DOT/FAA/CT-93/14

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

# Bird Ingestion Into Large Turbofan Engines

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February 1995

Final Report

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U.S. Department of Transportation
Federal Aviation Administration

NOTICE

**Technical Report Documentation Page**

| 1. Report No. | 2. Government Accession No. | 3. Recipient's Catalog No. |
|---|---|---|
| DOT/FAA/CT-93/14 | | |

| 4. Title and Subtitle | 5. Report Date |
|---|---|
| BIRD INGESTION INTO LARGE TURBOFAN ENGINES | February 1995 |
| | 6. Performing Organization Code |
| 7. Author(s) Howard Banilower (FAA) and Colin Goodall* | 8. Performing Organization Report No. DOT/FAA/CT-93/14 |
| 9. Performing Organization Name and Address<br>Federal Aviation Administration<br>Technical Center<br>Atlantic City International Airport, NJ 08405 | 10. Work Unit No. (TRAIS)<br>11. Contract or Grant No. |
| 12. Sponsoring Agency Name and Address<br>U.S. Department of Transportation<br>Federal Aviation Administration<br>Technical Center<br>Atlantic City International Airport, NJ 08405 | 13. Type of Report and Period Covered<br>Final Report<br>14. Sponsoring Agency Code<br>ACD-210 |

15. Supplementary Notes

*(Pennsylvania State University)

16. Abstract

This final report contains findings from a study conducted by the Federal Aviation Administration (FAA) of bird ingestion into certain modern large high bypass turbofan engines. These engines were certificated to current FAA standards and are installed in A300, A310, A320, B747, B757, B767, DC10, and MD11 aircraft in commercial service worldwide. Data pertaining to 644 aircraft ingestion events were collected for the FAA during 1989-1991 by the principal engine manufacturers. Topics addressed in the report include characteristics of ingested birds (numbers, species, and weights), ingestion rates, airports, aircraft parameters (flight phase, altitude, speed, engine position), and ingestion events which pose a potential threat to aircraft safety (multiple-engines or birds, transverse fracture of fan blades, power loss). Using statistical methods, the data are analyzed to determine the influence of flight phase (departure or arrival), bird weight, and bird numbers (single or multiple-bird), both separately and in combination, on overall engine damage, fan blade damage, core damage, and other adverse effects on flight. A summary of all pertinent data from each ingestion is included in an appendix.

| 17. Key Words | 18. Distribution Statement |
|---|---|
| Aircraft Engine Bird Ingestion<br>Aircraft Engine Damage<br>Species of Ingested Birds<br>Weights of Ingested Birds | Document is available to the public through the National Technical Information Service, Springfield, Virginia 22161 |

| 19. Security Classif. (of this report) | 20. Security Classif. (of this page) | 21. No. of Pages | 22. Price |
|---|---|---|---|
| Unclassified | Unclassified | 127 | |

Form DOT F 1700.7 (8-72) Reproduction of completed page authorized

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## EXECUTIVE SUMMARY

During 1981-83, the Federal Aviation Administration (FAA) conducted a study of bird ingestions into large high bypass ratio (HBPR) turbofan engines [1]. The majority of such engines in service at that time were certificated under airworthiness standards for bird ingestion predating Change 1 (October 1974) to Part 33 of the Federal Aviation Regulations. Over the past decade many newer HBPR engines, that were designed and certificated to more stringent standards, have come into wide-spread service. The current study grew out of a need to ascertain any changes that have occurred in the bird threat and to assess the effects of bird ingestions on these newer, second generation, engines.

The data in this report were generated from over 3 million operations flown by a fleet of more than 1500 aircraft during the period January 1989 through August 1991. Aircraft models include the A300, A310, A320, B747, B757, B767, DC10, and MD11.

A total of 644 aircraft ingestion events were reported by the engine manufacturers, yielding a worldwide ingestion rate of 2.04 events per 10,000 aircraft operations. This is approximately 87 percent of the rate in the 1981-83 FAA study. The foreign ingestion rate is three and one-half times the rate in the United States, compared with two and one-half times in the previous study. However, an analysis of engine damage indicates that domestic ingestions were under reported with respect to foreign.

Aircraft ingestion events were reported to have occurred at 162 different airports worldwide. Schipol Airport in Amsterdam had 20 events and Charles de Gaulle Airport in Paris had 15. The greatest number of events reported at any United States airport was 6, at John F. Kennedy in New York.

There were 31 multiple-engine events, yielding a rate of 9.8 per million operations. Three engines of a B747 ingested birds in one event. The other multiple-engine events all involved two engines of the aircraft. Fifty of the 676 engine ingestions were reported to have involved multiple birds.

The Herring Gull, Common Rock Dove, Black-headed Gull, Common Lapwing, Black Kite, and Eurasian Kestrel were the most frequently identified bird species. Of these, all but the Eurasian Kestrel were identified in the 1981-83 study. The first four were also the most frequently encountered birds during multiple-engine or multiple-bird ingestions. Fifty-nine percent of the events in which a species was identified involved a species that was also identified in the previous study.

Ingested bird weights, both United States and foreign, are similar to those in the previous study. This is true not only in terms of summary statistics (median, mode, mean, etc.) but also in terms of the distribution functions for the weights. As before, the domestic weights tend to be heavier than foreign. There were no multiple-bird or multiple-engine ingestions for which a verified species was determined that involved birds in the 1.5-pound weight class. In contrast, multiple-engine or multiple-bird ingestion of birds in the 2.5-pound weight class were reported in 5 aircraft events. (Weight classes are defined in table 4.6.)

Forty-seven percent of engines that ingested birds had some reported damage, compared to 62 percent in the previous study. Fifty-four percent of current damage to engines is classified as "minor," which typically consists of leading edge distortions or at most three bent, dented, or torn fan blades. Engine damage other than minor is called "significant".

The aircraft ingestion events are fairly evenly split between the departure (takeoff or climb) and arrival (descent, approach, or landing) phases of flight. However, engines ingesting birds during departures sustained damage at about twice the rate as during arrivals. It is verified statistically that engine damage and significant engine damage both tend to occur more often during departures than during arrivals. A similar analysis of the effect of bird multiplicity on engine damage indicates that the higher rate of significant damage found for multiple-bird ingestions compared to single-bird ingestions is statistically significant but that the corresponding effect for any engine damage is inconclusive.

Four logistic regression models are fit for the occurrence of (1) any engine damage, (2) significant engine damage, (3) any fan blade damage, and (4) torn, cracked or broken fan blades, as functions of the predictor variables (i) bird weight, (ii) arrival/departure phase of flight, and (iii) single/multiple birds ingested. All three predictors are shown to be statistically significant in both the "significant engine damage" model (2) and the "any fan blade damage" model (3). However, only bird weight and phase of flight were necessary in the the "any engine damage" model (1), and only flight phase in the "broken fan blade" model (4).

Bird matter was found in the main gas path (core) of 183 (27 percent) of engines that ingested birds. Sixty-one of these had some physical core damage, in all cases to compressors. A surge or stall was reported in 31 engine ingestions. Seven were nonrecoverable surges.

An unscheduled crew action (aborted takeoff, air turnback, etc.) was performed in 14 percent of the aircraft events, which is half the rate of the previous study. There were 16 in-flight engine shutdowns (IFSD's), representing less than 3 percent of all engine events. No more than a single engine of any aircraft required in-flight shutdown or experienced engine failure. In the previous study, nearly 13 percent of the engine events resulted in an IFSD. For events in which a species was determined, birds in the 2.5-pound weight class were involved in 5 of 9 IFSD's, 12 of 49 crew actions, 4 of 11 engine failures, and 2 of 5 uncontained events. In contrast, birds of the 1.5-pound class were identified in only 3 crew actions, 1 engine failure, and no IFSD's or uncontained events.

The following summary compares selected data from both FAA studies. Except where noted, all numbers represent worldwide data.

## DATA SUMMARY

| | Current Study | 1981-83 Study |
|---|---|---|
| No. of aircraft | 1556 | 1513 |
| No. of operations | 3,163,020 | 2,738,320 |
| No. of aircraft ingestions * | 65/561/644 | 97/484/638 |
| Ingestion rate (x 10^-4) * | 0.70/2.52/2.04 | 0.99/2.80/2.33 |
| No. of multiple-engine events | 31 | 25 |
| Multiple-engine ingestion rate (x 10^-6) | 9.80 | 9.86 |
| No. of engine events | 676 | 666 |
| No. of multiple-bird engine events | 50 | 65 |
| % Multiple-bird events | 7.4 | 9.8 |
| No. of damaging engine events | 316 | 416 |
| % Damaging engine events | 47 | 62 |
| Mean bird weight (oz.) * | 24/20/21 | 30/27/27 |
| Median bird weight (oz.) * | 17/14/14 | 32/18/18.5 |
| Modal bird weight (oz.) * | 40/10/40 | 40/24/40 |
| Modal bird weight class (lb.) * | 2.5/0.5/0.5 | 2.5/0.5/0.5 |
| No. of crew action a/c evts. | 89 | 129 |
| % Crew action events | 13.8 | 28.2 |
| No. of IFSD engine events | 16 | 85 |
| % IFSD's | 2.4 | 12.8 |

* US/FOREIGN/WORLDWIDE

## 1. INTRODUCTION.

### 1.1 BACKGROUND.

The Federal Aviation Administration (FAA) conducted a study during 1981-83 to determine the numbers, weights, and species of birds being ingested into all large high bypass ratio (HBPR) turbofan engines in service worldwide and to document any resultant damage. The purpose of that effort was to provide data in support of possible changes to the airworthiness certification standards for bird ingestion, so they might better reflect actual service experience. The data were collected by the three principal large engine manufacturers, General Electric (GE), Pratt and Whitney (PW), and Rolls Royce (RR), under contract to the FAA. Results from that study were reported in [1].

The majority of large turbofan engines in revenue service at that time were certificated in accordance with bird ingestion standards predating 1974. Over the past decade, many newer engines that were designed and certificated to more stringent standards have come into wide-spread service. The current study grew out of a need to ascertain any changes that may have have occurred in the bird threat and to assess the effects of bird ingestions on these newer engines.

The abovementioned three engine manufacturers were again contracted by the FAA to provide as much pertinent data as possible on all known bird ingestions into large engines that were certificated under standards of 1974 or later. However, because of complexities in contractual startups, it was not possible to synchronize the initiation of data collection between all three manufacturers. RR data reporting started January 1, 1989, PW followed on January 17, 1989, and GE data collection began July 1, 1989. Each data collection period lasted 26 months. International Aero Engine (IAE) and CFM International (CFMI) data were collected by PW and GE, respectively, and correspond to their reporting periods.

The FAA issued an interim report, [6], on an initial portion of data from this study. Two additional FAA bird ingestion studies, for medium and small turbine engines, were also conducted in recent years. (See [2] and [3].)

### 1.2 OBJECTIVE.

The objective of this study was to determine the numbers, species, and weights of birds being ingested into certain modern large HBPR turbine engines during worldwide service and to assess the impact of these ingestions on engines and aircraft operations.

### 1.3 ORGANIZATION OF REPORT.

The main body of the report is contained in sections 2 through 7. These sections are ordered so as to deal with relevant topics according to increasing dependency and complexity. The aircraft fleet under study and operations flown by it are discussed in section 2. Section 3 deals with various kinds of ingestion events and their rates of occurrence. Airports are also discussed there. The population of ingested birds is characterized in section 4 and engine damage is analyzed in sections 5 and 6. All kinds of engine damage are considered in section 5 while the following section concentrates specifically on core damage and fan blade damage. Section 7 examines certain adverse effects of bird ingestions on aircraft flights and engines. Section 8 contains a summary of results and conclusions.

## 2. ENGINES, AIRCRAFT, AND OPERATIONS.

### 2.1 ENGINE CERTIFICATION.

The current study involves all commercial aircraft with large high bypass ratio engines that were certificated under the most recent and most stringent airworthiness standards, i.e., those of Change 1 of October 31, 1974, or Change 5 of March 26, 1984, to Part 33 of the Federal Aviation Regulations. Both of these contain the requirement that an engine having inlet area greater than 3900 square inches continue to operate with 75 percent power and under specified conditions of safety upon the ingestion of a flock of eight 1.5-pound birds. Consideration has been given in recent years to include birds heavier than 1.5 pounds in this "medium bird" certification test. All applicable portions of the current (March 1984) standard relating to bird ingestion are summarized in appendix A.

### 2.2 ENGINE MODELS.

Table 2.1 lists each of the engine models included in this study, along with its manufacturer, takeoff thrust(s), bypass ratio(s), fan tip diameter, inlet throat area, and year(s) in which it was certified. All engines except the V2500 and CFM56 have inlet areas larger than 3900 square inches and, thus, require an eight-bird "medium bird" certification test. The CFM56-5 was certified with seven 1.5-pound birds and the V2500-A1 with six.

### 2.3 AIRCRAFT TYPES.

The engine models in table 2.1 have been installed in the following types of aircraft: Boeing B747, B757, and B767; McDonell Douglas DC10 and MD11; and Airbus Industrie A300, A310, and A320. The B747 has four engines while the DC10 and MD11 each have three engines. The remainder are all two-engine aircraft. All engines are wing-mounted with the exception of a single tail-mounted engine on the DC10 and MD11. Table 2.2 indicates the approximate number of aircraft in service worldwide for each aircraft type included in this study, broken down according to engine model. The fleet size, initially about 1100 aircraft, grew steadily to 1556 aircraft during the data collection period. This latter figure is nearly identical to the fleet size in the 1981-1983 FAA study, [1]. A relatively small number of DC10's (only those equipped with JT9-59A engines) are represented here. The B747 and A300 also have substantial numbers of aircraft with older engines that were omitted from this study. The remaining aircraft types are equipped exclusively with engines certificated under Change 1 of 1974 or the current standard.

### 2.4 AIRCRAFT OPERATIONS.

An **aircraft operation** is simply one complete flight cycle of an airplane. (See Glossary for formal definition.) It was not possible to utilize Official Airline Guide computer tapes to derive operational data as in previous studies [1 and 2] because these tapes do not distinguish between B747, A300 and DC10 aircraft having older engines and those with the newer engine models included in this study. All operational data, including estimates of United States (50 states) and foreign (non-United States) operations, were provided by the engine manufacturers.

TABLE 2.1 ENGINE MODELS

| ENGINE MODEL | MANUF. | TAKEOFF THRUST (1000 LB) | BYPASS RATIO | FAN DIAM (IN.) | INLET AREA (SQ.IN.) | YEAR(S) CERTIFIED |
|---|---|---|---|---|---|---|
| JT9D-7Q | PW | 53 | 4.9 | 92.8 | 5420 | 1979 |
| JT9D-59A | PW | 53 | 4.9 | 92.8 | 5490 | 1974 |
| JT9D-70A | PW | 53 | 4.9 | 92.8 | 5490 | 1974 |
| JT9D-7R4 | PW | 48-56 | 4.8-5 | 92.8 | 5420 | 1980-82 |
| PW2000 | PW | 38-42 | 6.0 | 77.4 | 4360 | 1983 |
| PW4000 | PW | 52-60 | 4.9 | 92.8 | 5540 | 1986 |
| CF6-80A | GE | 48 | 4.7 | 86.4 | 5380 | 1981 |
| CF6-80C2 | GE | 52-60 | 5.1 | 93.1 | 5840 | 1985 |
| RB211-535C | RR | 37.4 | 4.4 | 73.2 | 4290 | 1982 |
| RB211-535E4 | RR | 40-43 | 4.1 | 74.1 | 4360 | 1983 |
| RB211-524G | RR | 58 | 4.3 | 86.3 | 5850 | 1988 |
| RB211-524H | RR | 60.6 | 4.1 | 86.3 | 5850 | 1989 |
| V2500-A1 | IAE | 25 | 5.4 | 63.0 | 2770 | 1988 |
| CFM56-5 | CFMI | 25 | 6.0 | 68.3 | 3080 | 1987 |

TABLE 2.2 AIRCRAFT FLEET AT END OF DATA COLLECTION

| MANUF. | ENG.MODEL | A300 | A310 | A320 | B747 | B757 | B767 | DC10 | MD11 | TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|
| PW | JT9D-7Q | | | | 82 | | | | | 82 |
| PW | JT9D-59A | 24 | | | | | | 16 | | 40 |
| PW | JT9D-70A | | | | 7 | | | | | 7 |
| PW | JT9D-7R4 | 14 | 30 | | 67 | | 92 | | | 203 |
| PW | PW2000 | | | | | 163 | | | | 163 |
| PW | PW4000 | 30 | 28 | | 40 | | 43 | | 7 | 148 |
| GE | CF6-80A | | 47 | | | | 117 | | | 164 |
| GE | CF6-80C2 | 56 | 82 | | 65 | | 104 | | 12 | 319 |
| RR | RB211-535C | | | | | 40 | | | | 40 |
| RR | RB211-535E4 | | | | | 161 | | | | 161 |
| RR | RB211-524G | | | | 36 | | | | | 36 |
| RR | RB211-524H | | | | | | 9 | | | 9 |
| IAE | V2500-A1 | | | 27 | | | | | | 27 |
| CFMI | CFM56-5 | | | 157 | | | | | | 157 |
| | TOTALS | 124 | 187 | 184 | 297 | 364 | 365 | 16 | 19 | 1556 |

Figure 2.1 gives the number of monthly worldwide aircraft operations for the entire fleet of aircraft under consideration. The numbers are broken down according to engine manufacturer and correspond to their respective reporting periods. For example, there are no operational data from GE for the first six months or from PW and RR in the latter months. These facts, along with a steady growth in the aircraft fleet during the 32 calendar months of data collection, account for the large variation in cumulative monthly totals. As noted in the introduction, IAE and CFMI operational data were collected by PW and GE, respectively, and are included in their monthly totals.

Figure 2.2 indicates the total number of domestic and foreign aircraft operations for each aircraft type over the entire study. As in the previous figure, these numbers correspond to the individual reporting periods of each engine manufacturer. The B757 and B767 together accounted for over 80 percent of domestic operations. There were fewer than 5,000 MD11 operations because this aircraft entered commercial service in December, 1990. With the exception of the B757 and MD11, all aircraft types operated in a predominantly foreign environment. Overall, about 70 percent of the total fleet's operations were foreign. The precise numbers used to generate figure 2.2 are included in table 3.1. Although worldwide operational data are believed to be fairly accurate, the breakdowns according to United States and foreign stemmed, in some cases, from educated guesses by the engine manufacturers and should be viewed as approximations.

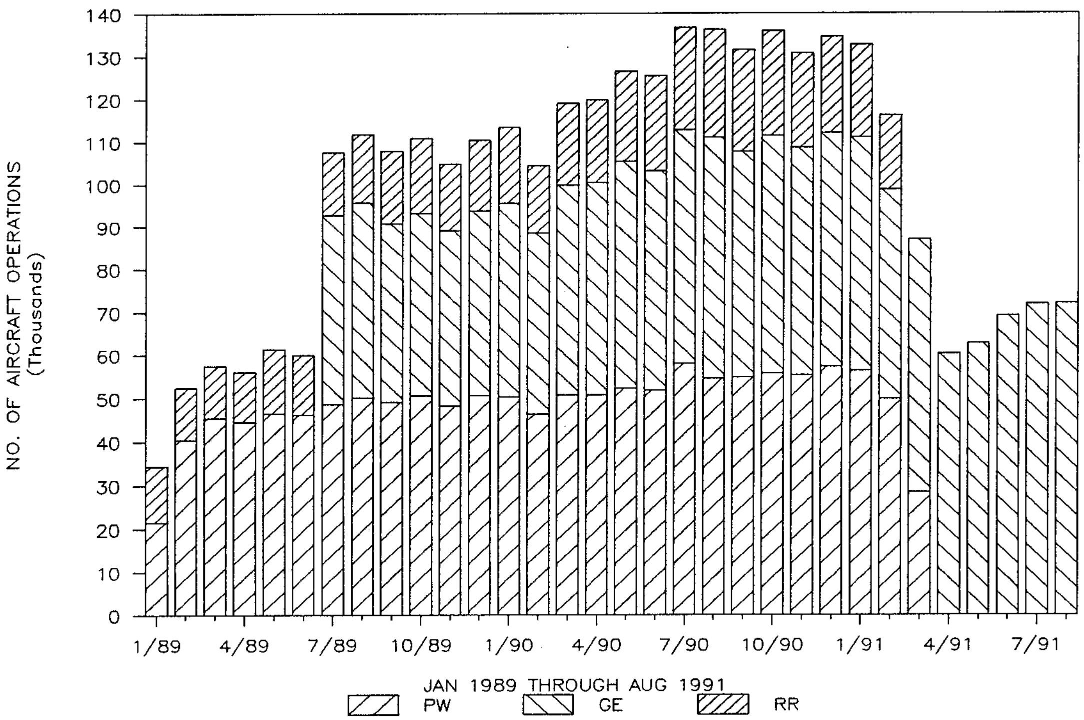



FIGURE 2.1. AIRCRAFT OPERATIONS BY MONTH AND ENGINE MANUFACTURER

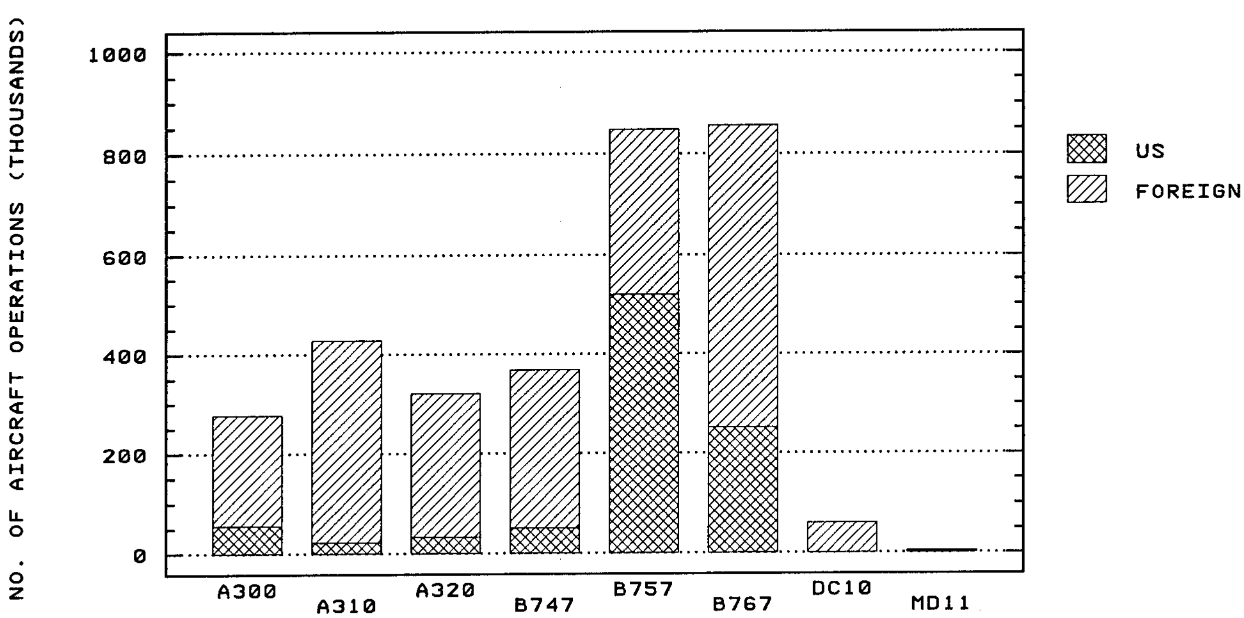



FIGURE 2.2. AIRCRAFT OPERATIONS BY AIRCRAFT TYPE, US/FOREIGN

## 3. INGESTION EVENTS AND RATES.

In this section various types of bird ingestion events are defined and their frequencies of occurrence are discussed. Although the current study attempts to document all incidents of bird ingestions into the requisite engines, it is likely that many such occurrences remain undiscovered or go unreported. It should be emphasized that only "reported" bird ingestions can be discussed here.

### 3.1 AIRCRAFT INGESTIONS.

An **aircraft ingestion event** (usually abbreviated as **aircraft ingestion** or **aircraft event**) occurs when one or more birds are simultaneously ingested into one or more engines of an aircraft during an aircraft operation. (See Glossary for formal definition.)

A total of 644 aircraft events were reported by the engine manufacturers. Two of these (events 249 and 636) were foreign "shop findings" in which the aircraft types remain unknown. Figure 3.1 depicts the aircraft type for the remaining 642 events and additionally indicates whether the ingestions took place inside or outside the United States. This latter information is unknown for 18 of the events. Of those remaining, only 65 occurred in the United States. Over 80 percent of the domestic ingestions occurred in Boeing-built aircraft. The foreign events are spread more evenly among the various aircraft types. All DC10 aircraft configured with JT9D-59A engines flew exclusively outside the United States and thus had no domestic ingestions. The B767 experienced 211 events of which 195 were foreign. The A320 and A310 reported 120 and 102 events, respectively, nearly all of which were foreign. Almost half of the domestic events, 30, involved a B757. Overall, there appears to be a relatively small number of reported domestic ingestion events.

### 3.2 INGESTION RATES.

It is more meaningful, however, to consider the number of ingestions relative to the frequency of exposure. An **ingestion rate** is obtained by dividing a quantity of ingestion events by the corresponding number of operations. Figure 3.2 is a histogram of reported ingestion rates for each aircraft type according to United States, foreign, and worldwide categories. As is customary, these rates are expressed in units of aircraft ingestions per 10,000 aircraft operations. The MD11 and B747 had the highest domestic ingestion rates. The MD11's rate, however, derived from a single aircraft ingestion (event 548) and a small number of operations. The six other aircraft types all had substantially higher foreign reported ingestion rates than domestic. Surprisingly, the only four-engine aircraft (B747) had a smaller worldwide ingestion rate than four other aircraft types.

Table 3.1 summarizes aircraft ingestions, operations, and ingestion rates according to aircraft type and domestic/foreign/worldwide. The numbers therein were used to generate figures 2.2, 3.1, and 3.2. The reported worldwide ingestion rate for the entire fleet was 2.04 (per 10,000 operations), compared to 2.33 in 1981-83 [1]. The foreign rate is 2.52, which is more than 3.5 times the domestic rate of 0.70. In the 1981-83 study [1], the foreign rate was about 2.5 times the domestic rate. This would seem to indicate that bird control measures have been relatively more effective at domestic airports than at airports outside the United States. It is also conceivable that foreign carriers

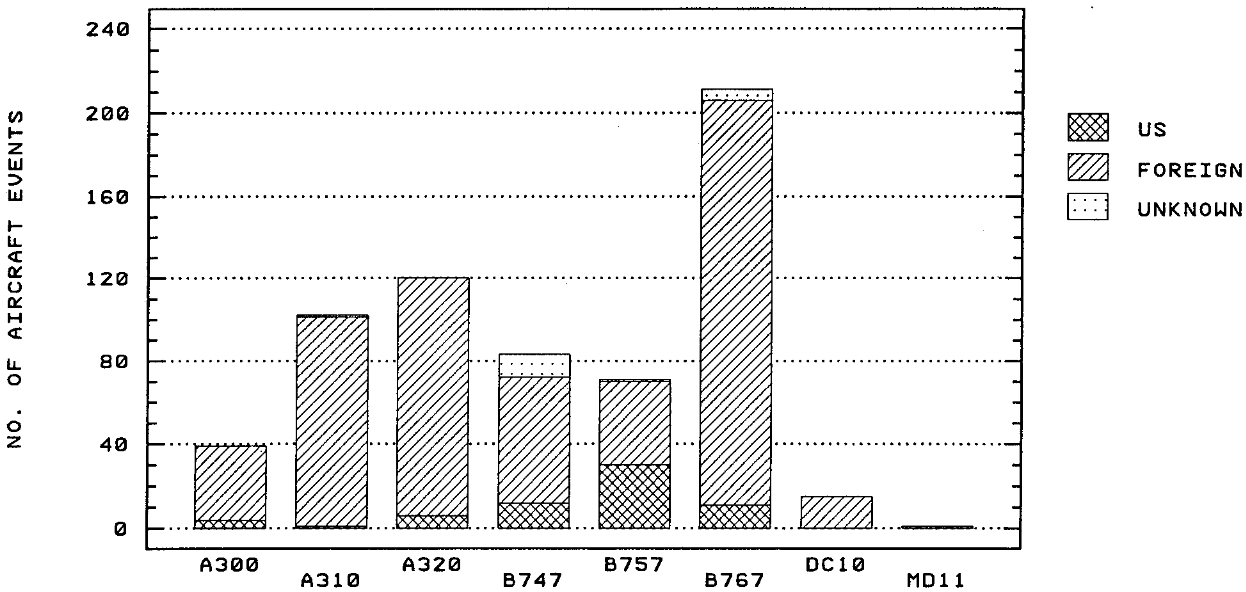



FIGURE 3.1. AIRCRAFT EVENTS BY AIRCRAFT TYPE, US/FOREIGN

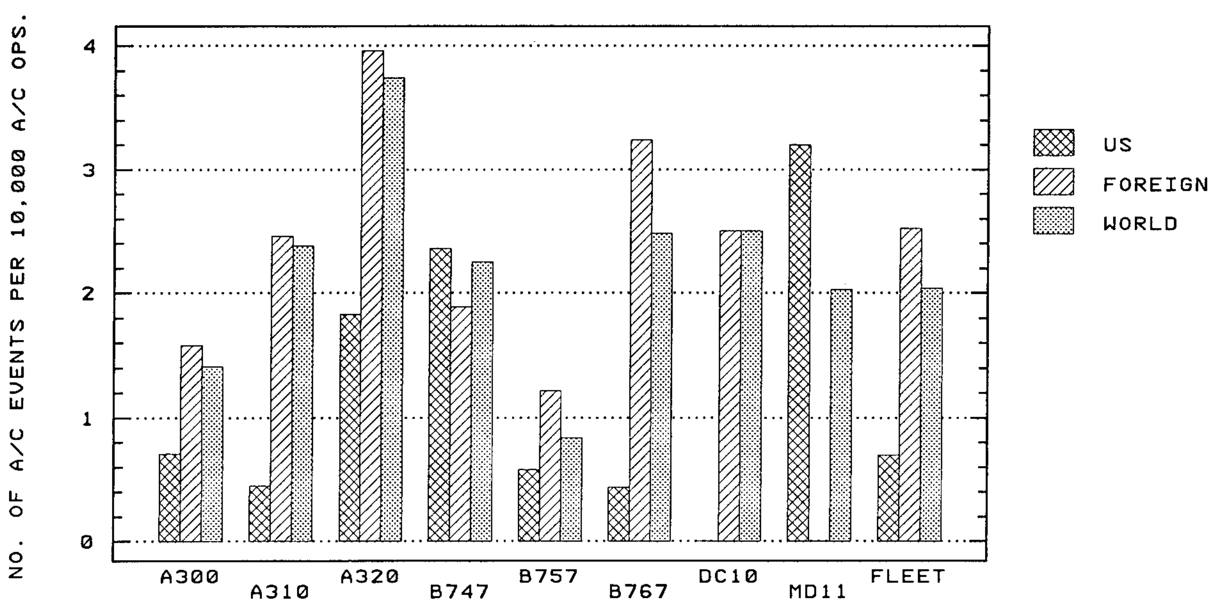



FIGURE 3.2. INGESTION RATES BY AIRCRAFT TYPE, US/FOREIGN/WORLDWIDE

*TABLE 3.1 OPERATIONS, INGESTIONS, AND INGESTION RATES BY AIRCRAFT TYPE*

| | *AIRCRAFT EVENTS* | | | | *AIRCRAFT OPERATIONS* | | | *INGESTION RATES (PER 10,000 OPS.)* | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *US* | *FOR* | *UNK* | *WW* | *US* | *FOR* | *WW* | *US* | *FOR* | *WW* |
| *A300* | *4* | *35* | *0* | *39* | *56,453* | *220,936* | *277,389* | *0.71* | *1.58* | *1.41* |
| *A310* | *1* | *100* | *1* | *102* | *22,035* | *406,313* | *428,348* | *0.45* | *2.46* | *2.38* |
| *A320* | *6* | *114* | *0* | *120* | *32,785* | *287,760* | *320,545* | *1.83* | *3.96* | *3.74* |
| *B747* | *12* | *60* | *11* | *83* | *50,759* | *317,500* | *368,259* | *2.36* | *1.89* | *2.25* |
| *B757* | *30* | *40* | *1* | *71* | *519,220* | *328,564* | *847,784* | *0.58* | *1.22* | *0.84* |
| *B767* | *11* | *195* | *5* | *211* | *250,814* | *604,996* | *855,810* | *0.44* | *3.24* | *2.48* |
| *DC10* | *0* | *15* | *0* | *15* | *0* | *59,964* | *59,964* | - | *2.50* | *2.50* |
| *MD11* | *1* | *0* | *0* | *1* | *3,125* | *1,797* | *4,922* | *3.20* | *0.00* | *2.03* |
| *unk a/c* | *0* | *2* | *0* | *2* | | | | | | |
| *TOTALS* | *65* | *561* | *18* | *644* | *935,191* | *2,227,830* | *3,163,021* | *0.70* | *2.52* | *2.04* |

were more diligent than domestic carriers in reporting bird ingestions. The spate of mergers and bankruptcies among domestic carriers may have been a contributing factor to the lower United States ingestion rate. For example, one bankrupt major domestic carrier, which has since ceased flying altogether, reported no bird ingestions although it flew a considerable number of operations during the reporting period with aircraft included in this study. Indeed, an analysis of engine damage in section 5.6 supports the premise of a greater tendency for domestic ingestions to have gone unreported compared to foreign ingestions.

It is likely that route structure and data source each have a profound influence on reported ingestion rates. Worldwide ingestion rates for each of the three engine manufacturers range from a low of 0.96 to a high of 2.84, while domestic rates range from 0.44 to 0.79. Care should also be taken in comparing data from different sources when assessing the influence of engine size on ingestion rates. As tables 2.1 and 2.2 indicate, the A320 engines have the smallest inlet dimensions and the B757 the next to smallest among engines in this study. All the remaining aircraft types are equipped with larger engines of equivalent inlet sizes. However, as table 3.1 shows, the dual engine A320 had the highest worldwide ingestion rate of any aircraft type, while the B747, which carries 4 of the larger engines, ranked fifth. Although the B747 had a somewhat higher domestic ingestion rate than the A320, the latter's domestic rate was significantly higher than those of all other 2-engine aircraft.

Because of the staggered start of data collection, any attempt to derive seasonal effects on the bird ingestion phenomenon by simply counting monthly aircraft ingestions could prove misleading. Again, it makes more sense to look at ingestion rates. Figure 3.3 plots reported worldwide ingestion rates for each of the 32 months of data. Some of the variation can be attributed to the changing data sources over the data collection period. In general, however, the rates are highest from June to September and lowest in December and January. Strictly speaking, this does not show seasonal effects since aircraft operations could not be broken down according to hemisphere. However, only 35 of the 644 aircraft events are known to have occurred in the Southern Hemisphere and the preponderance of aircraft operations were in the Northern Hemisphere.

## 3.3 PHASE OF FLIGHT.

Some indication of the phase of flight during which an ingestion took place was given for 396 of the 644 aircraft events. Figure 3.4 summarizes these data as reported by the engine manufacturers. All but one event (a cruise) involved a flight phase near an airport. Four events occurred during taxiing and eight during thrust reversal. The remaining 383 are almost equally divided between departure (takeoff or climb) and arrival (descent, approach, or landing) phases. One hundred thirty-one of the departure events and 85 of the arrivals were reported to have taken place on the runway.

## 3.4 AIRCRAFT ALTITUDE AND SPEED.

Altitudes where ingestions occurred were reported in 297 events, 228 of which took place on the ground. An indication of aircraft speed was given in 189 events. One hundred twenty-six (126) of these were numerical estimates in knots (KIAS) and the rest were reported in terms of V1 (decision speed) or VR (rotation speed). In addition, there were 4 "taxi" events in which no speeds were

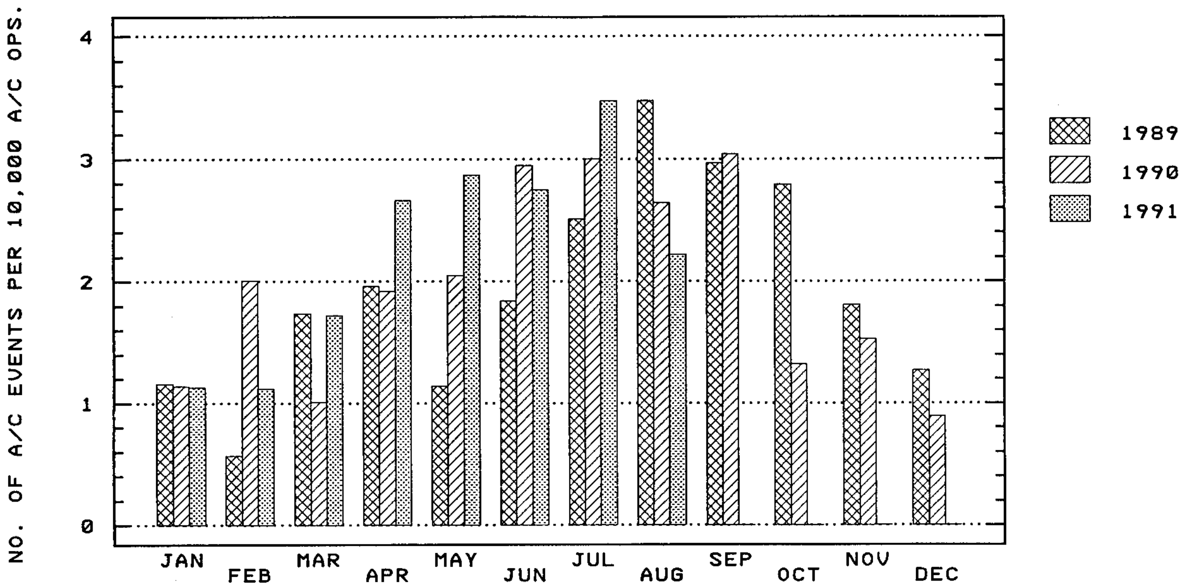



FIGURE 3.3 WORLDWIDE INGESTION RATES BY MONTH AND YEAR

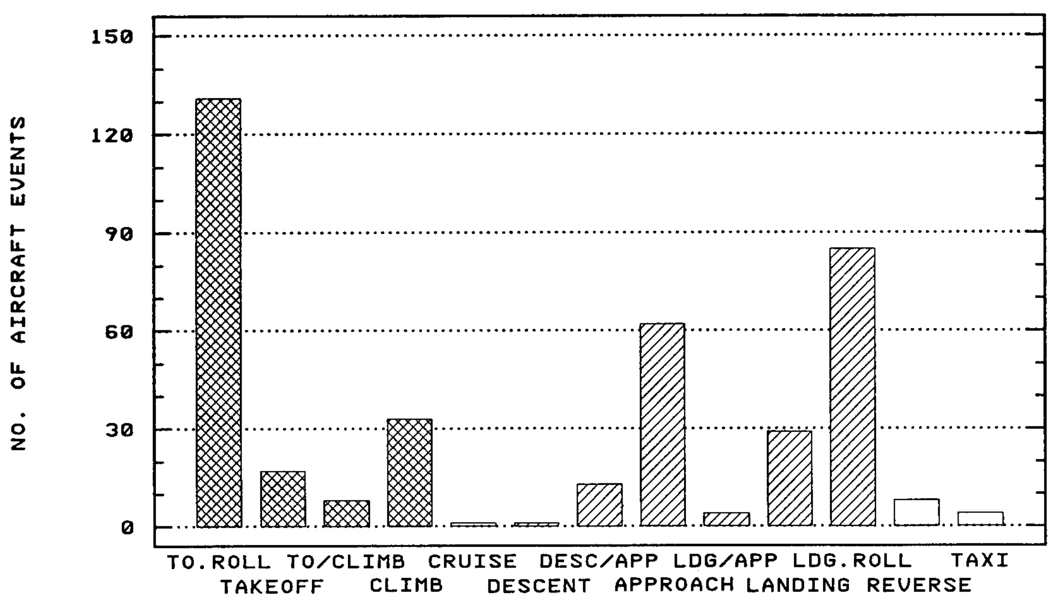



FIGURE 3.4. AIRCRAFT EVENTS BY PHASE OF FLIGHT

reported. Figure 3.5 is a 3-D histogram which tallies aircraft events according to speed and altitude for the 193 events in which altitude was reported and a speed estimate could be made. The altitudes and speeds were grouped into the indicated classes. Speeds given as V1, V1+ or VR were placed in the 145+ to 165 knot class, denoted as (145,165], while speeds reported as VR+ were put into the next higher class. The four taxi events are in the 0 to 60 knot class. An additional 20 "takeoff roll" and 65 "landing roll" events for which speed estimates were not reported are excluded from this figure.

## 3.5 MULTIPLE-ENGINE EVENTS.

In 31 aircraft events, more than one engine of the aircraft ingested a bird, i.e., there were 31 **multiple-engine events.** Thirty of these involved two engines of the aircraft. In the remaining event (#482) 3 engines of a B747 ingested birds. Figure 3.6 illustrates, according to aircraft type, both the frequencies and rates of multiple-engine ingestion events, worldwide. The rates are given in units of ingestions per million aircraft operations. The aircraft in 6 of the multiple-engine events were B747's, the only 4-engine aircraft included in the study, while the remaining 25 events involved both engines of two-engine aircraft. The B747 multiple-engine ingestion rate is 16.29, about 1.8 times the composite rate for all two-engine aircraft. The overall fleet multiple-engine ingestion rate is 9.80, which is nearly identical to the 9.86 rate of the previous study [1]. Multiple-engine ingestion events are of particular interest because they are a likely prerequisite for the loss of an aircraft due to bird ingestion. They are summarized, along with other types of (significant) events to be discussed later in this section, in table 3.2.

## 3.6 MULTIPLE-BIRD EVENTS.

All told, 676 different engines ingested one or more birds. Thus a total of 676 **engine ingestion events** (usually abbreviated as **engine events** or **engine ingestions**) occurred during the reporting period. (See Glossary for formal definition.)

When more than one bird is ingested into an engine, the corresponding aircraft and engine ingestion events are called **multiple-bird aircraft events** and **multiple-bird engine events,** respectively. There were 50 multiple-bird engine events. Specific numbers of birds that were ingested in these events are discussed in section 4. In 41 aircraft events, at least one engine of the aircraft ingested more than one bird; i.e., there were 41 multiple-bird aircraft events. Of these, 12 were also multiple-engine events.

## 3.7 SIGNIFICANT EVENTS.

Each multiple-engine or multiple-bird aircraft event falls into precisely one of the following categories: single-engine multiple-bird (SEMB), multiple-engine multiple-bird (MEMB), and multiple-engine single-bird (MESB). These are all considered to be **significant events.** Other events defined to be "significant" in this study are **involuntary power loss, transverse fracture** of a fan blade, and **airworthiness effects.** The last category encompasses any flight safety-related incident not covered by the previous categories.

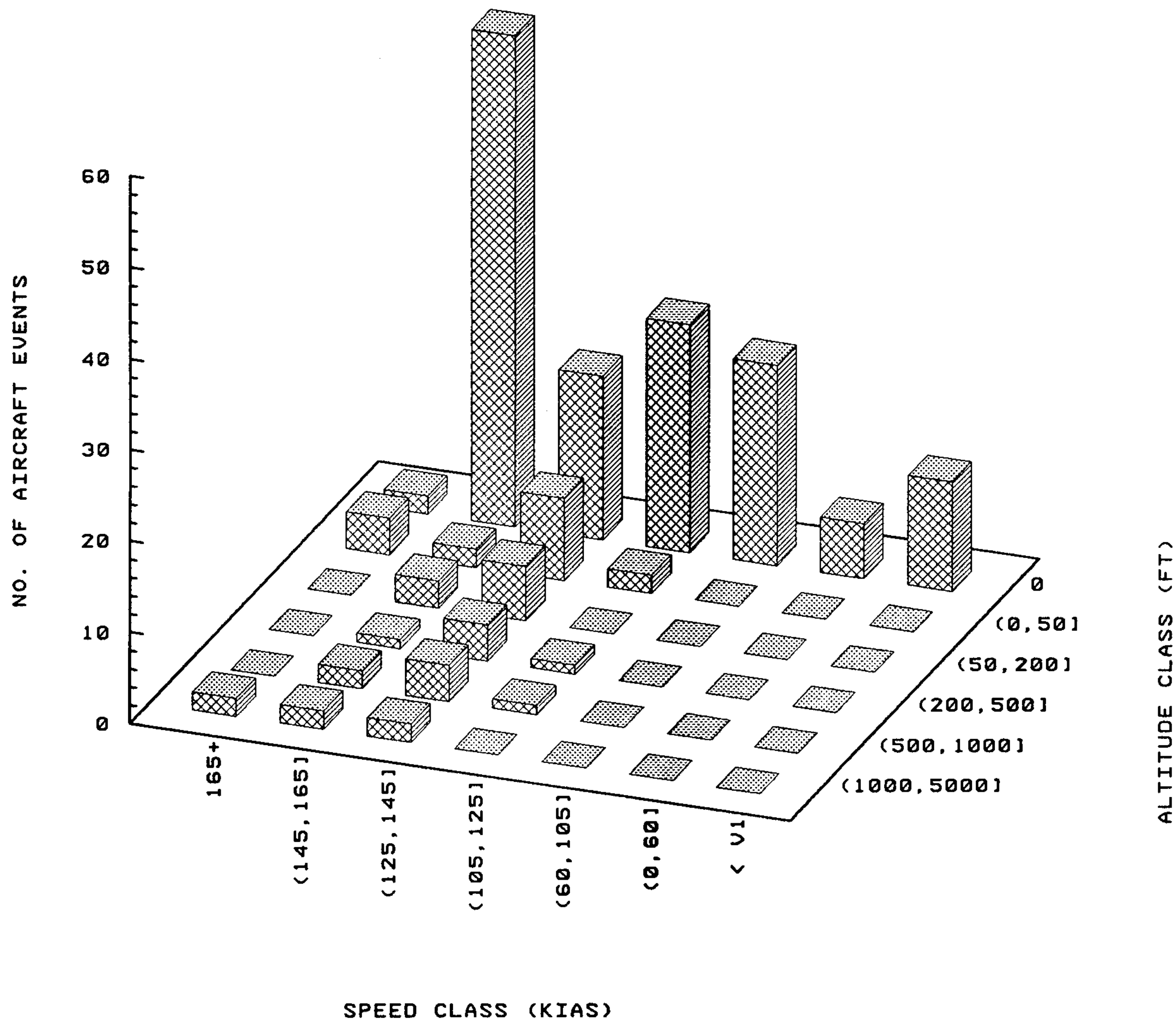



FIGURE 3.5. AIRCRAFT EVENTS BY SPEED AND ALTITUDE

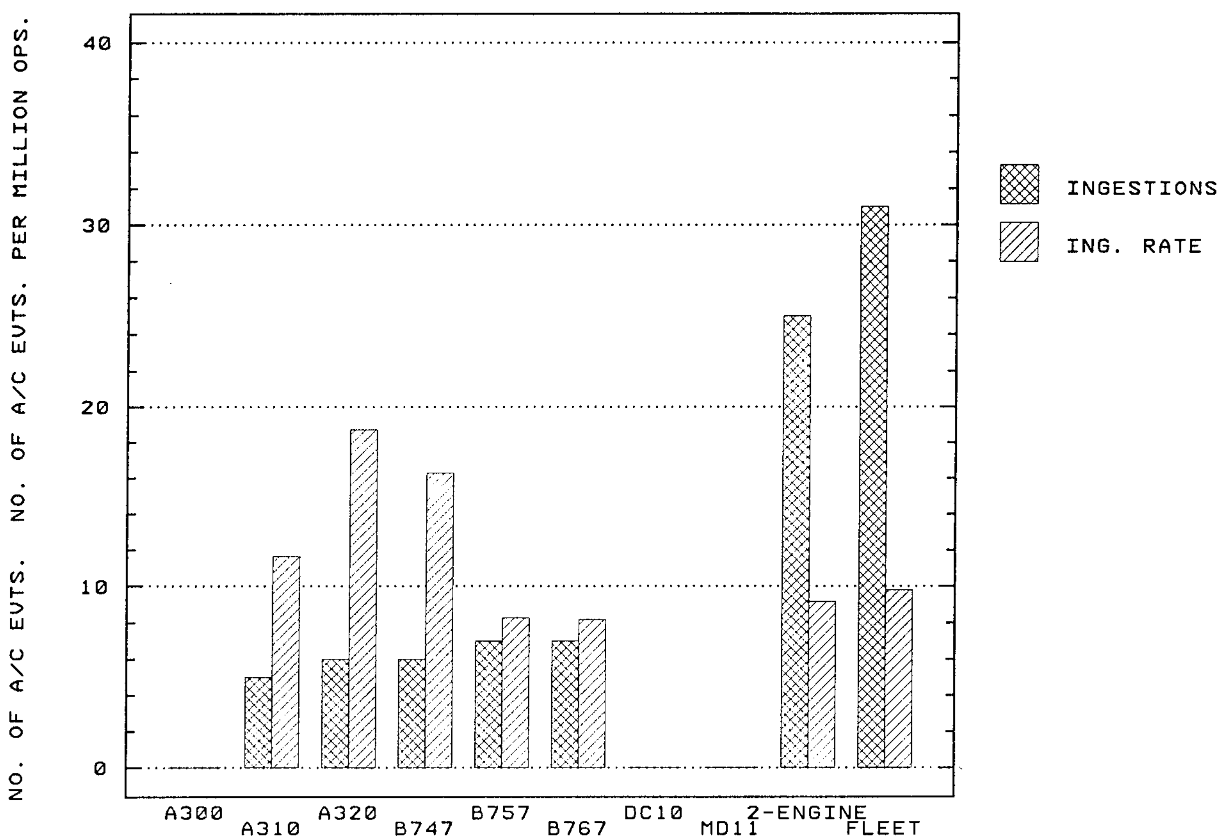



FIGURE 3.6. MULTIPLE-ENGINE EVENTS AND INGESTION RATES BY AIRCRAFT TYPE

Table 3.2 summarizes, in chronological order, the 69 significant events that were reported. Eleven of the 31 multiple-engine events are known to have occurred during departure and 14 during arrival. (The acronyms used for phases of flight are defined in appendix F.) Twelve events resulted in an involuntary power loss, six of which involved the transverse fracture of a fan blade. All twelve occurred during departure. In addition there were two "airworthiness" events--one involving extensive cowl damage (event 16) and the other (event 39) resulting in a reduction from the planned flight altitude. Significant events warrant close scrutiny because of their bearing on flight safety and are discussed in further detail in the ensuing sections.

## 3.8 ENGINE POSITION.

The aircraft type and engine position were both identified in 670 engine events. Of these, 565 took place in some 2-engine aircraft. Figure 3.7(a) indicates how these were split between the left (#1) and right (#2) engines for each aircraft type. There were a total of 297 left engine ingestions and 268 right engine ingestions in 2-engine aircraft. However, this is not a statistically significant difference. Indeed, if the probability of left and right engine ingestion were the same, then 24 percent of random samples of 565 engine ingestions in 2-engine aircraft would have at least 297 into one of the engines. Since there is no physical reason to expect the split between left and right engine ingestions to be unequal, this analysis illustrates how observed differences can be due to chance error alone.

Figure 3.7(b) plots frequencies of ingestion by engine position for 3-engine aircraft. There was one DC10 event for which the engine position is unknown. The remaining 14 ingestions were evenly split between the left (#1) and right (#3) wing engines. There were no ingestions into the tail (#2) engine. The single MD11 event also involved a wing engine. It is well known from previous studies that wing engines are more prone to ingest birds than tail engines. For example, only 9 of the 180 L1011 and DC10 ingestions in the 1981-83 study [1] were into a tail engine.

The tally according to engine position is shown in figure 3.7(c) for the 90 B747 engine ingestions. The left-most engine (#1) had only 16 events, at least eight less than each of the other three. This is not, however, a statistically significant indication that the engine position ingestion probabilities are unequal. Nearly 27 percent of all samples of 90 engine ingestions into four-engine aircraft would have 16 or less into one of the engines, assuming equal probabilities for each engine. A review of the corresponding data from the 1981-83 study, [1], supports the conclusion that the observed differences are again due to chance error.

## 3.9 REGIONS.

In addition to the United States/foreign breakdown, ingestion data were classified according to 8 geographical regions. They are: North America, South America, Europe, Africa, Asia, Australia-New Zealand, Pacific, and Middle East. Japan and Thailand are considered to be in the Pacific region, Korea in Asia, and Cyprus in the Middle East. All remaining countries in which ingestions were reported seem to fall naturally into a unique region. Figure 3.8 plots the frequency of aircraft ingestions by geographical region for the 457 events in which the region is known. Europe, Pacific, and North America predominate, in

TABLE 3.2 SIGNIFICANT EVENTS

| EVT | DATE | A/C | ENGINE | | POF | US/FOR | SIGNIFICANT EVENT |
|---|---|---|---|---|---|---|---|
| 1 | 01/24/89 | B757 | RB211 | 535C | TR | FOR | MESB |
| 16 | 03/12/89 | B747 | JT9D | 70A | CL | FOR | AIRWORTHY |
| 17 | 03/13/89 | A310 | 4000 | 4152 | AP | FOR | SEMB |
| 24 | 04/18/89 | B767 | JT9D | 7R4D | | FOR | MESB |
| 168 | 05/02/89 | B747 | JT9D | 7R4G2 | | | SEMB |
| 31 | 05/04/89 | B767 | JT9D | 7R4D | TR | FOR | SEMB |
| 32 | 05/10/89 | A300 | JT9D | 59A | TR | FOR | SEMB,POWER LOSS |
| 39 | 06/18/89 | B747 | JT9D | 7R4G2 | CL | FOR | AIRWORTHY |
| 72 | 07/19/89 | B767 | CF6 | 80C2 | TR | FOR | SEMB |
| 140 | 07/25/89 | A320 | V2500 | A1 | TR | FOR | SEMB |
| 74 | 08/13/89 | A310 | CF6 | 80C2 | TR | FOR | SEMB |
| 75 | 08/14/89 | B767 | CF6 | 80C2 | CL | FOR | TRANSVERSE FRACTURE |
| 171 | 08/31/89 | B747 | 4000 | 4056 | LR | US | MEMB |
| 138 | 09/12/89 | B747 | JT9D | 7Q | TR | US | MEMB,TRANSVRS.FRAC. |
| 151 | 10/04/89 | B767 | 4000 | 4060 | | | SEMB |
| 112 | 10/07/89 | B757 | RB211 | 535C | LD | FOR | MESB |
| 150 | 10/07/89 | B767 | 4000 | 4060 | | FOR | SEMB |
| 152 | 10/12/89 | B767 | JT9D | 7R4D | TR | FOR | MEMB,POWER LOSS |
| 155 | 10/19/89 | B767 | 4000 | 4060 | LR | FOR | SEMB |
| 102 | 10/21/89 | B747 | CF6 | 80C2 | CL | FOR | MESB |
| 103 | 10/23/89 | A310 | CF6 | 80C2 | TR | FOR | SEMB,TRANSVRS.FRAC. |
| 158 | 11/02/89 | B767 | JT9D | 7R4D | AP | FOR | SEMB |
| 115 | 11/18/89 | B757 | RB211 | 535C | LR | FOR | SEMB |
| 85 | 11/21/89 | A320 | CFM56 | 5 | | FOR | MESB |
| 97 | 12/14/89 | A310 | CF6 | 80A | LR | FOR | MEMB |
| 116 | 12/28/89 | B757 | RB211 | 535C | TO | FOR | SEMB |
| 184 | 01/14/90 | B767 | CF6 | 80A | LR | FOR | SEMB |
| 219 | 01/15/90 | B767 | JT9D | 7R4 | AP | FOR | SEMB |
| 193 | 01/16/90 | A310 | CF6 | 80C2 | | FOR | MESB |
| 244 | 02/09/90 | A310 | JT9D | 7R4E | | FOR | MESB |
| 226 | 02/11/90 | B747 | 4000 | 4056 | | | SEMB |
| 201 | 02/21/90 | B767 | CF6 | 80C2 | TR | FOR | MESB |
| 225 | 02/21/90 | B767 | JT9D | 7R4D | AP | FOR | MEMB |
| 292 | 04/06/90 | B767 | CF6 | 80C2 | LD | FOR | SEMB |
| 268 | 05/23/90 | A320 | CFM56 | 5 | TR | FOR | SEMB |
| 247 | 05/31/90 | A300 | JT9D | 59A | TR | FOR | POWER LOSS |
| 334 | 06/02/90 | DC10 | JT9D | 59A | | FOR | SEMB |
| 273 | 06/14/90 | A320 | CFM56 | 5 | | FOR | SEMB |
| 214 | 06/17/90 | B757 | RB211 | 535E4 | LD | US | MEMB |
| 257 | 07/30/90 | B757 | 2000 | 2037 | CL | US | TRANSVERSE FRACTURE |

*TABLE 3.2 SIGNIFICANT EVENTS (CONTINUED)*

| EVT | DATE | A/C | ENGINE | | POF | US/FOR | SIGNIFICANT EVENT |
|---|---|---|---|---|---|---|---|
| 263 | 08/05/90 | B747 | JT9D | 7Q | TR | US | POWER LOSS |
| 323 | 08/14/90 | B757 | 2000 | 2037 | TO | US | MEMB |
| 632 | 08/17/90 | B767 | CF6 | 80A | LR | FOR | MESB |
| 328 | 09/03/90 | B747 | JT9D | 7Q | TR | FOR | POWER LOSS |
| 382 | 09/04/90 | B747 | CF6 | 80C2 | LR | FOR | MEMB |
| 333 | 09/17/90 | B747 | JT9D | 7R4G2 | TX | US | MEMB |
| 437 | 09/27/90 | DC10 | JT9D | 59A | TR | FOR | SEMB |
| 435 | 10/14/90 | B747 | JT9D | 7Q | TR | FOR | TRANSVERSE FRACTURE |
| 442 | 11/14/90 | B757 | 2000 | 2037 | TR | US | MEMB |
| 427 | 11/24/90 | B757 | RB211 | 535C | TR | FOR | MEMB |
| 400 | 12/03/90 | A320 | CFM56 | 5 | TR | FOR | MESB |
| 446 | 12/19/90 | B757 | 2000 | 2037 | RV | US | SEMB |
| 402 | 12/22/90 | A320 | CFM56 | 5 | TR | FOR | SEMB |
| 448 | 12/23/90 | B757 | 2000 | 2037 | CL | US | MEMB |
| 452 | 01/04/91 | B767 | 4000 | 4056 | LD | FOR | SEMB |
| 463 | 01/29/91 | A310 | CF6 | 80A | | FOR | MESB |
| 470 | 02/04/91 | A300 | CF6 | 80C2 | TR | FOR | TRANSVERSE FRACTURE |
| 499 | 02/13/91 | B757 | 2000 | 2040 | | US | SEMB |
| 496 | 03/13/91 | B767 | JT9D | 7R4E | TR | FOR | POWER LOSS |
| 482 | 03/19/91 | B747 | CF6 | 80C2 | LR | FOR | MESB |
| 483 | 03/25/91 | B747 | CF6 | 80C2 | TR | FOR | SEMB |
| 550 | 06/03/91 | B767 | CF6 | 80C2 | | FOR | MESB |
| 536 | 06/23/91 | A310 | CF6 | 80A | LR | FOR | MESB |
| 559 | 07/21/91 | A320 | CFM56 | 5 | LR | FOR | MESB |
| 563 | 07/21/91 | A320 | CFM56 | 5 | LD | FOR | MESB |
| 565 | 07/29/91 | A320 | CFM56 | 5 | AP | FOR | MESB |
| 567 | 08/04/91 | A320 | CFM56 | 5 | AP | FOR | MESB |
| 590 | 08/07/91 | B767 | CF6 | 80C2 | TO | FOR | SESB |
| 573 | 08/11/91 | B767 | CF6 | 80A | TR | FOR | MESB |

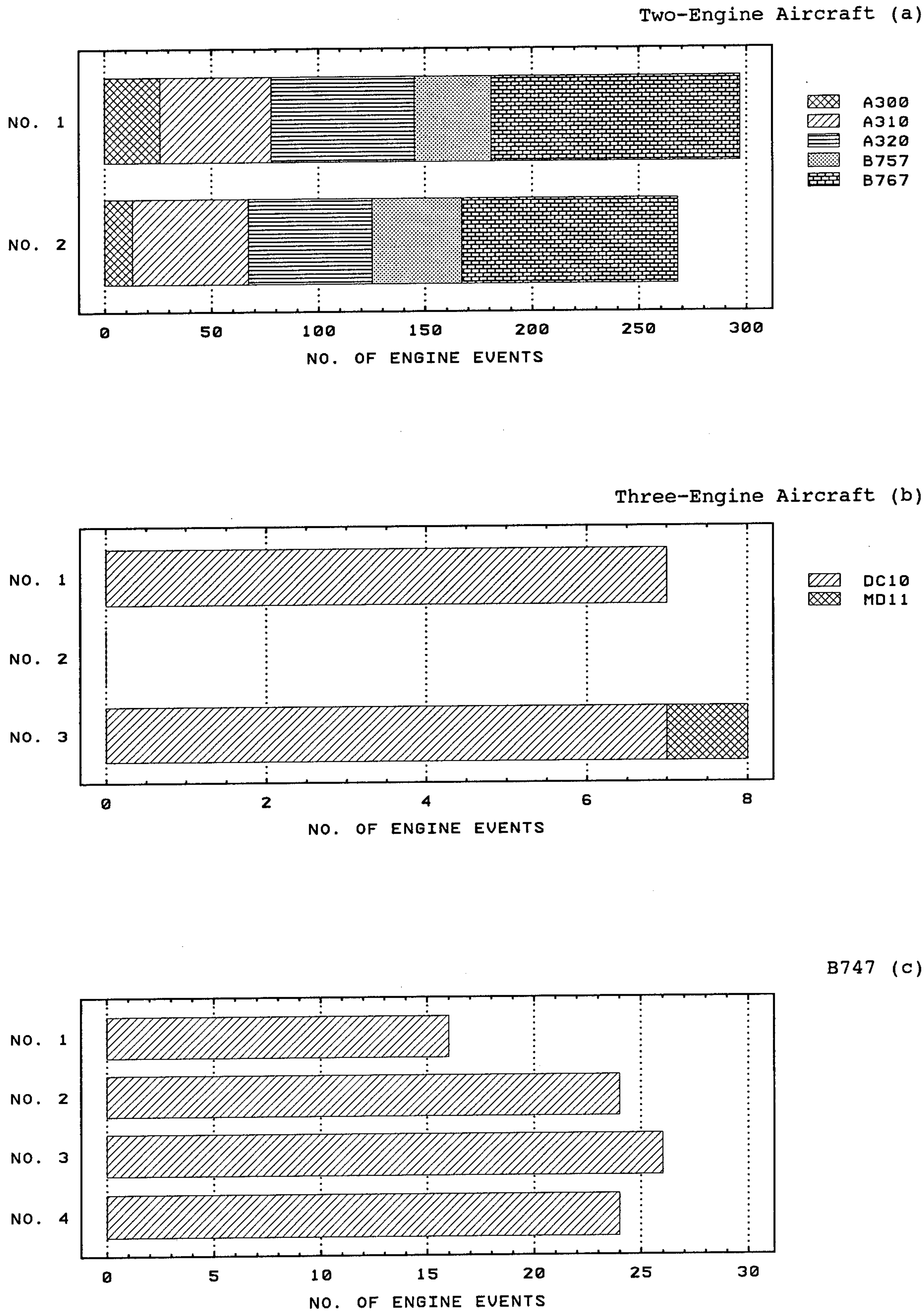



FIGURE 3.7. INGESTIONS BY ENGINE POSITION

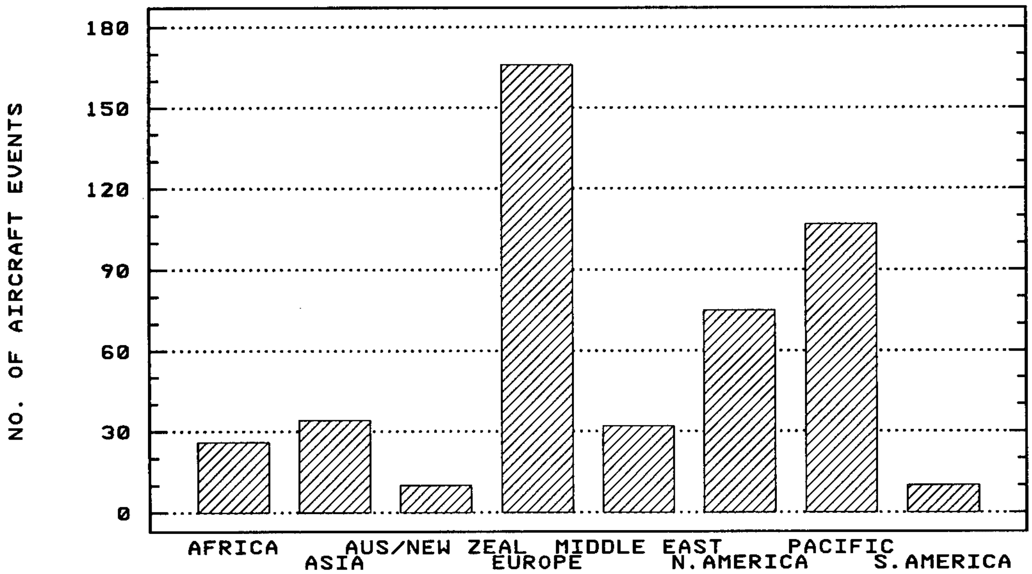



FIGURE 3.8. AIRCRAFT EVENTS BY REGION

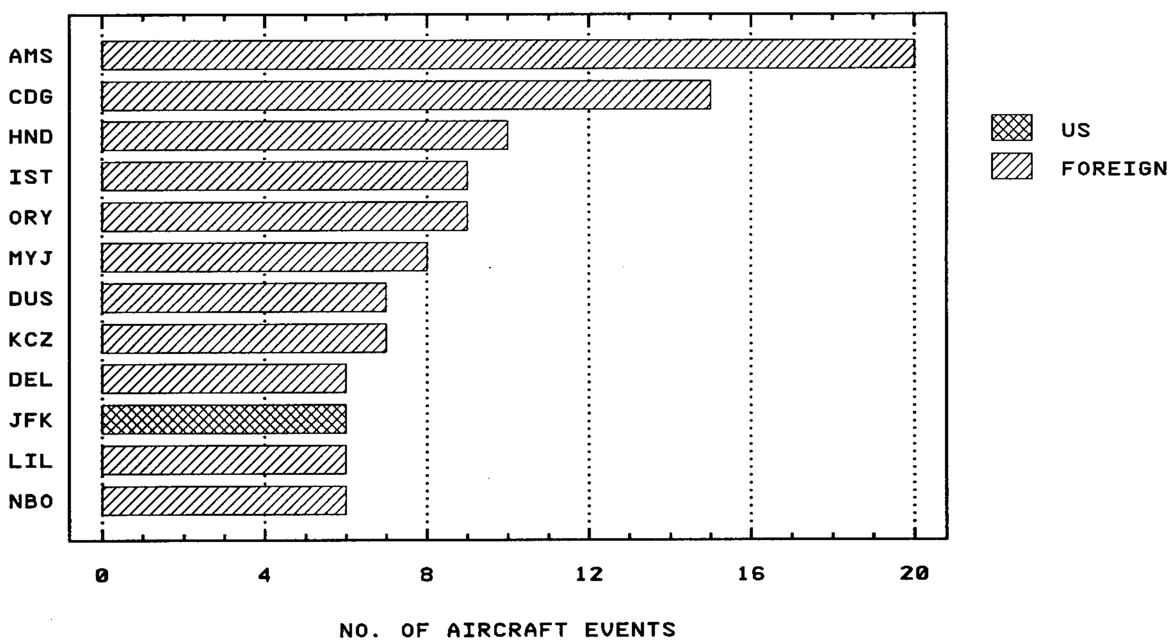



FIGURE 3.9. AIRPORTS WITH SIX OR MORE EVENTS

that order, and together account for over 75 percent of these events. Since operational data could not be broken down by region, computation of regional ingestion rates was not possible.

