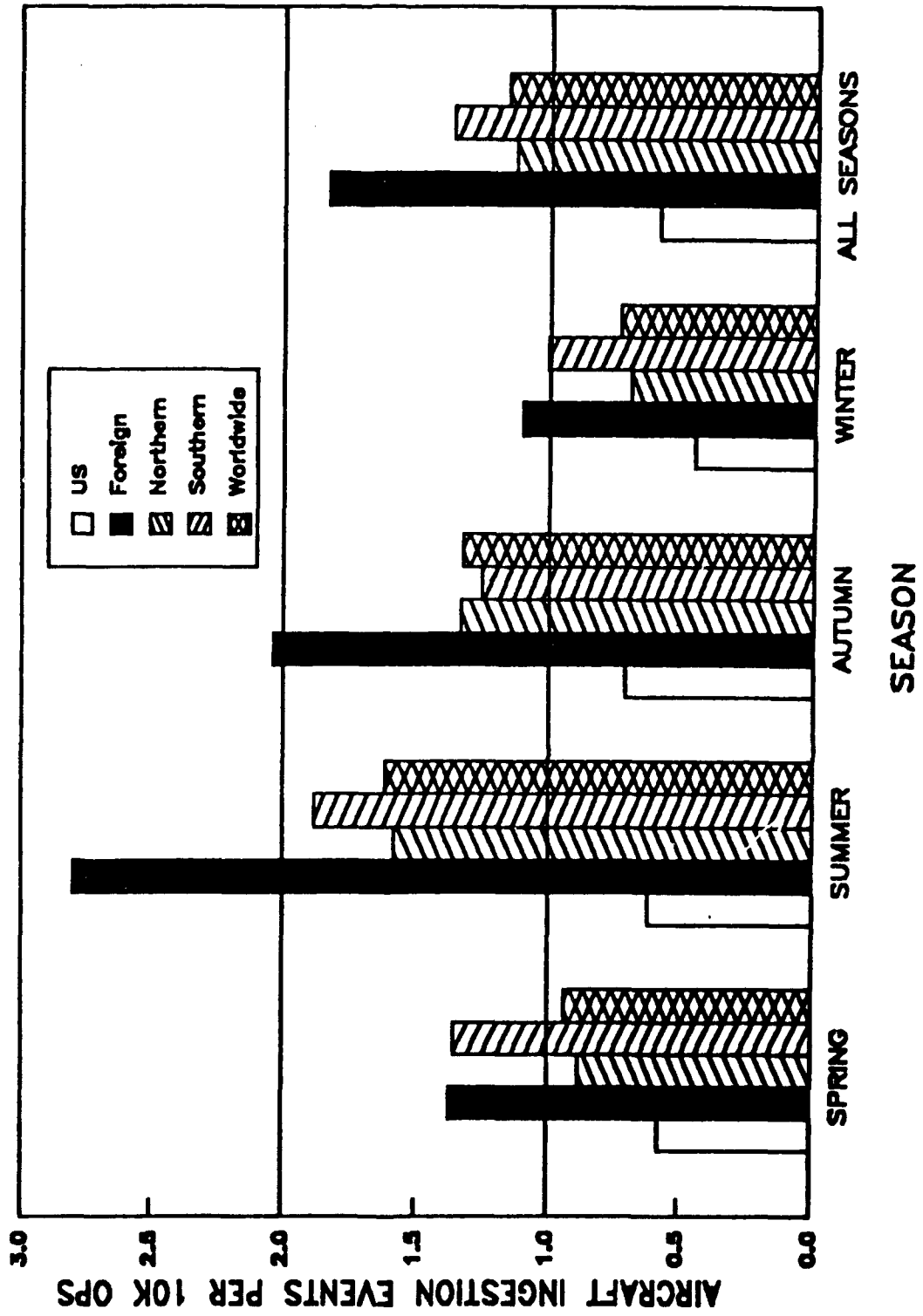


Figure 3.5 Seasonal Aircraft Ingestion Rates.

The winter data were eliminated in an effort to better identify the nature of the differences between the seasons. Testing for the equality of the ingestions for spring, summer and autumn also yields a significant difference with a test statistic of 45.72 and a five percent critical value of 5.99 which is also a very strong indication that ingestions vary between spring, summer, and autumn. Further testing between summer and autumn produces a test statistic of 10.66 which is also much larger than the 5 percent critical value of 3.84 for comparing 2 groups. Ingestion rates are highest in the summer, slightly lower in the fall, followed by spring, with lowest incidence of ingestions in the winter.

The time of day distribution of bird ingestion events is illustrated in Figure 3.6 with time of day reduced to the four basic segments of morning, mid-day, evening and night. There is a noticeable drop in the number of ingestions at night and the Chi-squared test for equality of the four time periods indicates that they are not the same. The Chi-squared test statistic is 48.22 while the 99th percentile of the Chi-squared with three degrees of freedom distribution is 11.34.

There are two likely reasons for a drop in ingestions during the night. Birds are not generally nocturnal so that bird activity is reduced at night. Also, there are fewer flights scheduled at night. A lessened exposure due to fewer flights and fewer birds results in a reduction in the number of ingestions at night.

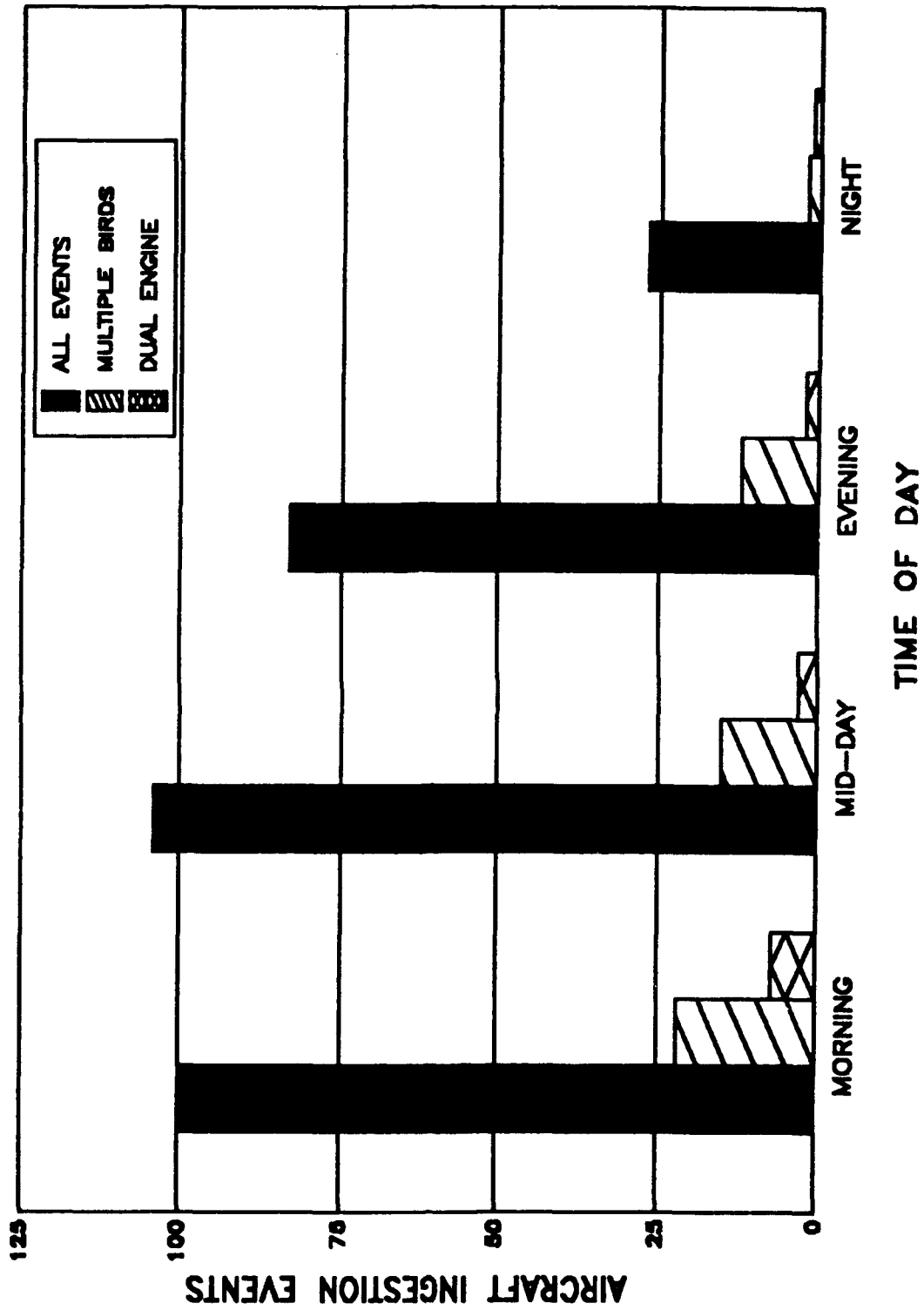


Figure 3.6 Histogram of Aircraft Ingestion Events by Time of Day.

## SECTION 4

### INGESTION RATES

This section describes the rates at which bird ingestions occurred during the 3-year collection period covered in this report. The Poisson distribution is commonly used to describe how events are randomly scattered in time, and the bird ingestion data are shown to agree with the assumptions of a Poisson process. The first part of this section provides the estimates of the basic ingestion rates. The second part describes the Poisson distribution and how it relates to the bird ingestion events. The final parts discuss statistical analyses based on the assumption that bird ingestions follow a Poisson process.

#### 4.1 INGESTION RATE ESTIMATES.

This sub-section provides a general description of ingestion rates broken down by location, engine, and phase of flight. The rates are given in terms of ingestions per 10,000 aircraft operations and have been adjusted to the inlet area of the engine to allow size independent comparisons between engines. The inlet area used throughout this report is called the "fat lip area" and was specified by the Boeing Company for each type of engine installation. A more detailed statistical analysis of ingestion rates is covered in the next section using statistical techniques for Poisson processes.

Table 4.1A lists the United States, foreign, and worldwide ingestion rates for both the JT8D and the CFM56 engines as well as a composite rate for all 737 aircraft. The inlet area adjustment was done using a 10-square-foot unit area on the basis of the total inlet area of both engines to keep the rates in a reasonable range. The composite rates in each geographical region are weighted means of the inlet area adjusted rates for the individual engines and are determined as follows: the number of ingestions per 10 square feet inlet area for each engine is projected by multiplying the rates by the number of aircraft operations. The composite rates are calculated by dividing the total projected ingestions for both engines by the total aircraft operations for the geographical region. Table 4.1B lists engine ingestion rates based on engine operations and normalized for the engine inlet area. The numbers in parentheses in Tables 4.1A and 4.1B reflect the number of ingestions where geographic location and/or engine type was not known.

The ingestion rates for the CFM56 engine were calculated using reported aircraft operations for specific geographical regions. The ingestion rates for the JT8D engine were calculated using estimated aircraft operations for specific geographical regions. The details of the calculation were presented in Section 3, equation 3.1.

Figure 4.1 shows monthly ingestion rates subdivided by engine type and adjusted for inlet area so that a comparison between engine types can be made. The adjusted monthly ingestion rate ( $R_{adj}$ ) for an engine type is expressed as ingestions per 10 ft<sup>2</sup> per 10,000 aircraft operations is calculated as:

$$R_{adj} = \text{Ing} \cdot \frac{1440}{2IA} \cdot \frac{10000}{\text{Ops}} \quad (4.1)$$

**TABLE 4.1A**  
**BREAKDOWN OF BIRD INGESTION RATES BY ENGINE AND LOCATION**  
**(BASED ON AIRCRAFT OPERATIONS)**

ENGINE TYPE:	JT8D	CFM56	ALL ENGINES
INLET AREA: *	2234 in <sup>2</sup>	4606 in <sup>2</sup>	N/A
<b><u>UNITED STATES</u></b>			
Aircraft Ingestion Events	132	147	284 (5)
OAG Aircraft Operations	3,250,431	1,578,741	4,829,172
Ingestion Rate (Ing/10K Ops)	0.41	0.93	0.59
Normalized Ingestion Rate (Ing/10K Ops/10ft <sup>2</sup> )	0.26	0.29	0.27
<b><u>FOREIGN</u></b>			
Aircraft Ingestion Events	572	218	790
OAG Aircraft Operations	3,145,832	935,849	4,081,681
Ingestion Rate (Ing/10K Ops)	1.82	2.33	1.94
Normalized Ingestion Rate (Ing/10K Ops/10ft <sup>2</sup> )	1.17	0.73	1.07
<b><u>WORLDWIDE</u></b>			
Aircraft Ingestion Events	705 (1)	366 (1)	1,076 (7)
OAG Aircraft Operations	6,396,263	2,514,590	8,910,853
Ingestion Rate (Ing/10K Ops)	1.10	1.46	1.21
Normalized Ingestion Rate (Ing/10K Ops/10ft <sup>2</sup> )	0.71	0.46	0.64

\*Total Area for 2 Engines

**TABLE 4.1B**  
**BREAKDOWN OF BIRD INGESTION RATES BY ENGINE AND LOCATION**  
**(BASED ON ENGINE OPERATIONS)**

ENGINE TYPE:	JT8D	CFM56	ALL ENGINES
INLET AREA:	1117 in <sup>2</sup>	2303 in <sup>2</sup>	N/A
<b><u>UNITED STATES</u></b>			
Engine Ingestion Events	137	153	295 (5)
OAG Engine Operations	6,500,862	3,157,482	9,658,344
Ingestion Rate (Ing/10K Ops)	0.21	0.48	0.31
Normalized Ingestion Rate (Ing/10K Ops/10ft <sup>2</sup> )	0.27	0.30	0.28
<b><u>FOREIGN</u></b>			
Engine Ingestion Events	583	227	810
OAG Engine Operations	6,291,664	1,871,698	8,163,362
Ingestion Rate (Ing/10K Ops)	0.93	1.21	0.99
Normalized Ingestion Rate (Ing/10K Ops/10ft <sup>2</sup> )	1.19	0.76	1.09
<b><u>WORLDWIDE</u></b>			
Engine Ingestion Events	721 (1)	381 (1)	1,107 (7)
OAG Engine Operations	12,792,526	5,029,180	17,821,706
Ingestion Rate (Ing/10K Ops)	0.56	0.76	0.62
Normalized Ingestion Rate (Ing/10K Ops/10ft <sup>2</sup> )	0.73	0.47	0.66

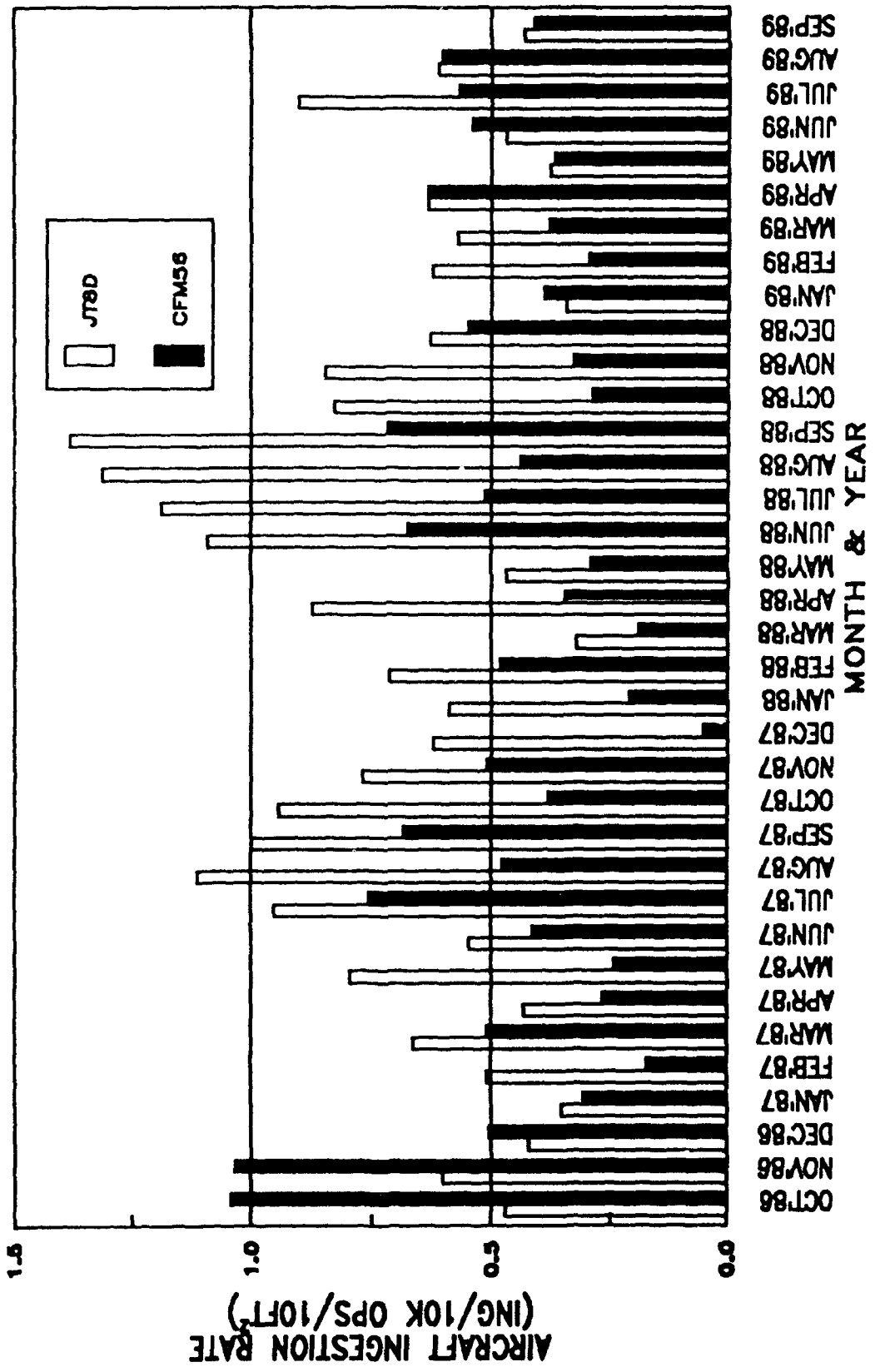


Figure 4.1. Histogram of Monthly Aircraft Ingestion Rates by Engine Type.

where  $Ing$  is the number of monthly aircraft ingestion events for an engine type,  $IA$  is the inlet area ( $in^2$ ) of the engine type, and  $Ops$  is the number of aircraft operations for the month. Twice the engine area is used because there are two engines on each B737 aircraft. The constant 1440 is the factor for converting square inches to units of 10-square-foot areas.

The phase of flight ingestion rate tabulation is presented in Table 4.2A. The method used to calculate ingestion rate 1 is expressed in Equation 3.1. The area adjustment used for ingestion rate 2 is implemented using Equation 4.1. The highest ingestion rates were in the take-off and landing phases followed by the climb and approach phases. There were very few ingestions during the taxi and cruise phases of flight. This pattern is typically seen in bird strike and bird ingestion studies and is indicative of the fact that airports are often located in desirable bird environs. Since birds congregate around airports, there is a greater chance of striking or ingesting a bird during the phases of flight that take place close to the airports. Also, commercial airline cruise routes are well above the altitude in which birds are usually found. Table 4.2B lists engine ingestion rates as a function of phase of flight. The differences in ingestion rates between Tables 4.2A and 4.2B are due to multiple engine ingestion events.

#### 4.2 THE POISSON PROCESS.

The Poisson process is the simplest type of stochastic process which describes how events are distributed in time. The Poisson process is here taken to govern aircraft ingestion events, and the times at which they occur are random. In a Poisson process the events are distributed somewhat evenly in time so that it appears that the times at which the events occurred form a uniform distribution. This section describes some of the properties of Poisson processes that will be useful in describing bird ingestions and in testing hypotheses about bird ingestion rates.

The basis of a Poisson process is a description of the probability distribution of the number of events that occur in a given time interval. The formula for the probability of  $n$  events in an interval of length  $T$  is:

$$P(X(T)=n) = \frac{e^{-\lambda T} (\lambda T)^n}{n!} \quad (4.2)$$

The parameter  $\lambda$  is the mean rate at which events occur and the mean number of events in the length  $T$  time interval is  $\lambda T$ . The time scale that will be used in this study is number of aircraft operations. Ingestion rates are typically reported in events per 10,000 aircraft operations which implies the use of aircraft operations as the time scale in a Poisson process.

One derivation of the formula for the Poisson distribution is the limiting distribution of the binomial distribution for large sample sizes. If we assume that the probability of a bird ingestion is the same from flight to flight, then the number of ingestions in a large number of flights has a binomial distribution. If the probability of ingestion is  $p$  and the number of flights is  $N$  then the probability that  $n$  ingestions occur in the  $N$  flights is:

$$P(X(N)=n) = \binom{N}{n} p^n (1-p)^{(N-n)} \quad (4.3)$$



TABLE 4.2A INGESTION RATES FOR ENGINE TYPE BY PHASE OF FLIGHT  
(BASED ON AIRCRAFT INGESTION EVENTS)

	PRATT-WHITNEY JT8D		CFMI CFM56		ALL ENGINES*	
	INLET** AREA	2234 in <sup>2</sup>	4606 in <sup>2</sup>	---		
AIRCRAFT OPERATIONS	6,396,263	2,514,590	8,910,853			
PHASE OF FLIGHT	AIRCRAFT ING. INGEST† EVENTS RATE 1	AIRCRAFT ING. INGEST† EVENTS RATE 1	AIRCRAFT*** ING. INGEST† EVENTS RATE 1	AIRCRAFT*** ING. INGEST† EVENTS RATE 2	AIRCRAFT*** ING. INGEST† EVENTS RATE 1	AIRCRAFT*** ING. INGEST† EVENTS RATE 2
Taxi	6 .009	.006	4 .016	.005	10 .011	.006
Takeoff	437 .683	.440	154 .612	.191	591 .663	.370
Climb	41 .064	.041	53 .211	.066	94 .105	.048
Cruise	3 .005	.003	15 .060	.019	18 .020	.007
Approach	42 .066	.042	41 .163	.051	83 .093	.045
Landing	175 .274	.176	99 .394	.123	274 .307	.161
Other	1 .002	.001	0 ---	---	1 .001	.001
All Phases	705 1.102	.710	366 1.456	.455	1071 1.202	.638

\* Includes Only Events Where Engine Type Known

\*\* Total Area of 2 Engines

\*\*\* Contains Proportioned Apportionment of Events with Unknown Phase of Flight

† Ingestion Events Per 10,000 Operations

†† Ingestion Events Per 10,000 Operations Per 10 ft<sup>2</sup>

††† Function of JT8D Rate 2, CFM56 Rate 2, and Corresponding Operations

TABLE 4.2B INGESTION RATES FOR ENGINE TYPE BY PHASE OF FLIGHT  
(BASED ON ENGINE INGESTION EVENTS)

INLET AREA	PRATT-WHITNEY JT8D		CFMI CFM56		ALL ENGINES*	
	1117 in <sup>2</sup>	2303 in <sup>2</sup>	5,029,180	17,821,706	---	---
ENGINE OPERATIONS	12,792,526	5,029,180	17,821,706			
PHASE OF FLIGHT	ENGINE** ING. EVENTS	INGEST† RATE 1	INGEST† RATE 2	ENGINE** ING. EVENTS	INGEST† RATE 1	INGEST†† RATE 2
Taxi	6	.004	.006	4	.008	.005
Takeoff	4	.335	.432	163	.324	.203
Climb	42	.031	.040	53	.105	.066
Cruise	3	.002	.003	15	.030	.019
Approach	43	.032	.041	44	.087	.055
Landing	177	.132	.170	102	.203	.127
Other	1	.001	.001	0	---	---
All Phases	721	.538	.694	381	.758	.474

\* Includes Only Events Where Engine Type Known

\*\* Contains Proprated Apportionment of Events with Unknown Phase of Flight

† Ingestion Events Per 10,000 Operations

†† Ingestion Events Per 10,000 Operations Per 10 ft<sup>2</sup>

††† Function of JT8D Rate 2, CFM56 Rate 2, and Corresponding Operations

The binomial probabilities in Equation 4.3 can be approximated by a Poisson distribution with mean  $Np$  for large values of  $N$ . That is, the single flight probability of an ingestion,  $p$ , replaces  $\lambda$  in Equation 4.2.

An important question that can be investigated through the Poisson process model of bird ingestions is the influence of inlet area on the ingestion rates. Past studies [6,7] in bird strikes have used the assumption that the probability of a bird strike is proportional to the cross sectional area of the aircraft. Applying the same concept to engines implies that the bird ingestion rate should be proportional to the inlet area of the engine.

The inlet area effect can be incorporated into the Poisson process model by letting the parameter  $\lambda$  represent the ingestion rate per unit area. The probability of  $n$  ingestions in  $N$  operations for an engine with inlet area  $A$  is:

$$P(X(N)=n) = \frac{e^{-\lambda AN} (\lambda AN)^n}{n!} \quad (4.4)$$

### 4.3 VALIDITY OF THE POISSON PROCESS MODEL FOR BIRD INGESTIONS.

The applicability of the Poisson process model can be tested by analyzing the times between ingestions. The interarrival times in a Poisson process are random variables that have independent exponential distributions, and the mean time between arrivals is the reciprocal of the ingestion rate. The validity of the Poisson process model can be tested by applying a goodness-of-fit (GOF) test for the exponential distribution to the times between ingestions.

The times between ingestions are measured by the number of days between aircraft ingestion events. Normally the number of aircraft operations between aircraft ingestion events would be used; however it is impossible to measure this directly. The number of days between aircraft ingestion events provides a suitable measure of the time between ingestions since daily aircraft operations are reasonably consistent.

The GOF test for the exponential distribution is a modified Kolmogorov-Smirnov (K-S) test comparing the observed cumulative distribution function (CDF) to the predicted exponential CDF based on the sample mean. The K-S test uses the test statistic  $D$  defined as the maximum distance between the observed and predicted cumulative distribution functions. A modification to the critical values for the test statistic is required when the predicted CDF is derived from the mean of the sample. The critical values for the modified K-S test were computed by Liliefors [8]. The critical value for a 0.05 level of significance when the sample size,  $n$ , is larger than 30 can be approximated by  $1.06/\sqrt{n}$ .

The modified K-S test was run on six subgroups of the data broken down by engine and location. The six groups were (1) domestic (United States) JT8D, (2) contiguous United States JT8D, (3) foreign JT8D, (4) domestic CFM56, (5) contiguous United States CFM56, and (6) foreign CFM56. Figures 4.2 through 4.7 compare the observed and predicted cumulative distributions for each of the six groups, respectively. In each case there is a very close visual agreement between the observed and predicted CDF's.

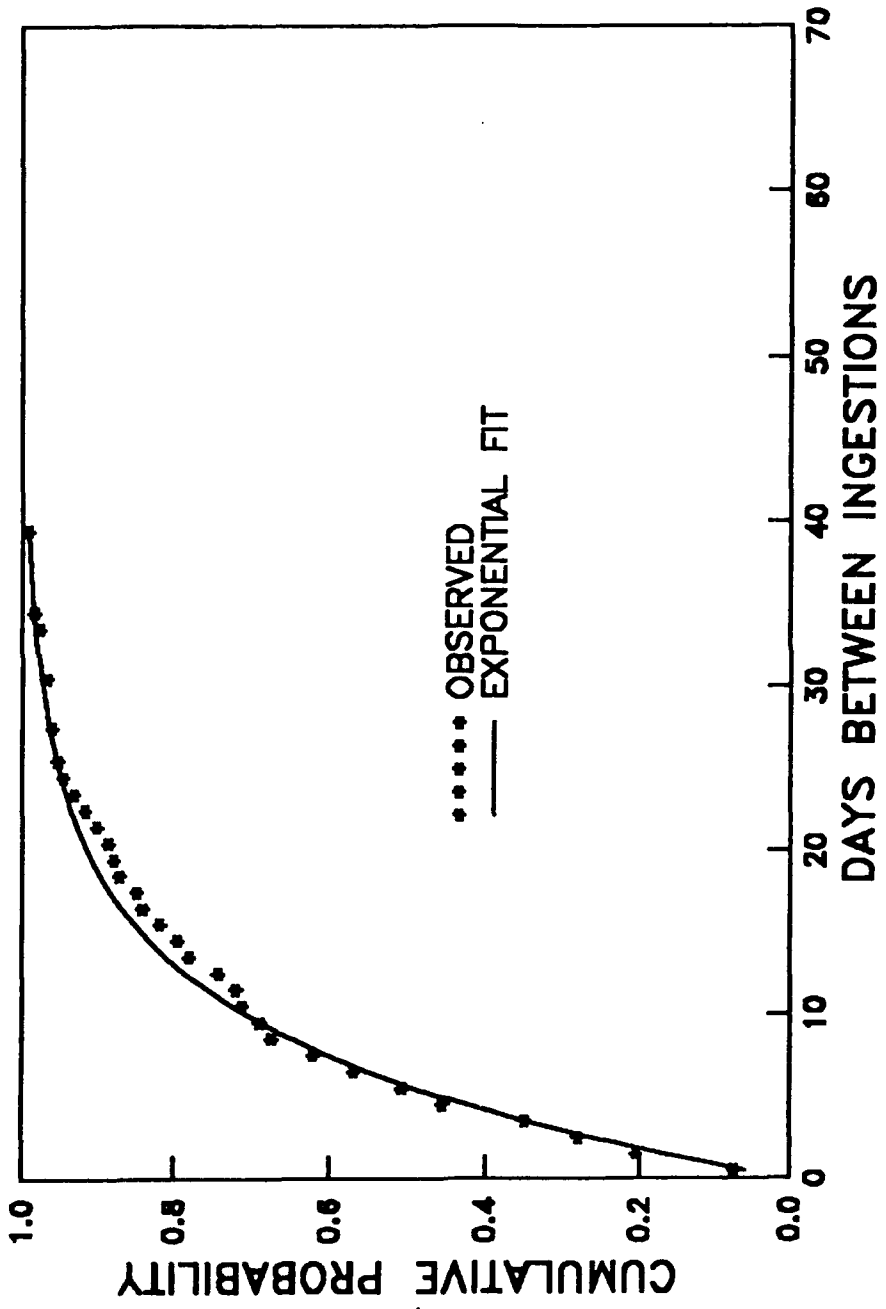


Figure 4.2 Comparison of Observed and Predicted CDFs for United States JT8D Aircraft Ingestion Events.

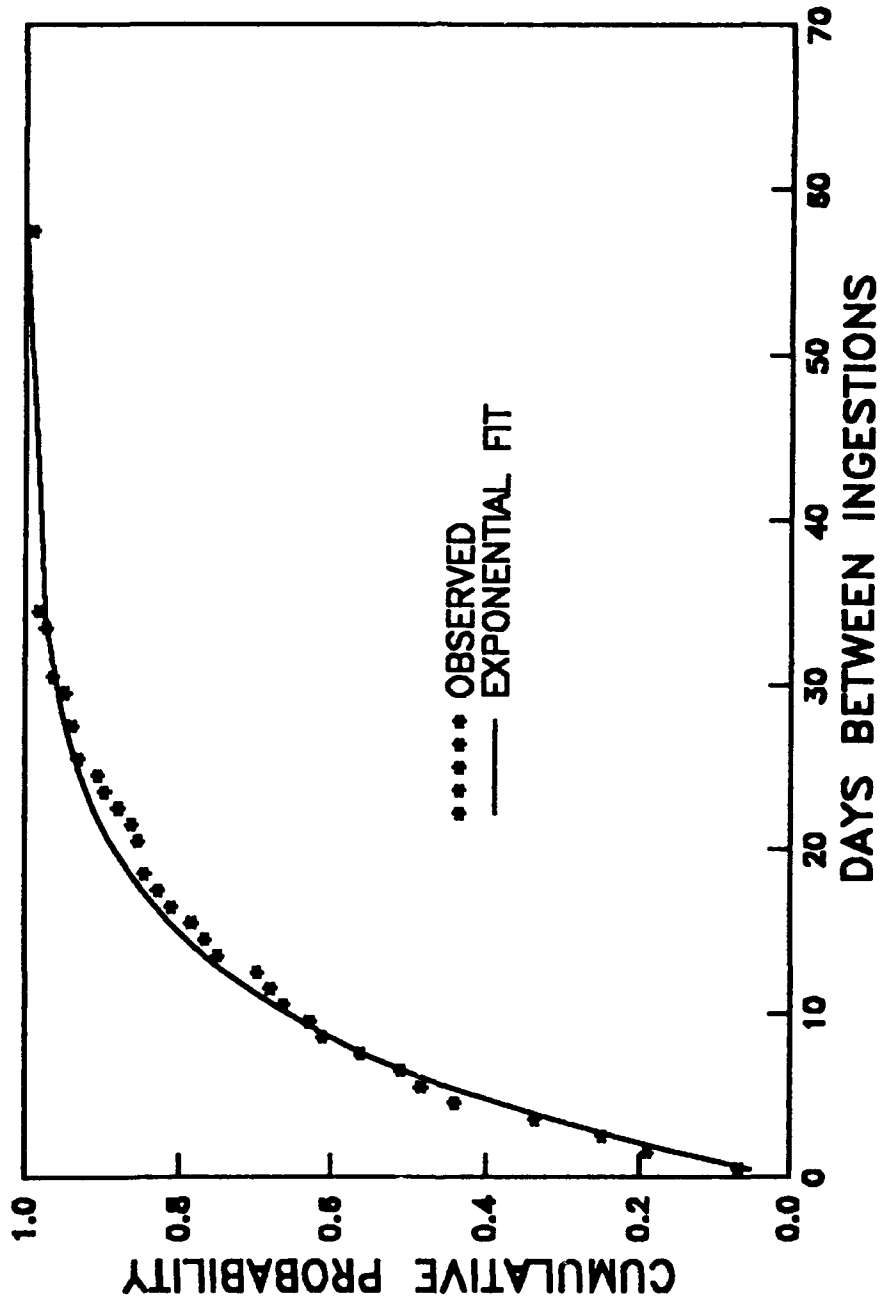


Figure 4.3 Comparison of Observed and Predicted CDFs for Contiguous United States JT8D Aircraft Ingestion Events.

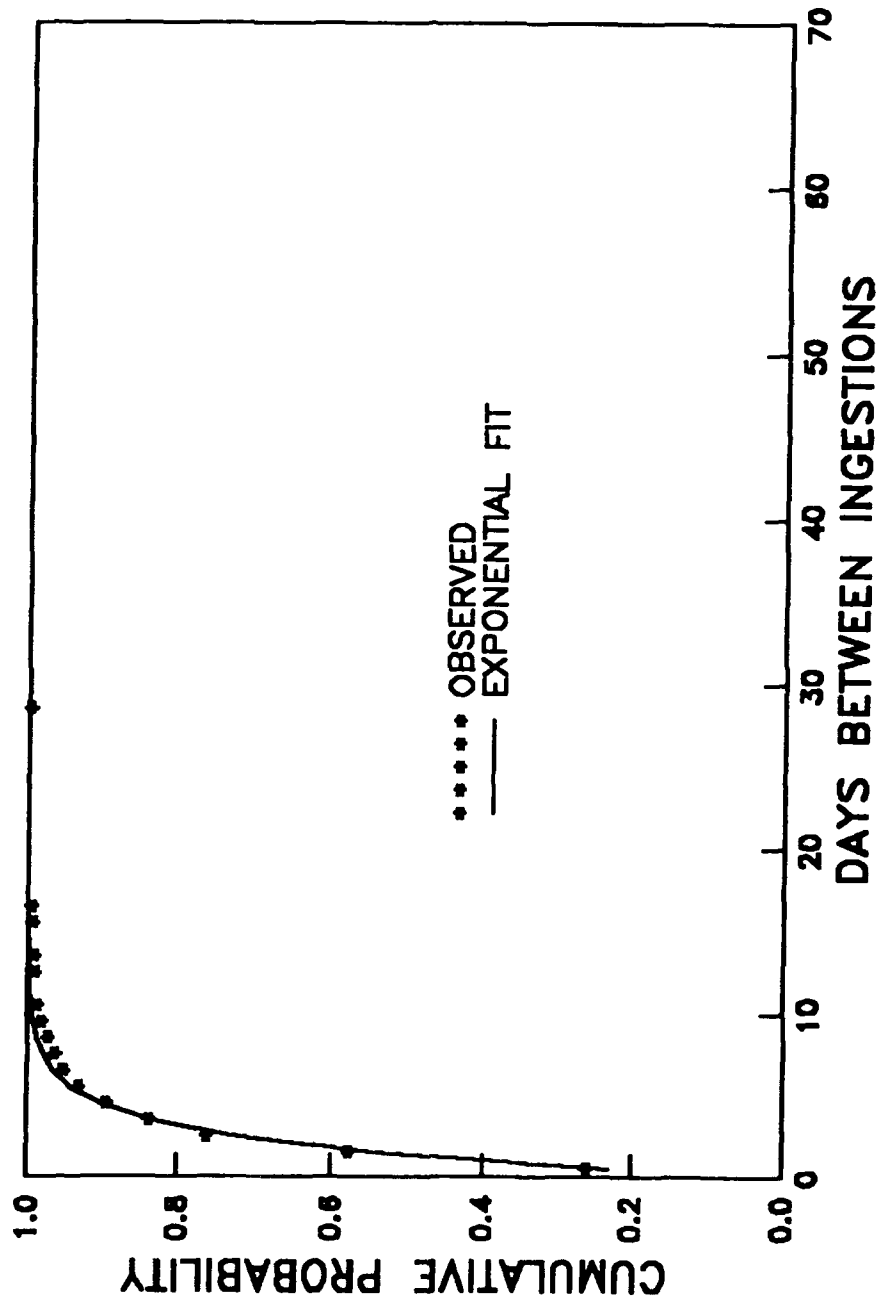


Figure 4.4 Comparison of Observed and Predicted CDFs for Foreign JT8D Aircraft Ingestion Events.

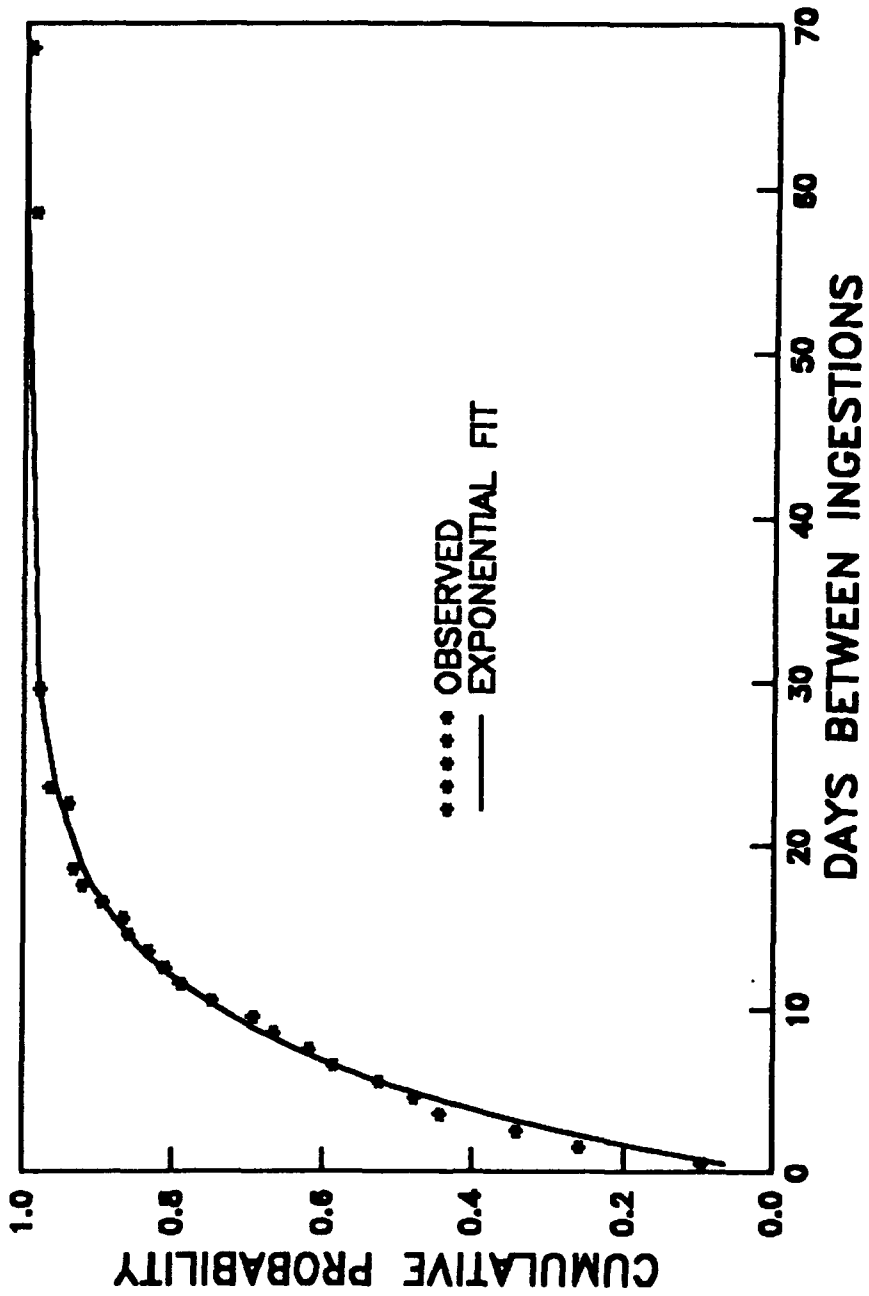


Figure 4.5 Comparison of Observed and Predicted CDFs for United States CFM56 Aircraft Ingestion Events.

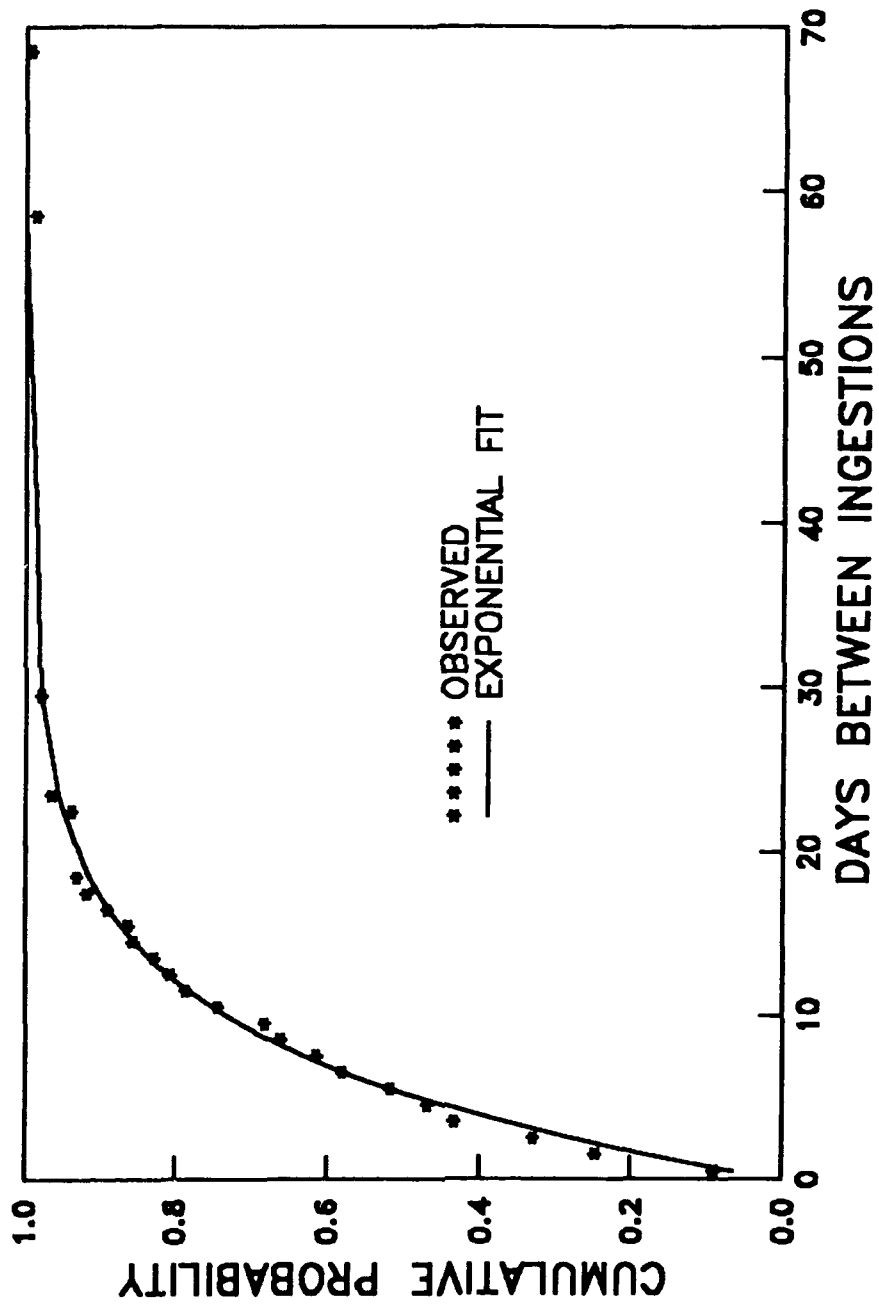


Figure 4.6 Comparison of Observed and Predicted CDFs for Contiguous United States CFM56 Aircraft Ingestion Events.



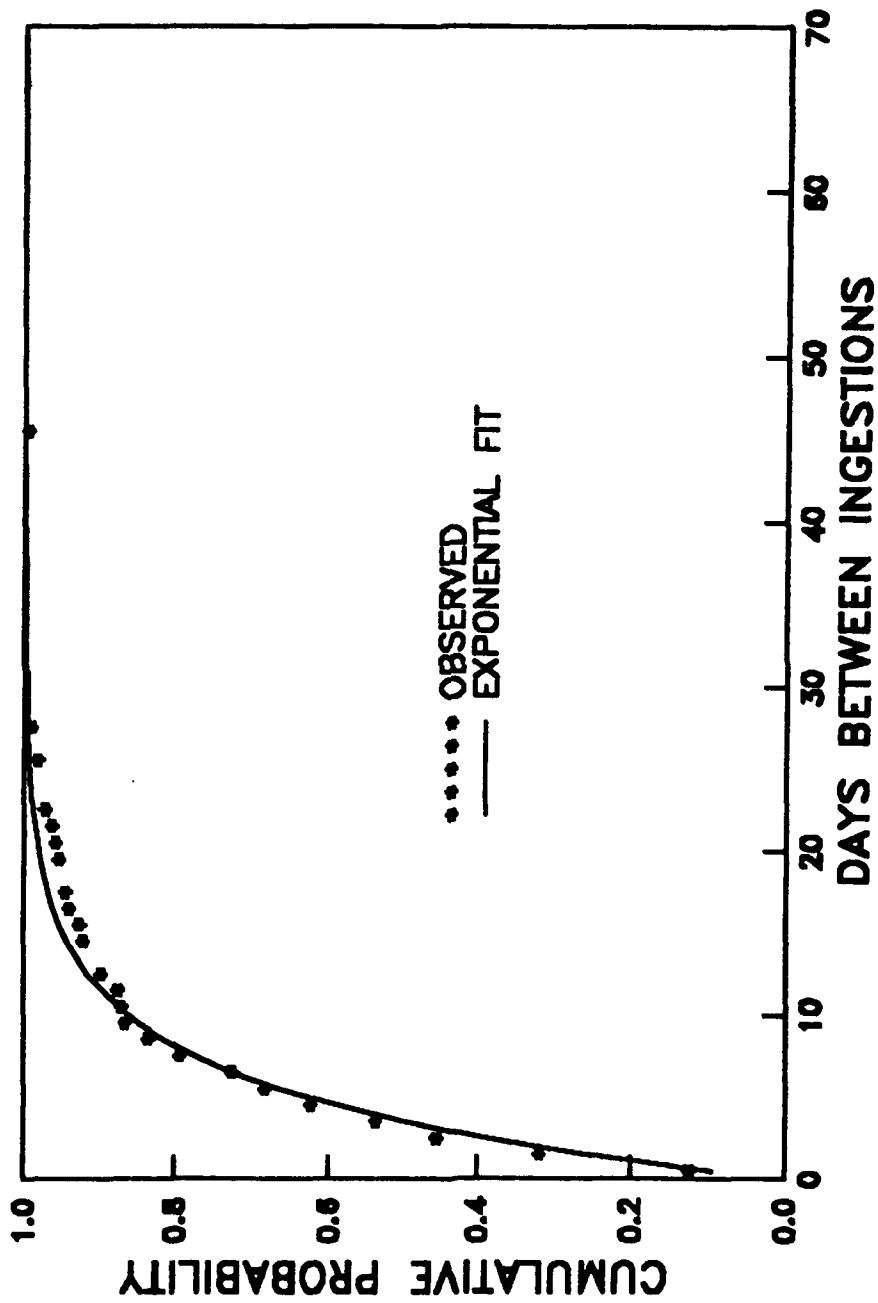


Figure 4.7 Comparison of Observed and Predicted CDFs for Foreign CFM56 Aircraft Ingestion Events.

The visual similarities are verified by the statistical tests which are summarized in Table 4.3. The mean time between ingestion events is given in column one. The sample size given in column two is the count of times between ingestions and is one less than the number of aircraft ingestion events. The critical value for a 5 percent significance level ( $D^*$ ) is in column three, and the test statistic ( $D$ ) is in column four. The assumption that the times between ingestion events come from an exponential distribution cannot be rejected at the 5 percent level in any of the six groups. The use of a Poisson process to model bird ingestions is appropriate based on these test results.

#### 4.4 INLET AREA EFFECT ON INGESTION RATES.

One property of the Poisson process model described in Section 4.2 is that ingestion rates should be proportional to the inlet area of the engine. The size effect can be investigated in the B737 bird ingestion data by comparing the number of ingestion events of the JT8D with the number of ingestion events of the CFM56. According to Equation 4.4 the total number of ingestion events during the reporting period for a given engine has a Poisson distribution with a mean that is proportional to the number of aircraft operations in the reporting period and to the inlet area of the engine. The number of JT8D ingestion events out of the total number of ingestion events will have a binomial distribution if the Poisson process model is valid.

The proportion of total ingestion events that occurred in JT8D engines for a particular geographic region should be:

$$P = \frac{OJ \cdot AJ}{OJ \cdot AJ + OC \cdot AC} \quad (4.5)$$

where OJ and OC are the numbers of regional aircraft operations for, and AJ and AC are the inlet areas of, the JT8D and CFM56 engines, respectively. The relevant values for Equation 4.5 can be obtained from Table 4.1A giving an expected proportion of JT8D ingestion events of  $P = 0.50$  for United States ingestion events and  $P = 0.62$  for foreign ingestion events. The observed proportion of JT8D events is 0.47 for the United States and 0.72 for foreign ingestion events. The test statistic to compare the observed proportion to the predicted is the standard Z statistic for the binomial distribution given by:

$$Z = (\hat{P} - P) / \sqrt{(P \cdot (1-P) / N)} \quad (4.6)$$

where  $\hat{P}$  is the observed proportion of JT8D engines and  $N$  is the total number of aircraft ingestion events for the geographic region.

The Z statistic defined in Equation 4.6 is used to test the null hypothesis that there is no difference between the two types of engines in ingestion rates for each region after adjusting for area. The test statistics for the two geographic regions are computed by substituting the observed proportions for  $\hat{P}$  and the expected proportions for  $P$  in Equation 4.6. The computed Z values are -0.89 for United States ingestion events and 6.035 for foreign ingestion events. The tests show no difference in ingestion rates between engines after adjusting for area for the United States events; however, the test for foreign events is significant at the 5 percent level of significance

TABLE 4.3

RESULTS OF THE EXPONENTIAL GOF TESTS  
TO VERIFY THE POISSON PROCESS

JT8D ENGINE

<u>GEOGRAPHIC AREA</u>	<u>MEAN</u>	<u>SAMPLE SIZE</u>	<u>D*</u>	<u>D</u>
United States	8.15	131	.093	.042
Contiguous US	9.28	115	.099	.055
Foreign	1.91	571	.044	.033

CFM56 ENGINE

<u>GEOGRAPHIC AREA</u>	<u>MEAN</u>	<u>SAMPLE SIZE</u>	<u>D*</u>	<u>D</u>
United States	7.45	146	.088	.076
Contiguous US	7.55	144	.088	.068
Foreign	5.04	217	.072	.063

indicating that the area adjustment does not fully explain the observed difference in engine ingestion rates for foreign events.

A second school of thought suggests that the relationship between engine size and ingestion rate is described better as a linear function of inlet diameter than as a linear function of inlet area. A similar Z test can be computed by substituting inlet diameter for inlet area in Equation 4.5. The expected proportions of JT8D ingestion events after an adjustment for inlet diameter are  $P = 0.59$  and  $P = 0.70$  for the United States and foreign events, respectively. The test statistics are  $Z = -3.94$  and  $Z = 1.42$  for the United States and foreign events, respectively. The null hypothesis is that there is no difference in ingestion rates after adjusting for inlet diameter, and the conclusion of the test is that there is no detectable difference at the 5 percent level of significance for the foreign events but is different for United States events.

There appears to be an engine size effect on ingestion rates; however, it is not clear whether it is best described by inlet area or diameter. The inlet area provides a good fit for the United States ingestions but not the foreign rates while inlet diameter provides a good fit for foreign rates but not for United States rates. The discrepancy could be due to differences in collection rates between the geographic regions; however, there are no data that could be used to determine whether collection rates varied geographically.

## SECTION 5

### AIRPORT BIRD INGESTION EXPERIENCE

The objective of the statistics of this section is to identify the frequency and location of bird ingestion events at airports worldwide. An aircraft ingestion event is the simultaneous ingestion of one or more birds by one or more engines of an aircraft. All of the bird ingestion data were provided by the engine manufacturer. Airport ingestion rates are expressed in terms of aircraft ingestion events per 10K airport operations.

The OAG tapes indicate that there are 1,143 airports worldwide for which 17,821,706 B737 airport operations were scheduled during the reporting period. Appendix A lists the airport code, airport location, and both the number of scheduled airport operations and number of aircraft ingestion events at these airports for each of the 3 years in the data collection period. Bird ingestion events were reported at only 296 of these airports. The OAG tapes show that there were 12,182,974 scheduled airport operations at these 296 airports over the 3-year period. There were also bird ingestion events reported by unscheduled B737 flights at 27 additional airports. These 27 airports are included in Appendix A but there are no OAG operations counts for them.

A complete summary of the airports having reported aircraft ingestion events is presented in Table 5.1 as a frequency count of worldwide bird ingestion events by phase of flight. The majority of aircraft ingestion events occur during takeoff or landing. This table suggests that the threat of bird ingestion is posed primarily from birds which live near the airport and/or whose migratory path crosses over or near the airport property.

Figure 5.1 is a bar chart showing reported aircraft ingestion events at domestic airports during the reporting period. There are 84 domestic airports at which bird ingestion events have been reported. The largest number of aircraft ingestion events reported in the United States during the 3-year period was 10 at Dallas, Love (DAL) followed by 9 at Houston (HOU). Of the 284 aircraft ingestion events reported in the United States, 91 events occurred at an unknown location and they are assigned to the airport code XUS on the bar chart.

Figure 5.2 is a bar chart showing reported aircraft ingestion events at foreign airports during the reporting period. There are 239 foreign airports at which bird ingestions have been reported. The largest number of aircraft ingestion events reported abroad during the period is 16 at Frankfurt, Germany (FRA) followed by 14 at Amsterdam, Netherlands (AMS). Of the 790 aircraft ingestion events reported outside of the United States, 262 events occurred at an unknown location and they are assigned to the airport code XFO on the bar chart.

Table 5.2 lists all airports worldwide which experienced three or more aircraft ingestion events during the reporting period. The airports are listed in descending order of airport operations. The table includes the number of ingestion events, the number of scheduled OAG airport operations, and the rate of aircraft ingestion events per 10,000 airport operations.

TABLE 5.1

FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS  
BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
001	BLAGNAC, FRANCE (LFBO)		1						1
ABQ	ALBUQUERQUE, NM, USA			1					1
ACA	ACAPULCO, MEXICO		1						1
ADD	ADDIS ABABA, ETHIOPIA		1						1
ADL	ADELAIDE, SA, AUSTRALIA		1				1		1
ADQ	KODIAK, AS, USA						1		1
AEP	BUENOS AIRES - NEWBERY, ARGENTINA						2		1
AGR	AGRA, INDIA		1				1		3
AJA	AJACCIO, CORSICA, FRANCE		1				1		2
AJU	ARACAJU, BRAZIL		1				1		1
AKL	AUCKLAND, NEW ZEALAND		3						3
ALB	ALBANY, NY, USA		1						1
ALC	ALICANTE, SPAIN		1			1			2
ALG	ALGIERS, ALGERIA		1			1			2
AMO	AHMEDABAD, INDIA		6				1		7
AMS	AMSTERDAM, NETHERLANDS		8	1			3	1	14
AOR	ALOR SETAR, MALAYSIA		1						1
ARD	ALOR, INDONESIA				1				1
ASP	ALICE SPRINGS, N.T., AUSTRALIA		1						1
ATH	ATHENS, GREECE		1						1
ATL	ATLANTA, GA, USA		2	1					3
AUS	AUSTIN, TX, USA		1	1					2
BAH	BAHRAIN, BAHRAIN		1						1
BB1	BHUBANESWAR, INDIA		1						1
BDQ	VADODARA, INDIA		1						1
BEG	BELGRADE, YUGOSLAVIA		1	1				1	3
BFN	BLOENFONTEIN, SOUTH AFRICA		5	2					7
BFS	BELFAST, N. IRELAND		1				1		2
BHI	BAHIA BLANCA, ARGENTINA		1	2					3
BHM	BIRMINGHAM, AL, USA		1	1		1	1	1	4
BHO	BHOPAL, INDIA						1		1
BHX	BIRMINGHAM, ENGLAND (UK)		2						2
BHZ	BELO HORIZONTE, BRAZIL		1						1
BJL	BANJUL, GAMBIA		1						1
BJR	BAHAR DAR, ETHIOPIA		1						1
BLR	BANGALORE, INDIA		2			1	4	1	7
BMA	NASHVILLE, TN, USA								1
BNE	BRISBANE, QLD, AUSTRALIA						2		2
BOH	BOURNEMOUTH, ENGLAND, UK								1
BOM	BOMBAY, INDIA		1				1		2
BOS	BOSTON, MA, USA		2					1	3
BRE	BREMEN, FED REP OF GERMANY			1			1		2
BRS	BRISTOL, ENGLAND (UK)		2				1		3
BRU	BRUSSELS, BELGIUM		4	1		2			9
BUD	BUDAPEST, HUNGARY		1						1
BUE	BUENOS AIRES, ARGENTINA		1						1
BWI	BALTIMORE, MD, USA		1						1
CAG	CAGLIARI, ITALY		1						1
CAS	CASABLANCA, MOROCCO					1	1		2
CBR	CANBERRA, A.C.T., AUSTRALIA		2						2
CCU	CAICUTTA, INDIA								1
CDG	PARIS DE GAULLE, FRANCE		1			1			2
CGN	COLOGNE BONN, FRG		1				1		2
CGR	CAMPO GRANDE, BRAZIL		3						3
CHC	CHRISTCHURCH, NEW ZEALAND		5				1	1	7

TABLE 5.1 (Continued)  
 FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS  
 BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
CID	CEDAR RAPIDS/IOWA CITY, IO, USA		1						1
CJB	COIMBATORE, INDIA		2						2
CJU	CHEJU, REP OF KOREA		1						1
CLE	CLEVELAND, OH, USA		3						3
CLT	CHARLOTTE, NC, USA		1				1		3
CHB	COLOMBO, SRI LANKA		1					1	3
CMG	CORUMBA, MATO GROSSO, BRAZIL		1						1
CNS	CAIRNS, QLD, AUSTRALIA		2				1		3
COK	COCHIN, INDIA		1						1
COR	CORDOBA, ARGENTINA		1						1
COS	COLORADO SPRINGS, CO, USA		1						1
CPH	COPENHAGEN, DENMARK		2						2
CPT	CAPE TOWN, SOUTH AFRICA		3						3
CRP	CORPUS CHRISTI, TX, USA		1						1
CRW	CHARLESTON, WV, USA		1						1
CTC	CATAMARCA, ARGENTINA				1				1
CTU	CHENGOU, P.R. CHINA	1							1
CWB	CURITIBA, PARANA, BRAZIL		1				1		2
CWL	CARDIFF, WALES, UK		1						2
DAB	DAYTONA BEACH, FL, USA		2						2
DAL	LOVE DALLS/FT. WORTH, TX, USA		5	1					6
DAY	DAYTON, OH, USA		2	2				2	6
DCA	NATIONAL, WASHINGTON, DC, USA		2				1		3
DEL	DELHI, INDIA		2				1		3
DEN	STAPLETON INT'L, DENVER, CO, USA		2	1					3
DET	DETROIT CITY, MI, USA		2						2
DEU	SOMEWHERE OVER GERMANY							1	1
DFW	DALLAS/FT WORTH, TX, USA		1						1
DLH	DULUTH, MN, USA						1		1
DTW	WAYNE CO, DETROIT, MI, USA						1		1
DUB	DUBLIN, REPUBLIC OF IRELAND		1		1				2
DUD	DUNEDIN, NEW ZEALAND								1
DUR	DURBAN, SOUTH AFRICA		5						5
DUS	DUESSELDORF, FRG		6	2			3		11
EAH	NEJMAN, SAUDI ARABIA		1	1					2
EDI	EDINBURGH, SCOTLAND		1						1
ELS	EAST LONDON, SOUTH AFRICA		2	1			2		5
EHA	EAST MIDLANDS, ENGLAND		1				1		2
EUR	NEWARK, NEW YORK, NY, USA		2		1		1		4
EZE	BUENOS AIRES-EZEIZA ARPT, ARGENTINA		1						1
FAO	FARO, PORTUGAL				1				1
FAT	FRESNO, CA, USA		1				1		2
FCO	DA VINCI, ROME, ITALY		1				1		2
FLL	FT LAUDERDALE, FL, USA		1						1
FMA	FORMOSA, ARGENTINA		1						1
FNC	FUNCHAL - MADEIRA, PORTUGAL		2						2
FNT	FLINT, MI, USA		1						1
FRA	FRANKFURT, FRG	1	4	4			3	1	16
GAJ	YAMAGATA, HONSHU, JAPAN							1	1
GAU	GAUHATI, INDIA		1						1
GHB	GOVERNORS HARBOUR, B/AMAS		1						1
GHU	GUALEGUAYCHU, ARGENTINA		1						1
GIG	RIO DE JANEIRO INT'L, BRAZIL		1				1		2
GOA	GENOA, ITALY								1
GOI	GOA, INDIA						1		1

TABLE 5.1 (Continued)

FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS  
BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
GOT	GOTHENBURG, SWEDEN	1					1		2
GRZ	GRAZ, AUSTRIA		1				1		2
GSP	GREENVILLE/SPARTANBURG, SC, USA		1						1
GVA	GENEVA, SWITZERLAND				1				1
GWL	GWALIOR, INDIA		1						1
HAC	HACHIJO, JIMA ISLAND, JAPAN						1		1
HAI	HANOVER, FED REP OF GERMANY						1		1
HAM	HAMBURG, FRG		6	1	1		1		9
HND	TOKYO-NANEDA, JAPAN						1		1
HNM	HANA, MAUI, HA, USA		1						1
HOU	HOUSTON, TX, USA		5	1			3		9
HRL	HARLINGEN, TX, USA						1		1
HYD	HYDERABAD, INDIA		4		1		2		7
IAD	DULLES INT'L, WASHINGTON, DC, USA		1				1	1	2
IAH	HOUSTON INTERCONT, TX, USA								1
IBZ	IBIZA, SPAIN			1			1		2
INU	NAURU, REP OF NAURU		1						1
ISA	MOUNT ISA, QLD, AUSTRALIA				1				1
ISG	ISHIGAKI, JAPAN		5						5
ISP	LONG ISLAND MACARTHUR, NY, USA			1					1
ITO	HILO HAWAII, HA, USA		3						3
IVC	INVERCARGILL, NEW ZEALAND		1						1
IXB	BAGDOGRA, INDIA						2	1	3
IXC	CHANDIGAR, INDIA		1						1
IXE	MANGALORE, INDIA		1				1		2
IXJ	JAMMU, INDIA		1			1			2
IXR	RANCHI, INDIA		1						1
IXU	AURANGABAD, INDIA		1						1
IXV	ALONG, INDIA						1	1	2
JAI	JAIPUR, INDIA			1			2		4
JAX	JACKSONVILLE, FL, USA		1						1
JDH	JODHPUR, INDIA		1						1
JNB	JOHANNESBURG, SOUTH AFRICA		3						3
JRH	JORHAT, INDIA		1						1
KCH	KUCHING, SARAWAK, MALAYSIA			1				1	2
KEF	REYKJAVIK-KEFLAVIK, ICELAND						1		1
KGS	KOS, GREECE		1						1
KHH	KAOHSTUNG, TAIWAN						1		1
KHI	KARACHI, PAKISTAN		1				1		2
KIM	KIMBERLEY, SOUTH AFRICA		2				1		3
KMG	KUNMING, P.R. CHINA		1						1
KOA	KONA, HA, USA		1						1
KOJ	KAGOSHIMA, JAPAN							2	2
KRT	KHARTOUM, SUDAN		1						1
KST	KOSTI, SUDAN					1			1
KTH	KATHMANDU, NEPAL						1		1
KUL	KUALA LUMPUR, MALAYSIA					1			1
LAS	LAS VEGAS, NV, USA		1						1
LAX	LOS ANG.-LES, CA, USA		4						4
LCA	LARNACA, CYPRUS					1			1
LDE	LOURDES/TARBES, FRANCE		3						3
LEX	LEXINGTON, KY, USA		1						1
LGA	NEW YORK LA GUARDIA, NY, USA		1				2		3
LGE	LIEGE, BELGIUM						1		1
LGW	LONDON-GATHICK, ENGLAND			2					2



TABLE 5.1 (Continued)  
 FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS  
 BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
LHE	LAHORE, PAKISTAN		1				1	1	3
LHR	LONDON HEATHROW, ENGLAND, (UK)		1			2	2		5
LHM	L'HUE, KAUAI, HA, USA		7				1		8
LIN	MILAN Linate, ITALY		2						2
LIT	LITTLE ROCK, AK, USA		2	1					3
LJU	LJUBLJANA, YUGOSLAVIA		1				2		3
LKO	LUCKNOW, INDIA		2						4
LLW	LILONGWE, MALAWI		1						1
LNZ	LNZ, AUSTRIA		1						1
LOS	LAGOS, NIGERIA		1					1	2
LPA	GRAN CANARIA, CANARY ISLANDS							1	1
LST	LAUNCESTON, TASMANIA, AUSTRALIA		1	1			1		3
LTM	LONDON-LUTON INT'L, ENGLAND						1		1
LXR	LUXOR, ARAB REP OF EGYPT		1						1
LXS	LEMNOS, GREECE		1						1
MAA	MADRAS, INDIA		2	1			1		4
MAD	MADRID, SPAIN		1						1
MAF	MIDLAND COESSA, TX, USA		1				1		2
MAH	MAHON, MENORCA, SPAIN		2						2
MAN	MANCHESTER, ENGLAND (UK)		1						1
MCO	ORLANDO-INT'L, FL, USA		3		1				4
MOP	MINDIPTANA, INDONESIA		1				1		2
MPP	MAR DEL PLATA, ARGENTINA		2				1		3
MPT	HARRISBURG-OLMSTEAD ST, PA, USA		1						1
MOW	CHICAGO-MIDWAY, IL, USA		4		1				5
MED	MEDINA, SAUDI ARABIA		1						1
MEL	MELBOURNE, VICTORIA, AUSTRALIA		1				1		2
MFR	MEDFOR, OR, USA		1						1
MGA	MANAGUA, NICARAGUA		1						1
MIA	MIAMI, FL, USA		1				1		2
MIL	MILAN, ITALY		1						1
MIL	MILTA, MEDITERRANEAN SEA						1		1
MMY	MIYAKO JIMA, JAPAN		6				4		10
MSO	MISSOULA, MT, USA		1				1		2
MSP	MINNEAPOLIS-ST PAUL, MN, USA		1				1		2
MSY	NEW ORLEANS, LA, USA		2	1					3
MUC	MUNICH, FRG		3	1		1			5
MYP	MILAN-MALPENSA, ITALY		1						1
MYR	MYRTLE BEACH, SC, USA		1				1		2
NCE	NICE, FRANCE		1						1
NCL	NEWCASTLE, ENGLAND						1		1
NGO	NAGOYA, JAPAN						1		1
NUE	NUREMBERG, FRG		1						1
OAK	OAKLAND, SAN FRANCISCO, CA, USA		1	2					3
OGG	KAHULUI, MAUI, HA, USA		2				2		4
OIT	OITA, JAPAN						1		1
OKC	OKLAHOMA CITY, OK, USA		1				1		2
OPO	OPORTO, PORTUGAL		1						1
ORD	CHICAGO-O'HARE, IL, USA		4	1			1		6
ORF	NORFOLK-VA. BEACH, VA, USA		2				3		5
ORX	PARIS - ORLY ARPT, FRANCE		4				4		8
PAT	PATNA, INDIA		2						2
PDB	PEDRO BAY, AS, USA		1				2	1	4
PDX	PORTLAND, OR, USA		1	1					2
PEK	BEIJIN, P. R. CHINA	1							1

TABLE 5.1 (Continued)  
 FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS  
 BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
PEN	PENANG, MALAYSIA								
PHL	PHILADELPHIA/WILMINGTON, PA, USA		1	1					2
PHX	PHOENIX, AZ, USA			2		1	2		4
PIE	TAMPA-ST. PETERSBURG, FL, USA	4							4
PLZ	PORT ELIZABETH, SOUTH AFRICA	3		1			2		6
PME	PORTSMOUTH, UK	1					1		2
PHI	PALMA MALLOCCA ISLAND, SPAIN	1							1
PHR	PALMERSTON, NEW ZEALAND	1					1		2
PNA	PAMPLONA, SPAIN		1						1
PSA	PISA, ITALY		1						1
PTY	PANAMA CITY, PANAMA	1							1
PUY	PULA, YUGOSLAVIA	1							1
PVD	PROVIDENCE, RI, USA	1							1
PVH	PORTO VELHO, BRAZIL	2							2
QTV	TREVISO, ITALY						1		1
RAP	RAPID CITY, SD, USA	1							1
REC	RECIFE, BRAZIL	1							1
RES	RESISTENCIA, ARGENTINA					1		1	2
RNO	RENO, NV, USA	1		1					2
ROA	ROANOKE, VA, USA					1			1
ROC	ROCHESTER, NY, USA	1				1			2
RUH	RIYADH, SAUDI ARABIA	1							1
SAB	SABA, NETH. ANTILLES						1		1
SAL	SAN SALVADOR, EL SALVADOR	1							1
SAN	SAN DIEGO, CA, USA			1					1
SAO	SAO PAULO, BRAZIL		2						2
SAT	SAN ANTONIO, TX, USA	1						1	2
SAV	SAVANNAH, GA, USA	1					1		2
SCC	PRUDHOE BAY, DEADHORSE, AS, USA						1		1
SCN	SAARBRUECKEN, FRG					1			1
SDF	LOUISVILLE, KY, USA	1							1
SDJ	SENDAI, JAPAN							1	1
SFN	SANTA FE, ARGENTINA						1		1
SFO	SAN FRANCISCO-OAKLAND, CA, USA	3		2			1	1	7
SHI	SHIMOJISHIMA, JAPAN							1	1
SJC	SAN JOSE, CA, USA	2				1	1		4
SLA	SALTA, ARGENTINA	1							1
SLC	SALT LAKE CITY, UT, USA				1		2		3
SLL	SALALAH, OMAN	1							1
SLZ	SAO LUIZ, MARANHAO, BRAZIL	1							1
SMF	SACRAMENTO, CA, USA	1				1			2
SNA	ORANGE COUNTY, CA, USA	1							1
SRQ	SARASOTA/BRADENTON, FL, USA	2							2
STN	LONDON-STANSTED, ENGLAND, UK		3	1			1		7
STR	STUTTGART, FRG	1					3		4
STV	SURAT, INDIA	1							1
SVG	STAVANGER, NORWAY	1							1
SXR	SRINAGAR, INDIA	1					1		2
SYD	SYDNEY N.S.W., AUSTRALIA	1		1		2			4
SYR	SYRACUSE, NY, USA	1							1
TCI	TENERIFE, CANARY IS.						1		1
TFS	TENERIFFE-REINASOFIA, CANARY ISLAND	2		1					3
TGD	TITOGRAD, YUGOSLAVIA	1					1		2
TLV	TEL AVIV-YAFO, ISRAEL	1							1
TNG	TANGIER, MOROCCO	2					1	1	4

TABLE 5.1 (Concluded)  
 FREQUENCY COUNT OF AIRCRAFT INGESTION EVENTS  
 BY AIRPORT AND PHASE OF FLIGHT.

AIRPORT	AIRPORT DEFINITION	TAXI	TAKEOFF	CLIMB	CRUISE	APPROACH	LANDING	UNKNOWN	TOTAL
TPA	TAMPA/ST PETERSBURG, FL, USA			1					1
TRN	TRIVANDRUM, INDIA		1						1
TRV	TOWNSVILLE, QLD, AUSTRALIA					3		1	4
TSV	TOTTORI, JAPAN		1			1			2
TTJ	TUCLUMAN, ARGENTINA	1	1		1				3
TUC	TULSA, OK, USA		3						3
TUL	TUNIS, TUNISIA		1			1			2
TUN	LAKE TAHOE, CA, USA			1					1
TVL	WEST BERLIN, GERMANY		1						1
TXL	UDAIPUR, INDIA					1			1
UDR	QUETTA, PAKISTAN						1		1
UET	UPINGTON, SOUTH AFRICA		1						1
UTN	VALVERDE, CANARY ISLANDS		1						1
VCE	VIENNA, AUSTRIA						2	1	3
VDM	VENICE, ITALY		1						1
VIE	VARAMASI, INDIA		2				4	2	8
VNC	WINDHOEK, NAMIBIA		1			1			2
VNS	WELLINGTON, NEW ZEALAND		3			1			4
MDH	UNKNOWN FOREIGN AIRPORT		11	1	8	1	9	232	262
MLG	XIAMEN, P. R. CHINA		2						2
XFO	JEREZ DE LA FRONTERA, SPAIN		1						1
XNN	UNKNOWN USA AIRPORT	1			3			85	91
XRY	SAULT STE MARIE, ONT., CANADA		1				2		2
XUS	HAY RIVER, NT, CANADA								1
XUM	HALIFAX, NS, CANADA		2						2
YHY	KARLOOOPS, BC, CANADA		1						1
YHZ	KELOWNA, BC, CANADA		1						1
YKA	FT MCMURRAY, ALTA, CANADA		1		1				2
YLV	OTTAWA, ONT, CANADA		1						1
YMH	QUEBEC, QUE, CANADA		2						2
YOM	REGINA, SASK, CANADA		1						1
YOB	THUNDER BAY, ONT, CANADA		1						1
YOR	MONTREAL, QUEBEC, CANADA		5				2		7
YQT	VAL D'OR, QUE, CANADA		1						1
YUL	NORMAN WELLS, NT, CANADA		1						1
YVO	VANCOUVER, BC, CANADA		3		1		4	1	6
YVR	WINNIPEG, MAN, CANADA		1						1
YWG	EDMONTON-MUNICIPAL, ALBERTA, CANADA		2			1			3
YXJ	FT ST JOHN, BC, CANADA		1						1
YXD	PRINCE GEORGE, BC, CANADA		1						1
YXJ	CALGARY, ALBERTA, CANADA		3			1	2		5
YYS	VICTORIA, BC, CANADA		1				1		2
YYJ	ST JOHNS, NFLD, CANADA		1						1
YYT	TORONTO, ONTARIO, CANADA		2		1				3
YYZ	YELLOWKNIFE, NT, CANADA		1						1
YZF	SANDSPIT, BC, CANADA						1		1
ZRH	ZURICH, SWITZERLAND		1				2		3
ZTH	ZAKINTHOS, GREECE							2	2
-0-	AIRPORT UNKNOWN								2
AIRPORTS WITH KNOWN INGESTIONS									1,076
									358
									184
									56
									13
									64
									394
									7

### AIRCRAFT INGESTION EVENTS

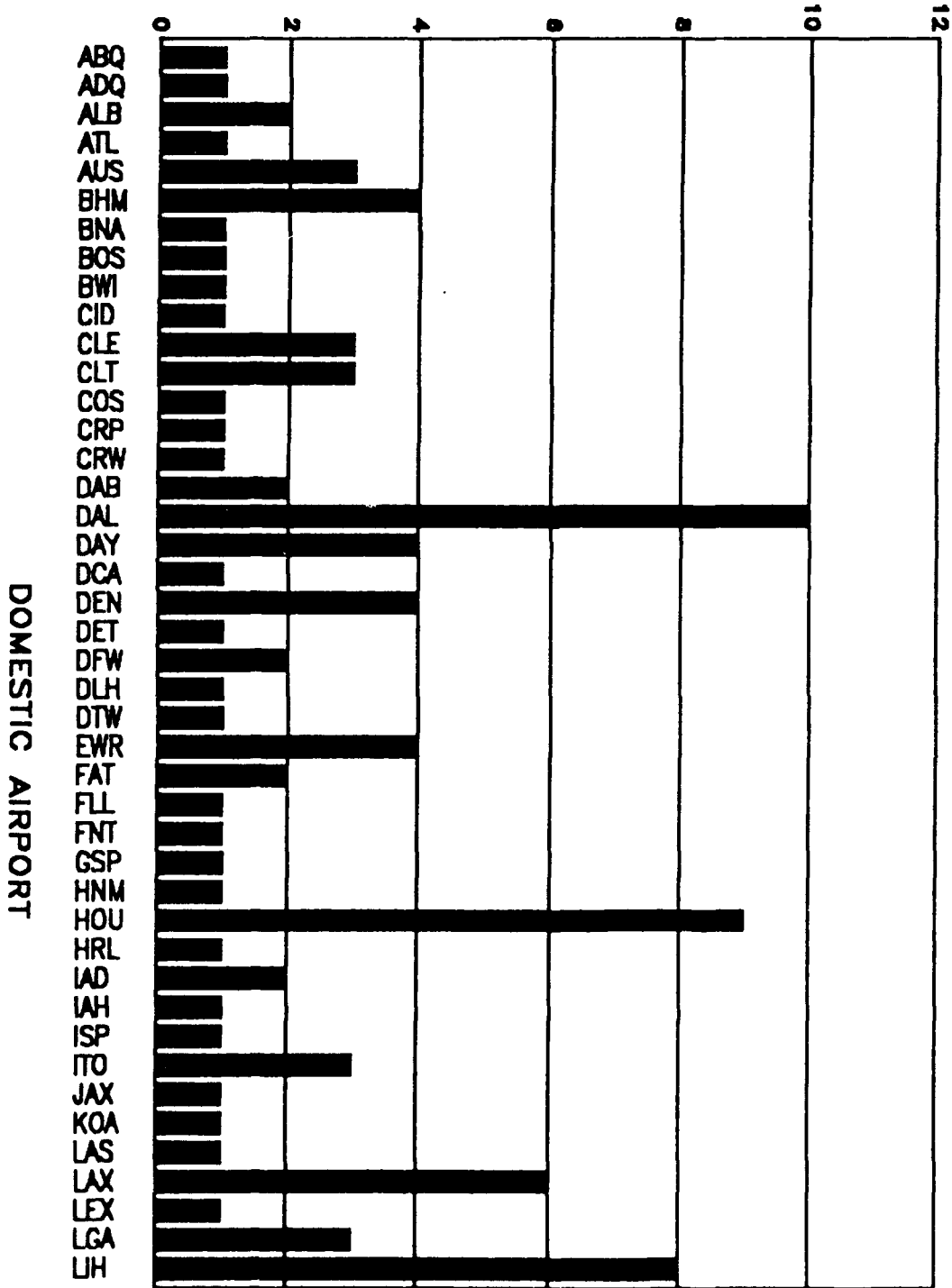


Figure 5.1 Histogram of Aircraft Ingestion Events at Domestic Airports.