## 3.10 AIRPORTS.

The airport near which the ingestion occurred was identified in 393 (61 percent) of the aircraft events. All told, aircraft ingestions are known to have taken place in the vicinity of 17 domestic and 151 foreign airports during the reporting period. For the aircraft events in which the associated airport could not be determined, it was reported that 29 occurred in the United States and 204 were foreign. Figure 3.9 gives the number of aircraft ingestions at each airport reporting 6 or more events. Twenty were reported at Schiphol in Amsterdam and 15 at Charles De Gaulle in Paris. The only domestic airport represented is John F. Kennedy International with 6 events. Airport ingestion rates could not be determined because the requisite operational data were unavailable.

Appendix C lists all airports at which aircraft ingestions are known to have occurred and tallies the aircraft types involved at each airport. The airports are organized into the geographical regions discussed above. Thirty one of the airports, three of which are in the United States, reported four or more events. XUS (respectively XFO) designates an unknown location known to be in (respectively outside) the United States. XXX indicates a location not known specifically to be domestic or foreign. In two cases, events 211 and 293, airports designated XXX are known to be in North America.

## 3.11 ICAO DATA.

The International Civil Aviation Organization (ICAO) collects data continuously on worldwide bird strikes to aircraft. A search of the ICAO data base yielded 111 "bird strikes" to engines included in this study which occurred during the data collection period but were not reported by the engine manufacturers. Unfortunately, there is no way to tell, in most cases, whether a bird was ingested into the engine or merely struck its case or nacelle. Even when it can be inferred that an ingestion took place, information concerning bird numbers, bird weights and engine damage is extremely limited. Although reference is made to these data from time to time in this report, they have been excluded from any of the analysis. A summary of this "ICAO data" appears in appendix G. Information from the ICAO data base was used, whenever possible, to supplement reports of bird ingestions from the engine manufacturers. This source was particularly valuable in determining time of day, airport, phase of flight, and aircraft speed and altitude for several events.

## 4. CHARACTERISTICS OF INGESTED BIRDS.

The numbers, species, and weights of birds that were ingested into the engines are discussed in this section. Bird species and weight were determined by licensed ornithologists upon examination of bird remains recovered from the engines. Numbers of birds were estimated by representatives of the engine manufacturers, primarily from the locations and patterns of bird debris in the engines.

### 4.1 BIRD NUMBERS.

Table 4.1 summarizes the data concerning numbers of birds ingested. Some estimate of the number of birds ingested was obtained in 655 of the 676 engine events. Six hundred and three of the engine ingestions are thought to have involved only a single bird while 50 were determined to be multiple-bird events. In 23 events the exact number could not be determined but rather a minimum and/or maximum number was given. In nine engine events, four or more birds are known to have been ingested. Four of these events were foreign and five were domestic. Two of the latter occurred in a B747 multiple-engine multiple-bird ingestion of 14-ounce Common Rock Doves at Los Angeles (event 138). (See section 5.) For two engine ingestions, estimates of bird numbers were only given as "one or more". It therefore remains undetermined whether these events (154 and 159) were single-bird or multiple-bird ingestions.

### 4.2 BIRD SPECIES.

The customary difficulty in obtaining comprehensive data on bird types is reflected in the fact that remains were recovered and a species identified in only 198 of the 644 aircraft events. This includes five events in which bats, not birds, were identified. It was discovered that engine #3 of the B747 in event 333 ingested a single 0.5 ounce Yellow-rumped Warbler while engine #4 ingested a pair of 56-ounce Canada Geese. This occurred while the aircraft was taxiing in Anchorage, Alaska. These two species and their corresponding weights are counted separately in this section. In each of the remaining 197 aircraft events the feather identifications yielded a unique species and estimated weight.

Thirty-one of the verified species are domestic and 165 are foreign. It could not be determined whether the ingestion took place inside or outside the United States in three events for which a species identification was made. These are event 137 (a 1.5-ounce Horned Lark), event 130 (a 10-ounce Black-headed Gull), and event 330 (a 0.65-ounce Meadow Pipit).

Figure 4.1 plots the frequency of domestic and foreign aircraft events for the most commonly identified bird species. The species are listed in descending order of worldwide occurrence and include all those involved in four or more events. The Herring Gull was the most frequently identified species (in 17 events), followed by the Black-headed Gull (14 events). The Black Kite and the Common Rock Dove were each identified in 9 events. The 14 species in figure 4.1 together account for 109 (56 percent) of the 194 events for which bird species were determined. Four of these species did not appear in the 1981-83 study; the Eurasian Kestrel, Common Skylark, Black-crowned Night Heron, and Hungarian Partridge.

*TABLE 4.1 NUMBER OF BIRDS INGESTED PER ENGINE EVENT*

| *NO. OF BIRDS* | *US* | *FOREIGN* | *UNKNOWN* | *WORLDWIDE* |
|---|---|---|---|---|
| *1* | *54* | *538* | *12* | *604* |
| *2* | *4* | *14* | *0* | *18* |
| *3* | *0* | *4* | *0* | *4* |
| *4* | *2* | *1* | *0* | *3* |
| *5* | *1* | *1* | *0* | *2* |
| *7* | *1* | *0* | *0* | *1* |
| *1 OR MORE* | *0* | *2* | *0* | *2* |
| *2 OR MORE* | *4* | *10* | *3* | *17* |
| *3 TO 4* | *0* | *1* | *0* | *1* |
| *4 TO 5* | *1* | *0* | *0* | *1* |
| *6 TO 17* | *0* | *2* | *0* | *2* |
| *UNKNOWN* | *5* | *13* | *3* | *21* |
| *TOTALS* | *72* | *586* | *18* | *676* |

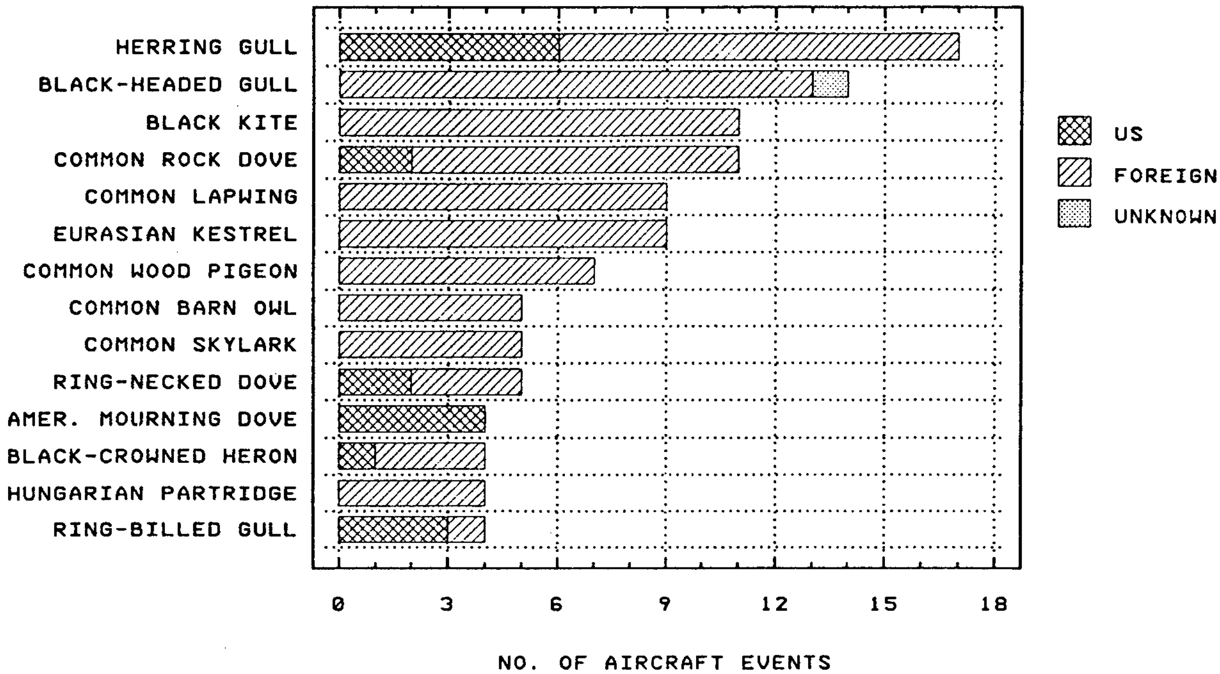



FIGURE 4.1. BIRD SPECIES WITH FOUR OR MORE EVENTS

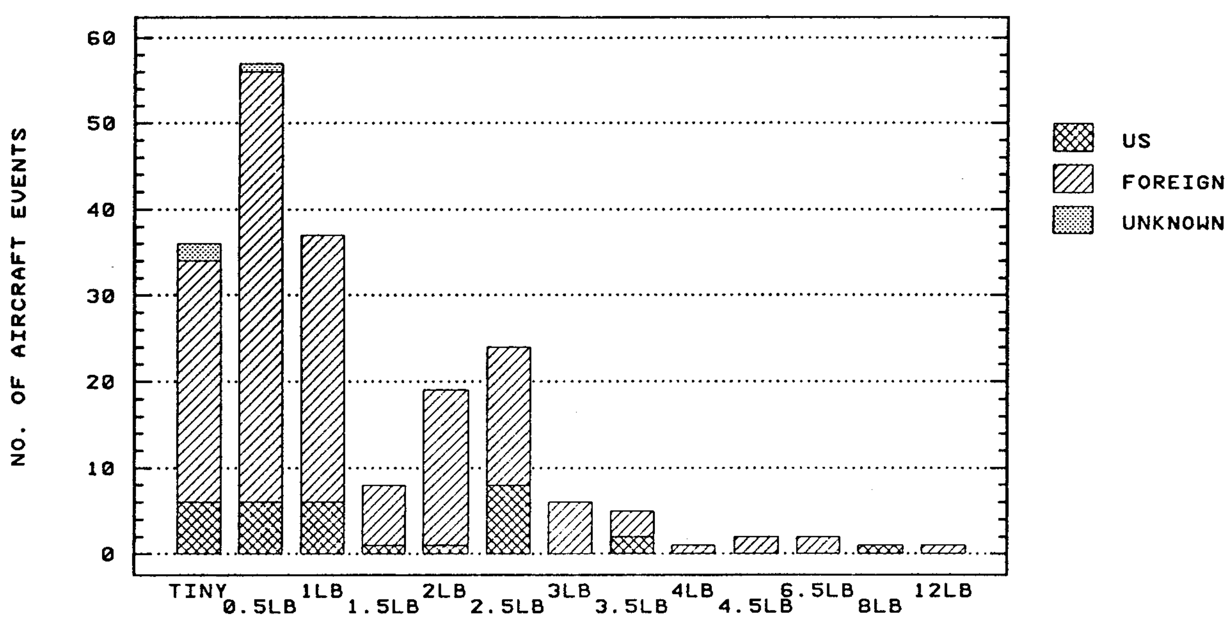



FIGURE 4.2. AIRCRAFT EVENTS BY BIRD WEIGHT CLASS, US/FOREIGN

Table 4.2 summarizes the data regarding all bird species. The number of aircraft ingestions (United States, foreign, and worldwide) are tallied for each species known to have been ingested. Since weight estimates for a given species can vary according to sex, maturity, and geographical location, the modal (most common) estimated weight and the range of estimated weights are also given for each species. The table is ordered by modal weight. Also indicated is the number of single-engine multiple-bird (SEMB), multiple-engine single-bird (MESB) and multiple-engine multiple-bird (MEMB) aircraft events in which each species was involved. The "multiple events" column indicates that the Common Lapwing, Black-Headed Gull, and Herring Gull are also the most pervasive flocking bird species being encountered. The initial two species are "small" birds, having modal weights of 8 and 10 ounces, respectively, while the herring gull modal weight is 40 ounces.

Seventy nine different bird species are represented in table 4.2. Thirty of these can also be found in the 1981-83 data. These 30 species account for 115 (59 percent) of the 194 aircraft events having verified bird species. As mentioned above, four species not identified in the previous study appear in figure 4.1. (four or more events.) Each of the remaining species identified in this study but not the previous one appear in at most two aircraft events.

Bird species codes from [4] are used in table 4.2 and throughout this report. Since different alphanumeric bird species codes from an older publication of E. P. Edwards were used in previous FAA bird ingestion reports, appendix D contains a cross-reference of old and new codes for each species that was identified. The order, family, scientific name and English name of each bird species, along with a tally of aircraft events by month, can also be found there.

As previously mentioned, appendix C lists all airports at which ingestions are known to have occurred and provides the aircraft types involved. It is important, in the interest of bird control, to determine the types of birds that threaten aircraft at any particular airport. Toward this purpose, the last column of appendix C contains a tally of all identified bird species at each airport. The English and scientific name of each species, whose code is given in Appendix C, can be found in appendix D.

## 4.3 BIRD WEIGHTS.

Whenever possible, bird weights were estimated by the ornithologists from the species, sex, and maturity of the bird and the geographical area and season of the ingestion. When no other information was available, the average weight of a given species was used. All 199 weights for confirmed bird species or bat events are tabulated in table 4.3. The unique weights (in ounces) are listed in ascending order, and the number of United States, foreign, and worldwide aircraft ingestions are tallied for each. Summary statistics (as defined in appendix B) are given in table 4.4 for the same three geographical weight groupings. The mean and median for domestic weights are each a few ounces larger than their foreign counterparts. However, the foreign modal weight is 14 ounces while the United States (and worldwide) modal weight is 40 ounces. These modes distinguish among individual weight estimates that are, for all practical purposes, the same (e.g., 40 ounces and 40.4 ounces.) It is more meaningful to first group the weights into "weight classes". Weight classes as defined in Table 4.6 below are used throughout this report.

TABLE 4.2 BIRD SPECIES

| BIRDNAME | SPECIES CODE | MODAL WT.(OZ) | WT RANGE (OZ) | US/FOR/WW | MULTIPLE EVENTS |
|---|---|---|---|---|---|
| COMMON SAND MARTIN | Z15b31 | 0.5 | | 0 1 1 | |
| YELLOW-RUMPED WARBLER | Z57a38 | 0.5 | | 1 0 1 | |
| MEADOW PIPIT | Z17a41 | 0.65 | | 0 0 1 | |
| BARN SWALLOW | Z15b39 | 0.75 | | 0 2 2 | |
| BAT | BAT | 1 | 0.3-1 | 0 5 5 | 2MESB |
| RUFOUS-BREASTED SWALLOW | Z15b55 | 1 | | 0 1 1 | 1SEMB |
| CHIMNEY SWIFT | U3b43 | 1 | | 0 2 2 | |
| SWAINSON'S THRUSH | Z21a253 | 1 | | 1 0 1 | |
| COMMON SWIFT | U3b68 | 1,1.5 | 1-1.5 | 0 2 2 | |
| DON-SMITH'S NIGHTJAR | T4b49 | 1.25 | | 0 1 1 | |
| HORNED LARK | Z14a83 | 1.5 | 1.5-2 | 1 1 3 | 1SEMB |
| FORK-TAILED SWIFT | U3b70 | 1.5 | | 0 2 2 | |
| LEAST TERN | P5b33 | 1.6 | | 0 1 1 | |
| CORN BUNTING | Z65c3 | 1.7 | | 0 1 1 | |
| COMMON SKYLARK | Z14a81 | 2 | 1.3-2 | 0 5 5 | |
| AMERICAN ROBIN | Z21a325 | 2.5 | | 2 0 2 | |
| COMMON NIGHTHAWK | T4a5 | 2.5 | | 1 0 1 | |
| SCHRENDK'S BITTERN | I1d6 | 3 | | 0 1 1 | |
| COMMON STARLING | Z53a82 | 3 | | 0 2 2 | |
| KILLDEER | P14b6 | 3 | | 0 1 1 | |
| ROSEATE TERN | P5b15 | 4 | | 0 1 1 | |
| AMERICAN MOURNING DOVE | Q3a108 | 4 | | 4 0 4 | |
| AMERICAN KESTREL | J5b11 | 4 | | 1 0 1 | |
| RUDDY TURNSTONE | P17b1 | 4 | | 0 1 1 | 1SEMB |
| COMMON SNIPE | P17d9 | 4,5 | 4-5 | 0 2 2 | |
| RING-NECKED DOVE | Q3a62 | 5 | | 0 1 1 | |
| LESSER GOLDEN PLOVER | P14b37 | 5 | | 0 1 1 | |
| SENEGAL COUCAL | S2f24 | 7 | | 0 1 1 | 1SEMB |
| BANDED PLOVER | P14a5 | 7 | | 0 1 1 | |
| EURASIAN KESTREL | J5b12 | 7 | 7-8 | 0 9 9 | |
| COMMON LAPWING | P14a1 | 8 | 7.7-8 | 0 9 9 | 2MESB 2SEMB |
| FRANKLIN'S GULL | P5a40 | 9 | | 1 0 1 | |
| GREATER KESTREL | J5b18 | 9.6 | | 0 1 1 | |
| BLACK-HEADED GULL | P5a35 | 10 | | 0 13 14 | 1MESB 2MEMB 2SEMB |
| GRAY-HEADED LAPWING | P14a12 | 10 | | 0 2 2 | 1SEMB |
| MASKED PLOVER | P14a6 | 11 | | 0 1 1 | |
| SILVER (RED-BILLED) GULL | P5a32 | 11 | | 0 3 3 | |
| COMMON BARN OWL | K1a2 | 11 | 11-12 | 0 5 5 | |
| CHIMANGO FALCON | J5a10 | 12 | | 0 1 1 | |
| SHORT-EARED OWL | K2c7 | 13 | | 1 1 2 | |

TABLE 4.2 BIRD SPECIES (CONTINUED)

| BIRDNAME | SPECIES CODE | MODAL WT.(OZ) | WT RANGE (OZ) | US/FOR/WW | MULTIPLE EVENTS |
|---|---|---|---|---|---|
| COMMON ROCK DOVE | Q3a1 | 14 | | 2 9 11 | 2MEMB 1SEMB |
| HUNGARIAN PARTRIDGE | M5b59 | 14 | | 0 4 4 | 1MESB 1SEMB |
| COMMON GULL | P5a12 | 16 | | 0 1 1 | 1MEMB |
| RED-LEGGED PARTRIDGE | M5b16 | 16 | | 0 1 1 | |
| EURASIAN STONE-CURLEW | P9a1 | 16 | | 0 1 1 | 1SEMB |
| RING-BILLED GULL | P5a14 | 17 | | 3 1 4 | 1MEMB 1SEMB |
| LITTLE EGRET | I1a23 | 17 | | 0 1 1 | |
| COMMON WOOD PIGEON | Q3a9 | 18 | | 0 7 7 | |
| CHUKAR | M5b12 | 18 | | 0 2 2 | 1MEMB |
| CARRION CROW | Z51a31 | 19 | | 0 1 1 | |
| BLACK-TAILED GULL | P5a11 | 21 | | 0 1 1 | |
| PEREGRINE FALCON | J5b44 | 22 | | 0 1 1 | |
| EURASIAN MARSH HARRIER | J4a82 | 23 | | 0 1 1 | |
| BLACK-CROWNED NIGHT-HERON | I1b2 | 24 | | 1 3 4 | |
| AFRICAN EAGLE OWL | K2a57 | 26 | | 0 1 1 | |
| BLACK KITE | J4a31 | 28 | 28-32 | 0 11 11 | |
| COMMON PINTAIL DUCK | L2e40 | 30 | | 0 1 1 | |
| COMMON BUZZARD | J4a180 | 32 | | 0 2 2 | |
| COMMON POCHARD | L2e60 | 35 | | 0 1 1 | 1SEMB |
| GREAT EGRET | I1a13 | 38 | | 0 1 1 | |
| BLACK-HEADED HERON | I1a7 | 38 | | 0 2 2 | |
| GREATER SCAUP | L2e69 | 40 | | 0 1 1 | 1MEMB |
| HERRING GULL | P5a24 | 40 | 32-40 | 6 11 17 | 1MESB 1MEMB 2SEMB |
| RING-NECKED PHEASANT | M5b141 | 40 | 32-48 | 2 3 5 | 1MEMB |
| MALLARD DUCK | L2e30 | 40 | | 0 1 1 | |
| SPOT-BILLED DUCK | L2e34 | 40 | | 0 2 2 | |
| WESTERN GULL | P5a19 | 40.4 | | 1 0 1 | |
| GYRFALCON | J5b43 | 46.4 | | 0 1 1 | |
| GLAUCOUS-WINGED GULL | P5a20 | 48 | | 0 1 1 | |
| BLACK VULTURE | J1a1 | 48 | | 0 2 2 | |
| TURKEY VULTURE | J1a2 | 52 | | 0 1 1 | |
| HELMETED GUINEA FOWL | M3a3 | 52 | | 0 2 2 | |
| OSPREY | J3a1 | 55 | | 1 0 1 | |
| GREAT BLACK-BACKED GULL | P5a16 | 60 | | 0 1 1 | 1MESB |
| CANADA GOOSE | L2c19 | 56,128 | 56-128 | 2 0 2 | 1SEMB |
| EGYPTIAN VULTURE | J4a46 | 75 | | 0 2 2 | |
| AFRICAN FISH EAGLE | J4a36 | 100 | | 0 2 2 | |
| INDIAN WHT-BCKD VULTURE | J4a48 | 192 | | 0 1 1 | |
| | | | TOTALS | 31 165 199 | |

*TABLE 4.3 BIRD WEIGHTS BY US/FOREIGN/WORLDWIDE*

| BIRD WEIGHT | US | FOR | UNK | WW | BIRD WEIGHT | US | FOR | UNK | WW |
|---|---|---|---|---|---|---|---|---|---|
| 0.3 | | 1 | | 1 | 17 | 3 | 2 | | 5 |
| 0.5 | 1 | 2 | | 3 | 18 | | 9 | | 9 |
| 0.65 | | | 1 | 1 | 19 | | 1 | | 1 |
| 0.75 | | 2 | | 2 | 21 | | 1 | | 1 |
| 1 | 1 | 7 | | 8 | 22 | | 1 | | 1 |
| 1.25 | | 1 | | 1 | 23 | | 1 | | 1 |
| 1.3 | | 1 | | 1 | 24 | 1 | 3 | | 4 |
| 1.5 | 1 | 4 | 1 | 6 | 26 | | 1 | | 1 |
| 1.6 | | 1 | | 1 | 28 | | 9 | | 9 |
| 1.7 | | 1 | | 1 | 30 | | 1 | | 1 |
| 2 | | 4 | | 4 | 32 | 1 | 6 | | 7 |
| 2.5 | 3 | | | 3 | 34 | | 1 | | 1 |
| 3 | | 4 | | 4 | 35 | | 1 | | 1 |
| 4 | 5 | 3 | | 8 | 36 | | 1 | | 1 |
| 5 | | 3 | | 3 | 38 | | 3 | | 3 |
| 7 | | 8 | | 8 | 40 | 7 | 12 | | 19 |
| 7.2 | | 1 | | 1 | 40.4 | 1 | | | 1 |
| 7.7 | | 4 | | 4 | 44 | | 1 | | 1 |
| 8 | | 7 | | 7 | 46.4 | | 1 | | 1 |
| 9 | 1 | | | 1 | 48 | | 4 | | 4 |
| 9.6 | | 1 | | 1 | 52 | | 3 | | 3 |
| 10 | | 15 | 1 | 16 | 55 | 1 | | | 1 |
| 11 | | 8 | | 8 | 56 | 1 | | | 1 |
| 12 | | 2 | | 2 | 60 | | 1 | | 1 |
| 12.7 | 1 | | | 1 | 75 | | 2 | | 2 |
| 13 | | 1 | | 1 | 100 | | 2 | | 2 |
| 14 | 2 | 13 | | 15 | 128 | 1 | | | 1 |
| 16 | | 3 | | 3 | 192 | | 1 | | 1 |

| TOTALS | US | FOR | UNK | WW |
|---|---|---|---|---|
| | 31 | 165 | 3 | 199 |

*ALL WEIGHTS ARE IN OUNCES*

TABLE 4.4 BIRD WEIGHT SUMMARY STATISTICS
CURRENT STUDY

| STATISTIC | US | FOREIGN | WORLDWIDE |
|---|---|---|---|
| SAMPLE SIZE | 31 | 165 | 199 |
| MEAN | 24.1 | 20.2 | 20.5 |
| MEDIAN | 17 | 14 | 14 |
| MODE | 40 | 10 | 40 |
| STD. DEVIATION | 26.2 | 22.5 | 23 |
| MINIMUM | 0.5 | 0.3 | 0.3 |
| MAXIMUM | 128 | 192 | 192 |
| LOWER QUARTILE | 4 | 7 | 7 |
| UPPER QUARTILE | 40 | 28 | 32 |

TABLE 4.5 BIRD WEIGHT SUMMARY STATISTICS
1981-83 STUDY

| STATISTIC | US | FOREIGN | WORLDWIDE |
|---|---|---|---|
| SAMPLE SIZE | 55 | 180 | 250 |
| MEAN | 30.4 | 26.8 | 27.1 |
| MEDIAN | 32 | 18 | 18.5 |
| MODE | 40 | 24 | 40 |
| STD. DEVIATION | 21.5 | 35.9 | 32.3 |
| MINIMUM | 1 | 1 | 1 |
| MAXIMUM | 112 | 240 | 240 |
| LOWER QUARTILE | 14 | 11 | 11 |
| UPPER QUARTILE | 40 | 28.5 | 32 |

ALL WEIGHTS ARE IN OUNCES

Summary statistics from the 1981-83 study corresponding to those in table 4.4 are given in table 4.5. (Since only verified weights are considered in this report, the numbers in table 4.5 vary somewhat from those in [1].) The mean, median, and modal weights for all three geographic categories are, in general, somewhat larger than in the current study. However, domestic and worldwide modal weights are again 40 ounces. As in the current study, United States bird weights are, in terms of these summary statistics, larger than foreign bird weights.

It should be noted that numerous additional unverified bird weights, based on visual observation of birds at the ingestion site, were reported in the current study. Since visual weight estimates are notoriously inaccurate, these weights were not included in the above tables or in any analysis. They can be found, along with a generic bird type identification, in the "BIRDNAME" column of appendix F. The corresponding species and weight columns are empty for these data.

For analytical purposes, each bird weight was assigned a weight class as defined in table 4.6. The initial class ("tiny" birds) includes all weights of 3 ounces or less. The remaining weights were grouped into successive 8-ounce intervals as indicated. For example, the 0.5-pound class contains all weights greater than 3 ounces and less than or equal to 11 ounces. This scheme was chosen because it distinguishes between, and yields intervals "centered" around, 1.5, 2, and 2.5 pounds, weights which are significant in terms of current and proposed certification standards.

The 199 verified bird weights fall into 13 distinct weight classes. Figure 4.2 indicates the frequency of aircraft ingestions of United States, foreign, and unknown origin for each of these weight classes. The vast majority of bird weights are in the smallest three weight classes ("tiny", 0.5 pound, and 1 pound) and relatively few are in the 1.5-pound class. There are, however, a significant number in the 2-pound and 2.5-pound classes. Indeed, the 2.5-pound weight class contains more domestic bird weights (8) than any other class. Six of these events occurred at Kennedy International Airport in New York (68, 98, 263, 323, 451, and 467), one (257) at Los Angeles International Airport, and the other (477) at Newark International Airport. It should be noted that the aforementioned six events at Kennedy Airport are the only ones known to have occurred there; i.e., all reported ingestions at JFK yielded verified bird weights, all of which are in the 2.5-pound weight class.

Figure 4.3(a) plots the cumulative distribution functions (see appendix B) for both United States and foreign bird weights. The two distributions diverge between 10 and 40 ounces, with a larger percentage of foreign bird weights less than 40 ounces. An application of the Kolmogoroff-Smirnov Two-Sample Test (see appendix B) yields $P$ = 5.27 percent which, although not quite statistically significant, is strong evidence that the domestic and foreign bird weight sample distributions are different. (The corresponding distributions were shown to be different by this two-sample test in the previous FAA large engine study, [1].)

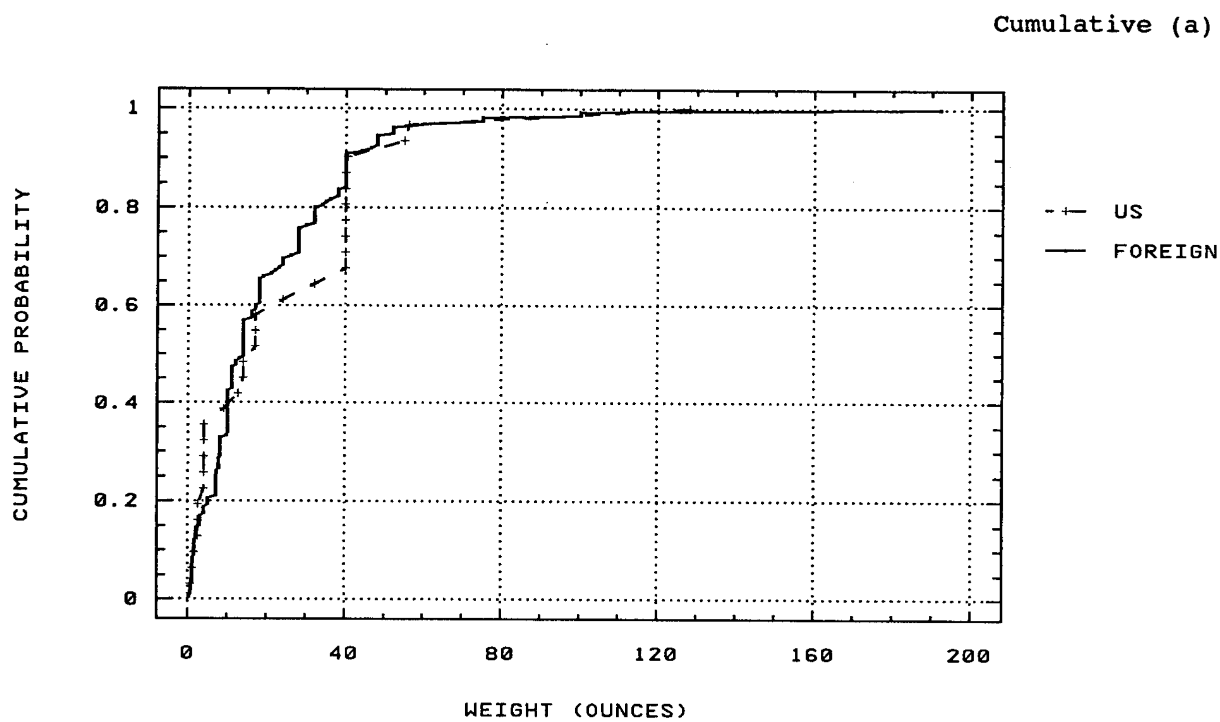
Relative frequency histograms for the same two distributions are shown in figure 4.3(b). The weight classes are the same as defined in table 4.6 except that here all weights above 59 ounces are combined into a single (4 pounds and up) class. Disparately higher percentages of domestic weights fall in the 2.5-pound class (driven by the abovementioned 6 events at JFK airport) while the opposite is true for the 0.5-pound and 2-pound weight classes.

TABLE 4.6 DEFINITION OF BIRD WEIGHT CLASSES

| WEIGHT RANGE(oz.) | WEIGHT CLASS(lbs.) | WEIGHT RANGE(oz.) | WEIGHT CLASS(lbs.) |
|---|---|---|---|
| 3 or less | Tiny | 99+ to 107 | 6.5 |
| 3+ to 11 | 0.5 | 107+ to 115 | 7 |
| 11+ to 19 | 1 | 115+ to 123 | 7.5 |
| 19+ to 27 | 1.5 | 123+ to 131 | 8 |
| 27+ to 35 | 2 | 131+ to 139 | 8.5 |
| 35+ to 43 | 2.5 | 139+ to 147 | 9 |
| 43+ to 51 | 3 | 147+ to 155 | 9.5 |
| 51+ to 59 | 3.5 | 155+ to 163 | 10 |
| 59+ to 67 | 4 | 163+ to 171 | 10.5 |
| 67+ to 75 | 4.5 | 171+ to 179 | 11 |
| 75+ to 83 | 5 | 179+ to 187 | 11.5 |
| 83+ to 91 | 5.5 | 187+ to 195 | 12 |
| 91+ to 99 | 6 | | |

TABLE 4.7 NUMBER OF BIRDS INGESTED BY BIRD WEIGHT CLASS

| NO. BIRDS | WEIGHT CLASS (LBS.) | | | | | | | | | TOTALS |
|---|---|---|---|---|---|---|---|---|---|---|
| | TINY | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4&UP | |
| 1 | 36 | 50 | 28 | 8 | 17 | 23 | 6 | 4 | 8 | 180 |
| 1 OR MORE | | 1 | | | | | | | | 1 |
| 2 | | 3 | 6 | | 1 | 1 | | 1 | | 12 |
| 2 OR MORE | 2 | 2 | 2 | | 1 | 2 | | | | 9 |
| 3 | | 3 | | | | 1 | | | | 4 |
| 4 | | 1 | 2 | | | | | | | 3 |
| 4 TO 5 | | | | | 1 | | | | | 1 |
| 5 | | | 2 | | | | | | | 2 |
| 7 | | | 1 | | | | | | | 1 |
| 6 TO 17 | | 2 | | | | | | | | 2 |
| UNK NO. | | | 2 | | | | | | | 2 |
| TOTALS | 38 | 62 | 43 | 8 | 20 | 27 | 6 | 5 | 8 | 217 |



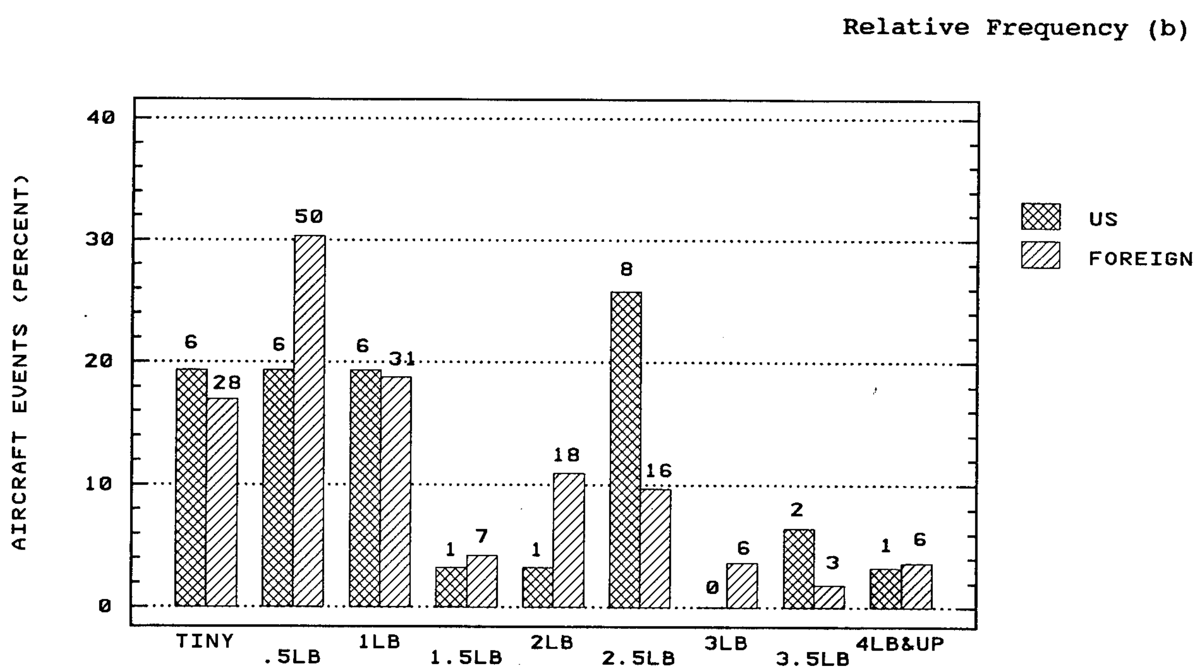




FIGURE 4.3. BIRD WEIGHT DISTRIBUTIONS - US VERSUS FOREIGN

It is of interest to make additional comparisons between bird weights from the current and previous studies. Pairwise plots from each study of the United States, foreign, and worldwide cumulative bird weight distributions are contained in figure 4.4 (a) through (c). Although similarities between corresponding distributions are evident, the Kolmogoroff-Smirnoff Two-Sample Test indicates that the domestic ($P$ = 4.73 percent) and foreign ($P$ = .0003 percent) sample distributions are statistically different.

It is again worthwhile to compare relative frequency histograms. This is done in figures 4.5(a) for domestic, 4.5(b) for foreign, and 4.5(c) for worldwide weights. The same nine weight classes of figure 4.3(b) are used here. In each case, certain similarities are notable. The United States distributions are each bimodal with roughly half the weights in the 1-pound or smaller classes and about 30 percent in the 2.5-pound class. The latter class is strongly influenced by events at JFK airport in both studies. Of the 18 domestic 2.5-pound class events in the 1981-83 study, 8 (all Herring Gulls) are known to have occurred at JFK airport while the airport was undetermined in 4 other events (2 Herring Gulls). Both figures show larger percentages of "tiny" birds for the current study. This could be due to a greater tenacity in collecting and identifying small amounts of bird matter from engines rather than an actual increase in the proportion of smaller birds being ingested. There is also a substantially lower percentage of foreign birds in the 1.5-pound class for the current study. In both studies, the modal weight class is 2.5 pounds for domestic birds and 0.5 pound each for foreign and worldwide birds.

The geographical region in which the aircraft ingestion occurred is known for 172 of the 199 events in which a bird weight was determined. Figure 4.6 plots their frequency according to region for each of the above nine weight classes. Most of the African bird weights fall into the heavier weight classes while the European weights tend to be lighter. North American and European weights are predominate in the 2.5-pound class.

As indicated in section 3, there were 31 multiple-engine and 41 multiple-bird aircraft events, including 12 that fell into both categories. Bird weights, none of which are over 60 ounces, were obtained in 35 of these 60 events. Figure 4.7 contains a frequency distribution of all bird weights up to the 4-pound weight class (so the bars are the same height as the initial portion of figure 4.2). The numbers of single-engine multiple-bird (SEMB), multiple-engine single-bird (MESB) and multiple-engine multiple-bird (MEMB) aircraft events for each weight class are shaded as indicated. The single-engine single-bird events (SESB) remain unshaded. The aforementioned multiple-species event (333) appears as an "MEMB" event in both the "tiny" and 3.5-pound classes. The 0.5-pound and 1-pound classes contain the greatest numbers (12 and 10, respectively) of these "multiple" events. The 2.5-pound class contains 5 of the 9 events in weight classes over 1-pound. The 1.5-pound class has no multiple-engine or multiple-bird events in which species was determined.

Table 4.7 contains a cross tabulation of the estimated number of birds ingested according to weight class for each of the 217 engine ingestions in which a species identification was made. Some estimate of bird numbers was given in all but two cases. The 1-pound and 0.5-pound weight classes contain most incidents where large numbers of birds were ingested. Four engines ingested multiple birds of the 2.5-pound class as did 3 engines for the 2-pound class. As noted above, all 1.5-pound engine ingestions involved only single birds.

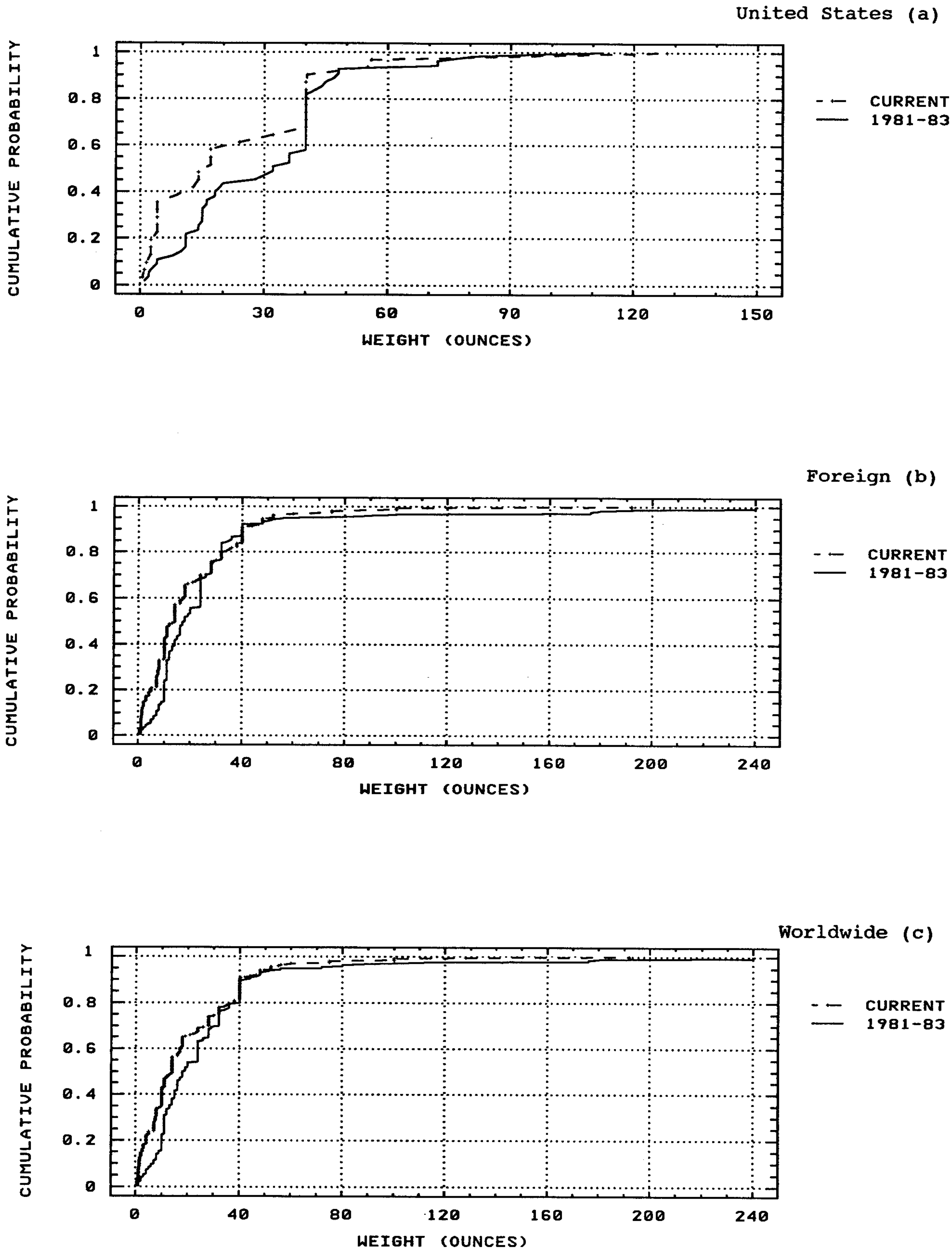
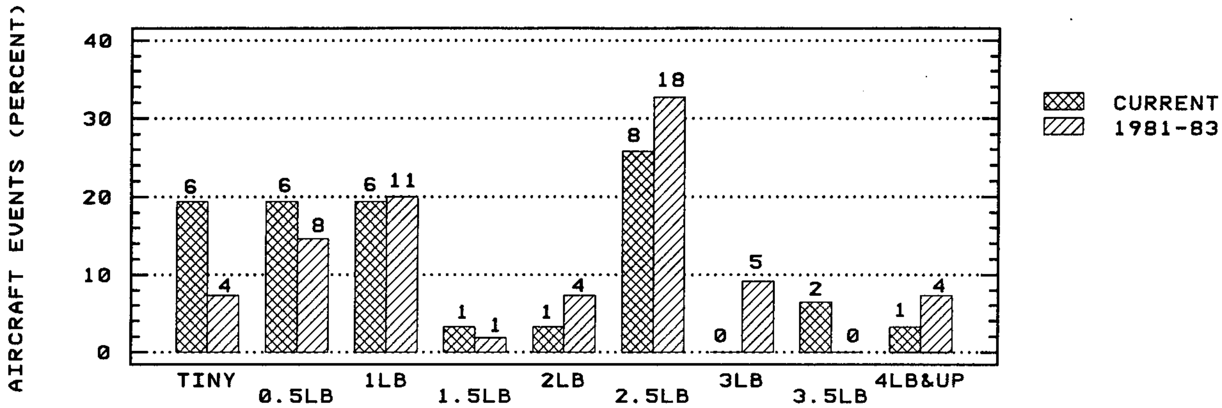
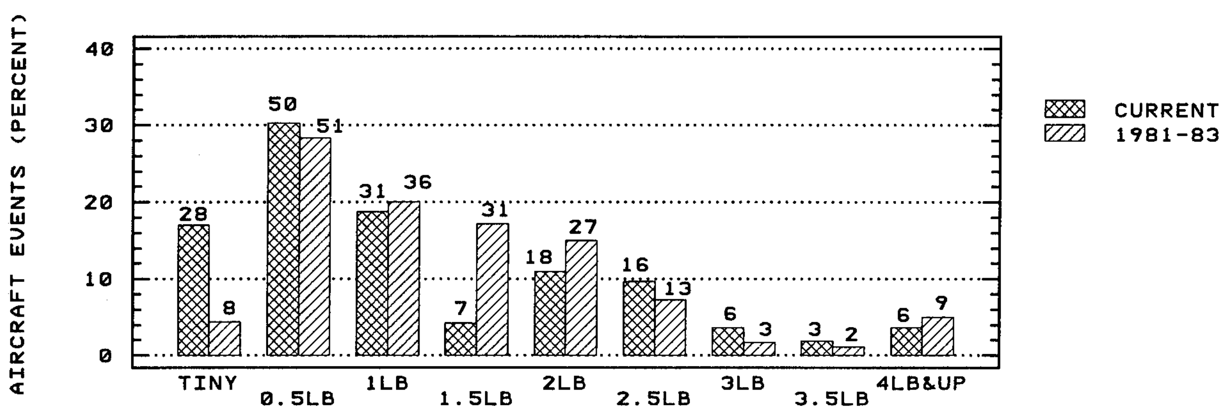



FIGURE 4.4. CUMULATIVE BIRD WEIGHT DISTRIBUTIONS - CURRENT VERSUS 1981-83 STUDY

United States (a)




Foreign (b)




Worldwide (c)

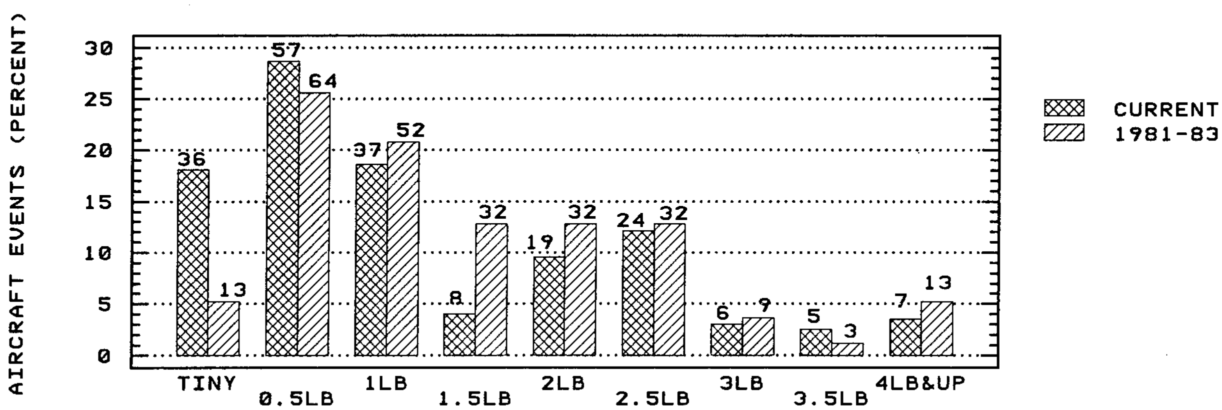



FIGURE 4.5. RELATIVE FREQUENCY BIRD WEIGHT DISTRIBUTIONS - CURRENT VERSUS 1981-83 STUDY

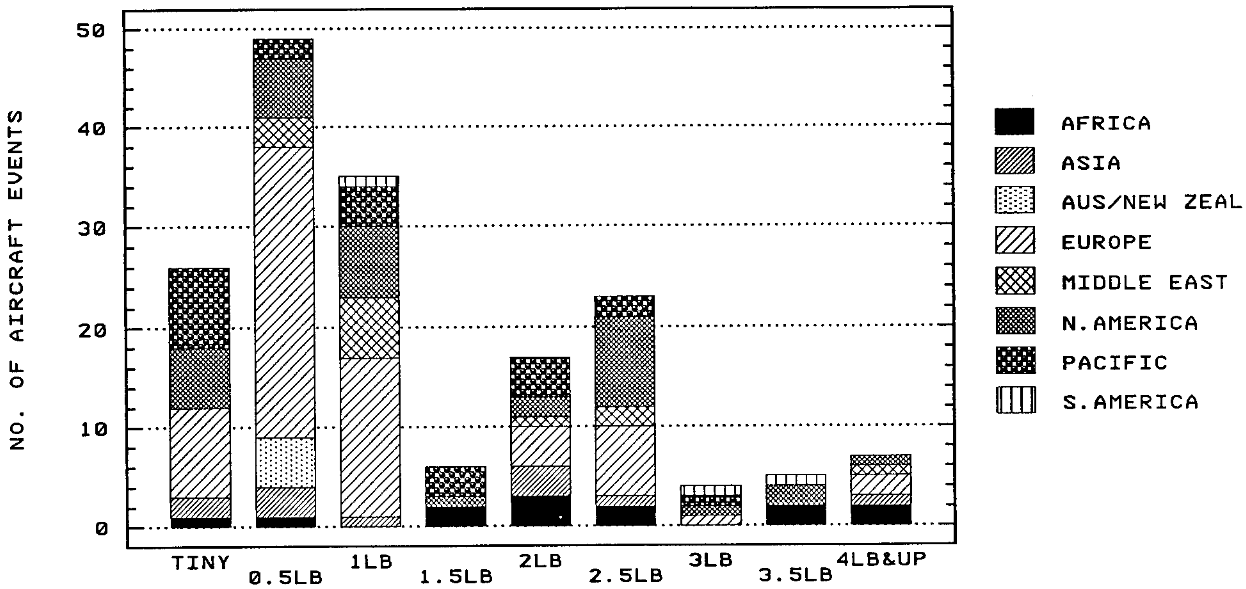



FIGURE 4.6. AIRCRAFT EVENTS BY BIRD WEIGHT CLASS AND REGION

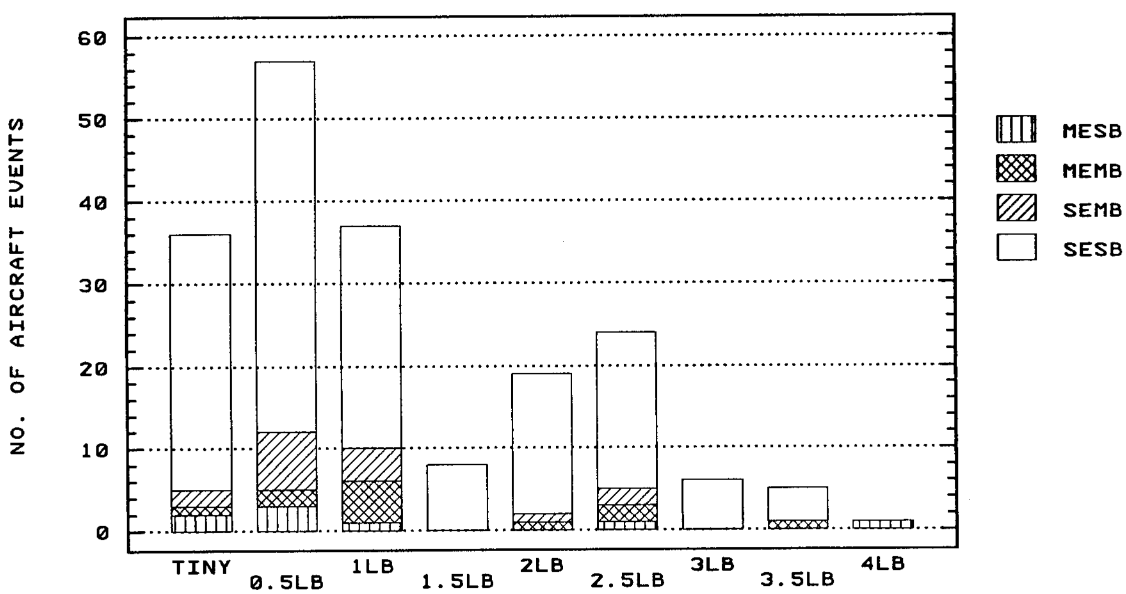



FIGURE 4.7. MULTIPLE-ENGINE AND MULTIPLE-BIRD EVENTS BY BIRD WEIGHT CLASS

It should be noted that the analyses of this section are given in terms of the various sample bird weight distributions that correspond to identified bird species. If it were assumed that each sample weight distribution is a random sample from the respective population of all ingested birds, the results could then be extrapolated to these larger populations. However, evidence from severity of damage to engines, as presented in section 5.8, indicates that this assumption is not valid.

## 5. ENGINE DAMAGE.

When a bird is ingested into an engine, the first moving part it typically contacts is the fan set. It is usually sliced into pieces by the fan blades, and the resulting matter can go out the bypass ducts or into the primary gas path (core) of the engine. Theoretically, according to the impulse-momentum principle of physics [5], the impulse (integral with respect to time) of the collision force of bird on fan set equals the product of the bird's mass with its striking velocity relative to the fan. For a particular fan set and location of impact, it is this collision force that ultimately determines the stresses, strains, and resulting damage, if any, to the fan blades. These may be nicks, bends, tears, cracks or, in worst cases, pieces of fan blade may break off. Secondary (hard object) damage that can be caused by these pieces is potentially more dangerous to both engine and aircraft than any "soft body" impact between bird matter and machinery.