### DOMESTIC AIRPORT

### AIRCRAFT INGESTION EVENTS

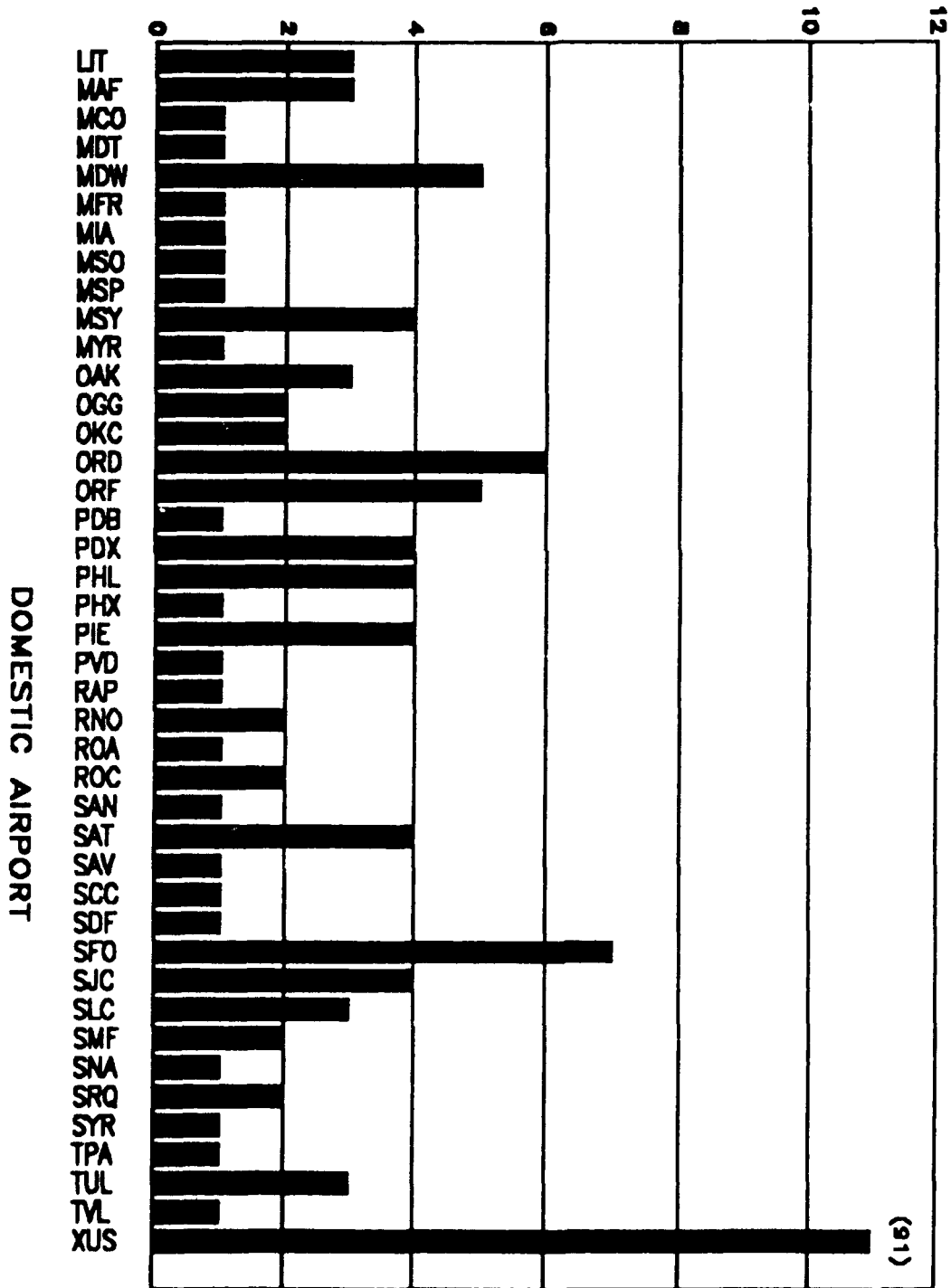


Figure 5.1 Histogram of Aircraft Ingestion Events at Domestic Airports. (Concluded)

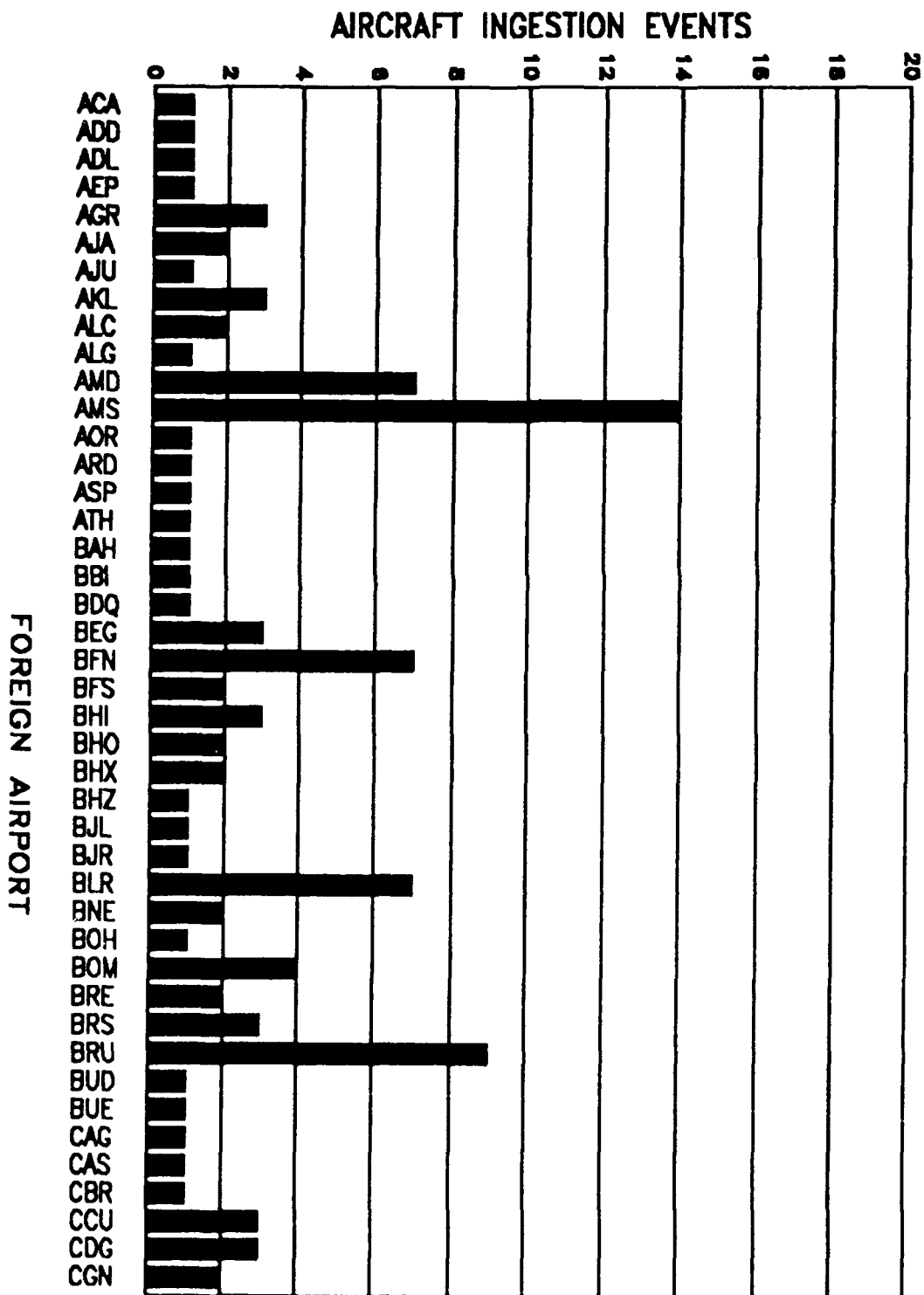


Figure 5.2 Histogram of Aircraft Ingestion Events at Foreign Airports.

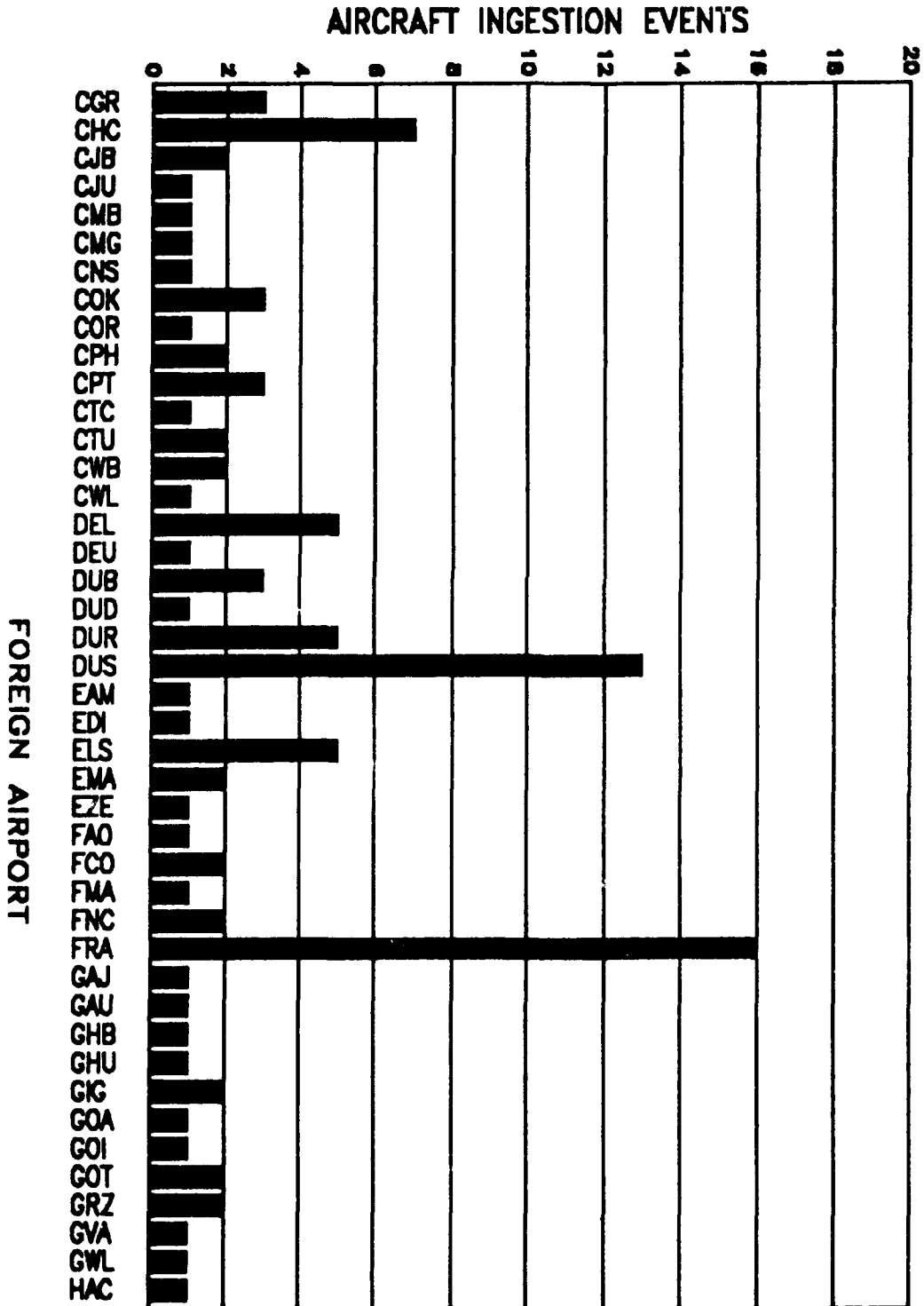


Figure 5.2 Histogram of Aircraft Ingestion Events at Foreign Airports. (Continued)

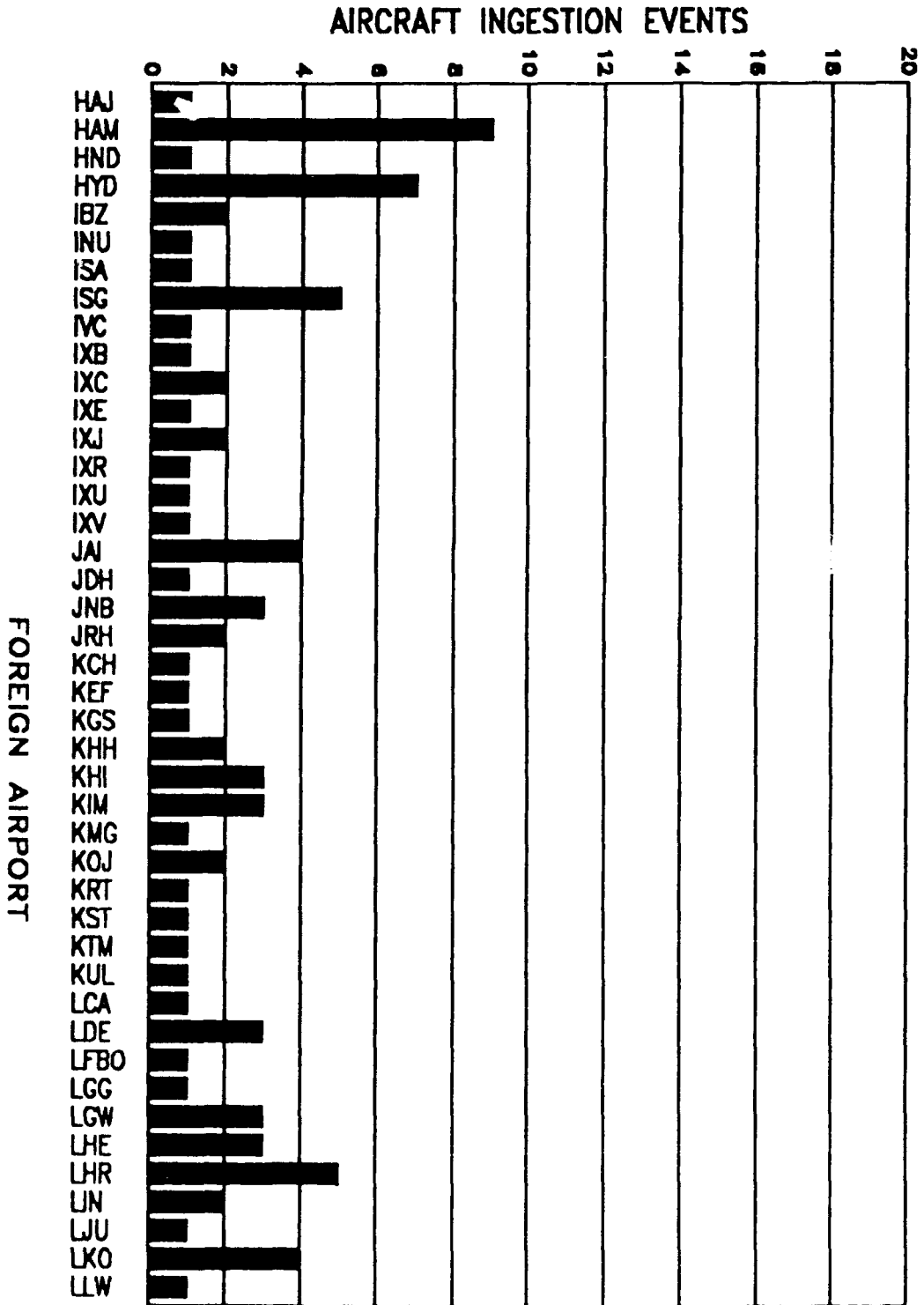


Figure 5.2. Histogram of Aircraft Ingestion Events at Foreign Airports  
(Continued).



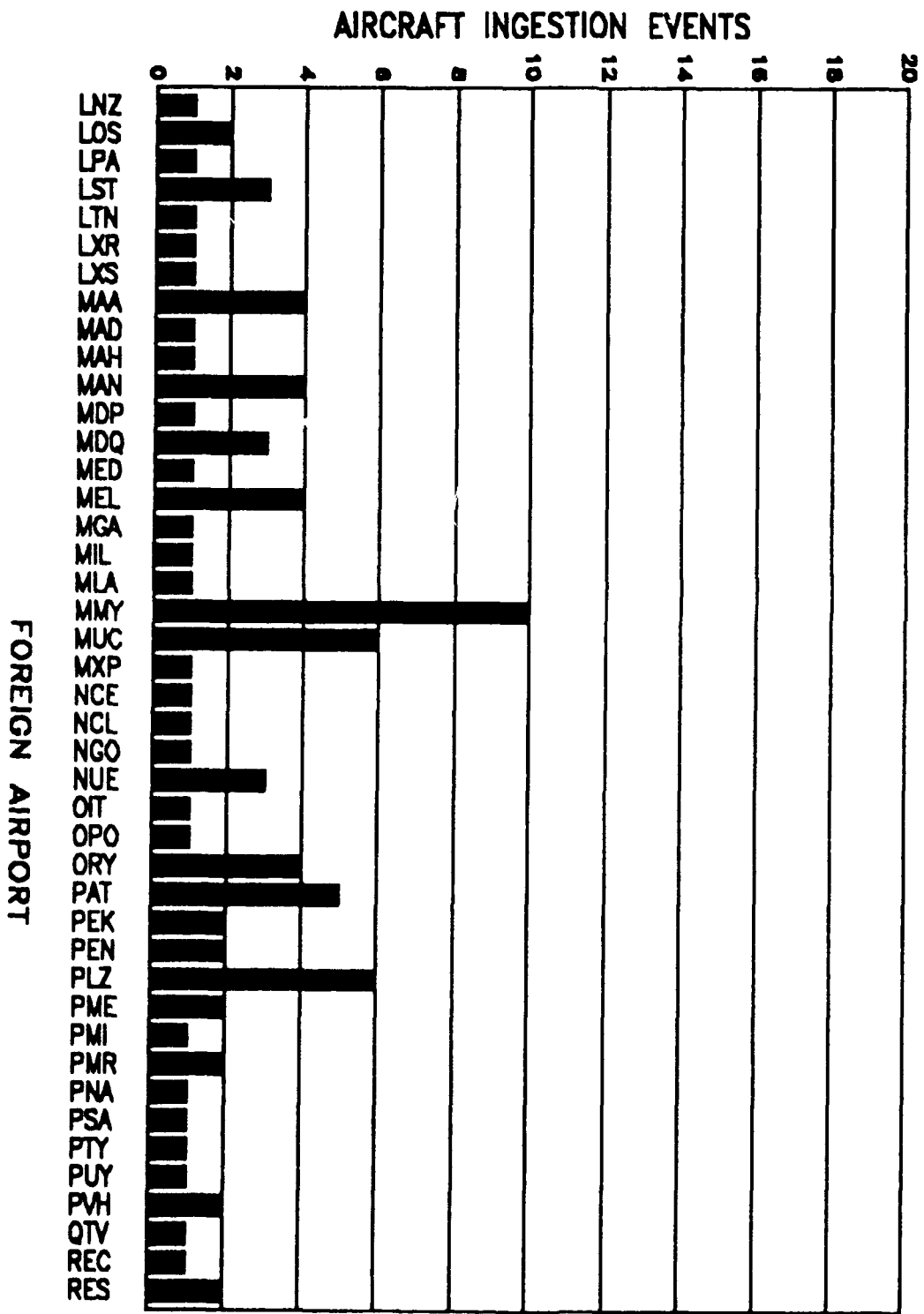


Figure 5.2. Histogram of Aircraft Ingestion Events at Foreign Airports  
(Continued).

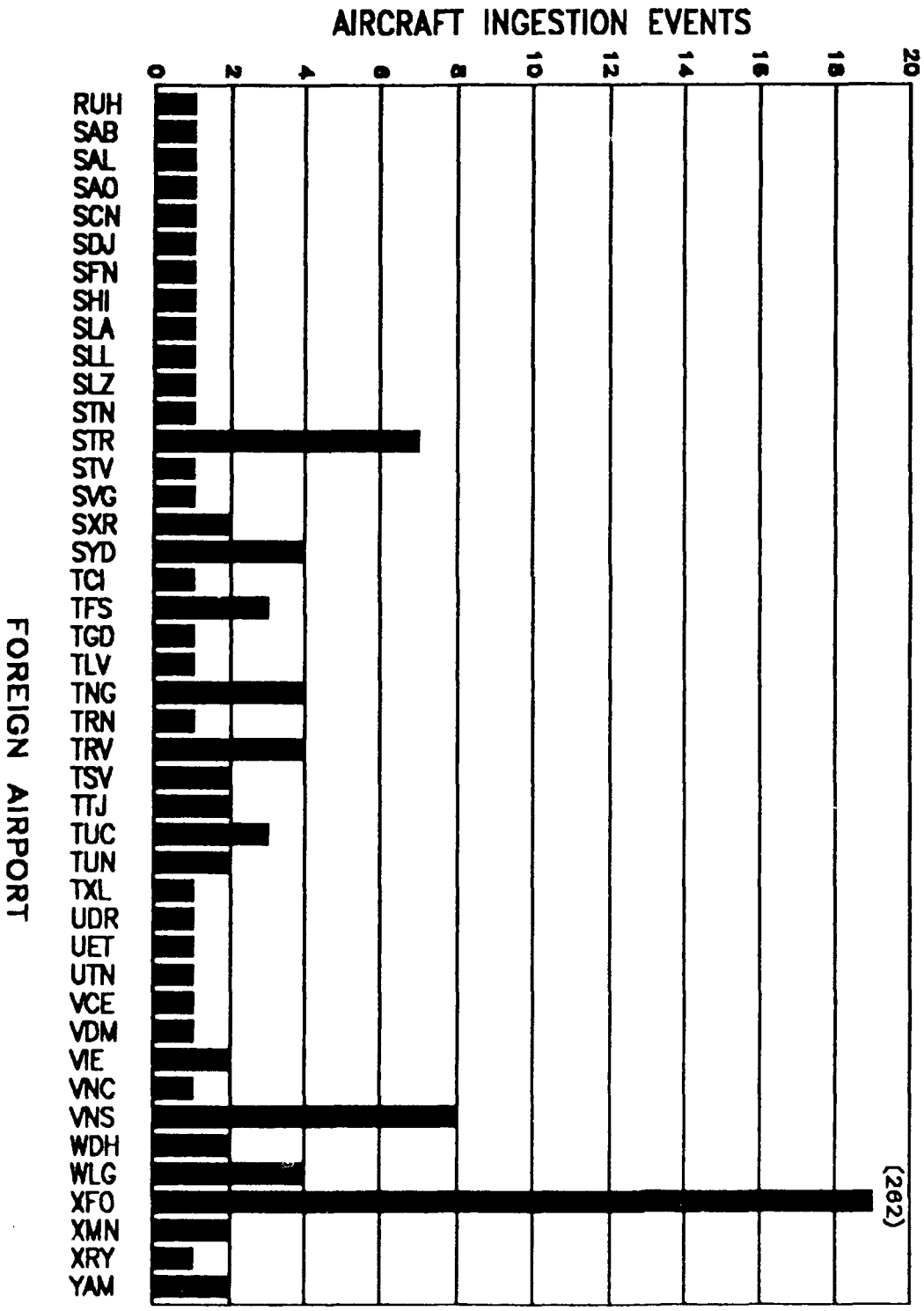
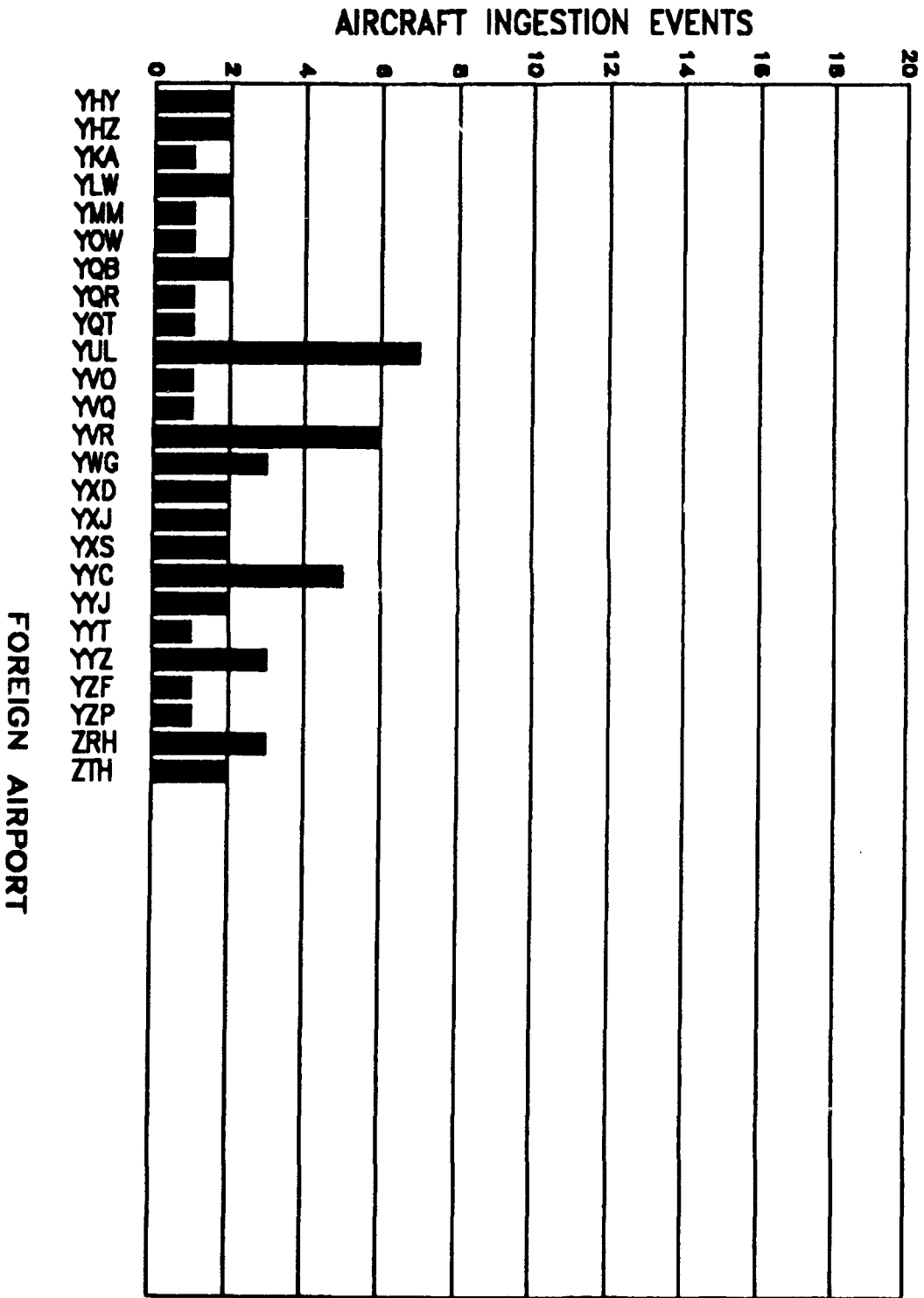


Figure 5.2. Histogram of Aircraft Ingestion Events at Foreign Airports  
(Continued).



**FOREIGN AIRPORT**

Figure 5.2. Histogram of Aircraft Ingestion Events at Foreign Airports  
(Concluded).

TABLE 5.2 AIRPORT BIRD INGESTION RATES  
(3 or More Aircraft Ingestion Events)

Airport Code	Scheduled Aircraft Operations	Aircraft Ingestion Events	Ingestion Rate Events/10K Ops	Airport Location
LAX	355	6	0.17	LOS ANGELES, CA, USA
DEN	332	4	0.12	STAPLETON INT'L, DENVER, CO, USA
CLT	331	3	0.09	CHARLOTTE, NC, USA
SFO	254	7	0.27	SAN FRANCISCO-OAKLAND, CA, USA
ORD	249	6	0.24	CHICAGO-O'HARE, IL, USA
EWB	247	4	0.16	NEWARK, NEW YORK, NY, USA
HOU	239	9	0.38	HOUSTON, TX, USA
LHR	238	5	0.21	LONDON HEATHROW, ENGLAND, (UK)
DAL	227	10	0.44	LOVE DALLS/FT. WORTH, TX, USA
SLC	221	3	0.14	SALT LAKE CITY, UT, USA
FRA	172	16	0.93	FRANKFURT, FRG
YYZ	136	3	0.22	TORONTO ONTARIO, CANADA
MDW	128	5	0.39	CHICAGO-MIDWAY, IL, USA
DAY	128	4	0.31	DAYTON, OH, USA
MUC	127	6	0.47	MUNICH, FRG
PHL	125	4	0.32	PHILADELPHIA/WILMINGTON, PA, USA
CLE	119	3	0.25	CLEVELAND, OH, USA
SJC	112	4	0.36	SAN JOSE, CA, USA
YVR	109	6	0.55	VANCOUVER, BC, CANADA
SAT	101	4	0.39	SAN ANTONIO, TX, USA
LGA	100	3	0.30	NEW YORK LA GUARDIA, NY, USA
BRU	100	9	0.89	BRUSSELS, BELGIUM
AUS	96	3	0.31	AUSTIN, TX, USA
DUS	96	13	1.35	DUESSELDORF, FRG
YYC	96	5	0.52	CALGARY ALBERTA, CANADA
MSY	91	4	0.44	NEW ORLEANS, LA, USA
AMS	89	14	1.56	AMSTERDAM, NETHERLANDS
CDG	86	3	0.34	PARIS DE GAULLE, FRANCE
TUL	85	3	0.35	TULSA, OK, USA
HAM	80	9	1.11	HAMBURG, FRG
OAK	77	3	0.39	OAKLAND, SAN FRANCISCO, CA, USA
WLG	75	4	0.53	WELLINGTON, NEW ZEALAND
DUB	71	3	0.42	DUBLIN, REPUBLIC OF IRELAND
SYD	71	4	0.56	SYDNEY, N.S.W., AUSTRALIA
AKL	70	3	0.43	AUCKLAND, NEW ZEALAND
MEL	69	4	0.57	MELBOURNE, VICTORIA, AUSTRALIA
CHC	68	7	1.03	CHRISTCHURCH, NEW ZEALAND
LGW	67	3	0.45	LONDON-GATWICK, ENGLAND
YUL	65	7	1.07	MONTREAL, QUEBEC, CANADA
ORF	64	5	0.77	NORFOLK-VA. BEACH, VA, USA
STR	59	7	1.17	STUTTGART, FRG
PDX	55	4	0.72	PORTLAND, OR, USA
LIH	54	8	1.47	LIHUE, KAUAI, HA, USA
DEL	50	5	1.00	DELHI, INDIA
BOM	48	4	0.83	BOMBAY, INDIA
JNB	48	3	0.62	JOHANNESBURG, SOUTH AFRICA
MAF	45	3	0.66	MIDLAND ODESSA, TX, USA
YWG	44	3	0.67	WINNIPEG, MAN., CANADA

TABLE 5.2 (Concluded) AIRPORT BIRD INGESTION RATES  
(3 or More Aircraft Ingestion Events)

Airport Code	Scheduled Airport Operations	Aircraft Ingestion Events	Ingestion Rate Events/10K Ops	Airport Location
ZRH	41,321	3	0.73	ZURICH, SWITZERLAND
PLZ	40,727	6	1.47	PORT ELIZABETH, SOUTH AFRICA
BEG	38,517	3	0.78	BELGRADE, YUGOSLAVIA
CCU	33,422	3	0.90	CALCUTTA, INDIA
ELS	31,567	5	1.58	EAST LONDON, SOUTH AFRICA
LIT	31,026	3	0.97	LITTLE ROCK, AK, USA
CPT	30,773	3	0.97	CAPE TOWN, SOUTH AFRICA
ITO	27,787	3	1.08	HILO HAWAII, HA, USA
BHM	26,703	4	1.50	BIRMINGHAM, AL, USA
LHE	25,548	3	1.17	LAHORE, PAKISTAN
ORY	25,127	4	1.59	PARIS - ORLY ARPT, FRANCE
KHI	25,124	3	1.19	KARACHI, PAKISTAN
DUR	24,288	5	2.06	DURBAN, SOUTH AFRICA
MAA	24,266	4	1.65	MADRAS, INDIA
MAN	24,179	4	1.65	MANCHESTER, ENGLAND (UK)
CGR	23,424	3	1.28	CAMPO GRANDE, BRAZIL
BLR	23,250	7	3.01	BANGALORE, INDIA
ISG	20,767	5	2.41	ISHIGAKI, JAPAN
AMD	17,076	7	4.10	AHMEDABAD, INDIA
LST	16,128	3	1.86	LAUNCESTON, TASMANIA, AUSTRALIA
COK	14,483	3	2.07	COCHIN, INDIA
BFN	14,158	7	4.94	BLOEMFONTEIN, SOUTH AFRICA
PAT	13,223	5	3.78	PATNA, INDIA
LKO	12,896	4	3.10	LUCKNOW, INDIA
KIM	12,859	3	2.33	KIMBERLEY, SOUTH AFRICA
JAI	12,680	4	3.15	JAI PUR, INDIA
MMY	12,276	10	8.15	MIYAKO, JIMA, JAPAN
NUE	11,527	3	2.60	NUREMBURG, FRG
MDQ	8,442	3	3.55	MAR DEL PLATA, ARGENTINA
VNS	8,302	8	9.64	VARANASI, INDIA
TRV	7,796	4	5.13	TRIVANDRUM, INDIA
TUC	7,106	3	4.22	TUCUMAN, ARGENTINA
BHI	6,974	3	4.30	BAHIA BLANCA, ARGENTINA
TNG	6,639	4	6.03	TANGIER, MOROCCO
HYD	6,582	7	10.64	HYDERABAD, INDIA
AGR	5,670	3	5.29	AGRA, INDIA
TFS	2,617	4	11.46	TENERIFFE-REINASOFIA, CANARY ISLAND
PIE	645	3	{*}	TAMPA-ST. PETERSBURG, FL, USA
BRS	18	3	{*}	BRISTOL, ENGLAND (UK)
LDE	18	3	{*}	LOURDES/TARBES, FRANCE
	6,710,177 (**)	416 (**)	0.62 (**)	

\* High proportion of unscheduled operations prevents calculation of meaningful ingestion rate

\*\* Does not include airports PIE, BRS and LDE

Unscheduled B737 operations are not reflected in the operations counts, whereas ingestion events occurring during either scheduled or unscheduled operations are included in the event counts. Therefore unscheduled B737 operations may account for the apparently higher ingestion rates.

The rates of bird ingestion events per aircraft operation summarized previously in Table 4.1A are twice the rates of bird ingestion events per airport operation. The number of reported foreign bird ingestion events exceeds the number of reported domestic ingestion events by a factor of 2.8; however, the number of foreign airport operations is slightly less than the number of domestic airport operations. The rate of reported bird ingestions per airport operation is 3.3 times higher at foreign airports than at domestic airports. This implies that either (1) there are far less birds in the environment of domestic airports, possibly due to environmental control programs, or (2) foreign airline operators are much more conscientious and cooperative in reporting bird ingestions.

## SECTION 6

### ENGINE DAMAGE DESCRIPTION

The type of damage incurred by well-defined engine bird ingestion events is useful in refining bird certification test criteria that could lead to improved engine design. In general, three parameters are used to describe engine damage and failure. The first is the type of damage incurred, the second is whether or not the engine failed, and the third is a description of the crew action taken during the engine ingestion event. The first part of this section provides descriptions of the types of damage incurred during the study, the relationships between engine damage and bird weight, engine damage and phase of flight, engine damage and aircraft airspeed, engine damage and multiple engine and multiple bird involvement, and the types of crew actions implemented as a result of the bird ingestion. The second part describes the statistical analysis of the relationship between bird weight and the likelihood of damage occurring in an engine ingestion event. The third part of this section provides estimates of the probabilities of a crew action or an engine shutdown. The fourth part describes the engine failures that were due to bird ingestions.

#### 6.1 ENGINE DAMAGE AND CREW ACTION DESCRIPTIONS.

The types of damage that were identified in the data base were grouped into 14 categories which are defined in Table 6.1. Within the year data collection period all 14 of the categories occurred. Tabulations of the occurrences of combinations of damage categories are presented in Table 6.2. The triangular top portion of the table provides tallies of co-occurrences for all pairs of damage categories. The number in the top portion represents the number of engine ingestion events in which both the row damage and the column damage occurred. The events in which more than two types of damage occurred were also included in the tallies of the top portion of Table 6.2. There were 41 events in which three types of damage occurred, 98 events in which two types of damage occurred, and 307 events with a single type of damage.

There are insufficient data in the top portion of Table 6.2 to make any strong statements about correlations between types of damage. There is some indication that bent and dented fan blades accompany core damage and broken and shingled fan blades and that leading edge fan blade damage accompanies fan blade shingling; however, these trends cannot be strongly substantiated because of the small amount of data. The observed trends could provide the starting point for further investigations into the damage mechanisms of bird ingestions.

The bottom half of Table 6.2 provides tallies of the number of engine ingestion events in which each damage category was the only type of damage and the total number of events that involved each of the damage categories. Fewer than three bent and dented blades, shingled blades, and broken blades seem more likely to occur by themselves than other types of damage. When more than three blades are bent or dented there is a much higher chance that some other type of damage will also occur. As with the trends identified in the top portion of Table 6.2, there is insufficient evidence to strongly substantiate these trends.

TABLE 6.1 DEFINITION OF ENGINE DAMAGE CATEGORIES

<u>DAMAGE CATEGORY</u>	<u>SEVERITY LEVEL</u>	<u>DAMAGE DEFINITION</u>
TRVSFRAC	Severe	Transverse fracture - fan blade broken chordwise (across) and piece liberated (includes secondary hard object damage).
CORE	Severe	Bent/broken compressor blades/vanes, blade/vane clash, blocked/disrupted airflow in low, intermediate, and high pressure compressors.
FLANGE	Severe	Flange separations.
TURBINE	Severe	Turbine damage.
BE/DE>3	Moderate	More than three fan blades bent or dented.
TORN>3	Moderate	More than three torn fan blades.
BROKEN	Moderate	Broken fan blades, leading edge and/or tip pieces missing, other blades also dented.
SPINNER	Moderate	Dented, broken, or cracked spinner (includes spinner cap).
RELEASED	Moderate	Released (walked) fan blades (blade retention mechanism broken).
TORN<3	Mild	Three or fewer torn fan blades.
SHINGLED	Mild	Shingled (twisted) fan blades.
NACELLE	Mild	Dents and/or punctures to the engine enclosure (includes cowl).
LEAD_EDG	Mild	Leading edge distortion/curl.
BEN/DEN	Mild	One to three fan blades bent or dented.



TABLE 6.2

TYPES OF DAMAGE CAUSED BY BIRD INGESTIONS

TRYSFRAC	11	CORE	0	FLANGE	0	TURBINE	2	BE/DE>3	1	TORN>3	0	BROKEN	0	SPINNER	0	RELEASED	0	TORN<3	1	SHINGLED	0	MACELLE	0	LEAD_EDG	6
CORE	2	FLANGE	2	TURBINE	0	BE/DE>3	11	TORN>3	1	BROKEN	13	SPINNER	0	RELEASED	3	TORN<3	0	SHINGLED	2	MACELLE	0	LEAD_EDG	8	BEN/DEN	6
FLANGE	0	TURBINE	0	BE/DE>3	0	TORN>3	0	BROKEN	14	SPINNER	0	RELEASED	4	TORN<3	0	SHINGLED	0	MACELLE	0	LEAD_EDG	1	BEN/DEN	0	6	
TURBINE	3	BE/DE>3	0	TORN>3	0	BROKEN	0	SPINNER	0	RELEASED	3	TORN<3	0	SHINGLED	0	MACELLE	0	LEAD_EDG	0	BEN/DEN	0	0	0	0	
BE/DE>3	2	TORN>3	0	BROKEN	0	SPINNER	0	RELEASED	5	TORN<3	0	SHINGLED	0	MACELLE	0	LEAD_EDG	0	BEN/DEN	0	0	0	0	0	0	
TORN>3	6	BROKEN	0	SPINNER	0	RELEASED	0	TORN<3	0	SHINGLED	0	MACELLE	0	LEAD_EDG	0	BEN/DEN	0	0	0	0	0	0	0	0	
BROKEN	0	SPINNER	0	RELEASED	0	TORN<3	0	SHINGLED	0	MACELLE	0	LEAD_EDG	0	BEN/DEN	0	0	0	0	0	0	0	0	0	0	
SPINNER	3	RELEASED	4	TORN<3	0	SHINGLED	0	MACELLE	0	LEAD_EDG	0	BEN/DEN	0	0	0	0	0	0	0	0	0	0	0	0	
RELEASED	0	TORN<3	2	SHINGLED	3	MACELLE	0	LEAD_EDG	1	BEN/DEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
TORN<3	2	SHINGLED	3	MACELLE	0	LEAD_EDG	0	BEN/DEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
SHINGLED	0	MACELLE	0	LEAD_EDG	0	BEN/DEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
MACELLE	0	LEAD_EDG	1	BEN/DEN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
LEAD_EDG	6	BEN/DEN	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BEN/DEN	7	ONLY DAMAGE	9	37	79	2	30	70	1	11	6	87	157	5	31	98	29	44	7	9	3	2	3	2	
ONLY DAMAGE	29	TOTAL	44	79	2	30	70	1	11	6	87	157	5	31	98	29	44	7	9	3	2	3	2	3	
TOTAL	7	TRYSFRAC	9	37	79	2	30	70	1	11	6	87	157	5	31	98	29	44	7	9	3	2	3	2	

Tables 6.3 and 6.4 describe the relationship between the weight of the ingested bird and the resulting engine damage. Table 6.3 shows the number of both multiple and single bird engine ingestion events as well as the total number of events with and without reported damage in each specified bird weight range where the bird was positively identified by an ornithologist. Engine damage summaries are shown in Tables 6.4A for all engine ingestion events, 6.4B for single bird events, and 6.4C for multiple bird events. These tables were made by tallying the damage codes from the events shown in Table 6.3 in each specified bird weight range.

Since many of the engine ingestion events have multiple damage categories, the total number of damage categories does not equal the number of engine ingestion events. Tables 6.4A, 6.4B and 6.4C also show the damage sustained by those engines that were considered to have failed due to the bird ingestion. (See section 6.4 for more information on engine failure.)

The amount of data available is insufficient to draw any correlations between the weight of the ingested bird and the type of damage that occurs. However, Table 6.4A shows that 48 percent of the ingestions (62) in which the bird weighed less than or equal to 24 ounces caused no damage. In comparison only 14 percent of the birds ingested that weighed more than 24 ounces caused no engine damage.

The relationship between engine damage, phase of flight and aircraft airspeed is shown in Tables 6.5 and 6.6. Table 6.5 depicts the relationship between engine damage and phase of flight. Of the 744 known phase of flight engine ingestion events, 64 percent occurred on takeoff and climb and 33 percent occurred during approach and landing. Fifty-two percent of the engine ingestion events that took place during takeoff and climb resulted in engine damage; in comparison, only 29 percent resulted in damage during approach and landing. This suggests a relationship between engine speed (thrust) and bird ingestion engine damage, since engine speed would typically be higher during takeoff and climb than during approach and landing. However, engine speed or power was rarely reported during the study. It should be noted that 35 engine failures occurred during takeoff and climb and only 2 engine failures occurred during approach and landing.

Table 6.6 shows the number of engine ingestion events and the number of damaging engine ingestions known to have occurred below 140 knots airspeed and at or above 140 knots. The table also shows the phase of flight that these damaging engine ingestions occurred in those airspeed ranges. There were 12 percent (48 percent versus 36 percent respectively) more engine ingestions that resulted in engine damage at or above 140 knots airspeed than those that occurred below 140 knots. It is also shown that a significantly greater number of damaging ingestions occurred during takeoff and climb than during approach and landing at both aircraft airspeed ranges.

Multiple engine and multiple bird ingestion events present the greatest hazard to aircraft. Table 6.7 shows the number of these events that occurred. Thirty-one aircraft had bird ingestions into both engines during the same event, and eight events resulted in damage to both engines. There were also five events where multiple birds were ingested into both engines; potentially the most hazardous bird ingestion condition an aircraft can encounter.

TABLE 6.3. TALLY OF POSITIVELY IDENTIFIED BIRD SPECIES BY WEIGHT RANGE AND EVENT TYPE

<u>Weight Range (oz.)</u>	<u>Total Bird Events</u>	<u>Bird Identifications*</u>	
		<u>Single Bird Events</u>	<u>Multiple Bird Events</u>
0 < x ≤ 8	70	59	11
8 < x ≤ 16	49	39	10
16 < x ≤ 24	11	9	2
24 < x ≤ 32	10	10	0
32 < x ≤ 40	15	10	5
x > 40	12	11	1
<b>Total</b>	<b>167</b>	<b>138</b>	<b>29</b>

\*One counted for each engine ingestion event

TABLE 6.4A. 737 AIRCRAFT ENGINE BIRD INGESTION DAMAGE SUMMARY  
(TOTAL BIRD EVENTS)\*

Severity	Damage Category	Bird Weight Range (oz.)					
		(0<x≤8)	(8<x≤16)	(16<x≤ 24)	(24<x≤32)	(32<x≤40)	(x>40)
	None	41	17	4	1	2	2
	Damage Unknown	1	2	0	1	0	0
	Other	0	3	0	1	0	0
Mild							
	Lead-Edg	2	5	2	1/1	3	0
	Shingled	10	10/1	1	1	4/2	4/1
	Ben/Den	16/1	9/1	3	1	2	2
	Torn<3	0	1	0	0	0	1
	Nacelle	1	0	0	2	0	0
Moderate							
	Be/De>3	5	8/3	2/2	0	5/3	4
	Torn>3	0	0	0	0	1/1	0
	Broken	4/1	5/2	2/1	4/1	2/1	2
	Spinner	0	0	0	0	0	0
	Released	0	3/2	0	0	2/1	0
Severe							
	Trvs Frac	3/3	6/6	1/1	2/2	2/2	1/1
	Core	2/1	7/6	2/2	1/1	0	3
	Flange	0	1/1	0	1/1	0	0
	Turbine	1/1	2/2	0	0	0	0

\*Number of occurrences/number of occurrences when engine failed

TABLE 6.4B. 737 AIRCRAFT ENGINE BIRD INGESTION DAMAGE SUMMARY  
(SINGLE BIRD EVENTS)\*

<u>Severity</u>	<u>Damage Category</u>	<u>Bird Weight Range (oz.)</u>					
		(0<x≤8)	(8<x≤16)	(16<x≤ 24)	(24<x≤32)	(32<x≤40)	(x>40)
	None	38	16	3	1	2	2
	Damage Unknown	1	2	0	1	0	0
	Other	0	1	0	1	0	0
<b>Mild</b>							
	Lead-Edg	1	3	1	1/1	3	0
	Shingled	7	7/1	1	1	0	3/1
	Ben/Den	12	8/1	2	1	1	1
	Torn<3	0	1	0	0	0	1
	Nacelle	1	0	0	2	0	0
<b>Moderate</b>							
	Be/De>3	2	3/1	2/2	0	4/2	4
	Torn>3	0	0	0	0	1/1	0
	Broken	3	5/2	2/1	4/1	2/1	1
	Spinner	0	0	0	0	0	0
	Released	0	1/1	0	0	1	0
<b>Severe</b>							
	Trvs Frac	2/2	4/4	1/1	2/2	1/1	1/1
	Core	2/1	3/2	2/2	1/1	0	3
	Flange	0	1/1	0	1/1	0	0
	Turbine	1/1	0	0	0	0	0

\*Number of occurrences/number of occurrences when engine failed

TABLE 6.4C. 737 AIRCRAFT ENGINE BIRD INGESTION DAMAGE SUMMARY  
(MULTIPLE BIRD EVENTS)\*

Severity	Damage Category	Bird Weight Range (oz.)					
		(0<x≤8)	(8<x≤16)	(16<x≤ 24)	(24<x≤32)	(32<x≤40)	(x>40)
	None	3	1	1	0	0	0
	Damage Unknown	0	0	0	0	0	0
	Other	0	2	0	0	0	0
<b>Mild</b>							
	Lead-Edg	1	2	1	0	0	0
	Shingled	3	3	0	0	4/2	1
	Ben/Den	4/1	1	1	0	1	1
	Torn<3	0	0	0	0	0	0
	Nacelle	0	0	0	0	0	0
<b>Moderate</b>							
	Be/De>3	3	5/2	0	0	1/1	0
	Torn>3	0	0	0	0	0	0
	Broken	1/1	0	0	0	0	1
	Spinner	0	0	0	0	0	0
	Released	0	2/1	0	0	1/1	0
<b>Severe</b>							
	Trvs Frac	1/1	2/2	0	0	1/1	0
	Core	0	4/4	0	0	0	0
	Flange	0	0	0	0	0	0
	Turbine	0	2/2	0	0	0	0

\*Number of occurrences/number of occurrences when engine failed

TABLE 6.5. PHASE-OF-FLIGHT (POF) ANALYSIS

	Known POF Aircraft Events/ Engine Ingestions <u>(718/744)</u>	Known POF Damaging Aircraft Events/ Engine Ingestions <u>(319/330)</u>	Known POF Engine Failure Ingestions <u>(37)</u>
Takeoff and Climb	458/476	241/249	35
Approaching and Landing	240/248	68/71	2

TABLE 6.6. AIRCRAFT AIRSPEED ANALYSIS

Aircraft <u>Airspeed</u>	Known Speed Engine Ingestions <u>(339)</u>	Known Speed Engine Ingestions, Takeoff And Climb <u>(219)</u>	Known Speed Engine Ingestions, Landing And Approach <u>(105)</u>
< 140 Knots	217	123	84
≥ 140 Knots	122	96	21

Aircraft <u>Airspeed</u>	Known Speed Damaging Engine Ingestions (138) <u>(138)</u>	Known Speed Damaging Engine Ingestions, Takeoff And Climb (113) <u>(113)</u>	Known Speed Damaging Engine Ingestions, Landing And Approach (25) <u>(25)</u>
< 140 Knots	79	59	20
≥ 140 Knots	59	54	5

TABLE 6.7. MULTIPLE ENGINE AND MULTIPLE BIRD ANALYSIS

	Aircraft Events/ Engine Ingestions <u>(718/744)</u>	Damaging Engine Ingestions <u>(319/330)</u>	Engine Failure Ingestions <u>(37)</u>
Multiple Engine	31/62	26/8*	2
Multiple Bird	84/89	52	9
Single Bird	992/1018	442	31

\*Aircraft events where more than one engine damaged

Table 6.7 also gives the number of engine ingestion events where more than one bird was ingested into the engine. Of the 89 multiple bird engine ingestions that occurred, 58 percent of the ingestions resulted in some engine damage. In comparison only 43 percent of the engines that ingested a single bird resulted in some engine damage. Ten percent of the multiple bird ingestions resulted in engine failures compared to only three percent of the single bird ingestions.

There were four types of crew action identified in connection with the aircraft ingestion events in the data base. An air turnback was performed in 105 of the events, the takeoff was aborted 99 times, a diversionary maneuver was performed 14 times, and in two events the crew action was listed as "other" without specifying the type of action taken. There was no crew action taken in 463 of the aircraft ingestion events for which a crew action entry was recorded, which was nearly 70 percent of the time. (One airplane crashed on takeoff.) The crew action should correspond to the phase of flight in which the event occurred. No change in the flight is usually required when an ingestion occurs during a landing maneuver. The aborted takeoffs and air turnbacks would most likely occur during takeoff and climb phases since there were practically no ingestions during the cruise phase. However, there was one air turnback as a result of a bird ingestion during the cruise phase.

## 6.2 PROBABILITY OF DAMAGE.

One of the key questions that inspired the bird ingestion survey is the issue of what weight bird should be considered for certification test criteria. Two of the main issues in deciding what the certification bird size should be are (1) the likelihood of ingesting a bird of the certification size or larger and (2) the likelihood that damage will result from ingesting a bird of a specified weight. The issue of bird weights is discussed in Sections 3 and 7 while the probability of damage is the topic of this section.

The problem of relating bird weight to the probability of damage (POD) is similar to bio-assay experiments which try to predict the probability of a response as a function of dose size. The key elements of similarity are that the probability of success for a dichotomous (pass/fail) trial is related to a continuous stimulus variable. In bird ingestions, the dichotomous trial is whether or not damage occurs and the stimulus variable is the weight of the ingested bird.

Linear logistic analysis is the most commonly used method of analyzing the dosage-response type of data and has been used successfully in relating the probability of transparencies breaking as a function of projectile size in dealing with the problem of propwash blown gravel breaking helicopter windshields [9]. The logistic distribution function is assumed to describe the relationship between the probability of damage and the bird weight in a linear logistic analysis. The logistic distribution function is given by:

$$\text{POD}(w) = 1 / \{1 + \exp[-(\pi/\sqrt{3})(w-\mu)/\sigma]\} \quad (6.1)$$

where  $w$  is the bird weight,  $\mu$  is the weight with a 50 percent chance of causing damage and  $\sigma$  is a parameter that is related to the steepness of the POD function.



The estimation of the function given in Equation 6.1 has been extensively studied, and the methods have been described in the literature [10,11]. The method of maximum likelihood provides the best estimates for the type of data in the bird ingestion study since there are only a few ingestions at each weight. The software for estimating the parameters of Equation 6.1 has been developed and extensively tested at the University of Dayton Research Institute [12] and verified by researchers at other institutions.

The types of damage were categorized as mild, moderate, or severe by the FAA. Table 6.8 itemizes the types of damage that were included in each of the severity categories. Three distinct analyses were conducted based on the severity ratings. The three analyses estimated the probability of any damage, the probability of at least moderate damage, and the probability of severe damage as a function of bias weight. Figures 6.1, 6.2, and 6.3 show the estimated POD functions along with confidence bounds on the POD functions for the three analyses. Note that the figures are based on the weight of one ingested bird per event, not the total weight of all birds ingested in the case of a multiple bird ingestion event.

Figure 6.1 shows the probability of any damage occurring and includes all three severity levels as positive responses. The probability of any damage occurring rises very steeply reaching 50 percent at about 6.0 ounces and the curve levels off at the 90 percent level at about 70 ounces. The relationship between bird weight and the probability of any damage is very strong and results in the confidence bound being close to the mean trend curve.

The probability of moderate damage does not rise quite so steeply, and a definitive weight cutoff between birds that cause damage and those that do not cause damage cannot be identified. The probability of moderate damage reaches 50 percent at 33 ounces and remains below 80 percent through the weight range collected in this study. The confidence bound shown in Figure 6.2 is further from the mean trend than the confidence bound in Figure 6.1 because the trend in the probability of moderate damage as a function of bird weight is not as strong as the trend in the probability of any damage.

The probability of severe damage and its confidence bound are plotted in Figure 6.3 as functions of bird weight. The probability of severe damage is much lower than the probabilities of any damage or moderate damage. As a result, the curves are much flatter and rise much more slowly than the curves in Figures 6.1 and 6.2. The probability of severe damage remains below 40 percent through the weight range collected in this study.

The probability of damage analysis is clouded by the poor bird identification rates. The estimated POD functions are likely to be biased toward higher POD values since there was a larger proportion of birds identified when engine damage occurred. The extent of the bias cannot be estimated accurately.

### 6.3 CREW ACTION AND ENGINE SHUTDOWN PROBABILITIES.

Two other factors that relate to the severity of engine damage are whether or not a crew action is required and whether or not an engine was shut down as a result of the ingestion. Table 6.9 lists the conditional probabilities that a crew action is required given the severity of damage that the engine incurs.

TABLE 6.8 DAMAGE SEVERITY DEFINITIONS

SEVERITY LEVEL	DAMAGE DEFINITION
SEVERE DAMAGE	Damage classified as severe. Achieved when reported damage category is TRVSFRAC, CORE, FLANGE, or TURBINE.
MODERATE DAMAGE	Damage classified as moderate. Achieved when reported damage category is BE/DE>3, TORN>3, BROKEN, SPINNER, or RELEASED <b>AND</b> no SEVERE damage has been reported.
MILD DAMAGE	Damage classified as mild. Achieved when reported damage category is LEAD_EDG, BEN/DEN, TORN<3, SHINGLED, or NACELLE <b>AND</b> neither SEVERE nor MODERATE damage has been reported.

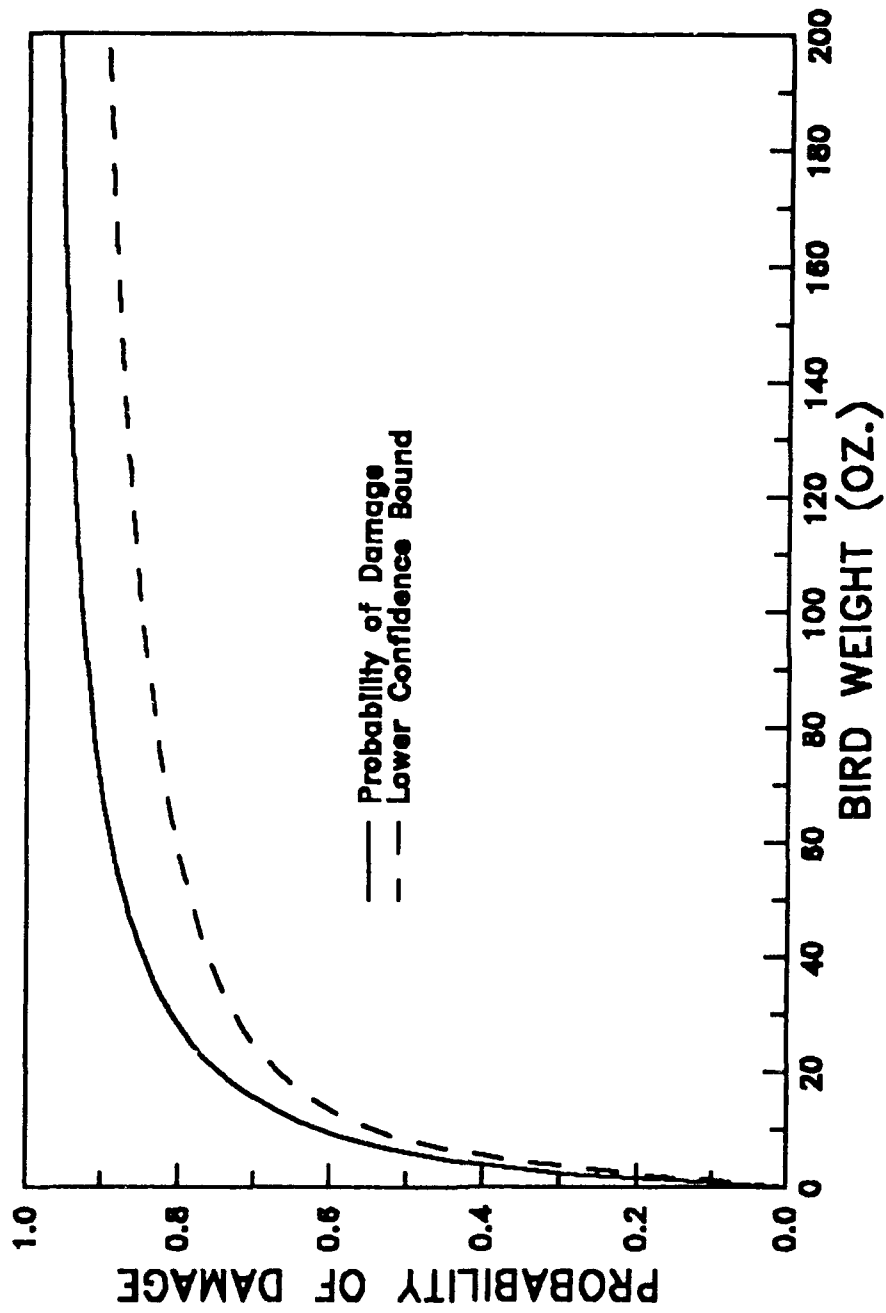


Figure 6.1.1. Estimated POD Function for any Damage with the 95 Percent Confidence Bound.

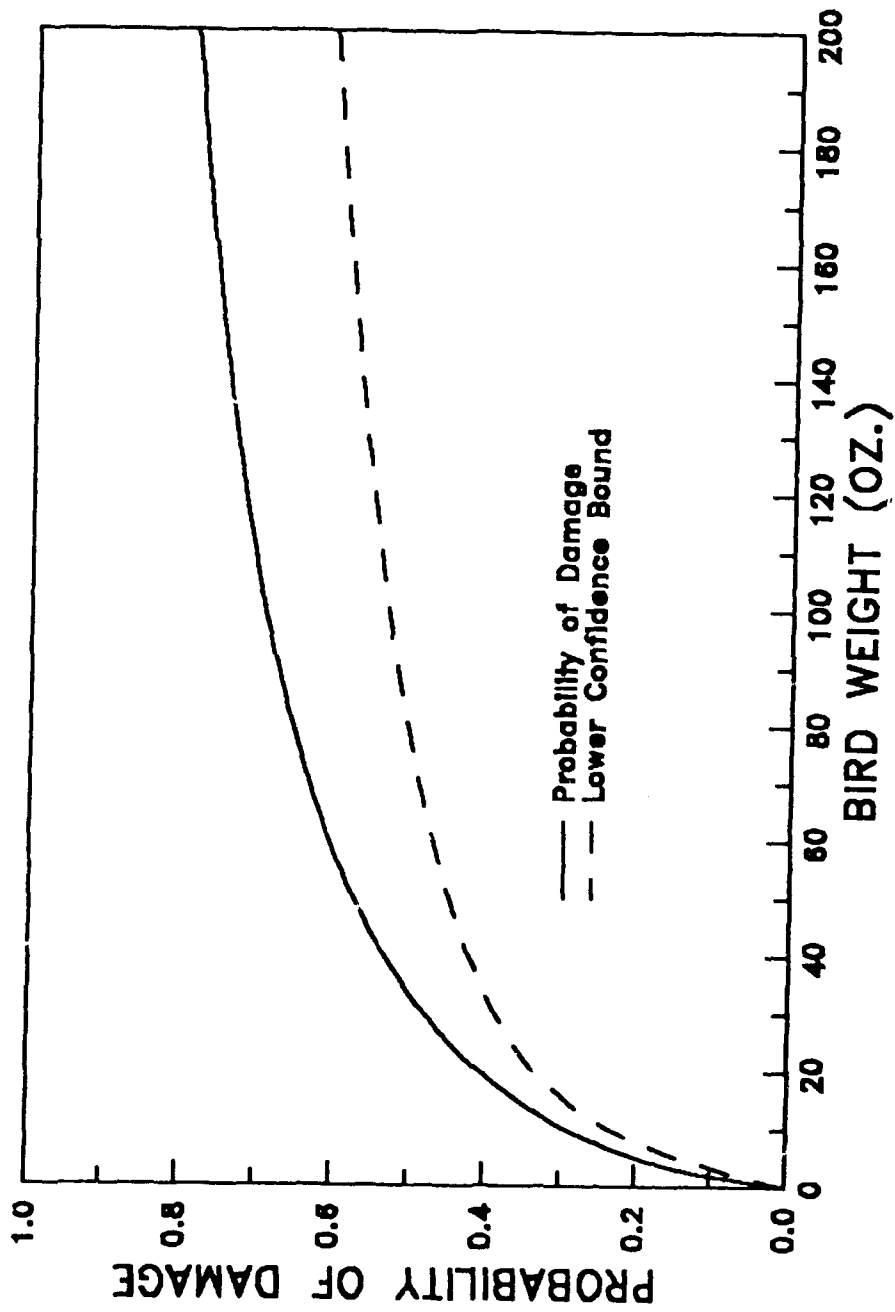


Figure 6.2 Estimated POD Function for Moderate or Worse Damage with the 95 Percent Confidence Bound.

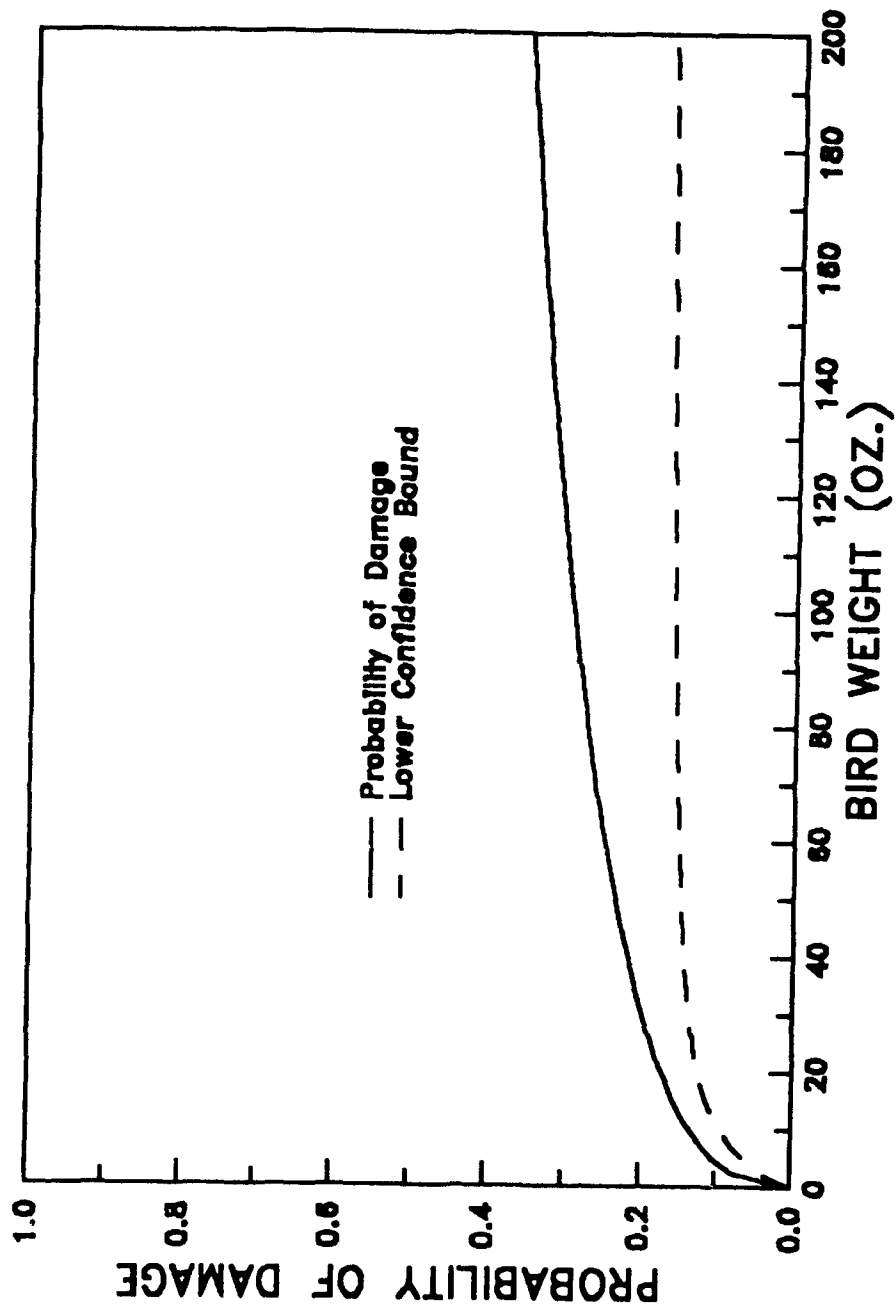


Figure 6.3 Estimated POD Function for Severe Damage with the 95 Percent Confidence Bound.

TABLE 6.9

CONDITIONAL PROBABILITY OF CREW ACTION  
GIVEN THE ENGINE DAMAGE SEVERITY

<u>ENGINE DAMAGE SEVERITY</u>	<u>PROBABILITY OF CREW ACTION P(CA)</u>	<u>UPPER CONFIDENCE BOUND</u>
NO DAMAGE	.145	.173
ANY DAMAGE	.283	.326
AT LEAST MODERATE DAMAGE	.400	.488
SEVERE DAMAGE	.571	.755

The probability that a crew action is required increases with the severity of engine damage, as expected. The third column of Table 6.9 contains the upper 95 percent confidence bound on the conditional probabilities given in column two.

The formula for the estimates of the conditional probability of a crew action given the engine damage severity are:

$$\hat{P} = \frac{C}{N_s} \quad (6.2)$$

$$P_{CB} = \hat{P} + 1.645 \sqrt{\frac{\hat{P}(1-\hat{P})}{N_s}} \quad (6.3)$$

In Equations (6.2) and (6.3),  $P$  is the estimated conditional probability of a crew action,  $C$  is the number of aircraft ingestion events in which a crew action was taken and an engine sustained the given severity level,  $N_s$  is the number of aircraft ingestion events in which an engine sustained the given severity level and  $P_{CB}$  is the upper confidence bound on the conditional probability. The constant 1.645 is derived from the cumulative normal distribution function to give a 95 percent level of confidence.

An in-flight engine shutdown occurred in 40 of the 1,076 aircraft ingestion events (which corresponds to an estimated probability of an in-flight engine shutdown given that an ingestion has occurred of 0.037 with a 95 percent confidence bound of 0.048). The reason for the shutdown was not known in 19 of the events. An involuntary shutdown occurred seven times. Excessive vibration precipitated the shutdown nine times. The engine was shut down because of incorrect engine pressure ratio three times, incorrect engine parameter readings once, and high exhaust gas temperature twice. Inferences about the causes of in-flight shutdowns cannot be drawn because of the large proportion of shutdowns in which the cause was not identified.

#### 6.4 ENGINE FAILURES.

Engine failures are important areas to consider when analyzing these engine bird ingestion events. For the purpose of this study an engine failure was considered to have occurred when an engine was not able to produce and maintain usable thrust of at least 50 percent. A transverse fan blade fracture and an involuntary engine in-flight shutdown were considered to be engine failures in all cases. Otherwise an engineering judgement was made based on the extent of engine damage, effect on flight, phase of flight, and any other factors that may have been provided in the description of the event or investigation summary.

Table 6.10 provides a summary of some of the important data categories for the engine ingestion events that resulted in an engine failure. The conditional probability of an engine failure given that an ingestion has occurred is 0.038 with a lower 95 percent confidence bound of 0.029. The lower confidence bound was calculated using the Z statistic for proportions. The overall engine failure rate for the 737 aircraft due to bird ingestion was 0.005 failures per ten thousand aircraft operations.

TABLE 6.10. ENGINE FAILURE SUMMARY BY BIRD WEIGHT

<u>Bird (oz.) Weight</u>	<u>Number of Birds</u>	<u>Damage Code</u>	<u>Phase of Flight</u>	<u>Power Loss</u>	<u>In-Flight Shutdown</u>	<u>Crew Action</u>
1.5	1	A,O	Takeoff	Epr Dec	Vibes	ATB
4.0	--	A,I	---	---	---	--
4.0	--	A,I,K	Takeoff	Compressor	No	ATO
7.0	*	A,C,G,I	Takeoff	Compressor	Parameters	ATB
10.1	*	A,I,K	Takeoff	Compressor	Vibes	ATB
11.5	6	A,D,K,O	Takeoff	Compressor	Involuntary	Crashed
11.5	8	A,D,K,O	Takeoff	Compressor	Involuntary	Crashed
12.0	1	A,I,M	Takeoff	Yes	Involuntary	ATB
14.0	1	A,G,I,K	Takeoff	Compressor	---	ATB
14.0	1	A,C,G,I	Takeoff	---	---	ATO
14.0	3	A,I,K,N	Takeoff	Compressor	Egt	ATB
15.0	1	A,D,H	Takeoff	Compressor	Involuntary	ATB
16.0	1	A,I,K,N	Takeoff	Compressor	Involuntary	ATB
22.0	1	A,D,G,K	Takeoff	None	No	ATB
24.0	1	A,D,I,K	Takeoff	Compressor	Voluntary	ATB
28.0	1	A,B,G,K	Takeoff	Spool Down	Involuntary	ATB
28.0	1	A,I,M	Takeoff	---	No	ATO
32.0	1	A,I	Takeoff	Epr Dec	Yes	DIV
38.4	1	A,D,G	Takeoff	---	No	ATO
40.0	1	A,D,F,I	Climb	---	---	ATB
40.0	2	A,D,H	Takeoff	Compressor	Yes	DIV
40.0	*	A,H,I,N	Takeoff	Compressor	Voluntary	ATB
80.0	1	A,H,I	Takeoff	Compressor	Yes	ATB
---	--	A,C,G,I	---	---	---	None



TABLE 6.10. ENGINE FAILURE SUMMARY BY BIRD WEIGHT (Continued)

<u>Bird (oz.) Weight</u>	<u>Number of Birds</u>	<u>Damage Code</u>	<u>Phase of Flight</u>	<u>Power Loss</u>	<u>In-Flight Shutdown</u>	<u>Crew Action</u>
---	---	A,Q	Climb	Spool Down	Involuntary	ATB
---	---	A,G,K	Takeoff	---	Vibes	ATO
---	1	A,I,K,Q	Takeoff	---	No	ATB
---	---	A,I,P	Takeoff	---	No	ATO
---	---	A,C,I,K	Takeoff	---	No	None
---	1	A,F,I	Takeoff	Compressor	Vibes	ATB
---	1	A,B,G,P	Takeoff	None	No	ATO
---	---	A,I,	---	---	---	---
---	*	A,I,K,Q	Takeoff	Compressor	No	ATO
---	1	A,I	Takeoff	Yes	Yes	ATO
---	---	A,I	Takeoff	---	No	---
---	1	A,D,G,K	Approach	Yes	Epr	---
---	1	A,C,G,I	Takeoff	---	---	---
---	---	A,I	---	---	---	---
---	---	A,C,G,I	Landing	None	No	---
---	---	A,I	---	---	---	---
---	2	A,D	Takeoff	Compressor	No	ATO
---	---	A,D,G,K	Takeoff	Compressor	Yes	ATO

\*Means more than one bird ingested but the exact count is unknown.

Note: A description of the columns and column contents can be found in Appendix B.

Table 6.10 shows that a voluntary or involuntary in-flight shutdown of the engine occurred in 21 of the 42 engine failures. There was also a power loss associated with 89 percent of the engine failures where there was information reported in the power loss category. The most significant cause of engine failures appears to be transverse fan blade fracture which caused 27 of the 42 engine failures.

Reviewing the bird threat data for these engine failures shows that the species of bird was identified and an estimated weight available in only 23 of the 42 engine failure events. The percentage of identifications is too low to allow statistical inferences about bird weights. The trend for the weights that are available is that the birds ingested in failure events are heavier than the birds ingested in all events. The mean of the weights for the birds that were identified in failure events is 29.8 ounces; which is 11.5 ounces heavier than the overall mean. The higher mean for the failure events should be interpreted as a pointer to a possible trend that should be investigated further since the weight identifications are low.

Thirty-one of the engine failures were caused by the ingestion of a single bird and nine were caused by the ingestion of multiple birds. This is a much higher percentage than the fraction of all ingestion events which involved multiple birds. This suggests that engine failure is more likely in cases of multiple bird ingestion. Also, in 5 of the 23 engine failures where the bird weight was known, the bird or birds weighed more than 2 pounds. However, 13 were caused by birds that weighed less than or equal to 1 pound. Comparing this with the number of engine ingestions where the bird weight was known (Table 6.3), shows that 19 percent and 11 percent of the engine ingestion events resulted in engine failures when the bird weighed more than 2 pounds and less than or equal to 1 pound, respectively.

Almost all of the failure events occurred during takeoff (33) with two failures during the climb, one during the approach, and one during landing. The phase of flight was unknown in five of the failure events. The engine location was split almost in half with 22 failures occurring in the left engine and 20 in the right.

## SECTION 7

### PROBABILITY ESTIMATES

This section provides a summary of the probabilities of various bird ingestion events. The probability of an event is a measure of the likelihood that the event will occur. The probabilities in this section are calculated on a per operation basis and present similar information to the ingestion rates. The ingestion rates that were presented in Section 4 were calculated on the basis of 10,000 aircraft operations; however, it was shown in Section 4.2 that the per operation ingestion rate is equal to the probability of ingestion for a single operation. This section provides more details on the probabilities of various categories of bird ingestion events.

Table 7.1 provides the estimated probabilities and 95 percent confidence bounds for the whole B737 fleet for various aircraft ingestion events. The overall likelihood of an aircraft ingestion event in a single operation is slightly more than one in ten thousand; and although the odds of having a bird ingestion on any one operation are very small, there are millions of B737 operations each year so that hundreds of ingestions are expected each year. Most ingestions occur during the takeoff and landing phases so that the probabilities for takeoff and climb and the approach and landing phases are relatively large. Dual engine and multiple bird ingestions are relatively rare (which is reflected in the smaller probabilities for these events).

The inlet area effect on aircraft ingestion probabilities is shown in Table 7.2 which separates the probabilities by location and engine. The probabilities for the CFM International CFM56 are always larger than the corresponding probabilities for the Pratt and Whitney JT8D. The larger probabilities for the CFM56 are expected since the inlet area of the CFM56 is nearly twice the inlet area of the JT8D.

The probability of an ingestion that causes moderate or severe engine damage ( $POI_d$ ) is calculated with respect to engine operations, not aircraft operations. Moderate or severe engine damage occurred in 175 (49 domestic, 125 foreign, 1 unknown) of the 1,107 engine ingestion events reported in the data collection period. The respective worldwide, domestic, and foreign  $POI_d$  values for the B737 fleet are  $0.98 \times 10^{-5}$ ,  $0.50 \times 10^{-5}$ , and  $1.53 \times 10^{-5}$ . The respective worldwide, domestic, and foreign 95 percent confidence bounds on the  $POI_d$  values are  $1.11 \times 10^{-5}$ ,  $0.64 \times 10^{-5}$ , and  $1.78 \times 10^{-5}$ .

The effect of bird weight on the probabilities is estimated in Tables 7.3 and 7.4. The entries in Tables 7.3 and 7.4 were calculated by multiplying the overall probability for each location/engine combination by the relative frequency of each bird weight range. The relative frequencies for bird weight ranges were derived from the weights of positively identified birds and are based on the number of events that involved birds in each weight range, not the total number of birds ingested. The validity of this calculation depends on the randomness of bird identifications, as discussed in Section 3. Table 7.3 provides a breakdown of the probability of ingestion ( $POI$ ) by location and engine while Table 7.4 combines the two engine types. The calculations in Tables 7.3 and 7.4 were made on both an aircraft operation basis (Tables 7.3A and 7.4A) and an engine operation basis (Tables 7.3B and 7.4B). Tables 7.4A

and 7.4B show that the worldwide probability of ingesting one or more birds as a function of bird weight is  $0.308 \times 10^{-5}$  and  $0.149 \times 10^{-5}$ , respectively, at the 44- to 48-ounce weight range for the B737 aircraft fleet. Above this weight range the probability of ingestion decreases.

TABLE 7.1 AIRCRAFT OPERATION INGESTION PROBABILITIES

<u>CONDITION</u>	<u>AIRCRAFT INGESTION EVENTS</u>	<u>PROBABILITY OF INGESTION</u> *	<u>CONFIDENCE BOUND</u> *
All Flights	1,071	12.02	12.64
Takeoff & Climb <sup>†</sup>	687	7.71	8.21
Approach & Landing <sup>†</sup>	357	4.01	4.37
Dual Engine / Single Bird Per Engine	20	0.22	0.33
Dual Engine / Multiple Birds	11	0.12	0.20
Multiple Birds / Single Engine	73	0.82	0.99

\* Scaled by  $10^5$

† Contains prorated apportionment of events with unknown phase of flight

TABLE 7.2 AIRCRAFT OPERATION INGESTION PROBABILITIES\* BY LOCATION AND ENGINE TYPE  
(BASED ON AIRCRAFT INGESTION EVENTS)

	JT8D ENGINE			CFM56 ENGINE		
	UNITED STATES	FOREIGN	WORLDWIDE	UNITED STATES	FOREIGN	WORLDWIDE
Aircraft Operations:	3,250,431	3,145,832	6,396,263	1,578,741	935,849	2,514,590
<u>Condition Under Consideration</u>	<u>Ing Ingestion Evt Prob'lity</u>	<u>Ing Ingestion Evt Prob'lity</u>	<u>Ing Ingestion Evt Prob'lity</u>	<u>Ing Ingestion Evt Prob'lity</u>	<u>Ing Ingestion Evt Prob'lity</u>	<u>Ing Ingestion Evt Prob'lity</u>
All Flights	132 4.06	572 18.18	705 <sup>†</sup> 11.02	147 9.31	218 23.29	366 <sup>†</sup> 14.56
Takeoff And Climb Phases	105 3.23	372 11.83	478 <sup>†</sup> 7.47	88 5.57	118 12.61	207 <sup>†</sup> 8.23
Approach And Landing Phases	25 0.77	192 6.10	217 3.39	53 3.36	87 9.30	140 5.57
Dual Engine - Single Bird Events	2 0.06	7 0.22	9 0.14	4 0.25	7 0.75	11 0.44
Multiple Birds - Single Engine Events	6 0.18	42 1.34	48 0.75	4 0.25	20 2.14	24 0.95
Multiple Birds - Dual Engine Events	3 0.09	4 0.13	7 0.11	2 0.13	2 0.21	4 0.16

\* Ingestion probabilities scaled by 10<sup>5</sup>  
<sup>†</sup> Geographic region unknown for 1 takeoff event  
<sup>††</sup> Engine type unknown for 1 landing event

TABLE 7.3A  
 PROBABILITY OF INGESTION\* AS A FUNCTION OF BIRD WEIGHT BY LOCATION AND ENGINE TYPE  
 (BASED ON AIRCRAFT OPERATIONS)

Bird Wt Range (Oz.)	JT8D ENGINE			CFM56 ENGINE		
	US	FOREIGN	WORLDWIDE	US	FOREIGN	WORLDWIDE
Aircraft Ops:	3,250,431	3,145,832	6,396,263	1,578,741	935,849	2,514,590
( 0 < X ≤ 4)	1.740	2.157	2.580	3.853	2.055	3.465
( 4 < X ≤ 8)	0.696	4.623	2.462	0.321	6.166	2.310
( 8 < X ≤ 12)	---	2.157	0.821	0.321	7.536	2.772
(12 < X ≤ 16)	0.580	1.849	1.290	2.248	2.741	2.541
(16 < X ≤ 20)	0.116	0.925	0.469	---	2.055	0.693
(20 < X ≤ 24)	0.116	0.616	0.352	0.321	---	0.231
(24 < X ≤ 28)	0.116	0.925	0.469	0.321	0.685	0.462
(28 < X ≤ 32)	---	1.283	0.469	---	---	---
(32 < X ≤ 36)	---	---	---	0.642	1.370	0.924
(36 < X ≤ 40)	0.348	1.541	0.938	0.963	---	0.693
(40 < X ≤ 44)	---	---	---	0.321	---	0.231
(44 < X ≤ 48)	---	0.925	0.352	---	0.685	0.231
(52 < X ≤ 56)	0.232	---	0.235	---	---	---
(76 < X ≤ 80)	---	0.308	0.117	---	---	---
(84 < X ≤ 88)	---	0.308	0.117	---	---	---
(124 < X ≤ 128)	0.116	---	0.117	---	---	---
(188 < X ≤ 192)	---	0.308	0.117	---	---	---
(212 < X ≤ 216)	---	0.308	0.117	---	---	---
All Weights†	4.061	18.183	11.022	9.311	23.294	14.555

\* Probability that either engine will ingest 1 or more birds of a given weight class per aircraft operation. Probabilities have been scaled up by 10<sup>5</sup>.

† Cumulative probability of all weight bands. Also probability of ingestion for engine, location combination.



TABLE 7.4A  
 PROBABILITY OF INGESTION\* AS A FUNCTION OF BIRD WEIGHT BY LOCATION  
 (BASED ON AIRCRAFT OPERATIONS)

BOEING-737 COMMERCIAL FLEET			
	UNITED STATES	FOREIGN	WORLDWIDE
Aircraft Operations:	4,829,172	4,081,681	8,910,853
Bird Weight Range (Ounces)	Probability Of Ingestion	Probability Of Ingestion	Probability Of Ingestion
( 0 < X ≤ 4)	2.481	2.081	2.846
( 4 < X ≤ 8)	0.643	4.995	2.384
( 8 < X ≤ 12)	0.092	3.746	1.461
( 12 < X ≤ 16)	1.103	2.081	1.692
( 16 < X ≤ 20)	0.092	1.249	0.538
( 20 < X ≤ 24)	0.184	0.416	0.308
( 24 < X ≤ 28)	0.184	0.832	0.461
( 28 < X ≤ 32)	---	0.832	0.308
( 32 < X ≤ 36)	0.184	0.416	0.308
( 36 < X ≤ 40)	0.551	1.041	0.846
( 40 < X ≤ 44)	0.092	---	0.077
( 44 < X ≤ 48)	---	0.832	0.308
( 52 < X ≤ 56)	0.184	---	0.154
( 76 < X ≤ 80)	---	0.208	0.077
( 84 < X ≤ 88)	---	0.208	0.077
(124 < X ≤ 128)	0.092	---	0.077
(188 < X ≤ 192)	---	0.208	0.077
(212 < X ≤ 216)	---	0.208	0.077
All Weights <sup>†</sup>	5.881	19.355	12.075

\* Probability that either engine will ingest 1 or more birds of a given weight class per aircraft operation. Probabilities have been scaled up by 10<sup>6</sup>.

† Cumulative probability of all weight bands in geographic location.



TABLE 7.4B  
 PROBABILITY OF INGESTION\* AS A FUNCTION OF BIRD WEIGHT BY LOCATION  
 (BASED ON ENGINE OPERATIONS)

BOEING-737 COMMERCIAL FLEET			
	UNITED STATES	FOREIGN	WORLDWIDE
Engine Operations:	9,658,344	8,163,362	17,821,706
Bird Weight Range (Ounces)	Probability Of Ingestion	Probability Of Ingestion	Probability Of Ingestion
( 0 < X ≤ 4)	1.303	1.002	1.451
( 4 < X ≤ 8)	0.314	2.405	1.153
( 8 < X ≤ 12)	0.045	2.405	0.930
( 12 < X ≤ 16)	0.629	1.002	0.893
( 16 < X ≤ 20)	0.045	0.601	0.260
( 20 < X ≤ 24)	0.090	0.200	0.149
( 24 < X ≤ 28)	0.090	0.401	0.223
( 28 < X ≤ 32)	---	0.401	0.149
( 32 < X ≤ 36)	0.090	0.200	0.149
( 36 < X ≤ 40)	0.270	0.501	0.409
( 40 < X ≤ 44)	0.045	---	0.037
( 44 < X ≤ 48)	---	0.401	0.149
( 52 < X ≤ 56)	0.090	---	0.074
( 76 < X ≤ 80)	---	0.100	0.037
( 84 < X ≤ 88)	---	0.100	0.037
(124 < X ≤ 128)	0.045	---	0.037
(188 < X ≤ 192)	---	0.100	0.037
(212 < X ≤ 216)	---	0.100	0.037
All Weights†	3.054	9.922	6.212

\* Probability that an engine will ingest 1 or more birds of a given weight class per engine operation. Probabilities have been scaled up by 10<sup>5</sup>.

† Cumulative probability of all weight bands in geographic location.

## SECTION 8

### DATA QUALITY

The interpretations derived from any large set of data are only as good as the data. The use of poor data can lead to invalid and misleading conclusions. The conclusions reached in this report should be interpreted in the context of the sources of the data and the quality of the data. The following paragraphs discuss the sources of data for the 3 years and the quality of the data as measured by the consistency of the data collected in each of the 3 years.

#### 8.1 DATA SOURCES.

The main body of data was collected by the manufacturers of the two engines used on B737 aircraft under separate contracts with the FAA. The FAA also collected data from the FAA Voluntary Bird Strike/Incident Report (FAA Form 5200-7) and from reports received from FAA field inspectors (see FAA Action Notice A8300.39). The method of data collection was a census rather than a survey sample, i.e., the goal was to collect information on every B737 bird ingestion event in the 3-year period. A complete census is nearly impossible to achieve under any circumstances; therefore, estimates involving the total number of ingestions, such as ingestion rates, should be viewed as lower bounds.

One specific factor that may have hindered collecting ingestion data for all B737 bird ingestion events is that the International Civil Aviation Organization (ICAO) collects bird strike data worldwide. Data from ICAO that were not reported by the engine manufacturers are available for part of the 3-year period and have been included in the data listing in Appendix B (identified by the source heading). These data were not used in the analysis.

One method of improving the collection percentage for the B737 bird ingestion data is to include the data collected by the ICAO; however, two problems prevent including the data at this time. The first problem is the collection and reporting cycles of the FAA and the ICAO are not synchronous; therefore, data from the ICAO are not yet available for the full 3-year period. The second problem is that the manner in which bird ingestion reports for individual events were made for the ICAO may differ from the way the engine manufacturers collected bird ingestion event information. The differences could affect interpretations made from the combined data sets.

At some future date, when complete data are available from ICAO and potential conflicts in data collection procedures have been analyzed, all the sources of data could be combined to provide a more complete description of B737 bird ingestions. Since these issues have not been resolved, the descriptions in this report are based only on the data collected by the engine manufacturers and the FAA.

#### 8.2 INTERNAL CONSISTENCY.

The data collected over the third year of the program appear to be consistent with the data collected in the first two years. Most of the tables, graphs, and statistical tests presented in this report for the 3-year period are very

similar to the corresponding data presented in the reports [1,2] for the data collected in the first 2 years. This section provides statistical verification of the similarities and discusses some of the differences.

The first feature for comparing the 3 years is the total number of aircraft ingestion events collected in each year. Section 4 provided evidence that aircraft ingestion events occur according to a Poisson process so that the proportion of events that were recorded in each year should be equal to the proportion of operations conducted in that year.

The same formulas used in Section 4 can be used here except that the area factor is no longer required since comparisons are made between years for the same engine. The formula for the expected proportion of events in year  $i$  becomes:

$$P_i = O_i / (O_1 + O_2 + O_3) \quad (8.1)$$

where  $O_i$  ( $i=1,3$ ) represents the number of operations for the specific engine and geographic location for year  $i$ .

The Chi-squared goodness of fit test is used instead of a Z test since there are more than 2 years. The Chi-squared test statistic provides a measure of the closeness of the observed number of events in each year to the number that would be expected if the collection rates were the same in each year. The expected number of events in year  $i$  are given by:

$$E_i = P_i * N \quad (8.2)$$

where  $N$  is the total number of events for the 3 years. The test statistic is then given by:

$$\chi^2 = \sum_{i=1}^3 \frac{(X_i - E_i)^2}{E_i}, \quad (8.3)$$

where  $X_i$  is the observed number of events in year  $i$ .

The data for performing the test are presented in Table 8.1 and Table 8.2. The number of events and number of operations for each year are broken down by engine type and geographic location in Table 8.1. The calculated  $\chi^2$  values for the test are given in Table 8.2 for each engine and location combination. The Chi-squared test detects any type of change among the three years and the critical value for a five percent level of significance for a Chi-square with two degrees of freedom is 5.99. The only significant change is in the collection rate for the foreign JT8D data.

The large value of the test statistic for foreign JT8D ingestion rates is caused by a reduction in the amount of data collected in the third year. One possible explanation is that the efforts of ICAO to collect bird ingestion data have hindered the collection of data for the JT8D. ICAO data are not yet available for the entire third year, so there is insufficient data to test for a corresponding increase in their foreign JT8D collection rates.

TABLE 8.1

COUNTS FOR UNITED STATES AND FOREIGN  
EVENTS AND AIRCRAFT OPERATIONS BY YEAR AND ENGINE

	<u>JT8D</u>		<u>CFM56</u>	
	EVENTS	OPERATIONS	EVENTS	OPERATIONS
<u>YEAR 1</u>				
UNITED STATES	39	1,160,091	40	353,656
FOREIGN	188	1,057,633	48	174,206
<u>YEAR 2</u>				
UNITED STATES	48	1,082,543	46	527,431
FOREIGN	238	1,062,971	63	302,415
<u>YEAR 3</u>				
UNITED STATES	45	1,007,797	61	697,654
FOREIGN	146	1,025,228	107	459,228

TABLE 8.2

CHI SQUARED TEST STATISTICS  
FOR COMPARING ANNUAL INGESTION RATES

	UNITED STATES	FOREIGN
JT8D	2.17	19.21
CFM56	1.96	2.14

The change in collection rates for the JT8D could affect the test for size effect that was described in Section 4. In the first year report [1], both area and diameter provided adequate adjustments for the differences in ingestion rates between the two engines. In the 2-year report [2], area provided an adequate adjustment but diameter did not, while in the 3-year report, diameter provided an adequate adjustment but area did not. The lower third year collection rate would have an impact on the ingestion rate analysis so that investigations into the nature of engine size effects should be considered inconclusive.

Another check on the consistency of the data collection is to compare the birds that were identified in the 3 years. There were too many different species and locations of ingestions to allow comparisons of these features; however if the species identifications are reduced to bird weights, the cumulative weight distributions for the 3 years can be compared.

Table 8.3 provides a table of the cumulative weight distributions for each of the 3 years for birds ingested in the United States and for birds ingested in foreign countries. The data in Table 8.3 are plotted in Figures 8.1 and 8.2 to provide visual comparisons of the three yearly bird weight distributions for United States and foreign ingested birds. The distributions for the United States ingestions are moderately close, and the distributions for the foreign ingestions are very close.

A statistical measure of the closeness of the cumulative distributions plotted in Figures 8.1 and 8.2 is provided by a multi-sample extension of the Kolmogorov-Smirnov D test, described by Kiefer [13]. The D statistic is the maximum vertical distance between two observed cumulative distribution functions, and the T statistic described by Kiefer is the maximum vertical scatter among the three observed cumulative distribution functions. The formula for the T statistic is:

$$T = \max_x \sum_{j=1}^3 n_j [S_j(x) - \bar{S}(x)]^2, \quad (8.4)$$

where  $\max_x$  indicates the maximum over  $x$ ,  $n_j$  is the sample size in year  $j$ ,  $S_j(x)$  is the observed cumulative distribution function in year  $j$  and  $\bar{S}(x)$  is the observed cumulative distribution function for all 3 years combined.

The Kiefer goodness-of-fit test shows very good consistency between the 3 years for the ingested bird weight distribution. The T statistic for the United States bird ingestions is 0.721 and for the foreign bird ingestions is 0.579 which are the nineteenth and ninth percentiles of the null distribution of T. Large values of T indicate differences between the three distributions and the observed values given above are in the lower half of the likely range of T. There is no statistical evidence that the bird weight distributions have changed over the 3 year period.

The overall quality of the data collected for the FAA seems to be adequate. There is some confusion about the influence of the efforts of other agencies to collect bird ingestion data on the completeness of the FAA data. A better set of bird ingestion data might be created by combining data from ICAO; however, the compatibility of the ICAO data should be verified before analyzing the combined set of data.

TABLE 8.3

COMPARISON OF WEIGHT DISTRIBUTIONS BETWEEN  
BIRDS INGESTED IN THE FIRST, SECOND, AND THIRD YEARS

WEIGHT (OZ)	UNITED STATES			FOREIGN		
	YEAR 1	YEAR 2	YEAR 3	YEAR 1	YEAR 2	YEAR 3
4	26.3	50.0	48.1	18.2	6.7	9.8
8	42.1	61.1	55.6	40.9	36.7	34.1
12	47.4	61.1	55.6	59.1	53.3	56.1
16	63.2	77.8	77.8	77.3	60.0	65.9
20	68.4	77.8	77.8	77.3	73.3	70.7
24	68.4	83.3	81.5	86.4	73.3	70.7
28	68.4	88.9	85.2	86.4	76.7	78.0
32	68.4	88.9	85.2	90.9	80.0	82.9
36	68.4	94.4	88.9	90.9	83.3	85.4
40	84.2	100.0	96.3	95.5	90.0	90.2
44	84.2	100.0	100.0	95.5	90.0	90.2
48	84.2	100.0	100.0	100.0	93.3	95.1
56	94.7	100.0	100.0	100.0	93.3	95.1
80	94.7	100.0	100.0	100.0	96.7	95.1
88	94.7	100.0	100.0	100.0	100.0	95.1
128	100.0	100.0	100.0	100.0	100.0	95.1
192	100.0	100.0	100.0	100.0	100.0	97.6
216	100.0	100.0	100.0	100.0	100.0	100.0

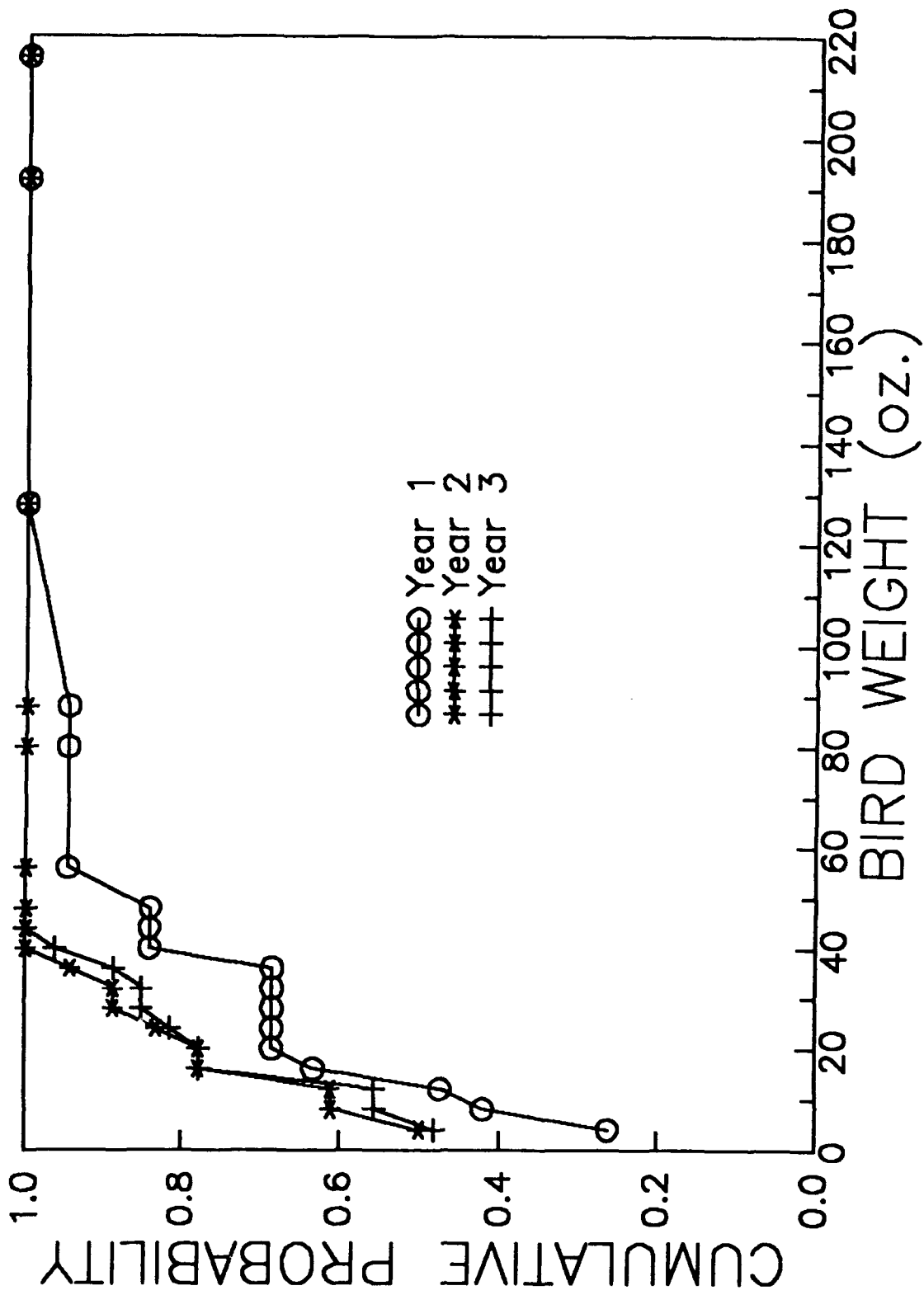


Figure 8.1 Comparison of the U.S. Bird Weight Distributions for the First, Second, and Third Years.

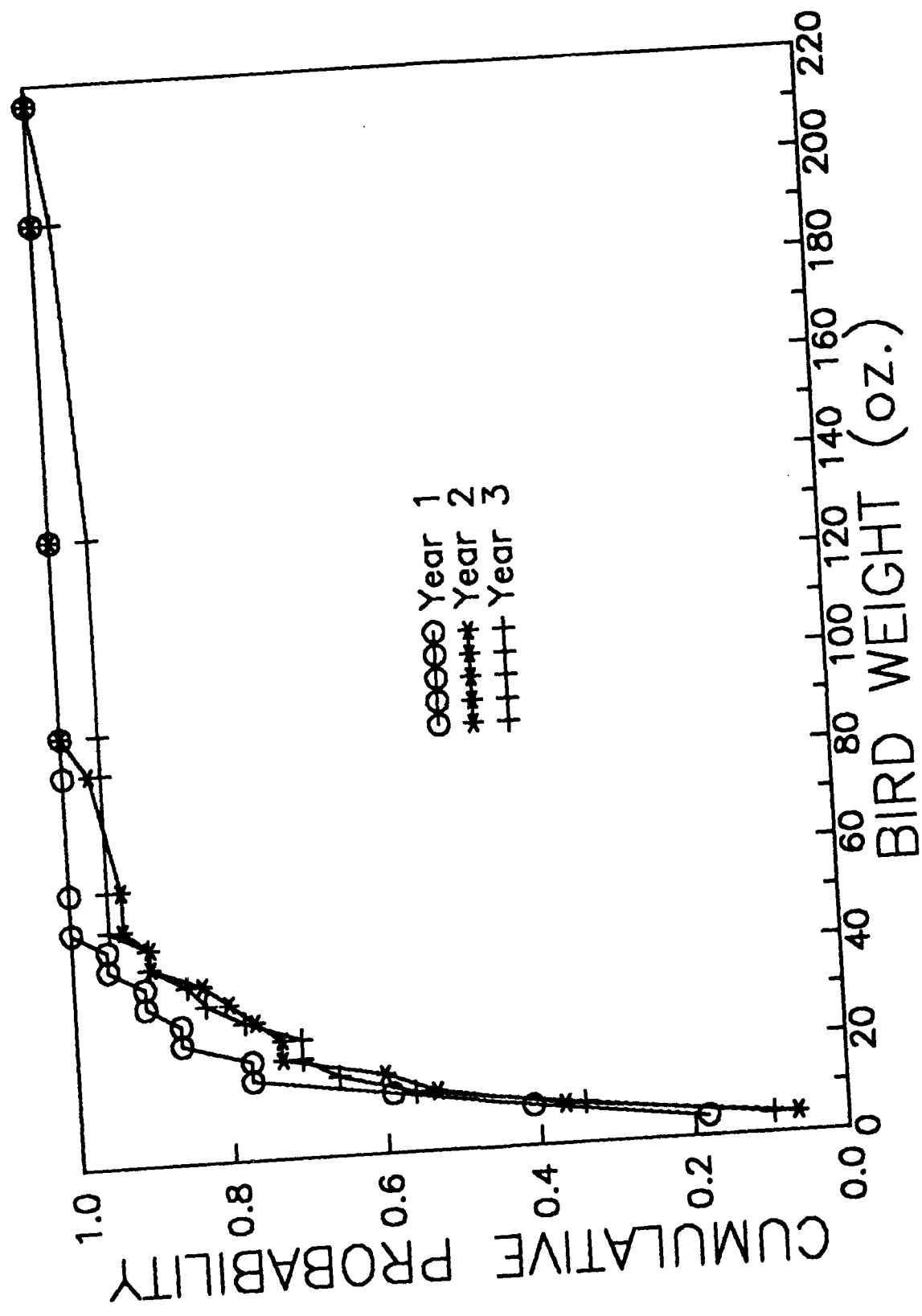


Figure 8.2 Comparison of the Foreign Bird Weight Distributions for the First, Second, and Third Years.



## SECTION 9

### CONCLUSIONS

This section summarizes conclusions based on the 3 years of data for the Boeing 737 aircraft.

#### Bird Descriptions

Gulls, doves, and lapwings are most often ingested.

There is a better species identification rate when the engine is damaged.

The weight of a bird most likely to be ingested outside the United States is significantly heavier than one most likely to be ingested within the United States.

#### Ingestion Rates

Bird ingestion events are seasonal with the highest rates in the summer and the lowest in the winter.

Bird ingestion events are much more likely to occur during daylight than at night.

Bird ingestion events can be modeled as a Poisson process.

Bird ingestion rates are proportional to the inlet size of the engine.

#### Airport Experiences

The foreign bird ingestion rate is significantly higher than the United States ingestion rate.

#### Effect of Flight

The probability that a crew action is required increases with the severity of engine damage.

The effects of flight that occur most often are air turnbacks and aborted takeoffs.

The probability of experiencing an involuntary in-flight engine shutdown, given a bird ingestion has occurred, is approximately one-half of one percent.

#### Engine Damage

Some types of engine damage are correlated with other types of damage.

The majority of engine bird ingestion events result in either minor or no engine damage.

The probability of any damage increases with the weight of the bird ingested.

The probability of engine damage, given a bird ingestion has occurred, is greater when the ingestion occurs during the takeoff and climb phases of flight than those that occur during approach and landing.

The probability of engine damage, given a bird ingestion has occurred, is greater when the aircraft airspeed is greater than or equal to 140 knots than those that occur at less than 140 knots.

Engine failure appears more likely to occur when multiple birds are ingested.

The mean or average weight of the birds that caused engine failures was significantly heavier than the mean weight for all bird ingestion events.

Engine failure is not necessarily associated exclusively with severe engine damage.

Engine failure appears more likely to occur during the takeoff phase of flight.

Engine failure can be caused by a bird ingestion in any bird weight range.

The majority of engine failures are caused by transverse fan blade fractures.

The probability of experiencing an engine failure, given a bird ingestion has occurred, is approximately 4 percent.

#### Probabilities of Ingestion

Bird ingestions are more likely during the takeoff and landing phases of an aircraft operation.

The worldwide probability of a bird ingestion as a function of bird weight for the B737 fleet remains relatively high up to 48 ounces.

#### Data Quality

The bird ingestion data collected during the third year of this study appears to be consistent with the data collected during the first and second years.

The overall quality of the bird ingestion data collected by the engine manufacturers for the FAA, is adequate for a meaningful statistical analysis.

## SECTION 10

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## SECTION 11

### GLOSSARY

<u>Term</u>	<u>Definition of Term</u>
Aircraft Ingestion Event	Simultaneous ingestion of one or more birds into one or more engines of an aircraft.
Aircraft Operation	A nonstop aircraft flight from one airport to another. (Includes time from taxi-out from departure airport through taxi-in at arrival airport.)
Airport Operation	Takeoff (departure) from an airport or a landing (arrival) at an airport.
Engine Ingestion Event	Process whereby one or more birds pass through the engine inlet during engine operation.
Engine Operation	The participation of each engine of an aircraft in an aircraft operation (e.g., a twin engine aircraft would, ideally, experience two engine operations for each aircraft operation).
Ingested Bird	A bird having experienced the process of engine ingestion event.
Ingestion Rate	The number of aircraft or engine ingestion events per flight event. Flight event refers to aircraft, engine or airport operation. The components of ingestion rate are specified when used in the report. The influence of engine inlet area is not considered.
Normalized Ingestion Rate	Ingestion rate adjusted to a given nominal area. Allows statistical comparison of ingestion rates of engines with different inlet areas.

## APPENDIX A

### AIRPORTS WITH SCHEDULED BOEING-737 FLIGHTS AND/OR REPORTED BIRD INGESTION EVENTS

This appendix presents information about airports having scheduled Official Airline Guide (OAG) operations or aircraft ingestion events during the 3-year data collection period. The data are taken from a data base developed by the contractor. The data base contents are described below:

<u>COLUMN</u>	<u>DESCRIPTION OF COLUMN CONTENTS</u>
AIRPORT	3-letter airport code.
APTDEF	Location of airport.
HEMISPHR	Hemisphere in which AIRPORT is located. N - Northern Hemisphere S - Southern Hemisphere
CONUS	Indicates whether AIRPORT is located in the United States. YES - located in contiguous United States (48 states) NO - not located in the contiguous United States, but in the United States (Alaska or Hawaii) FGN - foreign airport
STGFY87	Scheduled OAG airport operations during first year.
ING1	Aircraft ingestion events during first year.
STGFY88	Scheduled OAG airport operations during second year.
ING2	Aircraft ingestion events during second year.
STGFY89	Scheduled OAG airport operations during third year.
ING3	Aircraft ingestion events during third year.
STG737	Scheduled OAG airport operations during 3-year period.
INGS	Aircraft ingestion events during 3-year period.

AIRPORT	APTDEF	HEMISP	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
AAE	ANNABA, ALGERIA	N	FGN	2393	0	2237	0	2061	0	6691	0
AAV	AL GHAYDAH, YEMEN	N	FGN	210	0	314	0	162	0	686	0
ABE	ALLENTOWN, PA, USA	N	YES	370	0	1573	0	2490	0	4433	0
ABJ	ABIDJAN, COTE D'IVOIRE (IVORY COAST)	N	FGN	1620	0	1806	0	1899	0	5325	0
ABQ	ALBUQUERQUE, NM, USA	N	YES	41942	0	43562	0	44079	1	129583	1
ABS	ABU SIMBEL, ARAB REP OF EGYPT	N	FGN	3366	0	5028	0	5496	0	13890	0
ABT	AL BAH, SAUDI ARABIA	N	FGN	1148	0	642	0	626	0	2416	0
ABV	ABUJA, NIGERIA	N	FGN	1240	0	1178	0	1160	0	3578	0
ABZ	ABERDEEN, SCOTLAND	N	FGN	1519	0	1636	0	2871	0	6026	0
ACA	ACAPULCO, MEXICO	N	FGN	126	0	322	1	120	0	568	1
ACC	ACCRA, GHANA	N	FGN	486	0	0	0	216	0	702	0
ACE	LANZAROTE, CANARY ISLANDS	N	FGN	76	0	688	0	1115	0	1879	0
ACK	NANTUCKET, MA, USA	N	YES	0	0	7	0	9	0	16	0
ACV	EUREKA ARCATA, CA, USA	N	YES	2616	0	739	0	0	0	3355	0
ADB	IZMIR, TURKEY	N	FGN	0	0	236	0	426	0	662	0
ADD	ADDIS ABABA, ETHIOPIA	N	FGN	148	0	1538	1	1585	0	3271	1
ADE	ADEN, YEMEN	N	FGN	1346	0	1022	0	1242	0	3610	0
ADK	ADAK ISLAND, AS, USA	N	NO	0	0	16	0	0	0	16	0
ADL	ADELAIDE, SA, AUSTRALIA	S	FGN	4738	1	5568	0	9550	0	19856	1
ADQ	KODIAK, AS, USA	N	NO	2290	0	2500	0	2700	1	7490	1
ADZ	SAN ANDRES ISLAND, COLOMBIA	N	FGN	526	0	624	0	700	0	1850	0
AEP	BUENOS AIRES - NEWBERY, ARGENTINA	S	FGN	23291	0	22170	1	21296	0	66757	1
AES	AALESUND, NORWAY	N	FGN	8988	0	8364	0	8060	0	25412	0
AGA	AGADOR, MOROCCO	N	FGN	601	0	684	0	1164	0	2449	0
AGP	MALAGA, SPAIN	N	FGN	2434	0	3226	0	3213	0	8873	0
AGR	AGRA, INDIA	N	FGN	1980	1	2074	1	1616	1	5670	3
AGS	AUGUSTA, GA, USA	N	YES	1579	0	1881	0	1270	0	4730	0
AHB	ABHA, SAUDI ARABIA	N	FGN	2026	0	5425	0	5606	0	13057	0
AHU	AL HOCEIMA, MOROCCO	N	FGN	292	0	338	0	346	0	976	0
AJA	AJACCIO, CORSICA, FRANCE	N	FGN	59	1	87	0	177	1	323	2
AJF	JOUF, SAUDI ARABIA	N	FGN	1128	0	1258	0	1280	0	3666	0
AJU	ARACAJU, BRAZIL	S	FGN	1460	0	2592	1	5242	0	9294	1
AKL	AUCKLAND, NEW ZEALAND	S	FGN	16985	2	26503	0	26856	1	70344	3
AKN	KING SALMON, AS, USA	N	NO	1444	0	1832	0	1956	0	5232	0
AKR	AKURE, NIGERIA	N	FGN	238	0	354	0	244	0	836	0
ALB	ALBANY, NY, USA	N	YES	4461	2	6510	0	6964	0	17935	2
ALC	ALICANTE, SPAIN	N	FGN	148	0	1070	1	1796	1	3014	2
ALG	ALGIERS, ALGERIA	N	FGN	14258	1	13443	0	13905	0	41606	1
ALY	ALEXANDRIA, ARA REP OF EGYPT	N	FGN	2104	0	1507	0	2123	0	5734	0
AMA	AMARILLO, TX, USA	N	YES	12811	0	11122	0	10270	0	34203	0
AMD	AHMEDABAD, INDIA	N	FGN	5932	2	6180	4	4964	1	17076	7
AMM	AMMAN, JORDAN	N	FGN	2131	0	1859	0	1684	0	5674	0
AMS	AMSTERDAM, NETHERLANDS	N	FGN	19047	4	29304	4	41353	6	89704	14
ANC	ANCHORAGE, AS, USA	N	NO	18977	0	17295	0	18186	0	54458	0
ANF	ANTOFAGASTA, CHILE	S	FGN	1434	0	1635	0	2356	0	5425	0
ANI	ANIAK, AS, USA	N	NO	460	0	714	0	1108	0	2282	0
ANR	ANTWERP, BELGIUM	N	FGN	540	0	0	0	0	0	540	0
ANU	ANTIGUA, WEST INDIES	N	FGN	18	0	0	0	0	0	18	0
AOR	ALOR SETAR, MALAYSIA	N	FGN	1886	1	1884	0	2154	0	5924	1
APL	NAMPULA, MOZAMBIQUE	S	FGN	1144	0	1156	0	520	0	2820	0
APW	APIA, WESTERN SAMOA	S	FGN	858	0	264	0	158	0	1280	0
AQI	QAISUMAH, SAUDI ARABIA	N	FGN	494	0	552	0	642	0	1688	0
ARD	ALOR, INDONESIA	N	FGN	0	1	0	0	0	0	0	1
ARI	ARICA, CHILE	S	FGN	970	0	1308	0	1452	0	3730	0
ARN	STOCKHOLM ARLANDA, SWEDEN	N	FGN	7556	0	8439	0	10086	0	26081	0
ASM	ASMARA, ETHIOPIA	N	FGN	0	0	769	0	636	0	1405	0
ASP	ALICE SPRINGS, N.T., AUSTRALIA	S	FGN	1816	0	3728	0	5198	1	10742	1
ASU	ASUNCION, PARAGUAY	S	FGN	498	0	234	0	104	0	836	0
ASW	ASWAN, ARAB REP OF EGYPT	N	FGN	4968	0	7042	0	8616	0	20626	0
ATH	ATHENS, GREECE	N	FGN	24758	0	25267	0	31341	1	81366	1
ATL	ATLANTA, GA, USA	N	YES	42143	0	43773	0	47101	1	133017	1
ATM	ALTAMIRA, BRAZIL	S	FGN	416	0	420	0	416	0	1252	0
ATQ	AMRITSAR, INDIA	N	FGN	1846	0	1838	0	1460	0	5144	0
AUA	ARUBA, ARUBA	N	FGN	50	0	9	0	32	0	91	0
AUH	ABU DHABI, U. A. EMIRATES	N	FGN	4023	0	4381	0	4479	0	12883	0
AUS	AUSTIN, TX, USA	N	YES	33326	1	31454	2	32211	0	96991	3
AUX	ARAGUAINA, BRAZIL	S	FGN	244	0	420	0	582	0	1246	0
AVL	ASHEVILLE, NC, USA	N	YES	1298	0	1594	0	2212	0	5104	0
AVP	WILKES-BARRE/SCRANTON, PA, USA	N	YES	114	0	555	0	373	0	1042	0
AWZ	AHWAZ, IRAN	N	FGN	0	0	0	0	724	0	724	0
AXD	ALEXANDROUPOLIS, GREECE	N	FGN	908	0	1028	0	819	0	2755	0
AXT	AKITA, JAPAN	N	FGN	591	0	609	0	538	0	1738	0
AYT	ANTALYA, TURKEY	N	FGN	52	0	62	0	68	0	182	0
AZD	YAZD, IRAN	N	FGN	0	0	522	0	730	0	1252	0
AZO	KALAMAZOO, MI, USA	N	YES	2800	0	2802	0	2857	0	8459	0

AIRPORT	APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
AZR	ADRAR, ALGERIA	N	FGN	818	0	718	0	732	0	2268	0
BAH	BAHRAIN, BAHRAIN	N	FGN	11933	1	10623	0	10944	0	33500	1
BAQ	BARRANQUILLA, COLOMBIA	N	FGN	105	0	104	0	104	0	313	0
BBI	BHUBANESWAR, INDIA	N	FGN	2086	1	2160	0	2008	0	6254	1
BCN	BARCELONA, SPAIN	N	FGN	4166	0	4707	0	7749	0	16622	0
BDH	BANDAR LENGEN, IRAN	N	FGN	1460	0	1464	0	832	0	3756	0
BDL	HARTFORD, CN, USA	N	YES	15001	0	14757	0	15366	0	45124	0
BDQ	VADODARA, INDIA	N	FGN	1925	0	1866	1	1888	0	5679	1
BDT	BADO LITE, ZAIRE	N	FGN	208	0	278	0	282	0	768	0
BEG	BELGRADE, YUGOSLAVIA	N	FGN	10759	1	13303	1	14455	1	38517	3
BEL	BELEM, BRAZIL	S	FGN	5505	0	9161	0	12314	0	26980	0
BEN	BENGHAZI, LIBYAN A JAMAHIRIYA	N	FGN	0	0	62	0	444	0	506	0
BET	BETHEL, AS, USA	N	NO	3190	0	3238	0	3158	0	9586	0
BEW	BEIRA, MOZAMBIQUE	S	FGN	1304	0	1112	0	1094	0	3510	0
BFL	BAKESFIELD, CA, USA	N	YES	2742	0	1037	0	0	0	3779	0
BFN	BLOEMFONTEIN, SOUTH AFRICA	S	FGN	3954	0	4710	1	5494	6	14158	7
BFS	BELFAST, N. IRELAND	N	FGN	1570	0	2915	2	6866	0	11351	2
BFX	BAFOUSSAM, CAMEROON	N	FGN	0	0	14	0	0	0	14	0
BGF	BANGUI, CEN. AFRICAN REPUBLIC	N	FGN	272	0	340	0	373	0	985	0
BGI	BARBADOS, BARBADOS	N	FGN	52	0	52	0	52	0	156	0
BGM	BINGHAMTOM, NY, USA	N	YES	0	0	130	0	484	0	614	0
BGO	BERGEN, NORWAY	N	FGN	12038	0	14288	0	15923	0	42249	0
BGR	BANGOR, MA, USA	N	YES	0	0	0	0	204	0	204	0
BGW	BAGHDAD, IRAQ	N	FGN	0	0	31	0	38	0	69	0
BHH	BISHA, SAUDI ARABIA	N	FGN	1740	0	1779	0	1517	0	5036	0
BHI	BAHIA BLANCA, ARGENTINA	S	FGN	2162	0	2412	0	2400	3	6974	3
BHJ	BHUJ, INDIA	N	FGN	730	0	732	0	730	0	2192	0
BHM	BIRMINGHAM, AL, USA	N	YES	6048	2	11193	1	9467	1	26708	4
BHO	BHOPAL, INDIA	N	FGN	1828	0	2462	1	1924	1	6214	2
BHU	BHAVNAGAR, INDIA	N	FGN	730	0	732	0	538	0	2000	0
BHX	BIRMINGHAM, ENGLAND (UK)	N	FGN	2307	1	2630	1	3753	0	8690	2
BHZ	BELO HORIZONTE, BRAZIL	S	FGN	0	0	0	0	0	1	0	1
BIA	BASTIA, CORSICA, FRANCE	N	FGN	234	0	300	0	200	0	734	0
BIL	BILLINGS, MT, USA	N	YES	7285	0	4583	0	3874	0	15742	0
BIO	BILBAO, SPAIN	N	FGN	622	0	628	0	677	0	1927	0
BIQ	BIARRITZ, FRANCE	N	FGN	52	0	52	0	52	0	156	0
BIS	BISMARCK, ND, USA	N	YES	3396	0	3760	0	2746	0	9902	0
BJL	BANJUL, GAMBIA	N	FGN	472	0	420	0	420	1	1312	1
BJM	BUJUMBURA, BURUNDI	S	FGN	245	0	245	0	384	0	874	0
BJR	BAHAR DAR, ETHIOPIA	N	FGN	0	0	572	1	296	0	868	1
BKI	KOTA KINABALU, SABAH, MALAYSIA	N	FGN	8699	0	9134	0	11424	0	29257	0
BKK	BANGKOK, THAILAND	N	FGN	7329	0	7596	0	7058	0	21983	0
BKO	BAMAKO, MALI	N	FGN	50	0	54	0	82	0	186	0
BKY	BUKAVU, ZAIRE	S	FGN	104	0	106	0	72	0	282	0
BLI	BELLINGHAM, WA, USA	N	YES	0	0	2	0	237	0	239	0
BLL	BILLUND, DENMARK	N	FGN	2177	0	2178	0	2393	0	6748	0
BLQ	BOLOGNA, ITALY	N	FGN	310	0	374	0	634	0	1318	0
BLR	BANGALORE, INDIA	N	FGN	5886	3	8160	2	9204	2	23250	7
BME	BROOME, W.A., AUSTRALIA	S	FGN	0	0	0	0	2	0	2	0
BNA	NASHVILLE, TN, USA	N	YES	17920	0	22380	1	21447	0	61747	1
BND	BANDAR ABBAS, IRAN	N	FGN	1460	0	1922	0	1354	0	4736	0
BNE	BRISBANE, QLD, AUSTRALIA	S	FGN	12830	0	15610	2	21839	0	50279	2
BNI	BENIN CITY, NIGERIA	N	FGN	2127	0	1875	0	1666	0	5668	0
BNJ	BONN, FRG	N	FGN	0	0	0	0	0	0	0	0
BOD	BORDEAUX, FRANCE	N	FGN	688	0	790	0	1016	0	2494	0
BOH	BOURNEMOUTH, ENGLAND, UK	N	FGN	0	0	0	0	0	1	0	1
BOI	BOISE, ID, USA	N	YES	5399	0	5655	0	8309	0	19363	0
BOM	BOMBAY, INDIA	N	FGN	16848	2	15854	2	15490	0	48192	4
BOO	BODO, NORWAY	N	FGN	2868	0	3254	0	3286	0	9408	0
BOS	BOSTON, MA, USA	N	YES	30820	0	34903	1	37878	0	103601	1
BRC	SAN CARLOS DE BARILOCHE, ARGENTINA	S	FGN	1663	0	1656	0	1176	0	4495	0
BRE	BREMEN, FED REP OF GERMANY	N	FGN	4526	0	5729	0	5530	2	15785	2
BRS	BRISTOL, ENGLAND (UK)	N	FGN	2	1	0	2	16	0	18	3
BRU	BRUSSELS, BELGIUM	N	FGN	31942	2	32748	4	36110	3	100800	9
BRW	BARROW, AS, USA	N	NO	1897	0	1960	0	1946	0	5803	0
BSB	BRASILIA, BRAZIL	S	FGN	22788	0	30251	0	35278	0	88317	0
BSK	BISKRA, ALGERIA	N	FGN	0	0	0	0	96	0	96	0
BSL	BASEL/MULHOUSE, SWITZERLAND	N	FGN	554	0	538	0	528	0	1620	0
BTM	BUTTE, MT, USA	N	YES	1460	0	1464	0	1454	0	4378	0
BTR	BATON ROUGE, LA, USA	N	YES	2944	0	2065	0	1273	0	6282	0
BTV	BURLINGTON, VT, USA	N	YES	2544	0	2678	0	6126	0	11348	0
BUD	BUDAPEST, HUNGARY	N	FGN	1660	0	1468	1	4764	0	7892	1
BUE	BUENOS AIRES, ARGENTINA	S	FGN	0	0	0	1	0	0	0	1
BUF	BUFFALO, NY, USA	N	YES	17704	0	16940	0	14779	0	49423	0
BUQ	BULAWAYO, ZIMBABWE	S	FGN	1834	0	2870	0	2808	0	7512	0

AIRPORT	APTDEF	HEMISP	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
BUR	BURBANK, CA, USA	N	YES	11187	0	14262	0	20498	0	45947	0
BUX	BUNA, ZAIRE	N	FGN	210	0	208	0	166	0	584	0
BUZ	BUSHEHR, IRAN	N	FGN	88	0	24	0	0	0	112	0
BVB	BOA VISTA, BRAZIL	N	FGN	1314	0	1426	0	1914	0	4654	0
BVH	VITHENA, BRAZIL	S	FGN	0	0	62	0	254	0	316	0
BWI	BALTIMORE, MD, USA	N	YES	54435	1	60614	0	71566	0	186615	1
BWN	BASERI BEGAWAN, BRUNEI DARUSSALAM	N	FGN	2951	0	2782	0	3248	0	8981	0
BXO	BISSAU, GUINEA BISSAU	N	FGN	20	0	80	0	0	0	100	0
BZE	BELIZE CITY, BELIZE	N	FGN	3647	0	4416	0	5541	0	13604	0
BZN	BOZEMAN, MT, USA	N	YES	5200	0	4588	0	5762	0	15550	0
BZR	BEZIERS, FRANCE	N	FGN	0	0	0	0	1	0	1	0
BZV	BRAZZAVILE, PEOP REP OF CONGO	S	FGN	1406	0	1321	0	1180	0	3907	0
CAB	CABINDA, ANGOLA	S	FGN	1042	0	966	0	730	0	2738	0
CAE	COLUMBIA, SC, USA	N	YES	8213	0	8051	0	4297	0	20561	0
CAG	CAGLIARI, ITALY	N	FGN	0	0	0	1	0	0	0	1
CAI	CAIRO, ARAB REP OF EGYPT	N	FGN	8057	0	8970	0	10132	0	27159	0
CAK	AKRON/CANTON, OH, USA	N	YES	2241	0	2582	0	1398	0	6221	0
CAN	GUANGZHOU, P. R. CHINA	N	FGN	13955	0	16177	0	14550	0	44682	0
CAS	CASABLANCA, MOROCCO	N	FGN	0	0	8	1	8	0	16	1
CAY	CAYENNE, FRENCH GUIANA	N	FGN	208	0	367	0	415	0	990	0
CBD	CAR NICOBAR, INDIA	N	FGN	40	0	106	0	104	0	250	0
CBH	BECHAR, ALGERIA	N	FGN	1455	0	1258	0	1274	0	3987	0
CBQ	CALABAR, NIGERIA	N	FGN	1935	0	1783	0	1221	0	4939	0
CBR	CANBERRA, A.C.T., AUSTRALIA	S	FGN	5600	1	5064	0	6719	0	17383	1
CCJ	CALICUT, INDIA	N	FGN	0	0	174	0	536	0	710	0
CCP	CONCEPCION, CHILE	S	FGN	1184	0	1484	0	1444	0	4112	0
CCR	CONCORD, CA, USA	N	YES	0	0	0	0	37	0	37	0
CCS	CARACAS, VENEZUELA	N	FGN	0	0	52	0	52	0	104	0
CCU	CALCUTTA, INDIA	N	FGN	10798	2	11583	1	11041	0	33422	3
CDG	PARIS DE GAULLE, FRANCE	N	FGN	25514	1	28834	2	32635	0	86983	3
CDV	CORDOVA, AS, USA	N	NO	1514	0	1516	0	1512	0	4542	0
CEO	WACO KUNGO, ANGOLA	S	FGN	10	0	4	0	0	0	14	0
CFU	CORFU, GREECE	N	FGN	746	0	1152	0	1224	0	3122	0
CGB	CUIABA MATO GROSSO, BRAZIL	S	FGN	9184	0	8652	0	8360	0	26196	0
CGH	SAO PAULO-CONGONHAS, BRAZIL	S	FGN	1082	0	2410	0	2600	0	6092	0
CGK	JAKARTA-SOEKARNO, INDONESIA	S	FGN	626	0	630	0	687	0	1943	0
CGN	COLOGNE BONN, FRG	N	FGN	18161	1	19445	0	19597	1	57203	2
CGO	ZHENGZHOU, P. R. CHINA	N	FGN	208	0	394	0	341	0	943	0
CGP	CHITTAGONG, BANGLADESH	N	FGN	0	0	0	0	80	0	80	0
CGQ	CHANGCHUN, P. R. CHINA	N	FGN	62	0	70	0	268	0	400	0
CGR	CAMPO GRANDE, BRAZIL	S	FGN	6770	0	7800	3	8854	0	23424	3
CMA	CHATTANOOGA, TN, USA	N	YES	1618	0	1704	0	984	0	4306	0
CHC	CHRISTCHURCH, NEW ZEALAND	S	FGN	17095	7	24202	0	26870	0	68167	7
CHM	CHIMBOTE, PERU	S	FGN	0	0	0	0	98	0	98	0
CHO	CHARLOTTESVILLE, VA, USA	N	YES	1814	0	608	0	831	0	3453	0
CHQ	CHANIA, CRETE, GREECE	N	FGN	856	0	793	0	1554	0	3203	0
CHS	CHARLESTON, SC, USA	N	YES	7219	0	8528	0	8385	0	24132	0
CID	CEDAR RAPIDS/IOWA CITY, IO, USA	N	YES	3800	0	2995	0	3565	1	10360	1
CIX	CHICLAYO, PERU	S	FGN	286	0	450	0	800	0	1536	0
CJB	COIMBATORE, INDIA	N	FGN	1528	0	1674	2	1460	0	4662	2
CJC	CALAMA, CHILE	S	FGN	626	0	420	0	630	0	1676	0
CJU	CHEJU, REP OF KOREA	N	FGN	0	0	0	0	1708	1	1708	1
CKG	CHONGQING, P. R. CHINA	N	FGN	714	0	787	0	1138	0	2639	0
CKS	CARAJAS, BRAZIL	S	FGN	417	0	417	0	188	0	1022	0
CKY	CONAKRY, GUINEA	N	FGN	550	0	707	0	947	0	2204	0
CLE	CLEVELAND, OH, USA	N	YES	24028	1	40166	1	55625	1	119819	3
CLT	CHARLOTTE, NC, USA	N	YES	95251	2	113302	1	122448	0	331001	3
CMB	COLOMBO, SRI LANKA	N	FGN	3021	0	3078	0	3254	1	9353	1
CMG	CORUMBA, MATO GROSSO, BRAZIL	S	FGN	1460	1	1464	0	1068	0	3992	1
CMH	COLUMBUS, OH, USA	N	YES	8004	0	9329	0	9980	0	27313	0
CMI	CHAMPAIGN, IL, USA	N	YES	2186	0	2195	0	2188	0	6569	0
CMN	MOHAMEDV, CASABLANCA, MOROCCO	N	FGN	4767	0	6241	0	6621	0	17629	0
CND	CONSTANTO, ROMANIA	N	FGN	0	0	0	0	0	0	0	0
CNF	BELO HORIZONTE-CONFINS, BRAZIL	S	FGN	19683	0	19554	0	17047	0	56284	0
CNQ	CORRIENTES, ARGENTINA	S	FGN	1100	0	544	0	312	0	1956	0
CNS	CAIRNS, QLD, AUSTRALIA	S	FGN	4850	1	6049	0	7815	0	18714	1
CNX	CHIANG MAI, THAILAND	N	FGN	728	0	435	0	18	0	1181	0
COK	COCHIN, INDIA	N	FGN	5457	1	4646	2	4380	0	14483	3
COO	COTONOU, BENIN	N	FGN	1120	0	1038	0	838	0	2996	0
COR	CORDOBA, ARGENTINA	S	FGN	6772	0	6194	1	5551	0	18517	1
COS	COLORADO SPRINGS, CO, USA	N	YES	8004	0	8313	1	10804	0	27121	1
CPH	COPENHAGEN, DENMARK	N	FGN	11419	1	14184	0	15634	1	41237	2
CPO	CUPIATO, CHILE	S	FGN	0	0	320	0	632	0	952	0
CPQ	CAMPINAS, BRAZIL	S	FGN	1056	0	1207	0	889	0	3152	0
CPR	CASPER, WY, USA	N	YES	4230	0	2902	0	2170	0	9302	0



## AIRPORT APTDEF

HEMISPHR CONUS STGFY87 ING1 STGFY88 ING2 STGFY89 ING3 STG737 INGS

AIRPORT APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS	
CPT	CAPE TOWN, SOUTH AFRICA	S	FGN	8545	1	10490	0	11738	2	30773	3
CPV	CAMPINA GRANDE, BRAZIL	S	FGN	626	0	628	0	624	0	1878	0
CRD	COMODORO RIVADAVIA, ARGENTINA	S	FGN	2553	0	2041	0	1509	0	6103	0
CRP	CORPUS CHRISTI, TX, USA	N	YES	5584	0	5292	0	5290	1	16166	1
CRW	CHARLESTON, WV, USA	N	YES	4478	0	5070	1	2915	0	12463	1
CTA	CATANIA, ITALY	N	FGN	252	0	665	0	838	0	1755	0
CTC	CATAMARCA, ARGENTINA	S	FGN	778	0	782	1	730	0	2290	1
CTG	CARTAGENA, COLOMBIA	N	FGN	105	0	104	0	104	0	313	0
CTS	SAPPORO-CHITOSE, JAPAN	N	FGN	1398	0	2908	0	2784	0	7090	0
CTU	CHENGDU, P.R. CHINA	N	FGN	2138	1	1728	0	2749	1	6615	2
CUN	CANCUM, MEXICO	N	FGN	634	0	1212	0	602	0	2448	0
CUR	CURACAO, NETH ANTILLES	N	FGN	20	0	0	0	0	0	20	0
CUT	CUTRAL-CO, ARGENTINA	S	FGN	0	0	18	0	0	0	18	0
CVG	CINCINNATI, OH, USA	N	YES	14496	0	18777	0	16460	0	49733	0
CVT	COVENTRY, ENG, UK	N	FGN	0	0	0	0	42	0	42	0
CWB	CURITIBA, PARANA, BRAZIL	S	FGN	6532	0	8720	0	10110	2	25362	2
CWL	CARDIFF, WALES, UK	N	FGN	0	0	0	1	0	0	0	1
CXI	CHRISTMAS ISLAND, REP OF KIRIBATI	N	FGN	106	0	104	0	104	0	314	0
CYI	CHIAYI, TAIWAN	N	FGN	730	0	732	0	730	0	2192	0
CZL	CONSTANTINE, ALGERIA	N	FGN	3352	0	3129	0	3101	0	9582	0
CZS	CRUZEIRO DO SUL, ACRE, BRAZIL	S	FGN	344	0	436	0	454	0	1234	0
CZX	CHANGZHOU, P. R. CHINA	N	FGN	208	0	227	0	224	0	659	0
DAB	DAYTONA BEACH, FL, USA	N	YES	3532	1	4032	0	2840	1	10404	2
DAC	DHAKA, BANGLADESH	N	FGN	934	0	734	0	789	0	2457	0
DAL	LOVE DALLS/FT. WORTH, TX, USA	N	YES	75124	4	76295	3	76191	3	227610	10
DAM	DAMASCUS, SYRIA	N	FGN	523	0	883	0	905	0	2311	0
DAR	DAR ES SALAAM, TANZANIA	S	FGN	3407	0	2968	0	2961	0	9336	0
DAY	DAYTON, OH, USA	N	YES	37652	1	43020	2	48201	1	128873	4
DBV	DUBROVNIK, YUGOSLAVIA	N	FGN	1806	0	2366	0	2730	0	6902	0
DCA	NATIONAL, WASHINGTON, DC, USA	N	YES	22108	0	26412	0	30911	1	79431	1
DEC	DECATUR, IL, USA	N	YES	0	0	0	0	0	0	0	0
DEL	DELHI, INDIA	N	FGN	15987	0	16401	3	17645	2	50033	5
DEN	STAPLETON INT'L, DENVER, CO, USA	N	YES	112673	2	113634	2	106309	0	332616	4
DET	DETROIT CITY, MI, USA	N	YES	0	0	2064	0	10902	1	12966	1
DEU	SOMEWHERE OVER GERMANY	N	FGN	0	0	0	1	0	0	0	1
DFW	DALLAS/FT WORTH, TX, USA	N	YES	51130	1	48254	1	53615	0	152999	2
DHA	DHAHRAN, SAUDI ARABIA	N	FGN	7902	0	6474	0	6302	0	20678	0
DIB	DIBRUGARH, INDIA	N	FGN	816	0	864	0	852	0	2532	0
DIE	ANTSIRANANA, MADAGASCAR	S	FGN	610	0	610	0	576	0	1796	0
DIR	DIRE DAWA, ETHIOPIA	N	FGN	38	0	628	0	1100	0	1766	0
DJE	DJERBA, TUNISIA	N	FGN	547	0	267	0	303	0	1117	0
DJG	DJANET, ALGERIA	N	FGN	466	0	532	0	564	0	1562	0
DKR	DAKAR, SENEGAL	N	FGN	467	0	580	0	653	0	1700	0
DLA	DOJALA, REP OF CAMEROON	N	FGN	5262	0	4691	0	4654	0	14607	0
DLC	DALIAN, P. R. CHINA	N	FGN	0	0	44	0	130	0	174	0
DLG	DILLINGHAM, AS, USA	N	NO	1444	0	1622	0	1660	0	4726	0
DLH	DULUTH, MN, USA	N	YES	0	0	0	0	0	1	0	1
DMU	DIMAPUR, INDIA	N	FGN	0	0	0	0	326	0	326	0
DOD	DODOMA, TANZANIA	S	FGN	16	0	0	0	0	0	16	0
DOH	DOHA, QATAR	N	FGN	8859	0	9310	0	9325	0	27494	0
DPS	DENPASAR, INDONESIA	S	FGN	104	0	104	0	106	0	314	0
DRO	DURANGO, CO, USA	N	YES	2233	0	1462	0	1442	0	5137	0
DRW	DARWIN, N.T., AUSTRALIA	S	FGN	1107	0	2092	0	2513	0	5712	0
DSM	DES MOINES, IO, USA	N	YES	7748	0	9329	0	7785	0	24862	0
DTW	WAYNE CO, DETROIT, MI, USA	N	YES	16765	0	24028	0	21130	1	61923	1
DUB	DUBLIN, REPUBLIC OF IRELAND	N	FGN	19308	1	23823	1	28519	1	71650	3
DUD	DUNEDIN, NEW ZEALAND	S	FGN	4145	0	4379	1	5890	0	14414	1
DUR	DURBAN, SOUTH AFRICA	S	FGN	6925	2	7739	2	9624	1	24288	5
DUS	DUESSELDORF, FRG	N	FGN	30119	2	32964	5	33450	6	96533	13
DUT	DUTCH HARBOR, AS, USA	N	NO	828	0	1116	0	1432	0	3376	0
DXB	DUBAI, U. A. EMIRATES	N	FGN	3134	0	2234	0	2719	0	8087	0
EAM	NEJRAN, SAUDI ARABIA	N	FGN	2392	0	2412	0	2552	1	7356	1
EBB	ENTEBBE KAMPALA, UGANDA	N	FGN	39	0	167	0	459	0	665	0
EBD	EL OBEID, SUDAN	N	FGN	632	0	968	0	512	0	2112	0
EBJ	ESBJERG, DENMARK	N	FGN	482	0	284	0	156	0	922	0
EDI	EDINBURGH, SCOTLAND	N	FGN	1040	0	1988	0	7123	1	10151	1
EFL	KEFALONIA, GREECE	N	FGN	780	0	786	0	776	0	2342	0
EJH	WEDJH, SAUDI ARABIA	N	FGN	784	0	736	0	730	0	2250	0
ELF	EL FASHER, SUDAN	N	FGN	0	0	8	0	164	0	172	0
ELG	EL GOLEA, ALGERIA	N	FGN	416	0	416	0	416	0	1248	0
ELM	ELMIRA, NY, USA	N	YES	0	0	260	0	0	0	260	0
ELP	EL PASO, TX, USA	N	YES	38902	0	39117	0	41757	0	119776	0
ELQ	GASSIM, SAUDI ARABIA	N	FGN	4652	0	4072	0	3224	0	11948	0
ELS	EAST LONDON, SOUTH AFRICA	S	FGN	9987	3	11104	0	10476	2	31567	5
ELU	EL OUED, ALGERIA	N	FGN	288	0	312	0	426	0	1026	0

AIRPORT	APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
EMA	EAST MIDLANDS, ENGLAND	N	FGN	291	0	269	0	322	2	882	2
ENU	ENUGU, NIGERIA	N	FGN	3138	0	2980	0	2199	0	8317	0
EQS	ESQUEL, ARGENTINA	S	FGN	1116	0	1066	0	850	0	3032	0
ERI	ERIE, PA, USA	N	YES	1772	0	1618	0	1535	0	4925	0
ESB	ANKARA-ESENBAGA, TURKEY	N	FGN	0	0	695	0	1329	0	2024	0
ESR	EL SALVADOR, CHILE	S	FGN	836	0	772	0	728	0	2336	0
ETH	ELAT, ISRAEL	N	FGN	4	0	14	0	2	0	20	0
EUG	EUGENE, OR, USA	N	YES	3493	0	2908	0	5201	0	11602	0
EUN	LAAYOUNE, MOROCCO	N	FGN	244	0	503	0	317	0	1064	0
EVE	EVENES, NORWAY	N	FGN	1520	0	1874	0	1778	0	5172	0
EVV	EVANSVILLE, IN, USA	N	YES	2468	0	2519	0	1898	0	6885	0
EWR	NEWARK, NEW YORK, NY, USA	N	YES	78323	1	85323	2	83555	1	247201	4
EZE	BUENOS AIRES-EZEIZA ARPT, ARGENTINA	S	FGN	424	1	838	0	1483	0	2745	1
FAE	FAROE ISLANDS, DENMARK	N	FGN	756	0	837	0	752	0	2345	0
FAI	FAIRBANKS, AS, USA	N	NO	3674	0	3816	0	3756	0	11246	0
FAO	FARO, PORTUGAL	N	FGN	1069	0	1712	1	1300	0	4081	1
FAR	FARGO, ND, USA	N	YES	1561	0	383	0	445	0	2389	0
FAT	FRESNO, CA, USA	N	YES	9993	1	6833	1	4983	0	21809	2
FAY	FAYETTEVILLE, NC, USA	N	YES	3260	0	3643	0	2786	0	9689	0
FBM	LUBUMBASHI, ZAIRE	S	FGN	262	0	378	0	444	0	1084	0
FBU	FORNEBU, OSLO, NORWAY	N	FGN	11420	0	29599	0	33347	0	74366	0
FCA	KALISPELL GLACIER NAT'L OK, MT, USA	N	YES	1460	0	1460	0	1067	0	3987	0
FCO	DA VINCI, ROME, ITALY	N	FGN	4538	0	6614	1	8484	1	19636	2
FEZ	FEZ, MOROCCO	N	FGN	146	0	408	0	640	0	1194	0
FIH	KINSHASA, ZAIRE	S	FGN	2324	0	2776	0	2920	0	8020	0
FJR	AL FUJAIRAH, U.A.E.	N	FGN	0	0	208	0	225	0	433	0
FKI	KISANGANI, ZAIRE	N	FGN	1170	0	1596	0	1388	0	4154	0
FLI	FT LAUDERDALE, FL, USA	N	YES	12566	1	12687	0	17037	0	42290	1
FLN	FLORIANOPOLIS, BRAZIL	S	FGN	4180	0	5040	0	3909	0	13129	0
FMA	FORMOSA, ARGENTINA	S	FGN	682	0	696	1	648	0	2026	1
FMI	KALEMIE, ZAIRE	S	FGN	524	0	440	0	414	0	1378	0
FMO	MUENSTER, GERMANY	N	FGN	0	0	0	0	69	0	69	0
FNA	FREETOWN, SIERRA LEONE	N	FGN	112	0	0	0	0	0	112	0
FNC	FUNCHAL - MADEIRA, PORTUGAL	N	FGN	3737	1	4944	0	6276	1	14957	2
FNT	FLINT, MI, USA	N	YES	2186	0	2300	0	2923	1	7409	1
FOC	FUZHOU, P. R. CHINA	N	FGN	534	0	1116	0	1082	0	2732	0
FOE	FORBES, TOPEKA, KA, USA	N	YES	1407	0	62	0	0	0	1469	0
FOR	FORTALEZA, CEARA, BRAZIL	S	FGN	4798	0	6068	0	8582	0	19448	0
FPO	FREEPORT, BAHAMAS	N	FGN	2666	0	5156	0	4876	0	12698	0
FRA	FRANKFURT, FRG	N	FGN	52274	8	56256	2	64168	6	172698	16
FRL	FORLI, ITALY	N	FGN	0	0	0	0	2	0	2	0
FSD	STIOUX FALLS, SD, USA	N	YES	6410	0	2897	0	5603	0	14910	0
FTU	FT DAUPHIN, MADAGASCAR	S	FGN	332	0	328	0	330	0	990	0
FUE	FUERTEVENTURA, CANARY IS.	N	FGN	0	0	216	0	228	0	444	0
FUK	FUKUOKA, JAPAN	N	FGN	730	0	410	0	62	0	1202	0
FWA	FT WAYNE, IN, USA	N	YES	2580	0	2344	0	2444	0	7368	0
GAJ	YAMAGATA, HONSHU, JAPAN	N	FGN	1154	0	1426	1	1330	0	3910	1
GAL	GALENA, AS, USA	N	NO	0	0	270	0	182	0	452	0
GAU	GAUHATI, INDIA	N	FGN	3934	1	5832	0	6143	0	15909	1
GBE	GABORONE, BOTSWANA	S	FGN	527	0	500	0	246	0	1273	0
GCI	GUERNSEY, CHANNEL IS, UK	N	FGN	0	0	0	0	40	0	40	0
GDL	GUADALAJARA, MEXICO	N	FGN	0	0	38	0	92	0	130	0
GEG	SPOKANE, WA, USA	N	YES	8549	0	5588	0	6999	0	21136	0
GEO	GEORGETOWN, GUYANA	N	FGN	0	0	8	0	28	0	36	0
GHA	GHARDAIA, ALGERIA	N	FGN	1014	0	858	0	1032	0	2904	0
GHB	GOVERNORS HARBOUR, BAHAMAS	N	FGN	36	0	0	1	0	0	36	1
GHU	GUALEGUAYCHU, ARGENTINA	S	FGN	0	1	0	0	0	0	0	1
GIB	GIBRALTAR, GIBRALTAR	N	FGN	1788	0	2904	0	3440	0	8132	0
GIG	RIO DE JANEIRO INT'L, BRAZIL	S	FGN	27048	0	33116	1	34612	1	94776	2
GIZ	GIZAN, SAUDI ARABIA	N	FGN	5781	0	6019	0	6070	0	17870	0
GJT	GRAND JUNCTION, CO, USA	N	YES	2416	0	3572	0	2962	0	8950	0
GLA	GLASGLOW, SCOTLAND	N	FGN	687	0	1605	0	5763	0	8055	0
GMA	GEMENA, ZAIRE	N	FGN	312	0	332	0	252	0	896	0
GOA	GENOA, ITALY	N	FGN	292	1	267	0	1064	0	1623	1
GOI	GOA, INDIA	N	FGN	1798	0	1554	0	1982	1	5334	1
GOM	GOMA, ZAIRE	S	FGN	104	0	446	0	554	0	1104	0
GOP	GORAKHPUR, INDIA	N	FGN	486	0	328	0	404	0	1218	0
GOT	GOTHENBURG, SWEDEN	N	FGN	3846	0	4517	2	5431	0	13794	2
GOU	GAROUA, REP OF CAMEROON	N	FGN	1954	0	1822	0	1338	0	5114	0
GOV	GOVE, N.T., AUSTRALIA	S	FGN	314	0	600	0	624	0	1538	0
GRB	GREEN BAY, WI, USA	N	YES	605	0	0	0	0	0	605	0
GRJ	GEORGE, SOUTH AFRICA	S	FGN	2178	0	2262	0	2253	0	6693	0
GRR	GRAND RAPIDS, MI, USA	N	YES	4831	0	3497	0	4465	0	12793	0
GRU	SAO PAULO-GUARULMOS, BRAZIL	S	FGN	41061	0	45163	0	47825	0	134049	0
GRZ	GRAZ, AUSTRIA	N	FGN	619	1	304	0	562	1	1485	2

## AIRPORT APTDEF

HEMISPHR CONUS STGFY87 ING1 STGFY88 ING2 STGFY89 ING3 STG737 INGS

AIRPORT APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS	
GSO	GREENSBORO/HPT/WIN-SALEM, NC, USA	N	YES	18586	0	14989	0	15677	0	49252	0
GSP	GREENVILLE/SPARTANBURG, SC, USA	N	YES	1508	0	2324	0	2292	1	6124	1
GTF	GREAT FALLS, MT, USA	N	YES	4356	0	3398	0	2992	0	10746	0
GUA	GUATEMALA CITY, GUATEMALA	N	FGN	1667	0	2848	0	3522	0	8037	0
GUM	GUAM, GUAM	N	FGN	289	0	366	0	145	0	800	0
GVA	GENEVA, SWITZERLAND	N	FGN	10594	0	10520	1	11863	0	32977	1
GWL	GWALIOR, INDIZ	N	FGN	1460	0	1422	1	1460	0	4342	1
GWT	GALWAY, IRELAND	N	FGN	130	0	136	0	8	0	274	0
GXF	SEIYUN, YEMEN	N	FGN	26	0	0	0	0	0	26	0
GXG	NEGAGE, ANGOLA	S	FGN	382	0	314	0	0	0	696	0
GYE	GUAYAQUIL, ECUADOR	S	FGN	1609	0	0	0	0	0	1609	0
GYN	GOIANIA, BRAZIL	S	FGN	7891	0	8638	0	10582	0	27111	0
HAC	HACHIJO, JIMA ISLAND, JAPAN	N	FGN	834	1	1396	0	842	0	3072	1
HAH	MORONI-HAHAYA, COMOROS	S	FGN	266	0	343	0	222	0	831	0
HAJ	HANOVER, FED REP OF GERMANY	N	FGN	8844	0	9804	1	8722	0	27370	1
HAK	HAIKOU, P. R. CHINA	N	FGN	770	0	1508	0	1270	0	3548	0
HAM	HAMBURG, FRG	N	FGN	25535	2	27695	3	27741	4	80971	9
HAN	HANOI, SOC REP OF VIETNAM	N	FGN	152	0	158	0	242	0	552	0
HAS	HAIL, SAUDI ARABIA	N	FGN	3642	0	2720	0	2568	0	8930	0
HBA	HOBART, TASMANIA, AUSTRALIA	S	FGN	3785	0	4822	0	5322	0	13929	0
HBT	HAFR ALBAPIM, SAUDI ARABIA	N	FGN	140	0	228	0	208	0	576	0
HDN	STEAMBOAT SPRINGS, CO, USA	N	YES	0	0	0	0	88	0	88	0
HDY	HAT YAI, THAILAND	N	FGN	3094	0	2434	0	2706	0	8234	0
HEL	HELSINKI, FINLAND	N	FGN	2797	0	3382	0	4373	0	10552	0
HER	HERAKLION, GREECE	N	FGN	1780	0	2406	0	2312	0	6498	0
HGH	HANGZHOU, P. R. CHINA	N	FGN	1390	0	1619	0	1610	0	4619	0
HIR	HONIARA, GUADALCANAL, SOLOMON IS.	S	FGN	436	0	648	0	672	0	1756	0
HJR	HIROSHIMA, JAPAN	N	FGN	1460	0	1464	0	1460	0	4384	0
HKD	HAKODATE, JAPAN	N	FGN	1030	0	566	0	416	0	2012	0
HKG	HONG KONG, HONG KONG	N	FGN	2792	0	6018	0	7074	0	15884	0
HKT	PHUKET, THAILAND	N	FGN	1932	0	2110	0	2290	0	6332	0
HLN	HELENA, MT, USA	N	YES	2046	0	2188	0	1800	0	6034	0
HLZ	HAMILTON, NEW ZEALAND	S	FGN	627	0	727	0	1151	0	2505	0
HME	HASSI MESSAOUD, ALGERIA	N	FGN	256	0	118	0	268	0	642	0
HND	TOKYO-HANEDA, JAPAN	N	FGN	14398	0	12095	0	9997	1	36490	1
HNL	HONOLULU, OAHU, HA, USA	N	NO	51139	0	51563	0	58525	0	161227	0
HNM	HANA, MAUI, HA, USA	N	NO	0	0	0	0	0	1	0	1
HOD	HODEIDAH, YEMEN	N	FGN	86	0	0	0	0	0	86	0
HOF	HOFUF, SAUDI ARABIA	N	FGN	992	0	960	0	854	0	2806	0
HOR	HORTA FAIAL ISLAND, PORTUGAL	N	FGN	92	0	144	0	188	0	424	0
HOU	HOUSTON, TX, USA	N	YES	71429	3	81688	4	86754	2	239871	9
HPN	WHITE PLAINS, NY, USA	N	YES	2159	0	2049	0	1990	0	6198	0
HRB	HARBIN, MANCHURIA, P. R. CHINA	N	FGN	210	0	147	0	204	0	561	0
HRE	HARARE, ZIMBABWE	S	FGN	3314	0	5238	0	5347	0	13899	0
HRG	HORGHADA, ARAB REP OF EGYPT	N	FGN	760	0	732	0	1024	0	2516	0
HRL	HARLINGEN, TX, USA	N	YES	7446	1	7653	0	7583	0	22682	1
HSV	HUNTSVILLE/DECATUR, AL, USA	N	YES	1817	0	1972	0	3316	0	7105	0
HTI	HAMILTON ISLAND, QLD, AUSTRALIA	S	FGN	1351	0	1648	0	1748	0	4747	0
HTS	HUNTINGTON, WV, USA	N	YES	1152	0	1174	0	538	0	2864	0
HUN	HUALIEN, TAIWAN	N	FGN	6508	0	7264	0	8030	0	21802	0
HYD	HYDERABAD, INDIA	N	FGN	2103	1	2214	5	2265	1	6582	7
IAD	DULLES INT'L, WASHINGTON, DC, USA	N	YES	84839	1	52922	1	50660	0	188421	2
IAH	HOUSTON INTERCONT, TX, USA	N	YES	35485	0	46187	1	42713	0	124385	1
IAM	IN AMENAS, ALGERIA	N	FGN	408	0	420	0	506	0	1334	0
IBA	IBADAN, NIGERIA	N	FGN	1382	0	706	0	484	0	2572	0
IBZ	IBIZA, SPAIN	N	FGN	124	1	220	0	294	1	638	2
ICT	WICHITA, KA, USA	N	YES	10698	0	6225	0	6858	0	23781	0
IDA	IDAHO FALLS, ID, USA	N	YES	2190	0	2756	0	2714	0	7660	0
IDR	INDORE, INDIA	N	FGN	1460	0	1426	0	1460	0	4346	0
IEV	KIEV, USSR	N	FGN	0	0	32	0	8	0	40	0
IFN	ISFAHAN, IRAN	N	FGN	2256	0	2874	0	2728	0	7858	0
IGL	IZMIR-CIGLI, TURKEY	N	FGN	26	0	22	0	0	0	48	0
IGR	IGUAZU, ARGENTINA	S	FGN	986	0	784	0	522	0	2292	0
IGU	IGUASSU FALLS, BRAZIL	S	FGN	1776	0	2764	0	3510	0	8050	0
ILG	PHILADELPHIA-WILMINGTON, PA, USA	N	YES	440	0	0	0	0	0	440	0
ILM	WILMINGTON, NC, USA	N	YES	6254	0	5363	0	4298	0	15915	0
ILR	ILORIN, NIGERIA	N	FGN	1568	0	1884	0	737	0	4189	0
IMF	IMPHAL, INDIA	N	FGN	1460	0	1464	0	1460	0	4384	0
IMP	IMPERATRIZ, BRAZIL	S	FGN	1186	0	1464	0	1456	0	4106	0
IND	INDIANAPOLIS, IN, USA	N	YES	12290	0	19730	0	25796	0	57816	0
INI	NIS, YUGOSLAVIA	N	FGN	57	0	0	0	106	0	163	0
INU	NAURU, REP OF NAURU	S	FGN	889	0	906	1	430	0	2225	1
INZ	IN SALAH, ALGERIA	N	FGN	586	0	504	0	606	0	1696	0
IOA	IOANNINA, GREECE	N	FGN	1354	0	1200	0	1200	0	3754	0
IOS	ILMEUS, BRAZIL	S	FGN	2920	0	2928	0	2954	0	8802	0

## AIRPORT APTDEF

HEMISPHR CONUS STGFY87 ING1 STGFY88 ING2 STGFY89 ING3 STG737 INGS

AIRPORT APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS	
IQQ	IQUIQUE, CHILE	S	FGN	1460	0	1674	0	1868	0	5002	0
IQT	IQUITOS, PERU	S	FGN	210	0	304	0	844	0	1358	0
IRJ	LA RIOJA, ARGENTINA	S	FGN	860	0	768	0	736	0	2364	0
IRP	ISIRO, ZAIRE	N	FGN	104	0	156	0	210	0	470	0
ISA	MOUNT ISA, QLD, AUSTRALIA	S	FGN	546	0	1262	1	1660	0	3468	1
ISB	ISLAMABAD RAWALPINDI, PAKISTAN	N	FGN	3663	0	4673	0	4868	0	13204	0
ISG	ISHIGAKI, JAPAN	N	FGN	6936	1	7473	4	6358	0	20767	5
ISO	KINSTON, NC, USA	N	YES	2024	0	1464	0	495	0	3983	0
ISP	LONG ISLAND MACARTHUR, NY, USA	N	YES	5816	0	3036	0	3539	1	12391	1
IST	ISTANBUL, TURKEY	N	FGN	2551	0	2343	0	3213	0	8107	0
ITH	ITHICA, NY, USA	N	YES	182	0	2	0	151	0	335	0
ITO	HILO HAWAII, HA, USA	N	NO	8568	1	9273	2	9946	0	27787	3
IUE	NIUE ISLAND, NIUE	S	FGN	127	0	72	0	26	0	225	0
IVC	INVERCARGILL, NEW ZEALAND	S	FGN	2069	0	2076	1	2096	0	6241	1
IXA	AGARTALA, INDIA	N	FGN	1976	0	2720	0	2593	0	7289	0
IXB	BAGDOGRA, INDIA	N	FGN	2366	1	2196	0	2190	0	6752	1
IXC	CHANDIGAR, INDIA	N	FGN	1460	0	1464	1	1426	1	4350	2
IXD	ALLAHABAD, INDIA	N	FGN	392	0	500	0	1042	0	1934	0
IXE	MANGALORE, INDIA	N	FGN	2370	0	2168	1	1878	0	6416	1
IXJ	JAMMU, INDIA	N	FGN	1650	0	1576	1	1546	1	4772	2
IXL	LEH, INDIA	N	FGN	574	0	916	0	938	0	2428	0
IXM	MADURAI, INDIA	N	FGN	1200	0	1142	0	1344	0	3686	0
IXR	RANCHI, INDIA	N	FGN	1460	0	1464	1	1460	0	4384	1
IXS	SILOHAR, INDIA	N	FGN	1748	0	1832	0	1772	0	5352	0
IXU	AURANGABAD, INDIA	N	FGN	1820	0	1464	1	1460	0	4744	1
IXV	ALONG, INDIA	N	FGN	0	0	0	1	0	0	0	1
IXZ	PORT BLAIR ANDAMAN ISLAND, INDIA	N	FGN	706	0	928	0	994	0	2628	0
JAC	JACKSON, WY, USA	N	YES	2325	0	2179	0	2342	0	6846	0
JAI	JAIPUR, INDIA	N	FGN	4068	2	4876	2	3736	0	12680	4
JAN	JACKSON, MS, USA	N	YES	3392	0	3085	0	2959	0	9436	0
JAX	JACKSONVILLE, FL, USA	N	YES	10211	0	13077	0	15242	1	38530	1
JDH	JODHPUR, INDIA	N	FGN	2920	0	2928	0	2816	1	8664	1
JDO	JUAZEIRO DO NORTE CEARAH, BRAZIL	S	FGN	626	0	628	0	624	0	1878	0
JED	JEDDAH, SAUDI ARABIA	N	FGN	19745	0	20292	0	19897	0	59934	0
JER	JERSEY CHANNEL ISLANDS, UK	N	FGN	1263	0	1112	0	3011	0	5386	0
JFK	KENNEDY, NEW YORK, NY, USA	N	YES	13217	0	8785	0	8874	0	30876	0
JGA	JAMNAGAR, INDIA	N	FGN	730	0	732	0	730	0	2192	0
JHB	JOHOR BAHRU, MALAYSIA	N	FGN	4018	0	4164	0	4690	0	12872	0
JIB	DJIBOUTI, DJIBOUTI	N	FGN	508	0	686	0	868	0	2062	0
JKH	CHIOS, GREECE	N	FGN	1858	0	1720	0	1768	0	5346	0
JNB	JOHANNESBURG, SOUTH AFRICA	S	FGN	13746	2	15620	0	18693	1	48059	3
JNU	JUNEAU, AS, USA	N	NO	2255	0	2684	0	2686	0	7625	0
JOI	JOINVILLE, BRAZIL	S	FGN	626	0	628	0	624	0	1878	0
JOS	JOS, NIGERIA	N	FGN	2596	0	2022	0	1643	0	6261	0
JPA	JOAO PESSOA, BRAZIL	S	FGN	1460	0	1832	0	4074	0	7366	0
JRH	JORMAT, INDIA	N	FGN	694	2	732	0	730	0	2156	2
JRO	KILIMANJARO, TANZANIA	S	FGN	1667	0	1568	0	1405	0	4640	0
JSI	SKIATHOS, GREECE	N	FGN	412	0	342	0	448	0	1202	0
JTR	SANTORINI, THIRA ISLAND, GREECE	N	FGN	1126	0	884	0	1480	0	3490	0
JUB	JUBA, SUDAN	N	FGN	38	0	0	0	0	0	38	0
JUJ	JUJUY, ARGENTINA	S	FGN	600	0	226	0	26	0	852	0
KAD	KADUNA, NIGERIA	N	FGN	3896	0	3639	0	2650	0	10185	0
KAN	KANO, NIGERIA	N	FGN	700	0	708	0	765	0	2173	0
KBL	KABUL, AFGHANISTAN	N	FGN	208	0	208	0	78	0	494	0
KBR	KOTA BHARU, MALAYSIA	N	FGN	3024	0	3034	0	3091	0	9149	0
KCH	KUCHING, SARAWAK, MALAYSIA	N	FGN	5337	1	5482	0	6265	0	17084	1
KCZ	KOCHI, JAPAN	N	FGN	1522	0	816	0	170	0	2508	0
KDU	SKARDU, PAKISTAN	N	FGN	190	0	688	0	730	0	1608	0
KEF	REYKJAVIK-KEFLAVIK, ICELAND	N	FGN	561	0	936	0	992	1	2489	1
KER	KERMAN, IRAN	N	FGN	532	0	52	0	0	0	584	0
KGA	KANANGA, ZAIRE	S	FGN	420	0	366	0	490	0	1276	0
KGL	KIGALI, RWANDA	S	FGN	22	0	22	0	208	0	252	0
KGS	KOS, GREECE	N	FGN	550	1	566	0	894	0	2010	1
KHH	KAHSIUNG, TAIWAN	N	FGN	14596	2	18764	0	20170	0	53530	2
KHI	KARACHI, PAKISTAN	N	FGN	7384	2	9030	0	8710	1	25124	3
KHN	NANCHANG KIANGSI, P. R. CHINA	N	FGN	228	0	190	0	52	0	470	0
KIJ	NIIGATA, JAPAN	N	FGN	2190	0	2224	0	2162	0	6576	0
KIM	KIMBERLEY, SOUTH AFRICA	S	FGN	3888	0	4182	0	4789	3	12859	3
KIW	KINGSTON, JAMAICA	N	FGN	338	0	88	0	208	0	634	0
KKC	KHON KAEN, THAILAND	N	FGN	2264	0	1942	0	1668	0	5874	0
KLX	KALAMATA, GREECE	N	FGN	782	0	742	0	730	0	2254	0
KMG	KUNMING, P.R. CHINA	N	FGN	2448	1	2577	0	3683	0	8708	1
KMI	MIYAZAKI, JAPAN	N	FGN	4686	0	3536	0	3474	0	11696	0
KMJ	KUMAMOTO, JAPAN	N	FGN	0	0	74	0	42	0	116	0
KMP	KEETMANSHOOP, NAMIBIA	S	FGN	174	0	0	0	0	0	174	0

AIRPORT	APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
KMQ	KOMATSU, JAPAN	N	FGN	730	0	828	0	702	0	2260	0
KMX	KHAMIS MUSHAIT, SAUDI ARABIA	N	FGN	0	0	0	0	322	0	322	0
KND	KINDU, ZAIRE	S	FGN	480	0	622	0	522	0	1624	0
KNN	KANKAN, GUINEA	N	FGN	0	0	100	0	92	0	192	0
KNU	KANPUR, INDIA	N	FGN	1372	0	1578	0	1068	0	4018	0
KOA	KONA, HA, USA	N	NO	11308	0	11047	1	13819	0	36174	1
KOJ	KAGOSHIMA, JAPAN	N	FGN	843	0	1913	2	1095	0	3851	2
KRN	KIRUNA, SWEDEN	N	FGN	0	0	18	0	0	0	18	0
KRP	KARUP, DENMARK	N	FGN	0	0	0	0	72	0	72	0
KRS	KRISTIANSAND, NORWAY	N	FGN	7646	0	7990	0	7912	0	23548	0
KRT	KHARTOUM, SUDAN	N	FGN	1921	0	2623	1	1945	0	6489	1
KSA	KOSRAE, CAROLINE ISLANDS	N	FGN	10	0	132	0	104	0	246	0
KSD	KARLSTAD, SWEDEN	N	FGN	0	0	0	0	52	0	52	0
KSH	BAKHTARAN, IRAN	N	FGN	0	0	0	0	144	0	144	0
KSM	ST MARY'S, AS, USA	N	NO	420	0	562	0	722	0	1704	0
KST	KOSTI, SUDAN	N	FGN	0	1	0	0	0	0	0	1
KSU	KRISTIANSUND, NORWAY	N	FGN	2128	0	2024	0	2106	0	6258	0
KTM	KATHMANDU, NEPAL	N	FGN	2240	0	2200	1	2195	0	6635	1
KTN	KETCHIKAN, AS, USA	N	NO	1460	0	1464	0	1460	0	4384	0
KUA	KUANTAN, MALAYSIA	N	FGN	426	0	420	0	676	0	1522	0
KUH	KUSHIRO, JAPAN	N	FGN	1336	0	926	0	552	0	2814	0
KUL	KUALA LUMPUR, MALAYSIA	N	FGN	21147	1	22237	0	24379	0	67763	1
KVA	KAVALA, GREECE	N	FGN	1242	0	1160	0	1202	0	3604	0
KWE	GUIYANG, P. R. CHINA	N	FGN	684	0	660	0	834	0	2178	0
KWI	KUWAIT, KUWAIT	N	FGN	3659	0	2728	0	2536	0	8923	0
KWJ	KWANGJU, REP OF KOREA	N	FGN	0	0	0	0	668	0	668	0
KWL	GUILIN, P. R. CHINA	N	FGN	3855	0	4671	0	3365	0	11891	0
LAD	LUANDA, ANGOLA	S	FGN	5680	0	5112	0	3986	0	14778	0
LAN	LANSING, MI, USA	N	YES	1120	0	1646	0	1764	0	4530	0
LAS	LAS VEGAS, NV, USA	N	YES	82033	0	89149	1	96139	0	267321	1
LAX	LOS ANGELES, CA, USA	N	YES	113329	0	123390	2	118819	4	355538	6
LBB	LUBBOCK, TX, USA	N	YES	13600	0	16396	0	16240	0	46236	0
LBU	LABUAN SABAH, MALAYSIA	N	FGN	2398	0	2406	0	2709	0	7513	0
LBV	LIBREVILLE, GABON	N	FGN	1553	0	1955	0	1983	0	5491	0
LCA	LARNACA, CYPRUS	N	FGN	1352	0	1277	0	1616	1	4245	1
LCE	LA CEIBA, HONDURAS	N	FGN	380	0	570	0	1210	0	2160	0
LDB	LONDRINA, BRAZIL	S	FGN	0	0	440	0	1185	0	1625	0
LDE	LOURDES/TARBES, FRANCE	N	FGN	8	1	0	1	0	1	8	3
LDI	LINDI, TANZANIA	S	FGN	10	0	0	0	0	0	10	0
LED	LENINGRAD, U.S.S.R.	N	FGN	198	0	163	0	239	0	600	0
LEI	ALMERIA, SPAIN	N	FGN	100	0	104	0	130	0	334	0
LEJ	LEIPZIG, GDR	N	FGN	16	0	28	0	46	0	90	0
LEX	LEXINGTON, KY, USA	N	YES	3916	1	4165	0	3573	0	11654	1
LFT	LAFAYETTE, LA, USA	N	YES	0	0	0	0	302	0	302	0
LFW	LOME, TOGO	N	FGN	985	0	812	0	929	0	2726	0
LGA	NEW YORK LA GUARDIA, NY, USA	N	YES	32068	1	32703	1	36226	1	100997	3
LGB	LONG BEACH, CA, USA	N	YES	1299	0	3321	0	7605	0	12225	0
LGG	LIEGE, BELGIUM	N	FGN	0	0	0	0	0	1	0	1
LGK	LANGKAWI, MALAYSIA	N	FGN	0	0	206	0	448	0	654	0
LGW	LONDON-GATWICK, ENGLAND	N	FGN	13117	0	17634	1	36365	2	67116	3
LHE	LAHORE, PAKISTAN	N	FGN	7188	1	9191	2	9169	0	25548	3
LHR	LONDON HEATHROW, ENGLAND, (UK)	N	FGN	69405	2	75934	1	93470	2	238809	5
LHW	LANZHOU, P. R. CHINA	N	FGN	0	0	83	0	21	0	104	0
LIH	LIHUE, KAUAI, HA, USA	N	NO	17365	2	17708	3	19247	3	54320	8
LIL	LILLE, FRANCE	N	FGN	214	0	292	0	367	0	873	0
LIM	LIMA, PERU	S	FGN	1460	0	2157	0	2318	0	5935	0
LIN	MILAN Linate, ITALY	N	FGN	7588	1	7604	1	7641	0	22833	2
LIS	LISBON, PORTUGAL	N	FGN	10558	0	13190	0	14480	0	38228	0
LIT	LITTLE ROCK, AK, USA	N	YES	10791	1	10853	1	9382	1	31026	3
LJA	LODJA, ZAIRE	S	FGN	106	0	104	0	74	0	284	0
LJU	LJUBLJANA, YUGOSLAVIA	N	FGN	1741	0	1704	1	1615	0	5060	1
LKO	LUCKNOW, INDIA	N	FGN	4396	1	4264	1	4236	2	12896	4
LLA	LULEA, SWEDEN	N	FGN	0	0	8	0	0	0	8	0
LLW	LILONGWE, MALAWI	S	FGN	752	1	786	0	823	0	2361	1
LMT	KLAMATH FALLS, OR, USA	N	YES	1218	0	62	0	0	0	1280	0
LNK	LINCOLN, NB, USA	N	YES	5816	0	5847	0	4201	0	15864	0
LNZ	LONZ, AUSTRIA	N	FGN	768	1	704	0	683	0	2155	1
LOS	LAGOS, NIGERIA	N	FGN	16716	1	14969	1	11299	0	42984	2
LPA	GRAN CANARIA, CANARY ISLANDS	N	FGN	293	0	1439	0	2682	1	4414	1
LPB	LA PAZ, BOLIVIA	S	FGN	136	0	264	0	312	0	712	0
LPL	LIVERPOOL, ENGLAND	N	FGN	30	0	42	0	134	0	206	0
LRH	LA ROCHELLE, FRANCE	N	FGN	0	0	8	0	4	0	12	0
LST	LAUNCESTON, TASMANIA, AUSTRALIA	S	FGN	4721	1	5684	0	5723	2	16128	3
LTN	LONDON-LUTON INT'L, ENGLAND	N	FGN	192	0	270	0	556	1	1018	1
LUN	LUSAKA, ZAMBIA	S	FGN	2302	0	1961	0	2183	0	6446	0