Thus, all other things being equal, one could expect a direct relationship between "severity" or "extent" of engine damage and mass (weight) of ingested bird. In reality, "all other things" are never quite equal and it is likely that no two bird ingestion events are ever quite the same. There are numerous factors besides bird weight that can influence the effect of a bird ingestion on the engine: the numbers, orientation, and velocity (speed and direction) of the birds; the velocity of the aircraft; the speed and power of the engine; the location and angle of impact; and the engine design. In some cases, a bird is broken up by the inlet cowl and only a portion strikes the fan set. This occurred, for example, in event 118 in which a 12-pound vulture struck the leading edge of the inlet cowl and only a fraction of the bird, believed to be from 1/3 to 1/2, was actually ingested into the engine.

The spanwise location of impact on the fan blade is a critical factor in determining the impact speed of bird with fan, since for a given fan RPM the tangential velocity of the blade increases with distance from the root. Appendix E gives relative speeds of bird and fan set for a typical engine at seven representative phases of flight. For each flight phase, speeds are computed at the fan's root, tip, and at 30 and 70 percent span. In general, speeds at the fan's tip tend to be more than twice those at the root.

### 5.1 ENGINE DAMAGE CATEGORIES.

Some type of physical damage to the engine was reported in 316 of the 676 engine ingestions (47 percent). In 7 of these events it was determined that the engine damage was not caused by the bird ingestion. In addition, 11 of the engines which had no physical damage experienced, and recovered from, an engine surge. A surge is a potentially hazardous phenomenon that can occur when the primary gas path becomes blocked by bird matter. Surge events are discussed in detail in section 6.1.3.

Fifteen specific categories of engine damage were tracked in the FAA data base and are defined in table 5.1. The data summary in appendix F specifies all of the damage categories which occurred in each engine event. For analytical purposes, each damage category was classified as **minor** or **significant**, as indicated in table 5.1. In general, engine damage was defined to be "significant" if any significant category of damage occurred and "minor" if only

TABLE 5.1 ENGINE DAMAGE CATEGORIES - DEFINITIONS

| CATEGORY | DESCRIPTION | CLASSIFICATION |
|---|---|---|
| LEADEDGE | FAN BLADE LEADING EDGE DISTORTION | MINOR |
| BEDE<=3 | 1 TO 3 BENT/DENTED FAN BLADES | MINOR |
| TORN< =3 | 1 TO 3 TORN FAN BLADES | MINOR |
| SHINGLED | SHINGLED (TWISTED) FAN BLADE(S) | MINOR |
| ACPAFNAB | ACOUSTIC PANEL OR FAN RUB STRIP DAMAGED | MINOR |
| NACELLE | ENGINE ENCLOSURE DENTED OR PUNCTURED | MINOR |
| BEDE>3 | MORE THAN 3 FAN BLADES BENT/DENTED | SIGNIFICANT |
| TORN>3 | MORE THAN 3 FAN BLADES TORN | SIGNIFICANT |
| BROKEN | FAN BLADE LEADING EDGE OR TIP PIECES MISSING | SIGNIFICANT |
| TRVSFRAC | FAN BLADE BROKEN CHORDWISE, PIECE LIBERATED | SIGNIFICANT |
| RELEASED | BLADE RETENTION MECHANISM FAILED | SIGNIFICANT |
| FLANGE | FLANGE SEPARATIONS | SIGNIFICANT |
| CORE | COMPRESSOR BLADES/VANES DMGD. OR AIRFLOW BLOCKED | SIGNIFICANT |
| TURBINE | TURBINE DAMAGED | SIGNIFICANT |
| SPINNER | SPINNER/CAP DAMAGED | SIGNIFICANT |

minor damage categories occurred. However, in some cases (See Appendix F), engineering judgment overruled this guideline. As a consequence of these definitions, about 20 percent of engine ingestions resulted in significant damage and 26 percent in minor damage.

## 5.2 ENGINE DAMAGE BY BIRD MULTIPLICITY.

It is natural to ask whether multiple-bird ingestions caused "greater damage" than single-bird ingestions. Damage categories, as defined above, were assigned in 47 multiple-bird and 589 single-bird engine ingestions. Figure 5.1 is a relative frequency histogram showing the proportions of significant, minor, and no damage for both single- and multiple-bird events. It is evident that the percentage of damage is somewhat higher for multiple-bird ingestions than single-bird ingestions (59.6 percent versus 46.5 percent) and the proportion of significant damage is much greater in multiple-bird ingestions (42.6 percent versus 18.5 percent).

Figure 5.1 also contains the number of ingestions in each damage category for both single- and multiple-bird events. The 3 x 2 contingency table comprised of these numbers has chi-square = 17.9 with df = 2, yielding a *P-value* of 0.01 percent. Hence there is a significant statistical relationship among the factors. (See appendix B for a discussion of the chi-square test.)

As figure 5.1 indicates, 42.6 percent of multiple-bird ingestions caused significant damage while only 18.5 percent of single-bird ingestions did likewise. This suggests combining the counts for "no damage" and "minor damage" in figure 5.1. The resultant 2 x 2 contingency table whose rows represent (1) "significant damage" and (2) "minor or no damage" (and whose columns, again, represent single/multiple bird) has chi-square = 16.1 with df = 1, giving a *P*-value of 0.006 percent (with Yates correction.) Hence the effect of bird multiplicity on significant engine damage is statistically significant. This result formalizes what was evident graphically in figure 5.1. Intuition dictates that two of the defining categories for significant damage, bede>3 and torn>3, would be more prone to occur in multiple- than in single-bird ingestions. It is therefore surprising that these were determining factors for significant engine damage in only 4 out of the 20 multiple-bird ingestions with significant damage.

When, on the other hand, the analogous 2 x 2 contingency table derived from figure 5.1 whose rows represent (1) "damage (of any sort)" and (2) "no damage" is considered, then chi-square = 2.9 with df = 1, yielding $P$ = 8.6 percent. Hence the effect of bird multiplicity on any engine damage is not conclusive.

Engines having only damage unrelated to the bird ingestion or those that surged and recovered but had no physical damage were excluded from the above analysis. Engines sustaining only bird damage described as "within limits" or "serviceable" were assigned to the "minor damage" category. It should be noted that the weight and quantity (if greater than two) of birds were not taken into consideration in these analyses.

## 5.3 ENGINE DAMAGE BY PHASE OF FLIGHT.

Among the factors previously mentioned which could affect engine damage are engine speed/power and aircraft velocity. Although provision was made in the data base for recording the engine power setting at time of ingestion, this

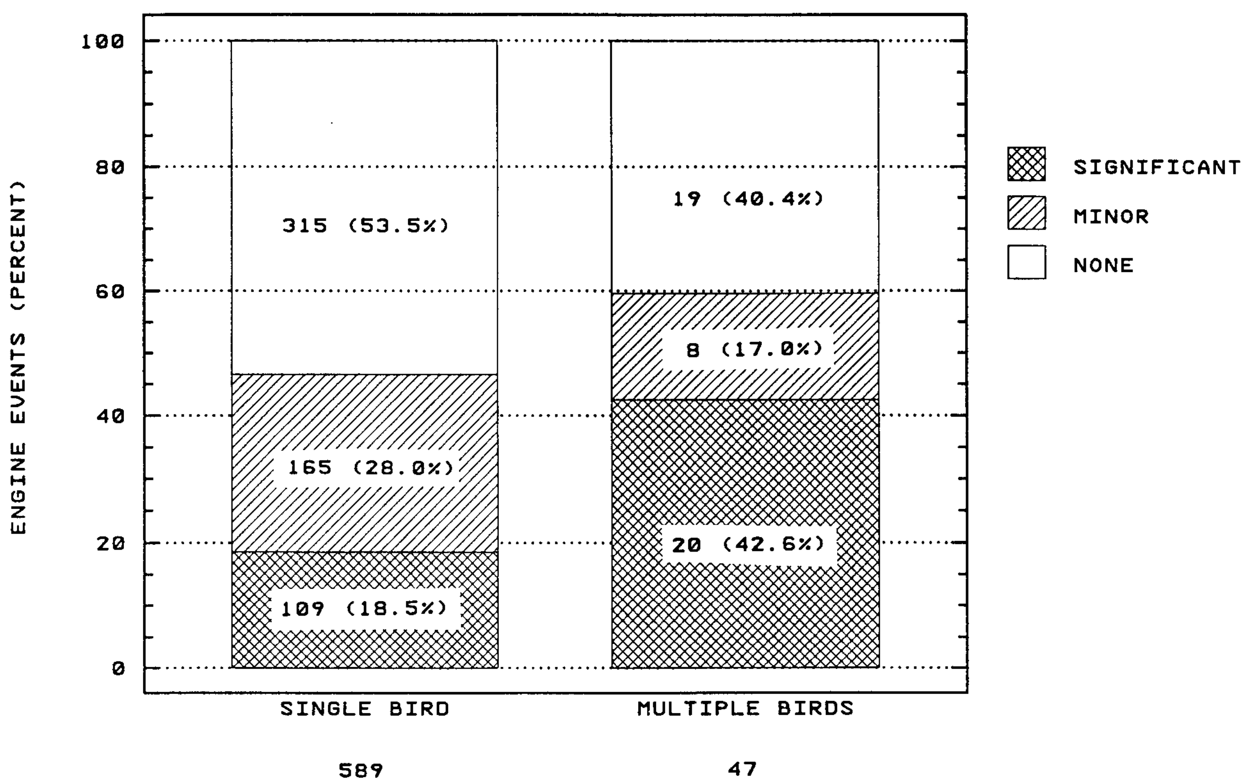



FIGURE 5.1. RELATIVE FREQUENCY OF ENGINE DAMAGE BY SINGLE/MULTIPLE BIRD

information was actually reported in only 13 of the aircraft events, while a numerical aircraft speed was reported only 126 times [Section 3.4.] However, as appendix E illustrates, there is a relationship between each of these factors and the phase of flight of the aircraft. For example, fan RPM is usually over 90 percent of maximum during the takeoff and climb phases, is roughly 65 percent during final approach, and falls below 40 percent during descent and landing. Since, as noted in section 3, some indication of flight phase was reported in nearly 60 percent of the aircraft events, it is natural to examine the relationship between phase of flight and engine damage.

The frequency of significant damage, minor damage, and no damage for each reported category of phase of flight is illustrated in figure 5.2(a) for the 408 engine events in which this information is known. The "takeoff roll," "takeoff" "climb," "approach," "landing," and "landing roll" categories each contain 10 or more damaging events. However, over half of the engine ingestions in each of the latter three categories were nondamaging. This suggests looking at the relative frequencies of damage in each phase of flight category, as shown in figure 5.2(b). The four "takeoff or climb" categories and "thrust reverse" have high percentages of significant or minor damage. However, as figure 5.2(a) indicates, the latter phase contains only eight events. These facts, along with the above remarks concerning fan speed in various phases of flight, suggest grouping phases of flight according to "departure" and "arrival" for analysis of engine damage.

The relative frequency histogram in figure 5.3 indicates the percentages of significant, minor, and no engine damage in each of the two aforementioned phase of flight categories. "Departure" includes all takeoff or climb phases while "arrival" contains the descent, approach, and landing phases. (The 14 "cruise," "reverse," or "taxi" events have been excluded.) It is evident that the proportions of significant and minor damage are much higher for "departure" than "arrival" ingestions.

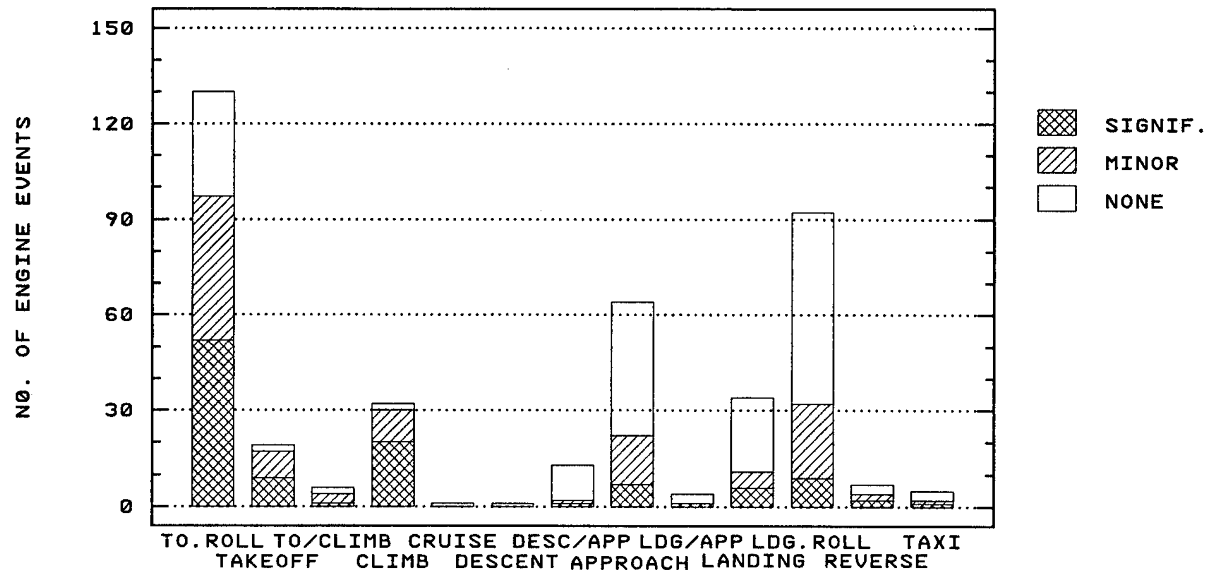
Figure 5.3 also contains the frequency of ingestions in each damage category for both departure and arrival events. The 3 x 2 contingency table consisting of these numbers has chi-square = 90.9 with df = 2, giving a $P$-value of 0 percent. Hence it is a statistical certainty that the factors in figure 5.3 are dependent. Note that about 44 percent of the departure ingestions were significantly damaging while only 21 percent were nondamaging. In contrast, the corresponding proportions for arrivals are 11 percent and 67 percent, respectively.

When the counts for "significant" and "minor" damage from figure 5.3 are combined, the resultant 2 x 2 contingency table whose rows represent (1) "damage (of any sort)" and (2) "no damage", (and whose columns represent departure/arrival) has chi-square = 82.7 with df = 1, giving a $P$-value of 0 percent. On the other hand, the analogous 2 x 2 contingency table derived from figure 5.3 whose rows represent (1) "significant damage" and (2) "minor or no damage" has chi-square = 50.1 with df = 1, which gives a $P$-value of 0 (to 11 decimal places). Therefore phase of flight has a statistically significant effect on both any engine damage and significant engine damage.

## 5.4 ENGINE DAMAGE BY BIRD WEIGHT.

The relationship between engine damage and weight of ingested birds is examined next. Figure 5.4(a) is a frequency histogram depicting engine damage category according to bird weight class for the 196 engine ingestions in which a species

Frequency (a)




Relative Frequency (b)

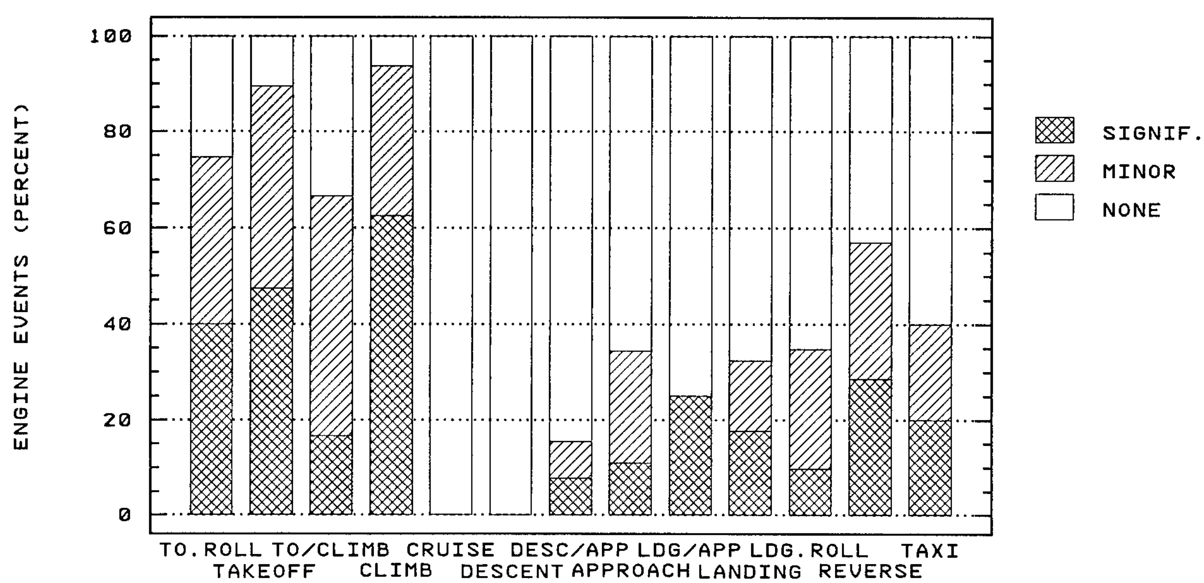



FIGURE 5.2. ENGINE DAMAGE BY PHASE OF FLIGHT

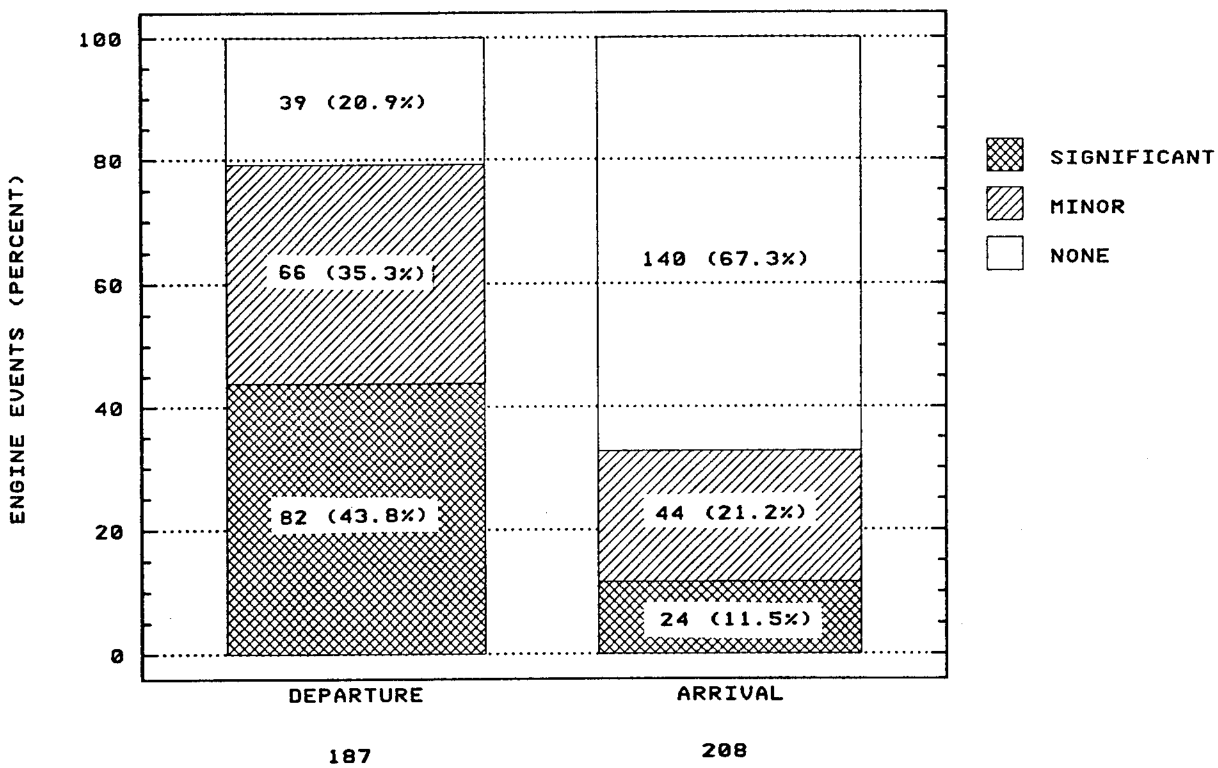
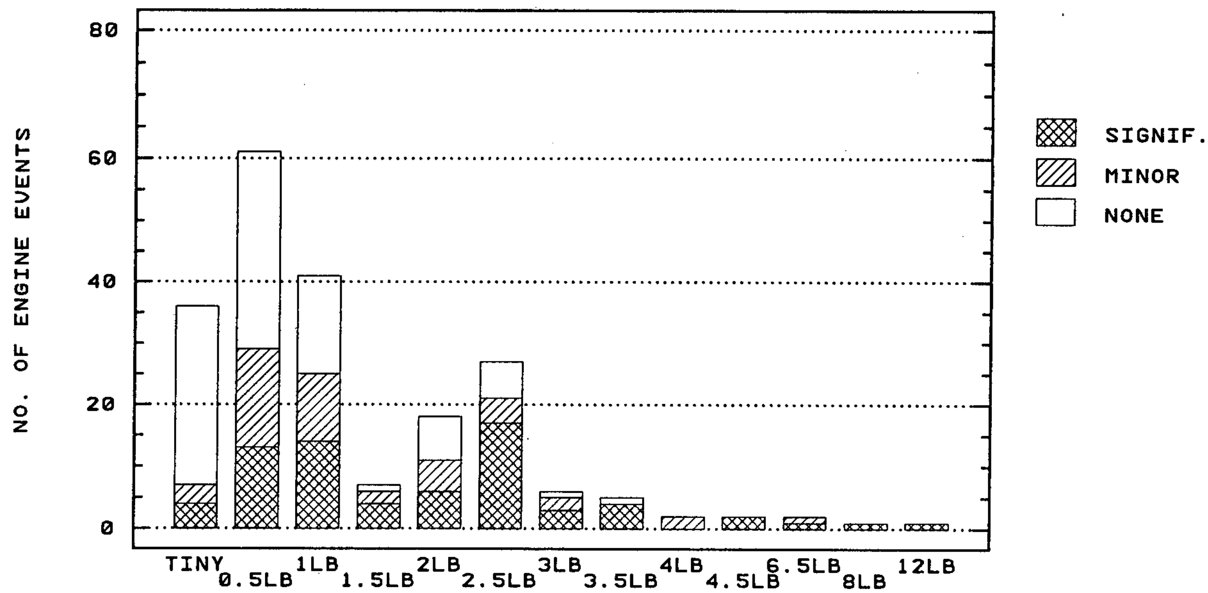



FIGURE 5.3. RELATIVE FREQUENCY OF ENGINE DAMAGE BY DEPARTURE/ARRIVAL

Frequency (a)




Relative Frequency (b)

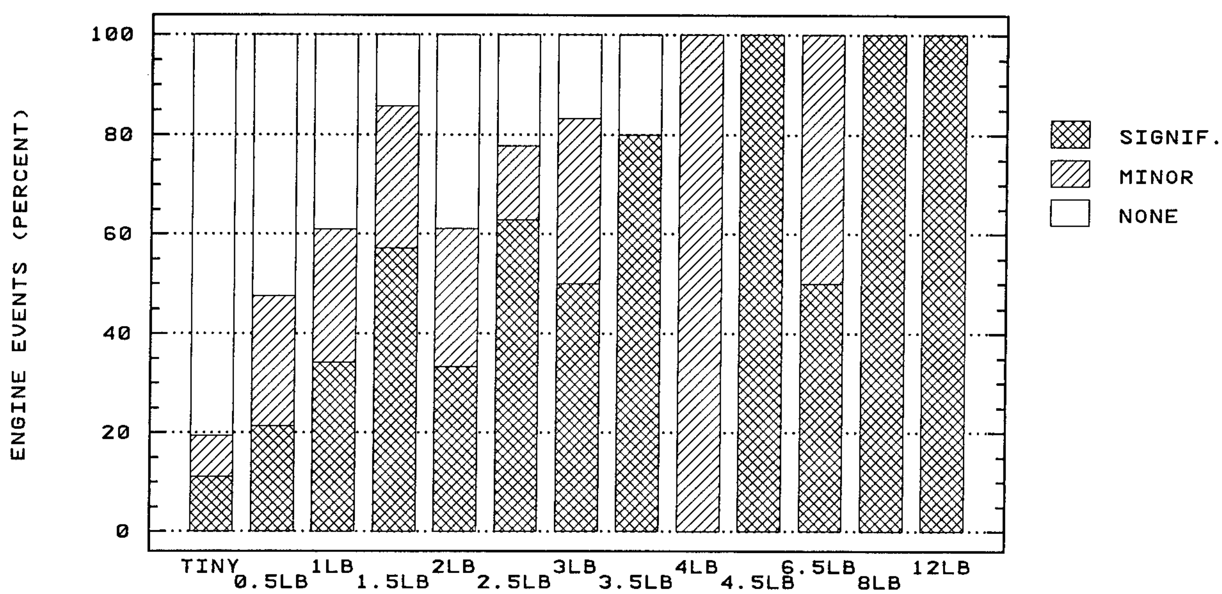



FIGURE 5.4. ENGINE DAMAGE BY BIRD WEIGHT CLASS

identification was made and a damage category assigned. The weight classes are the same as in section 4, as defined in table 4.5. The frequency of engine ingestions that resulted in no damage, minor damage, and significant damage is shown for each weight class. The corresponding relative frequencies are illustrated in figure 5.4(b). The 2.5-pound weight class had the greatest number of events with significant damage. All but 2 ingestions in the 3-pound class or greater were damaging, for the most part significantly. The 0.5-pound class contains the largest number of damaging ingestions but more than half in this class were nondamaging, as were more than 80 percent of all "tiny" bird ingestions. It is evident from figure 5.4(b) that, with few exceptions, the overall trend is for the relative frequency of both damaging and significantly damaging ingestions to increase with bird weight.

In [2], a logistic model is used for the probability of various "severities" of damage as a function of bird weight. Specifically, the logarithm of the odds ratio, log (probability/(1-probability)), is modeled as a linear function of bird weight. A rationale for choosing this particular model is also presented there. The same computer program used in [2], which also generates a mean probability and lower 95 percent confidence bound, was applied to the data in this report. The resultant probability of damage (respectively significant damage) curves are given in figure 5.5(a) (respectively figure 5.5(b)). The mean probability of damage reaches 50 percent at about 9 ounces and the mean probability of significant damage curve does likewise at 29 ounces. No factors other than bird weight were used to generate the curves in figures 5.5(a) and 5.5(b). In particular, the phase of flight and the number of birds ingested were not considered. These are addressed in the subsequent sections.

## 5.5 ENGINE DAMAGE BY BIRD WEIGHT AND PHASE OF FLIGHT.

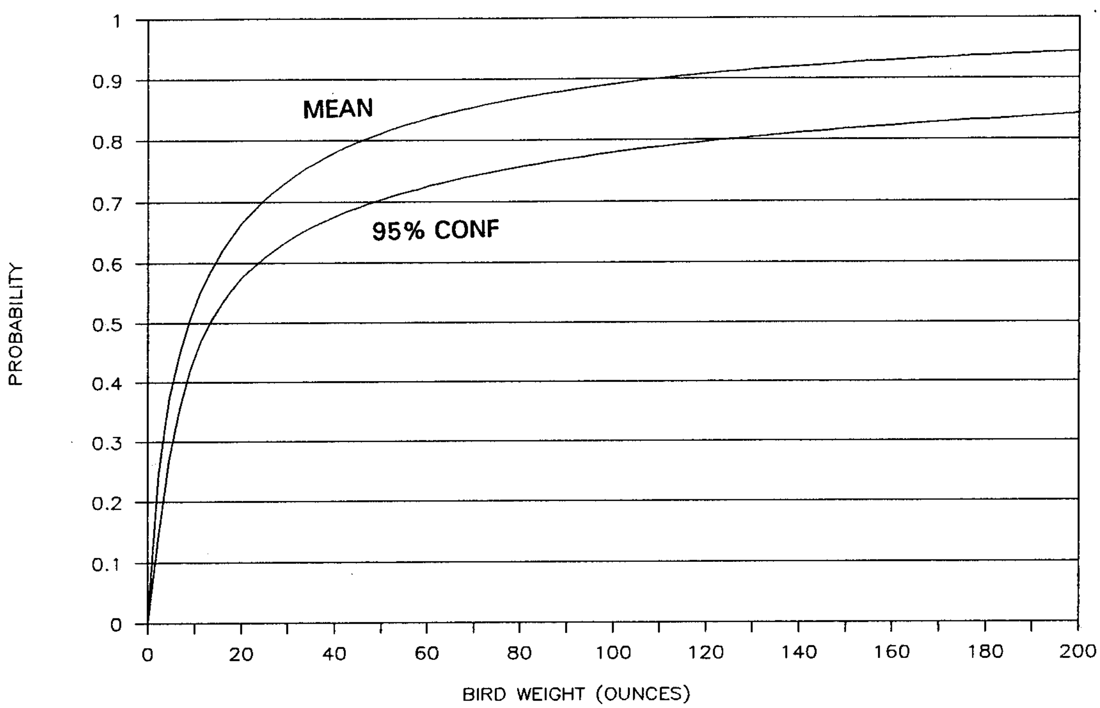
It was shown in the previous two sections how bird weight and phase of flight, each taken separately, influence engine damage. In this section the data are examined to shed light on the concurrent effects of bird weight and flight phase on engine damage.

A species identification was made and a damage category assigned for 87 engine events that occurred during some departure phase of flight. Figure 5.6(a) is a frequency histogram of engine damage category by bird weight class for these events, while figure 5.6(b) shows the corresponding relative frequencies. In these figures, the four weights above 59 ounces are assigned a single "4 pounds and up" weight class. Only 9 events, primarily in the 0.5-pound and 1-pound weight classes were nondamaging. Over 40 percent of the ingestions in the 0.5-pound class were significantly damaging as were at least half in every other weight class.

Figures 5.7(a) and 5.7(b) are histograms showing engine damage category by bird weight class for ingestions that occurred during an arrival phase of flight. As usual, the first figure gives frequency counts and the latter percentages for each weight class. Data is extant for 74 engine ingestions, 49 of which were nondamaging and only 9 significantly damaging. Figure 5.7(b) indicates a fairly reasonable correlation of both damage and significant damage with bird weight. The 100 percent damage rate for the 1.5-pound weight class is based on only one ingestion.

As the figures of this section indicate, bird weight alone is not a sufficient

Any Damage (a)




Significant Damage (b)

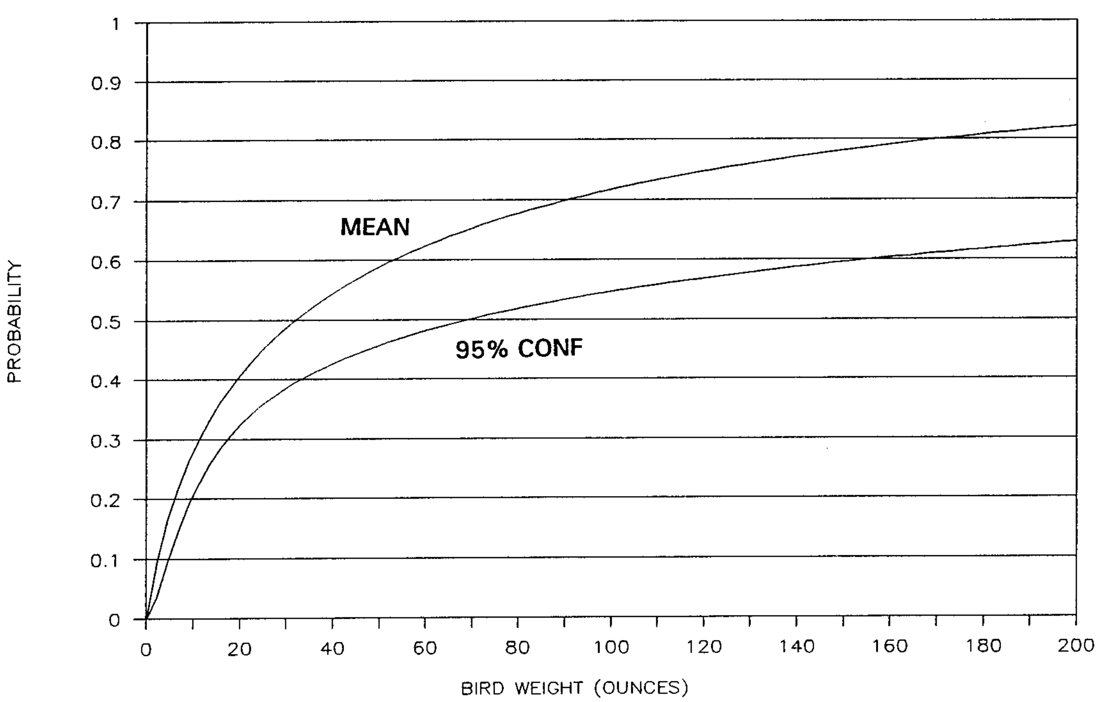
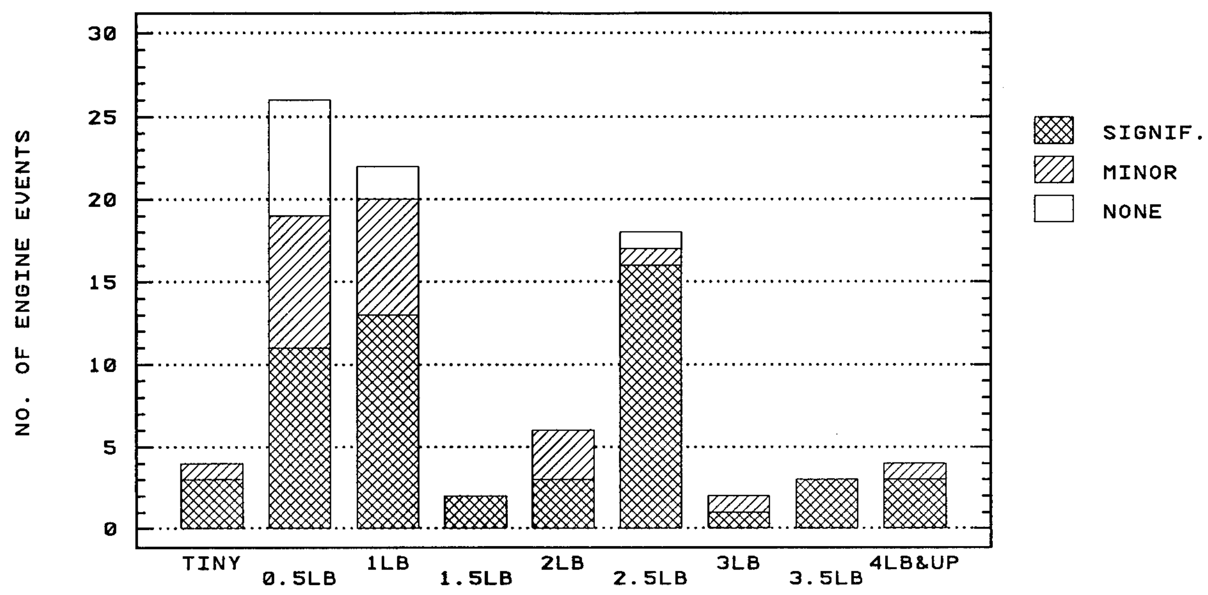



FIGURE 5.5. PROBABILITY OF ENGINE DAMAGE BY BIRD WEIGHT – LINEAR LOGISTIC MODEL

Frequency (a)




Relative Frequency (b)

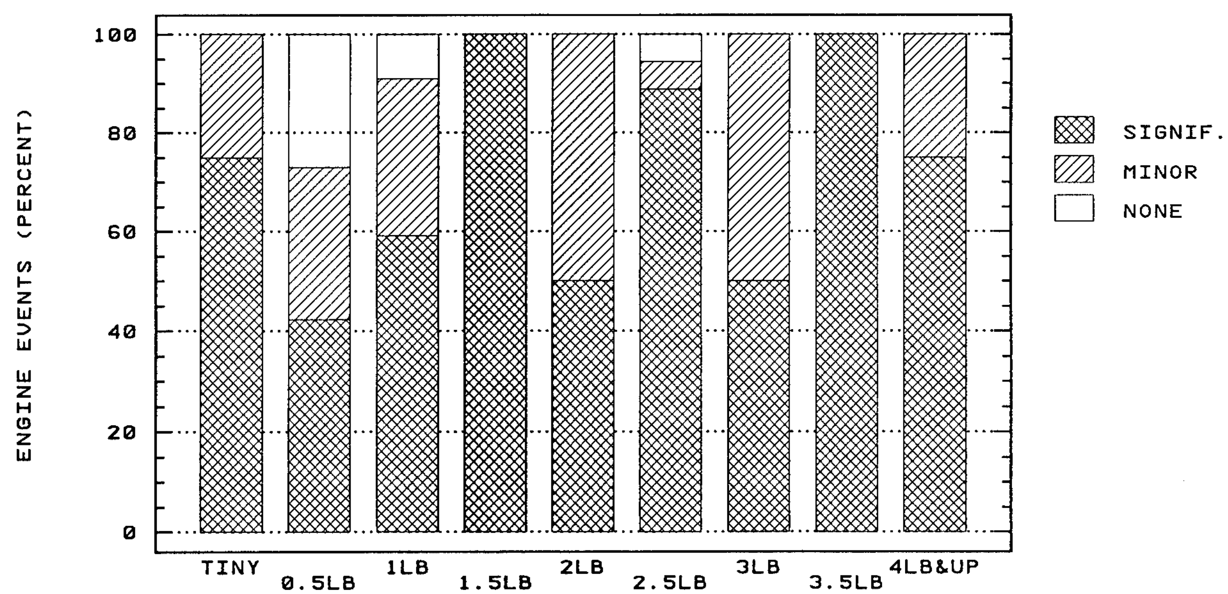
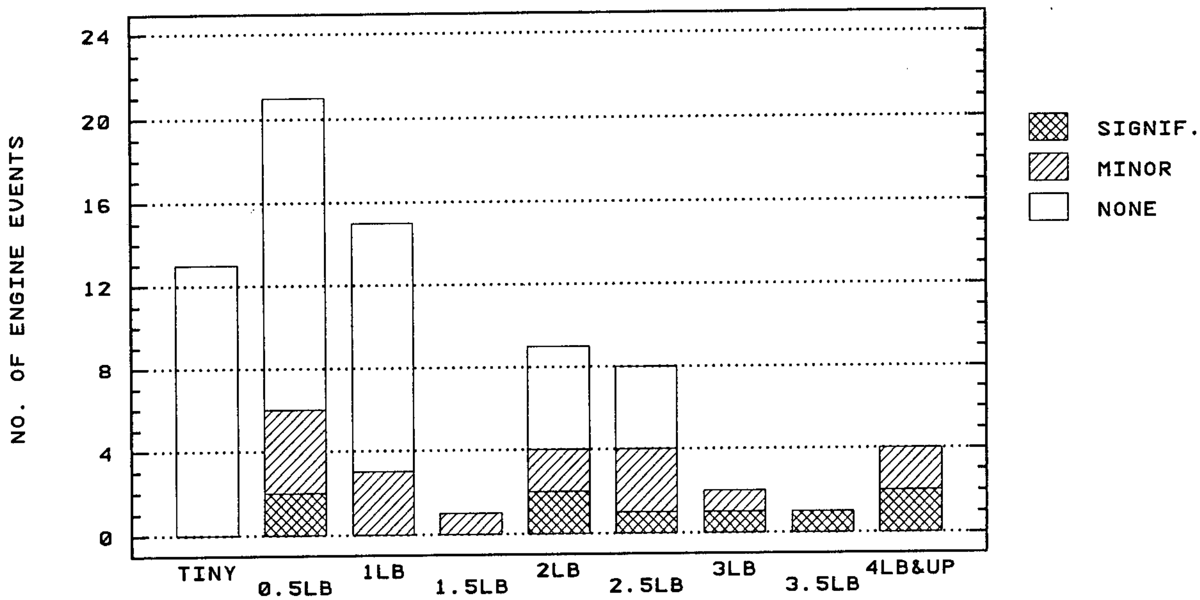



FIGURE 5.6. ENGINE DAMAGE BY BIRD WEIGHT CLASS - DEPARTURES

Frequency (a)




Relative Frequency (b)

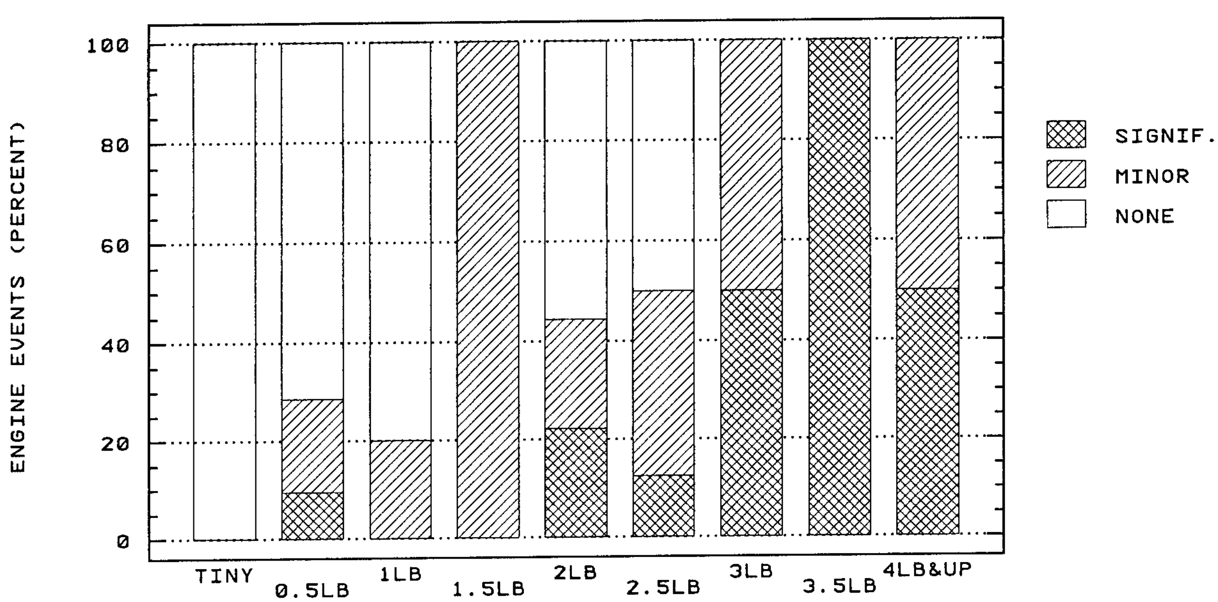



FIGURE 5.7. ENGINE DAMAGE BY BIRD WEIGHT CLASS - ARRIVALS

indicator of engine damage. The phase of flight should also be considered in any such analysis.

## 5.6 ENGINE DAMAGE BY BIRD WEIGHT, PHASE OF FLIGHT, AND BIRD MULTIPLICITY.

The previous sections indicated that phase of flight, bird weight, and, to some extent, bird multiplicity influence engine damage. In this section optimal logistic regression models (appendix B) are fitted for the probability of both engine damage and significant engine damage as functions of these predictor variables (bird weight, phase of flight, and bird multiplicity.) The effects of all three predictor variables are considered simultaneously. The 164 engine events for which data are complete for all the variables are used in the modeling. The software utilized to fit the models is version 3.1 of "S-PLUS".

It was shown in section 5.2 that bird multiplicity alone is not a statistically significant factor in causing engine damage. It is therefore not surprising that flight phase and bird weight were statistically significant predictors in the logistic regression model for any engine damage but bird multiplicity was not. Figure 5.8 summarizes graphically the results for this model. The figure contains plots of the mean curves for the probability of engine damage by bird weight for departures and arrivals, as well as lower 95 percent and 99 percent confidence curves for each case. The probability of damage during departure is over 65 percent for even the smallest birds and reaches 90 percent at about 20 ounces. In contrast, the mean curve for probability of damage during arrival attains only 50 percent at about 2 pounds and 90 percent at four pounds.

All three predictors were statistically significant in the model for significant engine damage. The mean curves for the probability of significant engine damage by bird weight for each of the four combinations of flight phase and bird multiplicity are given in figure 5.9, while the 95 percent and 99 percent lower confidence curves are plotted separately with each mean curve in figure 5.10. The probability of significant damage is over 60 percent for multiple-bird ingestions during departure involving even the smallest birds and climbs to 90 percent for two-pound birds. The mean curve for single-bird ingestions on departure reaches 50 percent at about one pound and 90 percent at four pounds. The corresponding curves for arrival ingestions reach 50 percent at about three pounds (multiple birds) and six pounds (single birds). As figure 5.10 indicates, confidence in the modeling results is weaker in the arrival cases than for departures.

## 5.7 ENGINE DAMAGE BY DOMESTIC/FOREIGN.

As noted in section 3.2, the foreign ingestion rate is more than 3.5 times the domestic rate. It is conceivable that some of this disparity is due to under-reporting of bird ingestions by domestic operators vis-a-vis their foreign counterparts. Figure 5.11 compares the frequencies of significant, minor, and no engine damage for domestic and foreign engine ingestions. The percentage of significant damage in United States events is over twice that for foreign. A *P*-value of 0.02 percent for the corresponding 2 x 2 contingency table indicates that this greater propensity for significant damage in domestic events is not due to chance. The proportion of engines sustaining damage (of any sort) is also greater in domestic (67.2 percent) than in foreign (45.3 percent) events. The associated 2 x 2 contingency table which compares frequencies of engine damage

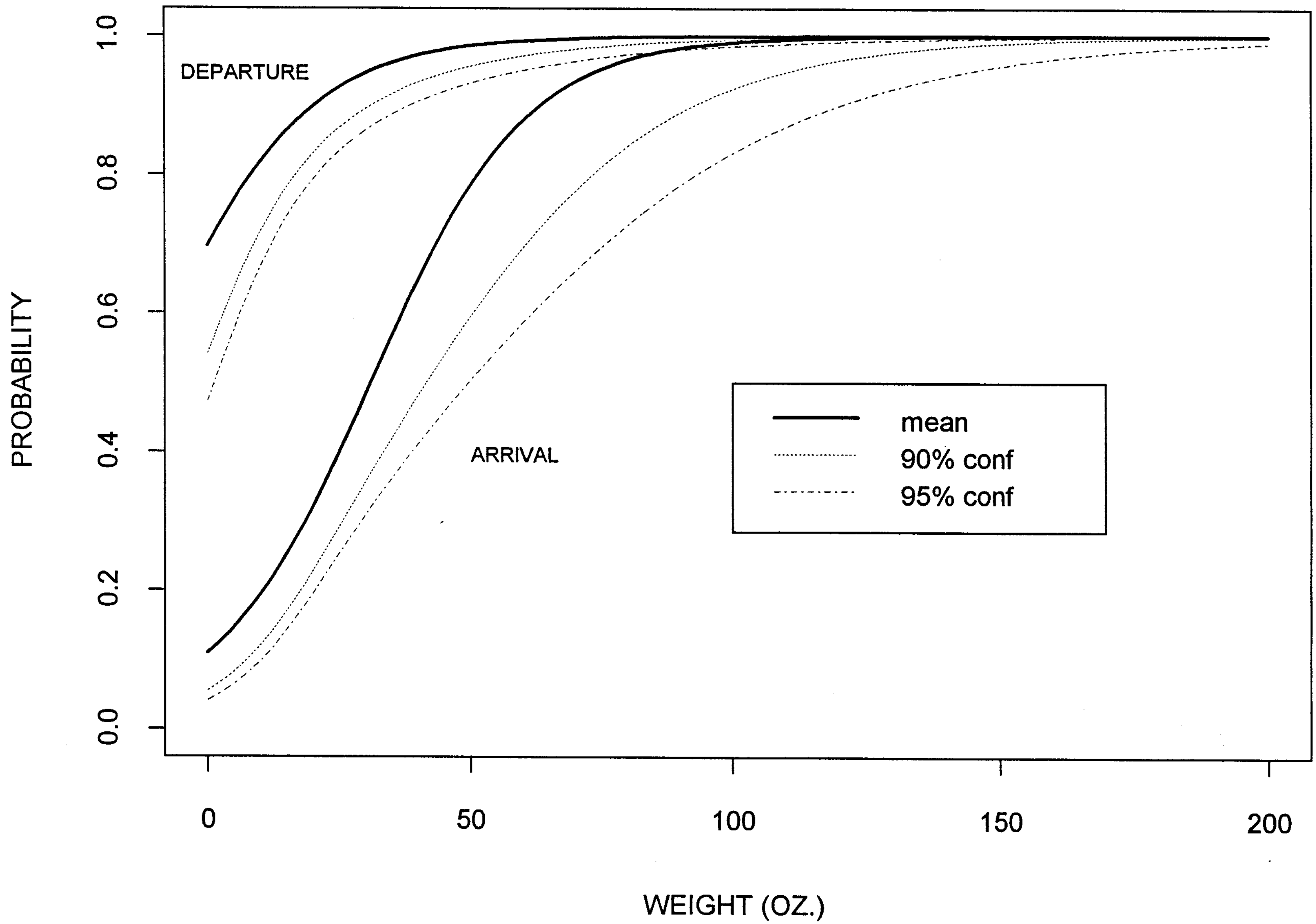



FIGURE 5.8. PROBABILITY OF ENGINE DAMAGE - LOGISTIC REGRESSION MODEL

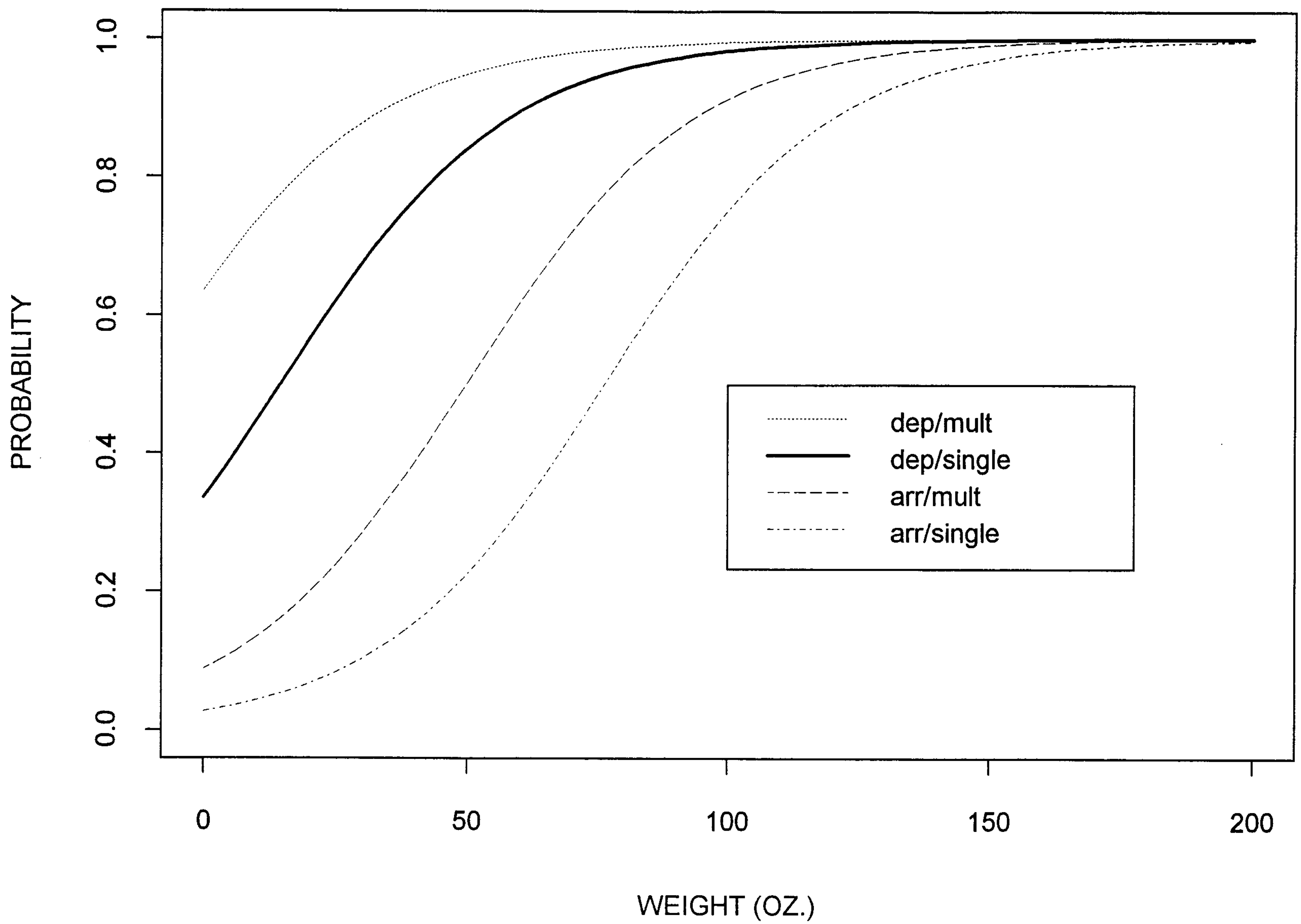



FIGURE 5.9. PROBABILITY OF SIGNIFICANT ENGINE DAMAGE - LOGISTIC REGRESSION MODEL MEAN CURVES

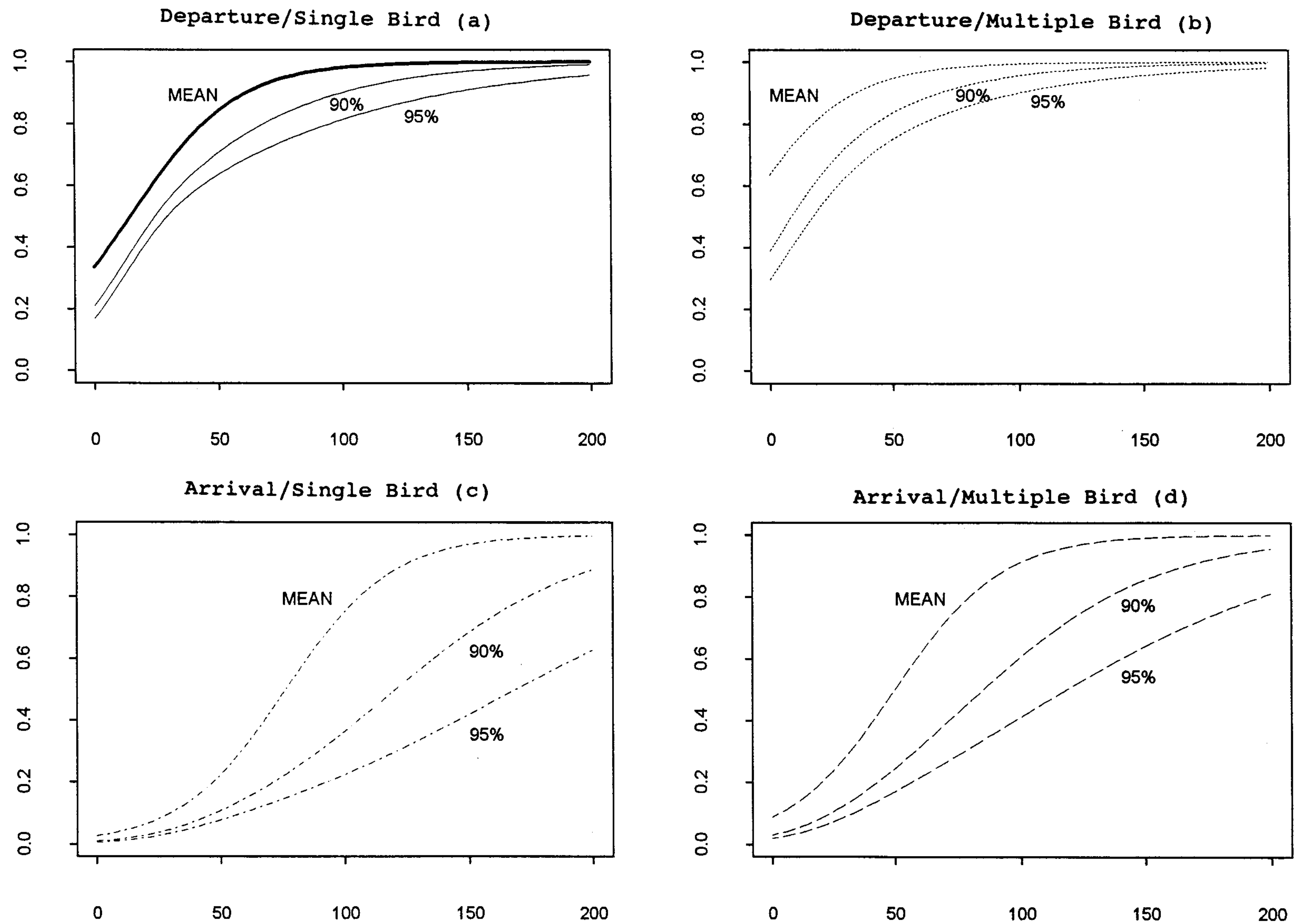



FIGURE 5.10. PROBABILITY OF SIGNIFICANT ENGINE DAMAGE - LOGISTIC REGRESSION MODEL - LOWER CONFIDENCE CURVES

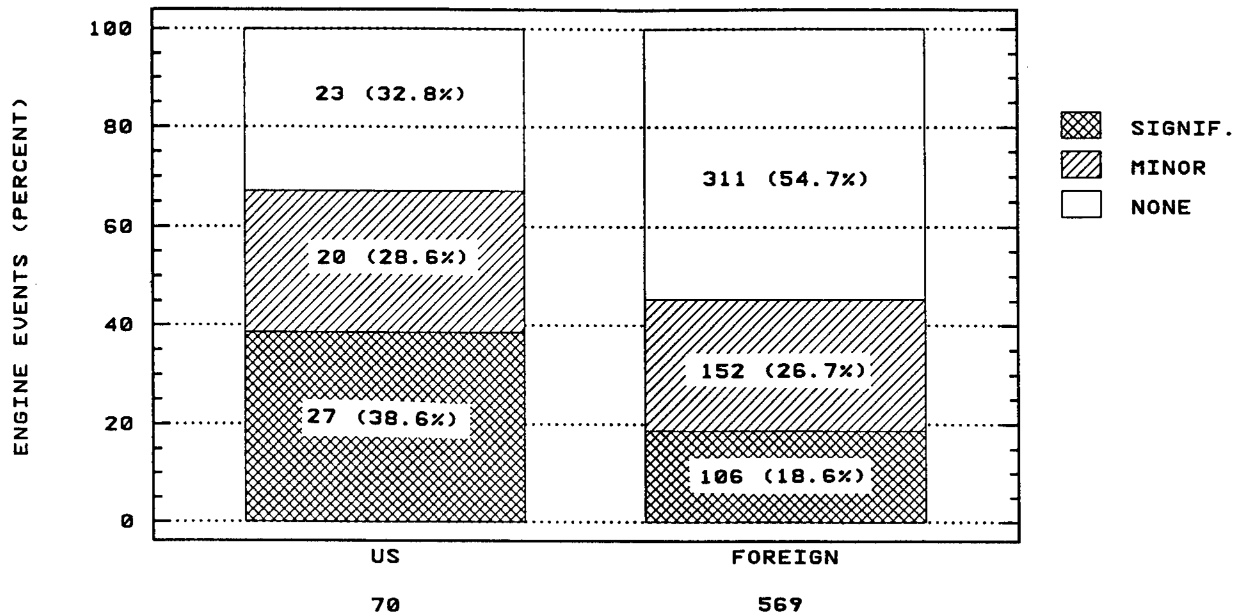



FIGURE 5.11. RELATIVE FREQUENCY OF ENGINE DAMAGE BY US/FOREIGN

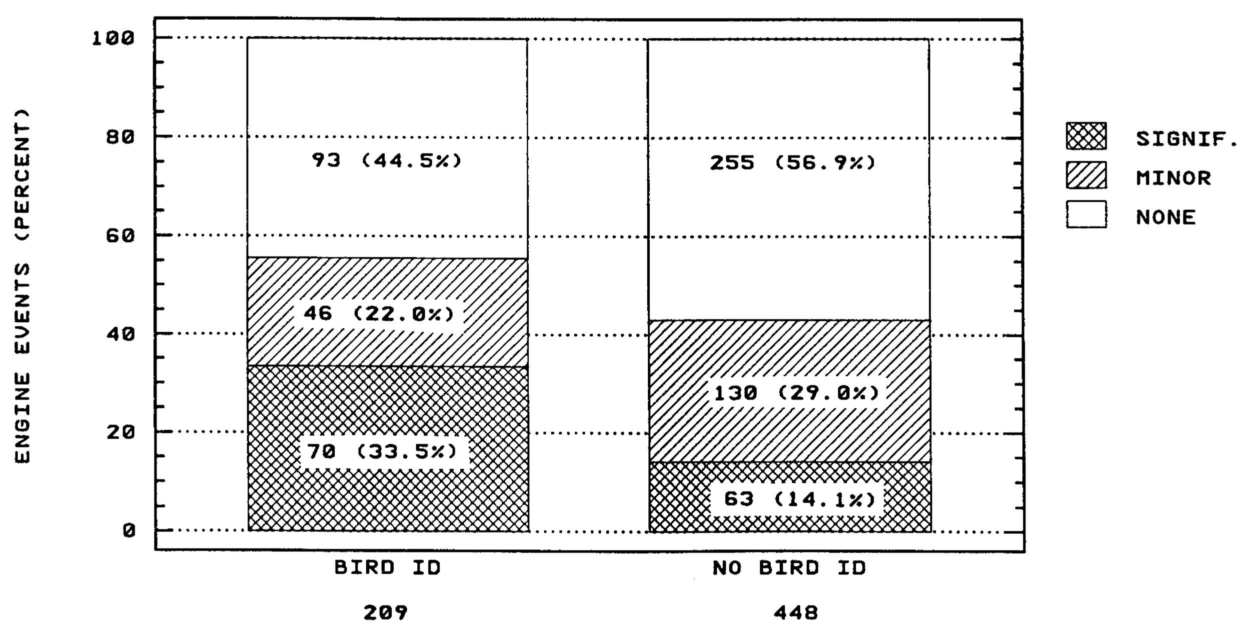



FIGURE 5.12. RELATIVE FREQUENCY OF ENGINE DAMAGE BY BIRD SPECIES IDENTIFICATION

versus no damage for domestic and foreign events has a *P*-value of 0.09 percent. Since it is likely that unreported events would tend to have less severe damage or be nondamaging, one explanation for these results is that a greater percentage of domestic events were indeed unreported compared to foreign.