## AIRPORT APTDEF

HEMISPHR CONUS STGFY87 ING1 STGFY88 ING2 STGFY89 ING3 STG737 INGS

AIRPORT APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS	
LUO	LUENA, ANGOLA	S	FGN	434	0	472	0	556	0	1462	0
LUQ	SAN LUIS, ARGENTINA	S	FGN	196	0	0	0	0	0	196	0
LUT	LAURA STATION, AUSTRALIA	S	FGN	0	0	0	0	0	0	0	0
LUX	LUXEMBOURG, LUXEMBOURG	N	FGN	2615	0	3500	0	3753	0	9868	0
LXR	LUXOR, ARAB REP OF EGYPT	N	FGN	2161	0	2143	1	2995	0	7299	1
LXS	LEMNOS, GREECE	N	FGN	1040	0	996	0	1060	1	3096	1
LYH	LYNCHBURG, VA, USA	N	YES	1824	0	2306	0	1754	0	5884	0
LYP	FAISALABAD, PAKISTAN	N	FGN	790	0	1326	0	1324	0	3440	0
LYR	LONGYEARBYEN, NORWAY	N	FGN	14	0	223	0	255	0	492	0
LYS	LYON, FRANCE	N	FGN	5223	0	5439	0	5714	0	16376	0
MAA	MADRAS, INDIA	N	FGN	7714	0	8485	3	8067	1	24266	4
MAB	MARABA, BRAZIL	S	FGN	470	0	628	0	782	0	1880	0
MAD	MADRID, SPAIN	N	FGN	6813	1	7477	0	9134	0	23424	1
MAF	MIDLAND OEOSSA, TX, USA	N	YES	16021	1	14942	0	14184	2	45147	3
MAH	MAHON, MENORCA, SPAIN	N	FGN	84	0	174	0	310	1	568	1
MAJ	MAJUORO, MARSHALL ISLAND	N	FGN	92	0	132	0	104	0	328	0
MAL	MANGOLE, INDONESIA	N	FGN	0	0	0	0	0	0	0	0
MAN	MANCHESTER, ENGLAND (UK)	N	FGN	5780	3	7490	1	10909	0	24179	4
MAO	MANAUS, BRAZIL	S	FGN	6627	0	7820	0	9619	0	24066	0
MBA	MOMBASA, KENYA	S	FGN	0	0	0	0	21	0	21	0
MBJ	MONTEGO BAY, JAMAICA	N	FGN	218	0	0	0	0	0	218	0
MBS	SAGINAW, MI, USA	N	YES	794	0	272	0	2169	0	3235	0
MBX	MARIBOR, YUGOSLAVIA	N	FGN	0	0	0	0	40	0	40	0
MCG	MCGRATH, AS, USA	N	NO	0	0	0	0	204	0	204	0
MCI	KANSIS CITY, MO, USA	N	YES	26453	0	29842	0	50786	0	107081	0
MCO	ORLANDO-INT'L, FL, USA	N	YES	23551	1	28187	0	25069	0	76807	1
MCP	MACAPA, AMAPA, BRAZIL	N	FGN	1888	0	2337	0	2295	0	6520	0
MCT	MUSCAT, OMAN	N	FGN	4409	0	5241	0	5174	0	14824	0
MCY	MAROOCHYDORE, QLD, AUSTRALIA	S	FGN	104	0	136	0	10	0	250	0
MCZ	MACEIO, ALAGOAS, BRAZIL	S	FGN	978	0	1646	0	4088	0	6712	0
MDE	MEDELLIN, COLOMBIA	N	FGN	312	0	312	0	314	0	938	0
MDI	MAKURDI, NIGERIA	N	FGN	730	0	695	0	375	0	1800	0
MDK	MBANDAKA, ZAIRE	N	FGN	416	0	522	0	526	0	1464	0
MDP	MINDIPTANA, INDONESIA	-0-	FGN	0	0	0	0	0	1	0	1
MDQ	MAR DEL PLATA, ARGENTINA	S	FGN	2964	0	2816	2	2662	1	8442	3
MDT	HARRISBURG-OLMSTEAD ST, PA, USA	N	YES	3784	1	3265	0	2805	0	9854	1
MDW	CHICAGO-MIDWAY, IL, USA	N	YES	33077	2	46544	2	49337	1	128958	5
MDZ	MENDOZA, ARGENTINA	S	FGN	1578	0	1106	0	886	0	3570	0
MED	MEDINA, SAUDI ARABIA	N	FGN	4698	0	5236	0	4896	1	14830	1
MEG	MALANGE, ANGOLA	S	FGN	740	0	758	0	696	0	2194	0
MEL	MELBOURNE, VICTORIA, AUSTRALIA	S	FGN	17124	1	21097	3	31383	0	69604	4
MEM	MEMPHIS, TN, USA	N	YES	8599	0	7534	0	7035	0	23168	0
MES	MEDAN, INDONESIA	N	FGN	730	0	732	0	714	0	2176	0
MEX	MEXICO CITY, MEXICO	N	FGN	4170	0	5281	0	5092	0	14543	0
MFE	MC ALLEN, TX, USA	N	YES	288	0	1148	0	1052	0	2488	0
MFR	MEDFOR, OR, USA	N	YES	3529	0	2228	1	1784	0	7541	1
MFU	MFUWE, ZAMBIA	S	FGN	34	0	60	0	30	0	124	0
MGA	MANAGUA, NICARAGUA	N	FGN	3212	0	2689	0	1762	1	7663	1
MGM	MONTGOMERY, AL, USA	N	YES	148	0	896	0	1681	0	2725	0
MGQ	MOGADISHU, SOMALIA	N	FGN	94	0	46	0	50	0	190	0
MHD	MASHAD, IRAN	N	FGN	516	0	0	0	0	0	516	0
MHT	MANCHESTER, NH, USA	N	YES	0	0	1106	0	2733	0	3839	0
MIA	MIAMI, FL, USA	N	YES	28033	0	34912	1	29373	0	92318	1
MID	MERIDA, MEXICO	N	FGN	0	0	244	0	170	0	414	0
MIL	MILAN, ITALY	N	FGN	0	1	0	0	0	0	0	1
MIR	MONASTIR, TUNISIA	N	FGN	488	0	336	0	567	0	1391	0
MIU	MAIDUGURI, NIGERIA	N	FGN	887	0	1042	0	636	0	2565	0
MJM	MBUJI-MAYI, ZAIRE	S	FGN	364	0	510	0	618	0	1492	0
MJN	MAJUNGA, MADAGASCAR	S	FGN	402	0	336	0	298	0	1036	0
MJT	MYTILENE, GREECE	N	FGN	2852	0	2634	0	2820	0	8306	0
MKE	MILWAUKEE, WI, USA	N	YES	1056	0	3124	0	4861	0	9041	0
MKY	MALACCA, MALAYSIA	S	FGN	2109	0	2272	0	1316	0	5697	0
MLA	MALTA, MEDITERRANEAN SEA	N	FGN	2882	0	4492	0	5117	1	17491	1
MLB	MELBOURNE, FL, USA	N	YES	958	0	1474	0	1034	0	3466	0
MLE	MALE, MALDIVES	N	FGN	356	0	464	0	454	0	1274	0
MLH	MULHOUSE/BASEL, FRANCE	N	FGN	1	0	4	0	21	0	26	0
MLI	MOLINE, IL, USA	N	YES	1947	0	2284	0	2941	0	7172	0
MLU	MONROE, LA, USA	N	YES	3670	0	3712	0	2852	0	10234	0
MLW	MONROVIA, LIBERIA	N	FGN	0	0	0	0	124	0	124	0
MNY	MIYAKO JIMA, JAPAN	N	FGN	3606	5	4836	5	3834	0	12276	10
MNL	MANILA, PHILIPPINES	N	FGN	1232	0	1211	0	1321	0	3764	0
MOB	MOBILE AL/PASCAGOULA, MS, USA	N	YES	3013	0	2274	0	330	0	5617	0
MOC	MONTES CLAROS, BRAZIL	S	FGN	416	0	420	0	416	0	1252	0
MOL	MOLDE, NORWAY	N	FGN	2129	0	2263	0	2366	0	6758	0
MOQ	MORONDAVA, MADAGASCAR	S	FGN	112	0	204	0	150	0	466	0

AIRPORT	APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
MOT	MINOT, ND, USA	N	YES	737	0	964	0	648	0	2349	0
MPL	MONTPELLIER, FRANCE	N	FGN	52	0	52	0	52	0	156	0
MPM	MAPUTO, MOZAMBIQUE	S	FGN	2248	0	2289	0	1480	0	6017	0
MRS	MARSEILLE, FRANCE	N	FGN	3381	0	3805	0	4186	0	11372	0
MRU	MAURITIUS, MAURITIUS	S	FGN	321	0	437	0	446	0	1204	0
MRY	MONTEREY, CA, USA	N	YES	3559	0	1923	0	1844	0	7326	0
MSN	MADISON, WI, USA	N	YES	1695	0	1489	0	2132	0	5316	0
MSO	MISSOULA, MT, USA	N	YES	3537	1	3427	0	3307	0	10271	1
MSP	MINNEAPOLIS-ST PAUL, MN, USA	N	YES	8120	1	11799	0	16476	0	36395	1
MSR	MUENSTER, FRG	N	FGN	4	0	0	0	0	0	4	0
MSY	NEW ORLEANS, LA, USA	N	YES	25950	0	32656	1	32966	3	91572	4
MSZ	NAMIBE, ANGOLA	S	FGN	228	0	262	0	138	0	628	0
MTS	MANZINI, SWAZILAND	S	FGN	96	0	192	0	154	0	442	0
MTY	MONTERREY, MEXICO	N	FGN	0	0	62	0	48	0	110	0
MUC	MUNICH, FRG	N	FGN	36435	4	44305	1	46990	1	127730	6
MUX	MULTAN, PAKISTAN	N	FGN	2488	0	2344	0	2303	0	7135	0
MUZ	MUSOMA, TANZANIA	S	FGN	8	0	0	0	0	0	8	0
MVB	FRANCEVILLE, GABON	N	FGN	1	0	5	0	3	0	9	0
MVD	MONTEVIDEO, URUGUAY	S	FGN	4977	0	5351	0	5226	0	15554	0
MVR	MAROUA, REP OF CAMEROON	N	FGN	1190	0	1052	0	933	0	3175	0
MWZ	MWANZA, TANZANIA	S	FGN	79	0	530	0	785	0	1394	0
MXP	MILAN-MALPENSA, ITALY	N	FGN	4	0	21	1	26	0	51	1
MXZ	MEIXIAN, P. R. CHINA	N	FGN	0	0	328	0	420	0	748	0
MYJ	MATSUYAMA, SHIKIKU, JAPAN	N	FGN	290	0	862	0	762	0	1914	0
MYR	MYRTLE BEACH, SC, USA	N	YES	4864	0	5504	0	6440	1	16808	1
MYW	MTWARA, TANZANIA	S	FGN	370	0	312	0	290	0	972	0
MYY	MIRI, SARAWAK, MALAYSIA	N	FGN	3024	0	3244	0	3730	0	9998	0
MZG	MAKUNG, TAIWAN	N	FGN	8877	0	10980	0	10180	0	30037	0
MZM	METZ, FRANCE	N	FGN	0	0	0	0	21	0	21	0
MZI	MAZATLAN, MEXICO	N	FGN	976	0	554	0	628	0	2158	0
NAG	NAGPUR, INDIA	N	FGN	2756	0	2440	0	1970	0	7166	0
NAK	NAKHON RATCHASIMA, THAILAND	N	FGN	0	0	0	0	82	0	82	0
NAN	NADI, FIJI	S	FGN	1373	0	1413	0	1724	0	4510	0
NAP	NAPLES, ITALY	N	FGN	739	0	584	0	662	0	1985	0
NAS	NASSAU, BAHAMAS	N	FGN	7440	0	9851	0	10501	0	27792	0
NAT	NATAL, BRAZIL	S	FGN	4380	0	4976	0	5422	0	14778	0
NBO	NAIROBI, KENYA	S	FGN	1051	0	1087	0	1344	0	3482	0
NCE	NICE, FRANCE	N	FGN	3675	1	5258	0	5599	0	14532	1
NCL	NEWCASTLE, ENGLAND	N	FGN	1825	0	1589	1	1879	0	5293	1
NDD	SUMBE, ANGOLA	S	FGN	10	0	0	0	0	0	10	0
NDJ	N'DJAMENA, CHAD	N	FGN	18	0	0	0	20	0	38	0
NGE	N'GAOUNDERE, REP OF CAMEROON	N	FGN	1006	0	902	0	870	0	2778	0
NGO	NAGOYA, JAPAN	N	FGN	5577	0	6995	1	6550	0	19122	1
NIM	NIAMEY, NIGER	N	FGN	62	0	0	0	0	0	62	0
NKC	NOUAKCHOTT, MAURITANIA	N	FGN	110	0	82	0	66	0	258	0
NKG	NANJING, P. R. CHINA	N	FGN	2476	0	2744	0	3005	0	8225	0
NLA	NDOLA, ZAMBIA	S	FGN	701	0	508	0	730	0	1939	0
NLK	NORFOLK ISLAND, PACIFIC OCEAN	S	FGN	420	0	581	0	628	0	1629	0
NNG	NANNING, P. R. CHINA	N	FGN	1157	0	1042	0	480	0	2679	0
NOS	NOSSIBE, MADAGASCAR	S	FGN	508	0	614	0	700	0	1822	0
NOU	NOUMEA, NEW CALEDONIA	S	FGN	219	0	209	0	949	0	1377	0
NOV	HUAMBO, ANGOLA	S	FGN	520	0	630	0	1254	0	2404	0
NPE	NAPIER, NEW ZEALAND	S	FGN	0	0	0	0	80	0	80	0
NQN	NEUQUEN, ARGENTINA	S	FGN	1876	0	1838	0	1598	0	5312	0
NRT	TOKYO-NARITA, JAPAN	N	FGN	0	0	640	0	730	0	1370	0
NUE	NUREMBURG, FRG	N	FGN	3516	1	4068	1	3943	1	11527	3
NVT	NAVEGANTES, BRAZIL	S	FGN	2608	0	2556	0	2500	0	7664	0
OAJ	JACKSONVILLE, NC, USA	N	YES	2428	0	1892	0	1588	0	5908	0
OAK	OAKLAND, SAN FRANCISCO, CA, USA	N	YES	27453	3	25240	0	24777	0	77470	3
ODE	ODENSE, DENMARK	N	FGN	567	0	496	0	503	0	1566	0
OGG	KAHULUI, MAUI, HA, USA	N	NO	27942	1	27757	1	29505	0	85204	2
OGN	YONAGUNI-JIMA, JAPAN	N	FGN	0	0	30	0	0	0	30	0
OGX	OUARGLA, ALGERIA	N	FGN	836	0	552	0	841	0	2229	0
OHD	OHRID, YUGOSLAVIA	N	FGN	292	0	523	0	452	0	1267	0
OIT	OITA, JAPAN	N	FGN	854	0	818	0	1472	1	3144	1
OKA	OKINAWA, RYUKYU IS, JAPAN	N	FGN	11818	0	13972	0	13660	0	39450	0
OKC	OKLAHOMA CITY, OK, USA	N	YES	25165	0	27072	1	26161	1	78398	2
OKJ	OKAJAMA, JAPAN	N	FGN	0	0	923	0	1444	0	2367	0
OLB	OLBIA, ITALY	N	FGN	40	0	42	0	92	0	174	0
OMA	OMAHA, NB, USA	N	YES	10800	0	10871	0	13689	0	35360	0
OME	OME, AS, USA	N	NO	2272	0	2232	0	2269	0	6773	0
OMO	MOSTAR, YUGOSLAVIA	N	FGN	0	0	0	0	178	0	178	0
ONT	ONTARIO, CA, USA	N	YES	33033	0	34539	0	35608	0	103180	0
OOL	GOLD COAST, QLD, AUSTRALIA	S	FGN	2812	0	3663	0	5208	0	11683	0
OPO	OPORTO, PORTUGAL	N	FGN	3349	1	3331	0	5553	0	12233	1

AIRPORT	APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STGF737	INGS
ORD	CHICAGO-O'HARE, IL, USA	N	YES	59542	2	79401	3	110094	1	249037	6
ORF	NORFOLK-VA. BEACH, VA, USA	N	YES	24618	2	20845	0	19290	3	64753	5
ORH	WORCESTER, MA, USA	N	YES	719	0	2976	0	1966	0	5661	0
ORK	CORK, IRELAND	N	FGN	2942	0	3322	0	4963	0	11227	0
ORN	ORAN, ALGERIA	N	FGN	4524	0	4495	0	4450	0	13469	0
ORY	PARIS - ORLY ARPT, FRANCE	N	FGN	6940	1	8806	1	9381	2	25127	4
OSA	OSAKA, JAPAN	N	FGN	1792	0	1262	0	1246	0	4300	0
OSD	OSTERSUND, SWEDEN	N	FGN	0	0	0	0	6	0	6	0
OSL	OSLO, NORWAY	N	FGN	14168	0	0	0	0	0	14168	0
OSM	MOSUL, IRAQ	N	FGN	312	0	314	0	314	0	940	0
OTP	BUCHAREST-OTOPENI, ROMANIA	N	FGN	487	0	405	0	481	0	1373	0
OTZ	KOTZEBUE, AS, USA	N	NO	2082	0	2050	0	2082	0	6214	0
OJA	OJAGADOUGOU, BURKINA FASO	N	FGN	14	0	0	0	0	0	14	0
OJD	OJJDA, MOROCCO	N	FGN	402	0	386	0	361	0	1149	0
OJE	OJESSO, PEOP REP OF CONGO	N	FGN	258	0	260	0	222	0	740	0
OZZ	OJARAZATE, MOROCCO	N	FGN	161	0	395	0	385	0	941	0
PAP	PORT AU PRINCE, HAITI	N	FGN	0	0	88	0	208	0	296	0
PAT	PATNA, INDIA	N	FGN	4973	2	4408	3	3842	0	13223	5
PBI	WEST PALM BEACH, FL, USA	N	YES	10310	0	9469	0	9081	0	28860	0
PBM	PARAMARIBO, REP OF SURINAME	N	FGN	104	0	106	0	104	0	314	0
PCL	PUCALLPA, PERU	S	FGN	586	0	110	0	182	0	878	0
PDB	PEDRO BAY, AS, USA	N	NO	0	0	0	0	0	1	0	1
PDL	PONTA DELGADA, PORTUGAL (AZORES)	N	FGN	886	0	933	0	451	0	2270	0
PDP	PUNTA DEL ESTE URUGUAY	S	FGN	2332	0	1676	0	1863	0	5871	0
PDX	PORTLAND, OR, USA	N	YES	18968	3	17604	0	18875	1	55447	4
PEK	BEIJIN, P. R. CHINA	N	FGN	9169	2	9152	0	8951	0	27272	2
PEM	PUERTO MALDONADO, PERU	S	FGN	0	0	92	0	64	0	156	0
PEN	PENANG, MALAYSIA	N	FGN	9062	2	9591	0	10330	0	28983	2
PER	PERTH, WA, AUSTRALIA	S	FGN	1178	0	1503	0	3664	0	6345	0
PEW	PESHAWAR, PAKISTAN	N	FGN	418	0	440	0	578	0	1436	0
PHC	PORT HARCOURT, NIGERIA	N	FGN	208	0	707	0	821	0	1736	0
PHE	PORT HEDLAND, WA, AUSTRALIA	S	FGN	130	0	0	0	0	0	130	0
PHL	PHILADELPHIA/WILMINGTON, PA, USA	N	YES	34184	0	45759	2	45635	2	125578	4
PHS	PHITSANULOK, THAILAND	N	FGN	1460	0	1464	0	818	0	3742	0
PNX	PHOENIX, AZ, USA	N	YES	163588	0	177325	0	199769	1	540682	1
PIA	PEORIA, IL, USA	N	YES	389	0	603	0	993	0	1985	0
PIE	TAMPA-ST PETERSBURG, FL, USA	N	YES	302	3	0	0	343	1	645	4
PIK	GLASGOW-PRESWICK, SCOTLAND	N	FGN	52	0	104	0	97	0	253	0
PIT	PITTSBURGH, PA, USA	N	YES	69413	0	80005	0	65047	0	214465	0
PIU	PIURA, PERU	S	FGN	1068	0	62	0	338	0	1468	0
PLZ	PORT ELIZABETH, SOUTH AFRICA	S	FGN	12531	1	14399	2	13797	3	40727	6
PMA	PENBA ISLAND, TANZANIA	S	FGN	8	0	0	0	0	0	8	0
PMC	PUERTO MONTT, CHILE	S	FGN	1400	0	1565	0	1861	0	4826	0
PME	PORTSMOUTH, UK	N	FGN	0	0	0	2	0	0	0	2
PMI	PALMA MALLORCA ISLAND, SPAIN	N	FGN	2449	0	3158	0	6948	1	12555	1
PMO	PALERMO, ITALY	N	FGN	0	0	46	0	246	0	292	0
PMR	PALMERSTON, NEW ZEALAND	S	FGN	2592	2	2752	0	2694	0	8038	2
PNA	PAMPLONA, SPAIN	N	FGN	0	0	0	0	0	1	0	1
PNQ	POONA, INDIA	N	FGN	842	0	1554	0	1968	0	4364	0
PNR	POINTE NOIRE, PEOP REP OF CONGO	S	FGN	1265	0	912	0	640	0	2817	0
PNS	PENSACOLA, FL, USA	N	YES	2180	0	1824	0	1328	0	5332	0
PNZ	PETROLINA, BRAZIL	S	FGN	720	0	732	0	732	0	2184	0
POA	PORTO ALEGRE, BRAZIL	S	FGN	8156	0	7765	0	5217	0	21138	0
POG	PORT GENTIL, GABON	S	FGN	18	0	139	0	263	0	420	0
POL	PENBA, MOZAMBIQUE	S	FGN	260	0	262	0	150	0	672	0
POS	PORT OF SPAIN, TRINIDAD/TOBAGO	N	FGN	52	0	52	0	52	0	156	0
PPG	PAGO PAGO, SAMOA	S	FGN	434	0	147	0	26	0	607	0
PPP	PROSERPINE, QLD, AUSTRALIA	S	FGN	437	0	521	0	257	0	1215	0
PPT	PAPEETE, SOCIETY IS, FR POLYNESIA	S	FGN	0	0	0	0	51	0	51	0
PRG	PRAGUE, CZECHOSLOVAKIA	N	FGN	1231	0	1148	0	1510	0	3889	0
PSA	PISA, ITALY	N	FGN	1082	0	1026	1	458	0	2566	1
PSC	PASCO, WA, USA	N	YES	864	0	2035	0	2565	0	5464	0
PSG	PETERSBURG, AS, USA	N	NO	1460	0	1464	0	1460	0	4384	0
PSI	PASNI, PAKISTAN	N	FGN	208	0	208	0	210	0	626	0
PSP	PALM SPRINGS, CA, USA	N	YES	3083	0	3434	0	3653	0	10170	0
PSS	POSADAG, ARGENTINA	S	FGN	938	0	928	0	810	0	2676	0
PTY	PANAMA CITY, PANAMA	N	FGN	2683	0	2922	1	3258	0	8863	1
PUB	PUEBLO, CO, USA	N	YES	2569	0	2395	0	2190	0	7154	0
PUQ	PUNTA ARENAS, CHILE	S	FGN	760	0	782	0	827	0	2369	0
PUS	PUSAN, REP OF KOREA	N	FGN	0	0	0	0	1704	0	1704	0
PUY	PULA, YUGOSLAVIA	N	FGN	76	0	286	0	400	1	762	1
PVD	PROVIDENCE, RI, USA	N	YES	5358	0	7982	0	10925	1	24265	1
PVH	PORTO VELHO, BRAZIL	S	FGN	4700	0	4786	1	4888	1	14374	2
PVK	PREVEZA/LEFKAS, GREECE	N	FGN	0	0	0	0	0	0	0	0
PVR	PUERTO VALLARTA, MEXICO	N	FGN	880	0	888	0	540	0	2308	0



AIRPORT	APTDEF	HEMISPHR	COMUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
PWM	PORTLAND, ME, USA	N	YES	2450	0	3650	0	6679	0	12779	0
PXO	PORTO SANTO, PORTUGAL (MADEIRA)	N	FGN	58	0	78	0	102	0	238	0
PZO	PUERTO ORDAZ, VENEZUELA	N	FGN	0	0	0	0	74	0	74	0
PZU	PORT SUDAN, SUDAN	N	FGN	925	0	1517	0	1344	0	3786	0
QTV	TREVISIO, ITALY	N	FGN	0	0	0	1	0	0	0	1
RAE	ARAR, SAUDI ARABIA	N	FGN	1662	0	1576	0	1728	0	4966	0
RAH	RAFHA, SAUDI ARABIA	N	FGN	166	0	210	0	240	0	616	0
RAJ	RAJKOT, INDIA	N	FGN	730	0	732	0	692	0	2154	0
RAK	MARRAKECH, MOROCCO	N	FGN	529	0	777	0	1086	0	2392	0
RAP	RAPID CITY, SD, USA	N	YES	4703	1	2847	0	3554	0	11104	1
RAR	RAROTONGA, COOK ISLAND, S. PACIFIC	S	FGN	152	0	63	0	0	0	215	0
RAS	RASHT, IRAN	N	FGN	540	0	40	0	0	0	580	0
RBA	RABAT, MOROCCO	N	FGN	0	0	562	0	531	0	1093	0
RBR	RIO BRANCO, BRAZIL	S	FGN	3614	0	3146	0	3146	0	9906	0
RCU	RIO CUARTO, ARGENTINA	S	FGN	552	0	0	0	0	0	552	0
RDD	REDDING, CA, USA	N	YES	3151	0	737	0	0	0	3888	0
RDU	RALEIGH-DURHAM, NC, USA	N	YES	23607	0	20624	0	16416	0	60647	0
REC	RECIFE, BRAZIL	S	FGN	8974	0	11088	1	15588	0	35650	1
REL	TRELEW, ARGENTINA	S	FGN	2448	0	1928	0	1984	0	6360	0
RES	RESISTENCIA, ARGENTINA	S	FGN	730	0	556	2	752	0	2038	2
RGA	RIO GRANDE, ARGENTINA	S	FGN	1628	0	1278	0	1253	0	4159	0
RGL	RIO GALLEGOS, ARGENTINA	S	FGN	3170	0	2492	0	1838	0	7500	0
RGN	RANGOON, BURMA	N	FGN	0	0	0	0	44	0	44	0
RHO	RHODES, GREECE	N	FGN	728	0	1132	0	2254	0	4114	0
RIC	RICHMOND, VA, USA	N	YES	8252	0	9847	0	9821	0	27920	0
RIJ	RIOJA, PERU	S	FGN	338	0	600	0	192	0	1130	0
RIY	RIYAN, YEMEN	N	FGN	560	0	322	0	242	0	1124	0
RJK	RIJEKA, YUGOSLAVIA	N	FGN	76	0	370	0	378	0	824	0
RKT	RAS AL KHAIMAH, U. A. EMIRATES	N	FGN	236	0	237	0	238	0	711	0
RNN	RONNE, DENMARK	N	FGN	298	0	242	0	272	0	812	0
RNO	RENO, NV, USA	N	YES	25150	1	20535	1	20236	0	65921	2
ROA	ROANOKE, VA, USA	N	YES	3910	1	4468	0	4283	0	12661	1
ROB	MONROVIA ROBERTS, LIBERIA	N	FGN	320	0	210	0	296	0	826	0
ROC	ROCHESTER, NY, USA	N	YES	13533	0	13078	1	17916	1	44527	2
ROK	ROCKHAMPTON, QLD, AUSTRALIA	S	FGN	3570	0	3750	0	2933	0	10253	0
ROR	KOROR, PALAU ISLAND, PACIFIC OCEAN	N	FGN	132	0	39	0	0	0	171	0
ROS	ROSARIO, ARGENTINA	S	FGN	1704	0	1478	0	900	0	4082	0
ROT	ROTORUA, NEW ZEALAND	S	FGN	0	0	292	0	482	0	774	0
RPR	RAIPUR, INDIA	N	FGN	1460	0	830	0	738	0	3028	0
RRS	ROROS, NORWAY	N	FGN	782	0	792	0	790	0	2364	0
RSW	FORT MYERS REGIONAL, FL, USA	N	YES	2486	0	7120	0	6729	0	16335	0
RTB	ROATAN, HONDURAS	N	FGN	0	0	188	0	1482	0	1670	0
RUH	RIYADH, SAUDI ARABIA	N	FGN	21799	0	21703	1	22246	0	65748	1
RUN	REUNION ISLAND, INDIAN OCEAN	S	FGN	436	0	410	0	304	0	1150	0
SAB	SABA, NETH. ANTILLES	N	FGN	0	0	0	1	0	0	0	1
SAH	SANAA, YEMEN	N	FGN	1580	0	1379	0	1291	0	4250	0
SAL	SAN SALVADOR, EL SALVADOR	N	FGN	6574	0	7271	0	8073	1	21918	1
SAN	SAN DIEGO, CA, USA	N	YES	36109	0	46848	1	55661	0	138618	1
SAO	SAO PAULO, BRAZIL	S	FGN	0	0	0	1	0	0	0	1
SAP	SAN PEDRO, SULA, HONDURAS	N	FGN	3411	0	4099	0	3944	0	11454	0
SAT	SAN ANTONIO, TX, USA	N	YES	31907	2	36421	1	33551	1	101879	4
SAV	SAVANNAH, GA, USA	N	YES	5077	0	4364	0	6639	1	16080	1
SBA	SANTA BARBARA, CA, USA	N	YES	2895	0	3035	0	3666	0	9596	0
SBN	SOUTH BEND, IN, USA	N	YES	1496	0	1708	0	2294	0	5498	0
SCC	PRUDHOE BAY, DEADHORSE, AS, USA	N	NO	3834	1	3908	0	3878	0	11620	1
SCK	STOCKTON, CA, USA	N	YES	787	0	0	0	0	0	787	0
SCL	SANTIAGO, CHILE	S	FGN	3733	0	5184	0	5928	0	14845	0
SCN	SAARBRUECKEN, FRG	N	FGN	0	0	0	1	8	0	8	1
SCO	SANTIAGO DE COMPOSTELA, SPAIN	N	FGN	0	0	0	0	348	0	348	0
SDA	BAGHDAD-SADDAM, IRAQ	N	FGN	2599	0	1451	0	1406	0	5456	0
SDD	LUBANGO, ANGOLA	S	FGN	862	0	784	0	694	0	2340	0
SDE	SANTIAGO DEL ESTERO, ARGENTINA	S	FGN	910	0	732	0	690	0	2332	0
SDF	LOUISVILLE, KY, USA	N	YES	11936	1	11837	0	9752	0	33525	1
SDJ	SENDAI, JAPAN	N	FGN	2796	0	3276	1	3527	0	9599	1
SDK	SANDAKAN, SABAH, MALAYSIA	N	FGN	2190	0	2196	0	4340	0	8726	0
SDQ	SANTO DOMINGO, DOMINICAN REP	N	FGN	0	0	124	0	208	0	332	0
SEA	SEATTLE/TACOMA, WA, USA	N	YES	27059	0	29147	0	26176	0	82382	0
SEL	SEOUL, REP OF KOREA	N	FGN	0	0	0	0	2376	0	2376	0
SEZ	MAHE IS. SEYCHELLES IS.	S	FGN	0	0	93	0	57	0	150	0
SFA	SFAX, TUNISIA	N	FGN	186	0	194	0	188	0	568	0
SFN	SANTA FE, ARGENTINA	S	FGN	624	0	784	0	686	1	2094	1
SFO	SAN FRANCISCO-OAKLAND, CA, USA	N	YES	82408	2	78067	4	94302	1	254777	7
SFT	SKELLEFTEA, SWEDEN	N	FGN	0	0	0	0	2	0	2	0
SGF	SPRINGFIELD, MO, USA	N	YES	3704	0	2335	0	2381	0	8420	0
SGN	HO CHI MINH, SOC REP OF VIETNAM	N	FGN	0	0	0	0	88	0	88	0

AIRPORT	APTDEF	HEMISP	CONUS	STGFY67	ING1	STGFY88	ING2	STGFY89	ING3	STGFY77	INGS
SHA	SHANGHAI, P. R. CHINA	N	FGN	1678	0	2060	0	2291	0	6029	0
SHE	SHENYANG, P. R. CHINA	N	FGN	208	0	400	0	444	0	1052	0
SHI	SHIMOJISHIMA, JAPAN	N	FGN	0	0	0	1	0	0	0	1
SHJ	SHARJAH, U. A. EMIRATES	N	FGN	2588	0	2845	0	2934	0	8367	0
SHV	SHREVEPORT, LA, USA	N	YES	3098	0	3472	0	2510	0	9080	0
SHW	SHARURAH, SAUDI ARABIA	N	FGN	730	0	730	0	732	0	2192	0
SIA	XI AN, P. R. CHINA	N	FGN	848	0	991	0	1265	0	3104	0
SID	SAL, CAPE VERDE ISLAND	N	FGN	10	0	40	0	0	0	50	0
SIN	SINGAPORE, SINGAPORE	N	FGN	6631	0	6354	0	6479	0	19464	0
SIT	SITKA, AS, USA	N	NO	778	0	782	0	778	0	2338	0
SJC	SAN JOSE, CA, USA	N	YES	37310	2	37278	0	37768	2	112356	4
SJD	LOS CABOS, MEXICO	N	FGN	0	0	38	0	0	0	38	0
SJJ	SARAJEVO, YUGOSLAVIA	N	FGN	174	0	356	0	564	0	1094	0
SJO	SAN JOSE, COST RICA	N	FGN	3317	0	3409	0	3128	0	9854	0
SJU	SAN JUAN, PUERTO RICO	N	FGN	0	0	60	0	0	0	60	0
SKG	THESSALONIKI, GREECE	N	FGN	1987	0	1721	0	2473	0	6181	0
SKO	SOKOTO, NIGERIA	N	FGN	1182	0	732	0	598	0	2512	0
SKP	SKOPJE, YUGOSLAVIA	N	FGN	210	0	710	0	722	0	1642	0
SKS	SKRYDSTRUP, DENMARK	N	FGN	45	0	0	0	0	0	45	0
SKZ	SUKKUR, PAKISTAN	N	FGN	566	0	720	0	870	0	2156	0
SLA	SALTA, ARGENTINA	S	FGN	1934	0	1947	1	1622	0	5503	1
SLC	SALT LAKE CITY, UT, USA	N	YES	77961	1	72870	0	70403	2	221234	3
SLL	SALALAH, OMAN	N	FGN	882	0	964	0	1010	1	2856	1
SLZ	SAO LUIZ, MARANHAO, BRAZIL	S	FGN	3629	0	4701	1	7507	0	15837	1
SMF	SACRAMENTO, CA, USA	N	YES	18876	0	24452	1	19931	1	63259	2
SMI	SAMOS ISLAND, GREECE	N	FGN	1678	0	1608	0	1774	0	5760	0
SNA	ORANGE COUNTY, CA, USA	N	YES	24680	1	22489	0	23389	0	70559	1
SNN	SHANNON, IRELAND	N	FGN	1999	0	2715	0	3658	0	8372	0
SNO	SAKON NAKHOM, THAILAND	N	FGN	566	0	282	0	0	0	848	0
SOF	SOFIA, BULGARIA	N	FGN	671	0	547	0	462	0	1680	0
SPC	SANTA CRUZ LA PALMA, CANARY IS.	N	FGN	0	0	1272	0	1186	0	2458	0
SPP	MENONGUE, ANGOLA	S	FGN	224	0	208	0	346	0	778	0
SPU	SPLIT, YUGOSLAVIA	N	FGN	1592	0	2213	0	1915	0	5720	0
SRQ	SARASOTA/BRADENTON, FL, USA	N	YES	657	0	994	1	2481	1	4132	2
SSA	SALVADOR, BRAZIL	S	FGN	9230	0	11330	0	16768	0	37328	0
SSG	MALABO, EQUATORIAL GUINEA	N	FGN	126	0	206	0	96	0	428	0
STL	ST LOUIS, MO, USA	N	YES	20660	0	25797	0	30162	0	76619	0
STM	SANTAREM, BRAZIL	S	FGN	3318	0	3913	0	4380	0	11611	0
STN	LONDON-STANSTED, ENGLAND, UK	N	FGN	0	0	874	0	1745	1	2619	1
STR	STUTT GART, FRG	N	FGN	18747	1	19270	4	21956	2	59973	7
STT	ST THOMAS, VIRGIN ISLANDS	N	FGN	748	0	732	0	730	0	2210	0
STV	SURAT, INDIA	N	FGN	0	1	0	0	0	0	0	1
STX	ST CROIX, VIRGIN ISLANDS	N	FGN	730	0	732	0	730	0	2192	0
SUB	SURABAYA, INDONESIA	S	FGN	0	0	0	0	80	0	80	0
SUV	SUVA, FIJI	S	FGN	650	0	582	0	565	0	1797	0
SUX	SIOUX CITY, IO, USA	N	YES	1536	0	2844	0	2127	0	6507	0
SVB	SAMBAVA, MADAGASCAR	S	FGN	274	0	220	0	294	0	788	0
SVG	STAVANGER, NORWAY	N	FGN	16946	0	18466	0	19633	1	55045	1
SVO	MOSCOW-SHEREMETYE, U.S.S.R.	N	FGN	864	0	962	0	1320	0	3146	0
SVP	KUITO, ANGOLA	S	FGN	422	0	392	0	316	0	1130	0
SVQ	SEVILLE, SPAIN	N	FGN	0	0	804	0	2074	0	2878	0
SWA	SHANTON, P. R. CHINA	N	FGN	0	0	507	0	1166	0	1673	0
SXB	STRASBOURG, FRANCE	N	FGN	76	0	4	0	86	0	166	0
SXF	BERLIN, GDR	N	FGN	86	0	202	0	470	0	758	0
SXR	SRINAGAR, INDIA	N	FGN	2123	1	2035	1	2692	0	6850	2
SYA	SHEMYA IS., AS, USA	N	NO	0	0	16	0	0	0	16	0
SYD	SYDNEY, N.S.W., AUSTRALIA	S	FGN	16325	2	21343	0	33543	2	71211	4
SYR	SYRACUSE, NY, USA	N	YES	10961	0	18007	1	25961	0	54929	1
SYZ	SHIRAZ, IRAN	N	FGN	3868	0	3768	0	3554	0	11190	0
SZG	SALZBURG, AUSTRIA	N	FGN	648	0	653	0	650	0	1951	0
TAI	TAIZ, YEMEN	N	FGN	820	0	872	0	690	0	2382	0
TAO	QINGDAO, P.R. CHINA	N	FGN	0	0	0	0	157	0	157	0
TBO	TABORA, TANZANIA	S	FGN	36	0	0	0	0	0	36	0
TBP	TUMBES, PERU	S	FGN	404	0	576	0	338	0	1318	0
TBT	TABATINGA, BRAZIL	S	FGN	764	0	852	0	836	0	2452	0
TBU	TONGATAPU, TONGA ISLAND, PACIFIC	S	FGN	667	0	323	0	316	0	1306	0
TBZ	TABRIZ, IRAN	N	FGN	214	0	0	0	0	0	214	0
TCI	TENERIFE, CANARY IS.	N	FGN	0	0	0	0	0	1	0	1
TEE	TBESSA, ALGERIA	N	FGN	652	0	628	0	624	0	1904	0
TER	TERCEIRA, PORTUGAL (AZORES)	N	FGN	87	0	260	0	253	0	600	0
TET	TETE, MOZAMBIQUE	S	FGN	364	0	364	0	158	0	886	0
TEZ	TEZPUR, INDIA	N	FGN	728	0	732	0	730	0	2190	0
TFE	TEFE, BRAZIL	S	FGN	246	0	208	0	264	0	718	0
TFN	TENERIFE, SPAIN	N	FGN	0	0	1842	0	1640	0	3482	0
TFS	TENERIFFE-REINASOFIA, CANARY ISLAND	N	FGN	244	1	874	1	1499	1	2617	3

AIRPORT	APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
TGD	TITOGRAD, YUGOSLAVIA	N	FGN	616	1	754	0	1002	0	2372	1
TGG	KUALA, TERENGGANU, MALAYSIA	N	FGN	438	0	418	0	640	0	1496	0
TGT	TANGA, TANZANIA	S	FGN	26	0	0	0	0	0	26	0
TGU	TEGUCIGALPA, HONDURAS	N	FGN	3746	0	4286	0	4645	0	12677	0
THE	TERESINA, PIAUI, BRAZIL	S	FGN	2920	0	3972	0	5418	0	12310	0
THR	TEHRAN, IRAN	N	FGN	4370	0	3536	0	4434	0	12340	0
TIA	TIRANA, ALBANIA	N	FGN	104	0	104	0	208	0	416	0
TIF	TAIF, SAUDI ARABIA	N	FGN	1484	0	926	0	888	0	3298	0
TIN	TINDOUF, ALGERIA	N	FGN	1006	0	962	0	966	0	2934	0
TIP	TRIPOLI, LIBYA	N	FGN	287	0	626	0	453	0	1366	0
TIV	TIVAT, YUGOSLAVIA	N	FGN	188	0	364	0	227	0	779	0
TKQ	KIGOMA, TANZANIA	S	FGN	18	0	0	0	0	0	18	0
TLE	TULEAR, MADAGASCAR	S	FGN	490	0	528	0	348	0	1366	0
TLH	TALLHASSEE, FL, USA	N	YES	0	0	1376	0	1711	0	3087	0
TLM	TILIMSEN, ALGERIA	N	FGN	1046	0	831	0	517	0	2394	0
TLS	TOULOUSE, FRANCE	N	FGN	1152	0	1107	0	1306	0	3565	0
TLV	TEL AVIV-YAFO, ISRAEL	N	FGN	2334	1	1608	0	2173	0	6115	1
TMM	TAMATAVE, MADAGASCAR	S	FGN	150	0	14	0	60	0	224	0
TMR	TAMANRASSET, ALGERIA	N	FGN	1228	0	1058	0	1136	0	3422	0
TMS	SAO TOME ISLAND, SAO TOME ISLAND	N	FGN	124	0	144	0	104	0	372	0
TNG	TANGIER, MOROCCO	N	FGN	2117	3	2241	0	2281	1	6639	4
TNN	TAINAN, TAIWAN	N	FGN	3324	0	3452	0	3444	0	10220	0
TNR	ANTANANARIVO, MADAGASCAR	S	FGN	1953	0	1801	0	1659	0	5413	0
TOE	TOZEUR, TUNISIA	N	FGN	86	0	18	0	4	0	108	0
TOL	TOLEDO, OH, USA	N	YES	1724	0	1192	0	545	0	3461	0
TOS	TROMSO, NORWAY	N	FGN	2080	0	2518	0	2557	0	7155	0
TOY	TOYAMA, JAPAN	N	FGN	1522	0	446	0	48	0	2016	0
TPA	TAMPA/ST PETERSBURG, FL, USA	N	YES	19425	0	19630	0	24615	1	63670	1
TPE	TAIPEI, TAIWAN	N	FGN	0	0	34	0	366	0	400	0
TPP	TARAPOTO, PERU	S	FGN	656	0	486	0	964	0	2106	0
TRD	TRONDHEIM, NORWAY	N	FGN	11039	0	13061	0	14345	0	38445	0
TRI	TRI-CITY AIRPORT, TN, USA	N	YES	2166	0	2926	0	2413	0	7505	0
TRN	TURIN, ITALY	N	FGN	932	0	1798	1	2048	0	4778	1
TRU	TRUJILLO, PERU	S	FGN	28	0	28	0	450	0	506	0
TRV	TRIVANDRUM, INDIA	N	FGN	2374	3	2708	1	2714	0	7796	4
TRW	TARAWA, REP OF KIRIBATI	N	FGN	106	0	104	0	52	0	262	0
TRZ	TIRUCHIRAPALLY, INDIA	N	FGN	2318	0	2094	0	2052	0	6464	0
TSA	TAIPEI-SUNG SHAN, TAIWAN	N	FGN	22439	0	26214	0	28454	0	77107	0
TSF	TREVISIO, ITALY	N	FGN	0	0	0	0	110	0	110	0
TSN	TIANJIN, P. R. CHINA	N	FGN	954	0	1421	0	1550	0	3925	0
TSV	TOWNSVILLE, QLD, AUSTRALIA	S	FGN	6252	1	6051	0	7323	1	19626	2
TTJ	TOTTORI, JAPAN	N	FGN	1460	0	1464	1	1460	1	4384	2
TTT	TAITUNG, TAIWAN	N	FGN	1488	0	1802	0	1880	0	5170	0
TUC	TUCUMAN, ARGENTINA	S	FGN	2409	0	2433	2	2264	1	7106	3
TUI	TURAIIF, SAUDI ARABIA	N	FGN	0	0	0	0	38	0	38	0
TUL	TULSA, OK, USA	N	YES	30215	0	29642	3	25417	0	85274	3
TUN	TUNIS, TUNISIA	N	FGN	5129	1	3906	1	4307	0	13342	2
TUR	TUCURUI, BRAZIL	S	FGN	419	0	417	0	187	0	1023	0
TUS	TUCSON, AZ, USA	N	YES	14844	0	14048	0	19849	0	48741	0
TUU	TABUK, SAUDI ARABIA	N	FGN	4152	0	3910	0	3222	0	11284	0
TVL	LAKE TAHOE, CA, USA	N	YES	2274	1	1985	0	1982	0	6241	1
TMU	TAWAU, SABAH, MALAYSIA	N	FGN	2920	0	2928	0	4256	0	10104	0
TXL	WEST BERLIN, GERMANY	N	FGN	17484	1	18958	0	28902	0	65344	1
TYL	TALARA, PERU	S	FGN	12	0	700	0	338	0	1050	0
TYN	TAIYUAN, P. R. CHINA	N	FGN	104	0	122	0	182	0	408	0
TYS	KNOXVILLE, TN, USA	N	YES	4917	0	5269	0	5066	0	15252	0
UAQ	SAN JUAN, ARGENTINA	S	FGN	546	0	706	0	614	0	1866	0
UBA	UBERABA, BRAZIL	S	FGN	1186	0	1464	0	1460	0	4110	0
UBJ	UBE, JAPAN	N	FGN	2496	0	1411	0	1247	0	5154	0
UBP	UBON PATCHATHANI, THAILAND	N	FGN	730	0	732	0	394	0	1856	0
UDI	UBERLANDIA, BRAZIL	S	FGN	1186	0	1464	0	1460	0	4110	0
UDR	UDAIPUR, INDIA	N	FGN	1460	0	2126	0	1866	1	5452	1
UEL	QUELIMANE, MOZAMBIQUE	S	FGN	418	0	420	0	208	0	1046	0
UET	QUETTA, PAKISTAN	N	FGN	832	1	1566	0	1652	0	4050	1
UIO	QUITO, ECUADOR	S	FGN	1609	0	0	0	0	0	1609	0
UNK	UNALAKLEET, AS, USA	N	NO	4	0	270	0	658	0	932	0
URT	SURAT THANI, THAILAND	N	FGN	798	0	1272	0	1202	0	3272	0
URY	GURAYAT, SAUDI ARABIA	N	FGN	740	0	942	0	866	0	2548	0
USH	USHUAIA, ARGENTINA	S	FGN	1804	0	1544	0	1532	0	4880	0
UTH	UDOM, THANI, THAILAND	N	FGN	738	0	732	0	314	0	1784	0
UTN	UPINGTON, SOUTH AFRICA	S	FGN	882	0	856	0	832	1	2570	1
UTP	UTAPAO, THAILAND	N	FGN	0	0	184	0	356	0	540	0
UVL	NEW VALLEY, ARAB REP OF EGYPT	N	FGN	315	0	312	0	312	0	939	0
VBY	VISBY, SWEDEN	N	FGN	0	0	0	0	2	0	2	0
VCE	VALVERDE, CANARY ISLANDS	N	FGN	1729	0	1335	0	1588	1	4652	1

AIRPORT	APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
VCP	SAO PAULO - VIRACOPOS, BRAZIL	S	FGN	104	0	56	0	0	0	160	0
VDM	VIEDMA, ARGENTINA	S	FGN	416	1	460	0	540	0	1416	1
VFA	VICTORIA FALL, ZIMBABWE	S	FGN	610	0	1292	0	1232	0	3134	0
VHC	SAURIMO, ANGOLA	S	FGN	252	0	234	0	384	0	870	0
VIE	VIENNA, AUSTRIA	N	FGN	5820	0	6195	0	7904	2	19919	2
VIL	DAKHLA, MOROCCO	N	FGN	8	0	58	0	78	0	144	0
VIX	VITORIA, ESPIRITO SANTO, BRAZIL	S	FGN	2878	0	3794	0	4160	0	10832	0
VLC	VALENCIA, SPAIN	N	FGN	206	0	342	0	1296	0	1844	0
VLG	VILLA GESELL, ARGENTINA	S	FGN	154	0	148	0	104	0	406	0
VLI	PORT VILA, VANUATU	S	FGN	251	0	560	0	934	0	1745	0
VNC	VENICE, ITALY	N	FGN	0	0	0	0	0	1	0	1
VNS	VARANASI, INDIA	N	FGN	3150	4	2686	3	2466	1	8302	8
VRN	VERONA, ITALY	N	FGN	0	0	3	0	8	0	11	0
VTE	VIENTIANE, LAOS	N	FGN	0	0	52	0	142	0	194	0
VTZ	VISHAKHAPATNAM, INDIA	N	FGN	1722	0	1774	0	1902	0	5398	0
VVI	SANTA CRUZ, VIRU VIRU, BOLIVIA	S	FGN	104	0	208	0	466	0	778	0
VXC	LICHINGA, MOZAMBIQUE	S	FGN	312	0	318	0	110	0	740	0
WAW	WARSAW, POLAND	N	FGN	1027	0	755	0	1162	0	2944	0
WDH	WINDHOEK, NAMIBIA	S	FGN	1862	1	1988	0	1942	1	5792	2
WKJ	WAKKANAI, JAPAN	N	FGN	0	0	550	0	562	0	1112	0
WLG	WELLINGTON, NEW ZEALAND	S	FGN	17828	2	28370	1	29044	1	75242	4
WLS	WALLIS IS, WALLIS & FUTUNA IS	S	FGN	0	0	0	0	180	0	180	0
WRG	WRANGELL, AS, USA	N	NO	1460	0	1464	0	1460	0	4384	0
WUH	WUHAN, P. R. CHINA	N	FGN	2002	0	2073	0	1307	0	5382	0
XMN	XIAMEN, P. R. CHINA	N	FGN	2254	0	3433	1	4474	1	10161	2
XRY	JEREZ DE LA FRONTERA, SPAIN	N	FGN	0	1	0	0	0	0	0	1
YAK	YAKUTAT, AS, USA	N	NO	1460	0	1464	0	1460	0	4384	0
YAM	SAULT STE MARIE, ONT., CANADA	N	FGN	3540	1	3286	1	1338	0	8164	2
YAO	YAOUNDE, REP OF CAMEROON	N	FGN	4147	0	3353	0	3493	0	10993	0
YBC	BAIE COMEAU, QUEBEC, CANADA	N	FGN	276	0	106	0	252	0	634	0
YBG	SAGUENAY, QUE, CANADA	N	FGN	520	0	264	0	244	0	1028	0
YBR	BRANDON, MAN, CANADA	N	FGN	1252	0	948	0	224	0	2424	0
YCB	CAMBRIDGE BAY, NWT, CANADA	N	FGN	239	0	296	0	338	0	873	0
YCG	CASTLEGAR, BC, CANADA	N	FGN	626	0	364	0	0	0	990	0
YCH	CHATHAM, NB, CANADA	N	FGN	626	0	550	0	56	0	1232	0
YCL	CHARLO, NB, CANADA	N	FGN	626	0	550	0	56	0	1232	0
YDF	DEER LAKE, NFLD, CANADA	N	FGN	2855	0	2432	0	2131	0	7418	0
YDQ	DAWSON CREEK, BC, CANADA	N	FGN	626	0	310	0	0	0	936	0
YEG	EDMONTON, ALTA, CANADA	N	FGN	11693	0	10938	0	10359	0	32990	0
YEV	INUUVIK, NWT, CANADA	N	FGN	745	0	912	0	1232	0	2889	0
YFB	IQALIUT, NWT, CANADA	N	FGN	1769	0	1576	0	1714	0	5059	0
YFC	FREDERICTON, NB, CANADA	N	FGN	1342	0	1054	0	1120	0	3516	0
YFO	FLIN FLON, MAN, CANADA	N	FGN	420	0	374	0	406	0	1200	0
YFS	FT SIMPSON, NWT, CANADA	N	FGN	0	0	0	0	42	0	42	0
YGJ	YONAGO, JAPAN	N	FGN	2190	0	2008	0	2180	0	6378	0
YGL	LA GRANDE, QUE, CANADA	N	FGN	1044	0	1092	0	1050	0	3186	0
YGW	KUUJJUARAPIK, QUE, CANADA	N	FGN	522	0	524	0	520	0	1566	0
YGX	GILLAM, MAN, CANADA	N	FGN	832	0	848	0	844	0	2524	0
YHD	DRYDEN, ONT, CANADA	N	FGN	2699	0	1520	0	0	0	4219	0
YHY	HAY RIVER, NWT, CANADA	N	FGN	1252	0	1256	1	1252	1	3760	2
YHZ	HALIFAX, NS, CANADA	N	FGN	14221	0	14832	0	14257	2	43310	2
YJT	STEPHENVILLE, NFLD, CANADA	N	FGN	144	0	0	0	0	0	144	0
YKA	KAMLOOPS, BC, CANADA	N	FGN	2650	0	2804	1	1498	0	6952	1
YLV	KELOWNA, BC, CANADA	N	FGN	8790	0	7473	2	5321	0	21584	2
YMM	FT MCMURRAY, ALTA, CANADA	N	FGN	1148	0	1152	1	1144	0	3444	1
YMS	YURIMAGUAS, PERU	S	FGN	210	0	264	0	96	0	570	0
YMX	MONTREAL MIRABEL, QUE, CANADA	N	FGN	569	0	138	0	1	0	708	0
YNB	YANBU, SAUDI ARABIA	N	FGN	2513	0	2511	0	2533	0	7557	0
YNG	YOUNGSTOWN, OH, USA	N	YES	330	0	0	0	0	0	330	0
YOL	YOLA, NIGERIA	N	FGN	1279	0	1261	0	792	0	3332	0
YOW	OTTAWA, ONT, CANADA	N	FGN	10695	0	15822	0	15489	1	42006	1
YPR	PRINCE RUPERT, BC, CANADA	N	FGN	1436	0	1412	0	1548	0	4396	0
YQB	QUEBEC, QUE, CANADA	N	FGN	1356	0	1003	1	1309	1	3668	2
YQD	THE PAS, MAN, CANADA	N	FGN	630	0	628	0	624	0	1882	0
YQG	WINDSOR, ONT, CANADA	N	FGN	2351	0	1093	0	14	0	3458	0
YQH	WATSON LAKE, YT, CANADA	N	FGN	335	0	184	0	0	0	519	0
YQM	MONCTON, NB, CANADA	N	FGN	0	0	557	0	525	0	1082	0
YQR	REGINA, SASK, CANADA	N	FGN	3925	0	4110	1	5168	0	13203	1
YQT	THUNDER BAY, ONT, CANADA	N	FGN	6659	0	5058	1	3257	0	14974	1
YQU	GRANDE PRAIRIE, ALBA, CANADA	N	FGN	1568	0	912	0	0	0	2480	0
YQX	GANDER, NFLD, CANADA	N	FGN	748	0	675	0	62	0	1485	0
YQY	SYDNEY, NS, CANADA	N	FGN	1846	0	1464	0	1342	0	4652	0
YQZ	QUESNEL, BC, CANADA	N	FGN	442	0	304	0	0	0	746	0
YRB	RESOLUTE, NT, CANADA	N	FGN	417	0	418	0	416	0	1251	0
YRT	RANKIN INLET, NWT, CANADA	N	FGN	0	0	0	0	328	0	328	0

AIRPORT	APTDEF	HEMISPHR	CONUS	STGFY87	ING1	STGFY88	ING2	STGFY89	ING3	STG737	INGS
YSB	SUBDURY, ONT, CANADA	N	FGN	1092	0	0	0	0	0	1092	0
YSJ	SAINT JOHN, NB, CANADA	N	FGN	1358	0	1464	0	1319	0	4141	0
YSM	FT SMITH, NWT, CANADA	N	FGN	1252	0	1256	0	1252	0	3760	0
YSR	NANISIVIK NWT, CANADA	N	FGN	208	0	210	0	246	0	664	0
YTH	THOMPSON, MAN, CANADA	N	FGN	1006	0	1008	0	1016	0	3030	0
YUL	MONTREAL, QUEBEC, CANADA	N	FGN	19081	1	23752	2	22533	4	65366	7
YUM	YUMA, AZ, USA	N	YES	31	0	408	0	0	0	439	0
YUX	HALL BEACH, NWT, CANADA	N	FGN	210	0	210	0	208	0	628	0
YUY	ROUYN-NORANDA, QUEBEC, CANADA	N	FGN	0	0	0	0	48	0	48	0
YVO	VAL D'OR, QUE, CANADA	N	FGN	1887	0	1204	0	1299	1	4390	1
YVP	FT CHIMO, QUE, CANADA	N	FGN	1178	0	1036	0	1408	0	3622	0
YVQ	NORMAN WELLS, NWT, CANADA	N	FGN	1133	0	1618	0	1588	1	4339	1
YVR	VANCOUVER, BC, CANADA	N	FGN	38426	0	38128	3	33322	3	109876	6
YWG	WINNIPEG, MAN, CANADA	N	FGN	13898	0	16176	2	14677	1	44751	3
YWK	WABUSH, NFLD, CANADA	N	FGN	964	0	976	0	1050	0	2990	0
YWL	WILLIAMS LAKE, BC, CANADA	N	FGN	442	0	304	0	0	0	746	0
YXC	CRANBROOK, BC, CANADA	N	FGN	2712	0	2800	0	1714	0	7226	0
YXD	EDMONTON-MUNICIPAL, ALBERTA, CANADA	N	FGN	10271	1	11878	0	11943	1	34092	2
YXE	SASKATOON, SASK, CANADA	N	FGN	3934	0	4688	0	5216	0	13838	0
YXJ	FT ST JOHN, BC, CANADA	N	FGN	3958	1	3491	1	2242	0	9691	2
YXS	PRINCE GEORGE, BC, CANADA	N	FGN	5052	1	4592	0	3975	1	13619	2
YXT	TERRACE, BC, CANADA	N	FGN	1790	0	1412	0	1594	0	4796	0
YXU	LONDON, ONT, CANADA	N	FGN	422	0	992	0	341	0	1755	0
YXY	WHITEHORSE, YT, CANADA	N	FGN	1479	0	1382	0	1552	0	4413	0
YYC	CALGARY, ALBERTA, CANADA	N	FGN	33327	1	33794	0	29159	4	96280	5
YYD	SMITHERS, BC, CANADA	N	FGN	904	0	1274	0	1306	0	3484	0
YYE	FT NELSON, BC, CANADA	N	FGN	962	0	548	0	0	0	1510	0
YYF	PENTICTON, BC, CANADA	N	FGN	2964	0	1643	0	0	0	4607	0
YYG	CHARLOTTETOWN, PEI, CANADA	N	FGN	1699	0	1403	0	852	0	3954	0
YYJ	VICTORIA, BC, CANADA	N	FGN	871	0	1265	1	690	1	2826	2
YYL	LYNN LAKE, MAN, CANADA	N	FGN	32	0	32	0	0	0	64	0
YYQ	CHURCHILL, MAN, CANADA	N	FGN	412	0	424	0	422	0	1258	0
YYR	GOOSE BAY, NFLD, CANADA	N	FGN	1733	0	1721	0	1898	0	5352	0
YYT	ST JOHNS, NFLD, CANADA	N	FGN	4331	0	4782	1	4680	0	13793	1
YYY	MONT JOLI, QUE, CANADA	N	FGN	276	0	106	0	242	0	624	0
YYZ	TORONTO, ONTARIO, CANADA	N	FGN	44100	1	49334	1	43077	1	136511	3
YZF	YELLOWKNIFE, NWT, CANADA	N	FGN	3253	0	3578	0	5142	1	11973	1
YZP	SANDSPIT, BC, CANADA	N	FGN	774	0	1282	0	1260	1	3316	1
YZT	PORT HARDY, BC, CANADA	N	FGN	708	0	0	0	0	0	708	0
YZV	SETP-ILES, QUE, CANADA	N	FGN	603	0	612	0	640	0	1855	0
ZAD	ZADAR, YUGOSLAVIA	N	FGN	52	0	109	0	164	0	325	0
ZAG	ZAGREB, YUGOSLAVIA	N	FGN	6743	0	8422	0	9322	0	24487	0
ZAH	ZAHEDAN, IRAN	N	FGN	88	0	210	0	160	0	458	0
ZCO	TEMUCO, CHILE	S	FGN	0	0	558	0	834	0	1392	0
ZHA	ZHANGJIANG, P. R. CHINA	N	FGN	416	0	579	0	723	0	1718	0
ZIH	IXTAPA/ZIHUATANEJO, MEXICO	N	FGN	44	0	146	0	482	0	672	0
ZNZ	ZANZIBAR, TANZANIA	S	FGN	1098	0	412	0	210	0	1720	0
ZRH	ZURICH, SWITZERLAND	N	FGN	12226	3	13751	0	15344	0	41321	3
ZTH	ZAKINTHOS, GREECE	N	FGN	676	1	718	0	748	1	2142	2
ZUM	CHURCHILL FALLS, NFLD, CANADA	N	FGN	216	0	210	0	192	0	618	0

APPENDIX B

CONTENTS OF FAA BIRD INGESTION DATA BASE  
 BOEING 737 AIRPLANE  
 OCTOBER 1986 - SEPTEMBER 1989

This appendix presents the contents of the Boeing 737 bird ingestion data base maintained by the FAA. The appendix presents actual data extracted from the FAA data base, and it consists of two sections. The first section contains the bird ingestion data supplied by the engine manufacturers and the FAA, and the second section contains data supplied to the FAA from ICAO. The contents of the data base are described below:

<u>COLUMN</u>	<u>DESCRIPTION OF COLUMN CONTENTS</u>
EDATE	Date (mm/dd/yyyy) of ingestion event.
EVT#	FAA bird ingestion event sequence number reflecting order in which events were entered into the FAA bird ingestion data base.
ENG_POS	Engine position of engine ingesting bird. Since each engine ingestion event has a unique record in the data base, duplicate event numbers indicate multiple engine ingestion events. This column provides record uniqueness in such cases. 1 - left engine of 737 airplane 2 - right engine of 737 airplane
ETIME	Local time of bird ingestion.
SIGN_EVT	Significant event factors. AIRWRTHY - engine related airworthiness effects INV POS LOSS - involuntary power loss MULT BIRDS - multiple birds in 1 engine MULT ENG - multiple engine ingestion (1 bird in each engine) MULT ENG-BIRDS - multiple engine ingestion and 1 or both engines sustained multiple bird ingestion TRVS FRAC - transverse fan blade fracture OTHER - other significant factor, may be reported in narrative remarks NONE - no significant factor noted
AIRCRAFT	737 aircraft type.
POF	Phase of flight during which bird ingestion occurred. (TAXI; TAKEOFF; CLIMB; CRUISE; APPROACH; LANDING; UNKNOWN)
ALTITUDE	Altitude (ft. AGL) at time of bird ingestion.
SPEED	Airspeed (kn) at time of bird ingestion.

**FL\_RULES** Flight rules in effect at time of bird ingestion.  
 IFR - instrument flight rules  
 VFR - visual flight rules  
 UNK - unknown

**LT\_CONDS** Light conditions at time of bird ingestion.  
 (DARK;LIGHT;DAWN;DUSK;etc.)

**WEATHER** Weather conditions at time of bird ingestion.

**CREW\_AC** Crew action taken in response to bird ingestion.  
 ATO - aborted takeoff  
 ATB - air turnback  
 DIV - diversion  
 UNK - unknown  
 NONE - no crew action taken  
 N/A - not applicable  
 OTHER - some action taken, may be specified in narrative remarks

**CREW\_AL** Indicates whether crew alerted to presence of birds at time of  
 bird ingestion.  
 (YES;NO;UNKNOWN)

**BIRD\_SEE** Indicates whether ingested bird(s) seen prior to ingestion  
 NO - not seen  
 YES - seen  
 SEVERAL - 2 to 10 birds observed  
 FLOCK - more than 10 birds observed

**BIRD\_NAM** Common bird name. Trailing asterisk (\*) implies bird not  
 positively identified as such.

**BIRD\_SPE** Species of positively identified bird. Alphanumeric  
 identification code which conforms to Edward's<sup>†</sup> convention.

**#\_BIRDS** Number of birds ingested. An asterisk (\*) implies more than one  
 bird; however, the exact count is unknown.

**WT\_OZ\_1** Weight (oz.) of first ingested bird.

**CTY\_PRS** Scheduled city pairs of aircraft operation.  
 (from code:to code) 3 letter city airport code. Reference  
 AIRPORT column in Appendix A.

**AIRPORT** Airport at which bird ingestion event occurred.  
 3 letter airport code. Reference AIRPORT column in Appendix A.

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<sup>†</sup> Edwards, E.P., "A Coded List of Birds of the Worlds,"  
 ISBN:911882-04-9, 1974

**LOCALE**        Nearest town, state, country, etc.

**US\_INCID**      Indicates whether bird ingestion occurred within US boundaries.  
 (YES;NO)

**ENGINE**        Engine model.  
 (CFM56;JT8D)

**DASH**          Engine dash number.

**DMG\_CODE**     Letter codes summarizing engine damage resulting from the bird ingestion. This column does not exist in the actual FAA database, but was developed by the contractor to compress 17 YES/NO damage fields into a single column. A letter code appears for damage columns whose values are YES. In the explanation of damage codes below, a number in parentheses indicates the damage severity code which is further explained in the SEVERITY column. The database column name is given in the explanation of the damage code.

- A(4) - ENG DAM; engine damaged due to bird ingestion
- B(3) - LEAD EDG; leading edge distortion/curl, minor fan blades
- C(3) - BEN/DEN; 1 to 3 fan blades bent or dented
- D(2) - BE/DE>3; more than 3 fan blades bent or dented
- E(3) - TORN<3; 1 to 3 fan blades torn
- F(2) - TORN>3; more than 3 fan blades torn
- G(2) - BROKEN; broken fan blade(s), leading edge and/or tip pieces missing; other blades also dented
- H(3) - SHINGLED; shingled (twisted) fan blades
- I(1) - TRVSFRAC; transverse fracture - a fan blade broken chordwise (across) and the piece liberated (includes secondary hard object damage)
- J(2) - SPINNER; dented, broken, or cracked spinner (includes spinner cap)
- K(1) - CORE; bent/broken compressor blades/vanes, blade/vane clash, blocked/disrupted airflow in low, intermediate, and high pressure compressors
- L(3) - NACELLE; dents and/or punctures to the engine enclosure (includes cowl)
- M(1) - FLANGE; flange separations
- N(2) - RELEASED; released (walked) fan blades (blade retention mechanism broken)
- O(1) - TURBINE; turbine damage
- P     - OTHER; any damage not previously listed
- Q     - UNKNOWN;

**NOTE:** The maximum number of damage codes listed for an engine ingestion event is three. These three damage codes reflect the most severe damage that occurred. There may be other damage that occurred which is less severe that may be listed in the remarks column.

**SEVERITY**     Numeric code indicating the severity of engine damage resulting from the bird ingestion. This column was developed by the contractor after analyzing reported damage in the data base. The



lower the severity code, the more severe the damage. The severity rating of a flight is determined as the lowest severity rating attained by any of the damage categories. Corresponding severity ratings for each damage category were presented in the DMG\_CODE discussion above.

- 1 - most severe damage (damage is known)
- 2 - moderately severe damage (damage is known)
- 3 - least severe damage (damage is known)
- 4 - damage indicated, but not specified
- 9 - no damage reported

POW\_LOSS Degree of power loss as a result of bird ingestion  
NONE - no power loss  
EPR DEC - engine pressure ratio decrease  
SPOOL DOWN - engine spooled down  
N1 CHANGE - N1 rotor change  
N2 CHANGE - N2 rotor change  
COMPRESSOR - compressor surge/stall  
UNKNOWN - unknown whether power loss occurred

MAX\_VIBE Maximum vibration reported as a dimensionless unit.

THROTTLE Voluntary throttle change by crew in response to bird ingestion.  
ADVANCE - voluntary throttle advance  
RETARD - voluntary throttle retard  
IDLE - voluntary throttle retard to idle  
CUTOFF voluntary throttle retard to cutoff  
NONE - no voluntary throttle change

IFSD Indicates whether in-flight shutdown occurred in response to bird ingestion.  
NO - no shutdown  
VIBES - shutdown due to vibrations  
STAL/SURG - shutdown due to compressor stall/surge  
HI EGT - shutdown due to high exhaust gas temperature  
EPR - shutdown due to incorrect engine pressure ratio  
INVLNTRY - involuntary engine shutdown  
PARAMTRS - shutdown due to incorrect engine parameters  
OTHER - other reasons, may be listed in remarks  
UNKNOWN - unknown cause for shutdown

REMARKS Narrative description providing additional information concerning some aspect of the ingestion.

SOURCE: ENGINE MANUFACTURER

EDATE	EV#	ENG_POS	ETIME	SIGN_EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LT_CONDS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
10/01/1986	1	1		NONE	300	UNKNOWN						NONE		
10/02/1986	2	2	16:20:00	NONE	300	CLIMB	700				OVERCAST	DIV		
10/02/1986	3	2		NONE	300	TAXI	0							
10/04/1986	235	2		NONE	200	UNKNOWN								
10/05/1986	4	1		NONE	300	TAKEOFF								
10/08/1986	5	2		NONE	300	TAXI	100	160	VFR	LIGHT	CLEAR	ATB	NO	YES
10/10/1986	233	2		NONE	200	UNKNOWN								
10/10/1986	234	2		NONE	200	TAKEOFF								
10/13/1986	6	1	8:00:00	MULT	300	TAKEOFF	146		VFR	DAWN	SCATTERED	ATB		FLOCK
10/13/1986	6	2	8:00:00	MULT	300	TAKEOFF	146		VFR	DAWN	SCATTERED	ATB		FLOCK
10/14/1986	232	2		NONE	200	LANDING	0	125						
10/16/1986	7	1		MULT	300	APPROACH								
10/16/1986	7	2		MULT	300	APPROACH								
10/19/1986	230	1		NONE	200	LANDING	0	90			CLEAR	NONE		FLOCK
10/19/1986	231	1		NONE	200	TAKEOFF								FLOCK
10/19/1986	231	1		NONE	200	TAKEOFF								
10/20/1986	228	1		NONE	200	UNKNOWN						ATO		
10/20/1986	229	1		NONE	200	TAKEOFF	0							
10/21/1986	226	2		NONE	200	TAKEOFF								
10/21/1986	227	1		NONE	200	TAKEOFF		145				ATB		
10/21/1986	227	1		MULT	200	TAKEOFF								
10/23/1986	62	1		MULT	200	TAKEOFF								
10/25/1986	236	2		NONE	200	UNKNOWN								
10/26/1986	8	1		NONE	300	TAKEOFF	0	130	VFR	DAY	PARTLY CLOUD	NONE	YES	SEVERAL
10/26/1986	8	2		NONE	300	TAKEOFF	90					ATB		SEVERAL
10/26/1986	225	1		NONE	200	CLIMB	0	20				NONE		FLOCK
10/28/1986	9	1		NONE	200	LANDING								SEVERAL
10/28/1986	9	2		MULT	200	TAKEOFF								SEVERAL
10/28/1986	9	2		MULT	200	APPROACH								SEVERAL
10/28/1986	10	1		NONE	300	UNKNOWN								
10/29/1986	11	1		NONE	300	TAKEOFF	0		VFR					
10/29/1986	12	1		NONE	300	TAKEOFF	0		VFR					
10/30/1986	225	1		NONE	200	CLIMB	0	20						FLOCK
11/01/1986	13	1		NONE	200	UNKNOWN								SEVERAL
11/02/1986	423	2		NONE	200	TAKEOFF								
11/03/1986	14	1		NONE	300	TAKEOFF	0		VFR			ATB		NO
11/04/1986	15	1		NONE	300	TAKEOFF	0	<100						NO
11/04/1986	73	2		NONE	200	TAKEOFF	0	145						
11/04/1986	16	1		NONE	200	UNKNOWN								
11/07/1986	16	2		NONE	200	UNKNOWN								
11/07/1986	74	1		NONE	200	LANDING								
11/09/1986	17	1		NONE	300	UNKNOWN								
11/09/1986	18	2		NONE	300	APPROACH								
11/10/1986	19	2		NONE	300	UNKNOWN								
11/10/1986	20	1		NONE	200	TAKEOFF	100	145	VFR	DARK	CLEAR	ATB	YES	
11/14/1986	75	1		NONE	200	TAKEOFF	0					ATO		
11/14/1986	76	1		NONE	200	TAKEOFF	0							
11/15/1986	21	1		NONE	200	TAKEOFF								
11/15/1986	21	2		MULT	200	ENG-BIRDS								
11/15/1986	22	2		NONE	200	ENG-BIRDS								
11/15/1986	22	2		NONE	200	ENG-BIRDS								
11/15/1986	23	2		NONE	200	ENG-BIRDS								
11/18/1986	24	2		NONE	300	LANDING								
11/20/1986	25	1		NONE	200	TAKEOFF	0	120	VFR	LIGHT	CLEAR	ATB	NO	YES
11/22/1986	26	1		NONE	200	APPROACH	500			DARK	CLEAR			SEVERAL
11/23/1986	27	1		MULT	300	UNKNOWN								
11/23/1986	27	2		MULT	300	UNKNOWN								
11/23/1986	28	1		NONE	300	TAKEOFF								
11/23/1986	300	2		MULT	200	UNKNOWN								
11/24/1986	29	1		NONE	200	TAKEOFF								
11/24/1986	29	2		MULT	200	UNKNOWN								
11/26/1986	30	2		NONE	200	TAKEOFF	0		VFR	LIGHT	CLEAR	OTHER	NO	NO
11/26/1986	31	1		NONE	200	TAKEOFF	0			LIGHT	CLEAR	NONE		YES
11/27/1986	31	1		NONE	200	LANDING								
11/27/1986	424	1		NONE	300	LANDING								
11/29/1986	77	1		NONE	200	LANDING								
12/02/1986	72	1		NONE	200	LANDING								
12/03/1986	34	1		MULT	300	APPROACH								FLOCK
12/08/1986	35	2		NONE	300	CLIMB	500	180	VFR	DARK	OVERCAST	NONE		
12/12/1986	36	1		NONE	300	CLIMB	500		IFR		CLEAR	NONE		
12/13/1986	36	1		MULT	200	UNKNOWN								
12/13/1986	37	2		MULT	300	UNKNOWN								
12/14/1986	37	2		NONE	200	CLIMB	1000	190	IFR	DAY	OVERCAST	ATB	NO	FLOCK
12/14/1986	57	2		NONE	200	TAKEOFF	0	100						

SOURCE: ENGINE MANUFACTURER

EDATE	EV#	ENG POS	BIRD MAN	BIRD SPE	# BIRDS	WT OZ	1	CTY	PRS	AIRPORT	LOCALE	US	INCID	ENGINE	DASH
10/01/1986	1	1								BEG	BELGRADE, YUGOSLAVIA	NO		CFM56	3
10/02/1986	2	2								TVL	LAKE TAHOE, CA	YES		CFM56	3
10/02/1986	3	2								CTU	CHENGOU, CHINA	NO		CFM56	3
10/04/1986	235	2	GULL*								CHINA	NO		JT8D	
10/05/1986	4	1								MDT	HARRISBURG, PA	YES		CFM56	3
10/08/1986	5	2								PEK	BEIJING, CHINA	NO		CFM56	3
10/10/1986	233	2									INDIA	NO		JT8D	9A
10/10/1986	234	2									MANCHESTER, ENGLAND	NO		JT8D	15
10/13/1986	6	1	GRAY-HEADED LAPWING	5N20						MAN-COG	KUNMING, CHINA	NO		CFM56	3
10/13/1986	6	2	GRAY-HEADED LAPWING	5N20							KUNMING, CHINA	NO		CFM56	3
10/14/1986	232	2									BOMBAY, INDIA	NO		JT8D	
10/16/1986	7	1	STARLING	21Z75						3-	DALLAS/FT WORTH, TEX-LOVE	YES		CFM56	3
10/16/1986	7	2	STARLING	21Z75						3-	DALLAS/FT WORTH, TEX-LOVE	YES		CFM56	3
10/19/1986	230	1									TRIVANDRUM, INDIA	NO		JT8D	9A
10/19/1986	231	1								ELS-	EAST LONDON, SOUTH AFRICA	NO		JT8D	17
10/20/1986	228	1								CCU	CHINA	NO		JT8D	
10/20/1986	229	1								CCU	CALCUTTA, INDIA	NO		JT8D	17
10/21/1986	226	2									INDIA	NO		JT8D	17A
10/21/1986	227	1								GAU-	GAUHATI, INDIA	NO		JT8D	17A
10/23/1986	62	1									GUALEQUAYCHU, CHINA	NO		JT8D	
10/25/1986	236	2									INDIA	NO		JT8D	
10/26/1986	8	1									ORANGE COUNTY, CA	YES		CFM56	3
10/26/1986	8	2									ORANGE COUNTY, CA	YES		CFM56	3
10/28/1986	9	1	ROCK DOVE	2P1						14-	ROANOAK, VA	YES		JT8D	15
10/28/1986	9	2	ROCK DOVE	2P1						14-	ROANOAK, VA	YES		JT8D	15
10/28/1986	10	1									DALLAS/FT WORTH, TEX-LOVE	YES		CFM56	3
10/29/1986	11	1									CHARLOTTE, NC	YES		CFM56	3
10/29/1986	12	1	ROBIN OR PIGEON*								BIRMINGHAM, ALA	YES		CFM56	3
10/29/1986	12	1	BLACK-HEADED GULL	14N36							INDIA	NO		JT8D	15
10/30/1986	225	1								9.7	MIDWAY AIRPORT	YES		JT8D	15
11/01/1986	13	1	NIGHTHAWK	5T5						2-	KARACHI, PAKISTAN	NO		JT8D	15
11/02/1986	423	2									ALBANY, NY	YES		CFM56	3
11/03/1986	14	1									HYDERABAD, INDIA	NO		JT8D	
11/04/1986	15	1									SRINAGAR, INDIA	NO		JT8D	15
11/04/1986	73	2									SAN ANTONIO, TEX	YES		CFM56	3
11/04/1986	161	1									DENVER, CO	YES		CFM56	3
11/07/1986	16	2									CHARLOTTE, NC	YES		CFM56	3
11/07/1986	74	1									PENANG, MAL	NO		JT8D	15A
11/07/1986	74	1									BANGALORE, INDIA	NO		JT8D	
11/09/1986	17	1									BHUBANESWAR, INDIA	NO		JT8D	15
11/09/1986	18	2									CHICAGO, IL	YES		JT8D	15
11/10/1986	19	2									CHICAGO, IL	YES		JT8D	15
11/10/1986	20	1									CALINS, OLD, AUSTRALIA	NO		CFM56	3
11/14/1986	75	1									AMSTERDAM, NETHERLANDS	NO		CFM56	3
11/14/1986	76	1									DALLAS/FT WORTH, TEX	YES		CFM56	3
11/15/1986	21	1	ROCK DOVE	2P1							LIHUE, KAUAI, HAWAII	YES		JT8D	9A
11/15/1986	21	2	ROCK DOVE	2P1							KEDAH, MALAYSIA	NO		JT8D	15
11/15/1986	22	2									LAHORE, PAKISTAN	NO		CFM56	3
11/15/1986	23	2									LAHORE, PAKISTAN	NO		CFM56	3
11/15/1986	23	2									HOUSTON, TEX	YES		CFM56	3
11/18/1986	24	2	GRAY-HEADED LAPWING	5N20						7.7	WELLINGTON, NEW ZEALAND	NO		JT8D	
11/20/1986	25	1									WELLINGTON, NEW ZEALAND	NO		JT8D	17A
11/22/1986	26	1									LILLOWGHE, MALAWI	NO		JT8D	7
11/23/1986	27	1									NEW YORK, NY	YES		JT8D	3
11/23/1986	27	2									PORTLAND, ORE	YES		CFM56	3
11/23/1986	28	1									PORTLAND, ORE	YES		JT8D	
11/23/1986	28	1									BANGALORE, INDIA	NO		JT8D	15
11/24/1986	300	1									CHRISTCHURCH, NEW ZEALAND	NO		JT8D	15
11/24/1986	300	2									CHRISTCHURCH, NEW ZEALAND	NO		JT8D	15
11/26/1986	29	1	BLACK WINGED PLOVER	5N10							ARGENTINA	NO		JT8D	3
11/26/1986	30	2	RING BILLED GULL	14N12							DALLAS/FT WORTH, TEX-LOVE	YES		CFM56	3
11/27/1986	31	1									TENERIFE	NO		CFM56	3
11/27/1986	31	1									AMSTERDAM, NETHERLANDS	NO		JT8D	3
11/27/1986	424	1									AMSTERDAM, NETHERLANDS	NO		JT8D	3
11/29/1986	77	1									SAN FRANCISCO/OAKLAND, CA	YES		CFM56	3
12/02/1986	72	1									CHRISTCHURCH, NEW ZEALAND	NO		JT8D	15
12/03/1986	32	1									ARGENTINA	NO		JT8D	3
12/08/1986	34	1									DALLAS/FT WORTH, TEX-LOVE	YES		CFM56	3
12/12/1986	35	2									TENERIFE	NO		CFM56	3
12/13/1986	36	1									AMSTERDAM, NETHERLANDS	NO		JT8D	3
12/13/1986	79	2									AMSTERDAM, NETHERLANDS	NO		JT8D	3
12/13/1986	79	2									AMSTERDAM, NETHERLANDS	NO		JT8D	3
12/14/1986	37	2	HERRING GULL	14N14						40-	SAN FRANCISCO/OAKLAND, CA	YES		CFM56	3
12/14/1986	57	2									CHRISTCHURCH, NEW ZEALAND	NO		JT8D	15