In order to estimate the extent that domestic events were underreported, it was assumed that the number of US engine events with significant damage (27) is correct and that the proportions of significant, minor, and no damage are the same for domestic as for foreign events (18.6, 26.7 and 54.7 percent, respectively.) It follows that there should have been 79.2 nondamaging and 38.7 minor damaging domestic events giving a projected total of 144.9 US engine events, as against 70 observed.

To take into account the sampling variability of these counts, confidence intervals with 95 percent confidence level were computed based on the assumption that each count is Poisson distributed [2]. The corrected numbers for the US [see Appendix B] are 79.2 non-damaging events with a confidence interval of 44.6 to 133.8 (23 reported), 38.7 minor damage events with the interval 21.2 to 56.2 (20 reported) and an interval for significant damage of 16.8 to 37.2 (27 reported.) The corrected US total is 144.9 events with an interval of 84.8 to 205 (70 reported.) Thus it is unlikely that domestic engine events were underreported relative to foreign by less than 20 percent (84.8/70). The best estimate is that underreporting is over 100 percent (144.9/70) but may be 200 percent (205/70) or higher.

## 5.8 ENGINE DAMAGE BY BIRD SPECIES IDENTIFICATION.

As noted in section 4.3, the results therein are valid only for the various sample bird weight distributions that correspond to identified bird species. If the sample of events having bird species (and hence verified bird weights) were a random sample from all ingestion events, there would be no reason to expect statistically significant differences between the severities of damage in engines for which bird species were determined versus those for which no bird identification was made.

Figure 5.12 compares the relative frequencies of significant, minor, and no engine damage for engine events having species identification with engine events where no bird identification was made. The proportion of significant damage is 33.5 percent in the former case and only 14.1 percent in the latter. The chi-square test statistic is 32.1 on 1 df, giving a *P*-value of 1.44 x 10^-8. This is a strong indication that the greater proportion of significant damage in engines where species were determined is not due to chance. For engines having bird identifications, 55.5 percent had some engine damage, versus 43.1 percent in engines without species identification. The corresponding chi-square test statistic is 8.36 on 1 df, giving a *P*-value of 0.0039 and indicating that the greater proportion of damage in engines having species identification is statistically significant. The evidence thus suggests that severity of engine damage was a factor in determining whether feathers were recovered and species identified and that the resultant sample of verified bird weights is not a random sample from the population of all ingested bird weights.

## 6. ENGINE DAMAGE REVISITED - CORE VERSUS FAN DAMAGE.

As previously noted, an ingested bird typically collides with some portion of the engine's fan set where it is sliced into pieces. The resultant bird matter can go out the bypass or into the main gas path (core) of the engine. In the previous section each incident of engine damage was classified as "minor" or "significant" for purposes of analysis. This classification, and the results emanating therefrom, did not differentiate between damage to the fan blades or the core, or to other ancillary types of engine damage (struts, casing, outlet guide vanes, acoustic liners, etc.). In order to gain further insight into the effects of bird ingestion on an engine, damage to the fan blades and the core are considered separately in this section. The various types of core damage and the circumstances in which they occur are treated first. In the latter part of this section, fan blade damage is examined from a fresh perspective in order to more directly characterize the effects of bird ingestion.

### 6.1 CORE DAMAGE.

Core ingestions are sometimes indicated by cockpit symptoms (smell of burning flesh, a loud bang) and are usually confirmed by boroscope inspection. The bypass ratios for engines in this study range from 4.1 to 6.0 (table 2.1). This suggests that roughly 20 percent of single-bird ingestions would involve the core. When more than one bird is ingested into an engine the probability of a core ingestion increases dramatically. One hundred eighty-three of the 676 engine ingestions (27 percent) resulted in some bird matter in the core. The corresponding proportion was 64 percent for multiple-bird engine events.

#### 6.1.1 Core Damage Categories.

Bird matter which has been sliced by the fan enters the primary gas path at the low-pressure compressor. There it is transformed into a fluid and the resultant mass typically travels through the successive compressor stages to the combustor section. Bird debris can block the primary gas path flow and a "surge" occurs. Symptoms of an engine surge can be a loud bang, flames from the tailpipe, and a momentary reduction in power. The blockage is usually expelled and normal engine power is regained, but in some cases the engine can fail to recover power ("nonrecoverable surge".) A surge need not be accompanied by any physical engine damage. Indeed, 13 such events were reported, all of which were excluded from the engine damage analysis in section 5.

Sixty-one engine ingestions resulted in some physical core damage, in all cases to compressors. There were an additional 26 events in which an engine surged but no core damage occurred. Six mutually exclusive categories of core damage are defined in table 6.1. The order is hierarchal, i.e., an engine event falls into the first appropriate category and no other. A blade/vane clash occurs when the leading edges of compressor blades come into contact with the trailing edges of stator vanes. It is a potentially hazardous condition usually accompanied by engine surges. Although core damage of any kind typically necessitates an engine change, minor nicks or bends to compressor blades or vanes sometimes have no discernable effect on engine performance and can go undetected for some time. Such prior core damage was discovered 6 times upon examination of an engine following a birdstrike.

TABLE 6.1 CORE DAMAGE CATEGORIES - DEFINITIONS

| CATEGORY | DESCRIPTION |
|---|---|
| BLADE/VANE | CONTACT BETWEEN COMPRESSOR BLADES & STATOR VANES |
| BROKEN | COMPRESSOR BLADE BROKEN |
| BENT>3 | >3 OR MULTI-STAGE COMPRESSOR BLADES/VANES BENT; TORN OR CRACKED BLADES |
| BENT<=3 | UP TO 3 BENT OR SHINGLED COMPRESSOR BLADES/VANES IN A SINGLE STAGE |
| UNKNOWN | SOME COMPRESSOR DAMAGE, BUT OF UNKNOWN TYPE OR EXTENT |
| SURGE | ENGINE SURGE; NO PHYSICAL CORE DAMAGE |

### 6.1.2 Core Damage by Phase of Flight.

As with fan sets, rotation speeds of compressors typically vary with flight phase. In any compressor, all departure RPM's exceed all arrival RPM's. Figure 6.1 plots the frequency of occurrence of each core damage category according to phase of flight. Most of the "bent blades only" events occurred during arrival, in 6 of which the blades were described as "within limits". All of the "surge only" events took place during departure. The phase of flight is unknown in 10 of the 16 "broken blade" events. One of the "blade/vane" departure events also had broken compressor blades resulting from vane contact (event 32). The rationale for placing "blade/vane" before "broken" in the core damage hierarchy in table 6.1 was provided by this event and the fact that no other engine ingestions sustained both kinds of damage. The lone arrival "blade/vane" event (119) occurred on final approach, when engine power is greater than during descent or landing. There was no in-flight engine surge for this event. The engine did surge, however, when subsequently tested on the ground at high power. The phase of flight is known in 59 of the 101 core ingestions where no core damage or surge occurred: 27 were departure events, 31 were arrivals, and one occurred during thrust reversal.

### 6.1.3 Surge Events.

A surge or stall was reported in 31 engine ingestions. These events can be identified in appendix F by the words "surge" or "stall" in the "POWER LOSS" column. Half of the 26 surge events that had no physical core damage had no engine damage at all. Some fan blade damage occurred in the remaining 13. Four of the 5 surge events with core damage had blade/vane clash (events 32, 247, 263 and 328) and were nonrecoverable surges. These and the 3 other nonrecoverable surge events (152, 435, and 496) are discussed in the next section under "engine failure."

The amount of bird matter going into the core during a core ingestion is usually unknown even when the the quantity and weights of all birds ingested into the engine are known. It nevertheless proves informative to classify surge events according to bird weight class and bird multiplicity of the engine ingestion. The number of ingested birds was estimated in 30 of the surge events. Their frequency by bird weight class and bird multiplicity is plotted in figure 6.2. The figure includes 22 events for which bird weight was determined and 8 events in which it is unknown. Eleven events are in the 1-pound class, 8 of which were multiple-bird events, and 4 are in the 2.5-pound class. There is only one 0.5-pound class surge event although there were several multiple-bird ingestions in this weight class, many of which caused engine damage (section 5).

The tree diagram in figure 6.3 summarizes much of the data concerning core ingestions discussed in section 6.1.

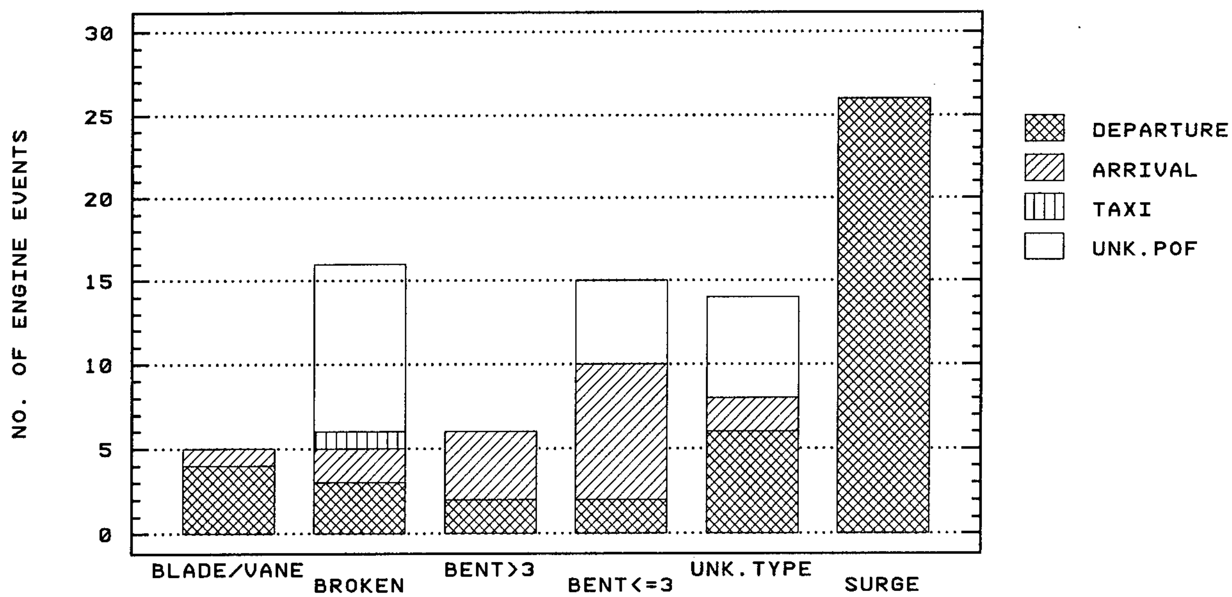



FIGURE 6.1. CORE DAMAGE BY PHASE OF FLIGHT

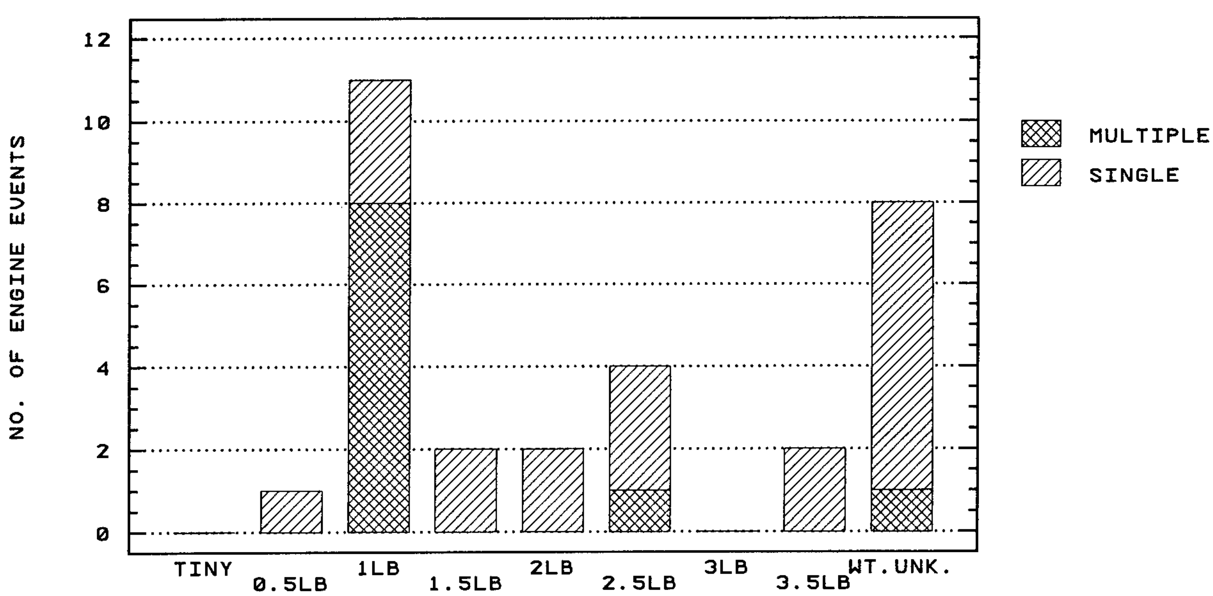



FIGURE 6.2. SURGE EVENTS BY BIRD WEIGHT CLASS AND SINGLE/MULTIPLE BIRD

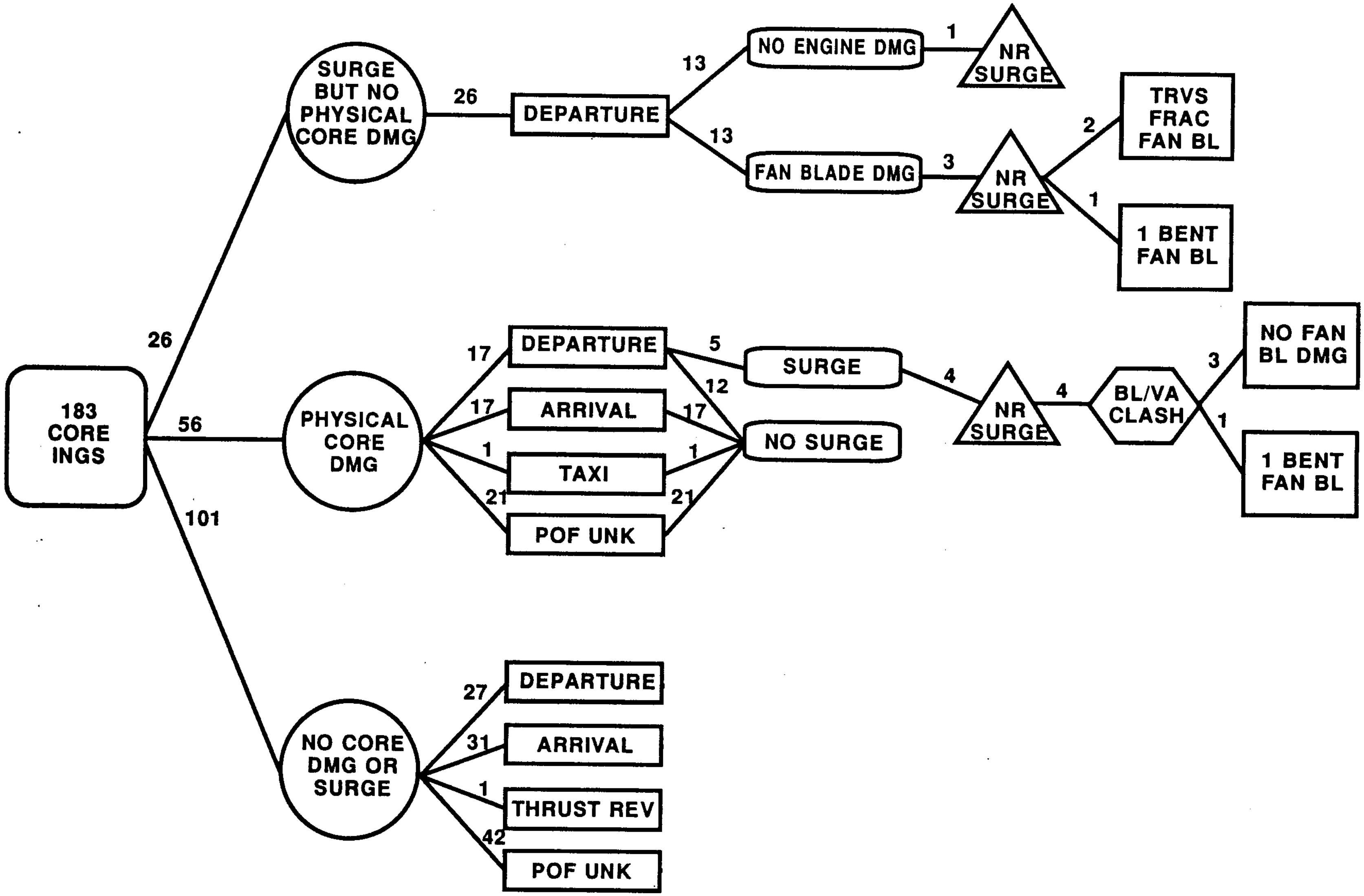



FIGURE 6.3. CORE INGESTION TREE DIAGRAM

## 6.2 FAN BLADE DAMAGE.

This section deals exclusively with fan blade damage. Categories of fan blade damage are defined to reflect the severity of bird-blade impact, without regard to the number of blades that were damaged. The goal is to clarify the relationship between fan blade damage, phase of flight, and the weights and numbers of ingested birds.

### 6.2.1 Fan Blade Damage Categories.

Ultimately it is the impact force of the bird on a particular fan blade that determines the type of damage, if any, that occurs to the blade. The impact could cause a transient "elastic" deformation or a permanent "plastic" bend to the leading edge. More severe impacts could cause pieces of the leading edge or tip to break off or, in the worst case, a blade could break chordwise (transverse fracture). The hierarcy of fan blade damage categories in table 6.2 was defined to reflect this progression. The categories are mutually exclusive and a given engine event is associated with the first applicable category and no other. A "no fan blade damage" category is also included. The 18 events in which shingling, but no other fan blade damage, occurred were put in this last category.

### 6.2.2 Fan Blade Damage by Bird Multiplicity.

A fan blade damage category was assigned in all but one engine event. Figure 6.4(a) (respectively 6.4(b)) gives the frequency (respectively relative frequency) of occurrence in each of the six categories for these 675 engine ingestions, of which 231 resulted in fan blade damage. The data are broken down according to bird multiplicity. This latter information was undetermined in 23 cases, including one "broken" and two "bent" blade events. Figure 6.4(b) seems to indicate that bird multiplicity is an influencing factor in "severity" of fan blade damage. The proportion of multiple- to single-bird events is greatest for transverse fractures and decreases monotonically across the 3 succeeding categories.

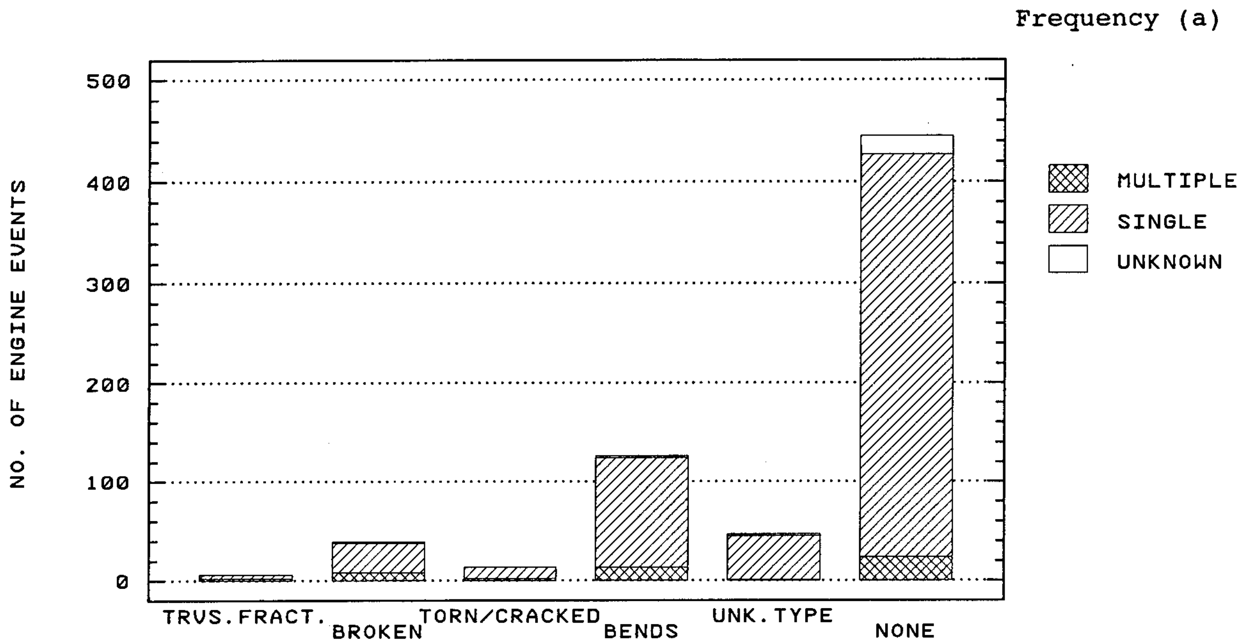
Twenty-six of 50 multiple-bird ingestions (52 percent) resulted in some fan blade damage. The corresponding numbers for single-bird events are 200 out of 618, or 32 percent. A *P*-value under 1 percent for the associated 2 x 2 contingency table is a strong indication that multiple-bird ingestions tend to cause fan blade damage more than single-bird ingestions. This result is not surprising in light of the laws of probability for repeated independent events (appendix B). For example, if the probability of a given single bird causing fan blade damage is, say, 32 percent, then, assuming independence, an ingestion of two birds would have a 54 percent probability of causing fan blade damage, and 3 birds a 69 percent probability. The relationship between bird multiplicity and engine damage in general is not as strong as in the above for fan blade damage alone. The corresponding *P*-value, as shown in section 5.2, was 8.4 percent.

### 6.2.3 Fan Blade Damage by Phase of Flight.

Figure 6.5(a) gives the frequency of ocurrence in each category of fan blade damage, according to phase of flight, for the 429 engine events in which this information is known. The corresponding relative frequencies are found in figure 6.5(b). The "other" phase of flight category includes the 1 cruise, 8 thrust

*TABLE 6.2 FAN BLADE DAMAGE CATEGORIES - DEFINITIONS*

| *CATEGORY* | *DESCRIPTION* |
|---|---|
| *TRANSVERSE FRACTURE* | *FAN BLADE BROKEN CHORDWISE, PIECE LIBERATED* |
| *BROKEN* | *FAN BLADE LEADING EDGE OR TIP PIECES MISSING* |
| *TORN/CRACKED* | *TORN OR CRACKED FAN BLADE* |
| *BENDS* | *BENT, DENTED, OR DISTORTED FAN BLADE* |
| *UNKNOWN* | *SOME FAN BLADE DAMAGE BUT OF UNKNOWN TYPE* |
| *NONE* | *NO FAN BLADE DAMAGE (INCLUDES SHINGLING)* |



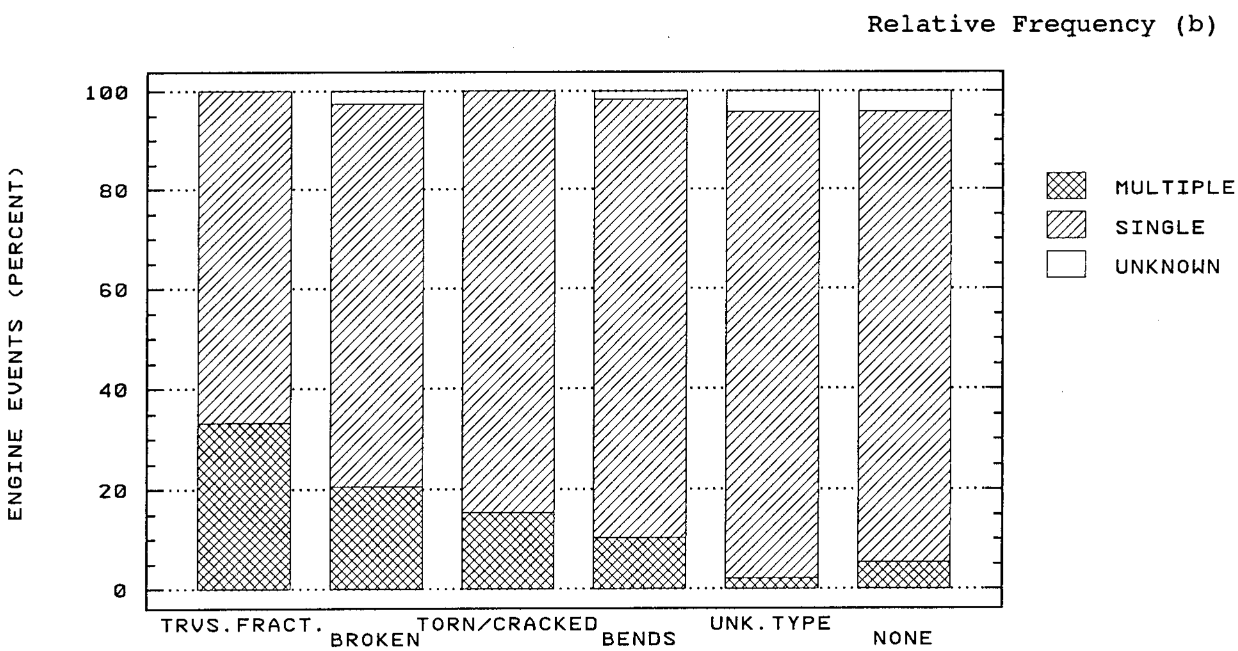




FIGURE 6.4. FAN BLADE DAMAGE BY SINGLE/MULTIPLE BIRD

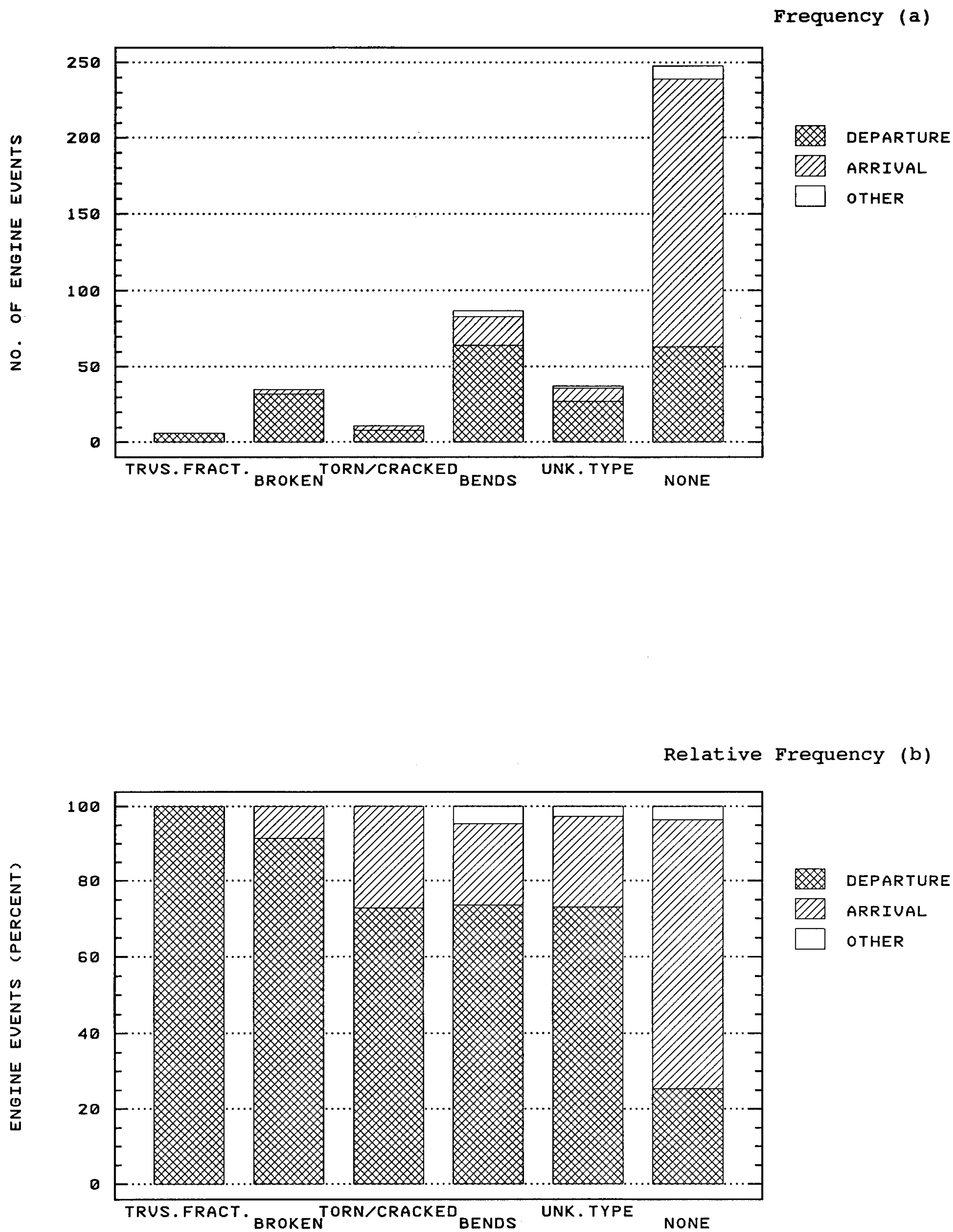



FIGURE 6.5. FAN BLADE DAMAGE BY PHASE OF FLIGHT

reverse, and 5 taxi events. All of the transverse fractures and 95 percent (all but 2) of the broken blade events occurred during departure, as did about 75 percent in each of the other 3 categories of fan blade damage. Only 25 percent of the nondamaging ingestions occurred during departures.

Some fan blade damage occurred in 136 of 199 departure engine events (68 percent) but in only 35 of 216 arrivals (16 percent). The *P*-value for the associated 2 x 2 contingency table is, in effect, zero which verifies statistically that fan blade damage tends to occur more during departures than arrivals.

### 6.2.4 Fan Blade Damage by Bird Weight.

A determination of bird weight and fan blade damage category was made in 203 engine events. Figure 6.6(a) plots the frequency in each category by bird weight class. The corresponding relative frequencies are shown in figure 6.6(b). Weights were obtained in 5 of the 6 transverse fracture events. Two are in the 1-pound class and one each in the 2.5-, 3-, and 3.5-pound classes. Most of the broken blade events fall in the 0.5-, 1-, and 2.5-pound classes. Phase of flight and bird multiplicity are not taken into account here.

### 6.2.5 Fan Blade Damage by Bird Weight and Phase of Flight.

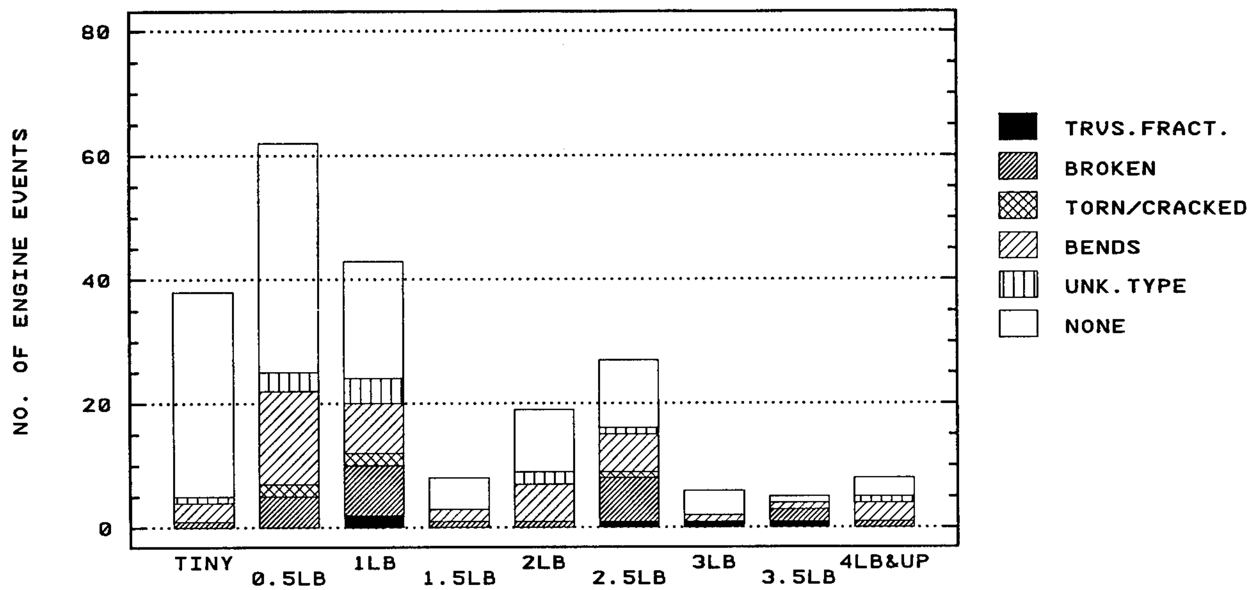
Bird weights were obtained in 85 engine events that occurred during a departure flight phase. Fan blade damage frequencies and relative frequencies for these events are contained in figures 6.7(a) and 6.7(b). With the exception of the 1.5-pound weight class, which had only 3 events, susceptability to some type of fan blade damage tends to increase with bird weight. This trend is not so strong, however, if only broken or transverse fractured fan blades are considered. Only 1 of 4 departure ingestions in the 4-pound & up class resulted in a broken fan blade and the 2-pound class had none.

The corresponding histograms for the 69 arrival events in which bird weights were obtained are in figures 6.8(a) and 6.8(b). The single broken blade arrival event falls in the 2-pound class. The majority of fan blade damage is in the bent blade category. The number of events in each weight class is small and any relationship between the probability of fan blade damage and bird weight is not as evident for arrivals as was for departures.

### 6.2.6 Fan Blade Damage by Bird Weight, Phase of Flight, and Bird Multiplicity.

A logistic regression model was fit, using "S-Plus", for the occurrence of any fan blade damage as a function of the predictor variables bird weight, flight phase (departure/arrival) and bird multiplicity (single/multiple). Stepwise selection resulted in all three predictors being statistically significant at 5 percent (appendix B.) Mean curves for the probability of any fan blade damage as a function of bird weight are given in figure 6.9 for the four flight phase/bird multiplicity combinations. The probability of fan damage is nearly 80 percent for even the smallest birds in multiple-bird encounters during departure and about 90 percent for 2.5-pound birds. In single-bird departure events, the probability of fan blade damage is over 50 percent for tiny birds and rises to 80 percent at about 2.5-pounds. As expected, the corresponding probabilities are much lower during arrival. The confidence curves given in figure 6.10 for each of the four cases indicate that the correlation of fan damage with bird weight is stronger for departures than arrivals. The above

Frequency (a)




Relative Frequency (b)

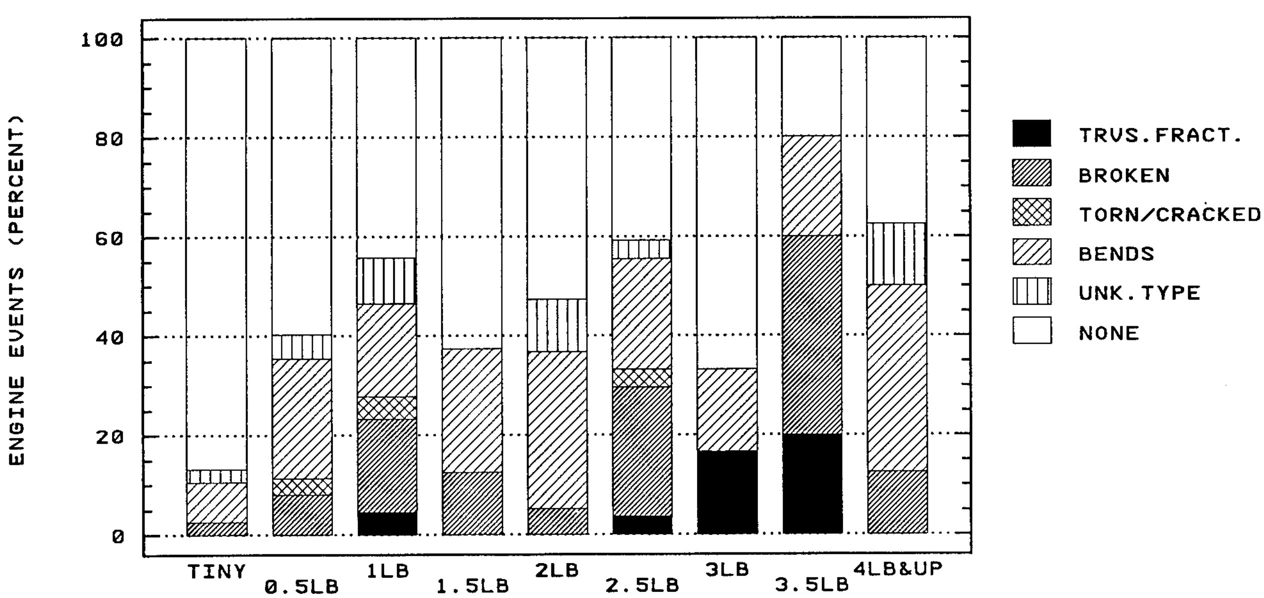
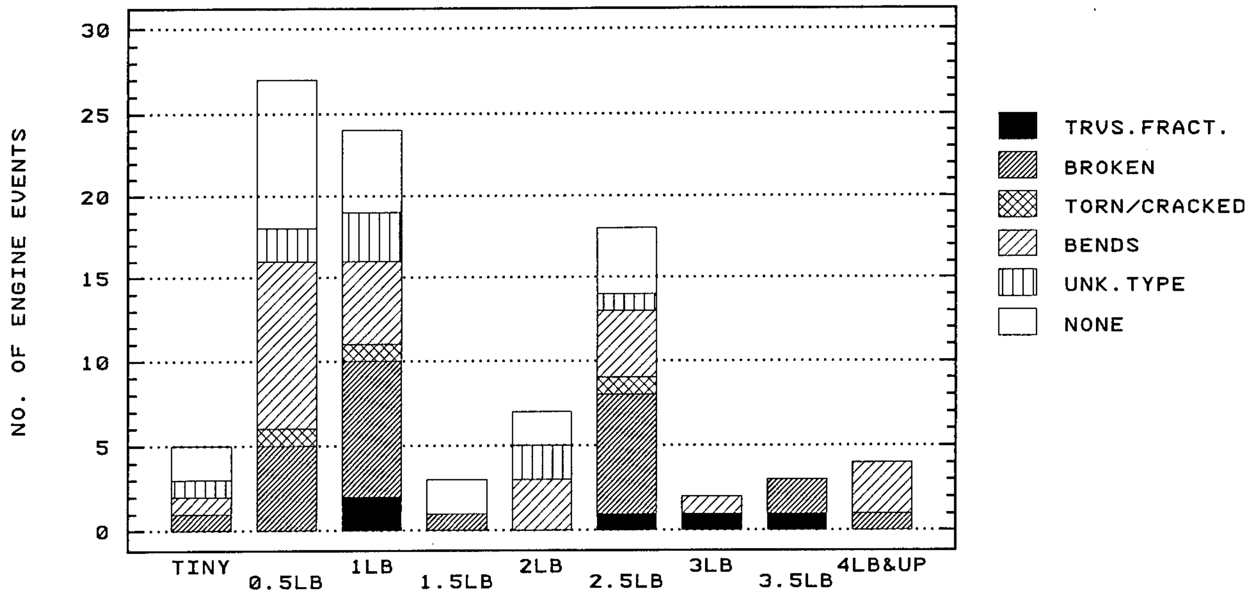



FIGURE 6.6. FAN BLADE DAMAGE BY BIRD WEIGHT CLASS

Frequency (a)




Relative Frequency (b)

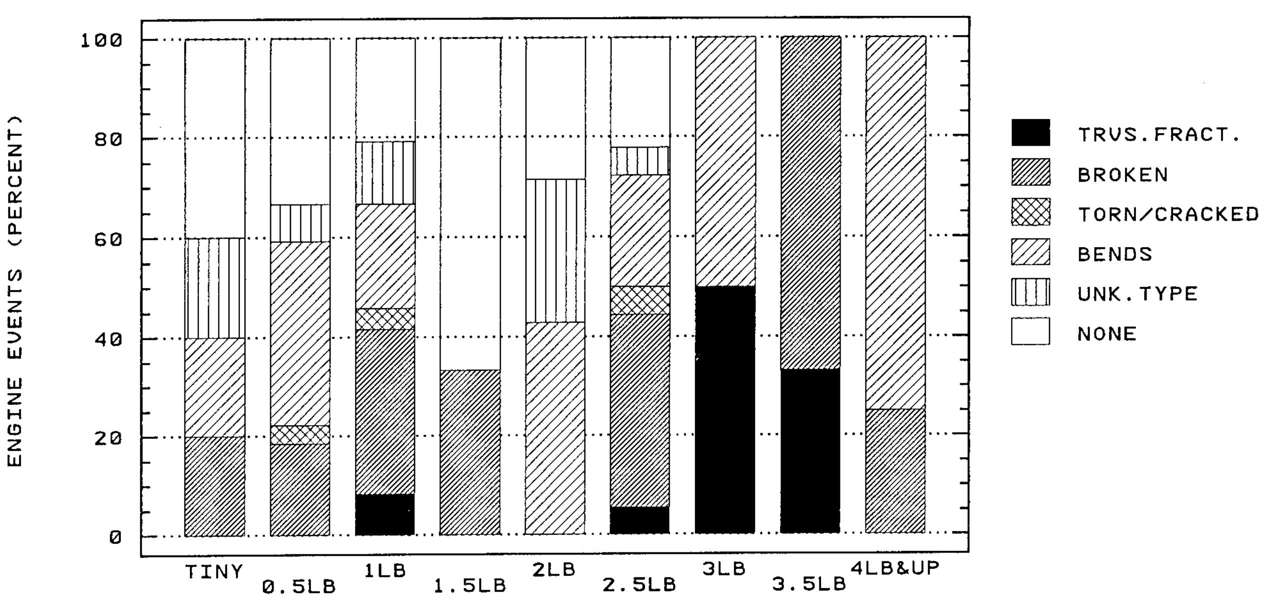
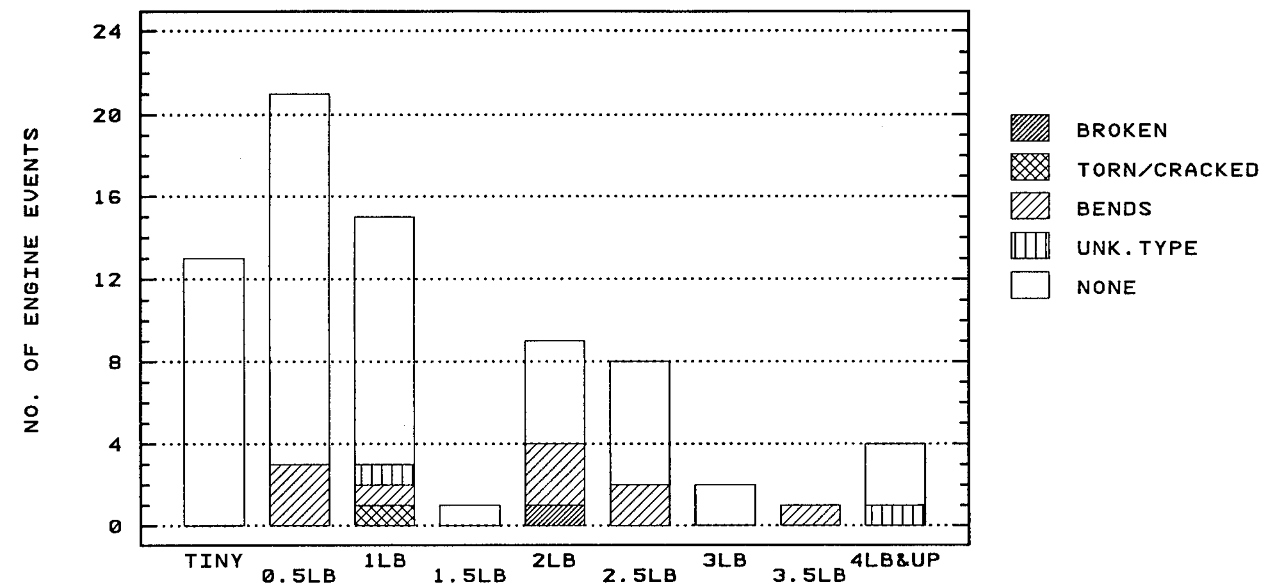



FIGURE 6.7. FAN BLADE DAMAGE BY BIRD WEIGHT CLASS - DEPARTURES

Frequency (a)




Relative Frequency (b)

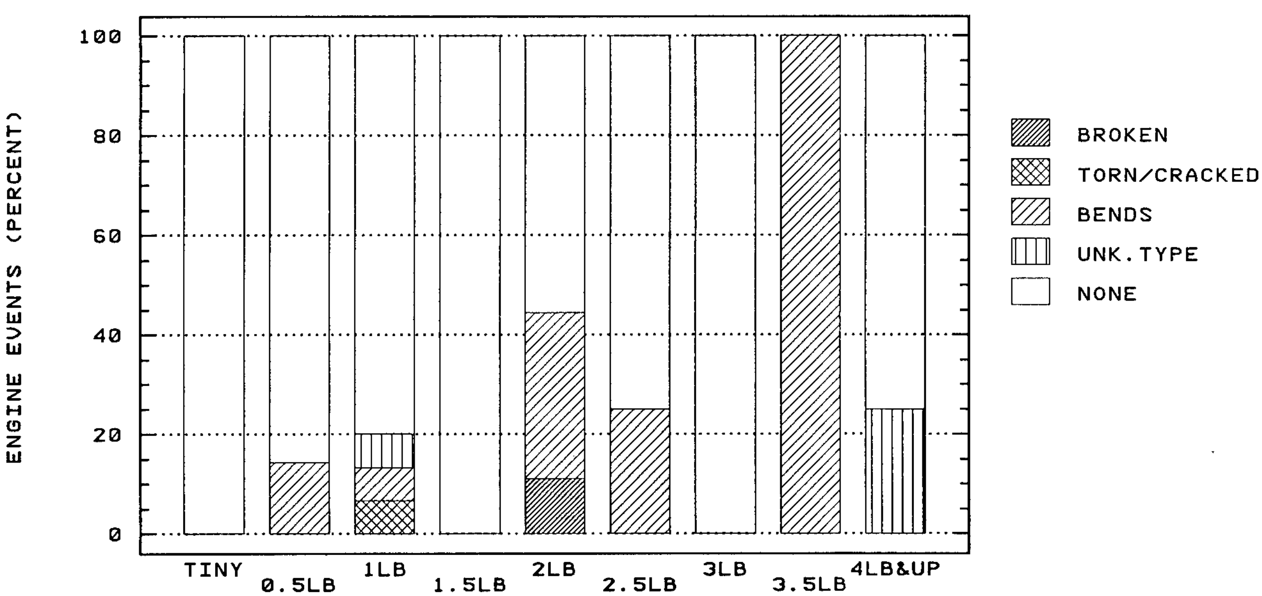



FIGURE 6.8. FAN BLADE DAMAGE BY BIRD WEIGHT CLASS - ARRIVALS

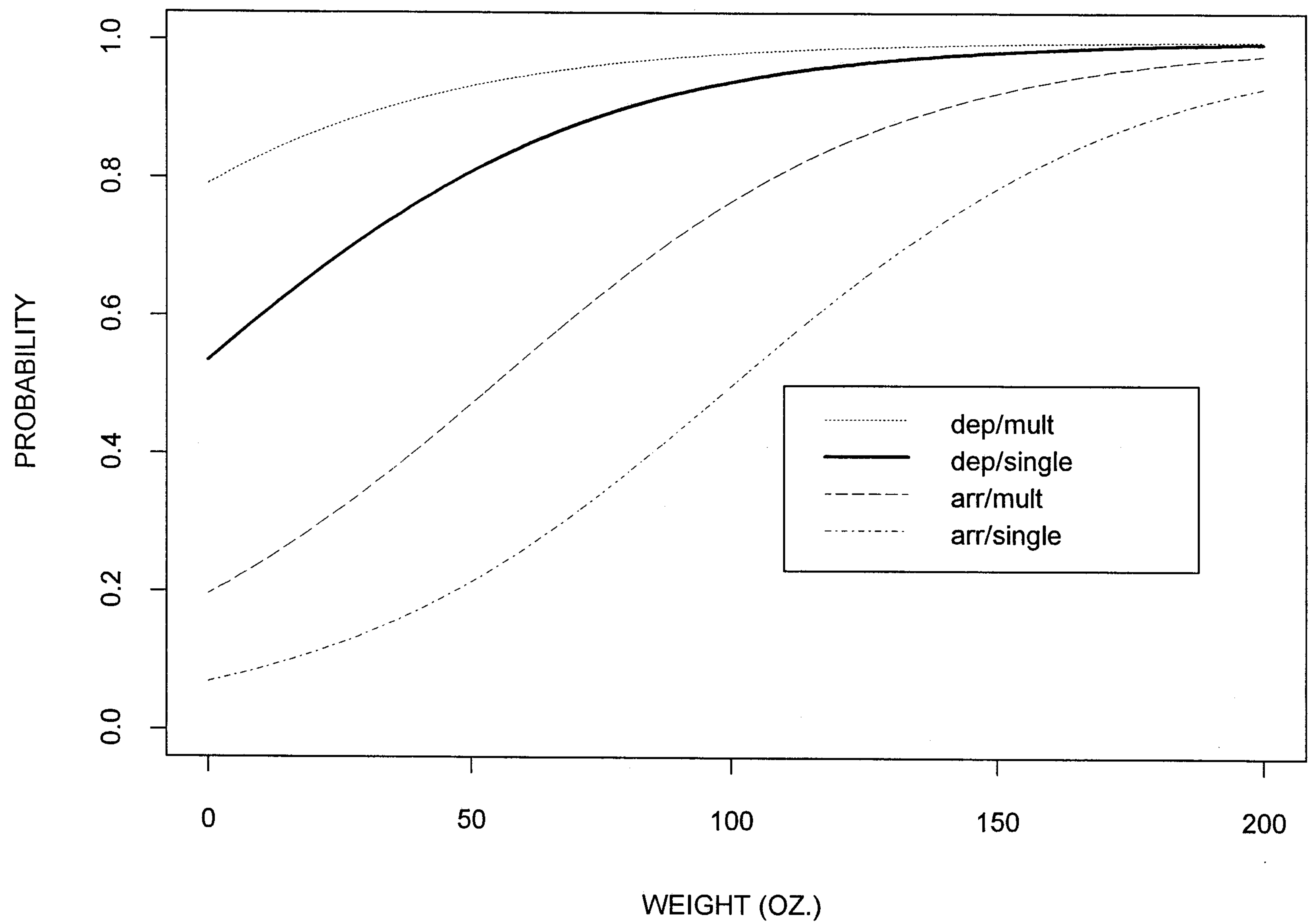



FIGURE 6.9. PROBABILITY OF FAN BLADE DAMAGE - LOGISTIC REGRESSION MODEL MEAN CURVES

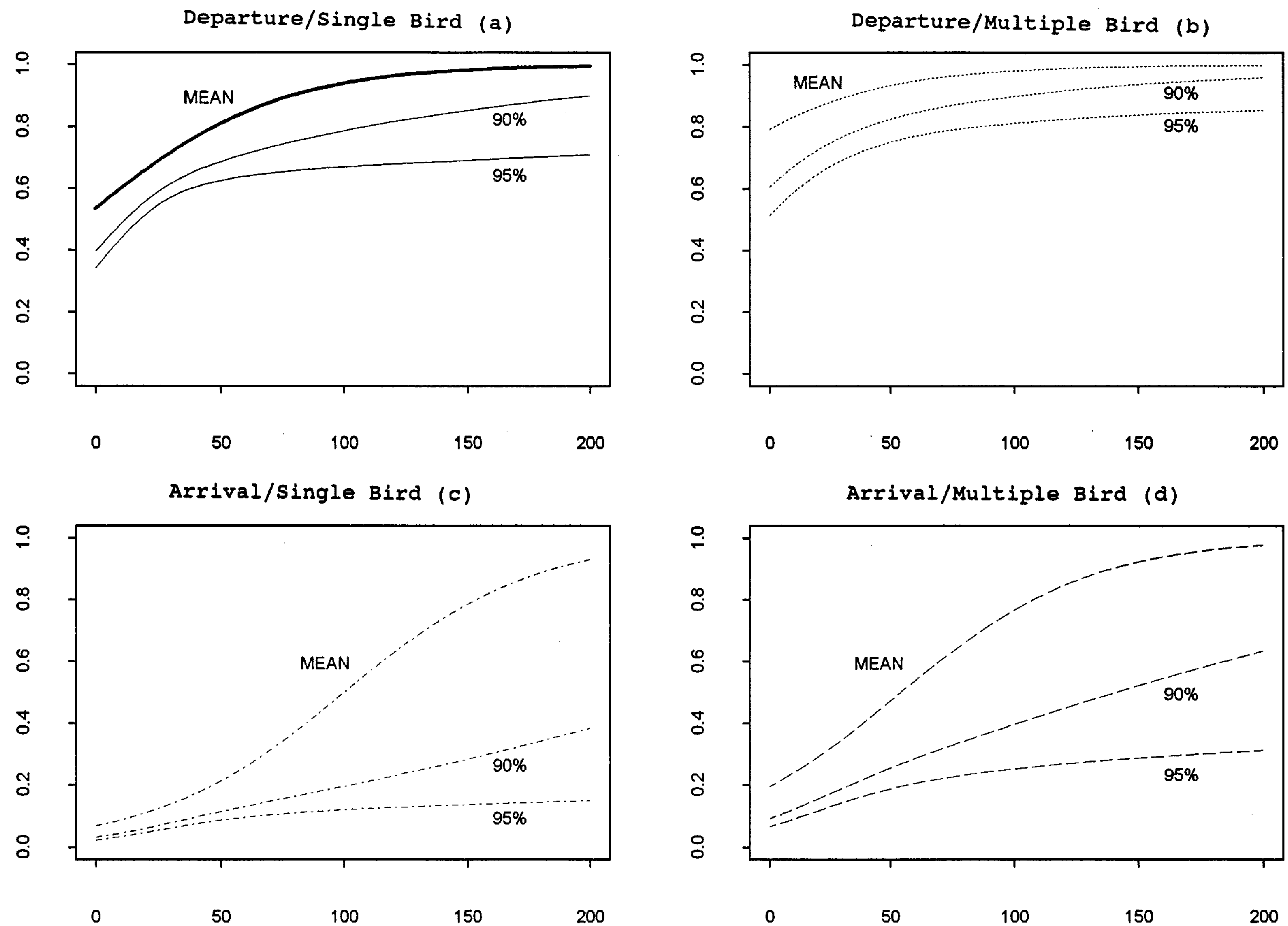



FIGURE 6.10. PROBABILITY OF FAN BLADE DAMAGE - LOGISTIC REGRESSION MODEL LOWER CONFIDENCE CURVES

model was derived from the 152 engine events for which data were complete in all pertinent factors.

A more severe type of fan blade damage, defined by the incidence of any transverse fractured, broken, cracked, or torn fan blade, was also modeled as a function of the three predictor variables. Stepwise selection showed phase of flight to be a statistically significant predictor but bird weight and bird multiplicity were not. Twenty-three percent of departure ingestions resulted in fan blade damage of the above type while only 3 percent of arrivals did likewise.

### 6.2.7 Fan Blade Damage by Shrouded/Unshrouded Blades.

Wide-chord unshrouded fan blades have been coming into greater use in newer engines. Of the engines in this study, only the V2500-A1 and RB211-535E4,-524G,-524H have no shrouds. All except the recently introduced 524H experienced bird ingestions. In a total of 41 shroudless engine events there were no reported incidents of torn, cracked, broken, or transversely fractured fan blades. Only 10 shroudless engines sustained any fan blade damage, all of the "bent blade" category. Of these, 7 resulted from the 10 ingestions into shroudless engines that are known to have taken place during some departure phase of flight.

## 7. EFFECTS ON FLIGHT

The underlying reason for concern about ingestion of birds into engines is the potential for disruption of aircraft flight by this phenomenon. Aside from economic considerations the adverse effects of bird ingestion can have severe safety repercussions. A B737 crashed on takeoff in Ethiopia in 1988 after both engines failed upon ingesting multiple birds [2]. During this study a B747 narrowly averted disaster after encountering a flock of pigeons during takeoff in Los Angeles (event 138). There are numerous instances of power loss, in-flight engine shutdowns, and adverse crew actions in the data. These and other deleterious effects are summarized in this section, and an attempt is made to provide some insight into their relationship with the numbers and weights of ingested birds.

### 7.1 POWER LOSS AND ENGINE FAILURE

Bird ingestion can cause an involuntary loss of power or thrust in the affected engine. Provision was made in the FAA data base for reporting the engine's instrumented power immediately before and after the ingestion so that a precise measure of power loss could be obtained. This information was supplied, however, for only 15 engine ingestions. Some loss of engine power following an ingestion was reported 38 times. This figure includes all "surge" events discussed in the previous section. A quantitative estimate of the extent of power loss, when made, was usually the result of an engineering judgment based on pilot interviews, in-flight data recordings, assessment of engine damage, and engine symptoms and pilot reaction following the incident.

FAA regulations specify a 75 percent post-ingestion sustained engine power requirement in the medium bird certification test [appendix A]. Previous FAA studies have used "the inability to maintain approximately 50 percent usable thrust" as a criterion for engine failure. (There were 32 engine failures in the 1981-83 FAA large engine study [1].) Momentary, recoverable engine surges, discussed in section 6, are therefore excluded, as are a few events (513, 579, 587, 590) in which a small fraction (5 to 10 percent) of engine power is believed to have been lost. There are no other known incidents with a power loss below 50 percent.

There were, however, 12 ingestion events which clearly satisfy the above engine failure criterion. Half of these involved the transverse fracture of a fan blade and the remaining were nonrecoverable surges (Section 6). These events are summarized in table 7.1. For each factor, a "Y" denotes occurrence and a "blank" nonoccurrence. Acronyms used for phases of flight are defined in appendix F. All 12 engine failures occurred in a single engine of the aircraft during a departure phase of flight, although events 138 and 152 were multiple-engine events. Takeoffs were aborted in 5 events and the remaining engine failures caused air turnbacks. As noted in section 6, the engine in event 496 had no physical damage. Bird weights were obtained in all but one of the engine failure events. Their frequency distribution by bird weight class is given in figure 7.1. The number of ingested birds is also indicated in the figure. There were 3 multiple-bird events in the 1-pound class, and 4 events in the 2.5-pound class. One 2.5-pound ingestion was also a multiple-bird event.

TABLE 7.1 ENGINE FAILURES

| evt | date | acft | eng | pof | eng pos | crew actn | inc vibe | surge | hi egt | trvs frac | bl/ vane | bird wt | mult bird | phys dmg | unc nacl |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 32 | 05/10/89 | A300 | JT9D | TR | 1 | ATB | | Y | Y | | Y | 36 | Y | Y | |
| 75 | 08/14/89 | B767 | CF6 | CL | 1 | ATB | Y | | | Y | | 48 | | Y | |
| 138 | 09/12/89 | B747 | JT9D | TR | 2 | ATB | Y | Y | Y | Y | | 14 | Y | Y | Y |
| 152 | 10/12/89 | B747 | JT9D | TR | 2 | ATB | | Y | | | | 18 | Y | Y | |
| 103 | 10/23/89 | A310 | CF6 | TR | 1 | ATO | Y | Y | | Y | | 16 | Y | Y | Y |
| 247 | 05/31/90 | A300 | JT9D | TR | 1 | ATB | Y | Y | Y | | Y | 40 | | Y | |
| 257 | 07/30/90 | B757 | 2000 | CL | 2 | ATB | Y | | | Y | | 40.4 | | Y | |
| 263 | 08/05/90 | B747 | JT9D | TR | 4 | ATO | | Y | | | Y | 40 | | Y | |
| 328 | 09/03/90 | B747 | JT9D | TR | 4 | ATB | | Y | Y | | Y | 28 | | Y | |
| 435 | 10/14/90 | B747 | JT9D | TR | 4 | ATO | | Y | Y | Y | | | | Y | |
| 470 | 02/04/91 | A300 | CF6 | TR | 2 | ATO | | | | Y | | 52 | | Y | Y |
| 496 | 03/13/91 | B767 | JT9D | TR | 1 | ATO | | Y | Y | | | 22 | | | |

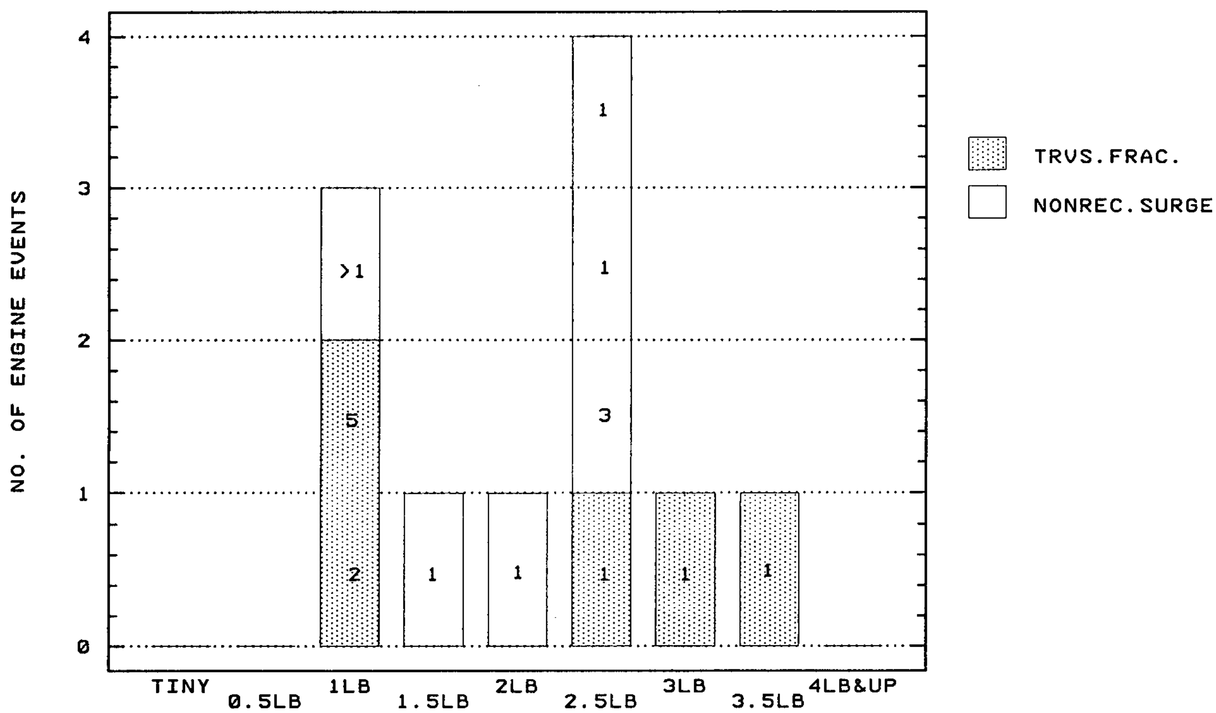



FIGURE 7.1. ENGINE FAILURES BY BIRD WEIGHT CLASS AND BIRD NUMBERS

## 7.2 CREW ACTION EVENTS.

All told there were 28 aborted takeoffs (ATO's) among the aircraft events. Six of these involved multiple engines or multiple birds. Besides the ATO's there were 61 other occasions of an adverse "crew action," i.e., a change in the planned flight path of the aircraft. These include 53 air turnbacks (ATB's), 7 diversions to a landing at an unscheduled airport (DIV's), and 1 change of altitude (ALT) on a subsequent flight. Nine of the 89 crew action events involved multiple engines and 14 involved multiple birds, including 5 aircraft ingestions that were both multiple-engine and multiple-bird events.

Figure 7.2 is a tree diagram which breaks down each of the above classes of crew action events according to category of engine damage. The "damage category of an aircraft event" is defined to be the most severe category of damage sustained by any engine on the aircraft; none, minor, or significant as in section 5. Fifty of the 53 ATB events were damaging, 33 significantly. These totals include one event (317) in which an engine sustained extensive turbine damage and, upon inspection, was discovered to have ingested a single 1-ounce bird on some prior flight. The engine damage, which was caused by a casting defect, was unrelated to the bird ingestion. (This event was considered nondamaging in all engine damage versus bird weight analyses.) Five of 7 DIV events involved significant damage as did 15 of 29 ATO's. Nine of the 13 nondamaging crew action events were ATO's. A recoverable engine surge was noted in seven of these. In event 152, both engines surged but only one engine recovered. The six other recoverable surge ATO's (events 22, 34, 169, 215, 437, and 497) were all single-engine and nondamaging. Event 22 resulted in an engine in-flight shutdown (IFSD).

All told there were 15 IFSD's among the 89 crew action events. (By convention, an "IFSD" can occur while the aircraft is on the runway.) The IFSD's are indicated in the next level of the tree in figure 7.2. Eleven of these, ten of which involved significant engine damage, are in the ATB's. All IFSD events are discussed in section 7.3.

Verified bird weights were obtained in 49 of the 89 crew action events. Figure 7.3 indicates the bird weight class involved in each of these events, and for the "no crew action" and "unknown crew action" events as well. The 0.5-pound and 2.5-pound classes each had the greatest number of crew action events, twelve, followed by eleven for the 1-pound class. The relative frequency of crew action events in the 2.5-pound class is 57 percent, a much higher figure than in the two smaller weight classes. The aforementioned event (317) in which an ATB was unrelated to the bird ingestion, accounts for the single "tiny" bird event in figure 7.3.

## 7.3 IN-FLIGHT SHUTDOWN EVENTS.

As previously noted, 15 of the "crew action" events resulted in an IFSD. The only other IFSD occurred in event 76 in which the A310 sustained minor fan blade damage in one engine during climb out. The engine was shut down because of vibration but the flight continued to its destination. All 16 IFSD events are summarized in table 7.2. Multiple birds were ingested into four of the engines that were shut down in flight. There were no multiple-engine IFSD's although in event 138, two engines of the B747 ingested birds. Increased engine vibration was cited ten times and a surge six times as contributing factor to an IFSD. Other symptoms given were high exhaust gas temperature (five times), and a bird

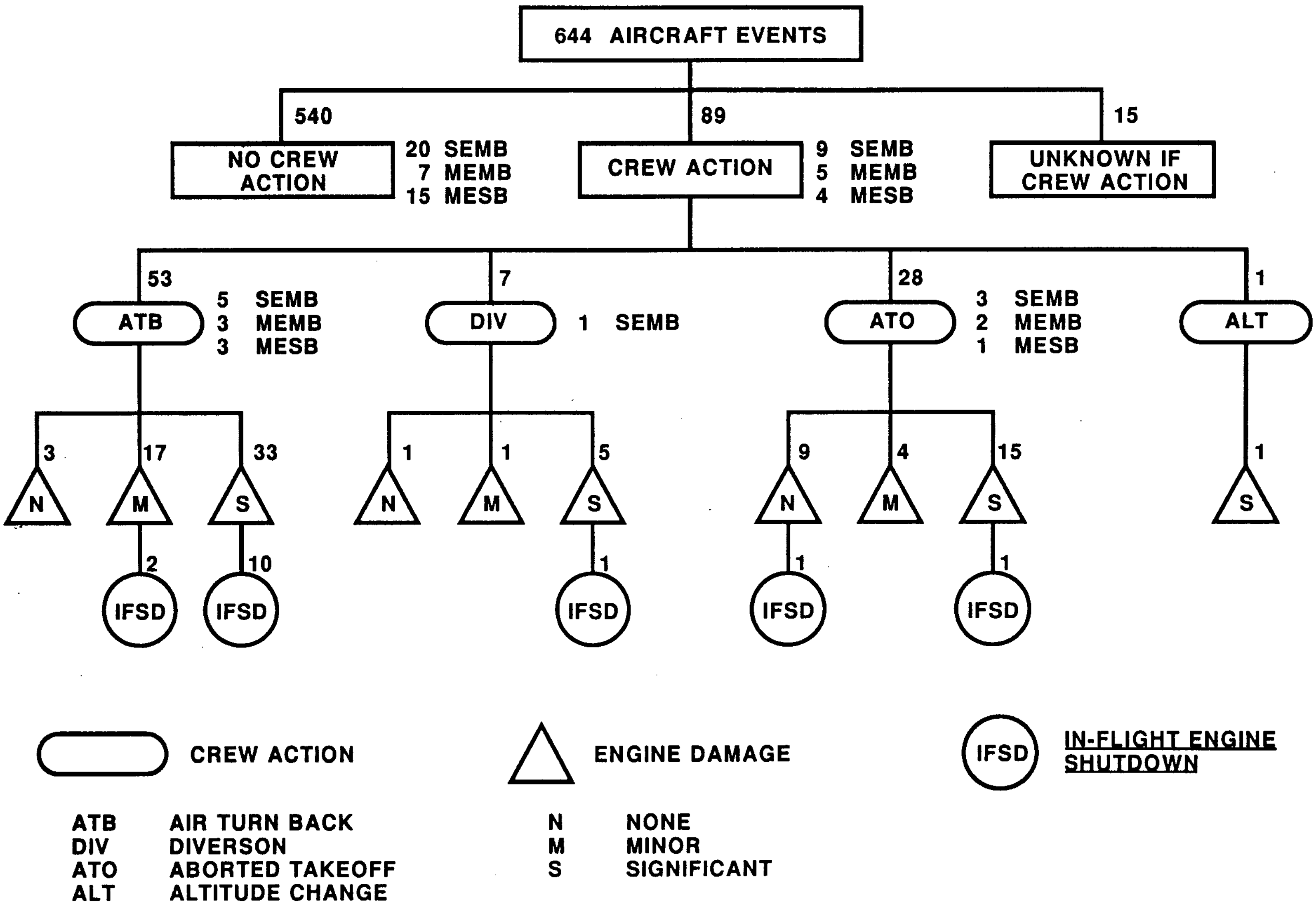



FIGURE 7.2. CREW ACTION TREE DIAGRAM

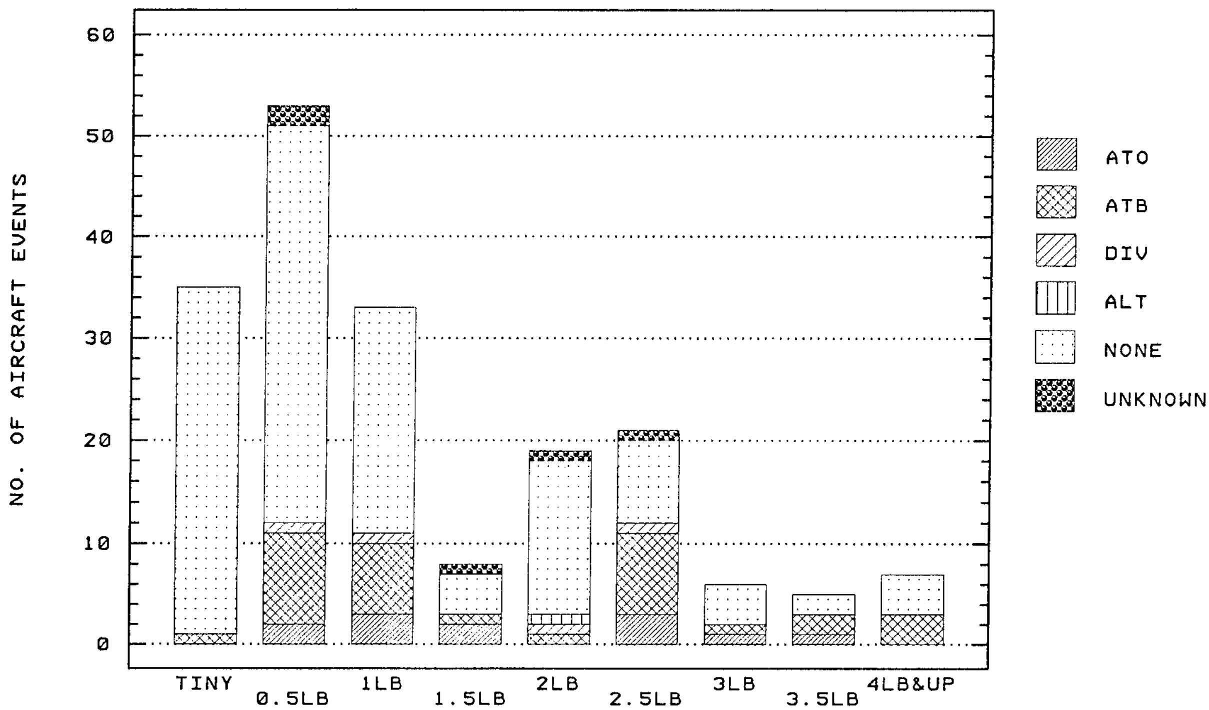



FIGURE 7.3. CREW ACTION EVENTS BY BIRD WEIGHT CLASS

TABLE 7.2 IN-FLIGHT SHUTDOWN EVENTS

| evt | date | acft | eng | pof | eng pos | crew actn | eng fail | surge | smell | inc vibe | hi egt | trvs frac | bird wt | mult bird | eng dmg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | 04/12/89 | B747 | JT9D | TR | 1 | ATO | | Y | | | | | | | N |
| 32 | 05/10/89 | A300 | JT9D | TR | 1 | ATB | Y | Y | | | Y | | 36 | Y | S |
| 140 | 07/25/89 | A320 | V2500 | TR | 1 | ATB | | | Y | | | | | Y | M |
| 75 | 08/14/89 | B767 | CF6 | CL | 1 | ATB | Y | | | Y | | | 48 | | S |
| 76 | 08/18/89 | A310 | CF6 | CL | 1 | | | | | Y | | | | | M |
| 138 | 09/12/89 | B747 | JT9D | TR | 2 | ATB | Y | Y | | Y | Y | Y | 14 | Y | S |
| 267 | 05/04/90 | A320 | CFM56 | TR | 1 | ATB | | | | Y | | | | | M |
| 247 | 05/31/90 | A300 | JT9D | TR | 1 | ATB | Y | Y | | Y | Y | | 40 | | S |
| 241 | 06/27/90 | B747 | JT9D | TR | 3 | DIV | | | | Y | | | 40 | | S |
| 257 | 07/30/90 | B757 | 2000 | CL | 2 | ATB | Y | | | Y | | | 40.4 | | S |
| 317 | 08/10/90 | A300 | 4000 | TC | 1 | ATB | | | | | | | 1 | | N |
| 328 | 09/03/90 | B747 | JT9D | TR | 4 | ATB | Y | Y | | | Y | | 28 | | S |
| 435 | 10/14/90 | B747 | JT9D | TR | 4 | ATO | Y | Y | | | Y | | | | S |
| 513 | 05/27/90 | A320 | CFM56 | TR | 1 | ATB | | | | Y | | | | | S |
| 579 | 08/07/91 | B767 | CF6 | CL | 2 | ATB | | | | Y | | | 40 | | S |
| 590 | 07/09/91 | B767 | CF6 | TO | 1 | ATB | | | | Y | | | | Y | S |

smell (once). As previously noted, 7 of the IFSD events were engine failures. Verified bird identifications were obtained in 9 events. Four of these involved birds in the 2.5-pound weight class of which three (events 32, 247, and 241) were Herring Gulls. Three Herring Gulls were ingested into a single engine in event 32.

## 7.4 UNCONTAINED EVENTS.

Fragments from broken fan blades can cause secondary damage to an engine following a bird ingestion. These fragments sometimes exit through the engine's case or nacelle (an "uncontained" event) and have the potential for seriously damaging the aircraft. There were no incidents of engine case uncontainment; although in two events (74 and 103), blade fragments punctured the metallic engine casing but were contained by the Kevlar containment system. In the latter event, fragments did exit through the nacelle. Event 103 and the six additional instances of uncontained nacelle damage are summarized in table 7.3. Fortunately, there were no reports of further damage to the aircraft in any of the uncontained events; although in event 241, a piece of blade from one engine ricocheted off the runway and struck the adjacent engine of the B747. Both affected engines in event 138 received uncontained damage to the nacelle. Bird identifications were obtained in five of the uncontained events. Herring Gulls weighing 2.5 pounds were cited twice (and also in the aforementioned event 74). The other three events all resulted from ingestions of multiple birds in the 1-pound weight class. Both uncontained events lacking a bird identification involved single birds.

## 7.5 MULTIPLE-ENGINE EVENTS.

All transport category aircraft are certificated to perform safely, during all flight phases, with any single engine inoperable. (See CFR Title 14, Part 25.) Multiple-engine ingestion events are of particular interest because an in-flight loss of two engines during the critical takeoff or climb phases could be catastrophic, even in three- or four-engine aircraft. Table 7.4 summarizes the 31 multiple-engine events in the data, all but one of which involved two engines. Three engines of the B747 in event 482 ingested birds. In event 138, one engine lost power due to a fan blade transverse fracture and was shut down. The cockpit symptoms following ingestion were a surge and high exhaust gas temperature. The other affected engine also surged and, fortunately, recovered. Both engines also surged, and one failed to recover, in event 152. Both engines of the B757 were damaged significantly in event 442. Six other events, 102, 201, 323, 427, 400, and 448 resulted in multiple-engine damage. Significant damage in a single engine occurred in three of these events. The B767 in event 201 received minor damage to each engine and performed an air turnback. It is interesting to note that the affected engines were on the same wing in all five of the 2-engine B747 multiple-engine events. The single 3-engine event (482) occurred during landing and was nondamaging. Verified bird weights were obtained in 16 of the multiple-engine events and are listed in table 7.4. Event 333 yielded a different species and weight for each engine. These 17 unique multiple-engine event weights were included in figure 4.7 of section 4.

TABLE 7.3. UNCONTAINED EVENTS

| evt | date | unc case | unc nacl | acft | eng | pof | eng pos | ifsd | eng fail | surge | inc vibe | hi egt | trvs frac | bird wt | mult bird |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 217 | 07/05/89 | | Y | A300 | JT9D | LD | 1 | | | | | | | | |
| 138 | 09/12/89 | | Y | B747 | JT9D | TR | 1 | | | Y | | | | 14 | Y |
| 138 | 09/12/89 | | Y | B747 | JT9D | TR | 2 | Y | Y | Y | Y | Y | Y | 14 | Y |
| 103 | 10/23/89 | | Y | A310 | CF6 | TR | 1 | | Y | Y | Y | | Y | 16 | Y |
| 231 | 03/16/90 | | Y | A300 | JT9D | CL | 2 | | | | Y | | | 40 | |
| 241 | 06/27/90 | | Y | B747 | JT9D | TR | 3 | Y | | | Y | | | 40 | |
| 435 | 10/14/90 | | Y | B747 | JT9D | TR | 4 | Y | Y | Y | | Y | Y | | |

TABLE 7.4 MULTIPLE-ENGINE EVENTS

| evt | date | acft | eng | pof | crew actn | eng pos | eng dmg | eng fail | surge | ifsd | inc vibe | hi egt | trvs frac | bird wt | mult bird |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 01/24/89 | B757 | RB211 | TR | ATB | 1 | N | | | | | | | 8 | |
| | | | | | | 2 | M | | | | Y | | | 8 | |
| 24 | 04/18/89 | B767 | JT9D | | | 1 | N | | | | | | | 0.5 | |
| | | | | | | 2 | N | | | | | | | 0.5 | |
| 171 | 08/31/89 | B747 | 4000 | LR | | 3 | N | | | | | | | | Y |
| | | | | | | 4 | N | | | | | | | | Y |
| 138 | 09/12/89 | B747 | JT9D | TR | ATB | 1 | S | | Y | | | | | 14 | Y |
| | | | | | | 2 | S | Y | Y | Y | Y | Y | Y | 14 | Y |
| 112 | 10/07/89 | B757 | RB211 | LD | | 1 | N | | | | | | | | |
| | | | | | | 2 | N | | | | | | | | |
| 152 | 10/12/89 | B767 | JT9D | TR | ATO | 1 | N | | Y | | | | | 18 | Y |
| | | | | | | 2 | S | Y | Y | | | | | 18 | Y |
| 102 | 10/21/89 | B747 | CF6 | CL | | 3 | S | | | | | | | | |
| | | | | | | 4 | M | | | | | | | | |
| 85 | 11/21/89 | A320 | CFM56 | LR | | 1 | N | | | | | | | 14 | |
| | | | | | | 2 | N | | | | | | | 14 | |
| 97 | 12/14/89 | A310 | CF6 | LR | | 1 | M | | | | | | | 10 | Y |
| | | | | | | 2 | N | | | | | | | 10 | Y |
| 193 | 01/16/90 | A310 | CF6 | | | 1 | N | | | | | | | | |
| | | | | | | 2 | N | | | | | | | | |
| 244 | 02/09/90 | A310 | JT9D | | | 1 | N | | | | | | | | |
| | | | | | | 2 | N | | | | | | | | |
| 201 | 02/21/90 | B767 | CF6 | TR | ATB | 1 | M | | | | | | | 7.7 | |
| | | | | | | 2 | M | | | | Y | | | 7.7 | |
| 225 | 02/21/90 | B767 | JT9D | AP | | 1 | S | | | | | | | 40 | Y |
| | | | | | | 2 | N | | | | | | | 40 | |
| 214 | 06/17/90 | B757 | RB211 | LD | | 1 | N | | | | | | | 32 | Y |
| | | | | | | 2 | N | | | | | | | 32 | Y |
| 323 | 08/14/90 | B757 | 2000 | TO | | 1 | S | | | | | | | 40 | Y |
| | | | | | | 2 | M | | | | | | | 40 | |
| 632 | 08/17/90 | B767 | CF6 | LR | | 1 | N | | | | | | | 1 | |
| | | | | | | 2 | N | | | | | | | 1 | |

TABLE 7.4 MULTIPLE-ENGINE EVENTS (CONTINUED)

| evt | date | acft | eng | pof | crew actn | eng pos | eng dmg | eng fail | surge | ifsd | inc vibe | hi egt | trvs frac | bird wt | mult bird |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 382 | 09/04/90 | B747 | CF6 | LR | | 1 | N | | | | | | | 10 | Y |
| | | | | | | 2 | N | | | | | | | 10 | Y |
| 333 | 09/17/90 | B747 | JT9D | TX | | 3 | N | | | | | | | 0.5 | |
| | | | | | | 4 | N | | | | | | | 56 | Y |
| 442 | 11/14/90 | B757 | 2000 | TR | ATO | 1 | S | | Y | | | | | 14 | Y |
| | | | | | | 2 | S | | Y | | | | | 14 | Y |
| 427 | 11/24/90 | B757 | RB211 | TR | ATB | 1 | M | | | | Y | | | 16 | Y |
| | | | | | | 2 | M | | | | | | | 16 | Y |
| 400 | 12/03/90 | A320 | CFM56 | TR | ATB | 1 | M | | | | | | | | |
| | | | | | | 2 | M | | | | | | | | |
| 448 | 12/23/90 | B757 | 2000 | CL | ATB | 1 | S | | Y | | | | | 17 | Y |
| | | | | | | 2 | M | | Y | | | | | 17 | |
| 463 | 01/29/91 | A310 | CF6 | | | 1 | N | | | | | | | | |
| | | | | | | 2 | N | | | | | | | | |
| 482 | 03/19/91 | B747 | CF6 | LR | | 1 | N | | | | | | | | |
| | | | | | | 2 | N | | | | | | | | |
| | | | | | | 3 | N | | | | | | | | |
| 550 | 06/03/91 | B767 | CF6 | | | 1 | N | | | | | | | | |
| | | | | | | 2 | N | | | | | | | | |
| 536 | 06/23/91 | A310 | CF6 | LR | | 1 | N | | | | | | | | |
| | | | | | | 2 | N | | | | | | | | |
| 559 | 07/21/91 | A320 | CFM56 | LR | | 1 | N | | | | | | | | |
| | | | | | | 2 | N | | | | | | | | |
| 563 | 07/21/91 | A320 | CFM56 | LD | | 1 | M | | | | | | | 10 | |
| | | | | | | 2 | N | | | | | | | 10 | |
| 565 | 07/29/91 | A320 | CFM56 | AP | | 1 | M | | | | | | | 60 | |
| | | | | | | 2 | M | | | | | | | 60 | |
| 567 | 08/04/91 | A320 | CFM56 | AP | | 1 | N | | | | | | | | |
| | | | | | | 2 | N | | | | | | | | |
| 573 | 08/11/91 | B767 | CF6 | TR | ATO | 1 | N | | | | | | | | |
| | | | | | | 2 | N | | | | | | | | |

## 8. SUMMARY AND CONCLUSIONS.

The data in this report were generated from over 3 million operations flown by a fleet of more than 1500 aircraft during the period January 1989 to August 1991. Aircraft models include the A300, A310, A320, B747, B757, B767, DC10, and MD11.

A total of 644 aircraft ingestions was reported by the engine manufacturers, yielding a worldwide ingestion rate of 2.04 ingestions per 10,000 aircraft operations. This is approximately 87 percent of the rate in the 1981-83 FAA study. The foreign aircraft ingestion rate is three and one-half times the United States rate, compared with two and one-half times in the previous study. However, an analysis of engine damage indicates that domestic ingestions were under reported with respect to foreign.

Aircraft ingestion events were reported to have occurred at 162 different airports worldwide. Schipol Airport in Amsterdam had 20 events and Charles de Gaulle Airport in Paris had 15. The greatest number of events reported at any United States airport was 6, at John F. Kennedy in New York.

There were 31 multiple-engine events, yielding a rate of 9.8 per million operations. Three engines of a B747 ingested birds in one event. The other multiple-engine events all involved two engines of the aircraft. Fifty of the 676 engine ingestions are known to have involved multiple birds.

The Herring Gull, Common Rock Dove, Black-headed Gull, Common Lapwing, Black Kite, and Eurasian Kestrel were the most frequently identified bird species. Of these, all but the Eurasian Kestrel were also identified in the 1981-83 study. The first four were also the most frequently encountered birds during multiple-engine or multiple-bird ingestions. Fifty-nine percent of the events in which a species was identified involved a species that was also identified in the previous study.

Bird weights, both United States and foreign, are similar to those in the previous study. This is true not only in terms of summary statistics (median, mode, mean, etc.) but also in terms of the distribution functions for the weights. As before, the domestic weights tend to be heavier than foreign. There were no multiple-bird or multiple-engine ingestions for which a verified species was obtained that involved birds in the 1.5-pound weight class. In contrast, multiple-engine or multiple-bird ingestions of the 2.5-pound weight class were reported in 5 aircraft events.

Forty-seven percent of engines that ingested birds had some reported damage, compared to 62 percent in previous study. Fifty-four percent of current engine damage is classified as "minor," which typically consists of leading edge distortions or at most three bent, dented, or torn fan blades. Engine damage other than minor is called "significant".

The aircraft ingestion events were fairly evenly split between the departure (takeoff or climb) and arrival (descent, approach, or landing) phases of flight. However, engines ingesting birds during departures sustained damage at about twice the rate as in arrivals. It is verified statistically that engine damage and significant engine damage both tend to occur more often during departures than during arrivals. A similar analysis of the effect of bird multiplicity on engine damage indicates that the higher rate of significant damage found in multiple-bird ingestions compared to single-bird ingestions is statistically significant but that the corresponding effect for any engine damage is inconclusive.

Four logistic regression models are fit for the occurrence of (1) any engine damage, (2) significant engine damage, (3) any fan blade damage, and (4) torn, cracked or broken fan blades, as functions of the predictor variables (i) bird weight, (ii) arrival/departure phase of flight, and (iii) single/multiple birds ingested. All three predictors are shown to be statistically significant in both the "significant engine damage" model (2) and the "any fan blade damage" model (3). However, only bird weight and phase of flight were necessary in the the "any engine damage" model (1) and only flight phase in the "broken fan blade" model (4).

Bird matter was found in the main gas path (core) of 183 (27 percent) of engines that ingested birds. Sixty-one of these had some physical core damage, in all cases to compressors. A surge or stall was reported in 31 engine ingestions. Seven surges were nonrecoverable.

An unscheduled crew action (aborted takeoff, air turnback, etc.) was performed in 14 percent of the aircraft events, which is half the rate in the previous study. There were 16 in-flight engine shutdowns (IFSD's), representing less than 3 percent of all engine events. No more than a single engine of any aircraft required in-flight shutdown or experienced engine failure. In the previous study, nearly 13 percent of engine events resulted in an IFSD. For events in which species identifications were made, birds in the 2.5-pound weight class were involved in 5 of 9 IFSD's, 12 of 49 crew actions, 4 of 11 engine failures and 2 of 5 uncontained events. In contrast, birds of the 1.5-pound class were identified in only 3 crew actions, 1 engine failure, and no IFSD's or uncontained events.

The engines included in the current study were designed and certificated to more stringent bird ingestion standards than most of those from the previous study. It is therefore not surprising that the current fleet has performed better in terms of the adverse effects of bird ingestions on engines and flights. However, one needs to simply recall the near-catastrophic B747 multiple-engine event in Los Angeles to be convinced that the ingestion of birds into engines continues to present a serious threat to aircraft safety.

Table 8.1 contains a summary of some data from the current and previous FAA studies. Except where noted, all numbers represent worldwide data.

TABLE 8.1 DATA SUMMARY

| | CURRENT STUDY | 1981-83 STUDY |
|---|---|---|
| No. of aircraft | 1556 | 1513 |
| No. of operations | 3,163,020 | 2,738,320 |
| No. of aircraft ingestions * | 65/561/644 | 97/484/638 |
| Ingestion rate (x 10^-4) * | 0.70/2.52/2.04 | 0.99/2.80/2.33 |
| No. of multiple-engine events | 31 | 25 |
| Multiple-engine ingestion rate (x 10^-6) | 9.80 | 9.86 |
| No. of engine events | 676 | 666 |
| No. of multiple-bird engine events | 50 | 65 |
| % Multiple-bird events | 7.4 | 9.8 |
| No. of damaging engine events | 316 | 416 |
| % Damaging engine events | 47 | 62 |
| Mean bird weight (oz.) * | 24/20/21 | 30/27/27 |
| Median bird weight (oz.) * | 17/14/14 | 32/18/18.5 |
| Modal bird weight (oz.) * | 40/10/40 | 40/24/40 |
| Modal bird weight class (lb.) * | 2.5/0.5/0.5 | 2.5/0.5/0.5 |
| No. of crew action a/c evts. | 89 | 129 |
| % Crew action events | 13.8 | 28.2 |
| No. of IFSD engine events | 16 | 85 |
| % IFSD's | 2.4 | 12.8 |

* US/FOREIGN/WORLDWIDE

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## 10. GLOSSARY.

**Aircraft operation** - One complete flight cycle of an aircraft, from engine startup at departure to engine shutdown upon arrival.

**Bird ingestion** - The entrance of a bird into the inlet of a turbine engine during an aircraft operation.

**Engine ingestion event** - The simultaneous ingestion of one or more birds into an engine.

**Aircraft ingestion event** - The simultaneous ingestion of one or more birds into one or more engines of an aircraft.

## APPENDIX A

### BIRD INGESTION CERTIFICATION STANDARDS

The following is a summary of current bird ingestion certification standards as they pertain to engines in this study. The complete regulations, which were last amended in February 1984 are contained in 14 CFR 33.77. The small (3-ounce size) bird test has been omitted from the summary since it was not required for engines in this study.

| TEST REQUIREMENT | MEDIUM BIRD TEST | LARGE BIRD TEST |
|---|---|---|
| BIRD SIZE | 1.5 pound | 4 pound |
| NO. OF BIRDS | 1 for the first 300 square inches of inlet area plus 1 for each additional 600 square inches or fraction thereof. | 1 |
| MAXIMUM NUMBER OF BIRDS | 8 | 1 |
| BIRD SPEED | Initial climb speed of typical aircraft. | Liftoff speed of typical aircraft. |
| ENGINE OPERATION | Takeoff | Takeoff |
| INGESTION PATTERN | In rapid sequence to simulate a flock encounter and aimed at critical areas. | Aimed at critical areas. |
| POST-INGESTION REQUIREMENTS: Ingestion may NOT | 1. Cause more than 25% sustained power or thrust loss.<br>2. Require engine shutdown within 5 minutes.<br>3. Result in a potentially hazardous condition. | Cause engine to:<br>1. Catch fire.<br>2. Burst.<br>3. Generate loads greater than maximum specified.<br>4. Lose capability of being shut down. |

APPENDIX B

STATISTICAL TERMINOLOGY

**Sample mean**. The mean of a sample of size n is the average of the n numbers. It is obtained by summing the numbers and dividing by n.

**Sample median**. The median of a sample is the observation in the middle of the sample. That is, half the observations are at least as large as the median and half are as small as the median or smaller. We commonly find the median by sorting the sample and taking the middle observation, or observations, in the sorted sample. For example, the sample 1 3 2 6 8 is sorted to give 1 2 3 6 8, and the median is 3, the 3rd largest number. The sample 3 7 5 6 9 3 is sorted to give 3 3 5 6 7 9, and the median is 5.5, the average of the 3rd and 4th observations.

**Sample mode**. The mode is the most frequently occurring observation in the sample. In the 2nd example illustrating the median, the mode is 3. The mean, median, and mode are usually close together in a moderate size, or larger, sample whose histogram is bell-shaped.

**Sample variance**. The sample variance is computed in three steps: (1) Centering the sample, by subtracting the sample mean from each observation. (2) Squaring each centered observation. (3) Summing the squared centered observations. (4) Dividing by the sample size less 1, n - 1. The variance is the average squared deviation of the observations from their mean.

**Sample standard deviation (SD)**. The sample standard deviation is the square root of the sample variance. It is a measure of the dispersion of the observations in the sample, that is, how far each observation is from the sample mean on the average. Typically, in a sample that has a histogram that resembles a bell-shaped curve, around 68 percent of the observations lie within one standard deviation of the samp]e mean, and 95 percent of the observations lie within two standard deviations of the sample mean.

**Maximum, minimum, and range**. The maximum and minimum of the sample are the largest and smallest observations in the sample, respectively. The range is the difference, maximum minus minimum.

**Upper and lower quartiles, and interquartile range (IQR)**. The upper and lower quartiles are defined in a similar way to the median. One-quarter of the observations in the sample are at least as large as the upper quartile, and three-quarters of the observations are as small or smaller. These fractions are reversed in defining the lower quartile, so that three-quarters of the observations are at least as large as the lower quartile, and one-quarter of the observations are as small or smaller. The interquartile range is the difference, upper quartile minus lower quartile. It is an alternative measure of sample dispersion. When the histogram resembles a bell-shaped curve, the interquartile range is about 1.35 times as large as the standard deviation.

**Outliers**. Outliers are observations that are exceptionally large or small, so that they appear to be atypical of the majority of observations in the sample. For example, the sample 1 4 3 5 15 contains a single outlier 15. The choice of observations to call outliers is aided by an outlier cutoff rule. For example, using the so-called standard boxplot rule, an observation is a high outlier if it is larger than the upper quartile by at least 1.5 times the interquartile range. There are several alternative outlier cutoff rules, and judgement must play an important role in first selecting observations to classify as outliers and then which outliers to remove from the sample. If the sample includes outliers, the sample mean will be pulled towards those observations and the standard deviation will be markedly larger than when the outliers are excluded. The minimum, maximum, and range of the sample are very affected by outliers. The sample median and the interquartile range are not affected by outliers. The sample median and interquartile range are so-called resistant summaries of center and dispersion, respectively. All these alternatives may be included in a selection of summary statistics (e.g., tables 4.4, 4.5, 8.1).

**Cumulative distribution function**. The cumulative distribution function at a given value (of bird weight, for example) is the fraction of observations less than or equal to that value. For example, the cumulative distribution function of the sample 1 3 3 4 is 0 for any value less than 1; is the fraction 1/4 for any value equal to or greater than 1 but less than 3; is the fraction 3/4 for any value equal to or greater than 3 but less than 4; and is 1 for any value equal to or greater than 4.

**Kolmogorov-Smirnov two-sample test**. The distributions of two samples can be compared using the Kolmogorov-Smirnov test. It is a nonparamctric procedure, meaning that few theoretical assumptions are made about populations from which the two samples were obtained. The Kolmogorov-Smirnov test is based on the largest absolute difference between the two cumulative distribution functions at any value (bird weight). If the difference is large, the two distributions are judged to be different. Tables and statistical algorithms are available to compute *P*-values and critical values to use in deciding how different the distributions are and whether the difference is significant.

***P*-value**. In statistical testing, it is usual to state a null hypothesis; for example, that there is no difference between two distributions. Of course the two samples are different, e.g., the cumulative distribution functions of bird weights are different, the means are different, or the proportions of significant damage in the samples of engine events for departures and arrivals, respectively, differ. But some differences are expected by chance even if each sample is chosen at random from a common pool or population. The *P*-value is the probability that a difference as large or larger than the observed difference between the two samples will be observed if two samples of the given sizes are drawn from the same population. The largest absolute difference used in the Kolmogorov-Smirnov test is a specific way of measuring the difference between the distributions of two samples. Another would be the difference between proportions of significant damage. A *P*-value of 5 percent or lower is commonly interpreted to mean that the observed difference is unlikcly to have occurred by chance, so that there is strong evidence for a substantive difference between the populations from which the two samples were obtained. When the *P*-value is larger than 5 percent, we are more willing to accept the possibility that the two populations are the same. That does not mean that we have proved that they are the same, only that the evidence for a difference is weaker. A *P*-value around 10 percent can be interpreted as weak evidence that the populations are not the same. A *P*-value around 40 percent is no evidence at all. A *P*-value less than 1 percent is very strong evidence.

**Critical value**. The choice of $P$-value of 5 percent as a dividing point between accepting the null hypothesis if $P > 5$ percent or not appears to be based on a historical perception of what is an unlikely event. An event is "unlikely" if the probability of occurring is less than 5 percent. Other choices are perfectly permissible, for example when we wish to strongly "protect" the null hypothesis, and not declare that there is a difference unless the evidence, measured by a small $P$-value is very convincing. The critical value is the $P$-value, often 5 percent, sometimes 1 percent, at which we make this declaration. For example, it may be the value of the largest absolute difference in the Kolmogorov-Smirnov test when the $P$-value equals 5 percent. The critical value will depend on the sample sizes involved.

**Chi-square test**. Counts of events are often arranged in a two-way table, with levels of two factors, for example damage severity and number of birds, represented by the rows and columns, respectively. These factors will be dependcnt if the proportion of engines with significant damage is larger (or perhaps smaller) among engines ingesting only one bird than among engines ingesting more than one bird. There is a symmetry to these statements: Equivalently we can say that engine events where there is significant damage involve multiple bird ingestions in a disproportionately high fraction of cases, relative to engine events where there is no damage or only minor damage.

When there is no dependence, the row and column factors are said to be independent. When the row and column factors are independent, the typical, or expected, number of observations in a given cell of the two-way table is simply the product of the row and column totals for that cell divided by the overall total. For example, in figure 5.1 there are 129 engine events with significant damage, and 589 out of 636 engine events involve only a single bird. Therefore, if damage severity and number of birds were independent, the number of engine events with significant damage where a single bird is ingested would be around 129 x 589/636, or 119 (after rounding). The observed number is 109. As described above, the observed numbers will always differ from the expected numbers, whether or not the two factors are independent. However, larger differences will typically occur when the factors are dependent than when they are independent. (The differences are both positive and negative, since each row total and column total must be the same using either the observed or expected number of observations.) The chi-square statistic is computed by summing the differences over all the cells of the table, specifically using the formula

$$chi\text{-}square = \sum_{all\ cells} \frac{(observed - expected)^2}{expected}$$

When the factors are independent, and the expected number of observations in each cell is not too small (at least 5, for example), the chi-square statistic is said to have an approximate chi-square distribution on (r - 1) x (c - 1) degrees of freedom (df), where r and c are the number of rows and columns in the table, respectively. The $P$-values and critical values are computed based on this distribution (using tables or algorithms) and, as with the Kolmogorov-Smirnov test, are used as evidence for and against the null hypothesis that the differences in the relative proportions between rows (or columns) of the table are due to chance fluctuations alone.

**Probability of a difference**. When a $P$-value of, for example, 14 percent is computed for a chi-square test, the claim might be made that the probability that the two factors are dependent is 86 percent. Analogously, when a $P$-value of 3 percent occurs using the Kolmogorov-Smirnov test, the claim might be made that the probability that the two populations are the same is only 3 percent. The probability that the two populations are different is 97 percent. These claims are justifiable if additional, Baysian, assumptions are made about the data. They give an impression of the weight of evidence, which is the interpretation used above.

**Poisson assumption**. Each estimate in section 5.7 of the number of US events in a particular damage category , when corrected for the undercount, is a ratio involving 3 numbers. For example, the estimate of the number of no damage events is 27 x 311 / 106. The Poisson approximation involves assuming that each count follows a Poisson distribution with mean equal to some $\lambda$ (different for each count). Estimating the Poisson parameter $\lambda$ by the count, e.g. $\hat{\lambda} = 27$, the variance in the expressed as a proportion of the count is $1/\hat{\lambda}$. Using the delta method and substituting the counts as estimates for the respective $\lambda$ gives a confidence interval for the number of no damage events equal to

$$27 \times \frac{311}{106} \times (1 \pm 1.96\sqrt{\frac{1}{311} + \frac{1}{27} + \frac{1}{106}}).$$

**Repeated independent events**. For probability p that a given bird causes fan blade damage, the probability that the bird causes no damage is 1 - p. Assuming that the effects of impacts of successive birds are independent, the probability of no fan blade damage from the strikes of two birds is

$$(1 - p) \times (1 - p),$$

for three birds is

$$(1 - p) \times (1 - p) \times (1 - p),$$

and so on. The probabilities of fan blade damage are, respectively,

$$1 - [(1 - p) \times (1 - p)]$$

for two birds, and

$$1 - [(1 - p) \times (1 - p) \times (1 - p)]$$

for three birds.

**Logistic regression**. Logistic regression is used to model the proportion of damaging events as a function of the predictor variables bird weight, phase of flight, and bird multiplicity. The logistic regression model asserts that the probability of damage is a "logistic" function of a linear combination of the predictor variables. Suppose there is just one predictor, say bird weight $w$. Then the linear combination is $b_0+b_1w$ for some coefficients $b_0$ and $b_1$. The probability of damage is

$$P(w) = \frac{\exp(b_0+b_1w)}{1 + \exp(b_0+b_1w)}$$

The probability of damage is found to increase with bird weight. Since the probability $P$ increases with the value of the linear combination, the coefficient $b_1$ is positive.

If phase of flight is included as a second predictor, then a third coefficient, $b_2$, is introduced. The probability of damage is

$$P(w) = \frac{\exp(b_0+b_1 w-b_2)}{1 + \exp(b_0+b_1 w-b_2)}$$

on arrival, and

$$P(w) = \frac{\exp(b_0+b_1 w+b_2)}{1 + \exp(b_0+b_1 w+b_2)}$$

on departure. For models fitted in this report, the probability on departure was higher than on arrival; accordingly, the coefficient $b_2$ is positive.)

Bird multiplicity might be included as a third predictor, with coefficient $b_3$. Then there are four different expressions for $P(w)$. For example, for multiple bird ingestions on arrival,

$$P(w) = \frac{\exp(b_0+b_1 w-b_2+b_3)}{1 + \exp(b_0+b_1 w-b_2+b_3)}$$

Since the probability of damage is higher with multiple bird ingestions, $b_3 > 0$.

Only those predictors are included in the fitted model whose contribution to explaining the pattern of events is statistically significant at 5 percent. The selection of predictors to include proceeds stepwise. Initially, only a constant term ($b_0$) is included in each model. Then the single predictor that explains the most is included. Then a second predictor may be included, if it is statistically significant, and so on. Interactions are also considered, that is, the coefficient ($b_1$) of weight may be different for departures and for arrivals. However, no interaction terms were found to be statistically significant.

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# APPENDIX C

## AIRCRAFT INGESTIONS BY AIRPORT - WITH AIRCRAFT TYPE AND BIRD SPECIES

This appendix lists all airports at which bird ingestions are known to have occurred. The airports are organized into the eight geographical regions introduced in section 3.9. The aircraft events are tallied by aircraft type for each airport. All verified bird identifications are also tallied, by species code, at each airport. The English and scientific names for each bird species can be found in appendix D.

N.AMERICA

| AIRPORT | LOCALE | AIRCRAFT A300 | A310 | A320 | B747 | B757 | B767 | DC10 | MD11 | AIRPORT TOTALS | BIRD SPECIES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *ANC | ANCHORAGE,ALASKA | | | | 2 | | | | | 2 | L2c19,Z57a38 |
| BOS | BOSTON,MASS. | | | | | 1 | 1 | | | 2 | P5a24 |
| DCA | WASHINGTON-NATIONAL,DC | | | | | 1 | | | | 1 | J3a1 |
| EWR | NEW YORK-NEWARK,NJ | 1 | | | | 1 | | | | 2 | P5a24 |
| FAR | FARGO,N.DAKOTA | | | | | 1 | | | | 1 | P5a40 |
| JFK | NEW YORK-JFK,NY | 1 | | | 3 | 1 | 1 | | | 6 | M5b141(2),P5a24(4) |
| LAX | LOS ANGELES,CAL. | | | | 1 | 1 | 1 | | | 3 | K2c7,P5a19,Q3a1 |
| MCO | ORLANDO,FLORIDA | | | | | 1 | 1 | | | 2 | |
| MEM | MEMPHIS,TENN. | | | | | 1 | | | | 1 | Z21a325 |
| MIA | MIAMI,FLORIDA | | | | | 2 | | | | 2 | P5a14 |
| MSY | NEW ORLEANS,LA | | | | | 1 | | | | 1 | P5a14 |
| ORD | CHICAGO,ILLINOIS | | | | 1 | 2 | 1 | | | 4 | P5a14,Q3a108 |
| PAE | EVERETT,WASHINGTON | | | | 4 | | | | | 4 | L2c19,T4a5 |
| PIE | ST.PETERSBURGH,FLA. | | | | | 1 | | | | 1 | |
| SAP | SAN PEDRO,SULA,HONDURAS | | | 1 | | | | | | 1 | |
| SFO | SAN FRANCISCO,CAL. | | | | | | 1 | | | 1 | I1b2 |
| SLC | SALT LAKE CITY,UTAH | | | | | 1 | | | | 1 | |
| SNA | ORANGE COUNTY,CALIFORNIA | | | 1 | | 1 | | | | 2 | Q3a1 |
| XFO | UNKNOWN,CANADA | | | | | 1 | 1 | | | 2 | L2e40 |
| XUS | UNKNOWN,US | 2 | 1 | 5 | 1 | 14 | 5 | | 1 | 29 | J5b11,Q3a108(3),Z14a83,Z21a253,Z21a325 |
| XXX | UNKNOWN,N.AMERICA | | | | | 1 | 1 | | | 2 | |
| YUL | MONTREAL, CANADA | | | 1 | | | | | | 1 | P5a14 |
| YVR | VANCOUVER, CANADA | | 1 | | | | 1 | | | 2 | P5a20,P5a24 |
| YYC | CALGARY,CANADA | | | | | | 1 | | | 1 | |
| YYZ | TORONTO, CANADA | | | | | | 2 | | | 2 | |
| | REGION TOTALS | 4 | 2 | 8 | 12 | 32 | 17 | 0 | 1 | 76 | |

## EUROPE

| AIRPORT | LOCALE | AIRCRAFT A300 | A310 | A320 | B747 | B757 | B767 | DC10 | AIRPORT TOTALS | BIRD SPECIES |
|---|---|---|---|---|---|---|---|---|---|---|
| ABZ | ABERDEEN,SCOTLAND,UK | | | 2 | | | | | 2 | |
| AMS | AMSTERDAM,NETHERLANDS | | 5 | 1 | 9 | 3 | 2 | | 20 | M5b59,M5b141(3),P5a35,P14a1,Q3a9 |
| BCN | BARCELONA,SPAIN | 1 | | | | | | | 1 | P5a24 |
| BEG | BELGRADE,YUGOSLAVIA | | | 1 | | | | | 1 | J5b12 |
| BFS | BELFAST,N.IRELAND,UK | | | | | 3 | | | 3 | P14a1(3) |
| BIA | BASTIA,CORSICA,FRANCE | | | 1 | | | | | 1 | J5b12 |
| BIQ | BIARRITZ,FRANCE | | | 1 | | | | | 1 | |
| BRE | BREMEN,GERMANY | | 2 | 3 | | | | | 5 | |
| BRU | BRUSSELS,BELGIUM | | 2 | 1 | | | | | 3 | P14a1,Q3a1,Z51a31 |
| BSL | BASEL/MULHOUSE,SWITZERLAND | | | 2 | | 1 | | | 3 | |
| BUD | BUDAPEST,HUNGARY | | | | | 1 | | | 1 | P5a12 |
| CDG | PARIS-CDG,FRANCE | | 2 | 8 | 4 | 1 | | | 15 | M5b59,P5a24,P5a35,P14a1,Q3a9,Z53a82(2) |
| CFU | CORFU,GREECE | | 1 | | | | | | 1 | J4a46 |
| CPH | COPENHAGEN,DENMARK | | | | | | 2 | | 2 | J5b12 |
| DUS | DUSSELDORF,GERMANY | | 3 | 4 | | | | | 7 | P14a1,Q3a9,U3b68 |
| FCO | ROME-DA VINCI,ITALY | | | 3 | | | | | 3 | P5a16,P5a35 |
| FNI | NIMES,FRANCE | | | 1 | | | | | 1 | |
| FRA | FRANKFURT,GERMANY | | 2 | 2 | 1 | | | | 5 | U3b68 |
| GRQ | GRONINGEN,NETHERLANDS | | | | | | 1 | | 1 | M5b16 |
| GVA | GENEVA,SWITZERLAND | | | | | 2 | | | 2 | J5b18 |
| HAM | HAMBURG,GERMANY | | 2 | 1 | 1 | 1 | | | 5 | |
| HER | HERAKLION,GREECE | | | | | | 1 | | 1 | Z14a83 |
| IBZ | IBIZIA,SPAIN | 1 | | | | | | | 1 | P5a24 |
| KEV | KEVLAVICK,ICELAND | | | | | 1 | | | 1 | |
| LBA | LEEDS-BRADFORD,ENGLAND,UK | | 1 | | | | | | 1 | |
| LEJ | LEIPZIG,GERMANY | | 1 | 1 | | | | | 2 | |
| LGW | LONDON-GATWICK,ENGLAND,UK | | | | | 1 | 1 | | 2 | |
| LHA | LAHR,GERMANY | | | | | 1 | | | 1 | |
| LHR | LONDON-LHR,ENGLAND,UK | | | 2 | | 2 | | | 4 | |
| LIL | LILLE,FRANCE | | | 6 | | | | | 6 | K1a2,P5a24,Q3a9 |
| LIN | MILAN-LIN,ITALY | | | 1 | | | | | 1 | |
| LJU | LJUBLJANA,YUGOSLAVIA | | | 1 | | | | | 1 | J5b12 |
| LTN | LONDON-LUTON,ENGLAND,UK | | | | | | 1 | | 1 | M5b59 |
| LXS | LEMNOS, GREECE | | | | 1 | | | | 1 | P5a24 |
| LYS | LYON,FRANCE | | | 4 | | | | | 4 | J5b12(2),Qa39 |
| MAN | MANCHESTER,ENGLAND,UK | | | | | | 1 | | 1 | |
| MGQ | MISKOLC,HUNGARY | | 1 | | | | | | 1 | |
| MLH | MULHOUSE/BASEL,FRANCE | | | 1 | | | | | 1 | |
| MRS | MARSEILLE,FRANCE | | | 1 | | | | | 1 | Z15b39 |
| MUC | MUNICH,GERMANY | | 1 | | | | 3 | | 4 | P5a35,P14a1 |
| NAP | NAPLES,ITALY | | | 1 | | | | | 1 | |
| NCE | NICE,FRANCE | | 1 | 3 | | | | | 4 | P5a24,P5a35,Z14a81 |

EUROPE (CONTINUED)

| AIRPORT | LOCALE | A300 | A310 | A320 | B747 | B757 | B767 | DC10 | AIRPORT TOTALS | BIRD SPECIES |
|---|---|---|---|---|---|---|---|---|---|---|
| NTE | NANTES,FRANCE | | 1 | | | | | | 1 | |
| NUE | NUREMBERG,GERMANY | | | 3 | | | | | 3 | |
| ORY | PARIS-ORLY,FRANCE | 1 | 1 | 6 | | | 1 | | 9 | P5a35,J5b12(2),Z65c3,Q3a9(2) |
| PIK | PRESTWICK,SCOTLAND,UK | | 1 | | | | | | 1 | P5a24 |
| PMI | PALMA,MALLORCA,SPAIN | | | | | 2 | | | 2 | Z15b31 |
| PMO | PALERMO,ITALY | | 1 | | | | | | 1 | Q3a1 |
| PRG | PRAGUE,CZECHOSLAVAKIA | | 1 | | | | | | 1 | |
| SVO | MOSCOW-SHEREMETYE,RUSSIA | | | | 1 | | | | 1 | |
| SXB | STRASBOURG,FRANCE | | | 1 | | | | | 1 | J4a180 |
| SXF | E.BERLIN,GERMANY | | 2 | | | | | | 2 | M5b59 |
| TIV | TIVAT,YUGOSLAVIA | | | 1 | | | | | 1 | P5a24 |
| TLS | TOULOUSE,FRANCE | | 2 | 2 | | | | | 4 | P5a35 |
| VCE | VENICE,ITALY | | | | | 1 | | | 1 | |
| VIE | VIENNA,AUSTRIA | | 1 | | | | | | 1 | P5a35 |
| WAW | WARSAW,POLAND | | | | | | 3 | | 3 | P5a35(3) |
| XFO | UNKNOWN,EUROPE | | 1 | | 2 | 6 | 1 | | 10 | |
| ZRH | ZURICH,SWITZERLAND | | | 1 | | | | | 1 | |
| | REGION TOTALS | 3 | 35 | 66 | 19 | 26 | 17 | 0 | 166 | |

S.AMERICA

| AIRPORT | LOCALE | A300 | A310 | A320 | B747 | B757 | B767 | DC10 | AIRPORT TOTALS | BIRD SPECIES |
|---|---|---|---|---|---|---|---|---|---|---|
| BGI | BARBADOS,BARBADOS | 1 | | | | | | | 1 | |
| BUE | BUENOS AIRES,ARGENTINA | | | | 1 | | | | 1 | |
| CCS | CARACUS,VENEZUELA | 1 | | | | | | | 1 | J1a2 |
| EZE | BUENOS AIRES-PISTARINI,ARG | | | | | | 1 | | 1 | J5a10 |
| GRU | SAO PAULO,BRAZIL | | | | | | 1 | | 1 | J1a1 |
| IGU | IGUASSA FALLS,BRAZIL | | | | | | 1 | | 1 | |
| LIM | LIMA, PERU | | | | | | 1 | | 1 | |
| MAO | MANUS,BRAZIL | | | | | | 1 | | 1 | |
| REC | RECIFE,BRAZIL | | | | | | 1 | | 1 | |
| | REGION TOTALS | 2 | 0 | 0 | 1 | 0 | 6 | 0 | 9 | |

## ASIA

| AIRPORT | LOCALE | A300 | A310 | A320 | B747 | B757 | B767 | DC10 | AIRPORT TOTALS | BIRD SPECIES |
|---|---|---|---|---|---|---|---|---|---|---|
| AMD | AHMEDABAD,INDIA | | | 2 | | | | | 2 | |
| BLR | BANGALORE,INDIA | | | 1 | | | | | 1 | |
| BOM | BOMBAY,INDIA | 2 | 1 | 1 | 1 | | | | 5 | J4a31,K1a2 |
| CCU | CALCUTTA,INDIA | | 1 | | | | | | 1 | |
| DEL | DELHI,INDIA | | 1 | 2 | 3 | | | | 6 | J4a31,J4a48 |
| HKG | HONG KONG | | | | 2 | | | | 2 | J4a31 |
| KHI | KARACHI,PAKISTAN | 1 | 1 | | | | | | 2 | |
| KTM | KATHMANDU,NEPAL | | | | | 1 | | | 1 | |
| KUH | KUSHIRO,INDIA | | | | | | 1 | | 1 | |
| PAU | PAUK,BURMA | | | 1 | | | | | 1 | |
| PEK | BEIJING,CHINA | | | | | | | 1 | 1 | P14a12 |
| PUS | PUSAN,KOREA | 1 | | | | | 1 | | 2 | P17d9 |
| SEL | SEOUL,KOREA | 3 | | | | | 1 | | 4 | I1a13,U3b43,Z14a81 |
| SHA | SHANGHAI,CHINA | 1 | | | | | | | 1 | Q3a1 |
| TRV | TRIVANDRUM,INDIA | | 1 | | | | | | 1 | |
| XFO | UNKNOWN,ASIA | | | | | 3 | | | 3 | |
| | REGION TOTALS | 8 | 5 | 7 | 6 | 4 | 3 | 1 | 34 | |

## AUSTRALIA-NEW ZEALAND

| AIRPORT | LOCALE | A300 | A310 | A320 | B747 | B757 | B767 | DC10 | AIRPORT TOTALS | BIRD SPECIES |
|---|---|---|---|---|---|---|---|---|---|---|
| ADL | ADELAIDE,AUSTRALIA | | | | 1 | | | | 1 | P5a32 |
| AKL | AUCKLAND,NEW ZEALAND | | | | | | 1 | | 1 | |
| BNE | BRISBANE,AUSTRALIA | | 1 | | | | | | 1 | |
| LST | LAUNCESTON,AUSTRALIA | | | 1 | | | | | 1 | P14a6 |
| PER | PERTH,AUSTRALIA | | | | | | 1 | | 1 | P14a5 |
| RMA | ROMA,AUSTRALIA | | | 1 | | | | | 1 | |
| SYD | SYDNEY,AUSTRALIA | | | 1 | 1 | | 1 | | 3 | P5a32 |
| WLG | WELLINGTON,NEW ZEALAND | | | | | | 1 | | 1 | P5a32 |
| | REGION TOTALS | 0 | 1 | 3 | 2 | 0 | 4 | 0 | 10 | |

PACIFIC

| AIRPORT | LOCALE | AIRCRAFT A300 | A310 | A320 | B747 | B757 | B767 | DC10 | AIRPORT TOTALS | BIRD SPECIES |
|---|---|---|---|---|---|---|---|---|---|---|
| AXT | AKITA,JAPAN | | | | 1 | | 1 | | 2 | |
| BKK | BANGKOK,THAILAND | | 1 | | 1 | | 1 | | 3 | K1a2 |
| CGK | JAKARTA-SOEKARNO,INDONESIA | 1 | | | | | | | 1 | |
| DPS | DENPASAR,BALI | 1 | | | | | | | 1 | |
| FUK | FUKUOKA,JAPAN | | | | | | 3 | 1 | 4 | Q3a1 |
| HIJ | HIROSHIMA,JAPAN | | | | | | 3 | | 3 | |
| HND | TOKYO-HND,JAPAN | | | | 2 | | 8 | | 10 | I1b2,L2e69,P14a12 |
| JKT | JAKARTA,INDONESIA | | | | 1 | | | | 1 | |
| KCZ | KOCHI,JAPAN | | | | | | 7 | | 7 | |
| KIJ | NIGATA,JAPAN | | | | | | 1 | | 1 | L2e34 |
| KMI | MIYAZAKI,JAPAN | | | | | | 1 | | 1 | |
| KMJ | KUMAMOTO,JAPAN | | | | | | 2 | | 2 | |
| MES | MEDAN,INDONESIA | | | | | | 1 | | 1 | |
| MYJ | MATSUYAMA,JAPAN | | | | | | 8 | | 8 | |
| NAN | NADI,FIJI | | | | 1 | | | | 1 | J4a82 |
| NGO | NAGOYA,JAPAN | | | | | | 3 | 2 | 5 | BAT |
| NRT | TOKYO-NRT,JAPAN | | | | 2 | | 1 | | 3 | L2e34,Q3a1 |
| OIT | OITA,JAPAN | | | | | | 2 | | 2 | |
| OKA | OKINAWA,JAPAN | | | | | | 1 | 1 | 2 | |
| OKJ | OKAYAMA,JAPAN | | | | | | 3 | | 3 | |
| OSA | OSAKA,JAPAN | | | | | | 2 | | 2 | |
| PEN | PENANG,MALAYSIA | | 2 | | | | | | 2 | |
| SDJ | SENDAI,JAPAN | | | | | | 4 | | 4 | |
| SHI | SHIMOJISHIMA,JAPAN | | | | | | 2 | | 2 | I1a23 |
| SIN | SINGAPORE | | 1 | | 2 | | | | 3 | J4a31 |
| SPK | SAPPORO,JAPAN | | | | 1 | | 3 | 1 | 5 | J4a31(2),L2e60,U3b70 |
| TAK | TAKAMATSU,JAPAN | | | | | | 3 | | 3 | |
| TOY | TOYAMA,JAPAN | | | | | | 5 | | 5 | BAT(2) |
| TPE | TAIPEI,TAIWAN | | | | 1 | | | | 1 | |
| TTJ | TOTTORI,JAPAN | | | | | | 1 | | 1 | |
| XFO | UNKNOWN,PACIFIC | 1 | 1 | | 8 | | 4 | 4 | 18 | I1d6,P5a11,P17d9,U3b70,Z14a81,BAT |
| | REGION TOTALS | 2 | 4 | 0 | 18 | 0 | 68 | 9 | 101 | |