SOURCE: ENGINE MANUFACTURER

EDATE	EV#	ENG_POS	DMG_CODE	SEVERITY	POW_LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
10/01/1986	1		A,B	3	NONE	2.0	NONE	NO	
10/02/1986	2		A,B	3	NONE	4.0	NONE	NO	
10/02/1986	3		A,B	3	NONE		NONE	NO	
10/04/1986	235		A,G	2					
10/05/1986	4		A,H	3	NONE		NONE	NO	AM EVENT, MEDIUM BIRD
10/08/1986	5		A,H	2	NONE		NONE	NO	
10/10/1986	233		A,H	3	NONE		NONE	NO	
10/10/1986	234		A,C	3	NONE		NONE	NO	CCOC PS4 CRACK
10/13/1986	6		A,B,E	3	NONE	5.0	IDLE	NO	
10/13/1986	6		A,B,E	2	NONE		NONE	NO	
10/14/1986	232			9	NONE		NONE	NO	THUD REPORTED
10/16/1986	7			9	NONE		NONE	NO	
10/16/1986	7			9	NONE		NONE	NO	
10/19/1986	230			9					
10/19/1986	231			9					
10/20/1986	228			9					
10/20/1986	229			9					
10/21/1986	226		A,C,G	3					
10/21/1986	227		A,C	2					
10/23/1986	62		A,B	3					
10/25/1986	236		A,C	3					
10/26/1986	8			3					
10/26/1986	8			3					
10/28/1986	9		A,H	9		3.0	NONE	NO	VIBRATION THUD SMELL 7 FAN BLADES REQUIRED LE TIP REPAIR 3 FAN BLADES BENT
10/28/1986	9			9			NONE	NO	
10/28/1986	10			9			NONE	NO	
10/28/1986	11			9			NONE	NO	
10/29/1986	11			9			NONE	NO	
10/29/1986	12		A,C,H	3		5.0	IDLE	NO	
10/30/1986	235			9			NONE	NO	
11/01/1986	13			9			NONE	NO	
11/02/1986	423			9			NONE	NO	
11/03/1986	14		A,H	3		3.8	NONE	NO	
11/04/1986	15		A,B,H	3			NONE	NO	
11/04/1986	73			9			NONE	NO	
11/04/1986	73		A,C	3			NONE	NO	TURBINE FAILED ON 11/10/86
11/04/1986	16			9			NONE	NO	
11/07/1986	16			2			NONE	NO	
11/07/1986	74			9			NONE	NO	
11/09/1986	17			9			NONE	NO	
11/09/1986	18			2			NONE	NO	
11/10/1986	19			2		4.0	NONE	NO	
11/10/1986	20			9			NONE	NO	
11/14/1986	75		A,C	3			NONE	NO	
11/14/1986	76			9			NONE	NO	
11/15/1986	21		A,C	3			NONE	NO	
11/15/1986	21		A,G	2			NONE	NO	
11/15/1986	22		A,C,H	3			NONE	NO	
11/15/1986	23			9			NONE	NO	
11/18/1986	24		A,H	3		5.0	IDLE	NO	
11/20/1986	25		A,B,C	3			NONE	NO	
11/22/1986	26		A,D,H	2			NONE	NO	SMALL BIRD
11/23/1986	27		A	4			NONE	NO	
11/23/1986	27		A	4			NONE	NO	
11/23/1986	28		A,B,H	3		HIGH	NONE	NO	
11/24/1986	300			9			NONE	NO	
11/24/1986	300		A,D,G	2			NONE	NO	ODOOR
11/26/1986	29		A,C,G	9	COMPRESSOR		NONE	NO	ODOOR IN CABIN
11/26/1986	30			2	COMPRESSOR		NONE	NO	
11/27/1986	31			9			NONE	NO	
11/27/1986	31			9			NONE	NO	
11/29/1986	424			9			NONE	NO	
12/02/1986	77			9			NONE	NO	
12/03/1986	72		A,G	9			NONE	NO	
12/08/1986	34			1			NONE	NO	
12/12/1986	35		A,H	2		2.0	NONE	NO	
12/13/1986	36		A,B	3		OFFSC	IDLE	VIBES	
12/13/1986	79			9			NONE	NO	
12/14/1986	37		A,B,H	3	COMPRESSOR		NONE	NO	
12/14/1986	37			9	COMPRESSOR		NONE	NO	ODOOR

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	ETIME	SIGN	EVT	AIRCRAFT	PCF	ALTITUDE	SPEED	FL RULES	LT COMDS	WEATHER	CREW AC	CREW AL	BIRD SEE
12/14/1986	80	2		NONE		200	UNKNOWN	1000	210	IFR	DAY	OVERCAST		NO	NO
12/14/1986	457	2		NONE		300	CLTIB	0	145					NO	NO
12/15/1986	81	2		NONE		200	TAKEOFF	200					ATB	NO	YES
12/17/1986	38	2		NONE		200	LANDING							NO	YES
12/17/1986	162	2		NONE		200	UNKNOWN							NO	YES
12/19/1986	82	2		NONE		200	LANDING							NO	YES
12/20/1986	58	1		NONE		200	TAKEOFF							NO	YES
12/24/1986	237	2		NONE		200	TAKEOFF							NO	YES
12/26/1986	42	2	8:30:00	TRVS	FRAC	200	CLTIB	500	150		LIGHT	BELOW CLOUDS			
12/31/1986	39	2	11:39:00	MULT	ENG	300	LANDING				LIGHT	CLEAR			
12/31/1986	39	2	11:39:00	MULT	ENG	300	LANDING				LIGHT	CLEAR			
01/02/1987	43	2		NONE		200	TAKEOFF								
01/04/1987	301	1		NONE		200	LANDING								
01/04/1987	302	1		NONE		200	TAKEOFF								
01/07/1987	44	1		NONE		200	TAKEOFF								
01/08/1987	83	1		NONE		200	LANDING								
01/09/1987	84	2		NONE	BIRDS	300	LANDING								
01/09/1987	238	1		NONE		200	UNKNOWN								
01/09/1987	303	1		NONE		200	TAKEOFF								
01/09/1987	304	1		NONE		200	UNKNOWN								
01/10/1987	45	1		NONE	BIRDS	300	LANDING								
01/16/1987	40	1		NONE		200	TAKEOFF								
01/17/1987	46	1		NONE		200	TAKEOFF								
01/19/1987	41	2		NONE		200	TAKEOFF								
01/28/1987	47	1	17:30:00	MULT	BIRDS	300	CLTIB	0	-V1	VFR	DUSK	ICY			SEVERAL
01/28/1987	47	1	17:30:00	MULT	BIRDS	300	CLTIB	200	150	VFR	DUSK	SCATTERED		NO	NO
02/06/1987	356	2		NONE		200	LANDING								
02/08/1987	240	2		NONE		200	LANDING								
02/10/1987	305	1		NONE		200	UNKNOWN								
02/10/1987	428	1		NONE		200	TAKEOFF								
02/10/1987	429	1		NONE		200	TAKEOFF								
02/10/1987	458	1		NONE		200	TAKEOFF								
02/10/1987	458	2		NONE		200	TAKEOFF								
02/11/1987	458	2		NONE		200	TAKEOFF								
02/13/1987	430	1		NONE		200	UNKNOWN								
02/14/1987	357	1		NONE		200	TAKEOFF								
02/17/1987	59	1		NONE		200	TAKEOFF								
02/19/1987	60	1		NONE		200	TAKEOFF								
02/23/1987	61	2		NONE		200	TAKEOFF								
02/25/1987	241	1		NONE		200	CLTIB	15000	350	VFR	DAY	CLEAR			
02/27/1987	49	1		NONE		200	TAKEOFF								
02/27/1987	242	2		NONE		200	CLTIB	0	145	VFR	DAY	SCATTERED			
02/28/1987	86	2		NONE		200	TAKEOFF								
03/02/1987	306	2		NONE		200	TAKEOFF								
03/03/1987	460	1		NONE		200	UNKNOWN								
03/10/1987	50	1		NONE		300	TAKEOFF								
03/11/1987	358	1		NONE		200	LANDING								
03/12/1987	359	2		NONE		200	LANDING								
03/13/1987	63	2		NONE		200	UNKNOWN								
03/16/1987	87	2		NONE		200	TAKEOFF								
03/17/1987	64	1		NONE		200	UNKNOWN								
03/18/1987	88	2		NONE		200	TAKEOFF								
03/19/1987	51	1		NONE		200	UNKNOWN								
03/21/1987	52	1		NONE		300	APPROACH								
03/21/1987	53	1		NONE		300	LANDING								
03/21/1987	65	1		NONE		200	TAKEOFF								
03/21/1987	89	1		NONE		200	TAKEOFF								
03/21/1987	90	2		NONE	BIRDS	200	UNKNOWN								
03/23/1987	54	1		NONE		200	UNKNOWN								
03/25/1987	307	2		NONE		300	UNKNOWN								
03/26/1987	66	1	18:35:00	TRV	POW LOSS	200	TAKEOFF								
03/26/1987	67	1	18:35:00	TRV	POW LOSS	200	TAKEOFF								
03/27/1987	91	2		NONE		200	LANDING								
03/28/1987	55	2		NONE		200	UNKNOWN								
03/29/1987	92	2		NONE		200	TAKEOFF								
03/29/1987	243	2		NONE		200	TAKEOFF								
03/29/1987	340	2		NONE		200	LANDING								
03/30/1987	56	1		NONE		300	TAKEOFF								

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	BIRD_NAM	BIRD_SPE	# BIRDS	WT_OZ_1	CTY_PRS	AIRPORT	LOCALE	US_INCD	ENGINE	DASH
12/14/1986	80	2	GULL*		1			CHC	CHRISTCHURCH, NEW ZEALAND	NO	JT80	15
12/14/1986	457	2	GULL*		1		SFO	SAN FRANCISCO, CA	NO	CFM56	3	
12/15/1986	81	2	MALLARD		1	40.	MAD	MADRID, SPAIN	NO	JT80		
12/17/1986	38	2	MALLARD		1		MSO	MISSOULA, MT	YES	JT80		
12/17/1986	162	2			1				NO	JT80		
12/19/1986	82	2			1		TRV	TRIVANDRUM, INDIA	NO	JT80	9A	
12/20/1986	58	1	HERRING GULL		1		CHC	CHRISTCHURCH, NEW ZEALAND	NO	JT80	15	
12/24/1986	237	2			1	40.	ORD	CHICAGO, IL	NO	JT80	17A	
12/26/1986	42	2			1		HOU	HOUSTON, TEX	YES	JT80	7	
12/31/1986	39	2			1		FAT	HOUSTON, TEX	YES	CFM56	3	
12/31/1986	39	2			1		FAT	HOUSTON, TEX	YES	CFM56	3	
01/02/1987	43	2			1		MHY	FRESNO, CA	YES	JT80	17	
01/02/1987	301	1			1		MHY	MIYAKO JIMA, JAPAN	NO	JT80		
01/04/1987	302	1			2		MEL	MELBOURNE, AUSTRALIA	NO	JT80	3	
01/07/1987	44	1			1		JAI	JAIPUR, INDIA	NO	CFM56		
01/08/1987	83	1			1		JAI	JAIPUR, INDIA	NO	JT80		
01/09/1987	84	2			1		VNS	VARANASI, INDIA	NO	JT80		
01/09/1987	238	1			1		MAN	MANCHESTER, ENGLAND	NO	JT80		
01/09/1987	303	1			1		AKL	AUCKLAND, NEW ZEALAND	NO	JT80		
01/09/1987	304	1			1		CHC	AUCKLAND, NEW ZEALAND	NO	JT80		
01/09/1987	304	1			1		AKL	AUCKLAND, NEW ZEALAND	NO	JT80		
01/10/1987	45	1	CROW*		*		LST	LAUNCESTON, TASMANIA	NO	CFM56	3	
01/16/1987	40	1	HORNED LARK		1	1.5	OAK-NR	SAN FRANCISCO, CA-OAKLAND	YES	JT80	17	
01/17/1987	46	1			1		OAK	SAN FRANCISCO, CA-OAKLAND	NO	JT80	3	
01/19/1987	41	2	CANADIAN GOOSE		2	128.	RNO-DEN	RENO, NEV	YES	JT80	17	
01/28/1987	47	1	GULL*		2		TGD	TITIGRAD, YUGOSLAVIA	NO	CFM56	3	
01/28/1987	47	2	GULL*		2		TGD	TITIGRAD, YUGOSLAVIA	NO	JT80	17	
02/06/1987	356	2			2		TGD	SOUTH AFRICA	NO	JT80	15	
02/08/1987	240	2			2		TGD	AUCKLAND, NEW ZEALAND	NO	JT80	15	
02/10/1987	305	1			1		AKL	AUCKLAND, NEW ZEALAND	NO	JT80	9	
02/10/1987	428	1			1		SJC	SAN JOSE, CA	YES	JT80	9	
02/10/1987	429	1	GULL*		1		SJC	SAN JOSE, CA	YES	JT80	15	
02/10/1987	458	1	GULL*		1		MDW	MIDWAY, ILL	YES	JT80	15	
02/11/1987	458	2	GULL*		1		MDW	MIDWAY, ILL	YES	JT80	15	
02/13/1987	85	2			1		TRV	TRIVANDRUM, INDIA	NO	JT80	3	
02/14/1987	430	1			1		HAM	HAMBURG, GERMANY	NO	CFM56	3	
02/14/1987	357	1			1		HAM	HAMBURG, GERMANY	NO	JT80	9A	
02/17/1987	59	1	GOLDEN PLOVER		1		OGG	ARGENTINA	NO	JT80	9A	
02/19/1987	59	1			1	6.	HNL	KANULUI, MAUI, HAWAII	YES	JT80	9A	
02/23/1987	61	2	GLAUCOUS WINGED GULL		1	56.	PLZ-DUR	DURBAN, SOUTH AFRICA	YES	JT80	17A	
02/25/1987	241	1			1		PDX	PORTLAND, ORE	YES	JT80	7	
02/27/1987	49	1			1		MUC	MUNICH, GERMANY	NO	JT80	3	
02/27/1987	242	2	BLACK-BACKED GULL		1		ALB	ALBANY, NY	YES	CFM56	15	
02/27/1987	242	2			1	31.	STR	STUTTGART, GERMANY	NO	JT80	15	
03/03/1987	460	2	SHORE (HORNED) LARK		1	1.5	CHC	CHRISTCHURCH, NEW ZEALAND	NO	JT80	15	
03/10/1987	50	1			1		PIE	ST. PETERSBURG, FL	YES	CFM56	3	
03/11/1987	358	2			1		PEK	BEIJING, CHINA	NO	JT80		
03/12/1987	359	2			1		OAK	SAN FRANCISCO, CA-OAKLAND	YES	CFM56	3	
03/13/1987	63	2	BLACK-HEADED GULL		1		LTH	LIHUE, KAUAI, HAWAII	YES	JT80	17A	
03/16/1987	87	2			1		IXB	BAGDOGRA, INDIA	YES	JT80	9A	
03/17/1987	64	1			1	10.	BAH	BAHRAIN, SAUDI AFRICA	NO	JT80	15	
03/18/1987	88	2			1		JAI	JAIPUR, INDIA	NO	JT80	3	
03/19/1987	51	1			1		SYD	SYDNEY, NSW AUSTRALIA	NO	CFM56	3	
03/21/1987	53	1	DUCK OR GOOSE*		1		ZRH	ZURICH, SWITZERLAND	NO	CFM56	3	
03/21/1987	65	1	GULL*		1		MSP	MINN./ST. PAUL, MINN	YES	CFM56	3	
03/21/1987	89	1			1		PIE	ST. PETERSBURG, FL	YES	JT80	9A	
03/23/1987	54	1			1		PAT	PATNA, INDIA	NO	JT80	17	
03/25/1987	307	2			1		UET	QUETTA, PAKISTAN	NO	CFM56	3	
03/26/1987	66	1	SPOTTED THICK-KNEE		1		MHY	MIYAKO JIMA, JAPAN	NO	JT80	17A	
03/26/1987	67	1			1	15.	JNB	JOHANNESBURG, SOUTH AFRICA	NO	JT80	17A	
03/27/1987	91	2			1		MDH	NAMIBIA, S.W. AFRICA	NO	JT80	17A	
03/28/1987	55	2			1		PHL	FT. LAUDERDALE/HOLLYWOOD, FL	NO	CFM56	3	
03/29/1987	243	2			1		AKL	AUCKLAND, NEW ZEALAND	YES	JT80	15	
03/29/1987	360	2			1		NCE	NICE, FRANCE	NO	JT80	15	
03/30/1987	56	1			1		DEN	DENVER, COL	YES	CFM56	3	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	DMG CODE	SEVERITY	POW LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
12/14/1986	80			2			NO	NO	
12/14/1986	457		A,D	2					PM EVENT
12/15/1986	81		A,D,H	2	NONE				ATB DUE TO WEATHER
12/17/1986	38		A,C	3					
12/17/1986	162		A,C	2					
12/19/1986	82		A,C	2					
12/20/1986	58		A,C	3					
12/24/1986	237		A,C	2					
12/26/1986	42		A,D,F,I	2					
12/31/1986	39		A,M	1		HIGH		YES	#1 CMPT FIRE
12/31/1986	39		A,M	2					
12/31/1986	43		A,M	2					
01/02/1987	301			2	COMPRESSOR				
01/02/1987	301			2					
01/04/1987	302			0					
01/07/1987	44			0					
01/08/1987	83			1					
01/09/1987	84			2					
01/09/1987	238			1					
01/09/1987	303			0					
01/09/1987	303			0					
01/09/1987	304			1					
01/10/1987	45		A,B	1					
01/16/1987	40		A,O	1	EPB DEC				
01/17/1987	46		A,C	1	NONE				
01/19/1987	41		A,C,G,H	2					
01/28/1987	47		A,C,G,H	1					
01/28/1987	47		A,H	2					
02/06/1987	356		A,C	2					
02/08/1987	240		A,C	2					
02/10/1987	305		A,C	2					
02/10/1987	428		A,K	1					
02/10/1987	429		A	1					
02/10/1987	458		A	1					
02/10/1987	458		A	2					
02/11/1987	85			2					
02/13/1987	430			4					
02/14/1987	357		A,C	1					
02/17/1987	59		A,C,H	1					
02/19/1987	60		A,C,H	1					
02/23/1987	61		A,D,G	2					
02/25/1987	241		A,D,G	1					
02/27/1987	49		A,H	1					
02/27/1987	242		A,H	2					
02/28/1987	86		A,G	2					
03/02/1987	306		A,G	2					
03/03/1987	460			2					
03/10/1987	50			1					
03/11/1987	358		A,C	1					
03/12/1987	359		A,C	2					
03/13/1987	63		A,C	2					
03/16/1987	87		A,H	2					
03/17/1987	64		A,H	1					
03/18/1987	88		A,D,H	2					
03/19/1987	51		A,D,H	1					
03/21/1987	52		A,H	1					
03/21/1987	53		A,H	1					
03/21/1987	65		A,G	1					
03/21/1987	89		A,H	1					
03/21/1987	90		A,H	1					
03/23/1987	54		A,D,E	2					
03/25/1987	307		A,D,E	2					
03/26/1987	66		A,D,H	1					
03/26/1987	91		A,D,H	1					
03/27/1987	92		A,C	2					
03/28/1987	55		A,D	2					
03/28/1987	92		A,D	2					
03/29/1987	243		A,D,H	2					
03/29/1987	360		A,D,H	2					
03/30/1987	56		A,H	1					

SOURCE: ENGINE MANUFACTURER

DATE	EVT#	ENG	POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	LT	CONDS	WEATHER	CREW	AC	CREW	AL	BIRD	SEE	
03/30/1987	308	2			NONE		200	UNKNOWN														
03/31/1987	435	2			NONE		200	TAKEOFF							CLEAR	ATO						FLOCK
04/01/1987	68	2		14:10:00	MULT	BIRDS	200	TAKEOFF	0 90						SCATTERED	ATO						SEVERAL
04/03/1987	244	2		9:00:00	NONE		200	TAXI	0 40						SCATTERED	NONE						NO
04/03/1987	309	2			NONE		200	TAKEOFF							SCATTERED							NO
04/05/1987	245	2		23:59:00	NONE		200	CLIMB	10 140													NO
04/07/1987	93	2			NONE		200	LANDING	0 90													YES
04/07/1987	361	1			NONE		200	UNKNOWN														
04/09/1987	106	1		19:40:00	NONE		300	TAKEOFF	0 -V1						CLEAR	DIV						
04/11/1987	107	1		22:30:00	NONE		300	CLIMB	600 160						CLEAR	NONE						
04/12/1987	246	2			MULT	BIRDS	200	APPROACH	100 140						SCATTERED							SEVERAL
04/14/1987	108	1			NONE		300	UNKNOWN														
04/17/1987	109	2			NONE		300	UNKNOWN														
04/21/1987	70	1			TRVS	FRAC	200	TAKEOFF	0 130						CLEAR	ATB						NO
04/22/1987	247	2		8:03:00	NONE		200	CLIMB	210						CLEAR							NO
04/23/1987	248	2		10:38:00	NONE		200	TAKEOFF	0 110						CLEAR							YES
04/26/1987	310	2			NONE		200	UNKNOWN														
04/26/1987	311	2			NONE		200	TAKEOFF														
05/01/1987	312	1			NONE		200	UNKNOWN														
05/01/1987	362	2			NONE		200	UNKNOWN														
05/03/1987	69	2			NONE		200	UNKNOWN	0 150													
05/04/1987	110	1		18:38:00	NONE		200	TAKEOFF	+V1													
05/10/1987	94	1			NONE		200	TAKEOFF														
05/10/1987	111	2		22:00:00	NONE		200	TAKEOFF														
05/12/1987	95	1			NONE		200	UNKNOWN														
05/12/1987	363	1			NONE		200	UNKNOWN														
05/16/1987	364	2			NONE		200	UNKNOWN														
05/17/1987	313	2			NONE		200	UNKNOWN														
05/18/1987	249	1		13:40:00	MULT	BIRDS	200	LANDING	300 140						SCATTERED							YES
05/20/1987	250	2		17:00:00	MULT	BIRDS	200	APPROACH	0 100						CLEAR							SEVERAL
05/22/1987	96	1			NONE		200	TAKEOFF														
05/22/1987	97	1			NONE		200	UNKNOWN	0 85													
05/22/1987	98	1			NONE		200	TAKEOFF														
05/24/1987	99	1		7:35:00	TRVS	FRAC	200	UNKNOWN	0 140						OVERCAST	ATO						YES
05/24/1987	100	1		6:30:00	NONE		200	TAKEOFF	0 90						CLEAR	ATB						ONE
05/25/1987	101	2		8:53:00	NONE		200	LANDING	15						CLEAR	NONE						YES
05/25/1987	102	2		16:00:00	NONE		200	TAKEOFF	300													
05/26/1987	252	1			NONE		200	APPROACH														
05/27/1987	114	2			NONE		200	UNKNOWN														
05/28/1987	100	2		20:30:00	NONE		200	UNKNOWN	300 150						SCATTERED							YES
05/29/1987	112	2			NONE		200	APPROACH														
05/30/1987	253	2		10:50:00	NONE		200	UNKNOWN														
05/31/1987	113	2		14:55:00	NONE		200	APPROACH	82 140						CLEAR							YES
05/31/1987	254	1		17:06:00	NONE		200	TAKEOFF	0 110						CLEAR							SEVERAL
06/02/1987	71	1		16:05:00	NONE		200	APPROACH	150 135						CLEAR	NONE						YES
06/03/1987	315	1			NONE		200	TAKEOFF	50 120						CLEAR	ATO						SEVERAL
06/04/1987	112	1		14:45:00	NONE		200	LANDING	+V1													YES
06/05/1987	115	2			NONE		200	TAKEOFF							CLEAR	NONE						
06/08/1987	116	1			NONE		300	LANDING														
06/09/1987	255	1		20:20:00	NONE		200	CRUISE	0 120						SCATTERED	ATO						SEVERAL
06/10/1987	101	1		16:10:00	NONE		200	TAKEOFF	0 120						SCATTERED	ATO						YES
06/13/1987	117	1			NONE		200	LANDING														
06/13/1987	256	1		4:03:00	MULT	ENG	200	TAKEOFF	0						CLEAR	ATB						YES
06/13/1987	256	2		4:03:00	MULT	ENG	200	TAKEOFF	0						SCATTERED							YES
06/13/1987	365	2			NONE		200	TAKEOFF	0 130													
06/14/1987	316	1		16:45:00	NONE		200	UNKNOWN	0 130						CLEAR							YES
06/15/1987	257	2			NONE		200	TAKEOFF														
06/17/1987	118	2			NONE		200	UNKNOWN														
06/17/1987	317	2			NONE		200	UNKNOWN														
06/19/1987	119	1		9:09:00	NONE		200	UNKNOWN	50 140						PARTLY CLOUD							FLOCK
06/22/1987	166	1		15:45:00	NONE		200	LANDING	500						SCATTERED	NONE						YES
06/22/1987	258	1			NONE		200	CLIMB	114						CLOUDY							ONE
06/25/1987	102	2		12:56:00	NONE		200	APPROACH	0 90						CLEAR							ONE
06/27/1987	103	2			NONE		200	LANDING														
06/27/1987	103	2			NONE		200	UNKNOWN														
06/27/1987	259	1		10:07:00	NONE		200	UNKNOWN	0 110						SCATTERED							YES
06/27/1987	318	2		15:18:00	MULT	BIRDS	200	LANDING	0 110						SCATTERED	ATB						SEVERAL
06/29/1987	427	1			NONE		200	TAKEOFF	80 120						RAIN	ATB						YES
07/02/1987	260	1		14:15:00	NONE		200	CLIMB							SCATTERED	ATB						YES
					NONE		200	APPROACH														



SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	BIRD MAN	BIRD SPE	# BIRDS	WT OZ	1	CITY	PRS	AIRPORT	LOCALE	US	INCID	ENGINE	DASH
03/30/1987	308	2									AUCKLAND, NEW ZEALAND	NO		JT8D	
03/31/1987	425	2									PORT ELIZABETH, S. AFRICA	YES		JT8D	17A
04/01/1987	68	2	SWALLOW*	412269	1	2.8				PLZ	FRANKFURT, GERMANY	NO		JT8D	
04/03/1987	244	2	COMMON BLACKBIRD		1					FRA	CHRISTCHURCH, NEW ZEALAND	NO		JT8D	
04/03/1987	309	2								CHC	KUCHING, MALAYSIA	NO		JT8D	
04/03/1987	245	2								KCN	CALCUTTA, INDIA	NO		JT8D	17
04/07/1987	93	2								CCU	ZATRE	NO		JT8D	15
04/07/1987	361	1									COPENHAGEN, DENMARK	NO		CFM56	3
04/09/1987	106	1									SYDNEY NSW, AUSTRALIA	NO		CFM56	3
04/11/1987	107	1									ZAKINTOS, GREECE	NO		JT8D	
04/12/1987	246	2									FRANKFURT, GERMANY	NO		CFM56	3
04/14/1987	108	1									DALLAS/FT. WORTH, TEX.	YES		CFM56	3
04/17/1987	109	2	AMERICAN KESTREL	5K26	1	4.				DAL		NO		CFM56	3
04/21/1987	70	1	ROCK DOVE	2P1	1	14.						NO		JT8D	17A
04/22/1987	247	2									PENANG, MALAYSIA	NO		JT8D	
04/23/1987	248	2									MANCHESTER, ENGLAND	NO		JT8D	
04/26/1987	310	2								MAN	CHRISTCHURCH, NEW ZEALAND	NO		JT8D	
04/26/1987	311	2									WELLINGTON, NEW ZEALAND	NO		JT8D	
05/01/1987	312	1									AUCKLAND, NEW ZEALAND	NO		JT8D	
05/01/1987	362	1									NIGERIA	NO		JT8D	15A
05/03/1987	69	2									ST. PETERSBURG, FL	YES		JT8D	9A
05/04/1987	110	1									SAN ANTONIO, TEX	YES		CFM56	3
05/10/1987	94	1									JORHAT, INDIA	NO		JT8D	
05/10/1987	111	2									LITTLE ROCK, ARK	YES		CFM56	3
05/12/1987	95	1									BOMBAY, INDIA	NO		JT8D	
05/12/1987	363	2									ENGLAND	NO		JT8D	15A
05/16/1987	364	2									CHRISTCHURCH, NEW ZEALAND	NO		JT8D	15
05/17/1987	313	2									LONDON, ENGLAND-HEATHROW	NO		JT8D	
05/18/1987	249	1									ALOR SETAR, MALAYSIA	NO		JT8D	
05/20/1987	250	2									BANGALORE, INDIA	NO		JT8D	
05/22/1987	96	1									VARANASI, INDIA	NO		JT8D	
05/22/1987	97	1										NO		JT8D	
05/22/1987	98	1										NO		JT8D	
05/24/1987	99	1	CATTLE EGRET	1135	1						LAGOS, NIGERIA	NO		JT8D	15
05/24/1987	251	2	HADADA IBIS	6112	1	16.					EAST LONDON, SOUTH AFRICA	NO		JT8D	
05/24/1987	251	2	SPARROW*		1	48.					COLOGNE/BONN, GERMANY	NO		CFM56	3
05/25/1987	164	2				3.					KUALA LUMPUR, MALAYSIA	NO		JT8D	15
05/26/1987	252	1									CHRISTCHURCH, NEW ZEALAND	NO		JT8D	
05/27/1987	314	2										NO		JT8D	
05/28/1987	100	2										NO		JT8D	
05/28/1987	165	1	SWALLOW*		1	3.					FRANKFURT, GERMANY	NO		JT8D	15
05/29/1987	112	2									AMSTERDAM, NETHERLANDS	NO		CFM56	3
05/30/1987	253	2									ALGERS, ALGERIA	NO		JT8D	15
05/31/1987	113	2									TANGER, MOROCCO	NO		CFM56	3
05/31/1987	254	1									DUBLIN, IRELAND	NO		JT8D	
06/02/1987	71	1	GULL*		1						NORFOLK, VA	YES		JT8D	15A
06/03/1987	315	1										NO		JT8D	
06/04/1987	114	1	CROW*		1						MIYAKO JIMA, JAPAN	NO		CFM56	3
06/05/1987	114	1									KOS, GREECE	NO		CFM56	3
06/08/1987	115	2	BLACK KITE	3K28	1	20.8					GRAZ, AUSTRIA	YES		CFM56	3
06/09/1987	255	1									SALT LAKE CITY, UT	NO		JT8D	9A
06/10/1987	101	1									LOURDES, FRANCE	NO		JT8D	
06/13/1987	117	1									EDMONTON ALTA-MUN., CANADA	NO		CFM56	3
06/13/1987	256	2									LINZ, AUSTRIA	NO		JT8D	
06/13/1987	365	1									MILAN, ITALY	NO		JT8D	15
06/13/1987	316	1									MILAN, ITALY	NO		JT8D	
06/14/1987	316	1									JAPAN	NO		JT8D	
06/15/1987	257	2									EAST LONDON, SOUTH AFRICA	NO		JT8D	3
06/17/1987	118	2									WASHINGTON, DC-DULLES	YES		CFM56	3
06/17/1987	317	2									JAPAN	NO		JT8D	
06/19/1987	119	1	GULL*		1						HARLINGEN, TEX	YES		CFM56	3
06/22/1987	166	1	SWALLOW*		1	3.					FRANKFURT, GERMANY	NO		JT8D	15
06/22/1987	258	1	COMMON SUIFT	1U55	1	2.					PARIS, FRANCE-DEGAULLE	NO		JT8D	
06/25/1987	102	2	NORTHERN MARSH HARRIER	3K78	1	18.					SAN FRANCISCO, CA-OAKLAND	YES		JT8D	9A
06/27/1987	103	1	FERAL PIGEON*		1	14.					KAOHSIUNG, TAIWAN	NO		JT8D	17A
06/27/1987	259	1									TUNJ'S TUNJ'SIA	NO		JT8D	
06/27/1987	318	2	SPUR-WINGED PLOVER	5M4	1	5.4					CHRISTCHURCH, NEW ZEALAND	NO		JT8D	
06/29/1987	427	1	RED TAI*		1						DAYTON, O	YES		JT8D	
07/02/1987	260	1									LONDON, ENGLAND-HEATHROW	NO		JT8D	15

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	DMG_CODE	SEVERITY	POW_LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
03/30/1987	308	2		9					
03/31/1987	425	2		9	COMPRESSOR		IDLE	NO	
04/01/1987	68	2		9				NO	
04/03/1987	244	2		9					
04/03/1987	309	2		9					
04/05/1987	245	2		9					
04/07/1987	93	2		3				NO	
04/07/1987	361	1	A,C	3	NONE	3.9		NO	
04/09/1987	106	1	A,H	3	NONE			NO	
04/11/1987	107	1	A,C	3	NONE			NO	
04/12/1987	266	2		9	NONE			NO	
04/12/1987	108	1		9	NONE			NO	
04/17/1987	109	2		1	COMPRESSOR			NO	
04/21/1987	70	1	A,G,I,K	3				NO	SMALL BIRD
04/22/1987	247	2	A,C	9					OOOR
04/23/1987	248	2		9					
04/26/1987	310	2		9					
04/26/1987	312	1		9					
05/01/1987	362	2		2	COMPRESSOR		NONE	NO	
05/03/1987	69	2	A,G	9	NONE			NO	
05/04/1987	110	1		9	NONE			NO	
05/10/1987	94	1	A,H	9	NONE			NO	
05/10/1987	111	2		9	NONE			NO	
05/12/1987	95	1		3				NO	
05/12/1987	363	1	A,C	9				NO	3 FAN BLADES DAMAGED
05/16/1987	364	2	A,C	3				NO	LARGE BIRD
05/17/1987	313	2	A,C	9				NO	
05/18/1987	249	1		9				NO	
05/20/1987	250	2		9				NO	
05/22/1987	96	1	A,H	3	COMPRESSOR			NO	
05/22/1987	97	1		9				NO	POWER LOSS
05/22/1987	98	1		9				NO	
05/24/1987	99	1	A,I,K,N	1	COMPRESSOR			NO	INVOLUNTARY COMPLETE FRAC OF #2 BEARING RET BOLTS
05/24/1987	251	2		9	NONE			NO	
05/25/1987	164	2		9				NO	MEDIUM BIRD
05/26/1987	252	1		9				NO	
05/27/1987	314	2		9				NO	
05/28/1987	100	2	A,H	3	NONE			NO	
05/28/1987	165	1		9	NONE			NO	
05/29/1987	112	2		9	NONE			NO	EVENT OCCURED DURING GO-ROUND SMALL BIRD
05/30/1987	253	2	A,D	9		3.8		NO	
05/31/1987	113	2		2				NO	
05/31/1987	254	1	A,D	9				NO	
06/02/1987	71	1		9				NO	
06/03/1987	315	1		9				NO	
06/04/1987	114	1		9	NONE			NO	
06/05/1987	115	2	A,H	3	NONE			NO	
06/08/1987	116	1	A,B	3	NONE			NO	
06/09/1987	255	1		9	COMPRESSOR			NO	
06/10/1987	101	1	A,H	9	NONE		RETARD	NO	
06/13/1987	117	1		9		5.0		NO	2 F J-LDS BLENDED
06/13/1987	256	1		9				NO	SLEWED ON GROUND
06/13/1987	257	2		9				NO	
06/13/1987	365	1		9				NO	
06/14/1987	316	1	A,C	9				NO	MEDIUM BIRD
06/15/1987	257	2		9				NO	
06/17/1987	118	2		9	NONE			NO	
06/17/1987	317	2		9	NONE			NO	
06/19/1987	119	1		9	NONE			NO	
06/22/1987	166	1		9	NONE			NO	
06/22/1987	258	1		9	NONE			NO	
06/22/1987	102	2	A,C,H	3			RETARD	NO	
06/23/1987	103	1	A,G	3				NO	
06/27/1987	259	1		3				NO	
06/27/1987	318	2	A,C	9				NO	LARGE BIRD
06/29/1987	427	1		9				NO	MEDIUM BIRD
07/02/1987	260	1		9				NO	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	ETIME	STGM	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LI_CONDS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
07/02/1987	366			NONE		200	UNKNOWN								
07/02/1987	431			NONE		300	UNKNOWN								
07/03/1987	319			NONE		200	TAKEOFF						ATB	NO	
07/04/1987	261	1	15:15:00	NONE		200	LANDING					SCATTERED			
07/05/1987	133	2	8:25:00	NONE		300	TAKEOFF		+V1			CLEAR	NONE		
07/06/1987	134	2		NONE		200	UNKNOWN								
07/07/1987	104	2		NONE		200	TAKEOFF		0 0				ATO		
07/09/1987	135	2	0:42:00	NONE		300	LANDING			NIGHT		SCATTERED	NONE	NO	YES
07/11/1987	262	1	12:20:00	NONE		200	CLIMB		3000 170						
07/13/1987	105	1		NONE		200	UNKNOWN								
07/13/1987	171	2		NONE		200	UNKNOWN		0				NONE	NO	
07/13/1987	1061	2		NONE		200	LANDING						NONE		
07/13/1987	1062	1		NONE		200	UNKNOWN						NONE		
07/14/1987	136	2		NONE		300	UNKNOWN								
07/14/1987	137	2		NONE		300	UNKNOWN								
07/14/1987	138	1		NONE		300	APPROACH		7000 137	VFR	DAY	CLEAR	NONE	NO	
07/15/1987	263	1	9:35:00	NONE		200	TAKEOFF		0			CLEAR	NONE	NO	
07/15/1987	1063	1		NONE		200	TAKEOFF						NONE	NO	
07/16/1987	320	1		NONE		200	UNKNOWN								
07/17/1987	367	1		NONE		200	UNKNOWN								
07/17/1987	432	2		NONE		300	CLIMB		1000 155						ONE
07/19/1987	139	2	18:39:00	NONE		300	APPROACH		300 130						
07/19/1987	264	2		NONE		300	UNKNOWN								
07/19/1987	264	2	20:26:00	MULT	BIRDS	100	TAKEOFF		0			SCATTERED	NONE	NO	SEVERAL
07/21/1987	140	2	7:00:00	NONE		300	TAKEOFF		+V1	DAWN		CLEAR	NONE	NO	YES
07/21/1987	265	2	15:20:00	NONE		200	APPROACH		100 125			CLEAR			
07/21/1987	426	2		NONE		200	TAKEOFF						ATO		
07/23/1987	122	2	19:00:00	NONE		200	TAKEOFF		0 110	VFR					NO
07/23/1987	123	2	18:37:00	NONE		200	TAKEOFF		0 150						FLOCK
07/26/1987	123	1	9:00:00	NONE		200	TAKEOFF		100 150	VFR			ATB		
07/26/1987	124	2		NONE		300	LANDING		0 80						
07/26/1987	141	2	20:37:00	NONE		200	TAKEOFF		140			CLEAR		NO	YES
07/27/1987	266	1		NONE		200	TAKEOFF		130				ATO		YES
07/27/1987	321	1		NONE		200	UNKNOWN		0 70				NONE		YES
07/29/1987	1065	1	17:45:00	NONE		200	TAKEOFF								
07/29/1987	125	1		NONE		200	TAKEOFF								
07/29/1987	142	1		NONE		300	TAKEOFF								
07/29/1987	368	2		NONE		200	UNKNOWN								
07/30/1987	127	1	4:55:00	NONE		200	UNKNOWN		0 130	VFR		CLEAR	ATO		
07/30/1987	322	1		NONE		200	TAKEOFF		0 100						
07/31/1987	143	1		NONE		300	LANDING						NONE		NO
07/31/1987	144	1		NONE	BIRDS	300	TAKEOFF		500 +V1	VFR	BRIGHT	OVERCAST	NONE		YES
08/03/1987	128	1	9:55:00	NONE		200	UNKNOWN		0 90	VFR	DAY	PARTLY CLOUD	ATO	NO	
08/03/1987	129	2		NONE		200	TAKEOFF					BELOW CLOUDS			SEVERAL
08/03/1987	205	2	9:22:00	NONE	BIRDS	200	UNKNOWN		0						
08/03/1987	267	2		NONE		200	APPROACH		1000 140				ATO		
08/04/1987	206	1		NONE		200	TAKEOFF								
08/04/1987	323	2		NONE		200	TAKEOFF								
08/05/1987	145	1		NONE		300	LANDING						NONE		ONE
08/05/1987	146	1		NONE	ENG	300	LANDING			DUSK		OVERCAST	NONE		NO
08/05/1987	146	2		MULT	ENG	300	LANDING						NONE		
08/05/1987	207	1		NONE		200	UNKNOWN		0 130				NONE		YES
08/05/1987	370	1		NONE		200	TAKEOFF								
08/06/1987	147	1		NONE		300	UNKNOWN								
08/07/1987	1067	1		NONE		200	UNKNOWN								
08/07/1987	1068	1		NONE		200	UNKNOWN								
08/08/1987	1066	2	9:54:00	NONE		200	UNKNOWN		140			CLOUDY	NONE		ONE
08/13/1987	208	2		NONE		200	TAKEOFF						ATB		NO
08/15/1987	433	2	9:00:00	NONE		300	LANDING		20 135						
08/17/1987	130	2	15:30:00	NONE		200	LANDING								
08/17/1987	148	2		NONE		300	UNKNOWN								
08/19/1987	131	1		MULT	BIRDS	200	LANDING		0	VFR		CLOUDY			YES
08/19/1987	1069	1	15:17:00	NONE		200	TAKEOFF		0 85				ATO		
08/20/1987	209	1		NONE		200	UNKNOWN								
08/22/1987	324	1		NONE		200	UNKNOWN								
08/22/1987	371	1		NONE		200	UNKNOWN								
08/22/1987	372	1		NONE		200	UNKNOWN								
08/22/1987	1070	2		NONE		200	TAKEOFF		0 60				ATO		

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	BIRD_NAM	BIRD_SPE	# BIRDS	WT_OZ	1	CITY	PRS	AIRPORT	LOCALE	US_INCID	ENGINE	DASH	
07/02/1987	366										HANOVER, GERMANY	NO	JT80	15	
07/02/1987	431									TNG	TANGER, MOROCCO	NO	CFM56	3	
07/03/1987	319	1								EZE	BUENOS AIRES, ARGENTINA	NO	JT80		
07/04/1987	261	2								FRA	FRANKFURT, GERMANY	NO	JT80	15	
07/05/1987	133	2								SDF	LOUISVILLE, KY	YES	CFM56	3	
07/05/1987	134	2								-IAD	WASHINGTON, DC-DULLES	YES	CFM56	3	
07/07/1987	104	2										NO	JT80		
07/07/1987	1064	1								AMD	AHMEDABAD, INDIA	NO	JT80	9A	
07/09/1987	135	2								ORY-AJA	AJACCIO, CORSICA, FRANCE	NO	CFM56	3	
07/11/1987	262	1								BRU	BRUSSELS, BELGIUM	NO	JT80		
07/13/1987	105	1								VNS	VARANASI, INDIA	NO	JT80	17	
07/13/1987	171	2									LOS ANGELES, CA	YES	JT80		
07/13/1987	1061	2								VNS	VARANASI, INDIA	NO	JT80	17A	
07/13/1987	1062	1								DEL-JAI	INDIA	NO	JT80	17	
07/14/1987	136	2								-KHI	KARACHI, PAKISTAN	NO	CFM56	3	
07/14/1987	137	2								-TVL	LAKE TAHOE, CA	YES	CFM56	3	
07/14/1987	138	1								TLV-MUC	TELAVIA-YAFO, ISRAEL	NO	CFM56	3	
07/15/1987	263	1								DUR	DURBAN, SOUTH AFRICA	NO	CFM56	3	
07/15/1987	1063	1									INDIA	NO	JT80	17	
07/15/1987	1063	1									CHRISTCHURCH, NEW ZEALAND	NO	JT80		
07/16/1987	320	1								-CHC	NUREMBURG, GERMANY	NO	JT80	15	
07/17/1987	367	1								MUC	MUNICH, GERMANY	NO	CFM56	3	
07/17/1987	432	2									MUNICH, GERMANY	NO	CFM56	3	
07/19/1987	139	2									MUNICH, GERMANY	NO	CFM56	3	
07/19/1987	264	2									BLAGNAC, FRANCE (LFBO)	NO	CFM56	3	
07/21/1987	140	2								-MUC	MUNICH, GERMANY	NO	CFM56	3	
07/21/1987	140	2								DAB-CLT	DAYTONA BEACH, FL	YES	CFM56	3	
07/21/1987	265	2									KST	KOSTI, SUDAN	NO	JT80	
07/21/1987	426	2								20.8	NEW YORK NY-NEWARK	YES	JT80	9A	
07/23/1987	122	2									MIYAKO JMA, JAPAN	NO	JT80	17	
07/26/1987	123	1									GENOVA, ITALY	NO	JT80	15A	
07/26/1987	124	2								40.	TORONTO, ONT., CANADA	NO	JT80	9A	
07/26/1987	141	2									DUSSELDORF, GERMANY	NO	CFM56	3	
07/26/1987	266	1									ITALY	NO	JT80		
07/27/1987	321	1									INDIA HAWAII	NO	JT80	9A	
07/27/1987	1065	1								6.	HILO, HAWAII	NO	JT80	9A	
07/29/1987	126	1								AMS-	AMSTERDAM, NETHERLANDS	YES	CFM56	3	
07/29/1987	142	1									AMS	AMSTERDAM, NETHERLANDS	YES	JT80	7
07/29/1987	368	2									BERLIN, WEST GERMANY	NO	JT80	15A	
07/30/1987	127	1								TXL-BRE	BERLIN, WEST GERMANY	NO	JT80		
07/30/1987	322	1								ISG-OKA	ISHIGAKI, JAPAN	NO	CFM56	3	
07/31/1987	143	1								HRL-ROU	HOUSTON, TEX	YES	CFM56	3	
07/31/1987	144	1								11.5	ADLAIDE, S. AUSTRALIA	NO	JT80		
08/03/1987	128	1									JOHANNESBURG, SOUTH AFRICA	NO	CFM56	3	
08/03/1987	129	2									RAPID CITY, S. DAK	YES	JT80	9	
08/03/1987	205	2								RAP-FSD	RAPID CITY, S. DAK	YES	JT80		
08/03/1987	267	2								-YYZ	TORONTO, ONT., CANADA	NO	JT80	15	
08/03/1987	369	2								10.	TORONTO, ONT., CANADA	NO	JT80	15	
08/04/1987	206	1								MUC-ZRH	ZURICH, SWITZERLAND	NO	JT80	9A	
08/04/1987	323	2									JEREZ DE LA FRONTERA, SPAIN	NO	JT80		
08/05/1987	145	1								YAM-YYZ	SAULT STE. MARIE, CANADA	NO	JT80		
08/05/1987	146	1								WLG-DUD	WELLINGTON, NEW ZEALAND	NO	CFM56	3	
08/05/1987	146	2								-BRS	BRISTOL, ENGLAND	NO	CFM56	3	
08/05/1987	207	1								-IBZ	IBIZA, SPAIN	NO	CFM56	3	
08/05/1987	370	1								-YVR	VANCOUVER, B.C., CANADA	NO	JT80	15	
08/06/1987	147	1									FRANKFURT, GERMANY	NO	CFM56	3	
08/07/1987	1067	1								AMS	AMSTERDAM, NETHERLANDS	NO	JT80	3	
08/07/1987	1068	1								MAA-VTZ	FRANKFURT, GERMANY	NO	CFM56	3	
08/08/1987	1066	2								JAI-BOM	INDIA	NO	JT80	9A	
08/13/1987	208	2								LKO-DEL	INDIA	NO	JT80	17	
08/15/1987	433	3								-YYZ	INDIA	NO	JT80	17A	
08/17/1987	130	2								YVR-YYC	LUCKNOW, INDIA	NO	JT80		
08/17/1987	148	2									TORONTO, ONT., CANADA	NO	CFM56	3	
08/19/1987	131	1								-SNA	TANGIER, MOROCCO	NO	JT80	3	
08/19/1987	1069	1								3.	CALGARY, ALTA., CANADA	YES	JT80	17A	
08/20/1987	209	1								YXJ-YXS	ORANGE COUNTY, CA	YES	CFM56	3	
08/22/1987	324	1								JRH-GAO	PRINCE GEORGE, B.C., CANADA	NO	JT80	15	
08/22/1987	371	1								-YLV	JORHAT, INDIA	NO	JT80	17	
08/22/1987	372	1								ISG-OKA	KELOWNA, B.C., CANADA	NO	JT80		
08/22/1987	372	1								-BRU	JAPAN	NO	JT80		
08/22/1987	1070	2								AMD-DEL	BRUSSELS, BELGIUM	NO	JT80		
08/22/1987	1070	2									FORTALEZA, CEARA, BRAZIL	NO	JT80		
08/22/1987	1070	2									AHMEDABAD, INDIA	NO	JT80	9A	

SOURCE: ENGINE MANUFACTURER

EDATE	EVNT#	ENG_POS	DWG_CODE	SEVERITY	POW_LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
07/02/1987	366			9					
07/02/1987	431			9					
07/03/1987	319			9					
07/04/1987	261	A,C		3	NONE	4.9			REPLACED 1 PAIR OF F BLDS
07/05/1987	133	A		4	NONE				
07/05/1987	134			9					
07/07/1987	104			9					
07/07/1987	1064			9					
07/09/1987	135			9	NONE				
07/11/1987	262	A,G		9					AIRCRAFT GROUNDED DUE TO FOD
07/13/1987	105	A,C,N		2	NONE				FOUND DURING GROUND INSPECTION
07/13/1987	171	A,B,M		2	NONE				8 FBLDS REPLACED BLD TANG BROKEN
07/13/1987	1061			9					FOUND ON GRD INSPEC
07/13/1987	1062	A		4	NONE				FOUND ON GRD INSPEC, 1 F BLD DAMAGED
07/14/1987	136			9	NONE				FOUND ON GRD INSPEC, SMALL BIRD
07/14/1987	137			9	NONE				
07/14/1987	138			9	NONE				
07/15/1987	263			9					FOUND ON GRD INSPEC
07/15/1987	1063			9					
07/16/1987	320			9					
07/17/1987	367			9					
07/17/1987	432	A		4	NONE				FOUND DURING GROUND INSPECTION
07/19/1987	139			9					
07/19/1987	264	A,D		2	NONE	3.2			
07/21/1987	140			2	NONE				
07/21/1987	265	A		4	YES				FAN BLADE DAMAGE
07/21/1987	426	A,C,H,M		2	EPR DEC				STRONG ODOR IN CABIN
07/23/1987	122	A,B,G,M		2	COMPRESSOR	YES			METAL IN TAILPIPE
07/26/1987	123			9					
07/26/1987	124			9					EPR SYMPTOM
07/26/1987	141			9					STRONG ODOR IN CABIN
07/26/1987	266	A,G,N		2					
07/27/1987	321			9					
07/27/1987	1065			9					
07/29/1987	126			9					
07/29/1987	142			9	NONE				
07/29/1987	368	A,C		3	EPR DEC				FAN CHANGE, ENG SHUTDOWN ON TAXI, COMP DAM
07/30/1987	127	A,C,G,K		1	EPR DEC		CUTOFF	EPR	STRONG ODOR IN CABIN
07/30/1987	322			9					
07/31/1987	143	A,B,D,M		9	NONE				
07/31/1987	144			2					
08/03/1987	128			9	COMPRESSOR				#2 ENGINE STALLED AT 80 KTS, PM EVENT
08/03/1987	129			9					
08/03/1987	205			9					
08/03/1987	267			9					
08/03/1987	369			9					
08/04/1987	206	A,C		9					TIRE FAILURE
08/04/1987	323	A,H		3	NONE				EVENT OCCURRED IN PM
08/05/1987	145	A,H		3	NONE	3.5			
08/05/1987	146	A,H		3	NONE	2.2			
08/05/1987	146			9					
08/05/1987	207			9					
08/05/1987	370			9					
08/06/1987	147	A		4	NONE				FOUND ON GRD INSPEC, 4 FAN BLADES REPLACED
08/07/1987	1067	A,M		3					FOUND ON GRD INSPEC
08/07/1987	1068			9					
08/08/1987	1066	A		4	COMPRESSOR				UNK POWER LOSS, 6 F BLDS UNKNOWN DAMAGE
08/13/1987	208			9					
08/13/1987	433			9					
08/17/1987	130	A,H		3	NONE				
08/17/1987	148	A,C,M		3					
08/19/1987	131			9					
08/19/1987	1069			9					
08/20/1987	209			9					
08/22/1987	324			9					
08/22/1987	371			9					
08/22/1987	372			9					
08/22/1987	1070			9					MOMENTARY EGT INC OF 70 DEG.C, 2-4 BIRDS

SOURCE: ENGINE MANUFACTURER

EDATE	EV1#	ENG_POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LT_CONDS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
08/22/1987	1071	1		NONE		200	APPROACH						NONE		YES
08/23/1987	373	2		NONE		200	TAKEOFF								
08/25/1987	210	2		NONE		200	UNKNOWN								
08/26/1987	198	1	8:23:00	TRYS	FRAC	200	LANDING			VFR	NIGHT	SCATTERED			YES
08/26/1987	374			NONE		200	TAKEOFF		0 140			CLEAR	ATO	NO	NO
08/26/1987	451			NONE		200	TAKEOFF		0 +V1			CLEAR	ATO	NO	SEVERAL
08/28/1987	325	1	16:15:00	MULT	BIRDS	200	TAKEOFF		0 130			RAIN		NO	YES
08/29/1987	211	2		MULT	BIRDS	200	TAKEOFF		0			BELOW CLOUDS			
08/29/1987	268	1		NONE		200	TAKEOFF						ATO		YES
08/29/1987	326	2		NONE		200	TAKEOFF		0 80						
08/30/1987	1072	2		NONE		200	TAKEOFF								
08/31/1987	149	2		NONE		300	UNKNOWN								
08/31/1987	150	2		NONE		300	LANDING								
08/31/1987	151	2		NONE		300	UNKNOWN								ONE
08/31/1987	269	1	8:06:00	NONE		200	TAKEOFF		0 100	VFR	DAY	CLEAR	NONE	NO	FLOCK
09/01/1987	327	1		NONE		200	TAKEOFF						ATB	NO	
09/02/1987	328	1		NONE		200	TAKEOFF								ONE
09/03/1987	328	1	6:57:00	NONE		200	LANDING		15 155	VFR		CLOUDY	NONE	NO	ONE
09/06/1987	132	2	10:15:00	NONE		200	TAKEOFF		0			CLEAR			ONE
09/07/1987	152	2		NONE		300	UNKNOWN								
09/07/1987	329	1		NONE		200	LANDING		35 130	VFR	DAY	CLEAR	NONE	NO	FLOCK
09/08/1987	449	2		NONE		200	LANDING								
09/08/1987	1073	1		NONE		200	UNKNOWN		140				ATB	NO	
09/09/1987	330	2		NONE		200	TAKEOFF								
09/10/1987	153	1	6:25:00	NONE		300	UNKNOWN		0 100						
09/10/1987	434	2		NONE		200	TAKEOFF								
09/12/1987	212	2	17:40:00	NONE		200	UNKNOWN		0 110						YES
09/13/1987	270	1		NONE		200	LANDING		+V1			BELOW CLOUDS			
09/13/1987	134	1		NONE		300	CLIMB								
09/14/1987	172	2		NONE		200	UNKNOWN								
09/15/1987	155	2	9:06:00	NONE		200	TAKEOFF		0 140	IFR	BRIGHT	CLEAR	ATB	NO	ONE
09/15/1987	376	1		NONE		200	TAKEOFF						NONE	NO	
09/16/1987	156	1	13:33:00	NONE	BIRDS	300	LANDING			VFR	BRIGHT	CLEAR	NONE	NO	SEVERAL
09/16/1987	327	1		NONE		200	UNKNOWN								
09/19/1987	1074	1	7:55:00	MULT	BIRDS	200	TAKEOFF		0 100			CLOUDY	ATO	NO	SEVERAL
09/17/1987	157	1		NONE		300	TAKEOFF		+V1				NONE	NO	FLOCK
09/17/1987	271	1	18:45:00	NONE		200	TAKEOFF		20 150						
09/17/1987	331	2		NONE		200	LANDING		40						
09/18/1987	158	1		NONE		300	APPROACH								
09/18/1987	157	1	16:50:00	NONE		200	TAKEOFF		20 150	VFR			ATB	NO	ONE
09/18/1987	329	2		NONE		200	UNKNOWN								NO
09/18/1987	1075	1	6:30:00	NONE		200	UNKNOWN		0 60			CLEAR	NONE	NO	SEVERAL
09/20/1987	332	1		NONE		200	TAKEOFF		140				ATO	NO	
09/22/1987	159	2	0:43:00	NONE		300	UNKNOWN		0	VFR	DARK	CLEAR	NONE	NO	
09/22/1987	169	1	9:57:00	NONE		200	TAKEOFF			VFR		OVERCAST	ATO		
09/22/1987	222	1		NONE		200	TAKEOFF								
09/22/1987	1076	2		NONE		200	UNKNOWN								
09/23/1987	160	1	19:20:00	NONE		300	UNKNOWN								
09/23/1987	450	2		NONE		200	TAKEOFF		80			CLEAR	NONE	NO	NO
09/24/1987	380	1		NONE		200	TAKEOFF					PARTLY CLOUD	ATO	NO	ONE
09/24/1987	1077	2		NONE		200	UNKNOWN								
09/25/1987	333	1		NONE		200	UNKNOWN								
09/25/1987	334	1	17:23:00	NONE		200	UNKNOWN			VFR	DARK DAY	CLEAR	NONE	NO	NO
09/28/1987	170	1		NONE		200	TAKEOFF								NO
09/29/1987	173	2		NONE		200	UNKNOWN								NO
09/30/1987	204	1		NONE		300	LANDING								ONE
10/01/1987	189	1	19:36:00	NONE		200	CRUISE		10 145			CLEAR	NONE	NO	
10/01/1987	213	2		NONE		200	TAKEOFF		140 130			CLOUDY	NONE	NO	
10/02/1987	335	1		NONE		200	UNKNOWN		100				ATB		
10/05/1987	336	1		NONE		200	UNKNOWN		0 110						
10/06/1987	381	1		NONE		200	LANDING								
10/06/1987	337	1		NONE		200	CLIMB								
10/06/1987	338	1		NONE		200	TAKEOFF								
10/08/1987	382	2		TRYS	FRAC	200	UNKNOWN								
10/08/1987	1078	1		MULT	ENG	200	UNKNOWN								
10/08/1987	1078	2		MULT	ENG	200	UNKNOWN								
10/10/1987	383	2	10:30:00	NONE		200	TAKEOFF		0 115				NONE	NO	YES

SOURCE: ENGINE MANUFACTURER

EDATE	EVTH	ENG POS	BIRD NAM	BIRD SPE	# BIRDS	WT OZ	1	CTY PRS	AIRPORT	LOCALE	US	IMCID	ENGINE	DASH
08/22/1987	1071	1			1			STV	INDIA	INDIA	NO	JT80	9A	
08/23/1987	373	2						-YEG	SURAT	INDIA	NO	JT80		
08/25/1987	210	2						MAC	EDMONTON	ALTA., CANADA	NO	JT80		
08/26/1987	188	1						HAM	HACHIJO	JAPAN	NO	JT80	9A	
08/26/1987	374	1						LEX	HAMBURG	GERMANY	NO	JT80	15	
08/26/1987	451	1						YXJ	LEXINGTON	KY	YES	JT80		
08/28/1987	325	1	COMMON SNIPES	6N47				4. 4.	PORTO	PORTUGAL	NO	JT80		
08/29/1987	211	2						3. 3.	FT. ST. JOHN	B. C., CANADA	NO	JT80	15	
08/29/1987	268	1						YKO	FRANKFURT	GERMANY	NO	JT80		
08/29/1987	326	2						FRA	FRANKFURT	GERMANY	NO	JT80		
08/30/1987	149	2						PHR	PALMERSTON	NEW ZEALAND	NO	JT80	17	
08/31/1987	150	1						PHR	PALMERSTON	NEW ZEALAND	NO	JT80	3	
08/31/1987	151	2						KH1	COCHIN	INDIA	NO	CFM56	3	
08/31/1987	151	2						KH1	COCHIN	INDIA	NO	CFM56	3	
08/31/1987	269	1						PHX	HOUSTON	TEX	YES	CFM56	3	
09/01/1987	327	1	GULL*					DUS	PHOENIX	ARIZ	YES	JT80	15	
09/02/1987	328	1	PIGEEON*					FNC	DUSSELDORF	GERMANY	NO	JT80		
09/03/1987	375	1	COMMON GULL	14N13				MZG	FUNCHAL	PORTUGAL	NO	JT80	15	
09/06/1987	132	2	OSPREY	2K1				15. 2	KAOHSIUNG	TAIWAN	NO	JT80		
09/06/1987	152	1						56. 3	ENGLAND		NO	JT80	9A	
09/07/1987	329	1						DUS	ORLANDO	FL	YES	JT80		
09/08/1987	449	2						PHR	DUSSELDORF	GERMANY	NO	CFM56	3	
09/08/1987	1073	1						ORF	PALMERSTON	NEW ZEALAND	NO	JT80	15	
09/09/1987	330	2						BOH	NORFOLK	VA	YES	JT80	9A	
09/10/1987	153	1						ORF	INDIA		NO	JT80		
09/12/1987	434	2	EURASIAN KESTREL	5K27				7. 2	PARIS	FRANCE	NO	JT80		
09/12/1987	212	2						MUC	MUNICH	GERMANY	NO	CFM56	3	
09/12/1987	270	1	BUZZARD OR FALCON*					FRA	MUNICH	GERMANY	NO	CFM56	3	
09/13/1987	154	1						YTC	FRANKFURT	GERMANY	NO	JT80		
09/14/1987	172	2						MUC	CALGARY	ALTA., CANADA	NO	JT80	15	
09/15/1987	155	2						YUL	MUNICH	GERMANY	NO	CFM56	3	
09/15/1987	376	1	SHARP-SHINNED HAWK	3K105				YUL	MONTREAL	QUE., CANADA	NO	JT80	17A	
09/16/1987	156	1						6.	SOUTH AFRICA		NO	JT80	3	
09/16/1987	377	1	YELLOW-BILLED CUCKOO	2R51				2.	MIDLAND/ODESSA	TEX	YES	CFM56	3	
09/17/1987	1074	1						AUS	BIRMINGHAM	ALA	YES	JT80	7	
09/17/1987	157	1						PAT	AUSTIN	TEX	YES	CFM56	3	
09/17/1987	271	1						ZRH	PATNA	INDIA	NO	JT80	9A	
09/17/1987	331	2						FRA	ZURICH	SWITZERLAND	NO	JT80	17	
09/18/1987	158	1						BHX	BIRMINGHAM	ENGLAND	NO	CFM56	3	
09/18/1987	167	1	MASKED PLOVER	5N24				CCR	PRUDHOE BAY	ALASKA	NO	JT80	15	
09/18/1987	379	2						CBR	CAMBERRA	A.C.T., AUSTRALIA	YES	JT80	3	
09/18/1987	1075	1						PLZ	JOHANNESBURG	SOUTH AFRICA	NO	JT80	17A	
09/20/1987	332	1						AGR	AGRA	INDIA	NO	JT80	15A	
09/20/1987	159	2						BRU	BRUSSELS	BELGIUM	NO	JT80	17	
09/22/1987	169	1						STL	BRUSSELS	BELGIUM	NO	JT80	3	
09/22/1987	272	1						PLZ	ST. LOUIS	MO	YES	CFM56	3	
09/23/1987	1076	2						CPT	CAPE TOWN	SOUTH AFRICA	NO	JT80	9	
09/23/1987	160	1						CMG	CORUMBA	BRAZIL	NO	JT80	17	
09/23/1987	450	2						PAT	INDIA		NO	JT80	3	
09/24/1987	380	1						HOU	HOUSTON	TEX	YES	CFM56	3	
09/24/1987	1077	2						BOI	BALTIMORE	MD	YES	JT80		
09/25/1987	333	1						OGA	INDIA		NO	JT80	9A	
09/27/1987	334	1						AKL	JAPAN		NO	JT80		
09/28/1987	170	1						ADL	AUCKLAND	NEW ZEALAND	NO	JT80	7	
09/29/1987	173	2						ADL	CLEVELAND	O	YES	JT80		
09/30/1987	204	1						TSV	DENVER	COL	YES	JT80	3	
10/01/1987	189	1						LAX	TAMPA	FL	YES	CFM56	3	
10/02/1987	335	1						YYZ	TORONTO	ONT., CANADA	NO	JT80		
10/05/1987	381	1						OGA	JAPAN		NO	JT80	9A	
10/06/1987	190	2						MMY	MIYAKO	JAPAN	NO	JT80		
10/06/1987	337	1						IAD	WASHINGTON	DC-DULLES	YES	JT80	3	
10/06/1987	338	1						PSA	PISA	ITALY	NO	CFM56		
10/08/1987	382	2						OGA	ISHIGAKI	JAPAN	NO	JT80		
10/08/1987	1078	1						STR	JAPAN		NO	JT80	9A	
10/08/1987	1078	2						BOH	INDIA		NO	JT80	9A	
10/10/1987	383	2	BUZZARD*					STR	STUTTGART	GERMANY	NO	JT80	15	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	DGM_CODE	SEVERITY	POV_LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
08/22/1987	1071	1		9				NO	
08/23/1987	373	2		9				NO	
08/25/1987	210	2		9				NO	
08/26/1987	188	1	A,C,G,I	1	NONE			NO	1, 1st STAGE F BLADES WERE FRAC, 2nd DAM
08/26/1987	374	9		9				NO	PM EVENT, LOUD ENGINE NOISE
08/26/1987	451	9		9				NO	
08/28/1987	325	1		3		YES		NO	SYMPTOM - VIBRATION
08/29/1987	211	2	A,C	3				NO	
08/29/1987	268	1		9		YES		NO	3 F BLDS BENT DROP IN EPR
08/29/1987	326	2	A,C	3				NO	FOUND DURING GROUND INSPECTION
08/31/1987	149	2	A	9	NONE	<2		NO	3 FAN BLADES DAMAGED
08/31/1987	150	1	A	4	NONE			NO	1 FAN BLADE DAMAGED
08/31/1987	151	2	A	9	COMPRESSOR			NO	
08/31/1987	269	1		9				NO	3 FAN BLADES SHINGLED
09/01/1987	327	1	A,H	3				NO	LPC DAMAGED
09/02/1987	328	1	A,C	3				NO	FOUND DURING GROUND INSPECTION
09/03/1987	328	1	A,K	3				NO	AM EVENT
09/03/1987	375	1		9				NO	OOOR
09/06/1987	132	2		9				NO	FOUND DURING GROUND INSPECTION
09/07/1987	329	1		9				NO	AM EVENT
09/08/1987	449	2		9	COMPRESSOR			NO	OOOR
09/09/1987	1073	1		9	NONE			NO	FOUND DURING GROUND INSPECTION
09/09/1987	350	2		9				NO	
09/10/1987	153	1		9				NO	
09/10/1987	434	1		9				NO	
09/12/1987	212	2		9				NO	
09/12/1987	270	1		9		2		NO	MEDIUM BIRD
09/13/1987	152	1	A,H	3	NONE			NO	4 FAN MID ACOUSTICAL PANELS REPLACED
09/13/1987	152	1	A,C	3	NONE			NO	
09/14/1987	172	2	A,H	3	NONE			NO	
09/15/1987	155	2	A,B,H	3	NONE			NO	
09/15/1987	376	1	A,C	3	NONE			NO	
09/16/1987	156	1		3				NO	
09/16/1987	377	1	A,C	3				NO	
09/19/1987	1074	1	A,G	3				NO	
09/17/1987	157	1		9				NO	
09/17/1987	271	1	A,C	3				NO	
09/17/1987	331	2		9				NO	
09/18/1987	158	1		9				NO	
09/18/1987	167	1		9				NO	
09/18/1987	379	2		9	COMPRESSOR			NO	
09/18/1987	1075	1	A,G	2				NO	
09/20/1987	332	1		9	COMPRESSOR			NO	
09/22/1987	159	2		9	NONE			NO	
09/22/1987	169	1		9				NO	
09/22/1987	272	1	A,C	3				NO	
09/22/1987	272	1	A,C,L	3				NO	FOUND DURING GRD INSPEC, OOR IN CABIN
09/23/1987	1076	2	A,H	3				NO	IGV AND COWL DAMAGE, 1 FAN BLADE DAMAGED
09/23/1987	160	1	A,B	3				NO	1 F BLD SHINGLED
09/23/1987	450	2		3	NONE			NO	FOUND DURING GROUND INSPECTION
09/24/1987	380	2	A,G	3				NO	AM EVENT
09/24/1987	1077	2	A,D	3				NO	
09/25/1987	333	1		9				NO	7 F BLDS BENT
09/27/1987	334	1	A,C	3				NO	
09/28/1987	170	1	A	4				NO	
09/29/1987	173	2		9	NONE			NO	
09/30/1987	204	1		9	NONE			NO	FOUND DURING GROUND INSPECTION
10/01/1987	189	1	A,B,H	3		2.5		NO	OOOR IN CABIN
10/01/1987	213	1		9				NO	PILLOT HEARD ""LOUD ENGINE NOISE""
10/02/1987	335	1		9				NO	
10/05/1987	336	1		9				NO	
10/05/1987	381	1	A,B,H	3				NO	SMALL BIRD
10/06/1987	337	1		9	NONE			NO	
10/06/1987	337	1		9				NO	
10/06/1987	338	1		9				NO	
10/06/1987	382	2	A,I	1				NO	
10/08/1987	1078	1		9		HIGH		NO	FOUND ON GRD INSPEC
10/08/1987	1078	2		9				NO	FOUND ON GRD INSPEC
10/10/1987	383	2	A,D,G	2				NO	ENG REMOVED, FAN AND DOWNSTREAM DAMAGE



SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	ETIME	SIGM	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	LT	COMDS	WEATHER	CREW	AC	CREW	AL	BIRD	SEE
10/10/1987	448			NONE		200	UNKNOWN		250	170				CLEAR	NONE					SEVERAL
10/11/1987	384		8:08:00	NONE		200	TAKEOFF		0						NONE					ONE
10/11/1987	1070	2		NONE		200	UNKNOWN								NONE					
10/11/1987	1080	2		NONE		200	TAKEOFF		0	60					NONE					
10/13/1987	1081	2	12:00:00	NONE		300	TAKEOFF								NONE					
10/14/1987	191	2		NONE		200	CRUISE								NONE					
10/14/1987	214	1		NONE		200	UNKNOWN								NONE					
10/15/1987	385	2		NONE		200	UNKNOWN								NONE					
10/16/1987	192	1		NONE		300	APPROACH		4000	190				DARK	NONE					FLOCK
10/17/1987	386	1		NONE		200	CRUISE		0						NONE					
10/19/1987	193	1	15:00:00	NONE		200	LANDING								NONE					
10/20/1987	387	1		NONE		200	UNKNOWN								NONE					
10/21/1987	388	1		NONE		200	TAKEOFF		0						NONE					
10/23/1987	194	2		NONE		300	UNKNOWN								NONE					
10/24/1987	168	2		NONE		200	UNKNOWN								NONE					
10/24/1987	195	1		NONE		300	LANDING								NONE					
10/25/1987	339	2	14:36:00	NONE		200	TAKEOFF		0	100					NONE					
10/26/1987	176	2		NONE		200	UNKNOWN								NONE					
10/28/1987	182	2		NONE		200	UNKNOWN								NONE					
10/28/1987	187	2		TRVS	FRAC	200	UNKNOWN								NONE					
10/28/1987	435	1		NONE		300	UNKNOWN								NONE					
10/29/1987	389	1		NONE		200	CRUISE		4500	210				DARK	NONE					ONE
10/29/1987	1082	2		NONE		200	TAKEOFF		0	140					NONE					ONE
10/30/1987	273	1		NONE		200	TAKEOFF								NONE					
10/31/1987	174	1	14:02:00	NONE		200	TAKEOFF		0	80					NONE					
11/02/1987	196	1	7:00:00	MULT	ENG	300	APPROACH		200	135					NONE					FLOCK
11/02/1987	196	2	7:00:00	MULT	ENG	300	APPROACH		200	135					NONE					
11/03/1987	340	2		NONE		200	TAKEOFF		0	115					NONE					
11/04/1987	422	1		NONE		200	TAKEOFF		0	100					NONE					
11/05/1987	390	2	19:50:00	MULT	BIRDS	200	TAKEOFF		0	130					NONE					
11/05/1987	728	1		NONE		200	CLIMB		5000	250					NONE					FLOCK
11/06/1987	183	2		NONE		200	UNKNOWN								NONE					
11/07/1987	184	2		NONE		200	UNKNOWN								NONE					
11/08/1987	177	2	22:15:00	NONE		200	LANDING		275	128					NONE					ONE
11/08/1987	1083	1	8:10:00	NONE		200	TAKEOFF		0						NONE					
11/09/1987	1084	2		NONE		200	UNKNOWN								NONE					
11/10/1987	185	2		NONE		200	UNKNOWN								NONE					
11/10/1987	198	1	14:45:00	NONE		300	TAKEOFF		0	90					NONE					YES
11/11/1987	452	2		NONE		200	LANDING		0						NONE					
11/11/1987	341	1		NONE		200	UNKNOWN								NONE					
11/12/1987	175	1		NONE		200	UNKNOWN								NONE					
11/14/1987	199	2	13:50:00	MULT	BIRDS	200	TAKEOFF		0	75					NONE					
11/14/1987	436	2	12:40:00	NONE		300	TAKEOFF		0	150					NONE					
11/14/1987	436	2	9:52:00	NONE		200	CLIMB								NONE					
11/15/1987	200	1		NONE		300	UNKNOWN								NONE					
11/15/1987	274	2		NONE		200	UNKNOWN								NONE					
11/16/1987	437	1		NONE		300	CRUISE								NONE					
11/18/1987	391	1	14:45:00	NONE		200	UNKNOWN								NONE					
11/22/1987	1085	1	19:25:00	NONE		200	UNKNOWN		0	100					NONE					
11/23/1987	201	1	17:00:00	NONE		200	TAKEOFF								NONE					
11/23/1987	215	1		NONE		300	TAKEOFF								NONE					
11/23/1987	275	1		NONE		200	UNKNOWN								NONE					
11/23/1987	421	1		NONE		200	TAKEOFF								NONE					
11/23/1987	421	2	7:55:00	MULT	ENG	300	TAKEOFF		1000	160					NONE					
11/24/1987	392	2		NONE		200	TAKEOFF		0	135					NONE					
11/25/1987	202	2	21:50:00	NONE		200	CLIMB								NONE					
11/26/1987	393	2		NONE		200	TAKEOFF		0	135					NONE					
11/26/1987	453	2		NONE		200	TAKEOFF								NONE					
11/26/1987	453	2		NONE		200	TAKEOFF								NONE					
11/26/1987	453	2		NONE		200	TAKEOFF								NONE					
12/01/1987	1087	2	19:32:00	MULT	ENG-BIRDS	200	TAKEOFF		0	120					NONE					
12/02/1987	179	2	20:00:00	MULT	ENG-BIRDS	200	TAKEOFF		0	120					NONE					
12/03/1987	343	2		NONE		200	TAKEOFF		0	90					NONE					
12/04/1987	344	2		NONE		200	UNKNOWN								NONE					
12/04/1987	216	1		NONE		200	TAKEOFF		0	123					NONE					
12/06/1987	217	2	9:13:00	NONE		200	TAKEOFF		0						NONE					
12/06/1987	276	2		MULT	BIRDS	200	TAKEOFF								NONE					
12/08/1987	277	2		NONE		200	TAKEOFF		0						NONE					

SOURCE: ENGINE MANUFACTURER

DATE	EVT#	ENG_POS	BIRD_NAM	BIRD_SPE	#_BIRDS	WT_OZ	1	CTY_PRS	AIRPORT	LOCALE	US_INCID	ENGINE	DASH
10/10/1987	448							BHM		BIRMINGHAM, ALA	YES	JT8D	15
10/11/1987	384							FCO		ROME-DA VINCI, ITALY	NO	JT8D	17
10/11/1987	1079	2			1			AMD-BLR		AHMEDABAD, INDIA	NO	JT8D	17A
10/11/1987	1080	2	SPARROW*		1			-AMD		INDIA	NO	JT8D	17
10/13/1987	1081	2						BDQ		VADODARA, INDIA	NO	CFM56	3
10/14/1987	191	2						-BEG		BELGRADE, YUGOSLAVIA	NO	JT8D	15
10/14/1987	214	1						-YUL		MONTREAL, QUE., CANADA	NO	JT8D	15
10/15/1987	385	2	COMMON GULL		1		14.	BRS-FAO	FAO	FARO, PORTUGAL	NO	CFM56	3
10/16/1987	192	1						-NCL		NEWCASTLE, ENGLAND	NO	JT8D	15
10/17/1987	386										NO	CFM56	3
10/19/1987	193	1									NO	JT8D	9A
10/20/1987	387	1	SPARROW*		1			SFO-SBA	SFO	SAN FRANCISCO/OAKLAND, CA	YES	JT8D	3
10/21/1987	388	2						-PEK		BEIJING, CHINA	YES	CFM56	3
10/23/1987	194	2									NO	JT8D	3
10/24/1987	168	2									NO	JT8D	3
10/24/1987	168	2									NO	JT8D	3
10/24/1987	195	1									NO	JT8D	3
10/25/1987	339	2						-MIA	MIA	MIAMI, FL	YES	CFM56	3
10/25/1987	339	2						AUS	AUS	AUSTIN, TEX	YES	JT8D	3
10/26/1987	176	2									NO	JT8D	3
10/28/1987	182	2									NO	JT8D	3
10/28/1987	182	2									NO	JT8D	3
10/28/1987	435							DEU		GERMANY	NO	JT8D	17
10/29/1987	389	2	VULTURE*		1						NO	CFM56	3
10/29/1987	1082	2									NO	JT8D	15
10/30/1987	273	1						MAA-BLR	MAA	MADRAS, INDIA	NO	JT8D	9A
10/31/1987	174	1	GULL*		1			CGR		CAMPO GRANDE, BRAZIL	NO	JT8D	7
11/02/1987	196	1	BLACK HEADED GULL		14N36		9.7	MFR-SFO	MFR	MEDFORD, OR	YES	JT8D	3
11/02/1987	196	2	BLACK HEADED GULL		14N36		9.7	-MAN	MAN	MANCHESTER, ENGLAND	NO	CFM56	3
11/03/1987	340	2						-MAN	MAN	MANCHESTER, ENGLAND	NO	CFM56	3
11/04/1987	422	1						IVC		INVERCARGILL, NEW ZEALAND	NO	JT8D	15
11/05/1987	390	2	GULL*		2			LAX	LAX	LOS ANGELES, CA	YES	JT8D	15
11/05/1987	728	1						AMS-FRA	AMS	AMSTERDAM, NETHERLANDS	NO	JT8D	15
11/06/1987	183	2						FRA-MUC	FRA	FRANKFURT, GERMANY	NO	JT8D	15
11/07/1987	184	2									NO	JT8D	15
11/08/1987	177	2	SNOW GOOSE		2J26		88.	YYZ-YVR	YVR	VANCOUVER, B.C., CANADA	NO	JT8D	17A
11/08/1987	177	2	KITE*					IXE		INDIA	NO	JT8D	17
11/09/1987	1083	1						AMD-BLR		INDIA	NO	JT8D	17
11/10/1987	1084	2									NO	JT8D	17
11/10/1987	185	2	GREAT EGRET		1152		38.4	IAH-	IAH	HOUSTON, TEX	YES	CFM56	3
11/10/1987	198	1						SFO		SAN FRANCISCO/OAKLAND, CA	YES	JT8D	17A
11/10/1987	452	2						-WLG		WELLINGTON, NEW ZEALAND	NO	JT8D	3
11/11/1987	341	1	PIGEON*		2			BHX-PMI	BHX	BIRMINGHAM, ENGLAND	NO	CFM56	3
11/12/1987	175	1						MUC		MUNICH, GERMANY	NO	CFM56	3
11/14/1987	199	2						DUS-	DUS	BRUSSELS, BELGIUM	NO	JT8D	17A
11/14/1987	436	2									NO	CFM56	3
11/14/1987	729	2									NO	JT8D	15
11/15/1987	200	1									NO	JT8D	15
11/15/1987	274	2									NO	CFM56	3
11/16/1987	437	2									NO	JT8D	15
11/18/1987	391	1						-HAM	HAM	HAMBURG, GERMANY	NO	JT8D	15
11/22/1987	1085	1						DAY-	DAY	BOMBAY, INDIA	NO	JT8D	9A
11/23/1987	201	1						YOW		DAYTON, OH	NO	CFM56	3
11/23/1987	215	1						SLZ-BEL	SLZ	OTTAWA, ONT, CANADA	YES	CFM56	3
11/23/1987	275	1						DAY	DAY	DAYTON, OH	NO	JT8D	3
11/23/1987	421	2						DUS-STR	DUS	DUESSELDORF, GERMANY	YES	CFM56	3
11/24/1987	392	2	GULL*		3K28		27.5	SFO-RNO	SFO	SAN FRANCISCO/OAKLAND, CA	YES	JT8D	15
11/25/1987	202	2	BLACK KITE								NO	CFM56	3
11/25/1987	393	2									NO	JT8D	17
11/26/1987	342	2									NO	JT8D	15
11/26/1987	453	2	DOVE*								NO	JT8D	9A
11/26/1987	453	2	DOVE*								NO	JT8D	9A
12/01/1987	1087	2	GOLDEN PLOVER		5N25		6.	BOM-AMD	BOM	BOMBAY, INDIA	YES	JT8D	9A
12/02/1987	179	2						KOA-HNL	KOA	KONA, HAWAII	YES	JT8D	9A
12/02/1987	343	2						YQB	YQB	QUEBEC, QUE, CANADA	NO	JT8D	9A
12/03/1987	216	2						ISG-OKA	ISG	ISHIGAKI, JAPAN	NO	JT8D	17A
12/04/1987	217	2						ACA-YMG	ACA	ACAPULCO, MEXICO	NO	JT8D	17A
12/06/1987	276	2									NO	JT8D	7
12/06/1987	276	2									NO	JT8D	7
12/08/1987	277	2						AJU	AJU	ARACAJU, BRAZIL	NO	JT8D	7