## AFRICA

| AIRPORT | LOCALE | AIRCRAFT A300 | A310 | A320 | B747 | B757 | B767 | DC10 | AIRPORT TOTALS | BIRD SPECIES |
|---|---|---|---|---|---|---|---|---|---|---|
| BJL | BANJUL,GAMBIA | | 1 | | | | | | 1 | |
| CAI | CAIRO,EGYPT | | 1 | | | | | | 1 | |
| CAS | CASABLANCA,MOROCCO | | 1 | | | | | | 1 | |
| EBB | ENTEBBE,UGANDA | | 1 | | | | | | 1 | J4a36 |
| FNA | FREETOWN,SIERRA LEONE | | 2 | | | | | | 2 | |
| HRE | HARARE,ZIMBABWE | 1 | | | | | 2 | | 3 | K2a57,M3a3,Z15b55 |
| KRT | KHARTOUM,SUDAN | 1 | | | | | | | 1 | Q3a62 |
| MBA | MOMBASA,KENYA | | 4 | | | | | | 4 | I1a7,J4a31,J4a36 |
| MRU | MAURITIUS,MAURITIUS | | | | | | 1 | | 1 | |
| NBO | NAIROBI,KENYA | 1 | 3 | | | | 2 | | 6 | I1a7,J4a31(2),M3a3 |
| RBA | RABAT,MOROCCO | | | | | 1 | | | 1 | |
| TUN | TUNIS,TUNISIA | | | 2 | | | | | 2 | |
| WDH | WINDHOEK,NAMIBIA | | | | 1 | | | | 1 | |
| XFO | UNKNOWN,AFRICA | | | | | | 1 | | 1 | J5b44 |
| | REGION TOTALS | 3 | 13 | 2 | 1 | 1 | 6 | 0 | 26 | |

## MIDDLE EAST

| AIRPORT | LOCALE | AIRCRAFT A300 | A310 | A320 | B747 | B757 | B767 | DC10 | AIRPORT TOTALS | BIRD SPECIES |
|---|---|---|---|---|---|---|---|---|---|---|
| AMM | AMMAN,JORDAN | | 1 | | | | | | 1 | P9a1 |
| ANK | ANKARA,TURKEY | | 1 | | | | | | 1 | |
| AYT | ANTALYA,TURKEY | | 1 | | | | | | 1 | J4a46 |
| DHA | DHAHRAN,SAUDI ARABIA | 1 | | | | | | | 1 | P5a24 |
| ESB | ANKARA-ESENBOGA,TURKEY | | 1 | 1 | | | | | 2 | |
| ETH | ELAT,ISRAEL | | | | | | 1 | | 1 | Q3a1 |
| IST | ISTANBUL,TURKEY | | 7 | | 1 | 1 | | | 9 | P5a24,P5a35(2) |
| JED | JEDDAH,SAUDI ARABIA | 4 | | | | | | | 4 | Q3a1 |
| LCA | LARNACA,CYPRUS | | 3 | | | | | | 3 | M5b12,P14a1 |
| PFO | PAPHOS,CYPRUS | | 1 | | | | | | 1 | K2c7 |
| RUH | RIYADH,SAUDI ARABIA | 1 | | | | | | | 1 | |
| SHJ | SHARJAH,UA EMIRATES | | 1 | | | | 1 | | 2 | |
| TLV | TEL AVIV,ISRAEL | | | | | 1 | 2 | | 3 | M5b12 |
| XFO | UNKNOWN,MIDDLE EAST | 2 | | | | | | | 2 | J4a31 |
| | REGION TOTALS | 8 | 16 | 1 | 1 | 2 | 4 | 0 | 32 | |

## APPENDIX D

### INGESTED BIRDS - ORDERS, FAMILIES, SPECIES, CODES

The 77 distinct species of ingested birds that were identified by ornithologists are listed by order and family in this appendix. The English and scientific names and the new code from [4], as well as the old code from a previous edition, are given for each. There is also a tally of the number of aircraft events in which each species was found to be involved, broken down by month of year.

| ORDER | FAMILY | NEW CODE | OLD CODE | SCIENTIFIC NAME | | ENGLISH NAME | NO. EVTS. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | MONTHLY | TOTALS | | | | | | |
| Ciconiiformes 9 EVENTS | Ardeidae | I1a7 | 1I59 | Ardea | melanocephala | BLACK-HEADED HERON | 2 | | 1 | | | 1 | | | | | | | |
| | | I1a13 | 1I52 | Egretta | alba | GREAT EGRET | 1 | | | | | | | | | 1 | | | |
| | | I1a23 | 1I50 | Egretta | garzetta | LITTLE EGRET | 1 | | | | | 1 | | | | | | | |
| | | I1b2 | 1I24 | Nycticorax | nycticorax | BLACK-CROWNED NIGHT-HERON | 4 | 1 | | | 1 | | | | 1 | 1 | | | |
| | | I1d6 | 1I9 | Ixobrychus | eurhythmus | SCHRENDK'S BITTERN | 1 | | | | | | | | | 1 | | | |
| Falconiformes 37 EVENTS | Cathartidae | J1a1 | 1K4 | Cathartes | atratus | BLACK VULTURE | 2 | | 1 | | | | | | 1 | | | | |
| | | J1a2 | 1K1 | Cathartes | aura | TURKEY VULTURE | 1 | | | | 1 | | | | | | | | |
| | Pandionidae | J3a1 | 2K1 | Pandion | haliaetus | OSPREY | 1 | | | | 1 | | | | | | | | |
| | Accipitridae | J4a31 | 3K28 | Milvus | migrans | BLACK KITE | 11 | 1 | | 2 | | 1 | 2 | | 1 | 2 | | 1 | 1 |
| | | J4a36 | 3K34 | Haliaeetus | vocifer | AFRICAN FISH EAGLE | 2 | | | | | 1 | | | | 1 | | | |
| | | J4a46 | 3K43 | Neophron | percnopterus | EGYPTIAN VULTURE | 2 | | | | 1 | | | 1 | | | | | |
| | | J4a48 | 3K46 | Gyps | bengalensis | INDIAN WHT-BCKD VULTURE | 1 | | | | | | | | 1 | | | | |
| | | J4a82 | 3K75 | Circus | spilonotus | EURASIAN MARSH HARRIER | 1 | 1 | | | | | | | | | | | |
| | | J4a180 | 3K180 | Buteo | buteo | COMMON BUZZARD | 2 | | | | | 1 | | | | | 1 | | |
| | Falconidae | J5a10 | 5K8 | Milvago | chimango | CHIMANGO FALCON | 1 | | | 1 | | | | | | | | | |
| | | J5b11 | 5K26 | Falco | sparverius | AMERICAN KESTREL | 1 | | | | | | | | 1 | | | | |
| | | J5b12 | 5K27 | Falco | tinnunculus | EURASIAN KESTREL | 9 | | | | | | 1 | 6 | 1 | | 1 | | |
| | | J5b18 | 5K24 | Falco | rupicoloides | GREATER KESTREL | 1 | | | | | | | 1 | | | | | |
| | | J5b43 | 5K55 | Falco | rusticolus | GYRFALCON | 1 | | | | | 1 | | | | | | | |
| | | J5b44 | 5K59 | Falco | peregrinus | PEREGRINE FALCON | 1 | | | 1 | | | | | | | | | |
| Strigiformes 8 EVENTS | Tytonidae | K1a2 | 1S2 | Tyto | alba | COMMON BARN OWL | 5 | | | 1 | | | | | 1 | | 2 | | 1 |
| | Strigidae | K2a57 | 2S44 | Bubo | africanus | AFRICAN EAGLE OWL | 1 | 1 | | | | | | | | | | | |
| | | K2c7 | 2S124 | Asio | flammeus | SHORT-EARED OWL | 2 | | | 1 | | | | | | | | 1 | |
| Anseriformes 8 EVENTS | Anatidae | L2c19 | 2J30 | Branta | canadensis | CANADA GOOSE | 2 | | | | 1 | | | | | 1 | | | |
| | | L2e30 | 2J84 | Anas | platyrhynchos | MALLARD DUCK | 1 | | 1 | | | | | | | | | | |
| | | L2e34 | 2J91 | Anas | poecilorhyncha | SPOT-BILLED DUCK | 2 | | | | 1 | | | | | | | 1 | |
| | | L2e40 | 2J95 | Anas | acuta | COMMON PINTAIL DUCK | 1 | 1 | | | | | | | | | | | |
| | | L2e60 | 2J115 | Aythya | ferina | COMMON POCHARD | 1 | 1 | | | | | | | | | | | |
| | | L2e69 | 2J124 | Aythya | marila | GREATER SCAUP | 1 | | 1 | | | | | | | | | | |
| Galliformes 14 EVENTS | Numididae | M3a3 | 5L3 | Numida | meleagris | HELMETED GUINEA FOWL | 2 | | 2 | | | | | | | | | | |
| | Pasianidae | M5b12 | 4L37 | Alectoris | chukar | CHUKAR | 2 | | | | | | 1 | | | | 1 | | |
| | | M5b16 | 4L41 | Alectoris | rufa | RED-LEGGED PARTRIDGE | 1 | | | | | | | | 1 | | | | |
| | | M5b59 | 4L85 | Perdix | perdix | HUNGARIAN PARTRIDGE | 4 | 1 | 1 | | | | | | | | 1 | 1 | |
| | | M5b141 | 4L161 | Phasianus | colchicus | RING-NECKED PHEASANT | 5 | | | 1 | 1 | | | | 1 | | 1 | 1 | |
| Charadriiformes 65 EVENTS | Laridae | P5a11 | 14N10 | Larus | crassirostris | BLACK-TAILED GULL | 1 | | | | | | | | | | 1 | | |
| | | P5a12 | 14N13 | Larus | canus | COMMON GULL | 1 | | | | | | | | | | | 1 | |
| | | P5a14 | 14N12 | Larus | delawarensis | RING-BILLED GULL | 4 | | | | | | | 1 | | | 1 | | 2 |
| | | P5a16 | 14N21 | Larus | marinus | GREAT BLACK-BACKED GULL | 1 | | | | | | | 1 | | | | | |
| | | P5a19 | 14N19 | Larus | occidentalis | WESTERN GULL | 1 | | | | | | | 1 | | | | | |
| | | P5a20 | 14N22 | Larus | glaucescens | GLAUCOUS-WINGED GULL | 1 | | | | | | | | | 1 | | | |
| | | P5a24 | 14N14 | Larus | argentatus | HERRING GULL | 17 | 2 | | 2 | | 2 | 2 | 4 | 2 | 2 | | 1 | |
| | | P5a32 | 14N32 | Larus | novaehollandiae | SILVER (RED-BILLED) GULL | 3 | | | 1 | | | 1 | 1 | | | | | |
| | | P5a35 | 14N36 | Larus | ridibundus | BLACK-HEADED GULL | 14 | | 1 | 1 | 1 | 1 | | 1 | 2 | 3 | | 2 | 2 |

| ORDER | FAMILY | NEW CODE | OLD CODE | SCIENTIFIC NAME | | ENGLISH NAME | NO. EVTS. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | MONTHLY TOTALS | | | | | | | | | | | |
| Charadriiformes (continued) | Laridae | P5a40 | 14N31 | Larus | pipixcan | FRANKLIN'S GULL | 1 | | | | | | | | | | 1 | | |
| | | P5b15 | 14N58 | Sterna | dougallii | ROSEATE TERN | 1 | | | | | | 1 | | | | | | |
| | | P5b33 | 14N74 | Sterna | albifrons | LEAST TERN | 1 | | | | | | | 1 | | | | | |
| | Burhinidae | P9a1 | 9N1 | Burhinus | oedicnemus | EURASIAN STONE-CURLEW | 1 | | | | | | | | | | 1 | | |
| | Charadriidae | P14a1 | 5N1 | Vanellus | vanellus | COMMON LAPWING | 9 | 1 | 2 | 1 | | 1 | | | | 1 | | 1 | 2 |
| | | P14a5 | 5N23 | Vanellus | tricolor | BANDED PLOVER | 1 | | | | | | | 1 | | | | | |
| | | P14a6 | 5N24 | Vanellus | miles | MASKED PLOVER | 1 | | | 1 | | | | | | | | | |
| | | P14a12 | 5N20 | Hoplopterus | cinereus | GRAY-HEADED LAPWING | 2 | | | | | 1 | | | 1 | | | | |
| | | P14b6 | 5N33 | Charadrius | vociferus | KILLDEER | 1 | | | | | | | 1 | | | | | |
| | | P14b37 | 5N26 | Pluvialis | dominica | LESSER GOLDEN PLOVER | 1 | 1 | | | | | | | | | | | |
| | Scolopacidae | P17b1 | 6N30 | Arenaria | interpres | RUDDY TURNSTONE | 1 | | | | | | 1 | | | | | | |
| | | P17d9 | 6N47 | Gallinago | gallinago | COMMON SNIPE | 2 | | 1 | | | | | | | | 1 | | |
| Columbiformes 23 EVENTS | Columbidae | Q3a1 | 2P1 | Columba | livia | COMMON ROCK DOVE | 11 | | | 1 | 2 | | 1 | 3 | | 1 | | 2 | 1 |
| | | Q3a9 | 2P9 | Columba | palumbus | COMMON WOOD PIGEON | 7 | | | 1 | 2 | | 2 | 1 | 1 | | | | |
| | | Q3a62 | 2P61 | Streptopelia | capicola | RING-NECKED DOVE | 1 | | | | | 1 | | | | | | | |
| | | Q3a108 | 2P105 | Zenaida | macroura | AMERICAN MOURNING DOVE | 4 | | 1 | | | | | | 1 | | 2 | | |
| Cuculiformes 1 EVENT | Cuculidae | S2f24 | 2R127 | Centropus | senegalensis | SENEGAL COUCAL | 1 | | | | | | | | | | 1 | | |
| Caprimulgiformes 2 EVENTS | Caprimulgidae | T4a5 | 5T5 | Chordeiles | minor | COMMON NIGHTHAWK | 1 | | | | | | | | | 1 | | | |
| | | T4b49 | 5T55 | Caprimulgus | donaldsoni | DON-SMITH'S NIGHTJAR | 1 | | | | | | | | 1 | | | | |
| Apodiformes 6 EVENTS | | U3b43 | 1U33 | Chaetura | pelagica | CHIMNEY SWIFT | 2 | | | | | | | 1 | 1 | | | | |
| | | U3b68 | 1U55 | Apus | apus | COMMON SWIFT | 2 | | | | | | 1 | 1 | | | | | |
| | | U3b70 | 1U70 | Apus | pacificus | FORK-TAILED SWIFT | 2 | | | | | | 1 | | 1 | | | | |
| Passeriformes 21 EVENTS | Alaudidae | Z14a81 | 17Z72 | Alauda | arvensis | COMMON SKYLARK | 5 | | | | 3 | | | | 1 | | | 1 | |
| | | Z14a83 | 17Z74 | Eremophila | alpestris | HORNED LARK | 3 | | | | | | | | | 1 | 2 | | |
| | Hirundinidae | Z15b31 | 18Z29 | Riparia | riparia | COMMON SAND MARTIN | 1 | | | | | 1 | | | | | | | |
| | | Z15b39 | 18Z37 | Hirundo | rustica | BARN SWALLOW | 2 | | | | 1 | | | | 1 | | | | |
| | | Z15b55 | 18Z55 | Hirundo | semirufa | RUFOUS-BREASTED SWALLOW | 1 | 1 | | | | | | | | | | | |
| | Motacillidae | Z17a41 | 47Z36 | Anthus | pratensis | MEADOW PIPIT | 1 | | | | | | | | 1 | | | | |
| | Turdidae | Z21a253 | 41Z246 | Catharus | ustulatus | SWAINSON'S THRUSH | 1 | | | | | | | | | 1 | | | |
| | | Z21a325 | 41Z314 | Turdus | migratorius | AMERICAN ROBIN | 2 | | | | 1 | | | | 1 | | | | |
| | Corvidae | Z51a31 | 22Z94 | Corvus | corone | CARRION CROW | 1 | | | | | | | | 1 | | | | |
| | Sturnidae | Z53a82 | 21Z75 | Sturnus | vulgaris | COMMON STARLING | 2 | 1 | | | | | | | | | 1 | | |
| | Parulidae | Z57a38 | 63Z20 | Dendroica | coronata | YELLOW-RUMPED WARBLER | 1 | | | | | | | | | 1 | | | |
| | Emberizidae | Z65c3 | 68Z166 | Emberiza | calandra | CORN BUNTING | 1 | | | | | | | | 1 | | | | |
| | | | | | | | 194 | 13 | 12 | 15 | 17 | 13 | 14 | 26 | 25 | 19 | 18 | 13 | 9 |

APPENDIX E

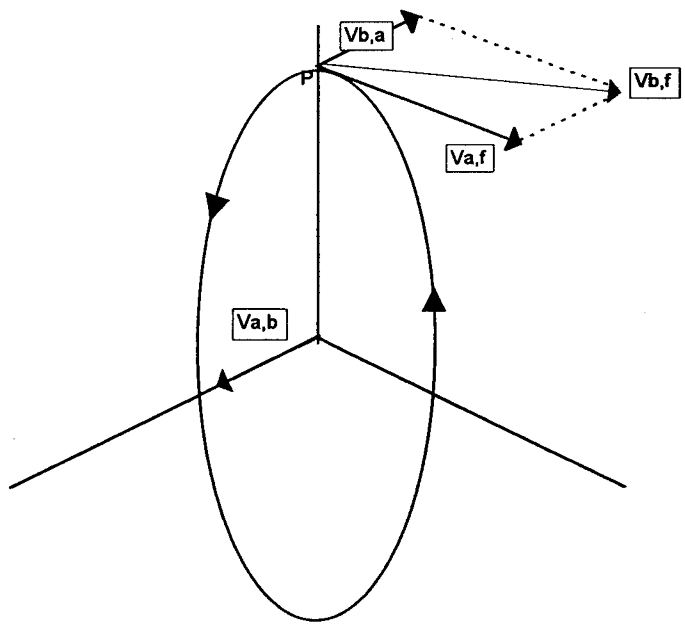
## IMPACT SPEED OF BIRD WITH FAN BLADE - BY FLIGHT PHASE AND SPAN LOCATION

In this appendix approximate impact speeds of bird with fan blade are computed for various phases of flight and span locations. The bird's velocity at ingestion is rarely known. However its speed in flight is usally small relative to that of the aircraft. Hence an assumption that the bird is stationary in air at impact is both a practical and acceptable necessity. It follows from this assumption that the bird hits the fan in the axial direction and that the relative velocity of bird with fan blade (impact velocity) is completely determined by aircraft speed, fan RPM, dimension (root and tip radii) of fan blade, and spanwise (radial) location of impact. The figure illustrates how the impact velocity (Vb,f) is derived from aircraft velocity and tangential velocity of fan at the point of impact.

P = point of impact

Vx,y = relative velocity of x with respect to y

a = aircraft
b = bird
f = fan




Dimensions of the CF6-80C2 fan blade were used for the computations in the table. This blade has a root radius of 16.5 inches and tip radius of 46.5 inches. The same engine's nominal N1 speed of 3300 RPM was also assumed. Representative aircraft speeds and percent of fan N1 were chosen for eight phases of flight. Impact speed computations, as shown below, were made at four spanwise locations for each flight phase. Spans of 0 percent and 100 percent represent impacts at the blade's root and tip, respectively. Intermediate impact locations are at 30 percent and 70 percent of blade length.

As expected, the impact speeds tend to be greatest in departure phases. They are, however, extremely sensitive to span location, varying two or three times in magnitude from root to tip in most cases. Indeed, impact speeds near the blade tip during final approach exceed those near the root for departure phases. The aircraft and fan speed parameters for thrust reverse are typical at full thrust reverser initiation. Although the resultant impact speeds are high, fan speed drops abruptly to taxi idle in about 10 seconds and aircraft speed (hopefully) decreases rapidly during this time. Since the aircraft is already on the ground, bird ingestion during thrust reversal does not usually represent a threat to flight safety.

| *PHASE OF FLIGHT* | *BIRD/FAN BLADE RELATIVE SPEED (FT/SEC) AT GIVEN FAN BLADE SPAN* | | | |
|---|---|---|---|---|
| | *0%* | *30%* | *70%* | *100%* |
| *TAKEOFF (V1) A/C SPEED=150 KTS 100% FAN N1* | *538* | *777* | *1109* | *1363* |
| *MAXIMUM CLIMB A/C SPEED=250 KTS 95% FAN N1* | *618* | *815* | *1109* | *1340* |
| *DESCENT A/C SPEED=250 KTS 35% FAN N1* | *454* | *494* | *566* | *631* |
| *FINAL APPROACH A/C SPEED=160 KTS 65% FAN N1* | *410* | *548* | *752* | *911* |
| *LANDING A/C SPEED=150 KTS 40% FAN N1* | *317* | *388* | *501* | *592* |
| *THRUST REVERSE A/C SPEED=130 KTS 95% FAN N1* | *502* | *731* | *1049* | *1291* |
| *TAXI A/C SPEED=25 KTS 20% FAN N1* | *104* | *153* | *220* | *271* |

## APPENDIX F

## SUMMARY OF DATA BASE CONTENTS

This appendix summarizes the contents of the FAA data base used to generate this report. Each line of information pertains to a unique engine ingestion event. The events are ordered chronologically. Unless otherwise specified, "N" denotes "no" or "none" and a "blank" entry means the information is "unknown."

The column headings are defined as follows:

| | |
|---|---|
| **DATE** | Date of ingestion |
| **EVT** | Aircraft ingestion event number (repeated in last column) |
| **A/C** | Aircraft type |
| **ENG** | Engine model |
| **DASH** | Engine model dash |
| **POS** | Engine position |
| **TIME** | Time of ingestion |
| **POF** | Phase of flight (TR=takeoff roll, TO=takeoff, TC=takeoff or climb, CL=climb, CR=cruise, DE=descent, AP=approach, LA=landing or approach, LD=landing, LR=landing roll, RV=thrust reverse, TX=taxi) |
| **SIGEVT** | Significant Event (SEMB=single engine-multiple bird, MEMB=multiple engine-multiple bird, MESB=multiple engine-single bird, AIRWORTHY, TRVS FRAC=transverse fracture, INVOLPOWLOS=involuntary power loss) |
| **ALT** | Altitude of aircraft (feet AGL) |
| **SPD** | Speed of aircraft (knots, V1=decision speed, VR=rotation speed, TAXI) |
| **FLR** | Flight Rules |
| **LTCON** | Light Conditions |
| **WEATHER** | Weather Conditions (NCLD=no clouds, SCLD=some clouds) |
| **CREW** | Crew Action (ATO=aborted takeoff, ATB=air turn back, DIV=diversion, ALT=altitude change) |
| **CITYPRS** | Scheduled departure-arrival airports |
| **APT** | Airport Code of ingestion |
| **LOCALE** | Location of airport |
| **US** | Y=US (50 states), N=Foreign (non-US), U=Unknown |
| **REGION** | Geographic Region |
| **BIRDNAME** | Bird species - English name |
| **SPEC** | Bird species code (from [4]) |
| **#BDS** | Number of birds ingested |
| **WT** | Bird weight (ounces) |
| **ALERT** | Crew Alerted to Presence of Birds |
| **SEE** | Number of Bird(s) Seen (SE=2 to 10, FL=11 or more, Y=number unknown) |
| **POWLOSS** | Power loss (100%, 50%, SURGE, STALLS, INVOLUNTARY, Y=yes) |
| **VIBE** | Engine vibration (maximum units, INC=increased, HIGH=high) |
| **IFSD** | In-flight engine shutdown reasons (SURGE, HI EGT=high exhaust gas temperature, SMELL=bird smell, VIBES=engine vibration, NOT BIRD=IFSD not due to bird, Y=no reason given for IFSD) |

In columns A through Q, "Y"=occurrence, "blank"=non-occurrence. Columns A through O represent specific categories of engine damage as defined in table 5.1.

| | | |
|---|---|---|
| A | LEADEDGE | Fan blade leading edge distortion |
| B | BEDE<=3 | 1 to 3 bent or dented fan blades |
| C | TORN<=3 | 1 to 3 torn fan blades |
| D | SHINGLED | Shingled (twisted) fan blades |
| E | ACPAFNAB | Acoustic panel or fan rub strip damaged |
| F | NACELLE | Engine enclosure dented or punctured |
| G | BEDE>3 | More than 3 fan blades bent or dented |
| H | TORN>3 | More than 3 fan blades torn |
| I | BROKEN | Pieces missing from fan blade leading edge or tip |
| J | TRVSFRAC | Fan blade broken chordwise, piece liberated |
| K | RELEASED | Blade retention mechanism failed |
| L | FLANGE | Flange separations |
| M | CORE | Compressor blades/vanes damaged or airflow blocked |
| N | TURBINE | Turbine damaged |
| O | SPINNER | Spinner/cap damaged |
| P | Other engine damage (see REMARKS) | |
| Q | Engine damage of unknown type (see REMARKS) | |

| | |
|---|---|
| NMS | Classification of engine damge (0=no damage, 1=minor damage, 2=significant damage, S=surge with no damage, L=damage within limits, X=damage unrelated to bird ingestion) |
| F | Engine failure indicated by * |
| REMARKS | The Remarks often contain more specific descriptions of engine damage as well as other pertinent information |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| DATE | EVT | A/C | ENG | DASH | POS | TIME | POF | SIGEVT | ALT | SPD | FLR | LTCON | WEATHER | CREW | CITYPRS | APT | LOCALE | US | REGION | BIRDNAME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01/17/89 | 166 | B747 | JT9D | 7Q | 2 | | | N | | | | | | N | SIN-OSA | XFO | SINGAPORE OR OSAKA | N | PACIFIC | |
| 01/24/89 | 1 | B757 | RB211 | 535C | 1 | 17:42 | TR | MESB | 0 | VR | VFR | DUSK | CLEAR | ATB | CDG-LHR | CDG | PARIS-CDG,FRANCE | N | EUROPE | COMMON LAPWING |
| 01/24/89 | 1 | B757 | RB211 | 535C | 2 | 17:42 | TR | MESB | 0 | VR | VFR | DUSK | CLEAR | ATB | CDG-LHR | CDG | PARIS-CDG,FRANCE | N | EUROPE | COMMON LAPWING |
| 01/29/89 | 2 | B757 | RB211 | 535E4 | 1 | | | N | | | | | | N | | XFO | GENOA,ITALY? | N | | |
| 01/30/89 | 3 | B757 | RB211 | 535E4 | 2 | 16:13 | LD | N | 100 | 140 | VFR | LIGHT | CLEAR | N | -PMI | PMI | PALMA,MALLORCA,SPAIN | N | EUROPE | "GULL"-MEDIUM |
| 02/17/89 | 15 | B747 | JT9D | 7R4G2 | 2 | | | N | | | | | | N | -NRT | XXX | TOKYO-NRT,JAPAN? | U | | |
| 02/23/89 | 176 | B757 | 2000 | 2037 | 2 | | CL | N | | | | | | N | MCO-MSP | MCO | ORLANDO,FLORIDA | Y | N.AMERICA | |
| 02/25/89 | 111 | B757 | RB211 | 535C | 1 | | | N | | | | | | N | -LHR | XFO | LONDON-LHR?? | N | | |
| 03/11/89 | 19 | DC10 | JT9D | 59A | 1 | 22:00 | LR | N | 0 | | | | | N | HND-FUK | FUK | FUKUOKA,JAPAN | N | PACIFIC | |
| 03/11/89 | 165 | B747 | JT9D | 7Q | 3 | | | N | | | | | | N | AMS-VIE | XFO | AMSTERDAM OR VIENNA | N | EUROPE | |
| 03/12/89 | 16 | B747 | JT9D | 70A | 3 | 21:30 | CL | AIRWORTHY | | | | DARK | | N | NRT-ANC | NRT | TOKYO-NRT,JAPAN | N | PACIFIC | COMMON ROCK DOVE |
| 03/13/89 | 17 | A310 | 4000 | 4152 | 1 | | AP | SEMB | | | | | | N | VIE-VIE | VIE | VIENNA,AUSTRIA | N | EUROPE | BLACK-HEADED GULL |
| 03/17/89 | 4 | B757 | RB211 | 535C | 2 | | | N | | | | | | N | | XFO | LONDON-LHR?? | N | | |
| 03/17/89 | 179 | A310 | 4000 | 4152 | 1 | | | N | | | | | | N | | TLS | TOULOUSE,FRANCE | N | EUROPE | |
| 03/18/89 | 18 | B767 | 4000 | 4060 | 1 | 23:06 | CL | N | 200 | 150 | IFR | DARK | RAIN/SNOW | ATB | MUC-FAD | MUC | MUNICH,GERMANY | N | EUROPE | COMMON LAPWING |
| 03/18/89 | 28 | B767 | 4000 | 4060 | 1 | | TR | N | 0 | | | | | ATB | MUC-ATH | MUC | MUNICH,GERMANY | N | EUROPE | |
| 03/22/89 | 20 | DC10 | JT9D | 59A | 3 | | | N | | | | | | | FUK-HND | XFO | FUKUOKA OR TOKYO-HND,JAPAN | N | PACIFIC | |
| 03/31/89 | 167 | B747 | JT9D | 7Q | 2 | 6:20 | AP | N | | | | | CLEAR | N | SIN-ADL | ADL | ADELAIDE,AUSTRALIA | N | AUS.NEW Z. | SILVER (RED-BILLED) GULL |
| 04/01/89 | 5 | B757 | RB211 | 535E4 | 1 | 16:00 | TO | N | 150 | 135 | | | DRY | N | LHR-MAN | LHR | LONDON-LHR,ENGLAND,UK | N | EUROPE | "MEDIUM WHITE" |
| 04/01/89 | 6 | B757 | RB211 | 535E4 | 2 | | | N | | | | | | N | AGP-AMS | XFO | MALAGA OR AMSTERDAM | N | EUROPE | |
| 04/04/89 | 21 | B757 | 2000 | 2037 | 2 | | TR | N | 0 | 150 | | | | N | MEM-MSP | MEM | MEMPHIS,TENN. | Y | N.AMERICA | AMERICAN ROBIN |
| 04/12/89 | 22 | B747 | JT9D | 7R4G2 | 1 | 20:19 | TR | N | 0 | 130 | | DARK | CLEAR | ATO | WDH-ABJ | WDH | WINDHOEK,NAMIBIA | N | AFRICA | |
| 04/15/89 | 23 | B767 | JT9D | 7R4D | 2 | | | N | | | | | | | SFO-SFO | SFO | SAN FRANCISCO,CAL. | Y | N.AMERICA | BLACK-CROWNED NITE HEF |
| 04/17/89 | 26 | B747 | JT9D | 7Q | 4 | | | N | | | | | | N | SEL-NRT | XFO | SEOUL,KOREA OR TOKYO-NRT | N | | |
| 04/18/89 | 24 | B767 | JT9D | 7R4D | 1 | | | MESB | | | | | | N | FUK-HND | XFO | FUKUOKA OR TOKYO-HND,JAPAN | N | PACIFIC | LITTLE BROWN BAT |
| 04/18/89 | 24 | B767 | JT9D | 7R4D | 2 | | | MESB | | | | | | N | FUK-HND | XFO | FUKUOKA OR TOKYO-HND,JAPAN | N | PACIFIC | LITTLE BROWN BAT |
| 04/19/89 | 25 | B747 | JT9D | 7Q | 3 | | | N | | | | | | N | YVR-NRT | XFO | VANCOUVER OR TOKYO-NRT | N | | COMMON ROCK DOVE |
| 04/20/89 | 7 | B757 | RB211 | 535E4 | 2 | | TR | N | 0 | | | | RAIN | DIV | HAM-LPA | HAM | HAMBURG,GERMANY | N | EUROPE | "GULL" |
| 04/23/89 | 30 | B747 | JT9D | 7Q | 2 | | | N | | | | | | N | -NRT | XFO | TOKYO-NRT?? | N | PACIFIC | |
| 04/30/89 | 27 | A310 | JT9D | 7R4E1 | 2 | 10:45 | AP | N | | | | | CLEAR | N | -BRU | BRU | BRUSSELS,BELGIUM | N | EUROPE | COMMON ROCK DOVE |
| 05/02/89 | 168 | B747 | JT9D | 7R4G2 | 2 | | | SEMB | | | | | | N | SIN- | XXX | | U | | |
| 05/04/89 | 31 | B767 | JT9D | 7R4D | 2 | 16:18 | TR | SEMB | 0 | 100 | | LIGHT | CLEAR | N | HND- | HND | TOKYO-HND,JAPAN | N | PACIFIC | GRAY-HEADED LAPWING |
| 05/10/89 | 32 | A300 | JT9D | 59A | 1 | 19:00 | TR | SEMB,POWER LOSS | 0 | VR | | LIGHT | CLEAR | ATB | BCN-MAD | BCN | BARCELONA,SPAIN | N | EUROPE | HERRING GULL |
| 05/14/89 | 33 | A300 | JT9D | 7R4H1 | 1 | | TR | N | 0 | V1 | | LIGHT | | N | KRT-JED | KRT | KHARTOUM,SUDAN | N | AFRICA | RING-NECKED DOVE |
| 05/17/89 | 8 | B757 | RB211 | 535E4 | 1 | 10:30 | AP | N | 1000 | 135 | | | | N | AMS-PMI | PMI | PALMA,MALLORCA,SPAIN | N | EUROPE | COMMON SAND MARTIN |
| 05/24/89 | 9 | B757 | RB211 | 535C | 2 | 6:48 | LR | N | 0 | | | | | N | ESB-IST | IST | ISTANBUL,TURKEY | N | MID.EAST | "GULL" |
| 05/28/89 | 10 | B757 | RB211 | 535C | 1 | | | N | | | | | | N | FCO-LHR | XFO | ROME OR LONDON-LHR | N | EUROPE | |
| 06/02/89 | 169 | B747 | JT9D | 7R4G2 | 1 | | TR | N | 0 | 100 | | | | ATO | BOM-SIN | BOM | BOMBAY,INDIA | N | ASIA | |
| 06/03/89 | 34 | A310 | 4000 | 4152 | 1 | | TR | N | 0 | 100 | VFR | LIGHT | CLEAR | ATO | PEN-SIN | PEN | PENANG,MALAYSIA | N | PACIFIC | "FISH EAGLE |
| 06/07/89 | 35 | B767 | JT9D | 7R4D | 2 | | | N | | | | LIGHT | | N | SPK-NGO | XFO | SAPPORO OR NAGOYA,JAPAN | N | PACIFIC | |
| 06/09/89 | 36 | B767 | JT9D | 7R4D | 1 | 11:58 | AP | N | 1000 | | | LIGHT | SCATTERED | N | NGO-SPK | SPK | SAPPORO,JAPAN | N | PACIFIC | FORK-TAILED SWIFT |
| 06/10/89 | 42 | A320 | V2500 | A1 | 1 | | AP | N | | | | | | N | -ZRH | ZRH | ZURICH,SWITZERLAND | N | EUROPE | |
| 06/13/89 | 11 | B757 | RB211 | 535E4 | 1 | 14:40 | TR | N | 0 | 120 | | LIGHT | DRY | ATO | VCE-LGW | VCE | VENICE,ITALY | N | EUROPE | "SEAGULL"-MEDIUM |
| 06/14/89 | 12 | B757 | RB211 | 535C | 1 | | LD | N | | | | | | N | CFN-LGW | LGW | LONDON-GATWICK,ENGLAND,UK | N | EUROPE | |
| 06/18/89 | 37 | A320 | V2500 | A1 | 1 | 11:25 | | N | | | | | | N | BEG-LJU | BEG | BELGRADE,YUGOSLAVIA | N | EUROPE | EURASIAN KESTREL |
| 06/18/89 | 39 | B747 | JT9D | 7R4G2 | 3 | | CL | AIRWORTHY | | | | | | ALT | SPK-HND | SPK | SAPPORO,JAPAN | N | PACIFIC | BLACK KITE |
| 06/18/89 | 40 | B747 | JT9D | 7Q | 3 | | AP | N | | | IFR | LIGHT | | N | LAX-ANC | ANC | ANCHORAGE,ALASKA | Y | N.AMERICA | |
| 06/24/89 | 44 | DC10 | JT9D | 59A | 1 | 21:00 | LR | N | 0 | | | DARK | CLEAR | N | OSA-OKA | OKA | OKINAWA,JAPAN | N | PACIFIC | "SMALL BIRDS" |
| 07/01/89 | 69 | B767 | CF6 | 80C2 | 2 | | LR | N | 0 | | | | | N | -TOY | TOY | TOYAMA,JAPAN | N | PACIFIC | |
| 07/02/89 | 13 | B757 | RB211 | 535E4 | 2 | 1:32 | TR | N | 0 | | IFR | DARK | DRY | N | TLV-FCO | TLV | TEL AVIV,ISRAEL | N | MID.EAST | |
| 07/02/89 | 41 | B767 | JT9D | 7R4D | 2 | | LR | N | 0 | | | | | N | FUK-OKA | FUK | FUKUOKA,JAPAN | N | PACIFIC | COMMON ROCK DOVE |
| 07/02/89 | 170 | A310 | 4000 | 4152 | 1 | | TO | N | 15 | | | | | N | PEN-SIN | PEN | PENANG,MALAYSIA | N | PACIFIC | "1 LARGE BIRD" |
| 07/04/89 | 38 | A320 | V2500 | A1 | 2 | 9:57 | AP | N | 20 | 130 | | | SCLD | N | DEL-BOM | BOM | BOMBAY,INDIA | N | ASIA | "EAGLE" OR "KITE" |
| 07/05/89 | 217 | A300 | JT9D | 59A | 1 | | LD | N | 10 | | | | | N | CGK-MES | MES | MEDAN,INDONESIA | N | PACIFIC | |
| 07/06/89 | 177 | B757 | 2000 | 2037 | 2 | | TR | N | 0 | | | | | N | | XUS | | Y | N.AMERICA | |
| 07/09/89 | 595 | A320 | CFM56 | 5 | 1 | 16:15 | TR | N | 0 | V1- | | DAY | | N | BSL- | BSL | BASEL/MULHOUSE,SWITZERLAND | N | EUROPE | |
| 07/12/89 | 14 | B757 | RB211 | 535C | 2 | 8:57 | LR | N | 0 | 120 | VFR | LIGHT | DRY | N | LHR-GVA | GVA | GENEVA,SWITZERLAND | N | EUROPE | GREATER KESTREL |
| 07/12/89 | 43 | A320 | V2500 | A1 | 2 | 19:20 | RV | N | 0 | 040 | | | | N | LJU-TIV | TIV | TIVAT,YUGOSLAVIA | N | EUROPE | HERRING GULL |
| 07/14/89 | 49 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -MEL | XFO | MELBOURNE,AUSTRALIA? | N | | |
| 07/14/89 | 70 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | | XFO | JAPAN | N | PACIFIC | |
| 07/14/89 | 613 | A310 | CF6 | 80A | 1 | 11:00 | DA | N | 3000 | 180 | | | | N | -ORY | ORY | PARIS-ORLY,FRANCE | N | EUROPE | |
| 07/15/89 | 45 | B747 | JT9D | 7R4G2 | 2 | | LD | N | | | | | | N | -CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | |
| 07/15/89 | 55 | B767 | CF6 | 80A | 1 | | AP | N | | | | | | N | -NGO | NGO | NAGOYA,JAPAN | N | PACIFIC | |
| 07/17/89 | 46 | A320 | V2500 | A1 | 1 | 17:45 | LD | N | | | | | | N | BEG-LJU | LJU | LJUBLJANA,YUGOSLAVIA | N | EUROPE | EURASIAN KESTREL |
| 07/17/89 | 596 | A320 | CFM56 | 5 | 2 | 10:05 | TR | N | 0 | 120 | | DAY | | N | BIA- | BIA | BASTIA,CORSICA,FRANCE | N | EUROPE | EURASIAN KESTREL |
| 07/18/89 | 71 | B767 | CF6 | 80C2 | 1 | | AP | N | | | | | | ATB | -MAO | MAO | MANUS,BRAZIL | N | S.AMERICA | |
| 07/18/89 | 597 | A320 | CFM56 | 5 | 1 | 6:34 | TR | N | 0 | 130 | | | | N | ORY- | ORY | PARIS-ORLY,FRANCE | N | EUROPE | EURASIAN KESTREL |
| 07/19/89 | 72 | B767 | CF6 | 80C2 | 2 | | TR | SEMB | 0 | | | | | N | HIJ-TYO | HIJ | HIROSHIMA,JAPAN | N | PACIFIC | |
| 07/20/89 | 175 | A310 | 4000 | 4152 | 1 | | | N | | | | | | N | | XFO | SINGAPORE? | N | | |
| 07/21/89 | 50 | A320 | CFM56 | 5 | 1 | | LD | N | | | | | | N | -DUS | DUS | DUSSELDORF,GERMANY | N | EUROPE | COMMON SWIFT |
| 07/24/89 | 29 | B757 | RB211 | 535E4 | 2 | | | N | | | | | | N | IVT-DUS | XFO | DUSSELDORF OR MADAGASCAR | N | | EURASIAN KESTREL |
| 07/24/89 | 117 | B747 | JT9D | 7R4G2 | 1 | | AP | N | | | | | | N | NRT-SVO | SVO | MOSCOW-SHEREMETYE,RUSSIA | N | EUROPE | |
| 07/25/89 | 140 | A320 | V2500 | A1 | 1 | 7:12 | TR | SEMB | 0 | 135 | | | | ATB | TLS-TLS | TLS | TOULOUSE,FRANCE | N | EUROPE | |
| 07/28/89 | 178 | B767 | JT9D | 7R4D | 1 | | RV | N | 0 | | | | | N | -TLV | TLV | TEL AVIV,ISRAEL | N | MID.EAST | |
| 07/30/89 | 614 | B767 | CF6 | 80A | 1 | | TR | N | 0 | V1- | | | | N | | XFO | | N | | |
| 08/02/89 | 118 | A320 | V2500 | A1 | 1 | 16:10 | CL | N | 3500 | 250 | | | SCLD | ATB | DEL-BLR | DEL | DELHI,INDIA | N | ASIA | INDIAN WHT-BCKD VULTUR |
| 08/02/89 | 120 | B757 | 2000 | 2037 | 2 | | | N | | | | | | N | DTW- | XUS | DETROIT,MICHIGAN?? | Y | N.AMERICA | AMERICAN KESTREL |
| 08/02/89 | 598 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | | XFO | | N | | |
| 08/03/89 | 51 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -LHR | XFO | LONDON,ENGLAND? | N | | |
| 08/03/89 | 121 | B767 | 4000 | 4060 | 1 | | TR | N | 0 | 085 | | | | DIV | GRQ-DUS | GRQ | GRONINGEN,NETHERLANDS | N | EUROPE | RED-LEGGED PARTRIDGE |
| 08/03/89 | 599 | A320 | CFM56 | 5 | 1 | | LR | N | 0 | | | | | N | -MRS | MRS | MARSEILLE,FRANCE | N | EUROPE | BARN SWALLOW |
| 08/05/89 | 122 | DC10 | JT9D | 59A | 3 | 14:16 | TR | N | 0 | | | LIGHT | CLEAR | N | PEK-OSA | PEK | BEIJING,CHINA | N | ASIA | GRAY-HEADED LAPWING |
| 08/06/89 | 123 | B767 | 4000 | 4060 | 2 | 13:09 | AP | N | 300 | 145 | | | NCLD | N | MBA-MUC | MUC | MUNICH,GERMANY | N | EUROPE | BLACK-HEADED GULL |
| 08/06/89 | 124 | B747 | JT9D | 7Q | 4 | | CL | N | 1800 | | | | | N | DEL-FLO | DEL | DELHI,INDIA | N | ASIA | |
| 08/06/89 | 615 | A310 | CF6 | 80A | 2 | | TR | N | 0 | 135 | | | | ATO | AMS- | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | |
| 08/07/89 | 47 | B757 | RB211 | 535C | 1 | | | N | | | | | | N | LHR-BFS | XFO | LONDON-LHR OR BELFAST | N | EUROPE | |
| 08/07/89 | 125 | DC10 | JT9D | 59A | 1 | 19:00 | | N | | | | | | N | NRT-BKK | XFO | TOKYO-NRT OR BANGKOK | N | PACIFIC | FORK-TAILED SWIFT |

| IRDNAME | SPEC | #BDS | WT | ALERT | SEE | POWLOSS | VIBE | IFSD | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | NMS | F | REMARKS | EVT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 166 |
| OMMON LAPWING | P14a1 | 1 | 8 | N | N | N | N | N | | | | | | | | | | | | | | | | | | 0 | | BIRD MATTER ON NOSE COWL,OUTSIDE OF FAN | 1 |
| OMMON LAPWING | P14a1 | 1 | 8 | N | N | | 4.7 | N | Y | Y | | Y | | Y | | | | | | | | | | | | 1 | | #2 ENG VIBR DUE TO CLAPPER LOCKUP | 1 |
| | | 1 | | | N | N | N | N | Y | Y | | | | | | | | | | | | | | | | 1 | | DMG BLD FOUND ON GRD INSP AT BAH | 2 |
| ULL*-MEDIUM | | 1 | | | SE | N | N | N | | | | | | | | | | | | | | | | | | 0 | | BLOOD ON BLD TIPS FOUND ON GROUND INSP | 3 |
| | | | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | HPC BSCOPED. NO DMG FOUND | 15 |
| | | | | N | FL | STALLS | | N | | | | | | | | | | | | | | | | | | S | | TAILPIPE FLAMES.THROTLE REDUC.POST CLIMB | 176 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | Y | | | | | 2 | | 1 IPC BL BE/DE | 111 |
| | | 1 | | | | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 1 FB BENT AT TIP | 19 |
| | | 1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 165 |
| OMMON ROCK DOVE | Q3a1 | 1 | 14 | | | N | INC | N | | | | | Y | Y | | | Y | | | | | | | | | 2 | | 10 PR FB REPLCD,127 COWL RIVETS FRACTRD | 16 |
| ACK-HEADED GULL | P5a35 | 3 | 10 | | Y | N | | N | | | | | | | | | | | | | | | | | | 0 | | TRAINING FLIGHT | 17 |
| | | | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | | 4 |
| | | 1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | VIBES EXISTED PRIOR TO BIRDSTRIKE | 179 |
| OMMON LAPWING | P14a1 | 1 | 7.7 | | | SURGE | | N | | | | | | | | | | | | | Y | | | | | S | | SURGE,FLAMES.LTU SUD INTL.ENG REMVD. | 18 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | LTU SUD INTL | 28 |
| | | | | | | N | | | | | | | | | | | | | | | Y | | | | | X | | C6 LE BL DENTS-HARD OBJ,NOT BIRD INGSTN | 20 |
| LVER (RED-BILLED) GULL | P5a32 | 1 | 11 | N | SE | N | | N | | | | | | | | | | | | | | | | | | 0 | | 2 OTHER A/C STRIKES | 167 |
| EDIUM WHITE* | | 1 | | N | FL | N | N | N | Y | | | | | | | | | | | | | | | | | 1 | | 1 FB LE DEFLECTION | 5 |
| | | 1 | | | N | N | N | N | | | | | | | | | | | | | | | | | | 0 | | BLOOD STAINS UPPER OUTER SIDE OF INTAKE | 6 |
| MERICAN ROBIN | Z21a325 | 1 | 2.5 | | Y | | | N | | Y | | | Y | | | | Y | | | | | | | Y | | 2 | | FAN CASE STRUT DMG.THUD.1FB BROKEN. | 21 |
| | | 1 | | N | | SURGE | | SURGE | | | | | | | | | | | | | | | | | | S | | LOUD BANG(SURGE).MANY TIRES DEFLATED. | 22 |
| ACK-CROWNED NITE HERON | I1b2 | 1 | 24 | | | | | | | | | | | | Y | | | | | | | | | | | 2 | | TRNG FLT.5 FB BE. | 23 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BLOOD ON INLET LIP | 26 |
| TTLE BROWN BAT | BAT | 1 | 0.5 | | N | N | | N | | | | | | | | | | | | | Y | | | | | X | | UNRELATED MINOR HARD OBJ HPC DMG.ENG REM | 24 |
| TTLE BROWN BAT | BAT | 1 | 0.5 | | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | WHEN,WHERE UNKNOWN | 24 |
| OMMON ROCK DOVE | Q3a1 | 1 | 14 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | MAINT. FOUND BIRD REMAINS IN INLET | 25 |
| ULL* | | | | N | FL | N | 1.9 | N | | Y | | | Y | | | | | | | | | | | | | 1 | | DIV TO MUC AT END OF CLIMB | 7 |
| | | 1 | | | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | BLOOD FOUND IN TOKYO PRE-DEPART CHECK | 30 |
| OMMON ROCK DOVE | Q3a1 | | 14 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD RMNS.ON FB'S | 27 |
| | | >1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | SQ FLT #44? SPINNER HIT | 168 |
| AY-HEADED LAPWING | P14a12 | 3 | 10 | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | SMALL WHITE BIRDS-TBI | 31 |
| RRING GULL | P5a24 | 3 | 36 | | Y | 100%,NR SURGE | | HI EGT | | Y | | | | | | | | | | | Y | | Y | | | 2 | • | EPR=0,HPC BL/VANE CLASH,HARD OBJ.DMG | 32 |
| NG-NECKED DOVE | Q3a62 | 1 | 5 | | N | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 2 FB BE.2 PR FB REPLACED | 33 |
| OMMON SAND MARTIN | Z15b31 | 1 | 0.5 | N | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | STRIKE ON OUTSIDE OF COWL | 8 |
| ULL* | | 1 | | | | N | N | N | | | | | | Y | | | | | | | | | | Y | | 1 | | NACELLE LINING DMG AFT OF FAN | 9 |
| | | | | | | N | N | N | | | | | | | | | | | | | | | | Y | | 1 | | 1 FB CLAPPER DMGED | 10 |
| | | 1 | | N | N | SURGE | | N | | | | | | | | | | | | | | | | | | S | | SURGE | 169 |
| ISH EAGLE | | 1 | | | Y | SURGE | | N | | | | | | | | | | | | | | | | | | S | | SURGE,NO BIRD REMAINS | 34 |
| | | 1 | | | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | BD.REMNS.FD ON GRD AT NAGOYA-SPINNR.FEGV | 35 |
| RK-TAILED SWIFT | U3b70 | 1 | 1.5 | | Y | N | | N | | | | | | | | | | | | | | | | | | 0 | | FOUND ON WALKAROUND | 36 |
| | | 1 | | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | INLET COWL HIT.NO INGESTION EVIDENCE | 42 |
| EAGULL*-MEDIUM | | 1 | | | 1 | N | 4.0 | N | | Y | | Y | Y | | | | | | | | | | | | | 1 | | 2 FB SHNGLD,TIP DMG.ATO DUE TO VIBES | 11 |
| | | | | | | N | N | N | | | | | | Y | | | | | | | Y | | | | | 2 | | 1 IPC BL BE/DE | 12 |
| RASIAN KESTREL | J5b12 | 1 | 7 | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | BDSTRIKE EVIDENCE FOUND ON WALKAROUND | 37 |
| ACK KITE | J4a31 | 1 | 32 | | | | | N | Y | | | | | | Y | | | | | | | | | | | 2 | | 12 FB BE.PLANNED ALT WAS CHANGED. | 39 |
| | | | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD RMNS IN GUIDE VANES | 40 |
| MALL BIRDS* | | 1 | | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | FLOCK OF SMALL BIRDS | 44 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | 3 HPC BLDS TIP CORNERS MISSING.SERVCABLE | 69 |
| | | 1 | | N | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | FLT CONTINUED NORMALLY.UNVALDTD 8oz WT | 13 |
| OMMON ROCK DOVE | Q3a1 | | 14 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BRD REMNS FAN EXIT GUIDE VANES | 41 |
| LARGE BIRD* | | 1 | | N | N | N | | N | | | | | Y | | | | | | | | | | | | Y | 1 | | 1 FB DMGD. HPC BLS MINOR NICKS | 170 |
| AGLE* OR *KITE* | | 1 | | | 1 | N | | N | Y | Y | | | Y | | | | | | | | | | | | | 1 | | 2FB,FAN CASE PANEL.PASSNGR SAW 6LB EAGLE | 38 |
| | | 1 | | | | | | N | | | Y | | | Y | | | Y | | | | | | | | | 2 | | 1FB PC MISSING,3FB TORN.COWL HOLE | 217 |
| | | 1 | | N | N | N | INC | N | | Y | | | | | | | | | | | | | | | | 1 | | 1-2 FB BE | 177 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BORESCOPED-NO DAMAGE | 595 |
| EATER KESTREL | J5b18 | 1 | 9.6 | N | 1 | N | N | N | | | | | | | | | | | | | Y | | | | | 2 | | 4 IPC BL BENT.HI IDLE=38% FAN SPEED | 14 |
| RRING GULL | P5a24 | 1 | 32 | | Y | N | | N | | | | | | | | | | | | | | | | | | 0 | | A/C AT FULL THRUST REVERSE,"1/2 BIRD" | 43 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | PREFLIGHT INSP. | 49 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GROUND INSP. | 70 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BORESCOPED. | 613 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 45 |
| | | 1 | | | | | | N | | Y | | | | | | | | | | | | | | | | 1 | | 2 FB BENT | 55 |
| RASIAN KESTREL | J5b12 | 1 | 8 | | | N | | N | | | | | Y | | | | | | | | | | | | | 1 | | DMG FN CASE PANEL CONTINUE IN SERVICE | 46 |
| RASIAN KESTREL | J5b12 | 1 | 7 | | SE | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 596 |
| | | 1 | | | Y | N | 5.0 | N | | | | Y | | | | | | | | | | | | | | 1 | | ATB ON SUCCEEDING FLIGHT | 71 |
| RASIAN KESTREL | J5b12 | 1 | 7 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | -V1.BORESCOPED-NO DAMAGE. | 597 |
| | | 2 | | | | N | | N | Y | | | Y | Y | | Y | | | | | | Y | | | | | 2 | | 2HPC STG 1 BLDS,6 FB DMGD. ENG REMOVED | 72 |
| | | 1 | | N | N | N | | N | | | | | Y | | | | | | | | | | | | | 1 | | RUBSTRIP BROKEN | 175 |
| MMON SWIFT | U3b68 | 1 | 1 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | FRESH BIRD STAINS AFTER LANDING | 50 |
| RASIAN KESTREL | J5b12 | 1 | 7.2 | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | GROUND INSP. | 29 |
| | | 1 | | | | | | N | | | | | | | | | | | | | | | | | | 0 | | AGB HOUSING NOT CRACKED.NO ENG DMG. | 117 |
| | | 2 | | N | Y | N | | SMELL | | | | | Y | | | | | | | | | | | | | 1 | | 1SMALL&1LARGE BIRD,NOSE PANEL CRACK.TRNG | 140 |
| | | 1 | | N | | N | | N | | | | | | | | | | | | | Y | | | | | X | | 3 HPC BLADES HARD OBJECT NICKS.NOT BIRD. | 178 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 614 |
| DIAN WHT-BCKD VULTURE | J4a48 | 1 | 192 | | SE | | INC | N | | | | | Y | Y | Y | | | | | | | | | | Y | 2 | | 6 FB BE.VOL.PWR RED-VIBES.COWL DMG. | 118 |
| ERICAN KESTREL | J5b11 | 1 | 4 | | N | N | | N | Y | Y | | | | | | | | | | | | | | | | 1 | | 1 FB LE DENT INBD SHROUD | 120 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 598 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GROUND INSP. LHR | 51 |
| D-LEGGED PARTRIDGE | M5b16 | 1 | 16 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | 2D STRK THIS ENG-3/18/89.SPINNER HIT. | 121 |
| RN SWALLOW | Z15b39 | 1 | 0.75 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 599 |
| AY-HEADED LAPWING | P14a12 | 1 | 10 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | SPINNER HIT | 122 |
| ACK-HEADED GULL | P5a35 | 1 | 10 | N | SE | N | | N | | | | | | | | | | | | | | | | | | 0 | | HIT NOSE COWL, ING INTO CORE | 123 |
| | | 1 | | | N | N | 4.0 AVM | N | Y | | | | | Y | | | Y | | | | | | | | Y | 2 | | 5FB DMGD,4FB REPAIRD.LOUD THUD.COWL DENT | 124 |
| | | 1 | | | 1 | N | INC | N | | | | | | | Y | | | | | | | | | | | 2 | | 6FB BE.SAW BIRD JUST BEFORE V1.BANG. | 615 |
| | | 1 | | N | N | N | N | N | | | | | | | | | | | | | Y | | | | | L | | 20 STG1 IPC BL SLITE TIP CURL WITN LIMIT | 47 |
| RK-TAILED SWIFT | U3b70 | 1 | 1.5 | | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD INTO CORE | 125 |