SOURCE: ENGINE MANUFACTURER

DATE	EVT#	ENG POS	DMG CODE	SEVERITY	POM LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
10/10/1987	448		A,B	3					FOUND DURING GROUND INSPECTION
10/11/1987	384		A,B	3					3 F BLDs MINOR LE DAMAGE
10/11/1987	1079	2	A,B	3					1 F BLD MINOR LE DAMAGE
10/13/1987	1081	2	A,B	3	NONE				TIP CORNER LE BENT ON 5 FAN BLADES
10/14/1987	191	2	A,B	3					
10/14/1987	214	1	A,C	3					
10/15/1987	385	2	A,C	3					NIGHT EVENT
10/16/1987	192	1	A,H	3					
10/17/1987	386	1	A,C	3					
10/19/1987	193	1	A,C	3					
10/20/1987	387	1	A,B,H	3					FOUND DURING GROUND INSPECTION
10/21/1987	388	1	A,C	3					1 FAN BLADE BENT
10/23/1987	194	2	A,B,H	3					
10/24/1987	168	2	A,C	3					
10/24/1987	195	1	A,C	3					
10/25/1987	339	2	A,C	3	COMPRESSOR				
10/26/1987	176	2	A,C	3					
10/28/1987	182	2	A,C	3					2, 1st STAGE F BLADES WERE FRAC, 2nd DAM
10/28/1987	187	2	A,I	1					NIGHT EVENT
10/28/1987	435	1	A,H	9					
10/29/1987	389	2	A,D,G,K	9					
10/29/1987	1082	2	A,H	9					SMALL BIRD
10/30/1987	273	1	A,H	9	COMPRESSOR				HPC+LPC DAMAGE, 1 COMP BLADE TRVS FRAC
10/31/1987	174	1	A,H	1	NONE				
11/02/1987	196	1	A,H	3					
11/02/1987	196	2	A,H	9					
11/03/1987	340	2	A,H	3					
11/04/1987	422	1	A,H	9					
11/05/1987	390	2	A,H	9					
11/05/1987	728	1	A,H	3					
11/06/1987	183	2	A,C	3					
11/07/1987	184	2	A,C	3					
11/08/1987	177	2	A,D,H,M	3					
11/08/1987	1083	1	A,B,C	2					FOUND ON GRD INSPIC
11/09/1987	1084	2	A,D,G	9					TIP PCE BRK (3.5X2.5IN), ACCU LINER TORN
11/10/1987	185	2	A,D	3					
11/10/1987	198	1	A,H	3					
11/10/1987	452	2	A,H	9					
11/11/1987	341	1	A,H	9					
11/12/1987	175	1	A,H	3	COMPRESSOR		IDLE		SURGES CONTINUES AT IDLE HIGH EGT
11/14/1987	199	2	A,E,K	2	NONE				ODOR IN CABIN,EVIDENCE OF DEBRIS IN CORE
11/14/1987	436	2	A,H	4					IMPACT DAMAGE IN LOW + HIGH COMPRESSOR
11/14/1987	729	2	A,H	1					
11/15/1987	200	1	A,H	3					FOUND DURING GROUND INSPECTION
11/15/1987	200	1	A,H	3					NIGHT EVENT
11/16/1987	274	2	A	9					
11/16/1987	437	2	A	9					
11/18/1987	391	1	A,B	9					
11/22/1987	1085	1	A,C	3					
11/23/1987	201	1	A,C	3					
11/23/1987	215	1	A,D	3					
11/23/1987	275	2	A,D	9					CABIN ODOR
11/23/1987	275	2	A,D	9					REPLACED FOUR PAIRS OF FAN BLADES
11/23/1987	421	1	A	2					
11/24/1987	392	2	A	9					
11/25/1987	202	2	A	9					3 STAGE 1 BOOSTER VANES SHEARED OFF
11/25/1987	393	3	A,C	9					
11/26/1987	342	2	A,C	3					
11/26/1987	453	1	A,G,K	3					PM EVENT
11/26/1987	453	2	A,C	9					PM EVENT
12/01/1987	1087	2	A,C	9					BLD PIECES THRU CORE OIL PRESS DROPPING
12/02/1987	179	2	A,C	3					FOUND ON GROUND INSPIC DUE TO ENG ODOR
12/03/1987	343	2	A,C	3					
12/03/1987	216	1	A,D	3					
12/04/1987	544	2	A,D	3					
12/06/1987	217	2	A,D	3	COMPRESSOR				EPR SYMPTOM, CABIN ODOR, SMALL BIRDS
12/06/1987	276	2	A,C	3					
12/08/1987	277	2	A,C	9					

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	ETIME	SIGN EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL RULES	LT CONDS	WEATHER	CREW AC	CREW AL	BIRD SEE
12/11/1987	180	1	7:20:00	MULT BIRDS	200	LANDING								FLOCK
12/12/1987	394	2		NONE	200	UNKNOWN								FLOCK
12/13/1987	731	2		NONE	200	UNKNOWN								FLOCK
12/15/1987	203	1		NONE	200	LANDING								FLOCK
12/15/1987	732	1	15:00:00	MULT BIRDS	200	TAKEOFF	210					NONE	ATB	NO
12/17/1987	181	1		NONE	200	LANDING	50	110	VFR	DAY	PARTLY CLOUD			YES
12/23/1987	219	2		NONE	200	UNKNOWN	0						ATO	
12/24/1987	1086	2		NONE	200	TAKEOFF								
12/29/1987	186	2		NONE	200	UNKNOWN								
01/03/1988	753	2		NONE	200	UNKNOWN								
01/03/1988	1088	1	8:49:00	NONE	200	TAKEOFF	0	100			CLEAR		NO	SEVERAL
01/04/1988	535	1		NONE	200	TAKEOFF								
01/05/1988	1089	2		NONE	200	TAKEOFF	0	60					ATO	NO
01/07/1988	279	2	23:15:00	NONE	200	TAKEOFF							ATO	
01/07/1988	395	2		NONE	200	UNKNOWN								
01/11/1988	283	2		NONE	300	CLIMB								
01/14/1988	734	2		NONE	200	UNKNOWN								
01/15/1988	220	1		NONE	200	UNKNOWN								
01/17/1988	1090	2		NONE	200	UNKNOWN								
01/19/1988	221	1	10:58:00	NONE	200	TAKEOFF	0	100			CLEAR		NO	ONE
01/19/1988	1091	2		NONE	200	UNKNOWN								
01/19/1988	1091	2		NONE	200	UNKNOWN								
01/20/1988	1092	2	18:40:00	NONE	200	TAKEOFF	0	140			CLEAR		NO	ONE
01/21/1988	735	1	18:50:00	NONE	200	LANDING	200	125					NO	ONE
01/22/1988	736	2		NONE	200	TAKEOFF	0	140					ATO	
01/25/1988	222	2		NONE	200	UNKNOWN			VFR					
01/25/1988	284	2		NONE	200	LANDING								
01/25/1988	284	2		NONE	200	UNKNOWN								
01/25/1988	285	1		NONE	300	UNKNOWN								
01/28/1988	223	1	12:05:00	NONE	200	TAKEOFF	0	+V1						YES
01/30/1988	286	2		NONE	300	UNKNOWN			VFR					
02/01/1988	396	2		NONE	200	UNKNOWN								
02/01/1988	737	1		NONE	200	LANDING								
02/05/1988	737	1		NONE	200	UNKNOWN								
02/06/1988	287	1	16:35:00	MULT BIRDS	200	CLIMB	500	160	VFR	DUSK	CLEAR			FLOCK
02/06/1988	738	1		NONE	200	UNKNOWN								
02/06/1988	739	1		NONE	200	UNKNOWN	0							
02/07/1988	289	2		NONE	300	LANDING								
02/08/1988	290	1	8:30:00	NONE	300	CRUISE								
02/08/1988	740	2		NONE	200	UNKNOWN								
02/09/1988	288	1		NONE	200	UNKNOWN								
02/10/1988	291	2	22:00:00	INV POW LOSS	300	UNKNOWN	100	128			RAIN		NO	NO
02/11/1988	292	1		NONE	300	TAKEOFF								
02/11/1988	397	1		NONE	200	UNKNOWN								
02/15/1988	280	1	18:15:00	NONE	200	LANDING								
02/15/1988	398	2		NONE	200	TAKEOFF	250	145	VFR					YES
02/15/1988	1093	2		NONE	200	UNKNOWN								
02/16/1988	1094	1	12:20:00	NONE	200	APPROACH	4000	210			CLOUDY		NO	SEVERAL
02/18/1988	399	1	12:30:00	NONE	200	TAKEOFF	0	146					NO	SEVERAL
02/18/1988	1095	2		NONE	200	UNKNOWN								
02/19/1988	281	2	6:55:00	NONE	200	LANDING	0	80			OVERCAST		NO	SEVERAL
02/19/1988	293	1		NONE	200	UNKNOWN								
02/20/1988	741	1	7:10:00	NONE	300	TAKEOFF	0	60			CLEAR		YES	ONE
02/21/1988	1096	1		NONE	200	TAXI	0	10					NO	ONE
02/24/1988	294	1	5:55:00	NONE	200	TAKEOFF	0	10			FOG		NO	ONE
02/24/1988	742	1	14:40:00	NONE	200	LANDING	0	125			CLOUDY		NO	ONE
02/26/1988	400	1		NONE	200	UNKNOWN								
02/27/1988	295	1		NONE	200	UNKNOWN								
02/27/1988	743	2		NONE	300	CRUISE								
02/28/1988	401	1		NONE	200	LANDING	200	140						
03/02/1988	1097	1	14:45:00	NONE	200	UNKNOWN								
03/07/1988	402	1		NONE	200	LANDING	0	65					NO	ONE
03/10/1988	744	1	17:30:00	NONE	200	LANDING	100	150			OVERCAST		NO	ONE
03/11/1988	282	2		NONE	200	TAKEOFF	0	100						
03/11/1988	296	2		NONE	200	TAKEOFF								
03/11/1988	297	2		NONE	300	LANDING								
03/18/1988	745	2		NONE	200	UNKNOWN								
03/20/1988	298	1	11:10:00	NONE	200	APPROACH	500	160					NO	ONE
03/21/1988	746	1	10:40:00	NONE	300	APPROACH	1150	120			CLOUDY		NO	ONE
03/22/1988	1098	2	19:37:00	NONE	200	LANDING	0	130			OVERCAST		NO	ONE

SOURCE: ENGINE MANUFACTURER		EVTH ENG POS		BIRD_SPE # BIRDS WT_OZ_1		CTY_PRS AIRPORT		LOCALE		US_INCID ENGINE DASH	
DATE				BIRD_SPE	# BIRDS	WT_OZ_1	CTY_PRS	AIRPORT	LOCALE	US_INCID	ENGINE DASH
12/11/1987	180	1		4L85	3	8.	TXL-MAJ	HANOVER, GERMANY		NO	JT8D
12/12/1987	394	2								NO	JT8D
12/13/1987	731	2								NO	CFM56
12/15/1987	203	1								NO	JT8D
12/15/1987	732	1								NO	JT8D
12/17/1987	181	1		5M1	2	6.		DUB DUB	DUBLIN, IRELAND	NO	JT8D
12/20/1987	278	1						ORV	PARIS-ORLY, FRANCE	NO	CFM56
12/23/1987	219	2							LASHAM, ENGLAND	NO	JT8D
12/24/1987	1086	2							CHALOTTE, NC	NO	JT8D
12/29/1987	186	2							CALGARY, ALTA., CANADA	YES	JT8D
01/03/1988	733	2							SRINAGAR, INDIA	NO	JT8D
01/03/1988	1088	1							LAGOS, NIGERIA	NO	JT8D
01/04/1988	535	1							TAIWAN	NO	JT8D
01/05/1988	1089	2							COMBATORE, INDIA	NO	JT8D
01/07/1988	279	2							MAR DEL PLATA, ARGENTINA	NO	JT8D
01/07/1988	395	2							COCHIN, INDIA	NO	JT8D
01/11/1988	283	2							DURBAN, S. AFRICA	NO	JT8D
01/14/1988	734	2							KINGSTON, JAMAICA	NO	JT8D
01/15/1988	220	1		5K39	1	18.5		MEL	MELBOURNE, AUSTRALIA	NO	CFM56
01/17/1988	1090	2							MAR DEL PLATA, ARGENTINA	NO	JT8D
01/19/1988	221	1							TRIVANDRUM, INDIA	NO	JT8D
01/19/1988	1091	2							BANGALORE, INDIA	NO	JT8D
01/20/1988	1092	2							CALGARY, ALTA., CANADA	NO	JT8D
01/21/1988	735	1							HYDERABAD, INDIA	NO	JT8D
01/22/1988	736	2							INDIA	NO	JT8D
01/25/1988	222	2							SALTA, ARGENTINA	NO	JT8D
01/25/1988	284	2							BUENOS AIRES, ARGENTINA	NO	JT8D
01/25/1988	285	1							CASABLANCA, MOROCCO	NO	JT8D
01/28/1988	223	1							AMSTERDAM, NETHERLANDS	NO	CFM56
01/30/1988	286	2		5N25	1	7.		GHB	GOVERNORS HARBOR, BAHAMAS	NO	CFM56
02/01/1988	396	2		2P103	1	2.		LH-LIH	LIHUE, KAUAI, HAWAII	YES	JT8D
02/05/1988	737	1						ONT	ONTARIO, CA	YES	CFM56
02/06/1988	287	1							GOTHENBURG, SWEDEN	NO	JT8D
02/06/1988	738	1							TAIWAN	NO	JT8D
02/07/1988	739	1							ALICANTE, SPAIN	NO	CFM56
02/07/1988	289	2							TAIWAN	NO	JT8D
02/08/1988	290	1							TAIWAN	NO	JT8D
02/09/1988	288	1							LAHORE, PAKISTAN	NO	JT8D
02/10/1988	291	2							CA	YES	CFM56
02/11/1988	292	1							TAIWAN	YES	CFM56
02/11/1988	397	1							PHOENIX, ARIZONA	YES	CFM56
02/15/1988	280	1							RIO DE JANEIRO, BRAZIL	NO	CFM56
02/15/1988	398	2							DUNEDIN, NEW ZEALAND	NO	JT8D
02/15/1988	1093	2							SARASOTA/BRADENTON, FL	YES	JT8D
02/16/1988	1094	1							ENGLAND	NO	JT8D
02/18/1988	399	2							BHOPAL, INDIA	NO	JT8D
02/18/1988	1095	2							RANCHI, INDIA	NO	JT8D
02/19/1988	281	2							HYDERABAD, INDIA	NO	JT8D
02/19/1988	293	1							SAN FRANCISCO/OAKLAND, CA	YES	JT8D
02/20/1988	741	1							DALLAS/FT. WORTH, TEX-LOVE	YES	CFM56
02/24/1988	1096	1							TUCUMAN, ARGENTINA	NO	JT8D
02/24/1988	294	1							DELHI, INDIA	NO	JT8D
02/26/1988	742	1							BRISBANE, AUSTRALIA	NO	CFM56
02/26/1988	400	1							CHRISTCHURCH, NEW ZEALAND	NO	JT8D
02/27/1988	295	1							GRANCANARIA, CANARY ISLANDS	NO	CFM56
02/28/1988	401	1							BUENOS AIRES, ARGENTINA	NO	JT8D
03/02/1988	1097	1							BUENOS AIRES, ARGENTINA	NO	JT8D
03/07/1988	402	1							VARANASI, INDIA	NO	JT8D
03/10/1988	744	2							NEW YORK, NY-NEWARK	YES	JT8D
03/11/1988	282	2							STUTTGART, GERMANY	NO	JT8D
03/13/1988	296	2							HILO, HAWAII	YES	JT8D
03/14/1988	297	2							NEW YORK-LA GUARDIA	YES	CFM56
03/18/1988	745	2							SALEM, NC	YES	CFM56
03/20/1988	298	1							CATAMARCA, ARGENTINA	NO	JT8D
03/21/1988	746	1							MOUNT ISA, AUSTRALIA	NO	CFM56
03/22/1988	1098	2							GENEVA, SWITZERLAND	NO	JT8D
									BANGALORE, INDIA	NO	JT8D

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	DMG_CODE	SEVERITY	POW_LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
12/11/1987	180	1	A,D,H	2	NONE			NO	
12/12/1987	394	2	A,C	3					ENGINE REMOVED
12/13/1987	731	2	A,G	2					
12/15/1987	203	1	A,G	2	NONE	NONE		NO	
12/17/1987	732	1	A,C	2	COMPRESSOR	HIGH		VIBES	
12/20/1987	181	1	A,C	2	COMPRESSOR				ENGINE REMOVED
12/23/1987	219	2	A,C	2					
12/24/1987	1086	2		2					
12/29/1987	186	2	A,C	3					
01/03/1988	733	2	A,D	2					
01/04/1988	1088	1	A,K	2					4 FAN BLADES BLENDED ON WING FAN CHANGED, COMP BLDS BENT DECREASE OF .05 IN EPR AND A DROP IN RPM
01/05/1988	535	1		2					
01/07/1988	1089	2		2					
01/07/1988	279	2	A,G	2					
01/11/1988	395	2		2	NONE				ENGINE REMOVED
01/14/1988	283	2	A,C	3					
01/15/1988	734	2	A,C	3					
01/17/1988	220	1	A,C	3					
01/17/1988	1090	2		2					
01/19/1988	221	1		2					
01/20/1988	1091	2		2					
01/21/1988	735	1		2	NONE				
01/22/1988	732	1		2					
01/22/1988	736	2		2					
01/25/1988	222	2	A,C	3	NONE				2 FAN BLADE SETS REPLACED FOUND DURING GROUND INSPECTION
01/25/1988	284	2	A,C,H	2	NONE	3.0			3 MATCHED PAIRS OF FAN BLADES REPLACED INGESTION CAUSED ENGINE "HUM" FOUND DURING GROUND INSPECTION
01/25/1988	285	1	A,C	3	NONE				
01/28/1988	223	1	A,C	3	NONE				
01/30/1988	286	2		2					
02/01/1988	396	2		2					
02/05/1988	737	1	A,D	2					4 FAN BLADES CHANGED
02/06/1988	287	1	A,C,H	2					3 MATCHED PAIRS OF FAN BLADES REPLACED
02/06/1988	738	1	A,D	2					7 BLADES BLENDED ON WING
02/06/1988	739	1	A,D	2					9 FAN BLADES CHANGED
02/07/1988	289	2	A,L	2	NONE	SOME			FLUCTUATING VIBRATION INDICATION
02/08/1988	290	1	A,D	2	NONE				4 FAN BLADES BLENDED ON WING
02/08/1988	740	2		2					
02/09/1988	288	1		2	NONE				
02/10/1988	291	2	A,I,M,P	2	YES	HIGH			INVOLUNTARY
02/11/1988	292	1		2	NONE				HEAVYDAMAGED ACOUSTIC PANELS,LOW OILPRES FOUND DURING GROUND INSPECTION
02/11/1988	297	1		2					
02/15/1988	280	1		2	COMPRESSOR				LARGE BIRD
02/15/1988	398	2	A,C	3					
02/15/1988	1093	2	A	4					
02/16/1988	194	1	A	4					
02/18/1988	399	1		4					3 F BLDS UNK DAMAGE COOR
02/18/1988	195	2	A,C,K	1					
02/19/1988	281	2		2					
02/19/1988	293	1		2	NONE				LPC+HPC DAMAGE, FOUND ON GROUND INSPC. COOR IN COCPIT
02/20/1988	741	1		2					
02/21/1988	1096	1		2	COMPRESSOR				
02/24/1988	294	1	A,H	2	NONE	SOME			
02/24/1988	742	1		2					
02/26/1988	400	1		2					
02/27/1988	295	1	A,B,E,H	3		5			AM EVENT
02/27/1988	743	2		3					
02/28/1988	401	2	A,H	3					
03/02/1988	1097	1		2					
03/07/1988	402	1		2					
03/10/1988	744	1		2					
03/11/1988	282	2	A,L	3	NONE				SMELL
03/13/1988	296	2		3	NONE				FOUND DURING GROUND INSPECTION
03/14/1988	297	2		3	NONE				
03/18/1988	745	2		2					
03/20/1988	298	1		2	NONE				
03/21/1988	746	1		2					8 F BLDS DAMAGED
03/22/1988	1098	2	A,G	2					

SOURCE: ENGINE MANUFACTURER

EDATE	EV#	ENG_POS	ETIME	SIGN_EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RJLES	LT_CONDS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
03/24/1988	299	2	18:40:00	NONE	300	CLIMB	300			OVERCAST	CLOUDY	ATB		
03/25/1988	403	1		NONE	200	LANDING		0	110		CLOUDY	NONE	NO	FLOCK
03/30/1988	1099	2	8:53:00	MULT BIRDS	200	TAKEOFF								
04/01/1988	404	1		NONE	200	TAKEOFF								
04/02/1988	366	2		NONE	200	TAKEOFF								
04/02/1988	405	1	3:10:00	NONE	200	TAKEOFF		90		VFR	NIGHT		NO	NO
04/03/1988	462	1		NONE	300	UNKNOWN						ATO		
04/03/1988	747	1		NONE	200	TAKEOFF	0					ATB		
04/04/1988	461	2	6:10:00	NONE	300	TAKEOFF	50	145		DAWN	CLEAR			
04/06/1988	406	2		NONE	200	UNKNOWN								
04/07/1988	748	1		NONE	200	LANDING								
04/08/1988	408	1		NONE	200	TAKEOFF								
04/09/1988	463	1	6:10:00	NONE	300	UNKNOWN						ATO		
04/09/1988	464	2		NONE	300	UNKNOWN						NONE		
04/10/1988	489	2		NONE	200	UNKNOWN								
04/12/1988	347	2		NONE	200	TAKEOFF								
04/12/1988	409	2		NONE	200	TAKEOFF	350	170		VFR	CLEAR		NO	NO
04/13/1988	411	2		NONE	200	UNKNOWN								
04/13/1988	465	1		NONE	200	TAKEOFF		+V1						
04/14/1988	410	2		NONE	300	TAKEOFF								
04/19/1988	466	1	4:40:00	NONE	200	UNKNOWN								
04/21/1988	490	1		NONE	300	TAKEOFF								
04/22/1988	749	2		NONE	200	UNKNOWN								
04/24/1988	348	2		NONE	200	LANDING	7000	180						
04/25/1988	412	1		NONE	200	CLIMB	0							
04/26/1988	349	2		NONE	200	TAXI								
04/26/1988	413	2		NONE	200	UNKNOWN								
04/27/1988	350	1		NONE	200	CLIMB	0	125				ATB		
04/27/1988	351	1		NONE	200	TAKEOFF								
04/27/1988	321	1		NONE	200	TAKEOFF								
04/27/1988	467	1		NONE	300	TAKEOFF								
04/28/1988	352	1		NONE	200	UNKNOWN								
04/29/1988	414	1		NONE	200	UNKNOWN								
04/29/1988	1100	1	22:38:00	MULT BIRDS	200	LANDING	30	126			CLEAR		NO	ONE
05/01/1988	730	1		NONE	200	TAKEOFF								
05/02/1988	354	2	19:22:00	MULT BIRDS	200	LANDING	0	90			CLOUDY		NO	SEVERAL
05/04/1988	415	2	20:00:00	TRYS FRAC	200	TAKEOFF	0	115				DIV	NO	
05/05/1988	468	2		NONE	200	UNKNOWN								
05/06/1988	469	2	14:30:00	NONE	300	CLIMB			VFR		CLEAR		NO	SEVERAL
05/11/1988	416	2		NONE	200	UNKNOWN								
05/11/1988	470	1	8:46:00	NONE	300	TAKEOFF	0	92			OVERCAST		NO	SEVERAL
05/11/1988	471	1	6:30:00	NONE	300	CLIMB								
05/15/1988	417	1		NONE	200	TAKEOFF								
05/17/1988	355	1		NONE	200	UNKNOWN								
05/19/1988	472	1		NONE	300	CLIMB								
05/20/1988	456			NONE	200	TAKEOFF								
05/20/1988	731	2		NONE	200	CLIMB								
05/21/1988	473	1	15:14:00	TRYS FRAC	200	LANDING	400	140			CLOUDY		NO	NO
05/22/1988	418	2		NONE	300	TAKEOFF	0	80					NO	ONE
05/23/1988	419	1		NONE	200	UNKNOWN	0	110					YES	ONE
05/23/1988	438	2		TRYS	200	CLIMB	0	70				ATB		
05/25/1988	474	1		TRYS	200	TAKEOFF	0	125				ATO		
05/27/1988	1101	1	9:45:00	MULT BIRDS	300	LANDING	0	120						FLOCK
06/02/1988	533	2	8:30:00	NONE	200	LANDING	0	130					NO	SEVERAL
06/04/1988	577	2	14:18:00	MULT BIRDS	300	LANDING	100	150					NO	SEVERAL
06/04/1988	752	2		NONE	200	APPROACH	5	128					NO	YES
06/06/1988	753	2		NONE	200	TAKEOFF	0					ATO		NO
06/07/1988	754	2	15:50:00	NONE	200	UNKNOWN	0	140					NO	NO
06/08/1988	439	1		NONE	200	TAKEOFF	0						NO	NO
06/08/1988	476	1	11:42:00	NONE	300	TAKEOFF								
06/08/1988	492	2		NONE	200	LANDING								
06/10/1988	492	2		NONE	200	UNKNOWN								
06/11/1988	576	2		NONE	300	TAKEOFF								
06/11/1988	1102	2	9:05:00	NONE	300	UNKNOWN	500	120					NO	ONE
06/12/1988	477	2		NONE	200	APPROACH								
06/13/1988	478	2	6:12:00	MULT BIRDS	300	TAKEOFF	0	115						

SOURCE: ENGINE MANUFACTURER

DATE	EVT#	ENG_POS	BIRD_NAM	BIRD_SPE	#_BIRDS	WT_OZ	1	CTY_PRS	AIRPORT	LOCALE	US_INCID	ENGINE	DASH
03/24/1988	299	2							MSY	NEW ORLEANS, LOUISIANA	YES	CFM56	3
03/25/1988	403	1						-CHC	CHRISTCHURCH, NEW ZEALAND	NO	JT8D		
03/30/1988	1099	2		*				IXM-MAA MAA ITO-HNL ITO YYJ-YYC YYJ	HILO, HAWAII	YES	JT8D	17	
04/01/1988	404	1						5. LIH-HNL LIH -YVR	CALGARY, ALTA., CANADA LIHUE, KAUAI, HAWAII VANCOUVER, CANADA	YES	JT8D	9A	
04/02/1988	405	1							TUCUMAN, ARGENTINA	NO	CFM56	3	
04/03/1988	747	1						22. -KIN	SACRAMENTO, CA	YES	JT8D	9	
04/04/1988	461	2			1124			DEN-OKC OKC INU-NOU INU	KINGSTON, JAMAICA OKLAHOMA CITY, OKLA	YES	CFM56	3	
04/06/1988	406	2						32. ATH-BEG -PEK	ATHENS, GREECE	NO	CFM56	3	
04/07/1988	481	1						14. OGG-HNL OGG	BEIJING, CHINA	NO	CFM56	3	
04/08/1988	408	1						FMA HAM	KAGOSHIMA, JAPAN	NO	JT8D	9A	
04/09/1988	463	2						REC SHI	CHRISTCHURCH, NEW ZEALAND	YES	JT8D	9A	
04/10/1988	489	2						MDO	FORMOSA, ARGENTINA	NO	JT8D	9A	
04/12/1988	347	2						HOU	HAMBURG, GERMANY	NO	CFM56	3	
04/13/1988	411	2						IAD-MSY	WELLINGTON, NEW ZEALAND	NO	JT8D	9A	
04/13/1988	465	1						LIT-OKC LIT	WASHINGTON, DC - LA	YES	JT8D	17A	
04/14/1988	410	2						DAL	LITTLE ROCK, ARK	YES	JT8D	17A	
04/19/1988	466	1						TUL	DALLAS/FT WORTH, TEX-LOVE	YES	JT8D	9A	
04/21/1988	490	1						DEN-BUR DEN	TULSA, OKLA	YES	JT8D	9A	
04/22/1988	749	2						ORD-SAB SAB	DENVER, COL	YES	CFM56	3	
04/24/1988	348	2						CGR-CRU CGR	HOUSTON, TEX	YES	CFM56	3	
04/25/1988	472	1						OKA-MHY MHY	SABA, NETH ANTILLES	NO	JT8D	9A	
04/28/1988	352	1						32. LDE-CRL LDE	DELHI, INDIA	NO	JT8D	15	
04/29/1988	414	1						14. DAL-HOU DAL	CAMPO, GRANDE, BRAZIL	NO	JT8D	15	
04/29/1988	1100	2						1. -HOU	MIYAKO JIMA, JAPAN	NO	JT8D	17	
05/01/1988	353	2						SAT-DAL SAT	LOURDES/TARBES, FRANCE	NO	JT8D	15	
05/01/1988	750	1						1. EWR-IAD	WELLINGTON, NEW ZEALAND	NO	JT8D	15	
05/02/1988	334	2						MUC-CDG CDG	DALLAS/FT WORTH, TEX-LOVE	YES	CFM56	3	
05/04/1988	415	2						DAL-HOU HOU	HOUSTON, TEX	YES	CFM56	3	
05/05/1988	468	2						TUN-BRU TUN	AMSTERDAM, NETHERLANDS	YES	JT8D	15A	
05/06/1988	469	2						EMA-OTV OTV	SAN ANTONIO, TEX	NO	CFM56	3	
05/11/1988	416	2						7. CVG-ORD ORD	AUSTIN, TEX	YES	CFM56	3	
05/11/1988	470	1						DUS-NUE DUS	NY-WASHINGTON, DC	YES	JT8D	7B	
05/11/1988	471	1						YWG-YOW YWG	SAO PAULO, BRAZIL	NO	CFM56	3	
05/17/1988	355	1						4. YOR-YUG YOR	MIDWAY, ILL	NO	JT8D	17	
05/19/1988	472	1						1. NIGHTJAR*	PARIS-DE GAULLE, FRANCE	YES	JT8D	15	
05/20/1988	456	2						COMMON ROCK DOVE	HOUSTON, TEX	YES	CFM56	3	
05/20/1988	751	2						COMMON TURTLE DOVE	TUNIS, TUNISIA	NO	JT8D	15	
05/21/1988	473	1						PIGEON*	DENVER, COL	YES	JT8D	17	
05/22/1988	418	2						PIGEON*	LUXOR, EGYPT	NO	JT8D	17	
05/23/1988	419	1						PIGEON*	TREVIŠO, ITALY	NO	CFM56	3	
05/23/1988	438	2						PIGEON*	HYDERABAD, INDIA	NO	JT8D	17A	
05/25/1988	474	1						PIGEON*	FRANKFURT, GERMANY	NO	CFM56	3	
05/27/1988	1101	1						PIGEON*	CHICAGO, ILL-OHARE	YES	CFM56	3	
06/01/1988	475	2						PIGEON*	ROCHESTER, NY	YES	JT8D	15A	
06/02/1988	533	2						PIGEON*	CORDOBA, ARGENTINA	NO	JT8D	9	
06/04/1988	577	2						PIGEON*	DUESSELDORF, GERMANY	NO	JT8D	17	
06/06/1988	752	2						PIGEON*	WINNIPEG, CANADA	NO	JT8D	17	
06/06/1988	753	2						PIGEON*	FRESNO, CA	YES	CFM56	3	
06/07/1988	754	2						PIGEON*	REGINA, SASK., CANADA	YES	JT8D	9A	
06/08/1988	439	1						PIGEON*	CA	NO	JT8D	9A	
06/08/1988	476	1						PIGEON*	HYDERABAD, INDIA	YES	CFM56	3	
06/10/1988	420	1						PIGEON*	BRISTOL, ENGLAND	NO	CFM56	3	
06/11/1988	576	2						PIGEON*		NO	CFM56	3	
06/11/1988	1102	2						PIGEON*		NO	CFM56	3	
06/12/1988	477	2						PIGEON*		NO	CFM56	3	
06/13/1988	478	2						PIGEON*		NO	CFM56	3	



SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	DWG CODE	SEVERITY	POW LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
							CUTOFF	YES	
03/24/1988	299	2	A,D	2					IFSD+POW LOSS NOT DUE TO BIRD INGESTION
03/25/1988	403	1		9				NO	
03/30/1988	1099	2	A,C	9				NO	
04/01/1988	404	1		3	COMPRESSOR				
04/02/1988	346	2		0					
04/02/1988	405	1	A,D	0				NO	ODOR 6 SETS OF FAN BLADES CHANGED
04/03/1988	462	1		2				NO	
04/03/1988	747	1		9			RETARD	NO	TIP PIECE BROKEN (5X2.5IN), COAL PUMCS
04/04/1988	461	2	A,D,G,K	1	NONE			NO	
04/04/1988	406	2	A,G	6		HIGH			
04/04/1988	407	2		0					
04/07/1988	748	1		0					
04/08/1988	408	1	A,D,G,K	1				NO	HEAVY DAMAGE, HPC DAMAGE FOUND DURING GROUND INSPECTION
04/09/1988	463	1	A,H	3	NONE			NO	FOUND DURING GROUND INSPECTION
04/09/1988	464	2		9	NONE			NO	
04/10/1988	489	2		9					
04/12/1988	347	2		0					ODOR, MEDIUM BIRD
04/12/1988	409	2		0					
04/13/1988	411	2	A	4	NONE			NO	ODOR AND NOISE, ENG CHANGED
04/13/1988	465	1		9					
04/14/1988	410	2		9				NO	
04/19/1988	466	1	A,D	2	NONE			NO	AM EVENT, REPLACED 2 FAN BLADES
04/21/1988	490	1		0					
04/22/1988	749	2		0					ODOR
04/24/1988	348	2		9					
04/25/1988	412	1		9					ODOR
04/26/1988	349	1	A,C	3					ODOR
04/26/1988	413	2		9					ODOR
04/27/1988	350	1		0					ODOR
04/27/1988	351	1		9					ODOR
04/27/1988	467	1		9	NONE			NO	
04/28/1988	352	1		9					3 F BLDG UNKNOWN DAMAGE
04/29/1988	414	1	A	6				NO	
04/29/1988	1100	1		0					
05/01/1988	353	2		9					EGT INCREASED TO FULL SCALE
05/01/1988	750	1		9					
05/02/1988	354	2	A,I	1	EPR DEC	HIGH		YES	
05/04/1988	415	2		0				NO	
05/05/1988	468	2	A,B,H	3	NONE			NO	
05/06/1988	469	2		0	NONE			NO	FOUND DURING GROUND INSPECTION
05/11/1988	416	2	A,C	3				NO	
05/11/1988	470	1		9	NONE	3.5		NO	
05/11/1988	471	1	A,B,H	3	NONE			NO	
05/15/1988	417	1		0					ODOR
05/17/1988	355	1	A,G	2				NO	PH EVENT, CHANGED 1 FAN BLADE
05/19/1988	472	1	A,H	3	NONE	2.9		NO	AM EVENT
05/20/1988	456	2		9	NONE			NO	
05/21/1988	751	2		9	NONE			NO	
05/22/1988	473	1		9	NONE			NO	
05/23/1988	418	2	A,C,G,I	1		HIGH			TRYS FRAC 1 INCH FROM TIP
05/23/1988	419	1		0				NO	ODOR SMALL BIRD
05/23/1988	438	2	A,C,G,I	1				NO	HPT METALLIZATION
05/23/1988	474	1	A,D,H	2	NONE	2.5		NO	FAN ABRADABLE SLIGHTLY DAMAGED
05/27/1988	1101	1		9	NONE			NO	
06/01/1988	475	2		9	NONE			NO	
06/02/1988	533	2		9	NONE			NO	
06/04/1988	577	2	A,H	3				VOLUNTARY	AM EVENT, MEDIUM BIRD, 1 BLADL SHINGLED
06/05/1988	752	2	A,G	4				NO	
06/05/1988	753	2		2				NO	
06/07/1988	754	2		9	NONE			NO	ODOR
06/08/1988	439	1		9	NONE			NO	
06/08/1988	476	1		9	NONE			NO	
06/08/1988	492	2		9	NONE			NO	
06/10/1988	420	1	A,C	3		HIGH		NO	ODOR, HWM, 3 FAN BLADES DAMAGED
06/11/1988	576	2	A	4	NONE			NO	ENGINE REMOVED FOR HIGH EGT
06/11/1988	1102	2		9	NONE			NO	
06/12/1988	477	2		9	NONE			NO	FOUND DURING GROUND INSPECTION
06/13/1988	478	2	A,B	3	NONE			NO	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	ETIME	SIGM_EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LT_CONDS	WEATHER	CREW_AC	CREW_AL	BI'D_SEE
06/13/1988	755	1		NONE	200	UNKNOWN								
06/14/1988	440	2		NONE	200	TAKEOFF						NONE		
06/14/1988	479	1		NONE	300	UNKNOWN								
06/14/1988	480	2		NONE	300	UNKNOWN								
06/14/1988	756	1	18:15:00	NONE	300	LANDING		0 70						
06/15/1988	481	1		NONE	300	TAKEOFF		+V1						
06/15/1988	757	1		NONE	200	OTHER		0 10						
06/16/1988	441	1		NONE	200	UNKNOWN								
06/16/1988	584	2		NONE	200	TAKEOFF						ATB		
06/18/1988	442	2		MULT	200	TAKEOFF						ATB		
06/18/1988	443	2		NONE	200	TAKEOFF		0 140						
06/18/1988	758	1		NONE	200	UNKNOWN								
06/19/1988	759	2		NONE	200	UNKNOWN								
06/20/1988	444	1		NONE	200	TAKEOFF		0				ATO		
06/20/1988	482	1		NONE	300	LANDING						NONE		
06/20/1988	483	2		MULT	300	TAKEOFF		+V1				NONE		
06/21/1988	484	1		NONE	200	UNKNOWN						NONE		
06/22/1988	484	2		NONE	300	UNKNOWN						NONE		
06/22/1988	760	2		NONE	200	UNKNOWN						ATO		
06/24/1988	446	2		NONE	200	TAKEOFF		0 110	VFR	EVENING				YES
06/25/1988	587	1		NONE	300	LANDING		0 70			CLEAR			ONE
06/25/1988	1103	1	8:30:00	NONE	200	LANDING		0 70				NONE		
06/26/1988	485	1	11:00:00	NONE	300	TAKEOFF		+V1				ATB		
06/26/1988	486	1		NONE	300	UNKNOWN								
06/27/1988	493	2		NONE	200	UNKNOWN								
06/27/1988	761	1		NONE	200	UNKNOWN								
06/28/1988	487	1	11:12:00	NONE	300	APPROACH		4000 210			CLOUDY			
06/28/1988	488	2	11:00:00	NONE	300	UNKNOWN								
06/28/1988	494	2		NONE	200	UNKNOWN								
06/28/1988	762	2	7:13:00	NONE	200	TAKEOFF		0 110	VFR		CLEAR			ONE
06/29/1988	1104	1		NONE	200	UNKNOWN								
06/30/1988	1105	1		MULT	200	UNKNOWN								
06/30/1988	1105	2		MULT	200	UNKNOWN								
06/30/1988	1106	2		NONE	200	UNKNOWN								
07/01/1988	497	2	20:00:00	NONE	200	LANDING		0 140			OVERCAST			YES
07/01/1988	536	1	8:44:00	MULT	300	TAKEOFF		20 135			CLOUDY			ONE
07/01/1988	1107	2	7:30:00	NONE	200	CLIMB								SEVERAL
07/01/1988	1108	2		NONE	200	UNKNOWN								
07/02/1988	763	1		NONE	200	UNKNOWN								
07/02/1988	1109	1	9:10:00	NONE	200	TAKEOFF		0 100			CLOUDY	ATO		FLOCK
07/03/1988	578	1		NONE	300	LANDING		30 140	VFR	DAY	OVERCAST			YES
07/05/1988	764	2		NONE	200	UNKNOWN								
07/07/1988	447	2		NONE	200	LANDING								
07/07/1988	1110	2	15:50:00	NONE	200	LANDING		0 60			CLOUDY			SEVERAL
07/08/1988	765	1	18:45:00	NONE	200	TAKEOFF		50 160			CLOUDY			SEVERAL
07/09/1988	495	2		NONE	200	UNKNOWN								
07/12/1988	496	1		NONE	200	UNKNOWN								
07/12/1988	1111	1		NONE	200	UNKNOWN								
07/14/1988	766	2		NONE	200	UNKNOWN								
07/15/1988	498	1		NONE	200	TAKEOFF								
07/15/1988	499	2		NONE	200	TAKEOFF								
07/15/1988	537	1		NONE	200	UNKNOWN								
07/15/1988	767	1	19:48:00	NONE	300	TAKEOFF		+V1			CLEAR			NO
07/15/1988	1112	1		NONE	200	LANDING		0 120			OVERCAST			FLOCK
07/16/1988	538	2		NONE	200	TAKEOFF		0 80			CLOUDY	ATO		ONE
07/16/1988	768	2		NONE	300	LANDING		0						NO
07/18/1988	500	2		NONE	200	UNKNOWN								
07/18/1988	501	2	15:45:00	NONE	200	LANDING		50 120	VFR	DAY	CLEAR			YES
07/18/1988	502	1	19:40:00	NONE	200	TAKEOFF		0						
07/19/1988	503	2		NONE	200	UNKNOWN								
07/19/1988	502	2		NONE	200	UNKNOWN								
07/19/1988	1320	2		NONE	200	TAKEOFF						ATB		NO
07/20/1988	539	2		NONE	300	CLIMB		100			BRIGHT			SEVERAL
07/20/1988	540	1	11:25:00	NONE	300	LANDING								
07/21/1988	560	1		NONE	200	UNKNOWN								
07/21/1988	568	1		NONE	300	UNKNOWN								
07/21/1988	568	1		NONE	200	UNKNOWN								
07/23/1988	505	1		NONE	300	APPROACH								
07/23/1988	541	1		NONE	200	CLIMB								NO
07/23/1988	542	1		NONE	300	UNKNOWN								NO

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	BIRD	MAN	BIRD SPE	# BIRDS	WT OZ	1	CTY PRS	AIRPORT	LOCALE	US	INCID	ENGINE	DASH	
06/13/1988	755	1								YUL-YOW	YUL	TAIWAN	NO		JT8D	7A	
06/14/1988	440	2								-FRA		MONTREAL, CANADA	NO		JT8D	17	
06/14/1988	479	1										FRANKFURT, GERMANY	NO		CFM56	3	
06/14/1988	480	2										BRISBANE, AUSTRALIA	NO		CFM56	3	
06/14/1988	756	1							1	OKA-MHY	BNE	MIYAKO JIMA, JAPAN	NO		JT8D	17	
06/15/1988	481	1							1	EMR-ORD	ELR	NEW YORK NY-NEMARK	YES		CFM56	3	
06/15/1988	757	1										RESISTENCIA, ARGENTINA	NO		CFM56	3	
06/16/1988	441	1								-GIG	PTY	RIO DE JANEIRO, BRAZIL	NO		JT8D	9	
06/16/1988	584	2										PANAMA CITY, PANAMA	NO		JT8D	9	
06/18/1988	442	2								7.	YKA-YVR	YKA	KAMLOOPS, CANADA	NO		JT8D	9A
06/18/1988	443	2							1	40.	YYT-YHZ	YYT	ST. JOHNS, CANADA	NO		JT8D	9A
06/18/1988	758	1										BEIJING, CHINA	NO		JT8D	15	
06/19/1988	759	2										TAIWAN	NO		JT8D	7A	
06/20/1988	444	1										RIYADH, SAUDI ARABIA	NO		JT8D	3	
06/20/1988	482	1							1			PORTSMOUTH, ENGLAND	NO		CFM56	3	
06/20/1988	483	2										PORTSMOUTH, ENGLAND	NO		CFM56	3	
06/21/1988	445	1										OKLAHOMA CITY, OKLA	YES		JT8D	3	
06/22/1988	484	2							1	16.		JAPAN	YES		CFM56	3	
06/22/1988	760	2										THUNDER BAY, ONT., CANADA	NO		JT8D	17	
06/24/1988	446	2										BOSTON, MASS	YES		CFM56	3	
06/25/1988	587	1										JAMMU, INDIA	NO		CFM56	3	
06/25/1988	1103	1										MILAN-MALPENSA, ITALY	NO		CFM56	17A	
06/26/1988	485	1										BREMEN, GERMANY	NO		CFM56	3	
06/26/1988	486	1										MAGAYA, JAPAN	NO		CFM56	3	
06/27/1988	493	2										JAPAN	NO		JT8D	17	
06/27/1988	761	1										SAARBRUECKEN, GERMANY	NO		JT8D	17	
06/28/1988	487	1							1	7.75	STR-SCN	SCN	CHINA	NO	CFM56	3	
06/28/1988	488	2										YAMAGATA, HONSHU, JAPAN	NO		CFM56	3	
06/28/1988	494	2										MUREMBERG, GERMANY	NO		JT8D	17	
06/29/1988	762	2										INDIA	NO		JT8D	15	
06/30/1988	1104	1										INDIA	NO		JT8D	9A	
06/30/1988	1105	1								2.	NUE-HAM	MUE	INDIA	NO	JT8D	9A	
06/30/1988	1106	2										INDIA	NO	JT8D	9A		
06/30/1988	1107	2										INDIA	NO	JT8D	17A		
07/01/1988	497	2										KATHMANDU, NEPAL	NO		JT8D	17	
07/01/1988	536	1							1			DUESSELDORF, GERMANY	NO		JT8D	3	
07/01/1988	1107	2								36.	BRU-CDG	CDG	PARIS-DE GAULLE, FRANCE	NO	CFM56	3	
07/01/1988	1108	2										JAIPIUR, INDIA	NO		JT8D	9A	
07/02/1988	763	1										INDIA	NO	JT8D	17		
07/02/1988	1109	1										JAPAN	NO	JT8D	17		
07/03/1988	578	1										COMBATORE, INDIA	NO		JT8D	17	
07/03/1988	579	1										DALLAS/FT. WORTH, TEX	YES		CFM56	3	
07/05/1988	764	2										TAIWAN	NO		JT8D	9A	
07/07/1988	447	2										MONTREAL, CANADA	NO		JT8D	17	
07/07/1988	1110	2										PATNA, INDIA	NO		JT8D	17A	
07/08/1988	765	1										TURIN, ITALY	NO		JT8D	15	
07/09/1988	495	2								3.	TRN-FRA	TRN	WASHVILLE, TENN	YES		JT8D	9A
07/12/1988	496	1										TOTTORI, JAPAN	NO		JT8D	17	
07/12/1988	1111	1										INDIA	NO		JT8D	9A	
07/14/1988	766	2										JAPAN	NO	JT8D	17		
07/15/1988	498	1										KELOWNA, CANADA	NO		JT8D	9A	
07/15/1988	499	2										SCOTLAND-ALASKA	NO		JT8D	9A	
07/15/1988	537	1										LIUBLJANA, YUGOSLAVIA	NO		CFM56	3	
07/15/1988	767	1								8.	MAD-STR	STR	STUTTGART, GERMANY	NO	JT8D	15	
07/15/1988	1112	1										GWALIOR, INDIA	NO		JT8D	17	
07/16/1988	538	2								8.8	GWL-BHO	GWL	BRUSSELS, BELGIUM	NO	CFM56	3	
07/16/1988	768	2										TAIWAN	NO	JT8D	7A		
07/18/1988	500	2								40.	PHL	PHL	PHILADELPHIA, PA	YES	JT8D	15	
07/18/1988	501	2										BRUSSELS, BELGIUM	NO	JT8D	15A		
07/19/1988	502	1								8.	CAG-BRU	CAG	CAGLIARI, ITALY	NO	JT8D	15	
07/19/1988	503	2										SENDAI, JAPAN	NO	JT8D	9A		
07/19/1988	1320	2										TULSA, OK	YES	JT8D	3		
07/20/1988	539	2										TULSA, OK	YES	JT8D	3		
07/20/1988	540	1										BELGRADE, YUGOSLAVIA	NO	CFM56	3		
07/21/1988	504	1								19.	CDG-AMS	AMS	AMSTERDAM, NETHERLANDS	NO	JT8D	9A	
07/21/1988	588	1										KOGOSHIMA, JAPAN	NO	JT8D	9A		
07/23/1988	505	1										COL	YES	CFM56	3		
07/23/1988	541	1										KELOWNA, CANADA	NO	JT8D	9A		
07/23/1988	542	1								1.	YVR-YLV	SAN	SAN DIEGO, CA	YES	CFM56	3	
07/23/1988	1033	1										SAN DIEGO, CA	YES	CFM56	3		

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	DMG CODE	SEVERITY	POM_LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
06/13/1988	755	1	A,C	3					1 FAN BLADE BLEND ON WING SYMPTOM-EGT
06/14/1988	440	2	A,C	3	NONE				FOUND DURING GROUND INSPECTION
06/14/1988	479	1	A,C	9	NONE				
06/14/1988	480	2		9	NONE				
06/14/1988	756	1	A,C	3	NONE				
06/15/1988	481	1		3					
06/15/1988	757	1		9					
06/16/1988	441	1		9					
06/16/1988	584	2	A,K	1	COMPRESSOR	HIGH			2 1ST STG COMPRESSOR BLADES DAMAGED
06/18/1988	442	2	A,C,G,I	2					METAL IN TAILPIPE SYMPTOM-EGT, 2 BLADES
06/18/1988	443	2	A,D,N	2					4 FAN BLADES DAMAGED, OOR
06/18/1988	758	1	A,G	2					
06/19/1988	759	2	A,D	2					5 FAN BLADES BLEND ON WING
06/20/1988	444	1		9					
06/20/1988	482	1	A,H	3	COMPRESSOR				
06/20/1988	483	2	A,H	3	NONE	SOME			M/S SHROUD DISTORTED, CSD COOLER CLOGGED
06/21/1988	445	1		9					FOUND DURING GROUND INSPECTION
06/22/1988	484	2	A	4	NONE				
06/22/1988	760	2		9					
06/24/1988	446	2	A,C	3	COMPRESSOR				OOOR IN CABIN
06/25/1988	587	1		9					
06/25/1988	1103	1		9					
06/26/1988	485	1	A,B	3	NONE	2.6			REPLACED 5 PAIR OF FAN BLADES
06/26/1988	486	1	A	4	NONE				REPLACED 3 PAIR OF FAN BLADES
06/27/1988	493	2		9					
06/27/1988	761	1		9					
06/28/1988	487	1	A,H	3	NONE				ENGINE NOISE
06/28/1988	488	2	A,K	3	NONE				FOUND DURING GROUND INSPECTION, UER
06/28/1988	494	2		9					
06/28/1988	762	2		9					
06/29/1988	1104	1		9					
06/30/1988	1105	1		9					
06/30/1988	1106	2		9					
06/30/1988	1106	2	A,H	3		HIGH			FOUND ON GRD INSPEC
07/01/1988	497	2	A,D,K,M	3		3.0			FOUND ON GRD INSPEC
07/01/1988	536	1	A,H	1					4 F BLDS SHINGLED
07/01/1988	1107	2	A,C,G,K	4					2 BLDS BROKEN TANGS SEVERE COMP BLD DAM
07/01/1988	1107	2		4					REPLACED 6 PAIR OF FAN BLADES
07/01/1988	1108	2		4					2 F BLDS UNK DAMAGE
07/02/1988	1109	1		1					FBLDS DAMAGED, 7TH+8TH STG BLD DAMAGE
07/02/1988	1109	1		9					
07/03/1988	578	1		9					
07/05/1988	764	2	A,D	2					MEDIUM BIRD
07/07/1988	447	2	A,H	3					4 FAN BLADES BLEND ON WING
07/07/1988	1110	2		3					2 F BLDS SHINGLED
07/08/1988	765	1		9					OOOR
07/09/1988	495	2		9					FOUND ON GRD INSPEC
07/12/1988	496	1	A,H	3					
07/12/1988	1111	1		9					
07/14/1988	766	2		9					
07/15/1988	498	1		9					
07/15/1988	499	2		9					
07/15/1988	537	1		9	NONE				FOUND DURING GROUND INSPECTION
07/15/1988	767	1		9					AM EVENT
07/15/1988	1112	1		9					
07/16/1988	538	2		9					
07/16/1988	768	2	A,D	2					
07/18/1988	500	2	A,D	2		HIGH			12 FAN BLADES REPLACED
07/18/1988	501	2	A,C	2					INVESTIGATED, AM EVENT
07/19/1988	502	1	A,C,G	2					
07/19/1988	503	2		2		HIGH			CREW NOTED NOISE AND VIBES AT TO
07/19/1988	1320	2	A,H	3	N1 DECREASE				
07/20/1988	539	2		3					MOMENTARY 10% DEC. IN FAN SPEED
07/20/1988	540	1	A,B	3	NONE				4 F BLADES HAD LE TIP CURL
07/21/1988	504	1		9					
07/21/1988	588	1		9					
07/23/1988	505	1		9					FOUND ON GRD INSPECTION, BLOOD ON COML
07/23/1988	541	1	A,H	3	NONE	3.0			3 F BLADES SHINGLED 1 BLADE REPLACED
07/23/1988	542	1		9	NONE				FOUND DURING LTR CHECK

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	ETIME	SIGN EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL RULES	LT CONDS	WEATHER	CREW AC	CREW AL	BIRD SEE
07/23/1988	769	1		NONE	200	UNKNOWN		0 80			RAIN	NONE	NO	SEVERAL
07/24/1988	543	2	8:15:00	NONE	300	TAKEOFF						ATB	NO	NO
07/25/1988	306	2	22:10:00	INV POW LOSS	200	TAKEOFF		70 140			CLEAR	ATB	NO	NO
07/25/1988	507	2		NONE	300	TAKEOFF		+V1				ATB	NO	SEVERAL
07/26/1988	544	1	15:20:00	MULT BIRDS	300	TAKEOFF		0 140			CLEAR	ATO	NO	NO
07/26/1988	545	2		NONE	200	TAKEOFF		0 100					NO	ONE
07/27/1988	508	2		NONE	200	APPROACH		1500 180	VFR		CLEAR		NO	NO
07/27/1988	586	1		NONE	200	UNKNOWN					CLOUDY	NONE	NO	ONE
07/28/1988	509	1	15:00:00	NONE	300	APPROACH							NO	NO
07/29/1988	546	2		NONE	200	LANDING		0 90				NONE	NO	NO
07/30/1988	510	1	14:00:00	NONE	200	LANDING						NONE	NO	NO
07/30/1988	511	2		NONE	200	APPROACH		5 130			OVERCAST	NONE	NO	ONE
08/01/1988	1113	1	17:55:00	NONE	200	UNKNOWN		0			CLEAR	NONE	NO	NO
08/05/1988	547	1		NONE	300	TAKEOFF		0 110	VFR		CLEAR	DIV	NO	ONE
08/05/1988	548	1	9:46:00	NONE	200	TAKEOFF						NONE	NO	SEVERAL
08/05/1988	1114	2		NONE	200	UNKNOWN		0 50			OVERCAST	NONE	NO	SEVERAL
08/07/1988	1188	2		NONE	200	TAKEOFF							NO	ONE
08/07/1988	513	2		NONE	200	UNKNOWN							NO	ONE
08/07/1988	770	1		NONE	200	TAKEOFF							NO	ONE
08/07/1988	1006	2		NONE	200	UNKNOWN							NO	ONE
08/09/1988	514	2		NONE	200	TAKEOFF							NO	ONE
08/09/1988	830	2		NONE	200	UNKNOWN							NO	ONE
08/10/1988	515	1		NONE	200	TAKEOFF							NO	ONE
08/10/1988	1007	1		NONE	200	LANDING		0 120	VFR	DAY	PARTLY CLOUD	ATB	NO	ONE
08/11/1988	516	1	7:13:00	NONE	200	UNKNOWN		0 123	VFR		CLEAR	NONE	NO	ONE
08/12/1988	517	1	8:30:00	NONE	200	TAKEOFF		0 125					NO	ONE
08/12/1988	518	2		NONE	200	UNKNOWN							NO	ONE
08/13/1988	585	2		NONE	200	TAKEOFF							NO	ONE
08/13/1988	771	1	19:14:00	NONE	200	TAKEOFF							NO	ONE
08/13/1988	1008	2	18:27:00	NONE	200	LANDING		0 110	VFR		CLEAR	NONE	NO	ONE
08/14/1988	549	1		NONE	300	UNKNOWN							NO	ONE
08/14/1988	773	1	21:45:00	MULT BIRDS	200	UNKNOWN							NO	ONE
08/15/1988	519	1		NONE	200	LANDING							NO	ONE
08/15/1988	520	1		NONE	200	UNKNOWN							NO	ONE
08/15/1988	550	2		NONE	300	UNKNOWN							NO	ONE
08/15/1988	581	2		NONE	200	UNKNOWN							NO	ONE
08/15/1988	774	2		NONE	200	CRUISE							NO	ONE
08/16/1988	1009	1		NONE	200	UNKNOWN							NO	ONE
08/16/1988	521	2		NONE	200	UNKNOWN							NO	ONE
08/16/1988	531	2	15:45:00	MULT BIRDS	200	TAKEOFF		50 150		BRIGHT	CLOUDY	NONE	NO	FLOCK
08/17/1988	552	2		NONE	300	TAKEOFF		0 145				ATB	NO	NO
08/18/1988	553	2		NONE	300	UNKNOWN						NONE	NO	NO
08/18/1988	554	1		NONE	200	UNKNOWN						NONE	NO	NO
08/19/1988	556	1		NONE	200	TAKEOFF		0				ATO	NO	NO
08/19/1988	1010	2	15:14:00	NONE	300	CLTIB		10 150			RAIN	NONE	NO	ONE
08/19/1988	1011	1		NONE	200	TAKEOFF		+V1				ATO	NO	NO
08/21/1988	555	1	8:52:00	NONE	300	LANDING						NONE	NO	NO
08/21/1988	1012	2		NONE	200	TAKEOFF		500				ATB	NO	SEVERAL
08/23/1988	523	2	6:18:00	MULT ENG	200	CLTIB		0 100			CLOUDY	ATO	NO	SEVERAL
08/23/1988	523	2		MULT ENG	200	TAKEOFF		0 100			CLOUDY	ATO	NO	SEVERAL
08/24/1988	1187	2	8:50:00	NONE	200	APPROACH		0 135	VFR			NONE	NO	SEVERAL
08/26/1988	524	1		NONE	200	TAKEOFF		0 +V1				NONE	NO	NO
08/26/1988	556	2		MULT ENG	300	TAKEOFF		0 +V1				NONE	NO	NO
08/26/1988	556	2		MULT ENG	300	TAKEOFF						NONE	NO	NO
08/28/1988	775	2		NONE	200	UNKNOWN						ATO	NO	FLOCK
08/28/1988	1013	2	8:43:00	MULT ENG-BIRDS	200	TAKEOFF		0		LIGHT	CLEAR	ATB	NO	FLOCK
08/29/1988	557	1	8:43:00	MULT ENG-BIRDS	300	TAKEOFF		20 145	IFR	LIGHT	CLEAR	ATB	NO	FLOCK
08/29/1988	557	2		NONE	200	UNKNOWN		20 145	IFR			NONE	NO	NO
08/29/1988	1014	2	14:30:00	NONE	300	UNKNOWN				BRIGHT	CLEAR	NONE	NO	NO
08/30/1988	525	1		NONE	200	UNKNOWN						NONE	NO	NO
08/30/1988	558	1		NONE	200	UNKNOWN						NONE	NO	NO
08/31/1988	776	1	13:00:00	NONE	300	UNKNOWN						NONE	NO	NO
09/01/1988	1186	2		NONE	200	UNKNOWN						NONE	NO	NO
09/02/1988	559	1		NONE	300	UNKNOWN						NONE	NO	NO
09/03/1988	560	2		NONE	300	UNKNOWN						NONE	NO	NO
09/03/1988	583	1		NONE	300	UNKNOWN						NONE	NO	NO

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	BIRD_NAM	BIRD_SPE	#	BIRDS	WT_OZ_1	CTY_PRS	AIRPORT	LOCALE	US_INCID	ENGINE	DASH
07/23/1988	769	1	GULL*		1			BRU-CDG	BRU	TAIWAN	NO	JT8D	7A
07/24/1988	543	2	GREY EAGLE-BUZZARD	3K161	1		80.	PLZ-JNB	PVH	BRUSSELS, BELGIUM	NO	CFM56	3
07/25/1988	506	2			1					PORTO VELHO, BRAZIL	NO	JT8D	7
07/26/1988	507	2			1					PORT ELIZABETH S. AFRICA	NO	JT8D	9
07/26/1988	544	1			1					LAHORE PAKISTAN	NO	CFM56	3
07/26/1988	545	2			1					CARDIFF WALES	NO	CFM56	3
07/26/1988	508	2			1					CAMPO GRANDE BRAZIL	NO	JT8D	7
07/27/1988	508	2			1					NASHVILLE, TENN	YES	JT8D	17A
07/28/1988	509	1	BURROWING OWL	2S102	1		5.		YVR	VANCOUVER, CANADA	NO	CFM56	3
07/29/1988	546	2	COMMON SWIFT	1U55	1		2.		AMS	AMSTERDAM, NETHERLANDS	NO	JT8D	9A
07/30/1988	510	1			1				YHY	HAY RIVER, CANADA	NO	JT8D	9A
07/30/1988	511	2			1				YVR	VANCOUVER, CANADA	NO	JT8D	17
08/01/1988	113	1			1				DEL-AGR	AGRA, INDIA	NO	CFM56	3
08/05/1988	547	1			1				BRU	BRUSSELS, BELGIUM	NO	CFM56	3
08/05/1988	548	1			1				-MCE	FRANCE	NO	CFM56	3
08/05/1988	1114	2			1				COK	COCHIN, INDIA	NO	JT8D	17
08/05/1988	1188	2			1				DUR	ARGENTINA	NO	JT8D	9A
08/07/1988	512	1	GULL*		1		4.	DUR-PLZ	DUR	DURBAN, S. AFRICA	NO	JT8D	17A
08/07/1988	513	2			1				YXJ-YXJ	FT. ST. JOHN, CANADA	NO	JT8D	9A
08/07/1988	770	1	BUZZARD*		1		32.	DUS-LIN	DUS	DUESSELDORF, GERMANY	NO	JT8D	15
08/07/1988	1006	2			1				-AGR	AGRA, INDIA	NO	JT8D	17
08/09/1988	514	2			1				YWG	WINNEPEG, CANADA	NO	JT8D	17A
08/09/1988	830	2			1				YHM	JAPAN	NO	JT8D	17
08/10/1988	515	1			1				YXC	FORT MCMURRAY, CANADA	NO	JT8D	9A
08/10/1988	1007	1	VULTURE*		1				YWG	WINNEPEG, CANADA	NO	JT8D	17
08/11/1988	516	1			1				YXC	CHANDIGARH, INDIA	NO	JT8D	17A
08/12/1988	517	1			1				YWG	CANADA	NO	JT8D	9A
08/12/1988	518	2	MOURNING DOVE	2P105	1		4.	SYR-IAD	HOU	HOUSTON, TEX	YES	JT8D	9A
08/13/1988	585	2			1				SYR	SYRACUSE, NY	YES	JT8D	17A
08/13/1988	771	1			1				BFN-KIM	BLOENFONTEIN, S. AFRICA	NO	JT8D	17
08/13/1988	772	2			1				PHY	MIYAKO JIMA, JAPAN	NO	JT8D	17
08/13/1988	1008	2			1				VNS	VARANASI, INDIA	NO	JT8D	17
08/14/1988	549	1	BUZZARD*		1				-FRA	FRANCE	NO	CFM56	3
08/14/1988	773	1			1		32.	DUS-STR	STR	STUTTGART, GERMANY	NO	JT8D	15
08/15/1988	519	1			1				YZZ-YXD	CANADA	NO	JT8D	9A
08/15/1988	520	1	KILLDEER	5N33	1		3.	OMA-PHX	PHX	PHOENIX, ARIZ	NO	JT8D	9A
08/15/1988	520	2			1				-STL	ST LOUIS, MO	YES	CFM56	3
08/15/1988	581	2			1				DAY-SDF	OHIO	YES	CFM56	3
08/15/1988	774	2			1				-BOM	INDIA	NO	JT8D	9A
08/15/1988	1009	1			1				MEL	MELBOURNE, AUSTRALIA	NO	JT8D	9A
08/16/1988	521	2			1				-CLT	CLT	NO	JT8D	7B
08/16/1988	521	2			1				LHR-	LONDON, ENGLAND	NO	CFM56	3
08/17/1988	532	2			1				HOU	HOUSTON, TEX	YES	CFM56	3
08/18/1988	533	1	UPLAND SANDPIPER	6N13	1		6.	CCU-BBI	CCU	CHICAGO, ILL-OHARE	NO	CFM56	3
08/19/1988	554	1			1				DEL-PAT	PATNA, INDIA	NO	CFM56	3
08/19/1988	554	1			1				TUL	TULSA, OKLA	NO	CFM56	3
08/19/1988	1010	2			1		3.5	BAROOA	BAROOA, INDIA	NO	JT8D	17	
08/21/1988	1011	1	AMERICAN KESTREL	5K26	1				HAM	HAMBURG, GERMANY	NO	JT8D	17
08/21/1988	525	1			1				HAM	HAMBURG, GERMANY	NO	JT8D	15
08/21/1988	1012	2			1				HAM	HAMBURG, GERMANY	NO	JT8D	15
08/23/1988	523	1	BLACK HEADED GULL	14N36	1		10.	COS-YHY	COS	COLORADO SPRINGS, COL	NO	JT8D	9A
08/23/1988	523	2	BLACK HEADED GULL	14N36	1		10.	TFS-SPC	TFS	TENERIFE, CANARY ISLANDS	YES	JT8D	15
08/24/1988	1187	2			3				TFS	TENERIFE, CANARY ISLANDS	NO	CFM56	3
08/26/1988	524	1	SPARROW*		1				OKA-1SG	OKA, INDIA	NO	CFM56	3
08/26/1988	556	2			1				AMD-BDQ	AMMADABAD, INDIA	NO	JT8D	17
08/26/1988	556	2			2		3.	ATQ-SXR	ATQ	ATMADABAD, INDIA	NO	JT8D	17A
08/28/1988	775	2	COMMON STARLING	21Z75	2		3.	YYC-YXD	YYC	CHICAGO, ILL-OHARE	YES	CFM56	3
08/29/1988	537	1	COMMON STARLING	21Z75	1				PIT-BDL	INDIA	NO	CFM56	3
08/29/1988	1014	2			1				ATQ-SXR	ATMADABAD, INDIA	NO	JT8D	17A
08/30/1988	525	1			1				PIT-BDL	INDIA	NO	JT8D	9A
08/30/1988	558	1			1				HRL-HOU	HARTLEPOOL, ENGLAND	NO	CFM56	3
08/31/1988	776	1	BARBARY PARTRIDGE	4L42	1		20.	-BEG	-BEG	BELGRADE, YUGOSLAVIA	NO	CFM56	3
09/01/1988	1186	2			1				-CLE	OHIO	YES	CFM56	3
09/02/1988	559	1			1						NO	CFM56	3
09/03/1988	560	2			1						NO	CFM56	3
09/03/1988	583	1			1						NO	CFM56	3

SOURCE: ENGINE MANUFACTURER

EDATE	EV#	ENG_POS	DWG_CODE	SEVERITY	POW_LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
07/23/1988	769	1	A,D	2	NONE	3.0	NO	NO	5 FAN BLADES BLENDING ON WING
07/24/1988	543	2	A,H	1	COMPRESSOR		YES	YES	REPLACED 3 PAIR OF FAN BLADES
07/25/1988	504	2	A,H,I,K	9	COMPRESSOR	HIGH	YES	YES	1 F BLADE FRACTURED BELOW MSS
07/26/1988	507	2	A,H	3	NONE	5.0	NO	NO	MOMENTARY THRUST LOSS FOR APPROX. 10 SEC
07/26/1988	544	1	A,B,N	3	NONE	NONE	NO	NO	
07/26/1988	545	2	A,B,N	9	NONE		NO	NO	ODOR IN CABIN, SMALL BIRD
07/27/1988	508	2	A,C,N,K	9	NONE		NO	NO	SMALL BIRD
07/27/1988	586	1	A	1	NONE		NO	NO	HPC DAMAGED AND REMOVED
07/28/1988	509	1	A	4	NONE		NO	NO	BST FOUND HPC STG6 BLD WITH A NICK
07/29/1988	546	2	A	9	NONE		NO	NO	SMALL BIRD
07/30/1988	510	1	A,H	9	NONE	2.0	NO	NO	6 FAN BLADES REPLACED
08/01/1988	113	1	A	9	NONE		NO	NO	ODOR
08/05/1988	547	1	A	9	NONE		NO	NO	4 F BLD UNK DAMAGE
08/05/1988	548	1	A	9	NONE		NO	NO	
08/05/1988	114	2	A	4	NONE		NO	NO	
08/05/1988	1188	2	A	9	NONE		NO	NO	
08/07/1988	512	1	A,H	9	NONE		NO	NO	
08/07/1988	513	2	A,H	9	NONE		NO	NO	
08/07/1988	770	1	A,H	9	NONE		NO	NO	
08/07/1988	1006	2	A,H	3	NONE		NO	NO	
08/09/1988	514	2	A,H	9	NONE		NO	NO	
08/09/1988	830	2	A,H	9	NONE		NO	NO	
08/10/1988	515	1	A,H	9	NONE		NO	NO	
08/10/1988	1007	1	A,H	3	NONE		NO	NO	
08/11/1988	516	1	A,H	9	NONE		NO	NO	
08/12/1988	517	1	A,H	9	NONE		NO	NO	
08/12/1988	518	2	A,H	9	NONE		NO	NO	
08/13/1988	585	2	A,H	9	NONE		NO	NO	
08/13/1988	771	1	A,H	9	NONE		NO	NO	
08/13/1988	772	2	A,H	9	NONE		NO	NO	
08/13/1988	1008	2	A,H	9	NONE		NO	NO	
08/14/1988	549	1	A,C,G	2	NONE		NO	NO	
08/14/1988	773	1	A,C,G	9	NONE		NO	NO	
08/15/1988	519	1	A,C,G	9	NONE		NO	NO	
08/15/1988	520	2	A,C,G	2	NONE		NO	NO	
08/15/1988	550	2	A,D,I	9	NONE		NO	NO	
08/15/1988	581	2	A,C	9	NONE		NO	NO	
08/15/1988	774	2	A,C	3	NONE		NO	NO	
08/15/1988	1009	1	A,C	9	COMPRESSOR		NO	YES	
08/16/1988	521	2	A,B,M	3	NONE		NO	YES	
08/16/1988	551	2	A,D	2	NONE		NO	NO	
08/17/1988	552	2	A,D	9	NONE		NO	NO	
08/18/1988	553	1	A	9	NONE		NO	NO	
08/19/1988	522	1	A	9	COMPRESSOR		NO	NO	
08/19/1988	554	1	A	4	COMPRESSOR		NO	NO	
08/19/1988	1010	2	A	9	NONE		NO	NO	
08/21/1988	555	1	A	9	NONE		NO	NO	
08/21/1988	1012	2	A,C	9	NONE		NO	NO	
08/23/1988	523	1	A,C	3	NONE		NO	NO	
08/23/1988	523	2	A,C	9	NONE		NO	NO	
08/24/1988	1187	2	A,D	9	NONE		NO	NO	
08/26/1988	524	1	A,D	2	NONE		NO	NO	
08/26/1988	556	1	A,D	2	NONE		NO	NO	
08/26/1988	556	2	A,D	9	NONE		NO	NO	
08/26/1988	556	2	A,D	9	NONE		NO	NO	
08/28/1988	775	2	A,B,M	9	NONE		NO	NO	
08/28/1988	1013	2	A,B,M	3	NONE		NO	NO	
08/29/1988	557	1	A,B	9	NONE		NO	NO	
08/29/1988	557	2	A,B	9	NONE		NO	NO	
08/30/1988	1014	2	A,B	9	NONE		NO	NO	
08/30/1988	525	1	A,B	3	NONE		NO	NO	
08/30/1988	558	1	A,C	9	NONE		NO	NO	
08/31/1988	776	1	A,G	3	NONE		NO	NO	
09/01/1988	1186	2	A,G	2	NONE		NO	NO	
09/02/1988	559	1	A	9	NONE		NO	NO	
09/03/1988	560	2	A	9	NONE		NO	NO	
09/03/1988	583	1	A	4	NONE		NO	NO	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	LT	CONDS	WEATHER	CREW AC	CREW AL	BIRD	SEE
09/04/1988	526	2		NONE		200	APPROACH								NONE		NO	
09/04/1988	561	1		NONE		300	UNKNOWN								ATO		ONE	
09/04/1988	1015	2	7:16:00	NONE		200	TAKEOFF		0 60						ATB		NO	
09/05/1988	562	1		NONE		300	TAKEOFF		+V1						NONE		NO	
09/05/1988	1017	1		NONE		200	UNKNOWN								NONE		NO	
09/06/1988	563	2		NONE		300	TAKEOFF		+V1						NONE		NO	
09/07/1988	777	2		NONE		200	TAKEOFF								NONE		NO	
09/08/1988	564	2	11:00:00	MULT	BIRDS	300	LANDING		0 130						NONE		NO	
09/08/1988	1018	1		TRVS	FRAC	200	TAKEOFF		0 132						ATB		ONE	
09/09/1988	527	1	8:39:00	NONE		200	LANDING		0 131						NONE		NO	
09/10/1988	528	1		NONE		200	TAKEOFF								NONE		NO	
09/10/1988	565	1		NONE		300	UNKNOWN								NONE		NO	
09/12/1988	778	2	13:40:00	INV	POW LOSS	200	APPROACH		2500 245						NONE		NO	SEVERAL
09/12/1988	1019	1		NONE		200	LANDING		0						NONE		NO	
09/12/1988	1207	2		INV	POW LOSS	300	CLIMB		800						ATB		SEVERAL	
09/14/1988	779	2		NONE		200	UNKNOWN								NONE		FLOCK	
09/14/1988	1016	2		NONE		200	TAKEOFF		0						ATO		FLOCK	
09/14/1988	1020	1		NONE		200	UNKNOWN								NONE		FLOCK	
09/15/1988	529	1	9:45:00	MULT	ENG-BIRDS	200	TAKEOFF		0 155						NONE		FLOCK	
09/15/1988	529	2	9:45:00	MULT	ENG-BIRDS	200	TAKEOFF		0 155						CRASHED	YES	FLOCK	
09/15/1988	566	1	18:50:00	MULT	BIRDS	300	TAKEOFF		25 150						ATB		FLOCK	
09/15/1988	1021	1	13:55:00	MULT	BIRDS	200	TAKEOFF		0 122						NONE		NO	SEVERAL
09/16/1988	567	1		NONE		300	CRUISE								NONE		NO	
09/16/1988	1032	1	8:45:00	NONE		200	TAKEOFF		0 120						NONE		NO	SEVERAL
09/17/1988	570	1	13:00:00	NONE		200	TAKEOFF								ATB		ONE	
09/17/1988	780	2	8:17:00	NONE		200	CLIMB		1600 160						ATB		NO	
09/18/1988	568	1		NONE		300	LANDING								NONE		NO	
09/18/1988	1023	1	8:15:00	NONE		200	TAKEOFF		0 80						ATO		FLOCK	
09/19/1988	781	1	13:14:00	MULT	ENG-BIRDS	200	TAKEOFF		30 160						NONE		FLOCK	
09/19/1988	781	2	13:14:00	MULT	ENG-BIRDS	200	TAKEOFF		30 160						NONE		FLOCK	
09/20/1988	530	1		NONE		200	UNKNOWN								NONE		NO	
09/20/1988	569	1	1:25:00	NONE		300	UNKNOWN		0 10						NONE		ONE	
09/20/1988	782	1	8:05:00	NONE		200	TAXI		0 135						NONE		ONE	
09/20/1988	783	2	16:24:00	NONE		200	TAKEOFF		0 80						NONE		NO	
09/20/1988	784	2		NONE		200	TAKEOFF		0 71						ATO		YES	
09/20/1988	1024	1		NONE		200	TAKEOFF								NONE		NO	
09/20/1988	1025	1		NONE		200	UNKNOWN								NONE		NO	
09/20/1988	1026	1		NONE		200	UNKNOWN								NONE		NO	
09/21/1988	570	2		MULT	ENG	300	TAKEOFF		0 VR						ATB		FLOCK	
09/21/1988	570	2		MULT	ENG	300	TAKEOFF		0 VR						ATB		FLOCK	
09/23/1988	531	1		NONE		200	TAKEOFF								NONE		NO	
09/23/1988	785	2		NONE		200	UNKNOWN								NONE		FLOCK	
09/24/1988	571	2		NONE		200	UNKNOWN								NONE		NO	
09/24/1988	580	1		NONE		300	UNKNOWN								NONE		NO	
09/25/1988	572	1		NONE		200	TAKEOFF								NONE		NO	
09/25/1988	1027	2		NONE		200	LANDING		+V1						NONE		NO	
09/25/1988	1185	2		NONE		200	TAKEOFF		0 140						NONE		YES	
09/26/1988	532	1	9:30:00	MULT	BIRDS	200	TAKEOFF		100 150						NONE		FLOCK	
09/26/1988	573	1		NONE		200	CLIMB								ATB		NO	
09/26/1988	786	2	12:23:00	NONE		200	UNKNOWN								NONE		NO	
09/27/1988	574	1	16:30:00	NONE		300	UNKNOWN								NONE		NO	
09/27/1988	787	1		NONE		200	UNKNOWN								NONE		NO	
09/27/1988	1028	2		NONE		200	LANDING								NONE		NO	
09/28/1988	788	2		NONE		200	TAKEOFF								NONE		NO	
09/28/1988	1029	2		MULT	BIRDS	200	LANDING		0 100						NONE		NO	
09/28/1988	789	2	7:27:00	TRVS	FRAC	200	TAKEOFF		0 127						NONE		NO	
09/30/1988	575	2		NONE		300	UNKNOWN		0 140						NONE		NO	
10/01/1988	697	1		NONE		300	UNKNOWN								NONE		NO	
10/02/1988	698	2		NONE		300	UNKNOWN								NONE		NO	
10/02/1988	790	1		MULT	ENG-BIRDS	200	APPROACH								NONE		NO	
10/02/1988	790	2		MULT	ENG-BIRDS	200	UNKNOWN								NONE		NO	
10/02/1988	791	1		NONE		200	UNKNOWN								NONE		NO	
10/02/1988	831	1		NONE		200	TAKEOFF		0 130						NONE		NO	ONE
10/03/1988	699	2		NONE		300	UNKNOWN								NONE		NO	
10/04/1988	1030	2	7:55:00	NONE		200	APPROACH		6500 250						NONE		NO	
10/05/1988	1031	1	20:52:00	NONE		200	LANDING								NONE		NO	
10/06/1988	832	2	8:35:00	MULT	BIRDS	200	LANDING		10 140						NONE		NO	FLOCK
10/07/1988	1032	1		NONE		200	LANDING		0 70						NONE		NO	



SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	BIRD_MAK	BIRD_SPE	#_BIRDS	WT_OZ_1	CITY	PRS	AIRPORT	LOCALE	US_INCID	ENGINE	DASH
09/04/1988	526	2					YZY-YAM			SAULT ST MARIE, CANADA	NO	JT80	9A
09/04/1988	561	1	KITE*		1		-PIT			PA	YES	CFM56	3
09/04/1988	1015	2					AND			AHMADABAD, INDIA	NO	JT80	15
09/05/1988	562	1					ORD			CHICAGO, ILL-OHARE	YES	CFM56	3
09/05/1988	1017	1					IXV-UOR			INDIA	NO	JT80	17
09/06/1988	563	2					RNO			RENO, NEV	YES	CFM56	3
09/07/1988	777	2					MHY-OKA			MIYAKO JIMA, JAPAN	NO	JT80	17
09/08/1988	564	2	GULL*		*		BFS			BELFAST N, IRELAND	NO	CFM56	3
09/09/1988	1018	1					PAT-LKO			PATNA, INDIA	NO	JT80	17A
09/09/1988	527	1	MADADA IBIS	6112	1	48.	CPT-PLZ			PORT ELIZABETH, S. AFRICA	NO	JT80	17A
09/10/1988	528	1					PHN			XIAHEM CHINA	NO	JT80	17A
09/10/1988	365	1					-LGJ			ENGLAND	NO	CFM56	3
09/12/1988	778	2	VULTURE*		1	208.	DEL			DEHRT, INDIA	NO	JT80	17A
09/12/1988	1019	1					TRV			TRIVANDRUM, INDIA	NO	JT80	17
09/12/1988	1207	2					PHL			PHILA, PA	YES	CFM56	3
09/14/1988	779	2					MHY-OKA			JAPAN	NO	JT80	17
09/14/1988	1016	2					AND			AHMEDABAD, INDIA	NO	JT80	17
09/14/1988	1020	1					-MAG			INDIA	NO	JT80	17
09/15/1988	529	1	SPECKLED PIGEON	2P4	8	11.5	BJR-ASH			BAHAR DAR, ETHIOPIA	NO	JT80	17A
09/15/1988	529	2	SPECKLED PIGEON	2P4	6	11.5	BJR-ASH			BAHAR DAR, ETHIOPIA	NO	JT80	17A
09/15/1988	566	1	LAPUNING*		2		BFS			BELFAST N, IRELAND	NO	JT80	17A
09/15/1988	1021	1					VNS-HJR			VARANASI, INDIA	NO	CFM56	3
09/16/1988	567	1					ZAG-ZRH			YUGOSLAVIA-SWITZERLAND	NO	JT80	3
09/16/1988	1022	1					HYD-HYD			HYDERABAD, INDIA	NO	CFM56	3
09/17/1988	579	1					MDW			CHICAGO, ILL-MIDWAY	YES	JT80	9A
09/17/1988	780	2	WOOD PIGEON	2P9	1	16.4	MAA-TRZ			MADURAI, INDIA	NO	JT80	17A
09/18/1988	568	1					LHR			LONDON-HEATHROW, ENGLAND	NO	CFM56	3
09/18/1988	1023	1	KITE*		1		IKU			AURANGABAD, INDIA	NO	JT80	9A
09/19/1988	781	1					BUD-MUC			BUDAPEST, HUNGARY	NO	JT80	15
09/19/1988	781	2					BUD-MUC			BUDAPEST, HUNGARY	NO	JT80	15
09/20/1988	530	1					YQT-YTC			CANADA	NO	JT80	9A
09/20/1988	569	1	BARRED DOVE	2P102	1	2.	GOT			GOTHENBURG, SWEDEN	YES	CFM56	3
09/20/1988	782	1	GULL*		1	10.	LIN-DUS			MILAN, ITALY	NO	JT80	15
09/20/1988	783	2	SMALLON*		1	10.	ISG-MHY			ISHIGAKI, JAPAN	NO	JT80	15
09/20/1988	784	2					LKO-BOM			LUCKNOW, INDIA	NO	JT80	9A
09/20/1988	1024	1					VNS-LKO			INDIA	NO	JT80	15
09/20/1988	1025	1					LAS			LAS VEGAS, NEV	YES	CFM56	3
09/21/1988	570	1					LAS			LAS VEGAS, NEV	YES	CFM56	3
09/21/1988	570	2					OKA-MHY			CANADA	NO	JT80	9A
09/23/1988	531	2					STL-HCU			JAPAN	NO	JT80	17
09/23/1988	785	2					CRW			CHARLESTON, W. VA	YES	CFM56	3
09/24/1988	571	2					LAX			LOS ANGELES, CA	YES	CFM56	3
09/24/1988	560	1	ROCK DOVE	2P1	1	14.	CRW			INDIA	NO	CFM56	3
09/25/1988	572	1					KRT-PZU			KHARTOUM, SUDAN	NO	JT80	9A
09/25/1988	1027	2					BRS-TCI			BRISTOL, ENGLAND	NO	JT80	17
09/25/1988	1185	2					MEL			MELBOURNE, AUSTRALIA	NO	CFM56	3
09/26/1988	532	1	HERRING GULL	14N14	2	40.	BRS-TCI			BRISTOL, ENGLAND	NO	JT80	15
09/26/1988	573	1	PARROT*		1	2.	MHD-YGJ			TEX	NO	CFM56	3
09/26/1988	786	2	SPARROW*				-DAL			PHOENIX, AZ	YES	CFM56	3
09/27/1988	574	1	MOURNING DOVE	2P105		4.	JDN-JAI			JAIPUR, INDIA	YES	CFM56	3
09/27/1988	787	1					BUE			BUENOS AIRES, ARGENTINA	NO	JT80	9A
09/27/1988	1028	2					BOM-IXV			ALONG, INDIA	NO	JT80	17
09/28/1988	788	2					-FRA			FRANKFURT, GERMANY	YES	CFM56	3
09/28/1988	1029	2					FRA			FRANKFURT, GERMANY	NO	CFM56	3
09/30/1988	575	2					YOR-YUL			CANADA	NO	JT80	9A
10/01/1988	697	1					STR-FRA			QUEBEC, CANADA	NO	JT80	9A
10/02/1988	698	2					-PIT			STUTTGART, GERMANY	NO	JT80	9
10/02/1988	790	2					IXJ			PITTSBURGH, PA	NO	JT80	15
10/02/1988	791	1					IXK-TAJ			JAMMU, INDIA	YES	CFM56	3
10/03/1988	831	1					VIE			VIENNA, AUSTRIA	NO	JT80	17
10/04/1988	699	2					VNS			VARANASI, INDIA	NO	JT80	17
10/05/1988	1030	1									NO	JT80	17
10/05/1988	1031	1									NO	JT80	17
10/06/1988	832	2									NO	JT80	17
10/07/1988	1032	1									NO	JT80	17

SOURCE: ENGINE MANUFACTURER

DATE	EVT#	ENG POS	DMG CODE	SEVERITY	POW LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
09/04/1988	526	2		9	NONE			NO	
09/04/1988	561	1		9	NONE			NO	
09/04/1988	1015	2	A	4	NONE			NO	REPLACED 4 PAIRS OF FAN BLADES FOUND ON GRD INSPEC
09/05/1988	562	1		9	NONE			NO	
09/05/1988	1017	1		9	NONE			NO	
09/06/1988	563	2		9	NONE			NO	
09/07/1988	777	2		9	NONE			NO	
09/08/1988	564	2	A,H	3	NONE			NO	LPC + HPC DAMAGE
09/08/1988	1018	1	A,I,K	1	NONE			NO	
09/09/1988	527	1	A,D,H	2	NONE			NO	
09/10/1988	528	1	A,C	3	NONE			NO	
09/10/1988	565	1		9	NONE			NO	
09/12/1988	778	2	A,D,G,K	1	YES	HIGH		EPR	PARAMETER DECAY, 1 1ST GVAME DISLOOGED
09/12/1988	1019	1		9	YES			NO	
09/12/1988	1207	2	A	4	SPOOL DOWN			IN	INVOLUNTARY EGT OVER TEMP LIGHT CAME ON, LOUD BANG
09/14/1988	779	2		9				NO	
09/14/1988	1016	2		9				NO	
09/15/1988	1020	1		9				NO	
09/15/1988	529	1	A,D,K,O,P	1	COMPRESSOR		ADVANCED	NO	CONTINUOUS SURGING, ERRATIC EPR
09/15/1988	529	2	A,D,K,O,P	1	COMPRESSOR		ADVANCED	NO	CONTINUOUS SURGING, ERRATIC EPR
09/15/1988	566	1	A,H	3	NONE	5.0	IDLE	NO	ODOR IN CABIN
09/15/1988	1021	1	A	4	NONE			NO	1ST F BLDG UNK DAMAGE
09/16/1988	567	1	A,D	2	NONE			NO	8 PAIRS OF FAN BLADES REPLACED
09/16/1988	1022	1		9	NONE			NO	ODOR
09/17/1988	579	1	A,C	3	NONE	SOME	IDLE	NO	DAMAGE TO C2 FAN BLADES, REPLACED C2 ASS
09/17/1988	780	2	A,D,G,K	1	NONE	2.8		NO	FAN AND COMP BLDG DAMAGED, ODOR
09/18/1988	568	1	A,G	9	NONE			NO	1STG F BLDG DAMAGED
09/18/1988	1023	1		9	NONE			NO	SMALL BIRDS
09/19/1988	781	1		9	NONE			NO	SMALL BIRDS
09/19/1988	781	2		9	NONE			NO	FOUND DURING GROUND INSPECTION
09/20/1988	530	1		9	NONE	1.9		NO	
09/20/1988	569	1		9	NONE			NO	
09/20/1988	782	1		9	NONE			NO	
09/20/1988	783	2		9	NONE			NO	
09/20/1988	784	2		9	NONE			NO	
09/20/1988	1024	1		9	NONE			NO	
09/20/1988	1025	1		9	NONE			NO	
09/20/1988	1026	1		9	NONE			NO	FOUND ON GRD INSPEC
09/21/1988	570	1		9	NONE			NO	FOUND ON GRD INSPEC
09/21/1988	570	2	A,H	3	NONE			NO	
09/23/1988	531	2		9	NONE			NO	
09/23/1988	785	2		9	NONE			NO	FOUND ON GRD INSPEC
09/24/1988	571	2	A,K	1	NONE			NO	1 STG 4 HPC BLADE DAMAGED
09/24/1988	580	1		9	NONE			NO	
09/25/1988	572	1	A	4	NONE			NO	14 PAIRS OF FAN BLADES REPLACED
09/25/1988	1027	2		9	NONE			NO	
09/25/1988	1185	1	A,G	2	NONE			NO	3 F BLDG DAMAGED
09/26/1988	532	1	A,D,H	2	COMPRESSOR		CUTOFF	YES	POWER LOSS, EPR SYMPTOM, EGT FAIL CODE
09/26/1988	573	1	A,H	3	COMPRESSOR	5.0	RETARD	NO	12 FAN BLADES SHINGLED
09/26/1988	786	2		9	NONE			NO	15 FAN BLADES DAMAGED, LE NICKS
09/27/1988	574	1	A,B	3	NONE			NO	ENGINE REMOVED
09/27/1988	787	1		9	NONE			NO	
09/27/1988	1028	2	A,G	9	NONE			NO	ENGINE REMOVED
09/28/1988	788	2		9	NONE			NO	
09/28/1988	1029	2		9	NONE			NO	
09/29/1988	789	2	A,I	1	NONE			NO	HPC BLADES BEYOND MM LIMITS
09/30/1988	575	2	A,C,K	1	NONE			NO	FOUND DURING GROUND INSPECTION
10/01/1988	697	1	A,H	9	NONE			NO	3 FAN BLADES DAMAGED
10/02/1988	698	2		9	NONE	4.0		NO	FOUND ON GRD INSPEC
10/02/1988	790	1		9	NONE			NO	FOUND ON GRD INSPEC
10/02/1988	790	2		9	NONE			NO	FAN RUB STRIP GOUGED, 1+2 STG F BLDG REP
10/02/1988	791	1	A,G,K	1	NONE			NO	FOUND ON GRD INSPEC., 3 F BLDG SHINGLED
10/02/1988	831	1		9	NONE			NO	1 F BLD SHINGLED
10/03/1988	699	2	A,H	3	NONE			NO	
10/04/1988	1030	1	A,H	3	NONE	YES		NO	
10/05/1988	1031	1		9	NONE			NO	
10/06/1988	832	2		9	NONE			NO	
10/07/1988	1032	1		9	NONE			NO	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	ENGINE	SIGN_EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LI_CONDS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
10/08/1988	1033	1		NONE	200	TAKEOFF		0 VR				ATB		
10/08/1988	1034	1		NONE	200	LANDING		0				NONE		
10/08/1988	1035	1		MULT ENG	200	LANDING						NONE		
10/08/1988	1035	2		MULT ENG	200	LANDING						NONE		
10/10/1988	792	2		NONE	200	UNKNOWN								
10/12/1988	793	2		NONE	200	APPROACH								YES
10/13/1988	700	2		NONE	300	UNKNOWN		0 120			CLOUDY	NONE	NO	SEVERAL
10/15/1988	1036	1		NONE	200	LANDING						NONE	NO	NO
10/17/1988	701	2		NONE	300	TAKEOFF						NONE	NO	SEVERAL
10/19/1988	794	2		NONE	200	LANDING						NONE	NO	SEVERAL
10/20/1988	1183	2		NONE	200	APPROACH						NONE	NO	SEVERAL
10/20/1988	1184	2		MULT BIRDS	200	LANDING						NONE	NO	SEVERAL
10/21/1988	795	1		MULT	200	TAKEOFF		0 25			CLOUDY	NONE	NO	SEVERAL
10/22/1988	1037	1		NONE	200	LANDING		120			CLOUDY	NONE	NO	SEVERAL
10/23/1988	833	1		NONE	200	TAKEOFF		0 80			CLOUDY	NONE	NO	SEVERAL
10/23/1988	1182	1		MULT BIRDS	200	TAKEOFF		0 80			CLEAR	NONE	NO	SEVERAL
10/24/1988	798	1		NONE	200	UNKNOWN						NONE	NO	SEVERAL
10/24/1988	1209	2		NONE	200	LANDING		0 100			BROKEN	NONE	NO	NO
10/26/1988	702	2		NONE	300	TAKEOFF					OVERCAST	NONE	NO	NO
10/26/1988	703	1		NONE	300	TAKEOFF		0 130			OVERCAST	NONE	NO	NO
10/26/1988	704	2		NONE	300	UNKNOWN						NONE	NO	NO
10/28/1988	799	1		NONE	300	TAKEOFF		0 VR			BROKEN	NONE	NO	ONE
10/28/1988	1038	2		NONE	200	LANDING		0 110			CLOUDY	NONE	NO	YES
10/31/1988	800	2		NONE	200	LANDING		0 130			CLEAR	NONE	NO	SEVERAL
11/02/1988	801	2		NONE	200	CLIMB		500 150			OVERCAST	ATB	NO	SEVERAL
11/02/1988	802	2		MULT BIRDS	200	TAKEOFF		0 146			OVERCAST	DIV	NO	NO
11/03/1988	705	2		NONE	300	TAKEOFF		200 140				NONE	NO	NO
11/03/1988	1039	1		NONE	200	TAKEOFF		50 130				NONE	NO	NO
11/04/1988	802	1		NONE	200	UNKNOWN						NONE	NO	NO
11/05/1988	803	1		NONE	500	TAKEOFF		5			CLOUDY	ATB	YES	ONE
11/07/1988	706	1		INV POW LOSS	300	TAKEOFF		0 150	VFR		CLOUDY	ATO	NO	NO
11/07/1988	804	2		NONE	300	TAKEOFF		0 +V1			CLOUDY	ATB	NO	SEVERAL
11/07/1988	804	2		NONE	200	TAKEOFF		15 133				ATB	NO	SEVERAL
11/07/1988	834	1		NONE	200	TAKEOFF						ATB	NO	ONE
11/09/1988	805	1		NONE	200	TAKEOFF						ATB	NO	NO
11/09/1988	806	1		NONE	200	TAKEOFF						ATB	NO	NO
11/09/1988	806	1		ATP/RTNY	200	CLIMB		2000	VFR		CLEAR	ATB	NO	ONE
11/12/1988	807	1		NONE	200	TAKEOFF						ATB	NO	NO
11/13/1988	835	2		NONE	200	CLIMB						NONE	NO	NO
11/14/1988	708	1		NONE	300	APPROACH						NONE	NO	NO
11/16/1988	808	1		NONE	200	UNKNOWN						NONE	NO	NO
11/17/1988	809	2		NONE	200	UNKNOWN						NONE	NO	NO
11/17/1988	1040	1		NONE	200	LANDING						NONE	NO	NO
11/18/1988	836	1		NONE	200	UNKNOWN						NONE	NO	NO
11/18/1988	837	2		NONE	200	UNKNOWN						NONE	NO	NO
11/19/1988	810	1		MULT BIRDS	200	LANDING		0 130			FOG	NONE	NO	FLOCK
11/19/1988	810	1		INV POW LOSS	200	TAKEOFF		200				ATB	NO	FLOCK
11/19/1988	1041	1		NONE	200	TAKEOFF		0 VT				NONE	NO	ONE
11/20/1988	838	2		NONE	200	LANDING		0 80			CLOUDY	ATO	NO	NO
11/21/1988	709	1		NONE	200	TAKEOFF						NONE	NO	NO
11/22/1988	710	2		NONE	300	LANDING						NONE	NO	NO
11/22/1988	711	2		NONE	300	UNKNOWN						NONE	NO	NO
11/23/1988	811	1		MULT BIRDS	200	TAKEOFF						NONE	NO	YES
11/23/1988	811	1		INV POW LOSS	200	TAKEOFF		4000				NONE	NO	FLOCK
11/24/1988	712	1		MULT BIRDS	200	CRUISE						NONE	NO	NO
11/24/1988	1042	1		NONE	200	TAKEOFF						NONE	NO	NO
11/24/1988	1205	2		NONE	200	UNKNOWN						NONE	NO	NO
11/26/1988	812	1		NONE	200	LANDING		0 120			RAIN	NONE	NO	NO
11/27/1988	813	2		NONE	200	LANDING		0 128			BELOW CLOUDS	OTHER	NO	NO
11/29/1988	839	1		NONE	200	LANDING					RAIN	NONE	NO	ONE
11/30/1988	713	2		NONE	200	LANDING					RAIN	NONE	NO	NO
12/01/1988	814	1		NONE	300	UNKNOWN		50 160			CLOUDY	ATB	NO	FLOCK
12/04/1988	714	1		MULT BIRDS	200	TAKEOFF		123				ATO	NO	SEVERAL
12/05/1988	815	1		NONE	200	CLIMB		0				ATO	NO	NO
12/05/1988	840	2		NONE	200	UNKNOWN						NONE	NO	NO
12/05/1988	841	2		NONE	200	LANDING		200 130			CLEAR	NONE	NO	ONE
12/07/1988	715	2		NONE	200	LANDING		0 VR		BRIGHT	CLEAR	NONE	NO	FLOCK
12/07/1988	716	1		NONE	300	TAKEOFF						ATB	NO	FLOCK
12/07/1988	716	2		MULT	300	APPROACH						NONE	NO	FLOCK
12/07/1988	716	2		MULT	300	TAKEOFF						NONE	NO	FLOCK
12/11/1988	717	1		MULT	300	APPROACH		0 130			CLOUDY	NONE	NO	NO
12/11/1988	718	2		NONE	300	TAKEOFF						NONE	NO	NO
12/11/1988	842	1		MULT ENG	200	CLIMB					CLEAR	NONE	NO	YES

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	BIRD_MAM	BIRD_SPE	# BIRDS	WT_OZ	1	CITY_PRS	AIRPORT	LOCALE	US_INCID	ENGINE	DASH
10/08/1988	1033	1			1			DEL-LKO	AGR	AGRA, INDIA	NO	JT80	17
10/08/1988	1034	1			1			LKO	LKO	LUCKNOW, INDIA	NO	JT80	17
10/08/1988	1035	1			1					INDIA	NO	JT80	9A
10/08/1988	1035	2			1					INDIA	NO	JT80	9A
10/10/1988	792	2	MOURNING DOVE	2P105	1					DALLAS, TX	YES	JT80	9A
10/12/1988	793	2	WHITE-THROATED SWIFT	1U71	1	4.	-DAL	YVR		VANCOUVER, CANADA	YES	CFM56	3
10/13/1988	700	2			1	1.5	-PHX			PHOENIX, AZ	NO	CFM56	3
10/15/1988	1036	1	COMMON SONG THRUST	417282	1	2.5	IDR-BHO	BHO		BHOPAL, INDIA	NO	JT80	9A
10/17/1988	701	2	SNOW GOOSE	2426	1	203.	YZF-YHY	ORY		PARIS-ORLY FRANCE	NO	CFM56	3
10/19/1988	704	2			1			YHC		HAT RIVER, CANADA	NO	JT80	9A
10/20/1988	1183	2	GULL*		1			SFN		TUCUMAN, ARGENTINA	NO	JT80	9A
10/20/1988	1184	2	GULL*		1	20.	DUR-SBP	DUR		SANTA FE, ARGENTINA	NO	JT80	9A
10/21/1988	795	1	HORNED LARK	17774	1		SLL-MCT	SLL		DURBAN S. AFRICA	NO	JT80	9A
10/23/1988	833	1			1	1.5				AHMEDABAD, INDIA	NO	JT80	9A
10/23/1988	1182	1			1					SALALAH, OMAN	YES	JT80	9A
10/24/1988	798	1			1					TX	YES	JT80	17
10/24/1988	1209	2			1					JAPAN	YES	JT80	17
10/26/1988	702	2			1			CMB-GRU	CMB	CURITIBA, BRAZIL	YES	CFM56	3
10/26/1988	703	1			1			-DFW		DALLAS/FORT WORTH, TX	YES	CFM56	3
10/26/1988	704	2			1			OKC-SLC	OKC	OKLAHOMA CITY, OK	YES	CFM56	3
10/28/1988	799	1	KITE*		1			MAA-BLR	BLR	BANGALORE, INDIA	NO	JT80	17
10/31/1988	1038	2			1			PNA		PATNA, INDIA	NO	JT80	17
11/02/1988	800	2	BLACK PARTRIDGE	4L44	1	14.	EMA-ACE	PVH		EAST MIDLANDS, ENGLAND	NO	JT80	15
11/03/1988	705	2			1			HYD		PORTO VELHO, BRAZIL	NO	CFM56	3
11/03/1988	1039	1			1					HYDERABAD, INDIA	NO	JT80	9A
11/04/1988	802	1			1					TAIWAN	NO	JT80	9A
11/05/1988	803	1			1					BIRMINGHAM, AL	YES	JT80	7
11/07/1988	706	1	HAUK*		1			BHM		MIDLAND/ODESSA, TX	YES	CFM56	3
11/07/1988	707	2	COMMON LAPWING	5N1	1	7.6		MAF		AMSTERDAM, NETHERLANDS	YES	CFM56	3
11/07/1988	804	2	BROWN-HOODED GULL	14N35	1	10.1	MDO-BUE	MDO		MAR DEL PLATA, ARGENTINA	NO	CFM56	3
11/09/1988	834	1			1			MOP		MINDIPIANA, INDONESIA	NO	JT80	9A
11/09/1988	805	1			1			SRO-TPA	SRO	SARASOTA, FL	YES	JT80	9
11/09/1988	806	1			1			BFN-JNB	BFN	BLOENFONTEIN S. FRICA	NO	JT80	17A
11/12/1988	807	1			1			YOM-YTZ	YOM	OTTAWA, CANADA	NO	JT80	9A
11/12/1988	808	1			1			BHI		BAHIA BLANCA, ARGENTINA	NO	JT80	9A
11/13/1988	835	2			1			-LGW	LGW	LONDON-GATWICK, ENGLAND	YES	CFM56	3
11/14/1988	708	1			1			MCI-DEN		MO-CO	YES	JT80	17
11/16/1988	808	1			1			DAY-ORD		OH-IL	YES	JT80	7B
11/17/1988	809	2			1			MAA-BLR	BLR	BANGALORE, INDIA	NO	JT80	17
11/17/1988	1040	1			1						NO	JT80	15
11/18/1988	836	2	GULL*		1			CGN-HAM	HAM	HAMBURG, GERMANY	NO	JT80	15
11/18/1988	837	2	AMERICAN WIGEON	2J71	1	28.	PDX-SFO	PDX		PORTLAND, OR	YES	JT80	7
11/19/1988	810	1			1			IXV-UDR	UDR	UDAIPUR, INDIA	NO	JT80	9A
11/20/1988	1041	1			1			GRZ		GRAZ, AUSTRIA	NO	JT80	15
11/20/1988	838	2	GULL*		1			CMB		CURITIBA, BRAZIL	NO	CFM56	3
11/21/1988	709	1	BURROWING OWL	2S102	1	5.3					NO	CFM56	3
11/22/1988	710	2			1						NO	CFM56	3
11/23/1988	711	2	STARLING*		1			PJE		TAMPA/ST PETERSBURG, FL	YES	CFM56	3
11/23/1988	811	1	STARLING*		1			BH2-MIN	BH2	BELO HORIZONTE, BRAZIL	NO	CFM56	3
11/24/1988	712	1			1			-LHR		LONDON-HEATHROW, ENGLAND	NO	CFM56	3
11/24/1988	1042	1			1			CMB-TRZ	CMB	COLOMBO, SRI LANKA	NO	CFM56	3
11/24/1988	1205	2			1						NO	JT80	17
11/26/1988	812	1	OWL*		1			CPT-PLZ	PLZ	PORT ELIZABETH, S. AFRICA	YES	JT80	17A
11/27/1988	813	2	HADADA 1B1S	6112	1	48.	DUR-ELS	ELS		EAST LONDON, S. AFRICA	NO	JT80	15A
11/29/1988	839	1			1			MLA		MALTA, MEDITERRANEAN SEA	NO	JT80	15
11/30/1988	713	2	BLACK-HEADED GULL	14N36	1	9.7	AMS-ENS	BRU		NETHERLANDS	NO	CFM56	3
12/01/1988	814	1	HERRING GULL	14N14	1	40.		LST		BRUSSELS, BELGIUM	NO	JT80	15A
12/04/1988	714	1	FLOWER*		1			BHI		LAUNCESTON, AUSTRALIA	NO	CFM56	3
12/05/1988	815	1	GULL*		1					BAHIA BLANCA, ARGENTINA	NO	JT80	15A
12/05/1988	840	2			1			HND		TOKYO-HANEDA, JAPAN	NO	JT80	9A
12/05/1988	841	2			1	10.		GSP		GREENVILLE, SC	YES	CFM56	3
12/07/1988	715	2			1			FRA		FRANKFURT, GERMANY	YES	CFM56	3
12/07/1988	716	1			1			FRA		FRANKFURT, GERMANY	NO	CFM56	3
12/07/1988	716	2			1			DUS-TFS	DUS	DUSSELDORF, GERMANY	NO	CFM56	3
12/11/1988	717	1	GULL*	5N1	1	7.7		-AMS		AMSTERDAM, NETHERLANDS	NO	CFM56	3
12/11/1988	718	2	COMMON LAPWING	14N35	1	10.1		BHI		BAHIA BLANCA, ARGENTINA	NO	JT80	9A
12/11/1988	842	1	BROWN-HOODED GULL		1						NO	JT80	9A

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	DMG CODE	SEVERITY	POW LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
10/08/1988	1033			9				NO	
10/08/1988	1034			9				NO	
10/08/1988	1035			9				NO	
10/08/1988	1035			9				NO	
10/10/1988	792			9				NO	FOUND ON GRD INSPEC.
10/12/1988	793			9	NONE			NO	
10/13/1988	700			9	NONE			NO	
10/15/1988	1036			9	NONE			NO	
10/17/1988	701	A,C		9				NO	1 F BLD BENT
10/19/1988	794			9				NO	
10/20/1988	1183			3	NONE			NO	1 STG FAN ASSEMBLY CHANGED
10/20/1988	1184	A,D		2				NO	10 OTHER FBlds SEVERE DAM, DAM THRU COMP
10/21/1988	795			2				NO	FOUND ON GRD INSPEC
10/22/1988	1037	A,I,K		1	COMPRESSOR	HIGH		NO	
10/23/1988	833			9	NONE			NO	BENT F Blds REPLACED FAN ASSEMBLY
10/23/1988	1182			1				NO	5 F Blds SHINGLED
10/24/1988	798			9				NO	'LOUD VIBRATING SOUND' FROM ENGINE
10/24/1988	1209	A,D		2				NO	
10/26/1988	702	A,H		3	NONE			NO	ENGINE CHANGE, 1STG F Blds REPLACED
10/26/1988	703			2				NO	ENG REMOVED, ENG SURGED TWICE ON POW RED
10/26/1988	704	A,D		9				NO	
10/28/1988	799			9				NO	
10/28/1988	1038			2				NO	
10/31/1988	800	A,D,G		2	COMPRESSOR		IDLE	NO	
11/02/1988	801	A,D,M,N		2	NONE			NO	VOLUNTARY
11/03/1988	705	A,C		3				NO	YES
11/03/1988	1039			3				NO	NO
11/04/1988	802	A,C		9				NO	1 F BLD CHANGED
11/05/1988	803			3				NO	LOUD BANG AT LIFTOFF
11/07/1988	706	A,D,H		2	COMPRESSOR			NO	3 FAN OGV'S DAMAGED
11/07/1988	707	A,D,H		2				NO	7 F Blds WITH TRAILING EDGE TIP CURL
11/07/1988	804	A,I,K		9	COMPRESSOR	HIGH		NO	SEVERE GAS PATH DAMAGE
11/07/1988	834			1				NO	
11/09/1988	805			9				NO	
11/09/1988	806	A,E,G,K		1	COMPRESSOR			NO	AC SWUNG TO LEFT, DAMAGE THRU GAS PATH
11/12/1988	807			9				NO	ODOR IN CABIN
11/13/1988	835	A,C,K		2				NO	SMALL DAM IN 13TH STG COMP
11/14/1988	708			9	NONE			NO	
11/16/1988	808	A,G		2				NO	FOUND ON GRD INSPEC, C1-C2 DAMAGE
11/17/1988	809	A,D		2				NO	FOUND ON GRD INSPEC, C1 DISK+Blds REPLACED
11/17/1988	1040			9				NO	LPC DAMAGE
11/18/1988	836	A,M,K,N		1				NO	
11/18/1988	837			9	NONE			NO	
11/19/1988	810	A,B,G,K		1	SPOOL DOWN			NO	INVOLUNTARY
11/19/1988	1041			9				NO	3X5IN LE PIECE LIBERATED
11/21/1988	838			2				NO	
11/22/1988	710			9				NO	
11/23/1988	811	A,B,C		9				NO	
11/23/1988	811	A,I		3	NONE	1.3		NO	FOUND ON SHOP INSPEC. FOR OTHER REASON
11/24/1988	712			1	YES	HIGH		NO	TRYS FRAC .75IN ABOVE MIDSPAN SHROUD
11/24/1988	1042			9	NONE			NO	N1 ENG CORE INLET PARTIALLY BLOCKED
11/24/1988	1205	A,D		2				NO	CHANGED FAN DUE TO BENT Blds # UNK
11/26/1988	812	A,C		3				NO	FAN CHANGE, ING WHILE IN REVERSE THRUST
11/27/1988	813	A,D		2				NO	
11/29/1988	839			9	NONE			NO	
11/30/1988	713			2				NO	
12/01/1988	814	A,H,I,N		1	COMPRESSOR	HIGH	CUTOFF	NO	FOUND ON GRD INSPEC
12/04/1988	714	A,C,H		1		HIGH		NO	ONE F BLD TRVS FRAC 100% LOSS OF THRUST
12/05/1988	815	A,D		1				NO	ACOUSTIC LINING AT REAR OF FBlds MISSING
12/05/1988	840	A,D		2	NONE			NO	EPR SYMPTOM
12/05/1988	841			2				NO	4 F Blds BENT
12/07/1988	715	A,C		2				NO	
12/07/1988	716			3				NO	1 F BLD BENT AT TIP
12/07/1988	716			9	NONE			NO	
12/11/1988	717	A,H		3				NO	
12/11/1988	718			9	NONE			NO	4 F Blds MARKED DUE TO SHINGLING
12/11/1988	842	A,C		3	NONE	4.0		NO	FOUND ON GRD INSPEC.

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	BIRD NAM	BIRD SPE	# BIRDS	WT OZ	1	CTY	PRS	AIRPORT	LOCALE	US	INCID	ENGINE	DASH
12/11/1988	842	2	BROWN-WOODEN GULL	14N35	*	10.1				BHI	BAHIA BLANCA, ARGENTINA	NO		JT80	9
12/12/1988	843	2	DUCK*	4N1	*	32				TIJ	TOITORI, JAPAN	NO		JT80	15A
12/13/1988	816	2	COMMON OYSTERCATCHER			8				AKL	AUKLAND, NEW ZEALAND	NO		JT80	17
12/14/1988	1043	2									INDIA	NO		JT80	9A
12/15/1988	517	1									ARGENTINA	NO		CFN56	3
12/18/1988	719	2	HERRING GULL	14N14	1	40.				AMS-FCO	AMSTERDAM, NETHERLANDS	YES		JT80	17A
12/19/1988	818	2	HERRING GULL	14N14	1	40.				ANC-ADD	KODIAK, ALASKA	YES		CFN56	3
12/19/1988	720	2	PARTRIDGE*							ISP-PIT	LONG ISLAND, NY	YES		CFN56	3
12/19/1988	810	1								SAL-BUE	SALTA, ARGENTINA	NO		JT80	9A
12/20/1988	820	2	GULL*							BFN-KIM	BLOEMFONTEIN, S. AFRICA	NO		JT80	17A
12/20/1988	844	2	KIEWIT*	2P9	1	18.				BFN-JNB	OITA, JAPAN	NO		JT80	17A
12/21/1988	821	1	KIEWIT*	14N12	*					BFN-DID	BLOEMFONTEIN, S. AFRICA	NO		JT80	17A
12/21/1988	822	2	WOOD PIGEON	17Z74	1	5.				BFN-DID	BLOEMFONTEIN, S. AFRICA	NO		JT80	17A
12/22/1988	721	1	RING-BILLED GULL							ALB-PHL	PHILA, PA	YES		CFN56	3
12/23/1988	797	1	HORNED LARK							-HOU	HOUSTON, TX	YES		JT80	3
12/25/1988	722	2	GULL*							LAX-SJC	SAN JOSE, CA	YES		CFN56	3
12/25/1988	723	1								SAT-DAL	SAN ANTONIO, TX	YES		CFN56	3
12/25/1988	823	2								PEK-	CHINA	NO		JT80	17A
12/28/1988	724	2								-PHX	PHOENIX, AZ	YES		CFN56	3
12/30/1988	725	1								DAL	DALLAS/FT WORTH, TX	YES		CFN56	3
12/31/1988	726	2								SMF	SACRAMENTO, CA	YES		CFN56	3
12/31/1988	727	1								DAL	DALLAS/FT WORTH, TX	YES		CFN56	3
12/31/1988	824	1	DOVE*							CPT-JNB	CAPE TOWN, S. AFRICA	NO		CFN56	3
01/03/1989	825	2								YVC-YXD	CANADA	NO		JT80	9A
01/06/1989	826	2								MOG-	ARGENTINA	NO		JT80	15A
01/08/1989	827	1	STARLING*		1					BFN-JNB	BLOEMFONTEIN, S. AFRICA	NO		JT80	17A
01/11/1989	863	1	STARLING*		*					LST-MEL	LAUNCESTON, AUSTRALIA	NO		CFN56	3
01/11/1989	863	2								LST-MEL	LAUNCESTON, AUSTRALIA	NO		CFN56	3
01/13/1989	864	2	PIGEON*		1	14.				DTW-MDW	CHICAGO, IL-MIDWAY	YES		CFN56	3
01/16/1989	865	2			2					-LGM	LONDON-GATWICK, ENGLAND	NO		CFN56	3
01/19/1989	828	2			1					LAX-YVR	LOS ANGELES, CA	YES		JT80	17
01/19/1989	829	2			1					HNM-HNL	HANA, HAWAII	YES		JT80	9A
01/20/1989	866	2			1					-FRA	CORPUS CHRISTI, TX	YES		CFN56	3
01/22/1989	845	2			1					JDH-UOR	ALASKA	YES		CFN56	3
01/23/1989	1044	2			1					ADQ-ANC	INDIA	NO		JT80	9A
01/27/1989	867	1	KIEWIT*		1					JDM-KIM	JODHPUR, INDIA	NO		JT80	9A
01/27/1989	867	2			1					UTN-KIM	KIMBERLEY, S. AFRICA	NO		JT80	9A
01/27/1989	868	2			1					-GRU	SAO PAULO, BRAZIL	NO		CFN56	3
01/29/1989	869	2	BLACK-HEADED GULL	14N36	1	9.7				-GIG	RIO DE JANEIRO, BRAZIL	NO		CFN56	3
01/29/1989	870	2			1					PALMA	LOS ANGELES, CA	YES		CFN56	3
01/30/1989	871	2			1					LAX	PALMA, MALLORCA IS, SPAIN	NO		CFN56	3
02/05/1989	847	1	COMMON LAPWING		1					LHX	LIHUE, KAUAI, HAWAII	YES		CFN56	3
02/05/1989	1046	1	DOVE*	SN1	1	7.7				LIH	LIHUE, KAUAI, HAWAII	YES		CFN56	3
02/06/1989	848	1			1					DUS-CPH	DUSSELDORF, GERMANY	NO		CFN56	3
02/07/1989	848	1			1					MAA	MADRAS, INDIA	NO		CFN56	15
02/08/1989	850	2	FALCON*		1	10.				LIH-MAU	LIHUE, KAUAI, HAWAII	YES		JT80	9A
02/08/1989	872	2	MALLARD*		1					MOH-JNB	WINDHOEK, NAMIBIA	NO		JT80	9A
02/10/1989	1208	2			1					MYR	LOS ANGELES, CA	YES		CFN56	3
02/11/1989	849	1			1					HYD-HYO	MYRTLE BEACH, SC	YES		JT80	15
02/11/1989	1194	1			2	32.				PLZ-ELS	INDIA	NO		JT80	17A
02/12/1989	851	1			1					PLZ	PORT ELIZABETH, S. AFRICA	YES		JT80	17A
02/14/1989	873	1	SWALLOW*		1					ORF	NORFOLK, VA	YES		JT80	7
02/15/1989	852	2			1					-FRA	FRANKFURT, GERMANY	NO		CFN56	3
02/15/1989	874	1			1					KIM	KIMBERLEY, S. AFRICA	NO		JT80	17A
02/16/1989	853	1			1					LPH	GRAY CANARIA, CANARY ISL	NO		CFN56	3
02/20/1989	875	2	SWALLOW*		1					YHZ-YYT	HALIFAX, CANADA	NO		JT80	9A
02/21/1989	1193	1			1					TCT	TENERIFE, CANARY ISL	NO		CFN56	3
02/21/1989	876	2			1					LAX	LOS ANGELES, CA	YES		JT80	9
02/22/1989	854	1	KIEWIT*		1					-PHX	PHOENIX, AZ	NO		CFN56	3
02/22/1989	877	1	GULL*		1					CPT-JNB	CAPE TOWN, S. AFRICA	NO		JT80	17A
02/24/1989	1191	2	GULL*		1					BEG-MOM	BELGRADE, YUGOSLAVIA	NO		CFN56	3
02/24/1989	1192	1	HAWK*		1					PHL	PHILA, PA	YES		JT80	15
02/26/1989	855	1	KIEWIT*		1					MSY	NEW ORLEANS, LA	YES		CFN56	3
02/27/1989	878	1			1					BFN-KIM	BLOEMFONTEIN, S. AFRICA	NO		JT80	9
										-TFS	TENERIFE, CANARY ISL	NO		CFN56	3

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	ETIME	SIGN_EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LI_CONDS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
12/11/1988	842	2	9:20:00	MULT	ENG	CLIMB								
12/12/1988	843	2	18:15:00	MULT	BIRDS	TAKEOFF	50	125			BELOW CLOUDS	NONE	NO	YES
12/13/1988	816	2	10:22:00	MULT	BIRDS	TAKEOFF	50				RAIN	ATB	NO	FLOCK
12/13/1988	1043	2		NONE		UNKNOWN								
12/14/1988	817	1		NONE		UNKNOWN								
12/15/1988	719	2	16:40:00	NONE		UNKNOWN								
12/18/1988	818	2	15:00:00	MULT	BIRDS	TAKEOFF	0	130	IFR	DARK	RAIN	NONE	NO	ONE
12/19/1988	819	2	7:45:00	NONE		LANDING	70				RAIN	NONE	NO	FLOCK
12/20/1988	820	2	10:30:00	NONE		CLIMB	1500		VFR		CLEAR	ATO	NO	SEVERAL
12/20/1988	844	2	10:30:00	NONE		TAKEOFF	0	133			RAIN	ATO	YES	ONE
12/21/1988	821	1	12:20:00	NONE		CLIMB	100	130			CLEAR	NONE	NO	NO
12/21/1988	821	1	7:00:00	MULT	ENG-BIRDS	TAKEOFF	20	145			CLEAR	NONE	NO	FLOCK
12/21/1988	821	2	7:00:00	MULT	ENG-BIRDS	TAKEOFF	20	145			CLEAR	NONE	NO	FLOCK
12/21/1988	822	2	7:00:00	MULT	ENG-BIRDS	UNKNOWN								
12/21/1988	822	2	7:00:00	MULT	ENG-BIRDS	UNKNOWN								
12/22/1988	721	1	8:00:00	NONE		LANDING	0						NO	ONE
12/23/1988	797	1	8:45:00	NONE		UNKNOWN	0	+V1	VFR	BRIGHT	CLEAR	NONE	NO	ONE
12/25/1988	722	2	8:45:00	NONE		LANDING	0						NO	ONE
12/25/1988	723	1	8:45:00	NONE		TAKEOFF	0						NO	FLOCK
12/25/1988	823	2		NONE		UNKNOWN								
12/28/1988	724	2		NONE		UNKNOWN								
12/30/1988	725	1	17:36:00	NONE		UNKNOWN								
12/31/1988	726	2	17:36:00	NONE		UNKNOWN								
12/31/1988	727	2	17:36:00	MULT	BIRDS	TAKEOFF	0	140			OVERCAST	NONE	NO	NO
12/31/1988	824	1	8:34:00	NONE		APPROACH	3600	210			OVERCAST	ATB	NO	ONE
12/31/1988	824	2	8:34:00	NONE		TAKEOFF	0	VR			OVERCAST	NONE	YES	FLOCK
01/03/1989	825	2	8:34:00	NONE		TAKEOFF	0	VR			CLEAR	ATB	NO	NO
01/06/1989	826	2		NONE		TAKEOFF	0	145						
01/08/1989	826	2		NONE		UNKNOWN								
01/08/1989	827	2		NONE		UNKNOWN								
01/11/1989	863	1	12:45:00	MULT	ENG-BIRDS	LANDING	0	VR	VFR		OVERCAST, DRY	ATO	NO	FLOCK
01/11/1989	863	2	12:45:00	MULT	ENG-BIRDS	TAKEOFF	0	VR	VFR		OVERCAST, DRY	DIV	NO	FLOCK
01/13/1989	864	2	12:30:00	MULT	ENG-BIRDS	TAKEOFF	0	VR	VFR		OVERCAST, DRY	DIV	NO	SEVERAL
01/16/1989	865	1	12:30:00	NONE		APPROACH	0							
01/19/1989	828	2		NONE		UNKNOWN								
01/19/1989	829	2		MULT	BIRDS	TAKEOFF	0	50					NO	YES
01/19/1989	829	2		MULT	BIRDS	TAKEOFF	0	50					NO	YES
01/19/1989	1203	1		NONE		TAKEOFF	100	140	IFR	DAY	FOG	ATB	NO	YES
01/20/1989	866	2		NONE		TAKEOFF	0							
01/22/1989	845	2	16:00:00	NONE		LANDING	0							
01/23/1989	1044	2	16:00:00	NONE		UNKNOWN								
01/23/1989	1044	2	16:00:00	NONE		UNKNOWN								
01/23/1989	1045	1	16:00:00	NONE		TAKEOFF	0							
01/27/1989	846	1	19:20:00	NONE		TAKEOFF	0							
01/27/1989	867	1	19:20:00	NONE		UNKNOWN								
01/27/1989	868	2	19:20:00	NONE		UNKNOWN								
01/29/1989	869	2	19:20:00	NONE		UNKNOWN								
01/29/1989	870	2	19:20:00	NONE		UNKNOWN								
01/29/1989	1204	2	19:20:00	NONE		TAXI	0							
01/30/1989	871	2	19:20:00	MULT	BIRDS	TAKEOFF	0	-V1						
02/05/1989	847	1		NONE		TAKEOFF	0	130						
02/05/1989	1046	1		NONE		TAKEOFF	0							
02/07/1989	848	1		MULT	BIRDS	LANDING	50		VFR	DAY	CLEAR	NONE	NO	SEVERAL
02/07/1989	850	2	20:20:00	NONE		TAKEOFF	0							
02/08/1989	872	2	20:20:00	NONE		TAKEOFF	0	70	VFR	DAY	PARTLY CLOUD	ATO	NO	SEVERAL
02/08/1989	872	2	20:20:00	MULT	BIRDS	TAKEOFF	0							
02/10/1989	1208	2		NONE		APPROACH								
02/10/1989	1047	2		NONE		TAKEOFF	20	145						
02/11/1989	849	1	14:32:00	NONE		CLIMB	200	145						
02/11/1989	1194	1	14:32:00	MULT	BIRDS	LANDING	200	145						
02/12/1989	851	1		NONE		UNKNOWN								
02/14/1989	873	2	10:44:00	NONE		UNKNOWN								
02/14/1989	873	2	10:44:00	NONE		UNKNOWN								
02/15/1989	852	2	10:44:00	MULT	BIRDS	TAKEOFF	0	130						
02/15/1989	874	1		NONE		TAKEOFF	0							
02/16/1989	853	1		NONE		LANDING								
02/20/1989	875	2		NONE		UNKNOWN								
02/20/1989	1193	1		NONE		UNKNOWN								
02/21/1989	876	2		NONE		TAKEOFF								
02/22/1989	854	1	23:27:00	NONE		TAKEOFF	5	140	VFR	DAY	RAIN	NONE	NO	YES
02/22/1989	854	1	23:27:00	NONE		TAKEOFF	0	120						
02/22/1989	877	1	23:27:00	NONE		TAKEOFF	0	125	VFR	NIGHT	CLEAR	ATB	NO	SEVERAL
02/24/1989	1191	2	20:00:00	NONE		CLIMB	3500	220			ABOVE CLOUDS	NONE	NO	FLOCK
02/24/1989	1192	1	20:00:00	NONE		LANDING	50	140	VFR		PARTLY CLOUD	NONE	YES	ONE
02/26/1989	855	1	20:00:00	NONE		TAKEOFF	50	140						
02/27/1989	878	1	20:00:00	NONE		UNKNOWN								

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	DMG CODE	SEVERITY	POW LOSS	MAX VIBE	THRUSTLE	IFSD	REMARKS
12/11/1988	842		A,C	3	NONE			NO	
12/12/1988	843			9					
12/13/1988	816			9		YES			
12/13/1988	1043		A,H	3	NONE				
12/14/1988	817			9					
12/15/1988	719		A,C	3	NONE				DOOR IN CABIN
12/18/1988	818			3					2 FBLDS SHINGLED, OTHER BLDLS LIGHT DENTS
12/19/1988	720			3					
12/19/1988	819		A,C,H	3	NONE				
12/20/1988	820			3					
12/20/1988	844		A,H	3	NONE				
12/21/1988	821			9					
12/21/1988	821			9					
12/21/1988	822		A,C	3	NONE				SEVERE DAMAGE ON C12 BLDLS AND C11 STATOR
12/22/1988	721			3					FOUND ON GRD INSPEC
12/23/1988	797			9					
12/25/1988	722			9					
12/25/1988	723			9					
12/25/1988	823		A,C,H	4					ATO/STALL ON 12/27 CORE DAM UNK CAUSE
12/28/1988	724			3					ENGINE REMOVED, 3 F BLDLS REPLACED
12/30/1988	725		A,C,H	3			IDLE		FOUND ON GRD INSPEC
12/31/1988	726		A,J	2					ENG NOISE CHANGED AT ROTATION
12/31/1988	727		A	4			IDLE		SPINNER BATTERED
12/31/1988	824			9	SLIGHT				ENG NOISE CHANGED AT ROTATION
01/03/1989	825		A,C,K	2					EPR SYMPTOM, SLIGHT MOMENTARY POW LOSS
01/06/1989	826		A,C	3		SOME			FOUND ON GRD INSPEC, 2 F BLDLS MINOR BENDS
01/08/1989	827			3	YES				
01/11/1989	863		A,B,H	3			RETARD		
01/11/1989	863		A,B,H	3		4.0			PILOT REDUCED POWER TO REDUCE VIBS
01/13/1989	864			3					FOUND ON GRD INSPEC
01/16/1989	845			9		HIGH			AC YAWED, NOTICEABLE CHANGE IN ENG PARAM
01/19/1989	828		A,C,H	3	COMPRESSOR				PM EVENT
01/19/1989	829			9					FOUND ON GRD INSPEC
01/19/1989	1203		A,C	3					FOUND ON GRD INSPEC
01/20/1989	866			9					
01/22/1989	845			9					
01/23/1989	1044			9					
01/23/1989	1045			9					
01/27/1989	846			9					
01/27/1989	867		A,H	3					
01/27/1989	868		A,H	3					FOUND ON GRD INSPEC, 2 F BLDLS CHANGED
01/29/1989	869			3					FOUND ON GRD INSPEC
01/29/1989	870		A,D	2		IDLE			
01/29/1989	1204		A,H	2					AM EVENT
01/30/1989	871			9		3.5			
02/05/1989	847		A,D	2		2.0			
02/05/1989	1046			9					DOOR, 5 F BLDLS BENT
02/06/1989	848			3					DOOR, 2 ADJACENT BLDLS BENT, AM EVENT
02/07/1989	850		A,C	3					DOOR
02/07/1989	872		A,H	3					ENG CHANGE
02/08/1989	1208		A	4		HIGH			FOUND ON GRD INSPEC
02/10/1989	1047			9					PM EVENT
02/11/1989	849			9					FOUND ON GRD INSPEC, ENG CHANGED
02/11/1989	1194			9					DOOR
02/12/1989	851		A	4					AM EVENT, DOOR
02/14/1989	873			9					FOUND ON GRD INSPEC, 1F BLD LE DISTORTED
02/15/1989	852			9					AC YAWED
02/15/1989	852			9					DOOR, 4 F BLDUS SHINGLED, 2 REPLACED
02/15/1989	852		A,H	3					PM EVENT
02/16/1989	853		A,C	3					
02/20/1989	875			3					
02/20/1989	1193		A,C	3					FOUND ON GRD INSPEC
02/21/1989	876		A,B	3					DOOR
02/22/1989	854			9					
02/22/1989	877		A,H	3	COMPRESSOR				
02/24/1989	1101			9		4.0			
02/26/1989	1102		A,H	3					
02/26/1989	855			9					FOUND ON GRD INSPEC
02/27/1989	878			9					



SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL	RULES	LT	COMDS	WEATHER	CREW	AC	CREW	AL	BIRD	SEE
															NONE	YES	NONE	YES	FLOCK	
02/28/1989	1201	1		NONE		200	TAKEOFF							CLEAR	NONE		NONE			
03/02/1989	856	2	6:57:00	NONE		200	TAKEOFF		4	160		DAY		CLEAR	NONE		NONE			YES
03/02/1989	879	1		NONE		300	UNKNOWN		0	80					NONE		NONE			YES
03/02/1989	1048	1		NONE		200	UNKNOWN								NONE		NONE			YES
03/03/1989	857	2		TRVS	FRAC	200	UNKNOWN								NONE		NONE			
03/03/1989	880	1		NONE		300	UNKNOWN								NONE		NONE			ONE
03/03/1989	1202	1		NONE		300	LANDING		10	120		DAY		CLEAR	NONE		NONE			NO
03/05/1989	881	1		NONE		300	UNKNOWN								NONE		NONE			NO
03/05/1989	936	1		NONE		200	TAKEOFF								NONE		NONE			NO
03/06/1989	1316	1		NONE		300	UNKNOWN								NONE		NONE			NO
03/08/1989	937	1		NONE		200	TAKEOFF		1000					CLEAR	NONE		NONE			NO
03/09/1989	1049	1	6:40:00	NONE		200	CLIMB		0						ATB		NONE			YES
03/10/1989	938	1		NONE		200	TAKEOFF		0						ATB		NONE			YES
03/12/1989	858	1		NONE		300	LANDING		0						ATB		NONE			YES
03/14/1989	882	2		NONE		200	UNKNOWN								NONE		NONE			FLOCK
03/15/1989	939	1		NONE		200	UNKNOWN								NONE		NONE			NO
03/16/1989	940	2		NONE		200	UNKNOWN								NONE		NONE			NO
03/18/1989	859	2	13:45:00	NONE		200	TAKEOFF		0	70		DAY		CLEAR	NONE		NONE			ONE
03/18/1989	861	1	17:10:00	MULT	BIRDS	200	TAKEOFF		0			NIGHT		CLEAR	ATO		NONE			FLOCK
03/17/1989	883	2		NONE		400	LANDING		3000			NIGHT		PARTLY CLOUD	NONE		NONE			ONE
03/20/1989	884	1		NONE		300	APPROACH								NONE		NONE			NO
03/23/1989	860	1		TRVS	FRAC	200	UNKNOWN								NONE		NONE			NO
03/23/1989	941	1		NONE		200	UNKNOWN								NONE		NONE			NO
03/24/1989	885	1		NONE		300	UNKNOWN								NONE		NONE			NO
03/24/1989	886	1		NONE		300	UNKNOWN								NONE		NONE			NO
03/28/1989	887	1		NONE		300	UNKNOWN								NONE		NONE			NO
03/31/1989	888	1	8:00:00	NONE		300	TAKEOFF		0	10		BRIGHT			NONE		NONE			YES
03/31/1989	942	2		NONE		200	UNKNOWN								NONE		NONE			NO
04/01/1989	889	1		NONE		300	LANDING		0	110				OVERCAST	NONE		NONE			NO
04/01/1989	1050	1		NONE		200	UNKNOWN								NONE		NONE			NO
04/02/1989	1051	1		NONE		200	LANDING		0						NONE		NONE			NO
04/02/1989	1199	2		NONE		300	LANDING		0			DAY		CLEAR	NONE		NONE			SEVERAL
04/03/1989	890	1	9:15:00	NONE		300	UNKNOWN		0	200		DAY		CLEAR	NONE		NONE			ONE
04/04/1989	891	1		NONE		300	UNKNOWN		0			DAY		CLEAR	NONE		NONE			NO
04/07/1989	892	2		NONE		300	TAKEOFF								NONE		NONE			YES
04/08/1989	893	2		NONE		300	TAKEOFF								NONE		NONE			NO
04/08/1989	894	1		NONE		300	UNKNOWN		0						NONE		NONE			NO
04/08/1989	895	1	20:40:00	NONE		300	TAKEOFF		0						NONE		NONE			NO
04/09/1989	896	2		NONE		300	APPROACH								NONE		NONE			NO
04/10/1989	862	2		NONE		200	UNKNOWN								NONE		NONE			NO
04/11/1989	897	2		NONE		200	TAKEOFF		0						NONE		NONE			NO
04/11/1989	898	2		NONE		400	LANDING								NONE		NONE			NO
04/13/1989	898	2		NONE		300	CLIMB								NONE		NONE			NO
04/14/1989	1181	1		NONE		200	UNKNOWN								NONE		NONE			NO
04/15/1989	899	2		NONE		300	TAKEOFF		0						NONE		NONE			NO
04/16/1989	900	2	16:00:00	NONE		300	TAKEOFF		0			CLEAR		CLEAR	NONE		NONE			NO
04/16/1989	943	2		NONE		200	TAKEOFF								NONE		NONE			NO
04/16/1989	944	1		NONE		200	UNKNOWN								NONE		NONE			NO
04/19/1989	901	1		NONE		300	UNKNOWN		0						NONE		NONE			NO
04/19/1989	946	1		NONE		200	TAKEOFF		0						NONE		NONE			NO
04/20/1989	947	2	20:00:00	NONE		200	APPROACH		700						NONE		NONE			NO
04/21/1989	948	2	11:30:00	NONE		200	CLIMB		530						ATB		NONE			FLOCK
04/21/1989	949	2		NONE		200	LANDING								NONE		NONE			NO
04/21/1989	1052	1		NONE		200	UNKNOWN								NONE		NONE			NO
04/23/1989	950	1		NONE		200	TAKEOFF								NONE		NONE			NO
04/23/1989	951	1		NONE		200	UNKNOWN								NONE		NONE			NO
04/25/1989	902	1	15:45:00	NONE		300	TAKEOFF		0	80		BRIGHT			ATO		NONE			YES
04/26/1989	903	2		NONE		300	UNKNOWN								NONE		NONE			NO
04/27/1989	952	2		NONE		200	TAKEOFF								NONE		NONE			FLOCK
04/27/1989	953	2	9:45:00	NONE		200	TAKEOFF		100						ATB		NONE			NO
04/28/1989	904	2		MULT	BIRDS	200	TAKEOFF								NONE		NONE			NO
04/28/1989	905	2		NONE		300	UNKNOWN								NONE		NONE			NO
04/29/1989	906	1		NONE		300	UNKNOWN								NONE		NONE			NO
04/30/1989	907	2		NONE		300	UNKNOWN								NONE		NONE			NO
04/30/1989	954	1	19:31:00	NONE		200	UNKNOWN								NONE		NONE			NO
04/30/1989	1200	1		NONE		200	TAKEOFF		2700	190		NIGHT		BELOW CLOUDS	NONE		NONE			FLOCK
05/06/1989	1053	1		NONE		200	CLIMB		0						NONE		NONE			ONE
05/07/1989	908	1	18:00:00	MULT	BIRDS	300	TAKEOFF		0			LIGHT		CLOUDY	ATO		NONE			YES
05/07/1989	955	1		NONE		200	LANDING		150						NONE		NONE			NO

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	BIRD NAM	BIRD SPE	# BIRDS	WT OZ	1	CTY	PRS	AIRPORT	LOCALE	US. INCD	ENGINE	DASH
02/28/1989	1201	1	SPUR-WINGED PLOVER	5N24	1	12.	WLG-AKL	MSY		KENNER LA	YES	JT8D	7B	
03/02/1989	856	2			1		TGD-BEG	WLG		WELLINGTON, NEW ZEALAND	NO	CFM56	3	
03/02/1989	879	1			1		-TRV			YUGOSLAVIA	NO	JT8D	17	
03/02/1989	1048	1	MOURNING DOVE	2P105	1	4.	-PHX	MAF		INDIA	YES	JT8D	15	
03/03/1989	880	1			1		-DAL			PHOENIX, AZ	YES	CFM56	3	
03/03/1989	880	1	MEADOW LARK*		1					MIDLAND, TX	YES	CFM56	3	
03/05/1989	881	1	PURPLE MARTIN	18212	1	2.				DALLAS/FT WORTH, TX	YES	CFM56	3	
03/05/1989	936	1	GREY-HEADED GULL	14N29	1	7.6	LIT			LITTLE ROCK, AR	YES	JT8D	9A	
03/06/1989	1316	1			1		HAM-MUC	HAM		HAMBURG, GERMANY	NO	CFM56	3	
03/08/1989	937	1			1		HJR-VNS			INDIA	NO	JT8D	15	
03/09/1989	1049	1	BLACK KITE	3K28	1	28.		HAM		HAMBURG, GERMANY	NO	JT8D	15	
03/10/1989	938	1			1		XMN-GHO	XMN		XIAMEN, CHINA	NO	JT8D	17A	
03/12/1989	858	1	STARLING*		1		NCL-LHR	LHR		LONDON-HEATHROW, ENGLAND	NO	CFM56	3	
03/14/1989	882	2			1		-HOU			HOUSTON, TX	YES	JT8D	9A	
03/15/1989	939	1	WHITE THROATED SPARROW	682218	1	1.	DET-MDW	KIM		MILWAUKEE, WI	YES	JT8D	9A	
03/16/1989	940	2	SECRETARY*	9N4	1	20.	KIM-JNB	KIM		KIMBERLEY, S. AFRICA	YES	JT8D	17A	
03/18/1989	861	1	SPOTTED THICK-KNEE		1		UTH-JNB	UTH		UPINGTON, S. AFRICA	NO	JT8D	17A	
03/19/1989	883	2			1		CLT-LGA	LGA		LA GUARDIA, NY	YES	CFM56	3	
03/20/1989	884	1			1			SJC		SAN JOSE, CA	YES	CFM56	3	
03/23/1989	840	1			1		PHC-			INDIA	NO	JT8D	17A	
03/23/1989	840	1			1		SEA			PORT HARCOURT, NIGERIA	NO	JT8D	15	
03/24/1989	885	1			1		BEG			SEATTLE/TACOMA, WA	YES	CFM56	3	
03/24/1989	886	1			1		PHX			BELGRADE, YUGOSLAVIA	NO	CFM56	3	
03/28/1989	887	1			1		CJU-KWJ	CJU		PHOENIX, AZ	YES	CFM56	3	
03/31/1989	885	1			1		MCI-MDW	EMA		CHEJU, KOREA	NO	CFM56	3	
04/01/1989	886	1			1					MOBILE, AL	YES	JT8D	9A	
04/01/1989	886	1			1					EAST MIDLANDS, ENGLAND	NO	CFM56	3	
04/01/1989	1050	1	GULL*	2P1	1	14.	COK-GOI	EMA		INDIA	NO	JT8D	17	
04/02/1989	1051	1	COMMON ROCK DOVE		1		IXJ-IXC	IXC		CHANDIGARH, INDIA	NO	JT8D	17	
04/03/1989	890	1			1		-DAL	DCA		WASHINGTON, DC	YES	CFM56	3	
04/04/1989	891	1			1		KHI-LHE	KHI		DALLAS, TX	YES	CFM56	3	
04/07/1989	892	1			1		FNC-BRU	FNC		KARACHI, PAKISTAN	NO	CFM56	3	
04/08/1989	893	2			1		-DAL			FUNCHAL, PORTUGAL	NO	CFM56	3	
04/08/1989	894	1	HUNGARIAN PARTRIDGE	4L85	1	14.1	FRA	FRA		DALLAS/FT. WORTH, TX	YES	CFM56	3	
04/08/1989	895	1			1		-ATH	DUS		FRANKFURT, GERMANY	NO	CFM56	3	
04/09/1989	896	2			1		ORF-ORD	ORF		DUSSELDORF, GERMANY	NO	CFM56	3	
04/10/1989	842	2			1		STN			ATHENS, GREECE	NO	CFM56	3	
04/11/1989	857	2			1		FRA-HAM	FRA		NORFOLK, VA	YES	JT8D	7	
04/13/1989	858	2			1					LONDON-STAMSTED, ENGLAND	NO	CFM56	3	
04/14/1989	1181	1			1		AMS-LHR	AMS		FRANKFURT, GERMANY	NO	CFM56	3	
04/15/1989	899	2			1		AMS-LHR	AMS		AFRICA	NO	JT8D	15	
04/16/1989	900	2			1		YHZ-YUL	AMS		AMSTERDAM, NETHERLANDS	NO	CFM56	3	
04/16/1989	943	2	HERRING GULL	14N14	1	40.	-MAF			AMSTERDAM	NO	CFM56	3	
04/16/1989	944	1	KILLDEER	5N33	1	3.				CANADA	NO	JT8D	9A	
04/19/1989	901	1	INDIAN WHITE VULTURE	3K46	1	192.	SFO-LGB	SFO		MIDLAND/ODESSA, TX	NO	JT8D	9A	
04/19/1989	906	1	CROWNED PLOVER	5N11	1	6.	DBL-DEL	DEL		SAN FRANCISCO, CA	YES	CFM56	3	
04/20/1989	947	2			1		ELS-DUR	ELS		DELHI, INDIA	NO	JT8D	17	
04/21/1989	948	2			1		SJC-SLC	SLC		EAST LONDON, S. AFRICA	NO	JT8D	17A	
04/21/1989	949	2			1		BLR-CJB			SALT LAKE CITY, UT	YES	JT8D	17	
04/21/1989	1052	1	CUCKOO	2R15	1	4.	MED-JED	MED		INDIA	NO	JT8D	9A	
04/23/1989	950	1	HORNED LARK	17Z74	1	2.	DAL-			MEDINA, SAUDI ARABIA	NO	JT8D	15	
04/23/1989	951	1	KITE HAWK*	2P1	1	14.		TSV		TX	YES	JT8D	9A	
04/25/1989	902	1	COMMON ROCK DOVE		1		-DAL			TAMMSVILLE, AUSTRALIA	NO	CFM56	3	
04/26/1989	903	2	GULL*	2P1	1	14.	CID-LNK	CID		DALLAS, TX	YES	CFM56	3	
04/27/1989	952	2	ROCK DOVE		1		ORD-LNK	ORD		CEDAR RAPIDS, IA	YES	JT8D	7B	
04/28/1989	904	2			1		-EUR			CHICAGO, ILL	YES	CFM56	3	
04/28/1989	905	1			1		-PHX			CHICAGO, ILL	YES	CFM56	3	
04/29/1989	906	1			1		-BEG			NEWARK, NJ	YES	CFM56	3	
04/30/1989	907	2			1		SJV-IAD	SAV		PHOENIX, AZ	YES	CFM56	3	
04/30/1989	934	1			1		ATL			AMSTERDAM, YUGOSLAVIA	NO	CFM56	3	
04/30/1989	1200	1			1		DEL			SAVANNAH, GA	YES	CFM56	3	
05/06/1989	1053	1			1		CIU			ATLANTA, GA	YES	CFM56	3	
05/07/1989	908	1	SWAINSON'S HAWK	3K171	2	32.	MGA-SJO	MGA		DELHI, INDIA	NO	JT8D	17	
05/07/1989	955	1			1					CHENGDU, CHINA	NO	CFM56	3	
					1					MANAGUA, NICARAGUA	NO	JT8D	9A	

SOURCE: ENGINE MANUFACTURER

DATE	EVT#	ENG POS	DWG CODE	SEVERITY	POW LOSS	MAX VIBE	THRUSTLE	IFSD	REMARKS
02/28/1989	1201	1		9	NONE			NO	PHI EVENT
03/02/1989	856	2	A,G,K	3	NONE			NO	ODOR
03/02/1989	879	1	A,B	9	NONE			NO	FOUND ON GRD INSPEC, 1F BLD LE DISTORTED
03/02/1989	1048	1		9	NONE			NO	FOUND ON GRD INSPEC
03/03/1989	857	2	A,I	1	NONE			NO	FOUND ON GRD INSPEC
03/03/1989	880	1		9	NONE			NO	ODOR, PHI EVENT
03/03/1989	1202	1		9	NONE			NO	ODOR
03/05/1989	881	1		9	COMPRESSOR			NO	
03/05/1989	936	1		9	COMPRESSOR			NO	
03/06/1989	1316	1		9	COMPRESSOR			NO	
03/09/1989	937	1		9	COMPRESSOR			NO	
03/09/1989	1049	1		9	COMPRESSOR			NO	
03/10/1989	938	1	A,G	2	NONE			NO	ODOR
03/12/1989	858	1	A,D,G	2	NONE	HIGH		NO	3 F BLDs BROKEN, 1 LARGE BIRD
03/14/1989	882	2		9	NONE			NO	
03/15/1989	939	1		9	NONE			NO	AM EVENT
03/16/1989	940	2		9	COMPRESSOR			NO	3 F BLDs DAMAGED
03/18/1989	859	2	A,B,C	3	NONE			NO	ODOR
03/18/1989	861	1	A,C,H	3	NONE			NO	FOUND ON GRD INSPEC
03/19/1989	883	2		9	NONE			NO	1 BENT F BLD
03/20/1989	884	2		9	NONE			NO	FOUND ON GRD INSPEC
03/23/1989	860	1	A,I	1	NONE			NO	FOUND ON GRD INSPEC
03/23/1989	941	1	A	4	NONE			NO	2 F BLDs WITH LE DENTS
03/24/1989	885	1	A,C	3	NONE			NO	
03/24/1989	886	1		9	NONE			NO	
03/28/1989	887	1		9	NONE			NO	
03/31/1989	888	1	A,B	3	NONE			NO	
03/31/1989	942	2		9	NONE			NO	
04/01/1989	889	1		9	NONE			NO	
04/02/1989	1050	1		9	NONE			NO	
04/02/1989	1051	1		9	NONE			NO	
04/02/1989	1199	2		9	NONE			NO	AM EVENT
04/03/1989	890	2		9	NONE	2.5		NO	2 F BLDs WITH SERVICEABLE LE TIP CURL
04/04/1989	891	1	A,B	3	NONE			NO	FOUND ON GRD INSPEC
04/07/1989	892	2		9	NONE			NO	
04/08/1989	893	2		9	NONE			NO	
04/08/1989	894	1		9	NONE			NO	
04/08/1989	895	1		9	NONE			NO	STAINS ON 3 F BLDs AND IGV'S
04/09/1989	896	2	A,B	3	NONE			NO	1 F BLD WITH LE TIP CURL
04/10/1989	862	2	A,G	2	COMPRESSOR			NO	2 IN. CHIP OUT OF FAN BLADE
04/11/1989	897	2	A	4	NONE			NO	1 F BLD DAMAGED, DAMAGE UNKNOWN
04/13/1989	898	2	A,B	3	NONE			NO	OIL COOLER CLOGGED, 3 F BLDs LE DAMAGE
04/14/1989	1181	1	A,C	3	NONE			NO	
04/15/1989	899	2	A,H	3	NONE			NO	
04/16/1989	900	2	A,H	9	NONE			NO	FOUND ON GRD INSPEC, 2 F BLDs SHINGLED
04/16/1989	943	2	A,C,G,H	3	NONE			NO	
04/16/1989	944	1		2	NONE			NO	
04/19/1989	901	1		9	NONE			EGT	
04/19/1989	946	1	A,C	3	NONE			NO	
04/20/1989	947	2		9	NONE			NO	
04/21/1989	948	2	A,B,C,G	2	NONE			NO	1 F BLD HAD 1X.75 IN PIECE BROKEN OFF
04/21/1989	949	2	A,C	2	NONE			NO	
04/21/1989	1052	1		9	NONE			NO	
04/23/1989	950	1		9	NONE			NO	
04/23/1989	951	1	A,B,G	9	NONE	2.8		NO	ACOUSTIC PANEL DAM, 6 BLDs 1X1.5IN MISS
04/25/1989	902	1		2	NONE			NO	FOUND ON GRD INSPEC
04/25/1989	903	2		9	NONE			NO	AC YAWED
04/27/1989	952	2	A,I,K,M	9	COMPRESSOR			EGT	2 BLDs TRYSFRAC, 2 BLDs BROKEN RET TANGS
04/27/1989	953	2		9	COMPRESSOR	HIGH		NO	FOUND ON GRD INSPEC
04/28/1989	904	2		9	NONE			NO	FOUND ON GRD INSPEC
04/28/1989	905	1		9	NONE			NO	FOUND ON GRD INSPEC
04/29/1989	906	1		9	NONE			NO	FOUND ON GRD INSPEC
04/30/1989	907	2	A,G	2	NONE	YES		NO	PHI EVENT
04/30/1989	954	1	A,D,G	2	NONE			NO	4 FBLDS DAM, METAL IN BEARING CHIP DECTS
05/06/1989	1200	1	A,B	3	NONE			NO	3-1ST STG BOOSTER VANES DISENGAGED
05/07/1989	908	1	A,C,G,L	3	NONE			NO	ODOR, 3 F BLDs DAMAGED
05/07/1989	955	1		2	NONE			NO	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG. POS	ETIME	SIGN. EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL. RULES	LT. CONDS	WEATHER	CREW AC	CREW AL	BIRD SEE
05/08/1989	909	1		NONE	400	APPROACH		250				NONE		
05/08/1989	910	1		NONE	300	LANDING	0	0				NONE		NO
05/08/1989	956	2		NONE	300	UNKNOWN						NONE		NO
05/10/1989	911	1		NONE	300	UNKNOWN						NONE		NO
05/12/1989	912	1		NONE	400	UNKNOWN						NONE		NO
05/14/1989	913	1		NONE	300	TAKEOFF		0 60		BRIGHT	CLEAR	ATO		NO
05/16/1989	957	1		NONE	200	LANDING		0				NONE		SEVERAL
05/17/1989	1054	2		NONE	200	UNKNOWN						NONE		YES
05/18/1989	914	1		NONE	300	TAKEOFF						ATO		
05/20/1989	915	1		NONE	300	TAKEOFF						ATO		
05/20/1989	958	1		NONE	300	UNKNOWN						NONE		
05/20/1989	1055	2		NONE	200	UNKNOWN						NONE		
05/25/1989	916	1		NONE	200	UNKNOWN						NONE		
05/25/1989	959	1		NONE	400	LANDING						NONE		
05/25/1989	960	1	19:45:00	NONE	200	TAKEOFF	4000 120		VFR	DAY	CLEAR		YES	ONE
05/26/1989	917	2		NONE	200	TAKEOFF	100 150							
05/27/1989	918	2		NONE	300	UNKNOWN						NONE		
05/31/1989	919	1		NONE	400	APPROACH						NONE		
05/31/1989	919	2		MULT ENG	400	TAKEOFF						ATB		FLOCK
05/31/1989	919	2		MULT ENG	400	TAKEOFF	0 139			DUSK	CLEAR	ATB		FLOCK
06/01/1989	1056	2		NONE	400	UNKNOWN		0 139		DUSK	CLEAR	ATB		NO
06/02/1989	920	1		NONE	200	CLIMB	3000 240		VFR	NIGHT	CLEAR			
06/02/1989	921	2		NONE	300	CLIMB								
06/02/1989	922	1		NONE	300	UNKNOWN								
06/03/1989	923	1		NONE	300	APPROACH								
06/04/1989	1196	1		NONE	300	TAKEOFF		0	VFR	DAY	OVERCAST			FLOCK
06/05/1989	924	1		NONE	300	LANDING		0 115			LIGHT RAIN			ONE
06/07/1989	925	2	12:26:00	NONE	300	TAKEOFF		0		DAY	LIGHT RAIN			SEVERAL
06/07/1989	925	2	12:50:00	NONE	400	TAKEOFF		0 135		LIGHT	LIGHT RAIN			ONE
06/08/1989	926	2		NONE	400	UNKNOWN								
06/10/1989	927	1		NONE	300	UNKNOWN								
06/12/1989	961	1		NONE	300	UNKNOWN								
06/13/1989	962	1	16:48:00	NONE	200	TAKEOFF		0 90		DAY	OVERCAST			FLOCK
06/13/1989	1057	1	21:05:00	TRVS FRAC	200	TAKEOFF	50 145		IFR	DAY	OVERCAST		YES	ONE
06/13/1989	1057	1		NONE	200	UNKNOWN								YES
06/15/1989	1058	1		NONE	200	UNKNOWN								NO
06/15/1989	928	1		NONE	300	UNKNOWN								SEVERAL
06/16/1989	929	2		NONE	200	CRUISE								ONE
06/19/1989	930	2		NONE	400	UNKNOWN								NO
06/19/1989	963	1		MULT BIRDS	300	TAKEOFF		0 137						FLOCK
06/19/1989	963	2		NONE	200	TAKEOFF								
06/20/1989	924	2		NONE	200	UNKNOWN								
06/20/1989	924	2		NONE	200	UNKNOWN								
06/20/1989	1059	1		NONE	200	UNKNOWN								
06/21/1989	931	1		NONE	300	UNKNOWN								
06/22/1989	965	1		NONE	200	UNKNOWN								
06/22/1989	1195	1	18:10:00	NONE	200	TAKEOFF		0 110		NIGHT	CLEAR		NO	YES
06/22/1989	1195	1	17:45:00	NONE	200	TAKEOFF		V2					NO	ONE
06/23/1989	932	2		NONE	400	CLIMB								
06/24/1989	933	1		NONE	300	LANDING		0						ONE
06/24/1989	966	1	5:50:00	TRVS FRAC	200	TAKEOFF		0 135			CLEAR			
06/25/1989	934	2		NONE	300	TAKEOFF		-V1						
06/26/1989	935	1		NONE	300	TAKEOFF								
06/28/1989	967	2	8:30:00	NONE	200	CLIMB	6000	0 110			CLEAR			
06/28/1989	968	1		NONE	200	TAKEOFF								
07/03/1989	1060	2	22:55:00	NONE	200	LANDING		0			CLEAR			
07/04/1989	1115	1		NONE	300	CLIMB								
07/06/1989	969	2		NONE	200	UNKNOWN								
07/07/1989	1116	2		NONE	200	UNKNOWN								
07/08/1989	970	2		NONE	200	UNKNOWN								
07/09/1989	1117	2		NONE	200	UNKNOWN								
07/10/1989	971	1		TRVS FRAC	300	UNKNOWN								
07/10/1989	1118	2		NONE	200	TAKEOFF		120						
07/11/1989	972	2		NONE	300	CLIMB								
07/11/1989	1119	1		NONE	200	APPROACH								
07/12/1989	973	2		NONE	200	LANDING		0						
07/12/1989	974	1		NONE	200	TAKEOFF		0						
07/12/1989	975	2		NONE	200	LANDING		0						
07/13/1989	976	1		NONE	200	UNKNOWN								
07/13/1989	976	1		NONE	200	TAKEOFF		0						NO
07/15/1989	977	2		NONE	200	LANDING								
07/15/1989	978	2		NONE	200	UNKNOWN								
07/16/1989	1180	1		TRVS FRAC	200	UNKNOWN								
07/17/1989	979	2		NONE	200	UNKNOWN								

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG	POS	BIRD	MAN	BIRD	SPE	#	BIRDS	WT	OZ	1	CITY	PRS	AIRPORT	LOCALE	US	IMCID	ENGINE	DASH
05/08/1989	909	1		RING-NECKED PHEASANT		4L161		1				44.	-YHZ	BRU	BRUSSELS, BELGIUM	NO		CFM56	3	
05/08/1989	910	1		SORA		7N84		1					SUX-PHX	DET	DETROIT, MI	YES		CFM56	3	
05/10/1989	911	2		ROCK DOVE*				1					-LGM		LONDON-GATWICK	NO		CFM56	9A	
05/12/1989	912	1		ROCK DOVE*				1					AJA-OKY		LONDON-GATWICK	NO		CFM56	3	
05/14/1989	913	1		ROCK DOVE*				1					LHR-FCO		ROME-DA VINCI, ITALY	NO		CFM56	3	
05/16/1989	957	1		ROCK DOVE*				1					IKU-UDR		INDIA	NO		CFM56	15A	
05/17/1989	1054	2		SWIFT				1					-FRA		TENERIFE, CANARY ISLANDS	NO		CFM56	9A	
05/18/1989	914	1						1					-NYD		FRANKFURT, GERMANY	NO		CFM56	3	
05/20/1989	915	1				1U55		1					1ST-LHR		FRANKFURT, GERMANY	NO		CFM56	3	
05/20/1989	958	1						1					-NYD		TURKEY - ENGLAND	NO		CFM56	15A	
05/20/1989	1055	2						1							INDIA	NO		CFM56	3	
05/25/1989	916	1		KESTREL		5K27		1					EAM		REYKJAVIK, ICELAND	NO		CFM56	3	
05/25/1989	959	1		ROCK DOVE		2P1		1					JED		MEJAN, SAUDI ARABIA	NO		CFM56	15	
05/25/1989	960	1						1					-IAH		DALLAS/FT. WORTH, TX	YES		CFM56	3	
05/26/1989	917	2						1							HOUSTON TX	YES		CFM56	9A	
05/27/1989	918	2						1							ALICANTE, SPAIN	NO		CFM56	3	
05/31/1989	919	1		BLACK-HEADED GULL		14N36		1					9.7	ALC	VENICE, ITALY	NO		CFM56	3	
05/31/1989	919	2		BLACK-HEADED GULL		14N36		1					9.7	VNC	VENICE, ITALY	NO		CFM56	3	
06/01/1989	1056	2						1					MAA-BLR		INDIA	NO		CFM56	17A	
06/02/1989	920	1						1							TAMPA FL	YES		CFM56	3	
06/02/1989	921	2						1					-FRA		FRANKFURT, GERMANY	NO		CFM56	3	
06/02/1989	922	1						1							FRANKFURT, GERMANY	NO		CFM56	3	
06/03/1989	923	1		BLACK-HEADED GULL		14N36		1					9.7	SYD	SYDNEY AUSTRALIA	NO		CFM56	3	
06/04/1989	1196	1		GULL*				1					CPH-ARN		COPENHAGEN, DENMARK	NO		CFM56	3	
06/05/1989	924	1		ROCK DOVE*				1					SAN-SIC		SALT LAKE CITY, UT	YES		CFM56	3	
06/07/1989	925	2						1					LHR-GLA		LONDON-HEATHROW, ENGLAND	NO		CFM56	3	
06/08/1989	926	2						1					-SEL		EDINBURGH, SCOTLAND	NO		CFM56	3	
06/10/1989	927	1		CROWNED LAPWING		5N11		1					-IAH		HOUSTON TX	YES		CFM56	3	
06/12/1989	961	1		POMARINE JAEGER		13N4		1					PLZ-DUR		PORT ELIZABETH, S. AFRICA	YES		CFM56	17A	
06/13/1989	962	1						1					POB-FAL		PEDRO BAY, ALASKA	YES		CFM56	17A	
06/13/1989	1057	1						1					-BOM		INDIA	NO		CFM56	17A	
06/13/1989	1058	1						1					-SXR		INDIA	NO		CFM56	17A	
06/15/1989	928	1						1					LHR-CPH		ENGLAND - DENMARK	NO		CFM56	3	
06/16/1989	929	2						1					-HAJ		HANOVER, GERMANY	NO		CFM56	3	
06/19/1989	930	2		GULL*				2					PUY-ZAG		PULA, YUGOSLAVIA	NO		CFM56	3	
06/19/1989	963	1						1					HOU-ORF		HOUSTON, TX	YES		CFM56	3	
06/20/1989	964	2						1					-JED		JEDDAH, SAUDI ARABIA	NO		CFM56	7B	
06/20/1989	1059	1						1					COK-TRV		INDIA	NO		CFM56	17	
06/21/1989	931	1						1					-SYD		SYDNEY AUSTRALIA	NO		CFM56	3	
06/22/1989	965	1		GULL*				1					MAH-MAM		MAHON, MENORCA, SPAIN	NO		CFM56	15	
06/22/1989	1195	1		GULL*				1							DAYTONA BEACH, FL	NO		CFM56	3	
06/23/1989	932	2		HERRING GULL				1					IBZ-PHI		IBIZA SPAIN	NO		CFM56	3	
06/24/1989	933	1						1							LARNACA, CYPRUS	NO		CFM56	3	
06/24/1989	966	1		BLACK KITE		3K28		1					28.		TARBES, FRANCE	NO		CFM56	7B	
06/25/1989	934	2						1							STAVANGER, NORWAY	NO		CFM56	3	
06/26/1989	935	1		GULL*				1					LGM-FNC		LONDON-GATWICK, ENGLAND	NO		CFM56	3	
06/28/1989	967	2		KITEVET*				1					BN-KIM		BLOEMFONTEIN, S. AFRICA	NO		CFM56	17A	
06/28/1989	968	1						1					YHZ-YYZ		HALIFAX, CANADA	NO		CFM56	3	
07/03/1989	1060	2						1					DEL-GOI		GOA, INDIA	NO		CFM56	9A	
07/04/1989	1115	1		BURROWING OWL		2S102		1					5. DAL		DALLAS, TX	YES		CFM56	9A	
07/06/1989	969	2		MOURNING DOVE		2P105		1					-MSY		BREKEN, GERMANY	NO		CFM56	3	
07/07/1989	1116	2						1					YTC-YXD		CALGARY, CANADA	NO		CFM56	9A	
07/08/1989	970	2						1					-CLT		MONTREY, MEXICO	NO		CFM56	3	
07/09/1989	1117	2						1							DALLAS, TX	YES		CFM56	9A	
07/10/1989	971	1						1					MSY		CHARLOTTE, NC	YES		CFM56	3	
07/10/1989	1118	1						1					ABO		NEW ORLEANS, LA	YES		CFM56	9A	
07/11/1989	972	2						1					YOM-YYZ		ALBUQUERQUE, NM	YES		CFM56	9A	
07/11/1989	1119	1						1							TORONTO, CANADA	NO		CFM56	17	
07/12/1989	973	2						1							BRUSSELS, BELGIUM	NO		CFM56	3	
07/12/1989	974	1						1					YPR-YZP		DUBLIN, IRELAND	NO		CFM56	3	
07/12/1989	975	2						1					-DHA		SANDSPIT, CANADA	NO		CFM56	9	
07/13/1989	976	1		GULL*				1					YFZ-YTC		DHAHRAN, SAUDI ARABIA	NO		CFM56	9A	
07/13/1989	977	2						1					YEG-YVR		YELLOWKNIFE, CANADA	NO		CFM56	17A	
07/15/1989	978	2						1					-DEL		VANCOUVER, CANADA	NO		CFM56	17A	
07/16/1989	1180	1		BLACK KITE		3K28		1					28. LHR-LYS		DELHI, INDIA	NO		CFM56	17A	
07/17/1989	979	2						1							ENGLAND - FRANCE	NO		CFM56	15A	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	DMG CODE	SEVERITY	POW LOSS	MAX VIBE	THROTTLE	IFSD	REMARKS
05/08/1989	909			9	NONE			NO	
05/08/1989	910		A,E	3	NONE	NONE		NO	8 F BLS REPLACED OORR FOUND ON GRD INSPEC
05/08/1989	956			9	NONE			NO	
05/10/1989	911			9	NONE			NO	
05/12/1989	912			9	NONE			NO	
05/14/1989	913		A,H	9	NONE	3.0	RETARD	NO	FOUND ON GRD INSPEC
05/16/1989	957		A,C	3	NONE			NO	1 PAIR F BLS SHINGLED AND REPLACED OORR, ENG SHUTDOWN ON TAXI IN
05/17/1989	1054			3	NONE			NO	
05/18/1989	914		A	4	NONE			NO	4 F BLS DAMAGED, DAMAGE UNKNOWN FOUND ON GRD INSPEC
05/20/1989	915			9	NONE			NO	
05/20/1989	958			9	NONE			NO	
05/20/1989	1055			9	NONE			NO	
05/25/1989	916		A,C	9	NONE			NO	
05/25/1989	959		A,C	3	YES	YES		NO	3 BLS BENT, IMMEDIATE EPR+32X1 RECOVERY OORR, AM EVENT
05/25/1989	960		A,C	3	NONE			NO	FOUND ON GRD INSPEC
05/26/1989	917			3	NONE			NO	
05/27/1989	918		A,H	3	NONE	5.0		NO	3 F BLS MIDSPAN SHROUD DAMAGE
05/31/1989	919		A,C,H	3	SOME	3.0		NO	AIRCRAFT SPEED DROPPED, 2 BENT F BLS
05/31/1989	919		A,D,H	2	SOME	1.5		NO	AIRCRAFT SPEED DROPPED, 5 F BLS BENT
05/31/1989	1056		A,D,G,H	2	SOME			NO	5 F BLS DAMAGED
06/01/1989	1197		A	2	NONE			NO	3 F BLS UNK DAMAGE PM EVENT
06/02/1989	920		A,H	3	NONE	3.8		NO	ENGINE NOISE, 2 PAIR OF F BLS REPLACED CABIN OORR, CONFIRMED ON GRD INSPEC
06/02/1989	921			3	NONE			NO	
06/02/1989	922			3	NONE			NO	
06/03/1989	923		A,H	3	NONE	2.5	RETARD	NO	3 F BLS SHINGLED AM EVENT
06/04/1989	1196			3	NONE			NO	
06/05/1989	924		A,C,H	3	NONE			NO	4 PAIR F BLS REPLACED
06/07/1989	925		A,C,H	3	NONE	1.8		NO	2 BENT F BLS, 2 SHINGLED F BLS
06/08/1989	926		A,C,H	3	NONE	2.0		NO	ACOUSTIC PANEL DAMAGE, 3 F BLS DAMAGED
06/10/1989	927		A,C,H	3	NONE			NO	3 F BLS DAMAGED, FOUND ON GRD INSPEC
06/12/1989	961		A,C	3	NONE			NO	2 F BLS BENT
06/13/1989	962		A,D,I,K	3	COMPRESSOR	HIGH	IDLE	NO	4 SURGES RETARD TO IDLE THEN VOL IFSD VOLUNTARY
06/13/1989	1057			9	COMPRESSOR			NO	
06/13/1989	1058			9	NONE			NO	
06/15/1989	928		A,D,H	9	NONE			NO	FOUND ON GRD INSPEC
06/16/1989	929		A,B	2	NONE			NO	ACOUSTIC PANEL DAMAGE, 5 F BLS DAMAGED
06/19/1989	930		A,D,G,H	3	NONE			NO	2 F BLS HEAVY TIP CURIAL
06/19/1989	963		A	4	COMPRESSOR	SOME	RETARD	NO	1 F BLD TIP CORNER MISSING, 25F BLS DAM
06/20/1989	964		A,H	3	COMPRESSOR			NO	
06/20/1989	1059			9	NONE			NO	
06/21/1989	931		A	4	COMPRESSOR			NO	FOUND ON GRD INSPEC
06/22/1989	965			4	COMPRESSOR			NO	SEVERE F BLD DAM, AC YAWED
06/22/1989	1195		A,B	4	COMPRESSOR			NO	
06/23/1989	932			3	NONE	3.5		NO	2 F BLS REPLACED DUE TO LE
06/24/1989	933			3	NONE	2.2		NO	
06/24/1989	966		A,I,M,P	1	NONE	YES	RFTARD	NO	FAN CASE SEPARATED AND MOVED FORWARD
06/25/1989	934		A,C,H	3	NONE	4.0		NO	SEVERAL F BLS DAMAGED
06/26/1989	935		A,B,H	3	NONE	3.5	IDLE	NO	9 F BLS DAMAGED
06/28/1989	967			9	NONE			NO	OORR
06/28/1989	968			9	NONE			NO	
07/03/1989	1060			9	NONE			NO	
07/04/1989	1115			9	NONE			NO	
07/06/1989	969			9	NONE			NO	
07/07/1989	1116			9	NONE			NO	FOUND ON GRD INSPEC
07/08/1989	970		A,C	3	NONE			NO	
07/09/1989	1117		A,G	2	COMPRESSOR	SOME		NO	9 F BLS DAM, 1 BLD TIP PIECE BROKEN OFF
07/10/1989	971		A,I,K	1	COMPRESSOR			NO	ENG OIL LIGHT CAME ON
07/10/1989	1118		A,C	3	NONE	3.0		NO	5 F BLS BENT
07/11/1989	972			9	NONE			NO	
07/11/1989	1119		A,H	3	NONE			NO	4 SHINGLED F BLS
07/12/1989	973		A,G	3	NONE			NO	EXTENSIVE ENG DAM, GOUGING OF F BLS
07/12/1989	974			4	NONE			NO	
07/12/1989	975		A	4	NONE			NO	FOUND ON GRD INSPEC
07/13/1989	976		A,D,K	1	NONE			NO	2ND+6TH STG BLADES NICKED
07/13/1989	977			9	NONE			NO	
07/15/1989	978			4	NONE			NO	F BLD DAMAGE
07/16/1989	1180		A,C,G,I	1	NONE			NO	BROKEN PIECE OF F BLD FOUND IN EXIT CASE
07/17/1989	979		A,H	3	NONE			NO	3 SHINGLED F BLS, FOUND ON GRD INSPEC