| DATE | EVT | A/C | ENG | DASH | POS | TIME | POF | SIGEVT | ALT | SPD | FLR | LTCON | WEATHER | CREW | CITYPRS | APT | LOCALE | US | REGION | BIRDNAME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 08/08/89 | 73 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN? | N | | |
| 08/09/89 | 126 | B747 | JT9D | 7Q | 4 | | | N | | | | | | N | -NRT | XFO | TOKYO-NRT,JAPAN?? | N | | COMMON SKYLARK |
| 08/10/89 | 127 | B767 | JT9D | 7R4D | 2 | | | N | | | | | | N | YYZ-YVZ | XFO | TORONTO/DEER LAKE,CANADA | N | N.AMERICA | |
| 08/11/89 | 52 | A320 | CFM56 | 5 | 2 | | AP | N | | | | LIGHT | CLEAR | N | -DUS | DUS | DUSSELDORF,GERMANY | N | EUROPE | COMMON WOOD PIGEON |
| 08/13/89 | 56 | B767 | CF6 | 80A | 1 | 16:56 | TR | N | 0 | 128 | | LIGHT | CLOUDS | ATO | LGW- | LGW | LONDON-GATWICK,ENGLAND,UK | N | EUROPE | |
| 08/13/89 | 74 | A310 | CF6 | 80C2 | 2 | 9:05 | TR | SEMB | 0 | | | | OVERCAST | ATB | PIK-BHX | PIK | PRESTWICK,SCOTLAND,UK | N | EUROPE | HERRING GULL |
| 08/14/89 | 75 | B767 | CF6 | 80C2 | 1 | 11:26 | CL | TRANSVERSE FRAC. | 200 | 150 | | | | ATB | GRU- | GRU | SAO PAULO,BRAZIL | N | S.AMERICA | BLACK VULTURE |
| 08/15/89 | 130 | B747 | JT9D | 7Q | 4 | | | N | | | | | | N | | XXX | | U | | BLACK-HEADED GULL |
| 08/16/89 | 57 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN? | N | | |
| 08/16/89 | 129 | DC10 | JT9D | 59A | 3 | 11:55 | AP | N | | | | | | N | HND-SPK | SPK | SAPPORO,JAPAN | N | PACIFIC | BLACK KITE |
| 08/18/89 | 76 | A310 | CF6 | 80C2 | 1 | | CL | N | | | | | | N | MBA- | MBA | MOMBASA,KENYA | N | AFRICA | |
| 08/18/89 | 128 | B747 | JT9D | 7R4G2 | 2 | 12:00 | TR | N | 0 | V1- | | LIGHT | CLEAR | ATO | ORD-NRT | ORD | CHICAGO,ILLINOIS | Y | N.AMERICA | "GULL" |
| 08/18/89 | 131 | B757 | 2000 | 2037 | 1 | | | N | | | | | | N | CAN-SHA | XFO | GUANGZHOU/SHANGHAI,CHINA | N | ASIA | |
| 08/20/89 | 174 | B757 | 2000 | 2037 | 1 | | | N | | | | | | N | | XUS | | Y | N.AMERICA | |
| 08/21/89 | 58 | B767 | CF6 | 80A | 1 | | LR | N | 0 | | | | | N | -OSA | OSA | OSAKA,JAPAN | N | PACIFIC | |
| 08/21/89 | 173 | B767 | JT9D | 7R4D | 2 | | | N | | | | | | N | | XUS | | Y | N.AMERICA | |
| 08/22/89 | 600 | A320 | CFM56 | 5 | 1 | 18:13 | LR | N | 0 | 120 | | | | N | -LYS | LYS | LYON,FRANCE | N | EUROPE | EURASIAN KESTREL |
| 08/25/89 | 77 | A310 | CF6 | 80C2 | 2 | | | N | | | | | | N | -YEG | XFO | EDMONTON,CANADA? | N | | |
| 08/28/89 | 78 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -LAX | XUS | LOS ANGELES,CA? | Y | N.AMERICA | |
| 08/28/89 | 79 | B767 | CF6 | 80C2 | 1 | | LR | N | 0 | | | | | N | -KUH | KUH | KUSHIRO,INDIA | N | ASIA | |
| 08/29/89 | 132 | B767 | JT9D | 7R4D | 1 | | TR | N | 0 | | | | | N | NRT- | NRT | TOKYO-NRT,JAPAN | N | PACIFIC | |
| 08/30/89 | 53 | A320 | CFM56 | 5 | 1 | 5:40 | TR | N | 0 | VR | | LIGHT | RAIN | ATB | BRU-LHR | BRU | BRUSSELS,BELGIUM | N | EUROPE | CARRION CROW |
| 08/31/89 | 59 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN? | N | | |
| 08/31/89 | 133 | B757 | 2000 | 2037 | 2 | | | N | | | | | | N | CAN-SHA | XFO | GUANGZHOU/SHANGHAI,CHINA | N | ASIA | |
| 08/31/89 | 142 | B767 | JT9D | 7R4D | 2 | 20:00 | AP | N | | | | | | N | NGO-HND | HND | TOKYO-HND,JAPAN | N | PACIFIC | BLACK-CROWNED NITE H |
| 08/31/89 | 171 | B747 | 4000 | 4056 | 3 | | LR | MEMB | 0 | | | | | N | PAE-PAE | PAE | EVERETT,WASHINGTON | Y | N.AMERICA | "SMALL BIRDS" |
| 08/31/89 | 171 | B747 | 4000 | 4056 | 4 | | LR | MEMB | 0 | | | | | N | PAE-PAE | PAE | EVERETT,WASHINGTON | Y | N.AMERICA | "SMALL BIRDS" |
| 08/31/89 | 172 | A300 | JT9D | 59A | 1 | | TC | N | | | | | | ATB | CGK-MES | CGK | JAKARTA-SOEKARNO,INDONESIA | N | PACIFIC | |
| 09/01/89 | 134 | B747 | JT9D | 7Q | 3 | 8:56 | AP | N | 500 | 145 | | | NCLD | N | BAH-BKK | BKK | BANGKOK,THAILAND | N | PACIFIC | "SMALL" |
| 09/05/89 | 60 | B767 | CF6 | 80A | 1 | | AP | N | | | | | | N | -SDJ | SDJ | SENDAI,JAPAN | N | PACIFIC | |
| 09/05/89 | 141 | A320 | V2500 | A1 | 1 | | TR | N | 0 | 145 | | | | N | DEL-HYD | DEL | DELHI,INDIA | N | ASIA | "LARGE KITE"4-5 KG |
| 09/05/89 | 601 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | | XFO | | N | | |
| 09/06/89 | 135 | B757 | 2000 | 2037 | 1 | | | N | | | | | | N | CAN-SHA | XFO | GUANGZHOU/SHANGHAI,CHINA | N | ASIA | |
| 09/07/89 | 136 | B747 | 4000 | 4056 | 3 | | LR | N | 0 | | | LIGHT | | N | PAE-PAE | PAE | EVERETT,WASHINGTON | Y | N.AMERICA | COMMON NIGHTHAWK |
| 09/09/89 | 61 | B767 | CF6 | 80A | 2 | | LD | N | | | | | | N | -TOY | TOY | TOYAMA,JAPAN | N | PACIFIC | "BAT" |
| 09/10/89 | 62 | A310 | CF6 | 80A | 1 | 15:10 | TR | N | 0 | V1 | VFR | LIGHT | OVERCAST | N | AMS- | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | |
| 09/10/89 | 137 | B747 | JT9D | 7R4G2 | 2 | | | N | | | | | | N | LHR-ANC | XXX | LONDON-LHR OR ANCHORAGE | U | | HORNED LARK |
| 09/11/89 | 80 | A310 | CF6 | 80C2 | 2 | | | N | | | | | | N | -DEL | XFO | DELHI,INDIA? | N | | |
| 09/11/89 | 634 | B767 | CF6 | 80C2 | 1 | | LR | N | 0 | | | | | N | -HIJ | HIJ | HIROSHIMA,JAPAN | N | PACIFIC | |
| 09/12/89 | 63 | A310 | CF6 | 80A | 1 | | | N | | | | | | N | -AMS | XFO | AMSTERDAM, NETHERLANDS? | N | | |
| 09/12/89 | 138 | B747 | JT9D | 7Q | 1 | | TR | MEMB,TRANSV.FRAC | 0 | 170 | | | | ATB | LAX-OSA | LAX | LOS ANGELES,CAL. | Y | N.AMERICA | COMMON ROCK DOVE |
| 09/12/89 | 138 | B747 | JT9D | 7Q | 2 | | TR | MEMB,TRANSV.FRAC | 0 | 170 | | | | ATB | LAX-OSA | LAX | LOS ANGELES,CAL. | Y | N.AMERICA | COMMON ROCK DOVE |
| 09/13/89 | 139 | B747 | JT9D | 7R4G2 | 3 | | | N | | | | | | N | MNL-BKK | XFO | MANILA OR BANGKOK | N | PACIFIC | SCHRENDK'S BITTERN |
| 09/13/89 | 554 | A320 | V2500 | A1 | 1 | 7:35 | RV | N | 0 | 080 | | | SCLD | N | -AMD | AMD | AHMEDABAD,INDIA | N | ASIA | "KITE"-MEDIUM |
| 09/15/89 | 54 | A320 | CFM56 | 5 | 2 | | TR | N | 0 | V1+ | | | | N | FRA-CDG | FRA | FRANKFURT,GERMANY | N | EUROPE | |
| 09/17/89 | 48 | B757 | RB211 | 535C | 1 | 9:33 | TR | N | 0 | 140 | VFR | LIGHT | DRY | ATB | BFS-LHR | BFS | BELFAST,N.IRELAND,UK | N | EUROPE | COMMON LAPWING |
| 09/17/89 | 81 | B767 | CF6 | 80C2 | 1 | | TR | N | 0 | | | | | N | MYJ-TYO | MYJ | MATSUYAMA,JAPAN | N | PACIFIC | |
| 09/19/89 | 65 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -SHI | XFO | SHIMOJISHIMA,JAPAN? | N | | |
| 09/20/89 | 82 | A310 | CF6 | 80C2 | 1 | | TR | N | 0 | 120 | | | | N | BJL-DKR | BJL | BANJUL,GAMBIA | N | AFRICA | |
| 09/22/89 | 143 | DC10 | JT9D | 59A | 3 | | CL | N | 100 | | | LIGHT | | N | | XFO | | N | | "LARGE SNOWY HERON" |
| 09/23/89 | 144 | A300 | 4000 | 4158 | 1 | 18:09 | TO | N | 20 | 132 | | | NCLD | N | PUS-SEL | PUS | PUSAN,KOREA | N | ASIA | "EGRET"-MEDIUM |
| 09/23/89 | 234 | A310 | 4000 | 4152 | 2 | 9:23 | | N | | | | | | | | XFO | | N | | |
| 09/24/89 | 66 | B767 | CF6 | 80A | 1 | | DA | N | | | | | | N | -OKA | OKA | OKINAWA,JAPAN | N | PACIFIC | |
| 09/25/89 | 145 | B767 | JT9D | 7R4D | 2 | | | N | | | | | | N | FUK-HND | FUK | FUKUOKA,JAPAN | N | PACIFIC | |
| 09/27/89 | 67 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN? | N | | |
| 09/27/89 | 146 | B747 | 4000 | 4056 | 4 | | | N | | | | | | N | | XXX | | U | | |
| 09/28/89 | 68 | B767 | CF6 | 80A | 2 | | TR | N | 0 | 130 | VFR | DARK | CLEAR | ATO | JFK- | JFK | NEW YORK-JFK,NY | Y | N.AMERICA | HERRING GULL |
| 09/28/89 | 83 | B747 | CF6 | 80C2 | 2 | | | N | | | | | | N | -RIO | XFO | RIOGRANDE,BRAZIL? | N | | BLACK-CROWNED NITE H |
| 09/29/89 | 147 | B747 | JT9D | 7Q | 1 | | | N | | | | | | N | YVR-SEL | XFO | VANCOUVER OR SEOUL | N | | |
| 09/29/89 | 602 | A320 | CFM56 | 5 | 1 | 8:50 | CL | N | 100 | 160 | | DAY | | N | BIQ- | BIQ | BIARRITZ,FRANCE | N | EUROPE | "FINCH" |
| 09/30/89 | 616 | B767 | CF6 | 80A | 2 | | TR | N | 0 | 125 | | | | N | KCZ- | KCZ | KOCHI,JAPAN | N | PACIFIC | |
| 10/01/89 | 88 | B767 | CF6 | 80A | 2 | | LR | N | 0 | | | | | N | -KCZ | KCZ | KOCHI,JAPAN | N | PACIFIC | |
| 10/01/89 | 98 | B747 | CF6 | 80C2 | 3 | | LR | N | 0 | | VFR | | | N | AMS-JFK | JFK | NEW YORK-JFK,NY | Y | N.AMERICA | RING-NECKED PHEASANT |
| 10/01/89 | 148 | B747 | 4000 | 4056 | 3 | | | N | | | | | | N | | XFO | | N | | COMMON BARN OWL |
| 10/04/89 | 151 | B767 | 4000 | 4060 | 1 | | | SEMB | | | | | | N | | XXX | | U | | |
| 10/04/89 | 603 | A320 | CFM56 | 5 | 1 | 14:56 | LR | N | 0 | 110 | | | | N | -LYS | LYS | LYON,FRANCE | N | EUROPE | EURASIAN KESTREL |
| 10/06/89 | 149 | B757 | 2000 | 2040 | 2 | | AP | N | | | | | | N | ALB-PIE | PIE | ST.PETERSBURGH,FLA. | Y | N.AMERICA | |
| 10/07/89 | 112 | B757 | RB211 | 535C | 1 | 11:22 | LD | MESB | 832 | 135 | VFR | LIGHT | DRY | N | LHR-BSL | BSL | BASEL/MULHOUSE,SWITZERLAND | N | EUROPE | "PIGEON"-MEDIUM |
| 10/07/89 | 112 | B757 | RB211 | 535C | 2 | 11:22 | LD | MESB | 832 | 135 | VFR | LIGHT | DRY | N | LHR-BSL | BSL | BASEL/MULHOUSE,SWITZERLAND | N | EUROPE | "PIGEON"-MEDIUM |
| 10/07/89 | 150 | B767 | 4000 | 4060 | 1 | | | SEMB | | | | | | N | CPH-CAI | XFO | COPENHAGEN OR CAIRO | N | | SENEGAL COUCAL |
| 10/09/89 | 604 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -NTE | XFO | NANTES,FRANCE?? | N | | |
| 10/10/89 | 113 | B757 | RB211 | 535E4 | 2 | | LD | N | | | | | | N | -KTM | KTM | KATHMANDU,NEPAL | N | ASIA | |
| 10/12/89 | 99 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN? | N | | |
| 10/12/89 | 152 | B767 | JT9D | 7R4D | 1 | | TR | MEMB,POWER LOSS | 0 | 125 | | | | ATO | TLV-CDG | TLV | TEL AVIV,ISRAEL | N | MID.EAST | CHUKAR |
| 10/12/89 | 152 | B767 | JT9D | 7R4D | 2 | | TR | MEMB,POWER LOSS | 0 | 125 | | | | ATO | TLV-CDG | TLV | TEL AVIV,ISRAEL | N | MID.EAST | CHUKAR |
| 10/15/89 | 605 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | | XFO | | N | | |
| 10/16/89 | 100 | B767 | CF6 | 80C2 | 1 | | LR | N | 0 | | | | | N | -OSA | OSA | OSAKA,JAPAN | N | PACIFIC | |
| 10/16/89 | 101 | A310 | CF6 | 80C2 | 1 | | AP | N | | | | OVERCA | RAIN | N | -IST | IST | ISTANBUL,TURKEY | N | MID.EAST | "SMALL BLACK" |
| 10/16/89 | 114 | B757 | RB211 | 535E4 | 2 | 8:03 | LD | N | 600 | 120 | VFR | LIGHT | DRY | N | DCA-ORD | ORD | CHICAGO,ILLINOIS | Y | N.AMERICA | RING-BILLED GULL |
| 10/16/89 | 153 | B747 | JT9D | 7R4G2 | 2 | | | N | | | | | | N | FUK-HND | XFO | FUKUOKA OR TOKYO-HND,JAPAN | N | PACIFIC | BLACK-TAILED GULL |
| 10/18/89 | 154 | B747 | JT9D | 7R4G2 | 2 | | | U | | | | | | N | CTS-HND | XFO | SAPPORO OR TOKYO-HND,JAPAN | N | PACIFIC | |
| 10/19/89 | 155 | B767 | 4000 | 4060 | 1 | | LR | SEMB | 0 | | | LIGHT | | N | -HER | HER | HERAKLION,GREECE | N | EUROPE | HORNED LARK |
| 10/21/89 | 84 | A320 | CFM56 | 5 | 1 | | LR | N | 0 | | | | | N | -CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | |
| 10/21/89 | 102 | B747 | CF6 | 80C2 | 3 | 15:56 | CL | MESB | 50 | 170 | | CLOUDS | RAIN | N | HAM- | HAM | HAMBURG,GERMANY | N | EUROPE | "MEDIUM" |
| 10/21/89 | 102 | B747 | CF6 | 80C2 | 4 | 15:56 | CL | MESB | 50 | 170 | | CLOUDS | RAIN | N | HAM- | HAM | HAMBURG,GERMANY | N | EUROPE | "MEDIUM" |
| 10/22/89 | 89 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -DUS | XFO | DUSSELDORF,GERMANY? | N | | |
| 10/23/89 | 103 | A310 | CF6 | 80C2 | 1 | 21:00 | TR | SEMB,TRANSV.FRAC | 0 | 147 | | DARK | 2100 | ATO | AMM- | AMM | AMMAN,JORDAN | N | MID.EAST | EURASIAN STONE-CURLI |

| BIRDNAME | SPEC | #BDS | WT | ALERT | SEE | POWLOSS | VIBE | IFSD | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | NMS | F | REMARKS | EVT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | N | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BSI OK | 73 |
| COMMON SKYLARK | Z14a81 | 1 | 2 | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | FEATHERS AT STGS 3 & 7.5 BLEED SCREEN | 126 |
| | | 1 | | N | N | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 1 FB BOWED 1/4" | 127 |
| COMMON WOOD PIGEON | Q3a9 | 1 | 18 | | | | | N | | | | | | | | | | | | | | | | | | 0 | | FEATHERS SENT TO AIR FRANCE | 52 |
| | | 1 | | | 1 | | 5.0 | N | Y | | | Y | Y | | | | | | | | | | | | | 2 | | 5FB,3AC.LINERS DMGD.DARK BIRD | 56 |
| HERRING GULL | P5a24 | 2 | 40 | | 1 | | INC | N | | | | Y | Y | | | | Y | | | | Y | | | | | 2 | | 18 FB DMGD,HPC BL DMG SERVICEABLE | 74 |
| BLACK VULTURE | J1a1 | 1 | 48 | N | 1 | 50% | 5.0 | VIBES | | | | Y | | Y | | | | Y | | | | | | | | 2 | * | 1 FB FAILED 3 IN ABOVE MIDSPAN SHROUD | 75 |
| BLACK-HEADED GULL | P5a35 | 1 | 10 | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD,RMNS IN LPC. ENG DISASSEMBLED | 130 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GROUND INSP. | 57 |
| BLACK KITE | J4a31 | 1 | 32 | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | FINAL AP. BIRD RMNS ON FEGV | 129 |
| | | 1 | | N | | | HIGH | VIBES | Y | | | | | | | | | | | | | | | Y | | 1 | | 3 FB LE,1 OGV DELAMINATED | 76 |
| "GULL" | | 1 | | | SE | N | | N | | | | | | | | | | | | | | | | | | 0 | | FEATHER ON FEGV | 128 |
| | | 1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | TO BE SCOPED.CORE DMG? | 131 |
| | | 1 | | N | N | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 1 FB BE.FLT # NW 1191 | 174 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | L | | HPC STG 1 BLDS DMGD SERVICEABLE LIMITS | 58 |
| | | | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD HIT NOSE COWL | 173 |
| EURASIAN KESTREL | J5b12 | 1 | 7 | | 1 | N | | N | | | | | | | | | | | | | | | | | | 0 | | BORESCOPED-NO DAMAGE. | 600 |
| | | 1 | | N | N | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 1 BE FB.GROUND INSP. | 77 |
| | | 1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | GROUND INSP. | 78 |
| | | 1 | | | Y | | | N | | | | | | | | | | | | | | | | | | 0 | | | 79 |
| | | | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 132 |
| CARRION CROW | Z51a31 | 1 | 19 | | | N | 9.6 | N | Y | | | Y | Y | | | | Y | | | | Y | | | | | 2 | | 22FB DMGD.COMP DMG SERVICEABLE | 53 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GROUND INSP. | 59 |
| | | 1 | | N | | N | | N | | Y | | | | | | | | | | | | | | | Y | L | | 2 FB BENT WITHIN LIMITS | 133 |
| BLACK-CROWNED NITE HERON | I1b2 | 1 | 24 | N | N | N | | N | | | | | | | | | | | | | Y | | | | | 1 | | C9 TIP NICK BLENDED OUT. | 142 |
| "SMALL BIRDS" | | >1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | TRAINING FLIGHT | 171 |
| "SMALL BIRDS" | | >1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | HIT ON SPINNER | 171 |
| | | 1 | | N | N | SURGE | | N | | | | | | | | | Y | | | | | | | | | 2 | | 1 BL BROKEN.BANG(SURGE),THEN POWER LOSS | 172 |
| "SMALL" | | 1 | | N | 1 | N | | N | | | | | Y | | | | Y | | | | | | | | | 2 | | 2FB PIECES MISSING.3FB DMG.COWL HIT. | 134 |
| | | 1 | | N | | N | | N | | | | | Y | | | | | | | | | | | Y | | 1 | | 10 OGV OUTER FAIRINGS,3.AC LINRS REPLCD | 60 |
| "LARGE KITE"4-5 KG | | 1 | | N | Y | N | INC | N | | Y | | | Y | Y | | | | | | | | | | | | 1 | | 3FB BE.FAN CASE FAIRING HOLE.CORE ING. | 141 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BORESCOPED-NO DAMAGE | 601 |
| | | 1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | SAME A/C AS 133 & 131. | 135 |
| COMMON NIGHTHAWK | T4a5 | 1 | 2.5 | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | BOEING OWNED.TO BE DELVD KE.SPINNER HIT. | 136 |
| "BAT" | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | 6 BLS DMGD IN STG 5&6 COMPRESSOR | 61 |
| | | 1 | | | | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 2 BE FB 15 MM FROM TIP | 62 |
| HORNED LARK | Z14a83 | 1 | 1.5 | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | ANC=ANCHORAGE, ALASKA.BIRD INTO CORE. | 137 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GROUND INSP. | 80 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 634 |
| | | 1 | | | | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 1 FB TIP CURL | 63 |
| COMMON ROCK DOVE | Q3a1 | 4 | 14 | N | Y | SURGE | | N | | | | | Y | Y | Y | | Y | | | | | | | | | 2 | | INLET COWL PEN. BY FB PIECE.5FB DMG. | 138 |
| COMMON ROCK DOVE | Q3a1 | 5 | 14 | N | Y | INVLNTRY.NRSTALL | INC | SURGE,HIEGT | | | | | Y | | Y | | | Y | | | | | | | | 2 | * | NONRECOV STALL,TAIL CONE LIBRTED,7BL DMG | 138 |
| SCHRENDK'S BITTERN | I1d6 | 1 | 3 | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 139 |
| "KITE"-MEDIUM | | 1 | | N | 1 | N | | N | Y | | | | Y | | | | | | | | | | | | | 1 | | 3FB LE WITHIN LIMITS,AC PNL DMG. | 554 |
| | | 1 | | | | N | 3.3 | N | | | | | | | | | | | | | | | | | Y | 1 | | 2FB DMG,RPL.VIB:3.3CLIMB,2CRUISE,1.2IDLE | 54 |
| COMMON LAPWING | P14a1 | 1 | 8 | N | SE | N | 2.2 | N | Y | | | | Y | | Y | Y | Y | | | | | | | | | 2 | | 5 FB BE/DE,14 TORN,3 BROKEN,ENG.CHANGED | 48 |
| | | 1 | | | Y | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 81 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | 1 STG 1 HPC BL TIP MISSG,5 STG6 BL TEARS | 65 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | SM-MED BIRD INTO CORE | 82 |
| "LARGE SNOWY HERON" | | 1 | | N | Y | N | | N | Y | | | | | | Y | | | | | | | | | | | 2 | | 5 BL BE LE. FLT #968 | 143 |
| "EGRET"-MEDIUM | | 1 | | Y | 1 | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 3 FB BE. | 144 |
| | | 1 | | | | N | | | Y | | | | | | | | | | | | | | | | | 1 | | 2 FB LE TIP CURL.RPLCD. | 234 |
| | | 1 | | N | | N | | N | | | | | | | | | | | | | | | | | | 0 | | DESCENT/APPROACH | 66 |
| | | 1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | POF UNKNOWN | 145 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | 4 HPC STG 7 BLS BEYOND LIMITS.ENG RMVD. | 67 |
| | | 1 | | N | N | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 1 FB LE CURL | 146 |
| HERRING GULL | P5a24 | 1 | 40 | N | 1 | N | | N | | | | | Y | | | | | | | | Y | | | | | 2 | | BROKEN STG 1 HPC BLDS.ENG REMOVED | 68 |
| BLACK-CROWNED NITE HERON | I1b2 | 1 | 24 | | N | | | N | | | | Y | | | | | | | | | Y | | | | | 2 | | 1 STG 1 COMP BL DMGD.2 SHGL FB.ENG RMVD | 83 |
| | | 1 | | N | N | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 2 FB LE DEF. | 147 |
| "FINCH" | | 1 | | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 602 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 616 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | Y | 2 | | 6 FB DMGD & RPLCD. | 88 |
| RING-NECKED PHEASANT | M5b141 | 1 | 40 | | | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 3 FB LE DEFORMED | 98 |
| COMMON BARN OWL | K1a2 | 1 | 11 | N | N | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 2 FB PRS RPLCD.WALKAROUND. | 148 |
| | | >1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | SEVERAL BDS HIT COWL | 151 |
| EURASIAN KESTREL | J5b12 | 1 | 7 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BORESCOPED-NO DAMAGE | 603 |
| | | 1 | | | Y | N | | N | | | | | | | | | | | | | Y | | | | | X | | 1 STG 6 HPC BL BEYOND LIMITS. HARD OBJ | 149 |
| "PIGEON"-MEDIUM | | 1 | | N | SE | N | 0.9 | N | | | | | | | | | | | | | | | | | | 0 | | FAN SPD 73%.MANY STRIKES A/C.ENGINES | 112 |
| "PIGEON"-MEDIUM | | 1 | | N | SE | N | 0.9 | N | | | | | | | | | | | | | | | | | | 0 | | FAN SPD 74%.MANY STRIKES A/C,ENGINES | 112 |
| SENEGAL COUCAL | S2f24 | >1 | 7 | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD ID IMPLIES CAIRO?? | 150 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BORESCOPED | 604 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 113 |
| | | 1 | | | N | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | HPC S1 LE TIP DMG,S8 UNK DMG.NO FB DMG. | 99 |
| CHUKAR | M5b12 | >1 | 18 | N | FL | SURGE | | N | | | | | | | | | | | | | | | | | | S | | SURGE.BIRDS IN COMP.INVESTIGATED. | 152 |
| CHUKAR | M5b12 | >1 | 18 | N | FL | NON-RECOV.SURGE | | N | | Y | | | | | | | | | | | | | | | | 2 | * | 1 FB BE. NON-RECOV.SURGE. INVESTIGATED. | 152 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BORESCOPED | 605 |
| | | 1 | | | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | NO CORE INGESTION | 100 |
| "SMALL BLACK" | | 1 | | | 1 | N | | N | | | | Y | | | | | | | | | | | | | | 1 | | 2 FB SHINGLD AT PART SPAN SHRDS. | 101 |
| RING-BILLED GULL | P5a14 | 1 | 17 | N | Y | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 114 |
| BLACK-TAILED GULL | P5a11 | 1 | 21 | N | N | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 2 FB BE | 153 |
| | | >=1 | | N | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | POSS MULT BIRD | 154 |
| HORNED LARK | Z14a83 | >1 | 2 | N | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | CORE ING. | 155 |
| | | 1 | | | Y | N | | N | | | | | | | | | | | | | | | | Y | | 1 | | T25 SENSOR REPLACED DUE TO BIRD DEBRIS | 84 |
| "MEDIUM" | | 1 | | N | SE | N | | N | Y | | Y | | | | | | Y | | | | | | | | | 2 | | 2 FB LE DISTOR, 1 FB LE CRACK | 102 |
| "MEDIUM" | | 1 | | N | SE | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 4 FB LE DISTORTION | 102 |
| | | 1 | | | N | N | | N | | | | | | | | | | | | | | | | | Y | 1 | | 2 FB DMGD | 89 |
| EURASIAN STONE-CURLEW | P9a1 | 2 | 16 | N | N | 50% "STALL" | 10.0 | N | | | | | | Y | Y | Y | Y | Y | | | | | | | | 2 | * | POSSIBLE HARD FOD. 2 FB SEPARATED | 103 |

| DATE | EVT | A/C | ENG | DASH | POS | TIME | POF | SIGEVT | ALT | SPD | FLR | LTCON | WEATHER | CREW | CITYPRS | APT | LOCALE | US | REGION | BIRDNAME | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10/24/89 | 90 | B767 | CF6 | 80A | 1 | | LR | N | 0 | | | | | N | TYO-KCZ | KCZ | KOCHI,JAPAN | N | PACIFIC | | |
| 10/24/89 | 606 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | | XFO | | N | | | |
| 10/25/89 | 91 | B767 | CF6 | 80A | 1 | | AP | N | | | | | | N | -OKJ | OKJ | OKAYAMA,JAPAN | N | PACIFIC | | |
| 10/26/89 | 104 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -MRU | XFO | MAURITIUS,MAURITIUS? | N | | COMMON BARN OWL | ( |
| 10/27/89 | 164 | B767 | 4000 | 4060 | 1 | | | N | | | | | | N | | XFO | | N | | | |
| 10/28/89 | 92 | A310 | CF6 | 80A | 1 | | TC | N | | V1+ | | | | N | CDG-LIN | CDG | PARIS-CDG,FRANCE | N | EUROPE | COMMON STARLING | 2 |
| 10/29/89 | 156 | B747 | JT9D | 7R4G2 | 1 | | AP | N | | | | | | N | -HND | HND | TOKYO-HND,JAPAN | N | PACIFIC | | |
| 10/29/89 | 157 | A310 | 4000 | 4152 | 1 | | TO | N | | | | | | N | HAM-JFK | HAM | HAMBURG,GERMANY | N | EUROPE | | |
| 11/02/89 | 119 | B767 | JT9D | 7R4D | 1 | | AP | N | 150 | | | DARK | SCATTERED | N | HKG-KIJ | KIJ | NIGATA,JAPAN | N | PACIFIC | SPOT-BILLED DUCK | I |
| 11/02/89 | 158 | B767 | JT9D | 7R4D | 1 | | AP | SEMB | | | | | | N | TLV-ETH | ETH | ELAT,ISRAEL | N | MID.EAST | COMMON ROCK DOVE | ( |
| 11/04/89 | 93 | B767 | CF6 | 80A | 2 | | DA | N | | | | | | N | -HND | HND | TOKYO-HND,JAPAN | N | PACIFIC | | |
| 11/05/89 | 607 | A320 | CFM56 | 5 | 2 | 10:15 | DA | N | | | | DAY | | N | -NCE | NCE | NICE,FRANCE | N | EUROPE | COMMON SKYLARK | 2 |
| 11/07/89 | 105 | A310 | CF6 | 80C2 | 2 | | LR | N | 0 | | | | | N | -CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | "SMALL BIRD" | |
| 11/08/89 | 106 | A310 | CF6 | 80C2 | 2 | | | N | | | | | | N | -BOM | XFO | BOMBAY,INDIA? | N | | | |
| 11/11/89 | 94 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN? | N | | | |
| 11/11/89 | 159 | B747 | JT9D | 7R4G2 | 3 | | TR | U | 0 | 145 | | LIGHT | CLEAR | ATB | IST-SIN | IST | ISTANBUL,TURKEY | N | MID.EAST | BLACK-HEADED GULL | I |
| 11/14/89 | 608 | A320 | CFM56 | 5 | 1 | | LR | N | 0 | | | | | N | -LIL | LIL | LILLE,FRANCE | N | EUROPE | | |
| 11/15/89 | 95 | A310 | CF6 | 80A | 1 | | CL | N | 50 | VR+ | VFR | | FOG | ATB | AMS-AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | | |
| 11/15/89 | 160 | B767 | 4000 | 4060 | | | | N | | | | | | N | EWR-ARN | XXX | NEWARK OR STOCKHOLM | U | | | |
| 11/15/89 | 609 | A320 | CFM56 | 5 | 1 | | LR | N | 0 | | | | | N | -LIL | LIL | LILLE,FRANCE | N | EUROPE | | |
| 11/16/89 | 107 | A310 | CF6 | 80C2 | 2 | 7:00 | CL | N | 17000 | | VFR | BRIGHT | CLEAR | N | TRV-BOM | TRV | TRIVANDRUM,INDIA | N | ASIA | | |
| 11/18/89 | 115 | B757 | RB211 | 535C | 2 | 15:25 | LR | SEMB | 0 | 121 | | LIGHT | RAIN | N | LHR-BFS | BFS | BELFAST,N.IRELAND,UK | N | EUROPE | COMMON LAPWING | F |
| 11/20/89 | 161 | B767 | JT9D | 7R4D | 2 | | AP | N | | | | | | N | -LAX | LAX | LOS ANGELES,CAL. | Y | N.AMERICA | SHORT-EARED OWL | K |
| 11/21/89 | 85 | A320 | CFM56 | 5 | 1 | 16:00 | LR | MESB | 0 | | | | | N | -CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | HUNGARIAN PARTRIDGE | N |
| 11/21/89 | 85 | A320 | CFM56 | 5 | 2 | | LR | MESB | 0 | | | | | N | -CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | HUNGARIAN PARTRIDGE | N |
| 11/25/89 | 162 | A300 | JT9D | 7R4H1 | 1 | | TC | N | | | | | | N | KWI-CAI | XFO | KUWAIT OR CAIRO | N | MID.EAST | BLACK KITE | J |
| 11/26/89 | 108 | A300 | CF6 | 80C2 | 1 | | TR | N | 0 | | | | | ATB | KHI- | KHI | KARACHI,PAKISTAN | N | ASIA | | |
| 11/29/89 | 617 | A310 | CF6 | 80A | 1 | | | N | | | | | | N | -AMS | XFO | AMSTERDAM,NETHERLANDS?? | N | | | |
| 12/03/89 | 96 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -BHX | XFO | BAHIA BLANCA,ARGENTINA? | N | | | |
| 12/04/89 | 245 | B747 | JT9D | 7R4G | 1 | 18:04 | RV | N | 0 | 125 | | | | N | OSA-SIN | SIN | SINGAPORE | N | PACIFIC | "VERY LARGE SEAGULL" | |
| 12/06/89 | 163 | A300 | JT9D | 7R4H1 | 1 | 12:00 | TR | N | 0 | VR | | LIGHT | CLEAR | N | -JED | JED | JEDDAH,SAUDI ARABIA | N | MID.EAST | COMMON ROCK DOVE | ( |
| 12/13/89 | 86 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -SAN | XUS | SAN DIEGO,CAL.?? | Y | N.AMERICA | | |
| 12/14/89 | 97 | A310 | CF6 | 80A | 1 | 19:00 | LR | MEMB | 0 | | | | CLEAR | N | ANK-IST | IST | ISTANBUL,TURKEY | N | MID.EAST | BLACK-HEADED GULL | F |
| 12/14/89 | 97 | A310 | CF6 | 80A | 2 | 19:00 | LR | MEMB | 0 | | | | CLEAR | N | ANK-IST | IST | ISTANBUL,TURKEY | N | MID.EAST | BLACK-HEADED GULL | F |
| 12/15/89 | 221 | B747 | JT9D | 7Q | 1 | 1:12 | | N | | | | | | N | TPE-BKK | XFO | TAIWAN OR THAILAND | N | PACIFIC | | |
| 12/19/89 | 216 | A310 | JT9D | 7R4 | 2 | 16:30 | TR | N | 0 | | | | | ATB | BRU- | BRU | BRUSSELS,BELGIUM | N | EUROPE | COMMON LAPWING | F |
| 12/19/89 | 220 | A300 | JT9D | 7R4H | 1 | 7:30 | RV | N | 0 | | | | | N | MED-JED | JED | JEDDAH,SAUDI ARABIA | N | MID.EAST | | |
| 12/20/89 | 109 | B767 | CF6 | 80C2 | 2 | 11:40 | LD | N | | | | | | N | -HND | HND | TOKYO-HND,JAPAN | N | PACIFIC | | |
| 12/22/89 | 610 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | | XFO | | N | | | |
| 12/23/89 | 110 | A310 | CF6 | 80C2 | 2 | | | N | | | | | | N | -MBA | XFO | MOMBASA,KENYA? | N | | | |
| 12/26/89 | 611 | A320 | CFM56 | 5 | 1 | | DA | N | 1000 | 160 | | NIGHT | | N | -FNI | FNI | NIMES,FRANCE | N | EUROPE | | |
| 12/28/89 | 116 | B757 | RB211 | 535C | 2 | 16:40 | TO | SEMB | 800 | 150 | VFR | LIGHT | SCLD | DIV | BFS-LHR | BFS | BELFAST,N.IRELAND,UK | N | EUROPE | COMMON LAPWING | F |
| 12/31/89 | 87 | A320 | CFM56 | 5 | 1 | 8:00 | LR | N | 0 | | VFR | DAWN | CLEAR | N | -LYS | LYS | LYON,FRANCE | N | EUROPE | | |
| 01/01/90 | 215 | B767 | 4000 | 4056 | 2 | 22:35 | TR | N | 0 | 080 | | | SCATTERED | ATO | HRE-LGW | HRE | HARARE,ZIMBABWE | N | AFRICA | AFRICAN EAGLE OWL | 2 |
| 01/01/90 | 218 | A310 | 4000 | 4158 | | | | N | | | | | | N | | XFO | KOREA OR INDONESIA | N | | LESSER GOLDEN PLOVER | 5 |
| 01/02/90 | 191 | B747 | CF6 | 80C2 | 2 | | LR | N | 0 | | | | | N | -HKG | HKG | HONG KONG | N | ASIA | | |
| 01/09/90 | 192 | A310 | CF6 | 80C2 | 1 | | LD | N | | | | | | N | -LCA | LCA | LARNACA,CYPRUS | N | MID.EAST | "GULL" 18 oz. | |
| 01/14/90 | 184 | B767 | CF6 | 80A | 1 | 12:00 | LR | SEMB | 0 | | | | OVERCAST | N | -LTN | LTN | LONDON-LUTON,ENGLAND,UK | N | EUROPE | HUNGARIAN PARTRIDGE | 4 |
| 01/15/90 | 219 | B767 | JT9D | 7R4 | 1 | 19:33 | AP | SEMB | 300 | 145 | | | | N | HND-SPK | SPK | SAPPORO,JAPAN | N | PACIFIC | COMMON POCHARD | 2 |
| 01/16/90 | 193 | A310 | CF6 | 80C2 | 1 | | | MESB | | | | | | N | -DLA | XFO | DOUALA,CAMEROON ??? | N | | | |
| 01/16/90 | 193 | A310 | CF6 | 80C2 | 2 | | | MESB | | | | | | N | -DLA | XFO | DOUALA,CAMEROON ??? | N | | | |
| 01/18/90 | 194 | A310 | CF6 | 80C2 | 2 | | LD | N | | | | | | N | -SXF | SXF | E.BERLIN,GERMANY | N | EUROPE | "CROW"? | |
| 01/24/90 | 195 | B767 | CF6 | 80C2 | 1 | | LR | N | 0 | | | | | N | -IGU | IGU | IGUASSA FALLS,BRAZIL | N | S.AMERICA | | |
| 01/28/90 | 185 | A310 | CF6 | 80A | 2 | 19:30 | CL | N | | | | DUSK | FOG | ATB | ANK- | ANK | ANKARA,TURKEY | N | MID.EAST | | |
| 01/28/90 | 196 | A300 | CF6 | 80C2 | 2 | | | N | | | | | | N | BKK-CNX | XFO | THAILAND | N | PACIFIC | | |
| 01/29/90 | 197 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -YYZ | XFO | TORONTO,CANADA ?? | N | | | |
| 01/30/90 | 180 | A320 | CFM56 | 5 | 2 | | CL | N | | | | | CLEAR | ATB | CDG- | CDG | PARIS-CDG,FRANCE | N | EUROPE | COMMON STARLING | 2 |
| 02/02/90 | 186 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -MYJ | XFO | MATSUYAMA,JAPAN ?? | N | | | |
| 02/08/90 | 222 | B767 | JT9D | 7R4D | 2 | 5:45 | | N | | | | | | N | TLV-CDG | XFO | TEL AVIV OR PARIS-CDG | N | | | |
| 02/09/90 | 244 | A310 | JT9D | 7R4E | 1 | 9:20 | | MESB | | | | | | N | SIN-CMB | XFO | SINGAPORE/COLOMBO,SRILANKA | N | | | |
| 02/09/90 | 244 | A310 | JT9D | 7R4E | 2 | 9:20 | | MESB | | | | | | N | SIN-CMB | XFO | SINGAPORE/COLUMBO,SRILANKA | N | | | |
| 02/10/90 | 198 | B747 | CF6 | 80C2 | 1 | | LR | N | 0 | | | | | N | -JKT | JKT | JAKARTA,INDONESIA | N | PACIFIC | | |
| 02/11/90 | 187 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -JFK | XUS | NEW YORK-JFK,NY ??? | Y | N.AMERICA | | |
| 02/11/90 | 226 | B747 | 4000 | 4056 | 2 | | | SEMB | | | | | | N | LAX-SYD | XXX | LOS ANGELES/SYDNEY,AUSTRLA | U | | | |
| 02/11/90 | 243 | A310 | JT9D | 7R4E | 2 | 14:50 | AP | N | 1340 | 130 | | | | N | KTM-CCU | CCU | CALCUTTA,INDIA | N | ASIA | "BIG HAWK" | |
| 02/12/90 | 199 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN ??? | N | | | |
| 02/12/90 | 224 | DC10 | JT9D | 59A | 3 | 17:30 | | N | | | | | | N | NRT-BKK | XFO | TOKYO-NRT OR BANGKOK | N | PACIFIC | COMMON SNIPE | 6 |
| 02/13/90 | 181 | A320 | CFM56 | 5 | 1 | | AP | N | 200 | 140 | | | | N | -BRE | BRE | BREMEN,GERMANY | N | EUROPE | | T |
| 02/13/90 | 227 | A310 | JT9D | 7R4E | 2 | | | N | | | | | | | -BRU | XFO | BRUSSELS,BELGIUM?? | N | | MALLARD DUCK | 2 |
| 02/14/90 | 182 | A320 | CFM56 | 5 | 1 | | LR | N | 0 | | | | | N | -TLS | TLS | TOULOUSE,FRANCE | N | EUROPE | BLACK-HEADED GULL | 1 |
| 02/14/90 | 251 | A300 | JT9D | 59A | 1 | | TR | N | 0 | | | | | N | DPS- | DPS | DENPASAR,BALI | N | PACIFIC | | |
| 02/18/90 | 200 | B747 | CF6 | 80C2 | 4 | | LR | N | 0 | | | | | N | -AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | | |
| 02/19/90 | 188 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -GIG | XFO | RIO DE JANEIRO,BRAZIL? | N | | BLACK VULTURE | 1 |
| 02/21/90 | 201 | B767 | CF6 | 80C2 | 1 | 15:00 | TR | MESB | 0 | V1+ | VFR | | CLEAR | ATB | AMS- | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | COMMON LAPWING | 5 |
| 02/21/90 | 201 | B767 | CF6 | 80C2 | 2 | 15:00 | TR | MESB | 0 | V1+ | VFR | | CLEAR | ATB | AMS- | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | COMMON LAPWING | 5 |
| 02/21/90 | 202 | B767 | CF6 | 80C2 | 2 | | LR | N | 0 | 090 | | | RAIN | N | -SHJ | SHJ | SHARJAH,UA EMIRATES | N | MID.EAST | "GULL-MEDIUM" | |
| 02/21/90 | 225 | B767 | JT9D | 7R4D | 1 | 12:46 | AP | MEMB | 800 | | | | | N | OSA-HND | HND | TOKYO-HND,JAPAN | N | PACIFIC | GREATER SCAUP | 2 |
| 02/21/90 | 225 | B767 | JT9D | 7R4D | 2 | 12:46 | AP | MEMB | 800 | | | | | N | OSA-HND | HND | TOKYO-HND,JAPAN | N | PACIFIC | GREATER SCAUP | 2 |
| 02/23/90 | 491 | B767 | 4000 | 4056 | 1 | | | N | | | | | | N | -DUS | XFO | DUESSELDORF,GERMANY?? | N | | | |
| 02/24/90 | 223 | A300 | JT9D | 7R4H | 1 | 6:22 | TR | N | 0 | 160 | | | | ATB | NBO-JED | NBO | NAIROBI,KENYA | N | AFRICA | HELMETED GUINEA FOWL | 5 |
| 02/27/90 | 206 | A310 | CF6 | 80C2 | 2 | | TR | N | 0 | V1+ | | | | ATB | SXF- | SXF | E.BERLIN,GERMANY | N | EUROPE | HUNGARIAN PARTRIDGE | 4 |
| 03/02/90 | 228 | B757 | 2000 | 2037 | 2 | | | N | | | | | | N | ATL-MSY | XUS | ATLANTA OR NEW ORLEANS | Y | N.AMERICA | | |
| 03/04/90 | 203 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -AXT | XFO | AKITA,JAPAN ??? | N | | | |
| 03/05/90 | 183 | A320 | CFM56 | 5 | 2 | 9:30 | TR | N | 0 | 120 | | OVRCST | WET | N | LST-MEL | LST | LAUNCESTON,AUSTRALIA | N | AUS.NEW Z. | MASKED PLOVER | 5 |
| 03/05/90 | 189 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -OKJ | XFO | OKAYAMA,JAPAN ?? | N | | | |
| 03/07/90 | 204 | B747 | CF6 | 80C2 | 3 | 7:00 | LR | N | 0 | | | DAWN | CLOUDY | N | JFK-AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | RING-NECKED PHEASANT | 4 |
| 03/09/90 | 229 | B767 | 4000 | 4056 | 1 | 12:10 | LR | N | 0 | 070 | | | | N | HRE-NBO | NBO | NAIROBI,KENYA | N | AFRICA | BLACK KITE | 3 |

| NAME | SPEC | #BDS | WT | ALERT | SEE | POWLOSS | VIBE | IFSD | A B C D E | F G H I J | K L M N O | P Q | NMS F | REMARKS | EVT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| : | | 1 | | | | N | | N | Y | | | | 1 | 2 FB SHINGLED | 90 |
| | | 1 | | | | N | | N | | | | | 0 | SAME ENGINE AS #605 | 606 |
| | | 1 | | | | N | | N | | | | | 0 | | 91 |
| N BARN OWL | K1a2 | 1 | 11 | | N | N | | N | | | | | 0 | | 104 |
| | | 1 | | N | N | N | | N | | | | | 0 | BD RMNS IN CORE | 164 |
| N STARLING | Z53a82 | 1 | 3 | | FL | N | N | N | | | | | 1 | 3 FB UNK DMG. ODOR AT 1000 FT AGL. | 92 |
| | | 1 | | N | N | N | | N | | | | | 0 | | 156 |
| | | 1 | | N | N | N | | N | | | | | 0 | MULT BIRD? ING. INTO CORE.HIT FLOCK? | 157 |
| ILLED DUCK | L2e34 | 1 | 44 | N | N | N | | N | | | Y | | 2 | 5TH STG LE TIPS CLASHED TE IGV'S.ENG RMD | 119 |
| N ROCK DOVE | Q3a1 | 2 | 14 | N | Y | N | | N | | | | | 0 | INVSTGTD | 158 |
| | | 1 | | | | N | | N | Y | | | Y | 2 | 5FB SHNGLD,12 FB BEYOND LIMITS, RPLCD. | 93 |
| N SKYLARK | Z14a81 | 1 | 1.3 | | | N | | N | | | | | 0 | BORESCOPED | 607 |
| BIRD* | | 1 | | | 1 | N | N | N | | | | | 0 | BSI ON #18 #2 RNGS. NO TRACES IN #1 | 105 |
| | | 1 | | | N | N | | N | Y | | | | 1 | 4 FB NON-SERVICABLE LE DMG | 106 |
| | | 1 | | | N | N | N | N | | | | | 0 | GROUND INSP. | 94 |
| IEADED GULL | P5a35 | >=1 | 10 | N | FL | | HIGH | N | Y YY | Y | | | 2 | POSS MULT BD, AIRWTHY 9FB DMG,3 RPLCD. | 159 |
| | | 1 | | | | N | | N | | | | | 0 | BORESCOPED | 608 |
| | | 1 | | | | N | | N | Y | | | Y | 1 | 3FB UNK DMG,2FB SHNGLED,3 FB SETS RPLCD | 95 |
| | | 1 | | N | N | N | | N | YY | | | | 1 | 1 BL DMGD | 160 |
| | | 1 | | | | N | | N | | | | | 0 | BORESCOPED | 609 |
| | | 1 | | | N | N | 2.6 | N | | | | Y | 1 | 3 FB IMPACT DMG.VIBE=1.4 UNITS AT CRUISE | 107 |
| N LAPWING | P14a1 | 4 | 8 | N | FL | N | 1.4 | N | | | Y | | 2 | 8 IPC BL BE.13 BDS HIT A/C.INVST.ENG RPL | 115 |
| EARED OWL | K2c7 | 1 | 12.7 | N | N | N | | N | | | | | 0 | | 161 |
| IIAN PARTRIDGE | M5b59 | 1 | 14 | | FL | N | | N | | | | | 0 | SAME ENG AS #84.LARGE FLOCK SEEN. | 85 |
| IIAN PARTRIDGE | M5b59 | 1 | 14 | | FL | N | | N | | | | | 0 | LARGE FLOCK SEEN. | 85 |
| :ITE | J4a31 | 1 | 28 | N | N | N | | N | | | | Y | 1 | 3 FB DMGD | 162 |
| | | 1 | | | N | N | INC | N | | | | Y | 2 | 4 FB UNK DMG,RPLCD. INC N1 VIBES | 108 |
| | | 1 | | | | N | | N | | Y | | Y | 1 | FAN FRAME STRUT COVER BROKEN. | 617 |
| | | 1 | | | N | N | N | N | Y | | | | 1 | 2 FB LE DEFORM OUTBD MIDSPAN SHROUD | 96 |
| ARGE SEAGULL* | | 1 | | | 1 | N | | N | | | | | 0 | REVERSER LOCKED OUT FOR UNKNOWN REASON | 245 |
| N ROCK DOVE | Q3a1 | 1 | 14 | N | N | SURGE | | N | Y | Y | | | 2 | 2 FB SEVERE DMG.TOUCH & GO(VR) | 163 |
| | | 1 | | | N | N | | N | | | | | 0 | | 86 |
| IEADED GULL | P5a35 | 6-17 | 10 | | FL | N | | N | Y | | | Y | 1 | 20 FB SHNGLD,1FB BLENDABLE. | 97 |
| IEADED GULL | P5a35 | 6-17 | 10 | | FL | N | | N | | | | | 0 | IMMED.AFTER TOUCHDOWN.>100 BIRDS HIT A/C | 97 |
| | | 1 | | | | N | | N | | | | | 0 | EVIDENCE FOUND IN INLET ON GROUND | 221 |
| N LAPWING | P14a1 | 1 | 7.7 | | | N | | N | Y | YY Y | | | 2 | INV.4FB BE,2FB BKN.14FB DMG.ALL FB RPLCD | 216 |
| | | 1 | | | | N | | | | | | | 0 | POWER AT REVERSE IDLE | 220 |
| | | 1 | | N | N | N | N | N | Y | YY | Y | Y | 2 | 7 FB DMGD, HPC S1 COMP BLS TORN,DENTED | 109 |
| | | 1 | | | | N | | N | | | | | 0 | | 610 |
| | | 1 | | | N | N | | N | Y | | | | L | SLIGHT FB LE DISTORT. WITHIN LIMITS | 110 |
| | | 1 | | | SE | N | | N | | | | | 0 | | 611 |
| N LAPWING | P14a1 | 3 | 8 | N | N | N | 4.6 | N | YY | Y | Y | | 2 | 4FB,15IPC BL BE/DE.E1 STRUCK ALSO. | 116 |
| | | 1 | | | Y | N | | N | YYY | | | | 1 | 2 FB LE, 8MM CRACK | 87 |
| N EAGLE OWL | 2S44 | 1 | 26 | Y | 1 | SURGE | | | | | | | S | BANG,SMELL,FLAMES,SURGE.VOL POWER RED. | 215 |
| GOLDEN PLOVER | 5N26 | 1 | 5 | | N | | | | | | | | 0 | FOUND DURING OVERHAUL.INTO CORE. | 218 |
| | | 1 | | | N | N | 5.0 | N | Y | | | | 1 | 1 FB LE DISTORTION | 191 |
| 8 oz. | | 1 | | | N | N | N | N | | | | | 1 | DENT ON INLET COWL LIP GRD INSP | 192 |
| IIAN PARTRIDGE | 4L85 | 2 | 14 | | N | N | N | N | YY Y | | | | 1 | 3 FB RPLCD.LE DENT,TIP CURL.CREW UNAWARE | 184 |
| N POCHARD | 2J115 | 2 | 35 | | | | | | YY | Y Y | Y | | 2 | 4FB DMG,1LE PIECE MISSING.PRIOR CORE DMG | 219 |
| | | 1 | | | N | N | | N | | | | | 0 | PREFLITE IHSP AT DLA | 193 |
| | | 1 | | | N | N | | N | | | | | 0 | PREFLITE INSP AT DLA | 193 |
| ? | | 1 | | | N | N | N | N | | | | | 0 | STAIN ON SPINNER, BOOSTER INLET. | 194 |
| | | 1 | | | N | N | N | N | | | | | 0 | ING.INTO BOOSTER AREA | 195 |
| | | 1 | | | N | N | 3.5 | N | Y Y | | | | 1 | 2 FB LE DISTORT | 185 |
| | | 1 | | | N | N | N | N | | | | | 0 | | 196 |
| | | 1 | | | N | N | | N | | | | | 0 | GRD. INSP. | 197 |
| N STARLING | 21Z75 | 1 | 3 | | N | N | | N | Y | | | YY | 2 | 8 OGV FAIRNGS BKN,4FB LE DIST,5PRFB RPLD | 180 |
| | | 1 | | | N | N | | N | | | | | 0 | EVIDENCE FOUND GRD.INSP. | 186 |
| | | 1 | | | | N | | N | Y | | | | 1 | 2 FB BE | 222 |
| | | | | | | N | | | | | | | 0 | WALK AROUND.ZULU TIME. | 244 |
| | | | | | | N | | | | | | | 0 | WALK AROUND.ZULU TIME. | 244 |
| | | 1 | | | N | N | | N | | | | | 0 | | 198 |
| | | 1 | | | N | N | | N | | | | Y | 1 | 1 FB RPLCD | 187 |
| | | >1 | | | | N | | | Y | | | | 1 | 3 FB DMGD | 226 |
| VK* | | 1 | | | 1 | N | | | | | | | 0 | | 243 |
| | | 1 | | | N | N | N | N | | | | | 0 | GRD. INSP. | 199 |
| N SNIPE | 6N47 | 1 | 5 | | | N | | N | | | | | 0 | GRD INSP.C1 STATOR HIT | 224 |
| | TBI | 1 | | | N | N | N | N | | | | | 0 | ODOR ON PREVIOUS FLIGHT | 181 |
| D DUCK | 2J84 | 1 | 40 | | | N | | | | | | | 0 | BIRD INTO CORE.WALKAROUND. | 227 |
| EADED GULL | 14N36 | 1 | 10 | | | N | | N | | | | | 0 | | 182 |
| | | 1 | | | | N | | | Y | | | | 1 | 3 FB BE | 251 |
| | | 1 | | | N | N | 4.1 | N | | | | Y | 2 | 11 DMG FB. | 200 |
| ULTURE | 1K4 | 1 | 48 | | N | N | | N | | | Y | | 2 | 12 HPC STG 1 BL DMGD.ENG RPLCD. | 188 |
| N LAPWING | 5N1 | 1 | 7.7 | | N | N | | N | Y | | | | 1 | 3 FB TIP CURL | 201 |
| N LAPWING | 5N1 | 1 | 7.7 | | N | N | 3.2 | N | Y | | | | 1 | 1 FB TIP CURL.ATB DUE TO VIBES(3.2) | 201 |
| EDIUM* | | 1 | | N | | N | | N | | | | | 0 | | 202 |
| R SCAUP | 2J124 | >1 | 40 | | FL | | | | | Y | | | 2 | BENT 5-8 BLADES | 225 |
| R SCAUP | 2J124 | 1 | 40 | | FL | N | | | | | | | 0 | | 225 |
| | | 1 | | | | N | | N | | | | | 0 | BIRD INTO CORE | 491 |
| ED GUINEA FOWL | 5L3 | 1 | 52 | N | SE | SURGE | 2.0 | N | Y Y | Y Y | | Y | 2 | SMELL,BANG.3FB LE TIP BRKN,FEGV BRKN.VR | 223 |
| IAN PARTRIDGE | 4L85 | 1 | 14 | | N | N | 2.8 | N | YY | | | | 1 | 1FB TORN,1FB DISTORT.JUST AFTER ROTATION | 206 |
| | | 1 | | N | N | N | | N | Y | Y | | | 2 | 3 FB DMG, 1 LE TIP BRK OUT | 228 |
| | | 1 | | | N | N | | N | | Y | Y | Y | 1 | 3STG1 HPC BL SHIFTED-SERVICBLE.COWL DENT | 203 |
| PLOVER | 5N24 | 1 | 11 | | SE | N | 9.9 | N | YY YY | YY | | | 2 | 20 FB DMG.ENG RMVD.3FB LE TIP FRAGMENTED | 183 |
| | | 1 | | | N | N | | N | | | | | 0 | FD.GROUND INSP. | 189 |
| CKED PHEASANT | 4L161 | 1 | 32 | | N | N | | N | Y | | | | 1 | 3 FB LE DISTORT-RPLCD | 204 |
| ITE | 3K28 | 1 | 28 | | Y | N | | N | Y | | | | 1 | SPINNER HIT.1FB BE.BIRD INTO CORE-SMELL | 229 |