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LT_COMDS	WEATHER	CREW	AC	BIRD	SEE
07/17/1989	980	2		NONE		200	UNKNOWN						NONE			
07/18/1989	995	2	21:35:00	TRVS	FRAC	200	TAKEOFF		137				ATO		NO	
07/18/1989	1120	2		NONE		400	UNKNOWN						NONE			
07/18/1989	1121	1	18:00:00	NONE		300	TAKEOFF						DIV		OME	
07/18/1989	1122	1		NONE		400	LANDING						NONE			
07/20/1989	981	2		MULT	BIRDS	200	LANDING			VFR		CLEAR	NONE			
07/21/1989	1123	1		NONE		300	UNKNOWN						NONE			
07/24/1989	1124	1		NONE		300	UNKNOWN						NONE			
07/25/1989	982	1	14:30:00	NONE		200	UNKNOWN						NONE			
07/26/1989	983	2		NONE		200	TAKEOFF						NONE			
07/26/1989	1125	1		NONE		300	UNKNOWN						NONE			
07/27/1989	1126	2		NONE		300	LANDING						NONE			
07/27/1989	1127	1		NONE		300	APPROACH						NONE			
07/28/1989	984	2	12:00:00	NONE		200	UNKNOWN						NONE			
07/28/1989	985	1	18:00:00	TRVS	FRAC	200	TAKEOFF		20				ATB		YES	
07/28/1989	1128	2		NONE		300	CRUISE						NONE			
07/28/1989	1129	2		NONE		300	UNKNOWN						NONE			
07/28/1989	1130	1	8:17:00	NONE		200	LANDING					CLEAR	NONE			
07/29/1989	1130	1		NONE		400	LANDING		0	80			NONE			
07/30/1989	986	1		NONE		200	LANDING		0	100			NONE			
07/30/1989	1131	1		NONE		300	APPROACH						NONE			
07/30/1989	1132	1		NONE		300	TAKEOFF			VFR	DAY		NONE		OME	
07/31/1989	1133	1		NONE		300	UNKNOWN						NONE			
07/31/1989	1134	2		NONE		300	CLIMB						NONE			
08/01/1989	1135	1		NONE		400	UNKNOWN						NONE			
08/02/1989	1136	1		NONE		300	TAKEOFF		0	+V1			NONE			
08/02/1989	1190	1		NONE		200	CLIMB						NONE			
08/02/1989	1198	1		NONE		200	TAKEOFF		100	140	DAY		NONE		NO	FLOCK
08/02/1989	1205	1		NONE		200	UNKNOWN						NONE			
08/03/1989	987	2		NONE		200	TAKEOFF						NONE			
08/05/1989	1137	1		NONE		300	CLIMB						NONE			
08/06/1989	988	1		NONE		300	TAKEOFF		0	+V1			NONE			
08/07/1989	989	2		TRVS	FRAC	200	TAKEOFF						ATO			
08/09/1989	1138	2		NONE		200	CLIMB						NONE			
08/10/1989	990	2		MULT	BIRDS	300	LANDING						DIV			FLOCK
08/10/1989	1139	2		NONE		300	TAKEOFF		0	+V1			NONE			
08/10/1989	1140	1	11:00:00	NONE		300	TAKEOFF		0	+V1			NONE			
08/10/1989	1141	1		NONE		300	LANDING		20		BRIGHT		NONE			
08/11/1989	1142	2		NONE		300	TAKEOFF						NONE			
08/12/1989	1143	1		NONE		300	TAKEOFF		0	+V1			NONE			
08/13/1989	991	1		NONE		200	TAKEOFF		0	+V1			NONE			
08/13/1989	1144	2		NONE		300	UNKNOWN		0	140			ATO			
08/14/1989	1145	1		NONE		300	UNKNOWN						NONE			
08/14/1989	1146	1		NONE		200	TAKEOFF		0	-V1			NONE			
08/15/1989	992	2		NONE		300	TAKEOFF						NONE			
08/15/1989	1147	1		NONE		300	LANDING		0		BRIGHT		NONE			YES
08/15/1989	1148	1		NONE		300	LANDING		0				NONE			
08/18/1989	1149	2		NONE		300	UNKNOWN						NONE			
08/19/1989	1150	1		NONE		300	UNKNOWN						NONE			
08/19/1989	1151	2		NONE		300	LANDING		0				NONE			
08/20/1989	993	2		NONE		200	UNKNOWN						NONE			
08/25/1989	994	1		NONE		200	LANDING						NONE			
08/26/1989	996	2		NONE		200	UNKNOWN						NONE			
08/27/1989	997	2		NONE		200	UNKNOWN						NONE			
08/28/1989	1152	1		NONE		300	UNKNOWN						NONE			
08/29/1989	1153	2		NONE		300	APPROACH		100	+V1			NONE			
08/29/1989	1154	2		NONE		300	TAKEOFF		0	+V1			NONE			
08/29/1989	1155	1		NONE		200	UNKNOWN						NONE			
08/29/1989	1179	2		NONE		200	UNKNOWN						NONE			
08/30/1989	998	2		NONE		200	UNKNOWN						NONE			
08/31/1989	1156	1		NONE		300	UNKNOWN						NONE			
09/01/1989	1157	1		NONE		400	UNKNOWN						NONE			
09/03/1989	1159	2		NONE		300	TAKEOFF		0	+V1			NONE			
09/04/1989	1160	2		NONE		300	UNKNOWN						NONE			
09/05/1989	999	1	17:30:00	MULT	ENG	200	TAKEOFF						ATB			
09/05/1989	999	2	17:30:00	MULT	ENG	200	TAKEOFF						DIV			
09/05/1989	1000	2		NONE		200	TAKEOFF						ATB			
09/06/1989	1001	2		NONE		200	TAKEOFF						NONE			

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG POS	BIRD_NAM	BIRD_SPE	# BIRDS	WT OZ	1	CITY	PRS	AIRPORT	LOCALE	US	IMCID	ENGINE	DASH
07/17/1989	930	2	WESTERN MEADOWLARK	64268										JT80	9A
07/18/1989	995	2	GULL*								LEMNOS, GREECE	YES		JT80	9A
07/18/1989	1120	2			1						PUSAN, KOREA	NO		CFM56	3
07/18/1989	1121	1			1						BOURNOUTH, ENGLAND	NO		CFM56	3
07/18/1989	1122	1			1						DUSSELDORF, GERMANY	NO		CFM56	3
07/20/1989	981	2	SANDPIPERS*								VANCOUVER, CANADA	NO		JT80	9A
07/21/1989	1123	1			1						INDIANAPOLIS, IN	YES		CFM56	3
07/24/1989	1124	1	COMMON EGRET	1152							DALLAS, TX	YES		CFM56	3
07/25/1989	982	1			1						DC - FL	YES		JT80	7
07/26/1989	983	2			1						PRINCE GEORGE, CANADA	YES		JT80	9A
07/26/1989	1125	1			1						DALLAS, TX	YES		CFM56	3
07/27/1989	1126	2			1						LIEGE, BELGIUM	NO		CFM56	3
07/27/1989	1127	2			1						ZAKINTHOS, GREECE	NO		CFM56	3
07/28/1989	984	2	CUCKOO	2R15							SAUDI ARABIA	NO		JT80	15
07/28/1989	985	1	GULL*								MONTREAL, CANADA	NO		JT80	9A
07/28/1989	1128	2			1						AMSTERDAM	NO		CFM56	3
07/28/1989	1129	2			1						PALMA MALLORCA, SPAIN	NO		CFM56	3
07/28/1989	1189	1	PARTRIDGE*								COLOGNE/BONN, GERMANY	NO		CFM56	3
07/29/1989	1130	1	GULL*								BREMEN, GERMANY	NO		CFM56	3
07/30/1989	986	1			1						CALGARY, CANADA	NO		JT80	9A
07/30/1989	1131	1			1						PHOENIX, AZ	YES		CFM56	3
07/30/1989	1132	1	HAWK*								ROCHESTER, NY	YES		CFM56	3
07/31/1989	1133	1			1						LONDON-HEATHROW, ENGLAND	NO		CFM56	3
07/31/1989	1134	2			1						ALICE SPRINGS, AUSTRALIA	NO		CFM56	3
08/01/1989	1135	1			1						SEOUL, KOREA	NO		CFM56	3
08/02/1989	1136	1	GULL*								SYDNEY, AUSTRALIA	NO		CFM56	3
08/02/1989	1190	1	GULL*								DAYTON, OH	YES		JT80	9
08/02/1989	1191	1			1						FLINT, MI	YES		JT80	9
08/02/1989	1206	2	COMMON BUZZARD	3K180							CHICAGO, IL	YES		JT80	15A
08/03/1989	987	2			1						DUSSELDORF, GERMANY	NO		JT80	3
08/05/1989	1137	1			1						PARIS-ORLY, FRANCE	NO		CFM56	3
08/06/1989	988	1			1						MONTREAL, CANADA	NO		JT80	17
08/07/1989	989	2			1						BANJUL, GAMBIA	NO		JT80	15
08/09/1989	1138	2			1						STUTTGART, GERMANY	NO		CFM56	3
08/10/1989	990	2	SWALLOW*								VICTORIA, CANADA	NO		JT80	9A
08/10/1989	1139	2			1						HAMBURG, GERMANY	NO		CFM56	3
08/10/1989	1140	1			1						AMSTERDAM, NETHERLANDS	NO		CFM56	3
08/10/1989	1141	1	RING-BILLED GULL	14M12							DETROIT, MI	YES		CFM56	3
08/11/1989	1142	2	EURASIAN KESTREL	5K27							VENICE, ITALY	NO		CFM56	3
08/12/1989	1143	1			1						MUNICH, GERMANY	NO		CFM56	3
08/13/1989	991	1			1						TANGIER, MOROCCO	NO		CFM56	3
08/13/1989	1144	2	ROCK DOVE	2P1							DALLAS, TX	YES		JT80	15
08/14/1989	1145	1			1						AMSTERDAM, NETHERLANDS	YES		CFM56	3
08/14/1989	1146	1			1						AMSTERDAM, NETHERLANDS	YES		CFM56	3
08/15/1989	992	2			1						ATHENS, GREECE	NO		CFM56	3
08/15/1989	1147	1	BLACK-HEADED GULL	14M36							NORMAN WELLS, CANADA	NO		JT80	9A
08/15/1989	1148	1			1						VIENNA, AUSTRIA	NO		CFM56	3
08/18/1989	1149	2	MOURNING DOVE	2P105							NORFOLK, VA	YES		CFM56	3
08/18/1989	1150	1			1						CO - AZ	YES		CFM56	3
08/19/1989	1151	2			1						DALLAS, TX	YES		CFM56	3
08/20/1989	993	2			1						DULUTH, MN	YES		CFM56	3
08/25/1989	994	1	GULL*								CANADA, CANADA	NO		JT80	9A
08/26/1989	996	2			1						MONTREAL, CANADA	NO		JT80	9A
08/27/1989	997	2			1						CANADA	NO		JT80	9A
08/28/1989	1152	1			1						CHICAGO, IL	YES		CFM56	3
08/29/1989	1153	2			1						DUSSELDORF, GERMANY	YES		CFM56	3
08/29/1989	1154	2	RED-LEGGED PARTRIDGE	4L41							CLEVELAND, OH	YES		CFM56	3
08/29/1989	1155	1			1						AMSTERDAM, NETHERLANDS	NO		CFM56	3
08/29/1989	1179	2			1						JAPAN	NO		CFM56	3
08/30/1989	998	2			1						CANADA	NO		JT80	17
08/31/1989	1156	2			1						AMSTRDAM, NETHERLANDS	NO		CFM56	3
09/01/1989	1157	1			1						DUBLIN, IRELAND	NO		CFM56	3
09/03/1989	1159	2			1						PROVIDENCE, RI	YES		CFM56	3
09/04/1989	1160	2	YELLOW-BREASTED CHAT	63Z69							DALLAS, TX	YES		CFM56	3
09/05/1989	999	1			1						HOUSTON, TX	YES		JT80	7B
09/05/1989	1000	2			1						HOUSTON, TX	YES		JT80	7B
09/05/1989	1001	2			1						NIJERIA	NO		JT80	15
09/06/1989	1001	2			1						CALGARY, CANADA	NO		JT80	9A



SOURCE: ENGINE MANUFACTURER

EDATE	EVTF	ENG_POS	DNG_CODE	SEVERITY	POW_LOSS	MAX_VIBE	THRUSTLE	IFSD	REMARKS
07/17/1989	980	2		9				NO	OOOR
07/18/1989	995	2	A,I,K	1	NONE			NO	EXTENSIVE GUIDE VANE DAM, 2 BLDs TRYSFRA
07/18/1989	1120	2	A,B,H	3				NO	FOUND ON GRD INSPEC, 4 F BLDs DAMAGED
07/18/1989	1121	1	A,H	3		HIGH	RETARD	NO	2 F BLDs SHINGLED
07/18/1989	1122	1		9		NONE	RETARD	NO	OOOR
07/20/1989	981	2		9		NONE		NO	55 DEAD BIRDS ON RUNWAY
07/21/1989	1123	1	A,C	9		NONE		NO	FOUND ON GRD INSPEC
07/24/1989	1124	1	A,C	9		NONE		NO	FOUND ON GRD INSPEC, SEVERAL DENTED F BLDs
07/25/1989	982	1	A,C	7				YES	NICKS ON F BLDs, SEVERAL DENTED F BLDs
07/26/1989	983	2		9				NO	MOMENTARY SHIFT IN ENG PARAMETERS
07/26/1989	1125	2		9				NO	FOUND ON GRD INSPEC
07/27/1989	1126	2		9		NONE		NO	
07/27/1989	1127	1		9		NONE		NO	
07/28/1989	984	2	A,L	3	COMPRESSOR	YES		NO	DENT AND LOOSE RIVETS IN MACELLE LIP
07/28/1989	985	1	A,F,I	3	NONE	3.5		NO	EMERGENCY DECLARED
07/28/1989	1128	2	A,H	3	NONE			NO	4 F BLDs SHINGLED
07/28/1989	1129	2	A,B,H	9				NO	FOUND ON GRD INSPEC, 6 F BLDs DAMAGED
07/28/1989	1189	1		9				NO	OOOR
07/29/1989	1130	1		9				NO	
07/30/1989	986	1	A,H	9				NO	3 F BLDs SHINGLED
07/30/1989	1131	1		9				NO	OOOR, AM EVENT
07/30/1989	1132	1		9				NO	OOOR, FOUND ON GRD INSPEC
07/31/1989	1133	1		9		NONE		NO	3 F BLDs DAMAGED
07/31/1989	1134	2	A,B,H	9				NO	1 F BLD LEADING EDGE DENT
08/01/1989	1135	1	A,B	3				NO	AFT STGS OF HPC HAD IMPACT DAMAGE
08/02/1989	1136	1	A,K	1				NO	OOOR, REPLACED 1ST STG FAN ASSEMBLY
08/02/1989	1190	1	A,D,H	2				NO	PH EVENT, 1 BENT F BLD
08/02/1989	1198	1	A,C	7				NO	
08/02/1989	1206	2		9				NO	
08/03/1989	987	2	A,C	9				NO	3 F BLDs BENT
08/05/1989	1137	1		9				NO	ENG RECOVERED IMMEDIATELY FROM STALL
08/06/1989	988	1	A,C,I,K	9	COMPRESSOR	YES		NO	3 FBLDS BENT, 4 FBLD TIPS WERE CUT OFF
08/07/1989	989	2	A,B,G	1				NO	11 F BLDs DAMAGED, 13 F OGV'S LE NICKS
08/09/1989	1138	2		6				NO	MINOR HPC BLADE IMPACT DAMAGE
08/10/1989	990	2	A,K	9				NO	OOOR
08/10/1989	1139	2		9				NO	MULT AC STRIKES
08/10/1989	1140	1		9				NO	
08/10/1989	1141	1		9				NO	
08/11/1989	1142	2		9				NO	
08/12/1989	1143	1		9				NO	
08/13/1989	991	1		9				EPR	
08/13/1989	1144	2	A,H	3				NO	1 F BLD SHINGLED
08/14/1989	1145	1	A,B,C	3				NO	1 F BLD TWISTED WITH LE DEFORMATION
08/14/1989	1146	1	A,D	3				NO	SEVERAL F BLDs BENT
08/15/1989	992	2		9				NO	OOOR, MULT AC STRIKES
08/15/1989	1147	1		9				NO	FOUND ON GRD INSPEC, 2 F BLDs SHINGLED
08/15/1989	1148	1	A,B,H	9				NO	OOOR
08/18/1989	1149	2		9				NO	FOUND ON GRD INSPEC
08/18/1989	1150	1		9				NO	FOUND ON GRD INSPEC
08/19/1989	1151	2		9				NO	FOUND ON GRD INSPEC
08/20/1989	993	2		9				NO	2 F BLDs BENT, FOUND ON GRD INSPEC
08/25/1989	994	1		9				NO	2 F BLDs SHINGLED, 1 F BLD TIP BENT .5IN
08/26/1989	996	2		9				NO	VIBES INCREASED THEN RETURNED TO NORMAL
08/27/1989	997	2	A,C	3				NO	1 STG F BLD ASSEMBLY CHANGED
08/28/1989	1152	1	A,C,H	9				NO	FOUND ON GRD INSPEC
08/29/1989	1153	2	A,I	3				NO	FOUND ON GRD INSPEC
08/29/1989	1154	2	A,H	3				NO	FOUND ON GRD INSPEC
08/29/1989	1155	2		9		3.9		NO	ENG REPAIR 11 HPC BLDs IMPACT DAMAGE
08/29/1989	1155	1	A,D	3				NO	OOOR, FOUND ON GRD INSPEC
08/29/1989	1179	2		2				NO	
08/30/1989	998	2		9				NO	
08/31/1989	1156	2		9				NO	
09/01/1989	1157	1	A,C,H	9				NO	FOUND ON GRD INSPEC
09/03/1989	1159	2	A,D,K	3				NO	2 F BLDs DAMAGED
09/04/1989	1160	2		9				NO	FOUND ON GRD INSPEC
09/05/1989	999	1		9				NO	OOOR, FOUND ON GRD INSPEC
09/05/1989	999	2		9				NO	
09/05/1989	1000	2	A	4				NO	FAN CHANGED
09/06/1989	1001	2	A,I	3				NO	OOOR, MACELLE DAMAGE, 6 RIVETS SHEERED

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	ETIME	SIGN_EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LT_CONDS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
09/06/1989	1161	2		NONE	300	UNKNOWN						NONE		
09/08/1989	1002	2		NONE	200	TAKEOFF		0 105				ATO		YES
09/09/1989	1162	1		NONE	300	UNKNOWN						NONE		
09/11/1989	1003	2		NONE	200	TAKEOFF		0		CLEAR		ATO		NO
09/12/1989	1004	1	6:05:00	NONE	200	TAKEOFF						NONE		
09/13/1989	1163	1		NONE	300	UNKNOWN						NONE		
09/14/1989	1003	1		NONE	200	TAKEOFF		0 80				ATO		
09/20/1989	1164	2		NONE	300	LANDING		0 100	VFR	BRIGHT	CLEAR	NONE		
09/21/1989	1165	1		NONE	300	UNKNOWN						NONE		
09/21/1989	1178	1		NONE	200	UNKNOWN		0				NONE	YES	YES
09/22/1989	1158	1		NONE	300	LANDING						NONE		
09/23/1989	1166	2		NONE	300	APPROACH						NONE		
09/23/1989	1167	2		NONE	300	LANDING						NONE		
09/24/1989	1168	1		NONE	300	UNKNOWN						NONE		
09/26/1989	1169	2		NONE	400	UNKNOWN						NONE		
09/30/1989	1170	1		MULT BIRDS	300	LANDING		0				NONE		YES
09/30/1989	1170	1		NONE	300	CLIMB						NONE		
09/29/1989	1176	1		NONE	200	TAKEOFF						ATB		YES
09/29/1989	1177	1		NONE	200	TAKEOFF						ATB		YES
09/30/1989	1175	2		AIRWORTHY	200	TAKEOFF						NONE		NO

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	BIRD NAM	BIRD SPE #	BIRDS	WT OZ	1	CTY	PRS	AIRPORT	LOCALE	US_INCID	ENGINE	DASH
09/06/1989	1161	2			1						CHENGDU, CHINA	NO	CFM56	3
09/08/1989	1002	2	GULL*		1			YMG-YVR	YMG	WINNIPEG, CANADA	NO	JT8D	9A	
09/09/1989	1162	1			1			-SFO		SAN FRANCISCO, CA	YES	CFM56	3	
09/11/1989	1003	2	GULL*		1			JNB-PLZ	JNB	JOHANNESBURG, S AFRICA	NO	JT8D	9A	
09/12/1989	1004	1			1			YVC-LAX	YVC	CALAGARY, CANADA	NO	JT8D	17	
09/13/1989	1163	1	MAWK*		1			-AMS		AMSTERDAM, NETHERLANDS	NO	CFM56	3	
09/14/1989	1005	1			1			YXD-TZF	YXD	EDMONTON, CANADA	NO	JT8D	9A	
09/20/1989	1164	2			1			AMS		AMSTERDAM, NETHERLANDS	NO	CFM56	3	
09/21/1989	1165	1			1			-LTN		LUTON, ENGLAND	NO	CFM56	3	
09/21/1989	1178	1	BLACK VULTURE		1	48.		YMG-YVR	GIG	CANADA	NO	JT8D	9A	
09/22/1989	1158	2			1				EUR	RIO DE JANEIRO, BRAZIL	NO	CFM56	3	
09/23/1989	1166	2			1					NEWARK, NJ	YES	CFM56	3	
09/23/1989	1167	2			1					GERMANY	NO	CFM56	3	
09/24/1989	1168	1			1			-LGW		LONDON, ENGLAND	NO	CFM56	3	
09/26/1989	1169	2			2	14.1			LTN	LUTON, ENGLAND	NO	CFM56	3	
09/29/1989	1170	1	HUNGARIAN PARTRIDGE		1			YVO-YUL	HUE	MURENBERG, GERMANY	NO	CFM56	3	
09/29/1989	1176	1			1			JAX-IAD	YVO	VAL D'OR, CANADA	NO	CFM56	3	
09/29/1989	1177	1			1			YUL-YYZ	JAX	JACKSONVILLE, FL	NO	JT8D	7	
09/30/1989	1175	2			1				YUL	MONTREAL, CANADA	NO	JT8D	9A	

SOURCE: ENGINE MANUFACTURER

EDATE	EVT#	ENG_POS	DMG_CODE	SEVERITY	POW_LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
09/06/1989	1161	2	A,B	3	NONE			NO	1 FBLD LE SLIGHT BEND, FOUND ON GRD INSPE
09/08/1989	1002	2	A,H	3	COMPRESSOR			NO	FOUND ON GRD INSPEC, 2 F BLDS UNK DAMAGE
09/09/1989	1162	1	A	4	NONE			NO	
09/11/1989	1003	2		0				NO	
09/12/1989	1004	1		0				NO	
09/13/1989	1163	1	A,B	3	NONE			NO	ODOOR
09/14/1989	1005	1		9	COMPRESSOR			NO	FOUND ON GRD INSPEC, 2 F BLDS LE DISTORT
09/20/1989	1164	2		9	NONE			NO	3 COMP STALLS
09/21/1989	1165	1	A,H	3	NONE			NO	ODOOR
09/21/1989	1178	1	A,H	0	NONE			NO	3 ACOUSTIC PANELS CRACKED, 3 FBLDS SHING
09/22/1989	1158	1	A,K	1	NONE	NONE		NO	FOUND ON GRD INSPEC
09/23/1989	1166	2		9	NONE			NO	ENG REM AFT FLT TO GRU, HPC DAM ALL STGS
09/23/1989	1167	2		9	NONE			NO	
09/24/1989	1168	1		9	NONE			NO	FOUND ON GRD INSPEC
09/26/1989	1169	2	A,B,H	3	NONE			NO	FOUND ON GRD INSPEC
09/29/1989	1170	1	A,B	3	NONE			NO	8 F BLDS SHINGLED+7 FBLDS LE DISTORTION
09/29/1989	1176	1		0				NO	11 F BLDS LE DISTORTION
09/29/1989	1177	1		9	COMPRESSOR			NO	
09/30/1989	1175	2		9	COMPRESSOR			NO	EXPERIENCED A BANG AND AC 'YAWED'

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

DATE	EVT#	ENG_POS	ETIME	SIGN_EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LT_CONDS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
01/31/1987	514	2	12:58:00	NONE	300	LANDING	0	110			CLEAR	NONE	NO	FLOCK
02/06/1987	623	1	10:40:00	MULT	300	TAKEOFF	0				CLEAR	NONE	NO	FLOCK
02/09/1987	655	2	18:41:00	NONE	300	CLIMB	350				CLOUDY	ATB	NO	
02/11/1987	589	2	17:45:00	NONE	300	LANDING					CLOUDY	NONE	NO	
02/11/1987	663	1		NONE	200	TAKEOFF					CLOUDY	NONE	NO	
02/22/1987	690	1	12:12:00	MULT	200	TAKEOFF	0	150			CLOUDY	NONE	NO	
02/22/1987	690	2	12:12:00	MULT	200	TAKEOFF	0	150			CLOUDY	NONE	NO	
03/02/1987	667	2	16:20:00	NONE	200	TAKEOFF					CLEAR	NONE	NO	
03/07/1987	590	1	6:35:00	MULT	300	LANDING					CLEAR	NONE	NO	FLOCK
03/12/1987	595	1	7:09:00	MULT	300	TAKEOFF					CLEAR	NONE	YES	SEVERAL
03/16/1987	647	1	21:00:00	NONE	200	LANDING	0	160			CLEAR	NONE	NO	
03/26/1987	627	2	20:17:00	MULT	200	CLIMB	700	160			CLEAR	ATB	NO	
03/27/1987	664	2	7:08:00	NONE	200	CLIMB	6000				CLEAR	ATB	NO	ONE
03/31/1987	584	1	9:30:00	NONE	300	TAKEOFF	0	140			CLOUDY	NONE	NO	SEVERAL
04/06/1987	657	1	13:00:00	MULT	300	TAKEOFF	0	140			CLOUDY	OTHER	NO	SEVERAL
04/08/1987	665	2	10:50:00	NONE	300	LANDING	200	140		OVERCAST	CLEAR	NONE	NO	SEVERAL
04/12/1987	593	1	11:15:00	NONE	300	TAKEOFF					CLEAR	NONE	NO	ONE
04/14/1987	681	2	20:05:00	MULT	300	TAKEOFF	200	175			CLEAR	NONE	NO	
04/26/1987	660	1	20:00:00	MULT	300	LANDING	0				CLOUDY	NONE	NO	
05/06/1987	591	1	20:38:00	NONE	300	LANDING					RAIN	NONE	NO	ONE
05/08/1987	592	1	15:30:00	NONE	200	APPROACH					CLEAR	NONE	NO	SEVERAL
05/10/1987	622	2	10:00:00	NONE	200	LANDING					CLEAR	NONE	NO	SEVERAL
06/05/1987	694	2	10:40:00	NONE	200	LANDING	0	80			CLOUDY	NONE	NO	ONE
06/08/1987	662	1	7:48:00	MULT	200	LANDING	150	125			CLOUDY	NONE	YES	SEVERAL
06/10/1987	608	1	1:25:00	NONE	200	LANDING	12	120			CLEAR	NONE	NO	ONE
06/12/1987	677	2	9:12:00	NONE	200	TAXI	0	12			CLEAR	NONE	NO	SEVERAL
06/19/1987	609	2	18:35:00	MULT	200	TAKEOFF	0	110			CLEAR	NONE	NO	SEVERAL
06/23/1987	674	1	4:40:00	NONE	200	TAKEOFF	0	140			CLEAR	NONE	NO	FLOCK
06/24/1987	676	2	10:07:00	NONE	200	CLIMB	3000	230			CLOUDY	NONE	NO	ONE
06/24/1987	682	1	7:50:00	NONE	200	LANDING	500	170			OVERCAST	OTHER	NO	ONE
06/28/1987	671	2	17:38:00	NONE	300	TAKEOFF	0	135			CLEAR	NONE	NO	SEVERAL
07/01/1987	620	2	7:35:00	NONE	200	TAKEOFF	0	90			CLOUDY	ATO	NO	ONE
07/13/1987	692	1	16:54:00	NONE	200	TAKEOFF	0	130			OVERCAST	NONE	NO	ONE
07/17/1987	632	2	15:20:00	NONE	200	LANDING	100	125			CLEAR	NONE	NO	SEVERAL
07/19/1987	685	2	18:20:00	MULT	200	TAKEOFF	0	100			CLOUDY	NONE	YES	SEVERAL
07/21/1987	615	2	11:40:00	NONE	200	TAKEOFF	0	50			CLEAR	ATO	NO	FLOCK
07/24/1987	606	2	9:00:00	NONE	200	CRUISE					CLEAR	ATB	NO	
07/25/1987	605	1	13:20:00	NONE	200	TAKEOFF	20	140			CLOUDY	NONE	YES	ONE
07/26/1987	612	2	19:30:00	NONE	200	TAKEOFF	0	135			RAIN	NONE	NO	SEVERAL
07/27/1987	635	1	14:16:00	NONE	200	LANDING	10	135			CLOUDY	NONE	NO	SEVERAL
07/29/1987	619	2	16:24:00	NONE	200	LANDING	0	128			OVERCAST	NONE	NO	ONE
07/30/1987	658	2	7:01:00	NONE	200	LANDING	0	100			CLEAR	NONE	NO	SEVERAL
07/31/1987	624	1	18:10:00	NONE	200	LANDING	0	123			CLOUDY	NONE	NO	SEVERAL
08/01/1987	600	2	8:15:00	NONE	200	TAKEOFF	0	20			CLOUDY	NONE	NO	FLOCK
08/05/1987	643	1	14:10:00	NONE	200	TAKEOFF	0	130			RAIN	NONE	NO	ONE
08/06/1987	626	2	10:00:00	NONE	300	TAKEOFF	0	130			OVERCAST	ATO	NO	ONE
08/07/1987	649	1	17:50:00	NONE	200	LANDING	0	100			CLEAR	NONE	NO	SEVERAL
08/12/1987	597	2	7:38:00	MULT	200	LANDING	0	100			CLEAR	NONE	NO	ONE
08/12/1987	693	2	8:18:00	NONE	200	TAKEOFF	0	150			RAIN	OTHER	NO	FLOCK
08/14/1987	645	2	6:18:00	NONE	200	TAKEOFF	0	60			CLEAR	NONE	NO	SEVERAL
08/15/1987	659	2	13:05:00	NONE	200	APPROACH	1500	170			CLEAR	ATO	NO	SEVERAL
08/18/1987	625	2	20:00:00	MULT	200	TAKEOFF	0	135			CLEAR	NONE	NO	FLOCK
08/18/1987	670	1	20:00:00	NONE	200	UNKNOW	0	135			CLEAR	NONE	NO	SEVERAL
08/22/1987	633	2	17:10:00	MULT	200	TAKEOFF	0	115			OVERCAST	NONE	NO	SEVERAL
08/22/1987	650	1	18:00:00	NONE	200	LANDING	0	120			CLEAR	OTHER	NO	SEVERAL
08/23/1987	680	1	22:15:00	NONE	200	TAKEOFF	0	100			CLEAR	ATO	NO	SEVERAL
08/27/1987	666	1	11:05:00	NONE	200	TAKEOFF	0	140			CLEAR	NONE	NO	ONE
08/27/1987	689	1	9:00:00	NONE	200	TAKEOFF	0	140			CLEAR	NONE	NO	ONE
08/28/1987	607	1	18:00:00	MULT	200	LANDING	0	115			OVERCAST	NONE	NO	SEVERAL
08/29/1987	598	1	15:23:00	NONE	200	TAKEOFF	0	120			CLEAR	NONE	NO	SEVERAL
08/30/1987	620	1	22:15:00	NONE	200	TAKEOFF	0	100			CLEAR	ATO	NO	SEVERAL
08/31/1987	669	1	11:05:00	NONE	200	UNKNOW	0	140			CLEAR	NONE	NO	ONE
09/01/1987	603	1	9:00:00	NONE	300	TAKEOFF	0	140			CLOUDY	NONE	NO	ONE
09/04/1987	593	2		NONE										

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	ENG_POS	BIRD_NAM	BIRD_SPE	# BIRDS	WT_OZ	1	CTY_PRS	AIRPORT	LOCALE	US_INCID	ENGINE	DASH
01/31/1987	614	2	GULL*		1				LCA	LARNACA, CYPRUS	NO	CFM56	3
02/06/1987	623	1			*				FRA	FRANKFURT, GERMANY	NO	CFM56	3
02/10/1987	655	2			1				EINN	SHANWICK, IRELAND	NO	JT8D	
02/13/1987	589	2	HAWK*		1				CBR	CANBERRA, AUSTRALIA	NO	CFM56	3
02/21/1987	663	1	KITE*		1				OPRN	CHAKLALA, PAKISTAN	NO	JT8D	
02/22/1987	650	1	KITE*		1				PIE	CLEARWATER, FL	YES	JT8D	
03/02/1987	690	2	GULL*		1				PIE	CLEARWATER, FL	YES	JT8D	
03/07/1987	667	2	TRUE SPARRON*		1				FAC	FUNCHAL MADEIRA, PORTUGAL	NO	JT8D	
03/12/1987	590	1	HAWK*		*				ABCG	COOLANGATTA, AUSTRALIA	NO	CFM56	3
03/16/1987	595	1			*				TSV	TOWNSVILLE, AUSTRALIA	NO	CFM56	3
03/26/1987	627	1			*				BDQ	VADOORA, INDIA	NO	JT8D	
03/27/1987	627	2			*				BNJ	BONN, GERMANY	NO	JT8D	
03/31/1987	664	2			1				LHE	LAHORE, PAKISTAN	NO	JT8D	
04/06/1987	657	1			1				LHR	LONDON-HEATHROW, ENGLAND	NO	CFM56	3
04/08/1987	665	2			*				HKNA	JOMO KENYATTA, KENYA	NO	JT8D	
04/12/1987	596	1			1				FAO	FARO, PORTUGAL	NO	CFM56	3
04/14/1987	681	2	HOUSE SPARRON		1		1.		TSV	TOWNSVILLE, AUSTRALIA	NO	CFM56	3
04/26/1987	660	1			1				BHX	BIRMINGHAM, ENGLAND	NO	CFM56	3
05/06/1987	591	1	AUSTRALIAN COURSER		*		2.5		AHS	AMSTERDAM, NETHERLANDS	NO	CFM56	3
05/08/1987	592	1	GULL*		*				DRW	DARWIN, AUSTRALIA	NO	CFM56	3
05/10/1987	622	2			1				SYD	SYDNEY, AUSTRALIA	NO	CFM56	3
05/10/1987	687	1			1				EMA	EAST MIDLANDS, ENGLAND	NO	JT8D	
06/05/1987	694	2	VULTURE*		*				TRV	TRIVANDRUM, INDIA	NO	JT8D	
06/08/1987	662	1	GULL*		1				CHC	CHRISTCHURCH, NEW ZEALAND	NO	JT8D	
06/10/1987	608	1			1				YOW	OTTAWA, CANADA	NO	JT8D	
06/12/1987	677	2	SWALLOW*		1				BKK	BANGKOK, THAILAND	NO	JT8D	
06/23/1987	609	2	GULL*		1				YXS	PRINCE GEORGE, CANADA	NO	JT8D	
06/24/1987	676	2			*				LERS	REUS, SPAIN	NO	JT8D	
06/24/1987	682	1			1				PMI	PALMA MALLOPCA, SPAIN	NO	JT8D	
06/28/1987	671	2			1				GLA	GLASGOW, SCOTLAND	NO	JT8D	
06/30/1987	628	2			1				MAD	MADRID, SPAIN	NO	JT8D	
07/01/1987	629	2	GULL*		1				TXL	W. BERLIN, GERMANY	NO	JT8D	
07/13/1987	692	1	PARTRIDGE*		1				LGSK	SKIATHOS, GREECE	NO	CFM56	3
07/17/1987	632	2	KITE*		1				AMD	AHMEDABAD, INDIA	NO	JT8D	
07/19/1987	685	1			1				LTN	LONDON-LUTON, ENGLAND	NO	JT8D	
07/21/1987	615	2			1				KRP	KASTRUP, DENMARK	NO	JT8D	
07/24/1987	606	2	KILLDEER		*		3.		YCG	CALLEGAR, CANADA	NO	JT8D	
07/25/1987	605	1	GULL*		1				YYC	CALGARY ALTA, CANADA	NO	JT8D	
07/26/1987	612	2			1				ATQ	MPEARSOA INTL, CANADA	NO	JT8D	
07/27/1987	635	1			1				LDE	AMRITSAR, INDIA	NO	JT8D	
07/29/1987	619	2	HAWK*		*				MLAL	LOURDES, FRANCE	NO	JT8D	
07/30/1987	658	2	PIGEON*		1				EDUO	LUQA MALTA	NO	JT8D	
07/31/1987	624	1			1				SZG	GUTERSLOH, GERMANY	NO	JT8D	
08/01/1987	600	2			1				PAT	SALTZBURG, AUSTRIA	NO	JT8D	
08/05/1987	643	1	KITE*		1				MUC	MUNICH, GERMANY	NO	JT8D	
08/06/1987	626	2	LAPWING*		1				VTZ	VISAKHAPATNAM, INDIA	NO	JT8D	
08/07/1987	649	1			1				LNZ	LNZ, AUSTRIA	NO	CFM56	3
08/12/1987	635	2			1				IXR	RANCHI, INDIA	NO	JT8D	
08/14/1987	645	2			1				GMTT	BOUKHAF, MOROCCO	NO	JT8D	
08/15/1987	659	2	HAWK*		1				HAM	HAMBURG, GERMANY	NO	JT8D	
08/18/1987	625	2	GULL*		*				LTBS	MUGLA, TURKEY	NO	JT8D	
08/18/1987	679	1			1				AMD	AHMEDABAD, INDIA	NO	JT8D	
08/22/1987	633	2	VULTURE*		1				DEL	DELHI, INDIA	NO	JT8D	
08/23/1987	680	1	COMMON LAPWING		*		7.7		SVO	MOSCOU-SHEREMETYE, USSR	NO	JT8D	
08/27/1987	666	1			*				FAO	FARO, PORTUGAL	NO	JT8D	
08/27/1987	689	1			1				NCL	NEW CASTLE, ENGLAND	NO	JT8D	
08/28/1987	607	1	COMMON SNIPE		*				YXJ	FT ST JOHN, CANADA	NO	JT8D	
08/29/1987	598	1	SWALLOW*		1				LNZ	LNZ, AUSTRIA	NO	JT8D	
08/29/1987	620	1	EURASIAN KESTREL		1				LDE	LOURDES, FRANCE	NO	JT8D	
08/31/1987	649	1			1				FAWH	J.G. STRIJDOM, S. AFRICA	NO	JT8D	
09/01/1987	603	1			1				EBOB	OOSTENDE, BELGIUM	NO	JT8D	
09/01/1987	604	1			1				WBSB	BRUNEL INTL, MALAYSIA	NO	JT8D	
09/04/1987	593	2			1				MEL	MELBOURNE, AUSTRALIA	NO	CFM56	3

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	ENG_POS	DMG_CODE	SEVERITY	POW_LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
01/31/1987	614	2		9					MEDIUM BIRD
02/06/1987	623	1		9					
02/10/1987	655	2	A	4					MEDIUM BIRD MINOR DAMAGE
02/13/1987	589	2	A	4					4, FAN BLADES DAMAGED
02/21/1987	663	1		9					LARGE BIRD
02/22/1987	690	2		9					MEDIUM BIRD
03/02/1987	667	2		9					SMALL BIRD
03/07/1987	590	1		9					LARGE BIRD
03/12/1987	595	1		9					SMALL BIRD
03/16/1987	647	1		9					SMALL BIRD
03/26/1987	827	1		9					MEDIUM BIRD
03/26/1987	827	2	A	4					MEDIUM BIRD, MINOR DAMAGE
03/27/1987	664	2	A	4					SMALL BIRD
03/31/1987	684	1		9					MEDIUM BIRD
04/06/1987	657	2		9					SMALL BIRD
04/08/1987	665	2		9					SMALL BIRD
04/12/1987	596	1		9					SMALL BIRD
04/16/1987	681	2		9					SMALL BIRD
04/26/1987	660	1		9					SMALL BIRD
05/06/1987	591	1		9					SMALL BIRD
05/08/1987	592	1		9					MEDIUM BIRD
05/10/1987	622	2		9					MEDIUM BIRD
05/10/1987	687	1		9					SMALL BIRD
06/05/1987	694	2		9					SMALL BIRD
06/08/1987	682	1	A	4					SUBSTANTIAL DAMAGE
06/10/1987	608	1		9					MEDIUM BIRD
06/12/1987	677	2		9					SMALL BIRD
06/19/1987	609	2		9					SMALL BIRD
06/23/1987	674	1	A	4					SUBSTANTIAL DAMAGE, ENGINE CHANGED
06/24/1987	576	2		9					
06/26/1987	682	1		9					
06/28/1987	671	2		9					
06/30/1987	628	2		9					
07/01/1987	629	2		9					
07/13/1987	692	1		9					
07/17/1987	632	2		9					
07/19/1987	685	1		9					
07/21/1987	615	2		9					
07/24/1987	606	2		9					
07/25/1987	605	1		9					
07/26/1987	612	2		9					
07/27/1987	635	1	A, M	3					
07/29/1987	619	2		9					SMALL BIRD, SUBSTANTIAL DAMAGE
07/30/1987	658	2		9					LARGE BIRD
07/31/1987	624	1		9					MEDIUM BIRD
08/01/1987	600	2		9					MEDIUM BIRD
08/05/1987	643	1		9					SMALL BIRD
08/06/1987	626	2		9					MEDIUM BIRD
08/07/1987	649	1		9					MEDIUM BIRD
08/12/1987	597	2		9					SMALL BIRD
08/12/1987	693	2		9					MEDIUM BIRD
08/14/1987	645	2		9					SMALL BIRD
08/15/1987	659	2	A	4					MEDIUM BIRD
08/18/1987	625	2	A	4					MEDIUM BIRD
08/18/1987	679	1		9					MEDIUM BIRD
08/22/1987	633	2		9					MEDIUM BIRD
08/22/1987	650	1		9					LARGE BIRD
08/23/1987	680	1		9					MEDIUM BIRD
08/27/1987	666	1		9					
08/27/1987	669	1		9					
08/28/1987	607	1		9					SMALL BIRD, MINOR DAMAGE
08/29/1987	598	1	A	4					SMALL BIRD
08/29/1987	620	1		9					MEDIUM BIRD
08/31/1987	669	1		9					MEDIUM BIRD
09/01/1987	603	1		9					SMALL BIRD
09/01/1987	604	1		9					MEDIUM BIRD
09/04/1987	593	2		9					

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EV#	ENG POS	ETIME	SIGN	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL RULES	LT CONDS	WEATHER	CREW AC	CREW AL	BIRD SEE
09/04/1987	672	1	19:55:00	MULT	ENG	200	TAKEOFF		0 100			CLEAR	NONE		
09/04/1987	672	2	19:55:00	MULT	ENG	200	TAKEOFF		0 100			CLEAR	NONE		
09/04/1987	676	1	19:55:00	MULT	ENG-BIRDS	200	TAKEOFF		0 90			CLEAR	NONE		FLOCK
09/04/1987	676	2	19:55:00	MULT	ENG-BIRDS	200	TAKEOFF		0 90			CLEAR	NONE		FLOCK
09/05/1987	618	1	10:39:00	NONE		300	LANDING		0 100		OVERCAST	CLEAR	NONE		SEVERAL
09/06/1987	599	2	11:20:00	NONE		300	LANDING		0 80			RAIN	NONE		SEVERAL
09/21/1987	621	1	9:55:00	NONE		200	TAKEOFF		0 140			CLEAR	NONE		FLOCK
09/21/1987	623	2	13:40:00	NONE		200	TAKEOFF		0 140			CLEAR	NONE		SEVERAL
09/22/1987	668	1	10:57:00	NONE		200	TAKEOFF		0 150			CLEAR	NONE		
10/01/1987	613	1	19:35:00	NONE	CRUISE	200	TAKEOFF					CLEAR	ATB		
10/04/1987	630	1	8:55:00	NONE		200	TAKEOFF		10 140			CLEAR	NONE		ONE
10/04/1987	686	2	8:55:00	NONE		200	TAKEOFF		75			CLOUDY	NONE		
10/07/1987	654	1	8:55:00	NONE		200	LANDING		0			CLOUDY	NONE		
10/11/1987	601	1	16:11:00	NONE		300	APPROACH		100 140			CLEAR	NONE		ONE
10/11/1987	616	1	16:11:00	NONE		100	TAKEOFF		0			CLEAR	NONE		
10/11/1987	683	2	9:30:00	NONE		200	PARKED		0			CLEAR	NONE		
10/19/1987	661	1	20:15:00	MULT	BIRDS	300	LANDING		0			CLEAR	NONE		
10/29/1987	594	1	7:00:00	NONE		300	TAKEOFF		0 130			CLOUDY	NONE		ONE
10/31/1987	675	2	18:13:00	NONE		200	LANDING		200 125			CLOUDY	NONE		SEVERAL
11/08/1987	652	2	20:10:00	NONE		200	UNKNOWN		120			CLEAR	NONE		ONE
11/09/1987	612	2	22:22:00	MULT	BIRDS	200	LANDING		250 130			CLEAR	NONE		SEVERAL
11/11/1987	617	2	18:00:00	NONE		100	TAKEOFF		0			CLEAR	OTHER		
11/20/1987	695	1	14:30:00	NONE		200	TAKEOFF		0 120			CLOUDY	NONE		
11/24/1987	646	2	14:30:00	NONE		200	TAKEOFF		10 138			CLEAR	ATB		SEVERAL
11/26/1987	656	1	11:05:00	MULT	BIRDS	200	TAKEOFF		0 142			RAIN	NONE		SEVERAL
12/02/1987	639	2	16:37:00	NONE		200	TAKEOFF		0 130			CLEAR	NONE		ONE
12/04/1987	688	1	12:05:00	MULT	BIRDS	300	APPROACH					CLEAR	NONE		
12/08/1987	651	1	8:22:00	NONE		200	UNKNOWN		0			CLEAR	NONE		
12/15/1987	678	1	16:35:00	NONE		200	TAKEOFF		0 70			CLOUDY	ATB		ONE
12/27/1987	641	2	16:35:00	NONE		200	TAKEOFF		0 110			CLEAR	NONE		
01/03/1988	1234	1	10:15:00	NONE		100	APPROACH		1000 130			CLEAR	NONE		
01/04/1988	1207	1	10:15:00	MULT	ENG-BIRDS	300	LANDING		200 130			RAIN	NONE		SEVERAL
01/20/1988	1265	1	10:15:00	MULT	ENG-BIRDS	300	LANDING		200 130			RAIN	NONE		SEVERAL
01/27/1988	1272	1	9:57:00	NONE		200	TAKEOFF		0 150			CLOUDY	ATB		SEVERAL
01/27/1988	1292	2	19:40:00	NONE		300	APPROACH		600 130			CLEAR	NONE		FLOCK
02/04/1988	1264	1	7:18:00	NONE		300	LANDING		0 125			OVERCAST	NONE		ONE
02/05/1988	1253	2	7:18:00	NONE		100	LANDING		0			OVERCAST	NONE		
02/13/1988	1263	1	10:35:00	NONE		200	TAKEOFF		0			CLEAR	NONE		
03/07/1988	1304	1	11:05:00	NONE		200	APPROACH		0 110			CLEAR	ATO		SEVERAL
03/13/1988	1228	2	17:55:00	NONE		200	TAKEOFF		0 100			CLEAR	OTHER		ONE
03/18/1988	1284	1	17:55:00	MULT	ENG-BIRDS	300	LANDING		50 145			CLEAR	NONE		
03/22/1988	1270	2	17:55:00	MULT	ENG-BIRDS	300	TAKEOFF		50 145			CLEAR	NONE		
03/22/1988	1270	2	11:30:00	MULT	ENG-BIRDS	300	TAKEOFF		700 170			CLEAR	OTHER		FLOCK
03/29/1988	1249	1	20:02:00	MULT	ENG-BIRDS	300	CLIMB		700 170			CLEAR	OTHER		FLOCK
03/29/1988	1259	1	20:02:00	MULT	ENG-BIRDS	300	TAKEOFF		0 130			CLEAR	NONE		
04/16/1988	1215	1	14:30:00	NONE		300	TAKEOFF		0 150			CLOUDY	NONE		ONE
04/16/1988	1265	2	18:30:00	NONE		300	TAXI		0 10			CLOUDY	NONE		SEVERAL
04/18/1988	1267	2	18:30:00	NONE		300	TAKEOFF		0 128			CLEAR	NONE		SEVERAL
04/20/1988	1289	2	6:50:00	MULT	BIRDS	300	LANDING		75 135			CLEAR	NONE		SEVERAL
04/26/1988	1246	2	23:10:00	MULT	BIRDS	200	TAKEOFF		0 119			CLEAR	NONE		SEVERAL
04/28/1988	1319	1	7:54:00	NONE		200	APPROACH		1000 142			CLOUDY	NONE		SEVERAL
04/29/1988	1303	1	21:28:00	NONE		100	LANDING		50 130			CLEAR	NONE		ONE
04/30/1988	1293	1	21:28:00	NONE		100	LANDING		20 135			CLEAR	OTHER		ONE
05/10/1988	1212	1	11:05:00	MULT	ENG	100	TAKEOFF		0			CLEAR	NONE		
05/10/1988	1212	2	11:05:00	MULT	ENG	100	TAKEOFF		0			CLEAR	NONE		
05/11/1988	1251	2	9:00:00	NONE		200	APPROACH		500 140			CLOUDY	NONE		ONE
05/15/1988	1220	1	9:00:00	NONE		100	APPROACH		0			CLOUDY	NONE		SEVERAL
05/21/1988	1256	2	15:25:00	MULT	BIRDS	100	LANDING		0 110			CLEAR	NONE		SEVERAL
05/22/1988	1288	1	12:10:00	MULT	BIRDS	200	TAKEOFF		0 110			CLEAR	OTHER		SEVERAL
05/26/1988	1306	2	12:10:00	MULT	BIRDS	200	TAKEOFF		0 110			CLEAR	OTHER		SEVERAL
05/29/1988	1260	1	11:10:00	MULT	BIRDS	200	TAKEOFF		500 140			OVERCAST	NONE		SEVERAL
06/02/1988	1227	2	11:10:00	MULT	BIRDS	200	APPROACH		0 120			RAIN	NONE		SEVERAL
06/09/1988	1221	1	13:30:00	NONE		200	LANDING		0 95			CLOUDY	NONE		SEVERAL
06/09/1988	1308	2	13:30:00	NONE		200	TAKEOFF		0 95			CLOUDY	ATO		ONE



SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	ENG_POS	BIRD_NAM	BIRD_SPE	#_BIRDS	WT_OZ_1	CTY_PRS	AIRPORT	LOCALE	US_INCID	ENGINE	DASH
09/04/1987	672	1						IBZ	IBIZA, SPAIN	NO	JT8D	
09/04/1987	672	2						IBZ	IBIZA, SPAIN	NO	JT8D	
09/04/1987	696	1						YSM	FT SMITH, CANADA	NO	JT8D	
09/04/1987	696	2						YSM	FT SMITH, CANADA	NO	JT8D	
09/05/1987	618	1	GULL*					NCE	NICE, FRANCE	NO	CFM56	3
09/06/1987	599	2						LNZ	LONZ, AUSTRIA	NO	CFM56	3
09/21/1987	621	1						LDE	LOURDES, FRANCE	NO	JT8D	
09/22/1987	668	1	SWIFT*					IBZ	IBIZA, SPAIN	NO	JT8D	
09/22/1987	668	2	DOVE*					FACT	D.F. MALAN S. AFRICA	NO	JT8D	
10/01/1987	613	1							PEARSON INTL CANADA	NO	JT8D	
10/04/1987	630	1	LAPWING*						HONG KONG, HONG KONG	NO	JT8D	
10/04/1987	686	2	GULL*						TEES-SIDE, ENGLAND	NO	JT8D	
10/07/1987	654	1							CORK, IRELAND	NO	JT8D	
10/11/1987	601	1							WIEN-SCHNECHAT AUSTRIA	NO	JT8D	
10/11/1987	616	1	COMMON BUZZARD	3K180		32.		LFW	BLAGNAC, FRANCE	NO	CFM56	3
10/11/1987	683	2						GLA	GLASGOW, SCOTLAND	NO	JT8D	
10/19/1987	661	1	AUSTRALIAN BELL MAGPIE	2377		11.		AMS	AMSTERDAM, NETHERLANDS	NO	CFM56	3
10/29/1987	594	1	LITTLE OML	23100				ROK	ROCKHAMPTON, AUSTRALIA	NO	CFM56	3
10/31/1987	675	2						LEHS	REUS, SPAIN	NO	JT8D	
11/08/1987	652	2						HYD	HYDERABAD, INDIA	NO	JT8D	
11/09/1987	611	2	GOOSE*					YVR	VANCOUVER, CANADA	NO	JT8D	
11/11/1987	617	2	COMMON SKYLARK	17Z72		1.5		FVCP	BLAGNAC, FRANCE	NO	JT8D	
11/20/1987	695	1						SYR	PRINCE CHARLES, ZIMBABWE	NO	JT8D	
11/24/1987	646	2	KITE*					LIPE	BORGO PANIGALE, ITALY	NO	JT8D	
11/26/1987	656	1	GULL*					GAU	GAUHATI, INDIA	NO	JT8D	
12/02/1987	639	2						LHR	LONDON-HEATHROW, ENGLAND	NO	CFM56	3
12/04/1987	688	1						DTTA	CHANDIGARH-DELHI, INDIA	NO	JT8D	
12/08/1987	651	1						MAA	MADRAS, INDIA	NO	JT8D	
12/15/1987	678	1						JNB	JAN SMUTS, S. AFRICA	NO	JT8D	
12/27/1987	641	2	IBTSE*					NCE	NICE, FRANCE	NO	JT8D	
12/28/1987	670	1	BLACK-HEADED GULL	14N36		10.		SMI	SAMOS, GREECE	NO	CFM56	3
01/03/1988	1234	1	GULL*					CNS	CAIRNS, AUSTRALIA	NO	CFM56	3
01/04/1988	1297	1						CNS	CAIRNS, AUSTRALIA	NO	JT8D	
01/20/1988	1225	1						LTN	LUTON, ENGLAND	NO	JT8D	
01/20/1988	1225	2						SYD	SYDNEY, AUSTRALIA	NO	CFM56	3
01/27/1988	1272	1	GULL*					HAJ	HANOY, GERMANY	NO	JT8D	
01/27/1988	1272	2	GULL*					BRU	BRUSSELS, BELGIUM	NO	JT8D	
02/04/1988	1264	1	GULL*					TBT	TABATINGA, BRASIL	NO	JT8D	
02/05/1988	1253	2	BARN OWL	1S2		11.25		MVD	CARRASCO, URUGUAY	NO	CFM56	3
02/15/1988	1223	1	AMERICAN BLACK VULTURE	1K4		60.		ISA	MT. ISA, AUSTRALIA	NO	JT8D	
03/07/1988	1304	1						DUR	DURBAN, S. AFRICA	NO	JT8D	
03/13/1988	1228	2						DUR	DURBAN, S. AFRICA	NO	JT8D	
03/18/1988	1284	1	SWALLOW*					DTMB	HABIB BOURGIBA, TUNISIA	NO	JT8D	
03/22/1988	1270	2	SWALLOW*					ALC	ALICANTE, SPAIN	NO	JT8D	
03/29/1988	1249	1						SYD	SYDNEY, AUSTRALIA	NO	CFM56	3
03/29/1988	1249	2						EBCI	GOSSELIES, BELGIUM	NO	CFM56	3
03/29/1988	1259	1						PER	PERTH, AUSTRALIA	NO	JT8D	
04/16/1988	1215	1	PIGEON*					LGV	LONDON, ENGLAND	NO	JT8D	
04/16/1988	1265	2	WOOD PIGEON					MAA	MADRAS, INDIA	NO	JT8D	
04/20/1988	1289	2						SVG	STAVANGER, NORWAY	NO	JT8D	
04/26/1988	1246	1						RBA	RABAT MOROCCO	NO	JT8D	
04/28/1988	1319	1	HOODED CROW*					CZL	CONSTANTINE, ALGERIA	NO	JT8D	
04/29/1988	1303	1	HERRING GULL	14N14				HAM	HAMBURG, GERMANY	NO	JT8D	
04/30/1988	1293	1						BCN	BARCELONA, SPAIN	NO	JT8D	
05/10/1988	1212	1	COMMON SWIFT	1U55		2.		PMT	PATNA, INDIA	NO	JT8D	
05/10/1988	1212	2	SWALLOW*					ALG	ALGIERS, ALGERIA	NO	JT8D	
05/11/1988	1251	2						ZRH	ZURICH, SWITZERLAND	NO	JT8D	
05/15/1988	1220	1	KITE*					KEF	KEFLAVIK, ICELAND	NO	JT8D	
05/21/1988	1256	2						MAP	NAPLES, ITALY	NO	JT8D	
05/22/1988	1288	1	PIGEON*	14N22		56.		BHX	BIRMINGHAM, ENGLAND	NO	JT8D	
05/22/1988	1314	2	GLAUCOUS WINGED GULL	17Z72		1.		TRD	TRONDHEIM, NORWAY	NO	JT8D	
05/24/1988	1306	2										
05/29/1988	1260	1	SKYLARK									
06/02/1988	1227	2	CURLEW*									
06/09/1988	1308	2										



SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	EMG_POS	EMG_ETM	SIGM	EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LT_COMDS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
06/10/1988	1261	2	13:25:00	MULT	BIRDS	200	TAKEOFF	0	70			CLEAR	NONE		FLOCK
06/11/1988	1273	2	14:42:00	NONE		200	TAKEOFF	50	150			CLEAR	NONE	NO	SEVERAL
06/12/1988	1219	1	20:30:00	MULT	BIRDS	100	CLIMB	500	155			CLEAR	NONE	NO	SEVERAL
06/13/1988	1274	1	7:02:00	NONE		300	LANDING	0	125			CLEAR	NONE	NO	ONE
06/13/1988	1281	2	19:31:00	NONE		300	CLIMB	0	120			CLEAR	NONE	NO	ONE
06/14/1988	1254	1	21:05:00	MULT	BIRDS	300	TAKEOFF	0	90			CLEAR	NONE	NO	SEVERAL
06/16/1988	1217	2	20:28:00	NONE		300	LANDING	0	140			CLOUDY	NONE	NO	ONE
06/18/1988	1282	1	7:20:00	MULT	BIRDS	200	TAKEOFF	0	115			CLEAR	NONE	NO	FLOCK
06/20/1988	1302	2	19:30:00	MULT	BIRDS	200	LANDING	10	130			OVERCAST	NONE	NO	SEVERAL
06/23/1988	1222	2	6:15:00	MULT	BIRDS	300	LANDING	600	135			CLOUDY	NONE	NO	FLOCK
06/26/1988	1258	2	20:10:00	NONE		300	APPROACH	50	145			CLEAR	NONE	NO	SEVERAL
06/27/1988	1262	1	8:00:00	NONE		300	TAKEOFF	150				CLEAR	NONE	NO	ONE
06/29/1988	1267	2	17:02:00	MULT	BIRDS	300	LLIMB	0	150			CLOUDY	ATB	NO	SEVERAL
07/01/1988	1285	1	4:40:00	NONE		300	TAKEOFF	0	120			CLOUDY	NONE	NO	FLOCK
07/05/1988	1291	1	9:39:00	MULT	BIRDS	300	LANDING	20	160			CLEAR	NONE	NO	FLOCK
07/07/1988	1286	1	19:25:00	NONE		300	TAKEOFF	50	150			CLEAR	NONE	NO	FLOCK
07/11/1988	1235	1	6:20:00	MULT	BIRDS	300	LANDING	0	100			RAIN	NONE	NO	SEVERAL
07/15/1988	1252	2	11:50:00	NONE		200	LANDING	30	125			OVERCAST	NONE	NO	ONE
07/16/1988	1245	2	9:40:00	MULT	BIRDS	200	LANDING	0	120			CLEAR	NONE	NO	ONE
07/19/1988	1310	1	20:15:00	NONE		200	TAKEOFF	0	120			CLEAR	NONE	NO	ONE
07/19/1988	1317	1	5:04:00	NONE		200	TAKEOFF	0	120			CLEAR	NONE	NO	ONE
07/20/1988	1307	1	6:00:00	NONE		100	TAKEOFF	0	40			CLEAR	NONE	NO	SEVERAL
07/23/1988	1229	2	7:02:00	MULT	BIRDS	100	TAKEOFF	0	120			CLOUDY	ATO	NO	SEVERAL
07/25/1988	1224	2	21:00:00	NONE		200	TAKEOFF	350	250			CLEAR	NONE	NO	SEVERAL
07/26/1988	1243	1	17:40:00	NONE		200	CLIMB	10	130			CLEAR	NONE	NO	SEVERAL
07/27/1988	1275	2	11:21:00	NONE		200	LANDING	800	170			CLOUDY	NONE	NO	ONE
07/28/1988	1309	1	8:17:00	MULT	BIRDS	100	APPROACH	0	100			CLEAR	ATO	NO	SEVERAL
07/28/1988	1266	1	13:00:00	NONE		300	LANDING	50	140			CLEAR	NONE	NO	SEVERAL
07/30/1988	1315	2	1:55:00	NONE		300	TAKEOFF	0	125			CLEAR	NONE	NO	SEVERAL
07/31/1988	1311	1	16:03:00	NONE		300	TAKEOFF	225	136			CLEAR	NONE	NO	SEVERAL
08/01/1988	1265	1	14:48:00	MULT	BIRDS	300	TAKEOFF	0	122			RAIN	NONE	NO	SEVERAL
08/07/1988	1248	1	9:48:00	NONE		100	LANDING	0	130			CLEAR	OTHER	NO	SEVERAL
08/09/1988	1214	1	20:26:00	NONE		100	TAKEOFF	0	140			CLEAR	ATB	YES	ONE
08/18/1988	1298	2	9:50:00	NONE		100	TAKEOFF	0	150			CLOUDY	NONE	YES	SEVERAL
08/20/1988	1287	2	12:30:00	NONE		100	TAKEOFF	150	138			CLEAR	ATO	YES	ONE
08/20/1988	1307	2	9:20:00	NONE		100	LANDING	1000	140			FOG	NONE	NO	ONE
08/21/1988	1257	2	14:56:00	NONE		100	APPROACH	0	60			RAIN	ATO	NO	SEVERAL
08/22/1988	1257	2	7:12:00	MULT	ENG-BIRDS	200	TAKEOFF	0	60			RAIN	ATO	NO	FLOCK
08/29/1988	1295	1	14:50:00	MULT	ENG-BIRDS	200	TAKEOFF	0	135			CLEAR	ATO	NO	FLOCK
09/01/1988	1255	1	14:50:00	MULT	ENG-BIRDS	100	TAKEOFF	0	135			CLEAR	ATO	NO	FLOCK
09/01/1988	1255	2	13:59:00	MULT	ENG-BIRDS	200	LANDING	0	125			CLOUDY	NONE	YES	FLOCK
09/01/1988	1277	1	9:40:00	NONE		200	LANDING	0	125			CLEAR	NONE	YES	FLOCK
09/01/1988	1277	2	15:45:00	NONE		200	TAKEOFF	0	130			CLEAR	ATB	NO	ONE
09/01/1988	1277	2	14:06:00	MULT	BIRDS	200	TAKEOFF	0	125			RAIN	NONE	NO	ONE
09/23/1988	1210	1	14:06:00	MULT	BIRDS	200	TAKEOFF	0	80			CLOUDY	ATB	NO	ONE
09/25/1988	1218	1	9:10:00	NONE		300	TAKEOFF	600	139			CLEAR	ATO	NO	ONE
09/28/1988	1250	2	17:19:00	NONE		200	APPROACH	0	145			CLOUDY	NONE	NO	FLOCK
09/28/1988	1271	1	10:06:00	NONE		100	TAKEOFF	0	140			OVERCAST	DIV	NO	FLOCK
09/29/1988	1231	2	7:05:00	NONE		200	TAKEOFF	10	130			CLEAR	NONE	NO	ONE
10/04/1988	1244	2	10:25:00	MULT	BIRDS	200	TAKEOFF	5	130			OVERCAST	ATB	NO	ONE
10/08/1988	1211	1	12:53:00	NONE		200	LANDING	100	120			CLOUDY	NONE	YES	FLOCK
10/12/1988	1276	2	9:10:00	MULT	BIRDS	300	LANDING	200	130			FOG	NONE	NO	FLOCK
10/14/1988	1270	1	14:03:00	MULT	BIRDS	300	APPROACH	200	160			CLOUDY	NONE	NO	FLOCK
10/18/1988	1240	2	14:03:00	NONE		200	LANDING	0	137			OVERCAST	NONE	NO	FLOCK
10/26/1988	1216	2	21:55:00	MULT	BIRDS	200	CLIMB	5	135			CLEAR	NONE	NO	ONE
10/29/1988	1236	1	13:44:00	MULT	BIRDS	200	LANDING					CLOUDY	NONE	NO	FLOCK
11/09/1988	1305	1													
11/09/1988	1305	2													
11/10/1988	1258	1													
11/14/1988	1237	1													

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	ENG_POS	BIRD_NAM	BIRD_SPE	# BIRDS	WT_OZ_1	CTY	PRS	AIRPORT	LOCALE	US	INCID	ENGINE	DASH
06/10/1988	1261	2			*				CFU	CORFU, GREECE	NO		JT80	
06/11/1988	1273	2			*				LTN	LUTON, ENGLAND	NO		JT80	
06/12/1988	1219	1			*				MAD	MADRID, SPAIN	NO		JT80	
06/13/1988	1274	1	SILVER GULL	14M32	1	12.			LTN	LUTON, ENGLAND	NO		CFM56	3
06/14/1988	1281	2			*				MEL	MELBOURNE, AUSTRALIA	NO		CFM56	3
06/15/1988	1284	2			*				LHR	LONDON, ENGLAND	NO		CFM56	3
06/16/1988	1282	1			*				LGRX	ARAXOS, GREECE	NO		CFM56	3
06/18/1988	1302	1			*				LEMH	MEMORCA, SPAIN	NO		JT80	
06/20/1988	1282	1	GULL*		*				LGSK	SKIATHOS, GREECE	NO		JT80	
06/23/1988	1282	2	GULL*		*				BOO	BODØ, NORWAY	NO		JT80	
06/26/1988	1288	2	KITE*		*				LHE	LAHORE, PAKISTAN	NO		CFM56	3
06/27/1988	1292	1	SWALLOW*		*				CFU	CORFU, GREECE	NO		CFM56	3
06/29/1988	1267	2	OWL*		*				LTN	LUTON, ENGLAND	NO		CFM56	3
06/29/1988	1285	1	SWALLOW*		*				MUC	MUNICH, GERMANY	NO		CFM56	3
07/01/1988	1280	1			*				MAN	MANCHESTER, ENGLAND	NO		CFM56	3
07/05/1988	1291	1			*				PVK	PREVEZA, GREECE	NO		CFM56	3
07/07/1988	1286	1			*				LTBS	MULGA, TURKEY	NO		CFM56	3
07/11/1988	1283	1			*				ABCG	COOLANGATTA, AUSTRALIA	NO		CFM56	3
07/15/1988	1282	2	HAWK*		*				HAM	HAMBURG, GERMANY	NO		CFM56	3
07/16/1988	1245	2	PIGEON*		*				OSL	OSLO, NORWAY	NO		JT80	
07/19/1988	1310	1			*				AES	ALESUND, NORWAY	NO		JT80	
07/19/1988	1317	1			*				BRU	BRUSSELS, BELGIUM	NO		JT80	
07/20/1988	1307	1	EUROPEAN SPARROW HAWK	3K103	1				CDG	PARIS, FRANCE	NO		JT80	
07/23/1988	1292	2			*				FAO	FARO, PORTUGAL	NO		JT80	
07/25/1988	1284	2			*				LTN	LUTON, ENGLAND	NO		JT80	
07/26/1988	1243	1			*				FAE	FAROE ISLANDS, DENMARK	NO		JT80	
07/27/1988	1275	2	HERRING GULL	14N14	1	40.			NCE	NICE, FRANCE	NO		JT80	
07/28/1988	1285	2	HAWK*		*				BNJ	BONN, GERMANY	NO		JT80	
07/30/1988	1266	1			*				FRA	FRANKFURT, GERMANY	NO		JT80	
07/31/1988	1315	2	SPARROW*		*				LOWM	WIEN-SCHWEGHAT, OSTERREICH	NO		CFM56	3
08/01/1988	1269	1	BARN OWL	1S2	1	11.25			LIS	LISBON, PORTUGAL	NO		CFM56	3
08/07/1988	1268	1			*				PZL	PORT ELIZABETH, S. AFRICA	NO		JT80	
08/09/1988	1273	1	HOUSE MARTIN	18Z69	1	0.5			BFS	BELFAST, N. IRELAND	NO		JT80	
08/09/1988	1214	1			*				BFS	BELFAST, N. IRELAND	NO		JT80	
08/09/1988	1214	1			*				COG	PARIS, FRANCE	NO		JT80	
08/09/1988	1250	1			*				LYS	LYON, FRANCE	NO		JT80	
08/18/1988	1298	2			*				PAI	PALMA MALLORCA, SPAIN	NO		JT80	
08/20/1988	1287	1			*				RBA	RABAT, MOROCCO	NO		JT80	
08/20/1988	1294	2	KITE*	5K27	1	7.			IBZ	IBIZA, SPAIN	NO		JT80	
08/21/1988	1257	2	EURASIAN KESTREL	5K27	1	8.			RBA	RABAT, MOROCCO	NO		JT80	
08/22/1988	1295	1	EURASIAN KESTREL		1				LOWM	WIEN-SCHWEGHAT, OSTERREICH	NO		JT80	
08/29/1988	1313	1	SWALLOW*		*				LHR	LONDON, ENGLAND	NO		JT80	
09/01/1988	1293	1			*				LHR	LONDON, ENGLAND	NO		JT80	
09/01/1988	1255	2	COMMON STARLING	21Z75	*	2.5			CND	CONSTANTA, ROMANIA	NO		JT80	
09/01/1988	1277	1	COMMON STARLING	21Z75	*	2.5			CND	CONSTANTA, ROMANIA	NO		JT80	
09/05/1988	1311	1			*				AES	ALESUND, NORWAY	NO		JT80	
09/05/1988	1311	2			*				AES	ALESUND, NORWAY	NO		JT80	
09/07/1988	1266	1			*				CBR	CANBERRA, AUSTRALIA	NO		CFM56	3
09/08/1988	1263	1			*				JRO	KILIMANJARO, TANZANIA	NO		JT80	
09/11/1988	1241	1	COMMON GULL	14N13	*	15.5			EDI	EDINBURGH, SCOTLAND	NO		JT80	
09/23/1988	1210	1	GALAH	1Q15	*	11.5			ADL	ADELAIDE, AUSTRALIA	NO		CFM56	3
09/25/1988	1218	1			*				BLR	BANGALORE, INDIA	NO		JT80	
09/28/1988	1250	2	BLACK-BACKED GULL	14N17	1	29.			DTHB	HABIB BOURGIBA, TUNISIA	NO		CFM56	3
09/28/1988	1271	1	EURASIAN KESTREL	5K27	1	7.			BRS	BRISTOL, ENGLAND	NO		JT80	
09/29/1988	1244	2	GULL*		1				COG	PARIS, FRANCE	NO		JT80	
10/04/1988	1244	2	EAGLE*		1				BGO	BERGEN, NORWAY	NO		JT80	
10/08/1988	1211	1			*				AGR	AGRA, INDIA	NO		JT80	
10/12/1988	1290	2			*				PWM	PORTLAND, ME	NO		JT80	
10/14/1988	1276	1			*				LTN	LUTON, ENGLAND	NO		JT80	
10/18/1988	1240	2	SPARROW*		*				CLT	CHARLOTTE, NC	NO		CFM56	3
10/26/1988	1216	2	GULL*		*				AYT	ANTALYA, TURKEY	NO		CFM56	3
10/29/1988	1256	1	LAPWING*		*				NCE	NICE, FRANCE	NO		JT80	
11/09/1988	1305	1	LAPWING*		*				EGMV	TEES-SIDE, ENGLAND	NO		JT80	
11/10/1988	1258	1			*				JAI	JAIPUR, INDIA	NO		JT80	
11/14/1988	1237	1	PIGEON*		*				NCE	NICE, FRANCE	NO		JT80	

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	ENG POS	DNG CODE	SEVERITY	POW LOSS	MAX VIBE	THRUSTLE	IFSD	REMARKS
06/10/1988	1261			9					
06/11/1988	1273			9					
06/12/1988	1219			9					
06/12/1988	1274			9					
06/13/1988	1281			9					
06/14/1988	1254			9					
06/16/1988	1217			9					
06/18/1988	1282			9					
06/20/1988	1302	A,K		9	COMPRESSOR				F BLDG, 2ND + 6TH STG COMP UNK DAMAGE
06/23/1988	1222	A,D		9					BENT F BLDG # UNK
06/26/1988	1268			9					
06/27/1988	1262			9					
06/29/1988	1267			9					
06/29/1988	1285	A,C		9					
07/01/1988	1280			9					
07/05/1988	1291			9					
07/07/1988	1286			9					
07/11/1988	1233			9					
07/15/1988	1252			9					
07/16/1988	1245			9					
07/16/1988	1310			9					
07/19/1988	1317			9					
07/20/1988	1307			9					
07/23/1988	1229	A		9					1 F BLD UNK DAM
07/25/1988	1224			9					
07/26/1988	1243			9					
07/26/1988	1275			9					
07/27/1988	1309	A		9					4 F BLDG UNK DAM
07/28/1988	1235			9					
07/28/1988	1266			9					
07/30/1988	1315			9					
07/31/1988	1312			9					
08/01/1988	1269	A		9					
08/07/1988	1248			9					
08/09/1988	1213			9					
08/09/1988	1214			9					
08/09/1988	1230			9					
08/18/1988	1298			9					
08/20/1988	1287			9					
08/20/1988	1294	A		9					ENG CHANGED
08/21/1988	1257			9					
08/22/1988	1295	A		9					
08/29/1988	1313			9					
09/01/1988	1255			9					
09/01/1988	1255			9					
09/01/1988	1277			9					
09/01/1988	1311			9					
09/05/1988	1311			9					
09/07/1988	1226			9					
09/08/1988	1263	A		9					150 BIRDS KILLED ON RUNWAY
09/11/1988	1241	A		9					
09/23/1988	1210	A,K		9					MANY F BLDG UNK DAMAGE ENG CHANGED UNK DAMAGE TO COMPRESSOR BLDG
09/25/1988	1218			9					
09/28/1988	1250			9					
09/28/1988	1271	A		9					UNK # OF F BLDG DAMAGED, DAM UNK
09/29/1988	1251			9					
10/04/1988	1244			9					
10/06/1988	1211			9					
10/12/1988	1290	A		9					
10/14/1988	1276	A		9					
10/18/1988	1240	A		9					
10/26/1988	1216			9					
10/29/1988	1216			9					
11/09/1988	1305			9					
11/09/1988	1305	A		9					
11/10/1988	1258			9					
11/14/1988	1237			9					

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	ENG_POS	ETIME	SIGM_EVT	AIRCRAFT	POF	ALTITUDE	SPEED	FL_RULES	LT_COMDS	WEATHER	CREW_AC	CREW_AL	BIRD_SEE
11/14/1988	1278	1	6:00:00	NONE		TAKEOFF	0	140			CLEAR	NONE	NO	
11/15/1988	1238	1	16:15:00	NONE	300	APPROACH						NONE	NO	
11/16/1988	1296	2	7:31:00	NONE	300	LANDING	50	120			RAIN	NONE	NO	FLOCK
11/17/1988	1279	1	13:49:00	NONE		TAKEOFF	0				CLOUDY	NONE	NO	ONE
11/19/1988	1300	2	16:20:00	MULT BIRDS	300	LANDING	0	130			OVERCAST	NONE	NO	FLOCK
12/05/1988	1318	1	9:41:00	NONE	200	TAKEOFF	0	140			CLOUDY	NONE	NO	SEVERAL
12/07/1988	1239	1	16:46:00	MULT ENG-BIRDS	300	LANDING	0	100			OVERCAST	ATB	NO	FLOCK
12/07/1988	1239	2	16:46:00	MULT ENG-BIRDS	300	LANDING	0	100			OVERCAST	NONE	NO	FLOCK
12/10/1988	1283	1		NONE	100	TAKEOFF	0					NONE	NO	FLOCK
12/16/1988	1242	1	15:15:00	MULT BIRDS	200	TAKEOFF	0	125			CLEAR	NONE	NO	FLOCK
12/20/1988	1301	1	15:15:00	MULT ENG-BIRDS	300	LANDING	10	120			OVERCAST	NONE	NO	FLOCK
12/20/1988	1301	2	15:15:00	MULT ENG-BIRDS	300	LANDING	10	120			OVERCAST	NONE	NO	FLOCK
12/22/1988	1232	2	16:25:00	MULT BIRDS	100	LANDING	30	124			OVERCAST	NONE	YES	FLOCK

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	EMG	POS	BIRD	WAM	BIRD_SPE	#	BIRDS	WT	OZ	1	CITY	PRS	AIRPORT	LOCALE	US_INCID	ENGINE	DASH
11/14/1988	1278	1												MAA	MADRAS, INDIA	NO		
11/15/1988	1258	1		GULL*			1							NCE	NICE, FRANCE	NO	CFM56	3
11/16/1988	1296	2					1							SZG	SALZBURG, AUSTRIA	NO	CFM56	3
11/17/1988	1279	1					1							LEMG	MALAGA, SPAIN	NO		
12/05/1988	1300	2		BROWN-HOODED GULL		14435	1		10.1					AMS	AMSTERDAM, NETHERLANDS	NO	CFM56	3
12/07/1988	1318	1					1							BHI	BAHIA BLANCA, ARGENTINA	NO	JT8D	3
12/07/1988	1239	1					1							DUS	DUSSELDORF, GERMANY	NO	CFM56	3
12/07/1988	1239	2					1							DUS	DUSSELDORF, GERMANY	NO	CFM56	3
12/10/1988	1203	1		DIPPER*			1							BOO	BORDEAUX, FRANCE	NO	JT8D	
12/14/1988	1242	1		LAPJING*			1							ELP	EL PASO, TX	YES	JT8D	
12/20/1988	1301	1		LAPJING*			1							AMS	AMSTERDAM, NETHERLANDS	NO	CFM56	3
12/20/1988	1301	2					1							AMS	AMSTERDAM, NETHERLANDS	NO	CFM56	3
12/22/1988	1232	2		BLACK-HEADED GULL		14436	1							CDG	PARIS, FRANCE	NO	JT8D	

SOURCE: INTERNATIONAL CIVIL AVIATION ORGANIZATION

EDATE	EVT#	ENG_POS	DMG_CODE	SEVERITY	POW_LOSS	MAX_VIBE	THROTTLE	IFSD	REMARKS
11/14/1966	1278	1		9					
11/15/1968	1238	1		9					
11/16/1988	1296	2		9					
11/17/1988	1279	1		9					
11/19/1988	1300	2		9					
12/05/1988	1318	1	A	4					
12/07/1988	1239	1	A	4					
12/07/1988	1239	2	A	4					
12/10/1988	1283	1	A,K	1					
12/14/1988	1242	1		9					
12/20/1988	1301	1	A	4					
12/20/1988	1301	2	A	4					
12/22/1988	1232	2		9					18 F BLDG + 8 COMP BLDG UNK DAMAGE



## APPENDIX C

### STATISTICAL HYPOTHESIS TESTING

Statistical analyses are based on an underlying probabilistic model of the processes that give rise to the data. For example, to provide the basis for comparing the weights of ingested birds in the United States and overseas it is necessary to hypothesize an underlying random distribution of bird weights. Statistical analyses are somewhat more sophisticated than descriptive data analyses and more care is required to ensure that the methods are appropriate for the data.

Statistical analysis is basically formalized inductive reasoning. Hypotheses about bird ingestion hazards are evaluated for consistency with the data that have been collected. Statistical analysis provides the rules for quantifying the level of consistency forming the basis for objective unbiased decisions. The process is known formally as statistical hypothesis testing and a brief outline of the procedure is presented here.

The basis of a statistical hypothesis test is the hypothesis; which is a formal statement about a relationship in the data. In comparing the weight distributions of United States ingestions versus foreign ingestions, one hypothesis is that there is no difference in the sizes of the birds ingested here versus those ingested overseas. If the data are found to be consistent with the hypothesis it is accepted; otherwise the hypothesis is rejected.

The rules for deciding whether to accept or reject the hypothesis are based on the possible errors that could be made. A type I error refers to the situation in which the hypothesis is true; however we reject the hypothesis. Alternatively when we accept the hypothesis when it is not true we commit a type II error.

The goal of the statistician is to minimize the likelihood of both types of errors. Unfortunately the likelihood of a type I error is reciprocally linked to the likelihood of a type II error so that lowering the likelihood of a type I error will increase the likelihood of a type II error. Since only one error can be fully controlled it has become standard practice to control the likelihood of a Type I error; which is called the significance level of the test. The test hypothesis is chosen so that it should be accepted unless there is strong evidence that it is not true and the test is constructed to minimize the likelihood of a type II error for the given significance level over a broad range of alternatives.

The mechanics of conducting a statistical hypothesis test are implemented by calculating a test statistic. The test statistic is a function of the data that is related to the test hypothesis. It is usually constructed so that small values are consistent with the null hypothesis and large values are consistent with the alternative hypothesis. The cutoff for accepting or rejecting the null hypothesis is called the critical value and is a function of the desired significance level.

Another aspect in evaluating the efficiency of a statistical test is its ability to detect when the test hypothesis is false. This ability is called the power of the test and is defined to be the probability of rejecting the test hypothesis when it is false. Generally there are many alternatives to the test hypothesis so that the power of the test is a function of the specific alternate hypothesis.

A variation on the statistical hypothesis test is the calculation of a confidence interval for a parameter such as the overall probability of ingestion (POI). Since there is no specific hypothesis about the POI, a confidence interval is used to describe the range of probabilities that are consistent with the data. The confidence level associated with a confidence interval corresponds to one minus the significance level of a hypothesis test and is a measure of the likelihood that the true value of the parameter (in this case the POI) is contained in the interval.