| DATE | EVT | A/C | ENG | DASH | POS | TIME | POF | SIGEVT | ALT | SPD | FLR | LTCON | WEATHER | CREW | CITYPRS | APT | LOCALE | US | REGION | BIRDNAME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 03/16/90 | 230 | A300 | JT9D | 7R4H1 | 1 | | | N | | | | | | N | RUH-JED | XFO | RIYADH OR JEDDAH,S.ARABIA | N | MID.EAST | |
| 03/16/90 | 231 | A300 | JT9D | 7R4H | 2 | | CL | N | | 144 | | | CLEAR | N | DHA-RUH | DHA | DHAHRAN,SAUDI ARABIA | N | MID.EAST | HERRING GULL |
| 03/17/90 | 207 | B757 | RB211 | 535C | 1 | | | N | | | | | | N | LHR-MAN | XFO | LONDON-LHR/MANCHESTER,ENG. | N | EUROPE | "SMALL" |
| 03/24/90 | 190 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN ??? | N | | |
| 03/24/90 | 232 | B747 | JT9D | 7Q | 3 | | TR | N | 0 | | | | | N | BUE-RIO | BUE | BUENOS AIRES,ARGENTINA | N | S.AMERICA | |
| 03/26/90 | 205 | A310 | CF6 | 80C2 | 2 | | | N | | | | | | N | -FRA | XFO | FRANKFURT,GERMANY ?? | N | | |
| 04/02/90 | 276 | A310 | CF6 | 80A | 2 | | AP | N | | | | | | N | -SHJ | SHJ | SHARJAH,UA EMIRATES | N | MID.EAST | |
| 04/04/90 | 233 | B767 | JT9D | 7R4D | 1 | 18:25 | AP | N | 300 | | | | RAIN | N | HND-SPK | SPK | SAPPORO,JAPAN | N | PACIFIC | |
| 04/06/90 | 265 | A320 | CFM56 | 5 | 2 | | TR | N | 0 | 137 | | | | N | LIL-LIL | LIL | LILLE,FRANCE | N | EUROPE | COMMON WOOD PIGEON |
| 04/06/90 | 277 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -ARB | XFO | ARLANDA,SWEDEN?? | N | | |
| 04/06/90 | 292 | B767 | CF6 | 80C2 | 2 | | LD | SEMB | 10 | | VFR | | RAIN | N | -WAW | WAW | WARSAW,POLAND | N | EUROPE | BLACK-HEADED GULL |
| 04/09/90 | 278 | A310 | CF6 | 80A | 1 | | LR | N | 0 | | | | | N | -DUS | DUS | DUSSELDORF,GERMANY | N | EUROPE | |
| 04/10/90 | 335 | DC10 | JT9D | 59A | | | | N | | | | | | N | | XFO | | N | | BARN SWALLOW |
| 04/11/90 | 293 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | LAX-YVR | XXX | LOS ANGELES OR VANCOUVER | U | N.AMERICA | |
| 04/12/90 | 266 | A320 | CFM56 | 5 | 2 | 15:44 | TR | N | 0 | 010 | | | SCLD | N | LHR-DUS | LHR | LONDON-LHR,ENGLAND,UK | N | EUROPE | |
| 04/13/90 | 235 | B757 | 2000 | 2037 | 2 | | AP | N | | | | | | N | MSP-DCA | DCA | WASHINGTON-NATIONAL,DC | Y | N.AMERICA | OSPREY |
| 04/16/90 | 279 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -FUK | XFO | FUKUAKA,JAPAN??? | N | | |
| 04/16/90 | 294 | B747 | CF6 | 80C2 | 2 | | LR | N | 0 | | | BRIGHT | CLEAR,DRY | N | YOW-AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | RING-NECKED PHEASANT |
| 04/16/90 | 295 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN??? | N | | |
| 04/16/90 | 296 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN??? | N | | |
| 04/17/90 | 208 | B747 | RB211 | 524G | 3 | | LD | N | | | | | | N | PAE-PAE | PAE | EVERETT,WASHINGTON | Y | N.AMERICA | CANADA GOOSE |
| 04/18/90 | 297 | B767 | CF6 | 80C2 | 1 | | TR | N | 0 | V1+ | | | | ATB | ORY-JFK | ORY | PARIS-ORLY,FRANCE | N | EUROPE | COMMON WOOD PIGEON |
| 04/19/90 | 298 | B767 | CF6 | 80C2 | 1 | | AP | N | 1000 | | | | | N | YVR-YYZ | YYZ | TORONTO,CANADA | N | N.AMERICA | |
| 04/19/90 | 299 | A310 | CF6 | 80C2 | 2 | | TR | N | 0 | V1+ | | | | ATB | AYT- | AYT | ANTALYA,TURKEY | N | MID.EAST | EGYPTIAN VULTURE |
| 04/23/90 | 280 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN??? | N | | |
| 04/25/90 | 300 | B747 | CF6 | 80C2 | 4 | | | N | | | | | | N | HND-FUK | XFO | TOKYO-HND OR FUKUOKA,JAPAN | N | PACIFIC | COMMON SKYLARK |
| 04/26/90 | 301 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -MYJ | XFO | MATSUYAMA,JAPAN?? | N | | |
| 04/26/90 | 302 | A310 | CF6 | 80C2 | 1 | | | N | | | | | | N | SXF-PFO | XFO | E.BERLIN OR CYPRUS | N | | |
| 04/30/90 | 236 | A310 | 4000 | 4152 | 1 | | TX | N | 0 | TAXI | | | | N | BNE-POM | BNE | BRISBANE,AUSTRALIA | N | AUS.NEW Z. | "HAWK" |
| 05/02/90 | 258 | A310 | 4000 | 4152 | 2 | | | N | | | | | | N | -TPA | XUS | TAMPA,ST. PETE ?? | Y | N.AMERICA | |
| 05/02/90 | 281 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -TOY | XFO | TOYAMA,JAPAN?? | N | | |
| 05/02/90 | 303 | A310 | CF6 | 80C2 | 2 | | LR | N | 0 | | | | | N | -EBB | EBB | ENTEBBE,UGANDA | N | AFRICA | AFRICAN FISH EAGLE |
| 05/03/90 | 259 | B747 | 4000 | 4056 | 3 | 9:00 | CL | N | | | | | | N | TPE-HKG | TPE | TAIPEI,TAIWAN | N | PACIFIC | |
| 05/03/90 | 304 | A310 | CF6 | 80C2 | 2 | 16:56 | LR | N | 0 | 132 | VFR | | CLEAR | N | -LBA | LBA | LEEDS-BRADFORD,ENGLAND,UK | N | EUROPE | "GULL" 24 oz. |
| 05/04/90 | 267 | A320 | CFM56 | 5 | 1 | | TR | N | 0 | V1+ | | | | ATB | LIL- | LIL | LILLE,FRANCE | N | EUROPE | "PARTRIDGE" 15OZ. |
| 05/05/90 | 305 | A300 | CF6 | 80C2 | 1 | | | N | | | | | | N | -BKK | XFO | BANGKOK,THAILAND?? | N | | |
| 05/08/90 | 282 | B767 | CF6 | 80A | 1 | | AP | N | | | | | | N | -MYJ | MYJ | MATSUYAMA,JAPAN | N | PACIFIC | |
| 05/09/90 | 237 | B767 | JT9D | 7R4D | 2 | 20:00 | AP | N | | | | | | N | NRT-NGO | NGO | NAGOYA,JAPAN | N | PACIFIC | LITTLE BROWN BAT |
| 05/10/90 | 306 | B767 | CF6 | 80C2 | 1 | | AP | N | | | | | | N | -TOY | TOY | TOYAMA,JAPAN | N | PACIFIC | |
| 05/11/90 | 283 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN ??? | N | | |
| 05/12/90 | 249 | | | | | | | N | | | | | | | | XFO | | N | | BLACK KITE |
| 05/13/90 | 239 | B767 | 4000 | 4060 | 1 | | | N | | | | | | N | | XFO | | N | | GYRFALCON |
| 05/15/90 | 209 | B757 | RB211 | 535E4 | 2 | | | N | | | | | | N | TFS-AMS | XFO | TENERIFE OR AMSTERDAM | N | EUROPE | |
| 05/17/90 | 284 | A310 | CF6 | 80A | 2 | | | N | | | | | | N | -STR | XFO | STUTTGART,GERMANY ?? | N | | |
| 05/18/90 | 285 | A310 | CF6 | 80A | 1 | | LR | N | 0 | | | | | N | LHR-LCA | LCA | LARNACA,CYPRUS | N | MID.EAST | COMMON LAPWING |
| 05/20/90 | 307 | B747 | CF6 | 80C2 | 4 | | | N | | | | | | N | -GIG | XFO | RIO DE JANEIRO,BRAZIL?? | N | | |
| 05/22/90 | 210 | B757 | RB211 | 535E4 | 1 | 16:00 | LD | N | | | | | | N | -KEV | KEV | KEVLAVICK,ICELAND | N | EUROPE | "LARGE" |
| 05/23/90 | 268 | A320 | CFM56 | 5 | 1 | | TR | SEMB | 0 | V1+ | | | | N | SYD-MEL | SYD | SYDNEY,AUSTRALIA | N | AUS.NEW Z. | |
| 05/26/90 | 248 | B767 | JT9D | 7R4D | 2 | 11:16 | TR | N | 0 | 120 | | | RAIN | N | SHI- | SHI | SHIMOJISHIMA,JAPAN | N | PACIFIC | LITTLE EGRET |
| 05/27/90 | 211 | B757 | RB211 | 535E4 | 1 | | CR | N | 13000 | | | | | N | | XXX | MEXICO OR TEXAS | U | N.AMERICA | |
| 05/27/90 | 635 | A310 | CF6 | 80C2 | 1 | | CL | N | | | | | | N | CAI-MGQ | CAI | CAIRO,EGYPT | N | AFRICA | |
| 05/29/90 | 308 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -NGS | XFO | NAGASAKI,JAPAN?? | N | | |
| 05/30/90 | 309 | A310 | CF6 | 80C2 | 1 | | CL | N | | | | | | N | MGQ- | MGQ | MISKOLC,HUNGARY | N | EUROPE | |
| 05/31/90 | 247 | A300 | JT9D | 59A | 1 | 11:16 | TR | POWER LOSS | 0 | VR | | | | ATB | IBZ- | IBZ | IBIZA,SPAIN | N | EUROPE | HERRING GULL |
| 05/31/90 | 250 | B767 | JT9D | 7R4E | 1 | | CL | N | | | | | | N | AKL-SYD | AKL | AUCKLAND,NEW ZEALAND | N | AUS.NEW Z. | |
| 06/01/90 | 238 | B767 | 4000 | 4056 | 1 | 20:00 | TR | N | 0 | | | | | | LIM-SCL | LIM | LIMA,PERU | N | S.AMERICA | "SMALL SEAGULL" |
| 06/02/90 | 334 | DC10 | JT9D | 59A | 3 | | | SEMB | | | | | | N | -FUK | XFO | FUKUOKA,JAPAN??? | N | | RUDDY TURNSTONE |
| 06/03/90 | 618 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -MYJ | XFO | MATSUYAMA,JAPAN?? | N | | |
| 06/04/90 | 310 | A300 | CF6 | 80C2 | 2 | | | N | | | | | | N | -LTN | XFO | LONDON-LUTON,ENGLAND?? | N | | |
| 06/07/90 | 269 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -MSP | XUS | MINNEAPOLIS?? | Y | N.AMERICA | |
| 06/07/90 | 311 | B767 | CF6 | 80C2 | 2 | | AP | N | | | | | | N | -KCZ | KCZ | KOCHI,JAPAN | N | PACIFIC | |
| 06/07/90 | 312 | A310 | CF6 | 80C2 | 1 | | LR | N | 0 | | | | | N | -LCA | LCA | LARNACA,CYPRUS | N | MID.EAST | CHUKAR |
| 06/08/90 | 313 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN??? | N | | |
| 06/09/90 | 212 | B757 | RB211 | 535C | 2 | | | N | | | | | | N | -MAN | XFO | MANCHESTER,ENG ??? | N | | |
| 06/09/90 | 270 | A320 | CFM56 | 5 | 2 | 14:20 | TR | N | 0 | 140 | | | SCLD | ATO | BSL-LHR | BSL | BASEL/MULHOUSE,SWITZERLAND | N | EUROPE | "PIGEON"-MEDIUM |
| 06/10/90 | 271 | A320 | CFM56 | 5 | 1 | | LR | N | 0 | | | | | N | -RMA | RMA | ROMA,AUSTRALIA | N | AUS.NEW Z. | |
| 06/11/90 | 286 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -TAK | XFO | TAKAMATSU,JAPAN ?? | N | | |
| 06/12/90 | 272 | A320 | CFM56 | 5 | 1 | | TR | N | 0 | V1+ | | | | ATB | LYS-BOD | LYS | LYON,FRANCE | N | EUROPE | COMMON WOOD PIGEON |
| 06/12/90 | 314 | A300 | CF6 | 80C2 | 1 | | LD | N | 100 | 140 | VFR | | OVERCAST | N | PEK-SHA | SHA | SHANGHAI,CHINA | N | ASIA | COMMON ROCK DOVE |
| 06/12/90 | 434 | DC10 | JT9D | 59A | 3 | 21:00 | | N | | | | | | N | -OKA | XFO | OKINAWA,JAPAN?? | N | | ROSEATE TERN |
| 06/12/90 | 490 | B757 | 2000 | 2037 | 1 | | | N | | | | | | N | | XUS | | Y | N.AMERICA | |
| 06/13/90 | 213 | B757 | RB211 | 535E4 | 1 | | | N | | | | | | N | MLA-MUC | XFO | MALTA OR MUNICH | N | EUROPE | |
| 06/13/90 | 287 | B767 | CF6 | 80A | 1 | | LR | N | 0 | | | | | N | -SDJ | SDJ | SENDAI,JAPAN | N | PACIFIC | |
| 06/14/90 | 273 | A320 | CFM56 | 5 | 2 | | | SEMB | | | | | | N | -MEL | XFO | MELBOURNE,AUSTRALIA?? | N | | "SMALL" |
| 06/14/90 | 485 | B757 | 2000 | 2037 | 1 | | LR | N | 0 | 080 | | | | N | CAS-RBA | RBA | RABAT,MOROCCO | N | AFRICA | |
| 06/14/90 | 619 | B767 | CF6 | 80A | 2 | | AP | N | | | | | | N | -KCZ | KCZ | KOCHI,JAPAN | N | PACIFIC | |
| 06/17/90 | 214 | B757 | RB211 | 535E4 | 1 | 4:00 | LD | MEMB | 30 | 110 | | DARK | CLEAR | N | -BOS | BOS | BOSTON,MASS. | Y | N.AMERICA | HERRING GULL |
| 06/17/90 | 214 | B757 | RB211 | 535E4 | 2 | 4:00 | LD | MEMB | 30 | 110 | | DARK | CLEAR | N | -BOS | BOS | BOSTON,MASS. | Y | N.AMERICA | HERRING GULL |
| 06/19/90 | 274 | A320 | CFM56 | 5 | 1 | | TR | N | 0 | V1+ | | | | N | PAU-ORY | PAU | PAUK,BURMA | N | ASIA | |
| 06/19/90 | 315 | A300 | CF6 | 80C2 | 1 | 8:30 | TR | N | 0 | V1+ | | | SCLD | N | BOM-DXB | BOM | BOMBAY,INDIA | N | ASIA | BLACK KITE |
| 06/20/90 | 246 | B747 | 4000 | 4158 | 1 | 6:20 | TX | N | 0 | TAXI | | | | N | SEL-CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | |
| 06/20/90 | 288 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -KMJ | XFO | KUMAMOTO,JAPAN?? | N | | |
| 06/22/90 | 289 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -NGS | XFO | NAGASAKI,JAPAN ?? | N | | |
| 06/25/90 | 290 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN ?? | N | | |
| 06/25/90 | 620 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -KMI | XFO | MIYAZAKI,JAPAN?? | N | | |
| 06/26/90 | 291 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN ?? | N | | |
| 06/26/90 | 636 | | CF6 | 80C2 | | | | N | | | | | | N | | XFO | HANOVER,GERMANY?? | N | | |

| RDNAME | SPEC | #BDS | WT | ALERT | SEE | POWLOSS | VIBE | IFSD | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | NMS | F | REMARKS | EVT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | | | N | | | | | | | | Y | | | | | | | | | | | | 1 | | DENTED COWL LIP.WALK AROUND. | 230 |
| RRING GULL | 14N14 | 1 | 40 | N | 1 | N | HIGH | N | | | | | | U | | | Y | | | | | | | | | 2 | | INLET COWL: 46 HOLES. 2 FB BRK.OUT | 231 |
| ALL" | | 1 | | | 1 | N | N | N | | | | | | | | | | | | | | | | | | 0 | | BIRD MATTER DOWN BYPASS DUCT | 207 |
| | | 1 | | | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | FOUND GROUND INSPECTION | 190 |
| | | | | | | N | | N | | | | | Y | | | | Y | | | | | | | | | 2 | | AT CRUISE AVM=1.5. 7 FB DMG, 3FB BRKN | 232 |
| | | 1 | | | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP | 205 |
| | | 1 | | | | N | | N | | | | | Y | | | | | | | | | | | | Y | 2 | | 16 FAN BLADES,6 ACOUSTIC LINERS DMGD. | 276 |
| | | 1 | | | 1 | N | | | | | | | | | | | | | | | | | | | | 0 | | BO INTO CORE. | 233 |
| MMON WOOD PIGEON | 2P9 | 1 | 18 | | | N | 9.9 | N | | | | | | | | | | | | | | | | | Y | 2 | | 7FB DMG BEYOND LIMITS,14FB REPLACED | 265 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | EVIDENCE ON HP STATOR VANES.GRD INSP | 277 |
| ACK-HEADED GULL | 14N36 | >1 | 10 | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | DEBRIS ON ALL FB.MIDSPAN CORE ING | 292 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 278 |
| N SWALLOW | 18Z37 | 1 | 0.75 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | TRAINING FLITE.FEATHERS 1ST STATOR VANE | 335 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | DEBRIS IN BOOSTER & COMP INLET.GRD INSP. | 293 |
| | | 1 | | Y | | N | 5.9 | N | | Y | | Y | | | | | | | | | | | | | | 1 | | 2 FB DE, 8 FB RPLCD | 266 |
| PREY | 2K1 | 1 | 55 | | | | | | | | | | | | Y | | | | | | | | | | | 2 | | 6 SETS FB RPLCD. | 235 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GROUND INSP | 279 |
| G-NECKED PHEASANT | 4L161 | 1 | 34 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | NO CORE ING | 294 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP. | 295 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP | 296 |
| NADA GOOSE | 2J30 | 1 | 128 | | 1 | N | N | N | | | | | | | | | | | | | Y | | | | | 2 | | 16 HPC BL BE-NOT SOFT BODY PRE DLVRY | 208 |
| MMON WOOD PIGEON | 2P9 | 1 | 18 | | FL | N | | N | | | | | | | | | | | | | | | | | Y | 1 | | 3FB UNK DMG. 2 PR FB RPLCD. | 297 |
| | | 1 | | | 1 | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD ING. INTO CORE | 298 |
| YPTIAN VULTURE | 3K43 | 1 | 75 | | | N | 2.6 | N | | | | | Y | Y | | | Y | | | | | | | | | 2 | | FANSET RPL,MIN DMG INLETCOWL,ACOU.PANEL | 299 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GROUND INSP | 280 |
| MMON SKYLARK | 17Z72 | 1 | 1.5 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | DEBRIS ON COWL,FB'S,SPINNER,PRIM.GASPATH | 300 |
| | | 1 | | | | N | | N | Y | Y | Y | | | | | | | | | | | | | | | 1 | | 1 FB WITH DE & AXIAL CRACK RPLCD. | 301 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP AT PHAPHOS,CYPRUS | 302 |
| AWK" | | 1 | | | 1 | N | | | | Y | | | | Y | | | | | | | | | | | | 1 | | TAXI OUT. 1FB NICKED.FAIRING DELAM | 236 |
| | | 1 | | | | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 2 FB LE BE. WALKAROUND | 258 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | HIT FAN OGV'S & INLET GOWL LIP.GRD INSP. | 281 |
| RICAN FISH EAGLE | 3K34 | 1 | 100 | | | N | 3.4 | N | | | | Y | | | | | | | | | | | | | Y | 2 | | VIBES ON SUBS.FLITE. 5FB RPLD,3FB SHGLD. | 303 |
| | | 1 | | | | N | 4.9 | N | | Y | | | | | | | | | | | | | | | | 1 | | 3 FB BE. BANG. NO SURGE. PARAMETER SHIFT | 259 |
| LL" 24 oz. | | 1 | | N | 1 | N | | N | | | | | | | | | | | | | | | | | | 0 | | AT TOUCHDOWN. | 304 |
| RTRIDGE" 15OZ. | | 1 | | | | N | INC | Y | Y | | | | | | | | | | | | | | | | | 1 | | 3 PR FB RPLCD LE DISTORTION | 267 |
| | | 1 | | | | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | FB#11 DE & REPAIRED | 305 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | STG 1 HPC BL BE DE | 282 |
| TLE BROWN BAT | BAT | 1 | 0.3 | | 1 | N | N | N | | | | | | | | | | | | | | | | | | 0 | | BAT HIT COWL. | 237 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD HIT FB'S, OGV, LPC IGV'S | 306 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD. INSP | 283 |
| ACK KITE | 3K28 | 1 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | SHOP FINDING. LITTLE DATA. DAMAGED?? | 249 |
| RFALCON | 5K55 | 1 | 46.4 | | | N | | | | | | | | | | | | | | | | | | | | 0 | | | 239 |
| | | | | | | N | N | N | | | | | | | | | | | | | | | Y | | | 1 | | SPINNER RUBBER TIP DMGD | 209 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BLOOD IN CORE INLET.GRD INSP. | 284 |
| MMON LAPWING | 5N1 | 1 | 7.7 | | | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 2 FB RPLCD | 285 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP | 307 |
| RGE" | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | HEAVY DEBRIS IN BY-PASS "LG"BD | 210 |
| | | 2 | | | | N | INC | N | | | Y | | | | | | | | | | | | Y | | Y | 2 | | 5FBDMGD,2FBLE TEARS.2 SPINNER CONESRPLCD | 268 |
| TLE EGRET | 1I50 | 1 | 17 | | | N | | | | | | | | | | | | | | | | | | | | 0 | | BIRD EXITED FAN AIR EXHAUST | 248 |
| | | | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | MEXICAN GOVT A/C | 211 |
| | | 1 | | | | N | HIGH | N | | | | | | | Y | | | | | | | | | | | 2 | | HIGH N1 VIBES.4FB BENT,RPLCD AT MGQ. | 635 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD. INSP. | 308 |
| | | 1 | | | | N | 3.4 | N | | | | | | | | | | | | | | | | | Y | 2 | | 4 FB UNK DMG BEYOND LIMITS | 309 |
| RRING GULL | 14N14 | 1 | 40 | | Y | INVLNTRY.NRSURGE | INC | HIEGT,VIBES | | | | | | | | | | | | | Y | | | | Y | 2 | • | FUEL DUMPED.NON-RECOV.SURGE,VIBES,HI EGT | 247 |
| | | 1 | | | | N | | | | | | | | | | | | | | | | | | | | 0 | | INTO CORE | 250 |
| MALL SEAGULL" | | 1 | | | 1 | N | | | | | | | | | | | | | | | | | | | | 0 | | SMELL. 8-12 OZ.SEAGULL. | 238 |
| DDY TURNSTONE | 6N30 | 2 | 4 | | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | WALKAROUND AT FUK | 334 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 618 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP. NO CORE ING. | 310 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | Y | | 2 | | SLITE HPC8THSTGVANE YIELDING.5OGVSPACERS | 269 |
| | | 1 | | | | N | 1.9 | N | | | | Y | | | | | | | | | | | | | | 1 | | 3 FB SHINGLED-REPLCD. | 311 |
| IUKAR | 4L37 | 1 | 18 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD HIT MIDSPAN SHROUD AREA | 312 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | CORE ING. | 313 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | Y | | | | | 2 | | UNK# IPC BL DMG. ENG RMVD | 212 |
| GEON"-MEDIUM | | 1 | | | 1 | N | | N | | | | | | | | | | | | | | | | | Y | 2 | | 17 FB DMGD, REPLCD | 270 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | ALL ENG PARAMS NORMAL | 271 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD HIT SPINNER.GRD INSP | 286 |
| MMON WOOD PIGEON | 2P9 | 1 | 18 | | | N | 6.0 | N | Y | | | | | | Y | | | | | | | | | Y | | 2 | | 7FB SEVERE DMG,DEFORM.SHRDS.5PR FB RPLCD | 272 |
| MMON ROCK DOVE | 2P1 | 1 | 14 | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD ENTERED BOOSTER,EXITED VBV DOOR | 314 |
| SEATE TERN | 14N58 | 1 | 4 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | FEATHERS R-6 BLOCKER DOOR | 434 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | ENG PARAMS NORMAL | 490 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | DEBRIS FOUND GROUND INSP. | 213 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRDS HIT ENG, COCKPIT CABIN FLOCK???? | 287 |
| MALL" | | 2 | | | | N | | N | | | | Y | | | | | | | | | | | | | | 1 | | VIBES ON SUBSEQUENT FLITES.FAN SET RPLCD | 273 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 485 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | FINAL APPROACH INTO KOCHI. | 619 |
| RRING GULL | 14N14 | >1 | 32 | | SE | N | N | N | | | | | | | | | | | | | | | | | | 0 | | DEBRIS DOWN BY-PASS | 214 |
| RRING GULL | 14N14 | 4-5 | 32 | | SE | N | N | N | | | | | | | | | | | | | | | | | | 0 | | 3 BDS HIT FAN, 1-2 DOWN CORE | 214 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | ODOR IN COCKPIT. ALL ENG PARAMS NORMAL | 274 |
| ACK KITE | 3K28 | 1 | 28 | N | 1 | N | 3.0 | N | Y | Y | | | | | | | | | | | | | | Y | | 1 | | 3 FB BE, 3 OGV'S SPLIT TRAILINO EDGE | 315 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | WALKAROUND.FRESH REMNS FB'S & EXIT VANES | 246 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP | 288 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD HIT FAN BOOSTER IGV 6:00 POSITION | 289 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP. | 290 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 620 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP | 291 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | OFF-WING INSP.HPC STG 1 BLADE DMG. | 636 |

| DATE | EVT | A/C | ENG | DASH | POS | TIME | POF | SIGEVT | ALT | SPD | FLR | LTCON | WEATHER | CREW | CITYPRS | APT | LOCALE | US | REGION | BIRDNAME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06/27/90 | 241 | B747 | JT9D | 7Q | 3 | 15:15 | TR | N | 0 | VR | | | | DIV | LXS-ATH | LXS | LEMNOS,GREECE | N | EUROPE | HERRING GULL |
| 06/27/90 | 621 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -NGS | XFO | NAGASAKI,JAPAN?? | N | | |
| 06/29/90 | 240 | B767 | JT9D | 7R4E | 2 | 15:29 | CL | N | 400 | | | | SCLD | ATB | WLG-MEL | WLG | WELLINGTON,NEW ZEALAND | N | AUS.NEW Z. | SILVER (RED-BILLED) GULL |
| 06/29/90 | 275 | A320 | CFM56 | 5 | 1 | | TR | N | 0 | V1- | | | | N | FRA- | FRA | FRANKFURT,GERMANY | N | EUROPE | |
| 06/29/90 | 622 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -KMI | XFO | MIYAZAKI,JAPAN?? | N | | |
| 06/29/90 | 637 | B767 | CF6 | 80C2 | 2 | | LR | N | 0 | | | | | N | -HIJ | HIJ | HIROSHIMA,JAPAN | N | PACIFIC | |
| 07/01/90 | 486 | B757 | 2000 | 2037 | 2 | | | N | | | | | | N | | XUS | | Y | N.AMERICA | |
| 07/02/90 | 242 | B767 | 4000 | 4060 | 1 | 8:10 | AP | N | | | | | | N | EWR-CPH | CPH | COPENHAGEN,DENMARK | N | EUROPE | EURASIAN KESTREL |
| 07/02/90 | 322 | A300 | 4000 | 4158 | 1 | | | N | | | | | | N | YUL-ORY | XFO | MONTREAL OR PARIS | N | | CHIMNEY SWIFT |
| 07/05/90 | 337 | B757 | RB211 | 535E4 | 2 | | | N | | | | | | N | | XUS | TULSA,OKLAHOMA ?? | Y | N.AMERICA | |
| 07/05/90 | 369 | A310 | CF6 | 80C2 | 1 | | AP | N | 400 | | VFR | OVRCST | | N | -TLS | TLS | TOULOUSE,FRANCE | N | EUROPE | "SMALL BIRD" |
| 07/06/90 | 339 | B757 | RB211 | 535C | 2 | 13:04 | TR | N | 0 | 120 | | | SCLD | ATB | LHR- | LHR | LONDON-LHR,ENGLAND,UK | N | EUROPE | "PIGEON"-MEDIUM |
| 07/08/90 | 488 | B757 | 2000 | 2037 | 1 | | TC | N | | | | | | | MIA- | MIA | MIAMI,FLORIDA | Y | N.AMERICA | |
| 07/12/90 | 254 | B767 | 4000 | 4060 | 1 | | | N | | | | | | | CPH-CPH | CPH | COPENHAGEN,DENMARK | N | EUROPE | |
| 07/12/90 | 623 | B767 | CF6 | 80A | 2 | | TR | N | 0 | 120 | | DAY | | N | SHI- | SHI | SHIMOJISHIMA,JAPAN | N | PACIFIC | "HERON" |
| 07/13/90 | 370 | B767 | CF6 | 80C2 | 2 | | TX | N | 0 | TAX | | | | N | | XFO | TOKYO-HND,JAPAN?? | N | PACIFIC | |
| 07/14/90 | 371 | A300 | CF6 | 80C2 | 2 | 7:06 | TR | N | 0 | 138 | | | OVERCAST | ATB | BGI- | BGI | BARBADOS,BARBADOS | N | S.AMERICA | "EGRET"-MEDIUM |
| 07/14/90 | 372 | A310 | CF6 | 80C2 | 2 | | CL | N | | | | | | N | CFU-MUC | CFU | CORFU,GREECE | N | EUROPE | EGYPTIAN VULTURE |
| 07/14/90 | 624 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | | XFO | | N | | |
| 07/15/90 | 338 | B757 | RB211 | 535E4 | 2 | | | N | | | | | | N | AMS-YYZ | XFO | AMSTERDAM OR TORONTO | N | | KILLDEER |
| 07/16/90 | 345 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -DUS | XFO | DUSSELDORF,GERMANY?? | N | | |
| 07/17/90 | 252 | A300 | JT9D | 7R4H | 2 | 19:45 | TR | N | 0 | | | | | N | RUH-ABT | RUH | RIYADH,SAUDI ARABIA | N | MID.EAST | |
| 07/17/90 | 373 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | |
| 07/18/90 | 355 | A310 | CF6 | 80A | 2 | | DA | N | 100 | 130 | | | | N | -NCE | NCE | NICE,FRANCE | N | EUROPE | HERRING GULL |
| 07/19/90 | 625 | B767 | CF6 | 80A | 2 | 19:31 | DA | N | 1000 | 128 | IFR | | | N | -MYJ | MYJ | MATSUYAMA,JAPAN | N | PACIFIC | |
| 07/22/90 | 255 | B767 | JT9D | 7R4E | 1 | 20:00 | CL | N | | | | | RAIN | ATB | PER-NRT | PER | PERTH,AUSTRALIA | N | AUS.NEW Z. | BANDED PLOVER |
| 07/22/90 | 626 | B767 | CF6 | 80A | 1 | 8:05 | AP | N | 200 | | | | | N | -SYD | SYD | SYDNEY,AUSTRALIA | N | AUS.NEW Z. | SILVER (RED-BILLED) GULL |
| 07/23/90 | 253 | B767 | JT9D | 7R4E | 2 | | | N | | | | | | N | | XFO | ETHIOPIA??? | N | | |
| 07/23/90 | 638 | B767 | CF6 | 80C2 | 2 | 19:47 | AP | N | 30 | 132 | | | | N | | XFO | | N | | |
| 07/24/90 | 321 | DC10 | JT9D | 59A | 1 | | TC | N | | | | | | N | NGO-FUK | NGO | NAGOYA,JAPAN | N | PACIFIC | |
| 07/24/90 | 356 | A310 | CF6 | 80A | 2 | | | N | | | | | | N | AMS-LCA | XFO | AMSTERDAM OR LARNACA | N | | COMMON ROCK DOVE |
| 07/24/90 | 374 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN?? | N | | |
| 07/24/90 | 375 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -MYJ | XFO | MASUYAMA,JAPAN?? | N | | |
| 07/25/90 | 320 | B767 | JT9D | 7R4D | 1 | | LA | N | | | | | | N | -FUK | FUK | FUKUOKA,JAPAN | N | PACIFIC | |
| 07/25/90 | 627 | B767 | CF6 | 80A | 2 | | LR | N | 0 | | | | | N | -NGO | NGO | NAGOYA,JAPAN | N | PACIFIC | |
| 07/25/90 | 639 | B767 | CF6 | 80C2 | 2 | | LR | N | 0 | | | | | N | -MYJ | MYJ | MATSUYAMA,JAPAN | N | PACIFIC | |
| 07/27/90 | 256 | B767 | JT9D | 7R4D | 2 | 20:00 | LA | N | | | | | | N | MYJ-HND | HND | TOKYO-HND,JAPAN | N | PACIFIC | |
| 07/27/90 | 319 | DC10 | JT9D | 59A | 1 | | | N | | | | | | N | OKI-HND | XFO | OKI ISLAND/TOKYO-HND,JAPAN | N | PACIFIC | |
| 07/28/90 | 262 | A310 | 4000 | 4152 | 2 | | CL | N | | | | | | | KHI- | KHI | KARACHI,PAKISTAN | N | ASIA | |
| 07/28/90 | 318 | DC10 | JT9D | 59A | 1 | | | N | | | | | | N | OSA-PUS | XFO | OSAKA,JAPAN/PUSAN,KOREA | N | | |
| 07/28/90 | 346 | A320 | CFM56 | 5 | 1 | | LR | N | 0 | | | | | N | -YUL | YUL | MONTREAL,CANADA | N | N.AMERICA | RING-BILLED GULL |
| 07/28/90 | 357 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -KOJ | XFO | KAGOSHIMA,JAPAN??? | N | | |
| 07/29/90 | 358 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -KMI | XFO | MIYAZAKI,JAPAN?? | N | | |
| 07/30/90 | 257 | B757 | 2000 | 2037 | 2 | 7:15 | CL | TRANSVERSE FRAC. | 800 | | | | | ATB | LAX-SLC | LAX | LOS ANGELES,CAL. | Y | N.AMERICA | WESTERN GULL |
| 07/30/90 | 376 | A300 | CF6 | 80C2 | 1 | | | N | | | | | | N | -BKK | XFO | BANGKOK,THAILAND?? | N | | |
| 07/30/90 | 640 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -MYJ | XFO | MATSUYAMA,JAPAN?? | N | | |
| 07/31/90 | 377 | A310 | CF6 | 80C2 | 1 | | LR | N | 0 | | | | | N | -DEL | DEL | DELHI,INDIA | N | ASIA | |
| 08/01/90 | 260 | B757 | 2000 | 2037 | 1 | | | N | | | | | | N | -DTW | XUS | DETROIT,MICHIGAN??? | Y | N.AMERICA | AMERICAN ROBIN |
| 08/01/90 | 261 | B757 | 2000 | 2040 | 2 | | | N | | | | | | | ABY-MOB | XUS | ALBANY,GA OR MOBILE,ALA | Y | N.AMERICA | AMERICAN MOURNING DO |
| 08/01/90 | 492 | B747 | 4000 | 4056 | 2 | | | N | | | | | | N | | XXX | | U | | |
| 08/01/90 | 628 | B767 | CF6 | 80A | 2 | | LR | N | 0 | | | | | N | -KMI | KMI | MIYAZAKI,JAPAN | N | PACIFIC | |
| 08/04/90 | 359 | B767 | CF6 | 80A | 2 | | LR | N | 0 | | | | | N | -KCZ | KCZ | KOCHI,JAPAN | N | PACIFIC | |
| 08/05/90 | 263 | B747 | JT9D | 7Q | 4 | | TR | POWER LOSS | 0 | V1- | | | | ATO | JFK- | JFK | NEW YORK-JFK,NY | Y | N.AMERICA | HERRING GULL |
| 08/05/90 | 316 | B767 | 4000 | 4060 | 1 | 6:08 | TO | N | 500 | | | | FOG | ATB | AMS-HER | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | "GULL"-MEDIUM |
| 08/06/90 | 347 | A320 | CFM56 | 5 | 1 | | TR | N | 0 | V1+ | | | | DIV | LIL-LYN | LIL | LILLE,FRANCE | N | EUROPE | COMMON BARN OWL |
| 08/08/90 | 324 | A300 | 4000 | 4158 | 1 | | | N | | | | | | N | JIB-ORY | XFO | DJIBOUTI OR PARIS | N | | DON-SMITH'S NIGHTJAR |
| 08/10/90 | 317 | A300 | 4000 | 4158 | 1 | | TC | N | | | | | | ATB | SEL-PUS | SEL | SEOUL,KOREA | N | ASIA | CHIMNEY SWIFT |
| 08/10/90 | 378 | A310 | CF6 | 80C2 | 1 | | | N | | | | | | N | -BOM | XFO | BOMBAY,INDIA?? | N | | |
| 08/10/90 | 641 | B767 | CF6 | 80C2 | 1 | | AP | N | | | | | | N | -MYJ | MYJ | MATSUYAMA,JAPAN | N | PACIFIC | |
| 08/12/90 | 325 | B767 | 4000 | 4060 | 1 | | | N | | | | | | N | -AMS | XFO | AMSTERDAM,NETHERLANDS?? | N | EUROPE | |
| 08/12/90 | 379 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | ORY-ALG | XFO | PARIS-ORLY OR ALGIERS | N | | |
| 08/12/90 | 629 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -TOY | XFO | TOYAMA,JAPAN?? | N | | "BAT" |
| 08/13/90 | 348 | A320 | CFM56 | 5 | 1 | 14:35 | TR | N | 0 | 125 | | | NCLD | N | BRE- | BRE | BREMEN,GERMANY | N | EUROPE | "DOVE"-MEDIUM |
| 08/13/90 | 630 | B767 | CF6 | 80A | 2 | 19:12 | LR | N | 0 | | | NIGHT | | N | -TOY | TOY | TOYAMA,JAPAN | N | PACIFIC | "BAT" |
| 08/13/90 | 642 | B767 | CF6 | 80C2 | 2 | | LR | N | 0 | | | | | N | -OIT | OIT | OITA,JAPAN | N | PACIFIC | |
| 08/14/90 | 323 | B757 | 2000 | 2037 | 1 | | TO | MEMB | 10 | VR+ | | | | N | JFK-SLC | JFK | NEW YORK-JFK,NY | Y | N.AMERICA | RING-NECKED PHEASANT |
| 08/14/90 | 323 | B757 | 2000 | 2037 | 2 | | TO | MEMB | 10 | VR+ | | | | N | JFK-SLC | JFK | NEW YORK-JFK,NY | Y | N.AMERICA | RING-NECKED PHEASANT |
| 08/15/90 | 631 | B767 | CF6 | 80A | 2 | | LR | N | 0 | | | | | N | -TTJ | TTJ | TOTTORI,JAPAN | N | PACIFIC | |
| 08/16/90 | 360 | B767 | CF6 | 80A | 2 | | LR | N | 0 | | | | | N | -OKJ | OKJ | OKAYAMA,JAPAN | N | PACIFIC | |
| 08/16/90 | 380 | A310 | CF6 | 80C2 | 2 | 11:15 | AP | N | 50 | 140 | | | NCLD | N | -NTE | NTE | NANTES,FRANCE | N | EUROPE | "SWALLOW" OR "SWIFT"1 |
| 08/17/90 | 632 | B767 | CF6 | 80A | 1 | | LR | MESB | 0 | | | | | N | -TOY | TOY | TOYAMA,JAPAN | N | PACIFIC | "BAT" |
| 08/17/90 | 632 | B767 | CF6 | 80A | 2 | | LR | MESB | 0 | | | | | N | -TOY | TOY | TOYAMA,JAPAN | N | PACIFIC | "BAT" |
| 08/20/90 | 349 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -LYN | XFO | LYON,FRANCE?? | N | | |
| 08/20/90 | 350 | A320 | CFM56 | 5 | 1 | | LR | N | 0 | | | | | N | -DUS | DUS | DUSSELDORF,GERMANY | N | EUROPE | |
| 08/21/90 | 361 | A310 | CF6 | 80A | 1 | | LR | N | 0 | | | DUSK | CLEAR | N | -IST | IST | ISTANBUL,TURKEY | N | MID.EAST | "LGE SEAGULL" 40 OZ. |
| 08/22/90 | 351 | A320 | CFM56 | 5 | 2 | | TR | N | 0 | V1+ | | | | N | ORY-TLS | ORY | PARIS-ORLY,FRANCE | N | EUROPE | |
| 08/24/90 | 362 | B767 | CF6 | 80A | 1 | | LR | N | 0 | | | | | N | -SDJ | SDJ | SENDAI,JAPAN | N | PACIFIC | |
| 08/24/90 | 489 | B747 | JT9D | 7R4 | 3 | | LA | N | | | | | | N | SIN-AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | |
| 08/25/90 | 352 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -YUL | XFO | MONTREAL,CANADA??? | N | | |
| 08/25/90 | 643 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | |
| 08/27/90 | 330 | B767 | 4000 | 4060 | 1 | 8:30 | | N | | | | | | N | -CPH | XXX | COPENHAGEN?? | U | | MEADOW PIPIT |
| 08/28/90 | 363 | B767 | CF6 | 80A | 2 | | LR | N | 0 | | | | | N | -TAK | TAK | TAKAMATSU,JAPAN | N | PACIFIC | |
| 08/29/90 | 327 | B747 | JT9D | 7R4G2 | 4 | | AP | N | | | | | | N | -FRA | FRA | FRANKFURT,GERMANY | N | EUROPE | |
| 08/30/90 | 633 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | | XFO | | N | | "SPARROW" 1 OZ. |
| 08/31/90 | 381 | B747 | CF6 | 80C2 | 3 | | LR | N | 0 | 100 | | DAWN | CLEAR | N | -AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | |
| 09/03/90 | 328 | B747 | JT9D | 7Q | 4 | 8:27 | TR | POWER LOSS | 0 | 170 | | | SCLD | ATB | DEL-SIN | DEL | DELHI,INDIA | N | ASIA | BLACK KITE |
| 09/04/90 | 264 | A300 | 4000 | 4152 | 1 | | TC | N | | | | | | N | SEL-HKG | SEL | SEOUL,KOREA | N | ASIA | |

| | BIRDNAME | SPEC | #BDS | WT | ALERT | SEE | POWLOSS | VIBE | IFSD | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | NMS | F | REMARKS | EVT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | HERRING GULL | 14N14 | 1 | 40 | N | FL | N | HIGH | VIBES | | | Y | | | Y | Y | | Y | | | | | | | | | 2 | | COWL PEN.4FB BE,1 BROKEN,PIECE HIT#4 ENG | 241 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 621 |
| Z | SILVER (RED-BILLED) GULL | 14N32 | 1 | 11 | | | N | HIGH | N | | Y | | Y | | | | | | | | | | | | | | 1 | | 1FB BE.VOL POWER RED.ATB DUE TO VIBES. | 240 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | ODOR IN CABIN. STAINS ON FAN & CORE | 275 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BORESCOPED. | 622 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 637 |
| :A | | | 1 | | | | | | N | | Y | | | Y | | | | Y | | | | | | | | | 2 | | 2FB BROKEN.2 SETS RPLCD. | 486 |
| | EURASIAN KESTREL | 5K27 | 1 | 8 | | 1 | N | | | | | | | | | | | | | | | | | | | | 0 | | RMNS ON FAN EXIT VANE | 242 |
| | CHIMNEY SWIFT | 1U33 | 1 | 1 | | | | | | | Y | | | | | | | | | | | | | | | | 1 | | 1 FB BE. | 322 |
| :A | | | 1 | | | | N | N | N | Y | Y | | | | | | | | | | | | | | | | 1 | | 2 FB LE CURL | 337 |
| | "SMALL BIRD" | | 1 | | | 1 | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 369 |
| | "PIGEON"-MEDIUM | | 1 | | | SE | N | 4.0 | N | | Y | | Y | | | | | | | | | | | | | | 1 | | 3 FB BE. 2 FB SHGLD.ATB DUE TO VIBES. | 339 |
| :A | | | 1 | | | | | | | | | | | | | | | | | | | | | | | Y | 1 | | 2 SETS FB RPLCD. | 488 |
| | | | 1 | | | FL | N | | | | | | | | | | | | | | | | | | | | 0 | | HIT LPC INLET,FAN EXIT VANES.TRNG FLITE | 254 |
| | "HERON" | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | -V1 | 623 |
| | | | 1 | | | | N | 3.2 | N | | | | | | | | | | | | | Y | | | | | 2 | | 1HPC BL LE TIP MSNG,MDSPNSHRD OVLAP.RMVD | 370 |
| :A | "EGRET"-MEDIUM | | 1 | | | | N | | N | Y | Y | Y | | | | | | | | | | | | | Y | | 1 | | 1FB BE,CRACKED, NOTCHED 1FB LE NICKED | 371 |
| | EGYPTIAN VULTURE | 3K43 | 1 | 75 | | 1 | N | | N | Y | | | | | | Y | | | | | | Y | | | | | 2 | | 4 FB LE BE.2 HPC BL "NICKS".ENG RMVD. | 372 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 624 |
| | KILLDEER | 5N33 | 1 | 3 | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | DEBRIS ON OGV'S. WALKAROUND. | 338 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | DEBRIS ON FB'S & 1ST STG LPC. | 345 |
| | | TBI | 1 | | | N | N | INC | | | | | | | | Y | | Y | | | | | | | | | 2 | | 4 FB BE, 1 BRK OUT | 252 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSPECT. AT TYO | 373 |
| | HERRING GULL | 14N14 | 1 | 40 | | SE | N | | N | | | | Y | | | | | | | | | | | | | | 1 | | 4 FB SHINGLED, REPLACED | 355 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 625 |
| Z | BANDED PLOVER | 5N23 | 1 | 7 | | 1 | N | | | | Y | | | | | | | Y | | | | | | | | | 2 | | 1 FB LE BRKN, 2 FB BE. HIGH VIBES ON LDG | 255 |
| Z | SILVER (RED-BILLED) GULL | 14N32 | 1 | 11 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 626 |
| | | | 1 | | | N | N | | | | | | | | | | | | | | | | | | | | 1 | | 1 FB BE | 253 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 638 |
| | | | 1 | | | | N | | | | | | | | | | | | | | | | | | | | 0 | | SMELL.INTO CORE. | 321 |
| | COMMON ROCK DOVE | 2P1 | 1 | 14 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | DEBRIS IN CORE | 356 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD. INSP. AT OSAKA | 374 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP AT MATSUYAMA | 375 |
| | | | 1 | | | | N | | | | | | | | | | | | | | | | | | | | 0 | | | 320 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 627 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 639 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | DISCOVERED UPON ENGINE REMOVAL | 256 |
| | | | 1 | | | | N | | | | | | | | | | | | | | | | | | | | 0 | | | 319 |
| | | | 1 | | | | N | | | | Y | | | | | | | | | | | | | | | Y | 1 | | #BIRDS? | 262 |
| | | | 1 | | | | N | | | | | | | | | | | | | | | | | | | | 0 | | | 318 |
| :A | RING-BILLED GULL | 14N12 | 1 | 17 | | | N | | N | | | | | | | | | | | | | | | | | Y | 1 | | 1FB DMGD. DEBRIS IN OGV'S | 346 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD INTO CORE. | 357 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD. INSP. AT MIYAZAKI | 358 |
| :A | WESTERN GULL | 14N19 | 1 | 40.4 | | | 50% | HIGH | VIBES | Y | | | | Y | Y | Y | | | Y | Y | | Y | | | | | 2 | * | CONTND.3FB FRACT 3"BELOW MDSPN SHROUD | 257 |
| | | | 1 | | | | N | HIGH | N | | | | | | | | | | | | | Y | | | | | 2 | | 2 HPC BL TIPS MSNG,7 W/LE TIP CURL.REMVD | 376 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 640 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | X | | OLD HPC DMG NOT BY BIRD,IN LIMITS | 377 |
| :A | AMERICAN ROBIN | 41Z314 | 1 | 2.5 | | | N | | | | Y | | | | | | | | | | | | | | | Y | 1 | | UNCONFIRMED. 3 FB BE BEYOND LIMITS | 260 |
| :A | AMERICAN MOURNING DOVE | 2P105 | 1 | 4 | | | N | | N | | Y | Y | | | | | | | | | | | | | | | 1 | | 2 FB DMGD.1 BLD TORN | 261 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | HIT OUTSIDE SHROUD | 492 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 628 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 359 |
| :A | HERRING GULL | 14N14 | 1 | 40 | | | NR SURGE,HI EGT | | | | | | | | | | | | | | | Y | | | | | 2 | * | SURGE,HI EGT. 5TH STG BL/VA CLASH. | 263 |
| | "GULL"-MEDIUM | | 1 | | N | SE | N | INC | | | | | | | | Y | | | | | | | | | | | 2 | | 4 FB BE.ATB DUE TO VIBES. | 316 |
| | COMMON BARN OWL | 1S2 | 1 | 11 | | | N | 5.8 | N | | | | Y | | | | | | | | | Y | | | | | 2 | | HPC STG 5&9 DMG.ENG CHANGED.DIV TO ORLY | 347 |
| | DON-SMITH'S NIGHTJAR | 5T55 | 1 | 1.25 | | | N | | | | | | | | | | | | | | | | | | | | 0 | | WALK AROUND. | 324 |
| | CHIMNEY SWIFT | 1U33 | 1 | 1 | | | | | NOT BIRD | | | | | | | | | | | | | | Y | | | | X | ? | TURBINE FAILURE-CASTING DEFECT.NOT BIRD. | 317 |
| | | | 1 | | | | N | | N | | | | | Y | | | | | | | | | | | Y | | 1 | | GRD INSP AT BOMBAY.ACCOU.PANEL,OGV DMG | 378 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | FINAL APPROACH AT MYJ | 641 |
| | | | 1 | | | | N | | | | | | | | | | | | | | | | | | | | 0 | | WALK AROUND. | 325 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | DEBRIS ON SPINNER AND FB'S | 379 |
| | "BAT" | BAT | 1 | 1 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 629 |
| | "DOVE"-MEDIUM | | 1 | | N | 1 | N | INC | N | | | | | | | | | | | | | | | | | | 0 | | NI VIBES FLUCTUATED.ODOR IN CABIN. | 348 |
| | "BAT" | BAT | 1 | 1 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | 1 OR MORE BATS INGESTED | 630 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 642 |
| :A | RING-NECKED PHEASANT | 4L161 | >1 | 40 | | | N | | | | | | | Y | | | | Y | | | | | | | | | 2 | | SMELL.1 FB BKN.BIRD BROKEN UP BY SPINNER | 323 |
| :A | RING-NECKED PHEASANT | 4L161 | 1 | 40 | | | N | | | Y | | Y | | Y | | | | | | | | | | | | | 2 | | 3 FB LE DEF,1TORN.SMELL.BIRD BROKEN UP | 323 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRDSTRIKE TO COWL.SAME ENG. AS #630. | 631 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 360 |
| | "SWALLOW" OR "SWIFT"1 OZ | | 1 | | N | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | HIT WINDSHIELD,RADOME | 380 |
| | "BAT" | BAT | 1 | 1 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BAT HIT COWL | 632 |
| | "BAT" | BAT | 1 | 1 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BAT HIT COWL. | 632 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSPECTION AT LYON | 349 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 350 |
| | "LGE SEAGULL" 40 OZ. | | 1 | | | | N | 3.5 | N | Y | Y | | Y | | | | | | | | | | | | | | 1 | | 1 FB LE BE, 2 FB SHGLD.40oz.GENERIC GULL | 361 |
| | | | 1 | | | | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 2 FB BE | 351 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 362 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 489 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | STG1BL CRACK,2BL PIECE MISSING.NO FB DMG | 352 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 643 |
| | MEADOW PIPIT | 47Z36 | 1 | 0.65 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | WALKAROUND AT CPH | 330 |
| | | | 1 | | | | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 1 FB BE - TRIMMED | 363 |
| | | | 1 | | | | N | | | | | | | | | | | | | | | | | | | | 0 | | NO PARAMETER SHIFTS | 327 |
| | "SPARROW" 1 OZ. | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 633 |
| | | | 1 | | | | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 2 FB DISTORTED, RPLCD. | 381 |
| | BLACK KITE | 3K28 | 1 | 28 | | 1 | NON-RECOV.SURGE | | HI EGT | | | | | | | | | | | | | Y | | | | | 2 | * | NON-RECOV.SURG.STG5 HPC,IGV CLASH | 328 |
| | | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 264 |

| DATE | EVT | A/C | ENG | DASH | POS | TIME | POF | SIGEVT | ALT | SPD | FLR | LTCON | WEATHER | CREW | CITYPRS | APT | LOCALE | US | REGION | BIRDNAME | SI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 09/04/90 | 336 | A300 | 4000 | 4152 | 1 | | TO | N | | | | | | N | SEL-HKG | SEL | SEOUL,KOREA | N | ASIA | GREAT EGRET | 1I |
| 09/04/90 | 353 | A320 | CFM56 | 5 | 2 | | LR | N | 0 | | | | | N | -CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | | |
| 09/04/90 | 382 | B747 | CF6 | 80C2 | 1 | 7:00 | LR | MEMB | 0 | 120 | | DAWN | CLEAR | N | -AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | BLACK-HEADED GULL | 1 |
| 09/04/90 | 382 | B747 | CF6 | 80C2 | 2 | 7:00 | LR | MEMB | 0 | 120 | | DAWN | CLEAR | N | -AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | BLACK-HEADED GULL | 1 |
| 09/04/90 | 383 | A310 | CF6 | 80C2 | 2 | 22:00 | LR | N | 0 | | VFR | DARK | CLEAR | N | YYZ-YVR | YVR | VANCOUVER,CANADA | N | N.AMERICA | GLAUCOUS-WINGED GULL | 1 |
| 09/05/90 | 364 | A310 | CF6 | 80A | 1 | | AP | N | | | | BRIGHT | CLEAR | N | -IST | IST | ISTANBUL,TURKEY | N | MID.EAST | HERRING GULL | 1 |
| 09/05/90 | 365 | A310 | CF6 | 80A | 2 | | CL | N | | | | DUSK | RAIN | DIV | IST-DXB | IST | ISTANBUL,TURKEY | N | MID.EAST | | |
| 09/06/90 | 340 | B757 | RB211 | 535C | 1 | 19:27 | LR | N | 0 | 085 | | | SCLD | N | LHR-AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | "BUZZARD"-LARGE(CONFRMD) | |
| 09/07/90 | 329 | B757 | 2000 | 2037 | 2 | | | N | | | | | | | | XUS | | Y | N.AMERICA | | |
| 09/08/90 | 612 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -YUL | XFO | MONTREAL,CANADA?? | N | | | |
| 09/09/90 | 384 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -KOJ | XFO | KAGOSHIMA,JAPAN?? | N | | | |
| 09/09/90 | 644 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | | XFO | | N | | | |
| 09/10/90 | 354 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -DTW | XUS | DETROIT,MICHIGAN?? | Y | N.AMERICA | | |
| 09/10/90 | 385 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -TOY | XFO | TOYAMA,JAPAN?? | N | | | |
| 09/10/90 | 386 | B767 | CF6 | 80C2 | 2 | | TR | N | 0 | V1+ | | | | N | YYZ-YUL | YYZ | TORONTO,CANADA | N | N.AMERICA | | |
| 09/11/90 | 387 | A310 | CF6 | 80C2 | 2 | | TR | N | 0 | V1+ | VFR | OVRCST | RAIN | ATB | MBA- | MBA | MOMBASA,KENYA | N | AFRICA | AFRICAN FISH EAGLE | 3 |
| 09/13/90 | 332 | B767 | 4000 | 4060 | 2 | | | N | | | | | | N | | XXX | | U | | | |
| 09/13/90 | 388 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -CTS | XFO | SAPPORO-CHITOSE,JAPAN?? | N | | | |
| 09/13/90 | 450 | B757 | 2000 | 2037 | 1 | | TR | N | 0 | 150 | | | CLEAR | ATB | LHA- | LHA | LAHR,GERMANY | N | EUROPE | | |
| 09/17/90 | 331 | B747 | 4000 | 4056 | 3 | | TR | N | 0 | 120 | | | | N | HKG-SIN | HKG | HONG KONG | N | ASIA | BLACK KITE | 3 |
| 09/17/90 | 333 | B747 | JT9D | 7R4G2 | 3 | | TX | MEMB | 0 | TAXI | | | | N | DTW-ANC | ANC | ANCHORAGE,ALASKA | Y | N.AMERICA | YELLOW-RUMPED WARBLER | 63 |
| 09/17/90 | 333 | B747 | JT9D | 7R4G2 | 4 | | TX | MEMB | 0 | TAXI | | | | N | DTW-ANC | ANC | ANCHORAGE,ALASKA | Y | N.AMERICA | CANADA GOOSE | 2. |
| 09/17/90 | 366 | B767 | CF6 | 80A | 2 | | LR | N | 0 | | | | | N | -OKJ | OKJ | OKAYAMA,JAPAN | N | PACIFIC | | |
| 09/17/90 | 389 | B767 | CF6 | 80C2 | 2 | | LD | N | 10 | | | | | N | -WAW | WAW | WARSAW,POLAND | N | EUROPE | BLACK-HEADED GULL | 1 |
| 09/18/90 | 341 | B747 | RB211 | 524G | 2 | | | N | | | | | | N | PAE-PAE | PAE | EVERETT,WASHINGTON | Y | N.AMERICA | | |
| 09/18/90 | 342 | B757 | RB211 | 535C | 2 | 18:05 | LR | N | 0 | 122 | | | | N | LHR-GVA | GVA | GENEVA,SWITZERLAND | N | EUROPE | "BUZZARD"-MEDIUM | |
| 09/18/90 | 367 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN?? | N | | | |
| 09/18/90 | 390 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -AUH | XFO | ABU DHABI,U.A.E.?? | N | | | |
| 09/19/90 | 391 | A310 | CF6 | 80C2 | 2 | 7:49 | LR | N | 0 | 100 | | | OVERCAST | N | -MUC | MUC | MUNICH,GERMANY | N | EUROPE | "GULL"-MEDIUM | |
| 09/19/90 | 438 | A300 | 4000 | 4158 | 2 | 9:15 | TR | N | 0 | 130 | | | NCLD | N | ORY-DJE | ORY | PARIS-ORLY,FRANCE | N | EUROPE | BLACK-HEADED GULL | 1 |
| 09/20/90 | 453 | A320 | V2500 | A1 | 2 | 1:10 | AP | N | | 125 | | | | N | DEL-AMD | AMD | AHMEDABAD,INDIA | N | ASIA | | |
| 09/21/90 | 724 | A310 | CF6 | 80C2 | 2 | 7:09 | TR | N | 0 | 070 | | | RAIN | N | BRE- | BRE | BREMEN,GERMANY | N | EUROPE | "GULL-MEDIuM" | |
| 09/22/90 | 432 | B757 | 2000 | 2037 | 1 | | | N | | | | | | N | | XUS | | Y | N.AMERICA | SWAINSON'S THRUSH | 4 |
| 09/23/90 | 343 | B747 | RB211 | 524G | 4 | 8:08 | TO | N | | | | | | N | SYD-MEL | SYD | SYDNEY,AUSTRALIA | N | AUS.NEW Z. | "GULL"-MEDIUM | |
| 09/24/90 | 368 | A310 | CF6 | 80A | 2 | | TO | N | 10 | 150 | | | | N | BRE-FRA | BRE | BREMEN,GERMANY | N | EUROPE | "SEAGULL" 20 oz. | |
| 09/24/90 | 497 | A300 | JT9D | 7R4H | 2 | | TR | N | 0 | 080 | | | | ATO | JED-SAH | JED | JEDDAH,SAUDI ARABIA | N | MID.EAST | | |
| 09/25/90 | 431 | B757 | 2000 | 2037 | 2 | | TR | N | 0 | 080 | | | | N | SLC-SFO | SLC | SALT LAKE CITY,UTAH | Y | N.AMERICA | | |
| 09/27/90 | 437 | DC10 | JT9D | 59A | 1 | 12:40 | TR | SEMB | 0 | | | | | ATO | NGO-SIN | NGO | NAGOYA,JAPAN | N | PACIFIC | "MIDSIZE" | |
| 09/28/90 | 430 | A310 | JT9D | 7R4E1 | 2 | | | N | | | | | | N | SIN-KUL | XFO | SINGAPORE OR KUALA LUMPUR | N | PACIFIC | | |
| 09/30/90 | 392 | B767 | CF6 | 80C2 | 1 | | LR | N | 0 | | | | | N | -OIT | OIT | OITA,JAPAN | N | PACIFIC | | |
| 10/01/90 | 410 | B767 | CF6 | 80C2 | 1 | | TR | N | 0 | V1+ | | | | N | MRU-THR | MRU | MAURITIUS,MAURITIUS | N | AFRICA | | |
| 10/02/90 | 433 | B757 | 2000 | 2037 | 1 | | TR | N | 0 | 120 | | | | ATO | FAR-MSP | FAR | FARGO,N.DAKOTA | Y | N.AMERICA | FRANKLIN'S GULL | 1 |
| 10/03/90 | 403 | A310 | CF6 | 80A | 1 | | | N | | | | | | N | -FRA | XFO | FRANKFURT,GERMANY?? | N | | COMMON BUZZARD | 3 |
| 10/08/90 | 393 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -FRA | XFO | FRANKFURT,GERMANY??? | N | | | |
| 10/12/90 | 411 | A310 | CF6 | 80C2 | 1 | | | N | | | | | | N | LON-LIS | XFO | LISBON OR LONDON | N | EUROPE | | |
| 10/12/90 | 436 | B767 | JT9D | 7R4D | 1 | | TR | N | 0 | 100 | | | | ATB | ORD-FRA | ORD | CHICAGO,ILLINOIS | Y | N.AMERICA | AMERICAN MOURNING DOVE | 2 |
| 10/14/90 | 435 | B747 | JT9D | 7Q | 4 | 12:22 | TR | TRANSVERSE FRAC. | 0 | 150 | | | NCLD | ATO | DEL-FRA | DEL | DELHI,INDIA | N | ASIA | "EAGLE" OR "VULTURE" | |
| 10/16/90 | 412 | B747 | CF6 | 80C2 | 2 | | LR | N | 0 | 100 | | | CLEAR | N | -AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | HUNGARIAN PARTRIDGE | 4 |
| 10/17/90 | 394 | A320 | CFM56 | 5 | | | | N | | | | | | N | | XUS | | Y | N.AMERICA | HORNED LARK | 1 |
| 10/17/90 | 441 | B747 | 4000 | 4056 | 3 | | | N | | | | | | N | -JFK | XXX | NEW YORK-JFK,NY?? | U | | | |
| 10/22/90 | 404 | B767 | CF6 | 80A | 2 | | LR | N | 0 | | | | | N | -HND | HND | TOKYO-HND,JAPAN | N | PACIFIC | | |
| 10/22/90 | 423 | B747 | RB211 | 524G | 4 | | | N | | | | | | N | LHR-MAN | XFO | LONDON-LHR/MANCHESTER,UK | N | EUROPE | | |
| 10/23/90 | 413 | B747 | CF6 | 80C2 | 4 | | | N | | | | | | N | -SPN | XFO | SAIPAN,MARIANA IS?? | N | | | |
| 10/28/90 | 414 | A300 | CF6 | 80C2 | 2 | | | N | | | | | | N | -BKK | XFO | BANGKOK,THAILAND??? | N | | | |
| 10/29/90 | 415 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | | |
| 10/29/90 | 416 | B767 | CF6 | 80C2 | 1 | | CL | N | | | | | | N | PUS-SEL | PUS | PUSAN,KOREA | N | ASIA | COMMON SNIPE | 6 |
| 10/30/90 | 439 | B767 | 4000 | 4060 | 2 | | | N | | | | | | N | -HAM | XFO | HAMBURG,GERMANY???? | N | | | |
| 10/30/90 | 443 | B757 | 2000 | 2037 | 1 | | | N | | | | | | N | | XUS | | Y | N.AMERICA | AMERICAN MOURNING DOVE | 2 |
| 11/01/90 | 395 | A320 | CFM56 | 5 | 2 | | TR | N | 0 | V1- | | | | ATO | LIL- | LIL | LILLE,FRANCE | N | EUROPE | HERRING GULL | 1 |
| 11/03/90 | 424 | B757 | RB211 | 535E4 | 2 | | TR | N | 0 | 105 | | | | ATO | AMS- | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | RING-NECKED PHEASANT | 4 |
| 11/03/90 | 440 | B767 | JT9D | 7R4E | 2 | | LD | N | | | | | | N | -NBO | NBO | NAIROBI,KENYA | N | AFRICA | | |
| 11/06/90 | 405 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | | |
| 11/06/90 | 406 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN?? | N | | | |
| 11/07/90 | 425 | B757 | RB211 | 535E4 | 2 | | AP | N | | 100 | | | | N | -ORD | ORD | CHICAGO,ILLINOIS | Y | N.AMERICA | | |
| 11/08/90 | 417 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | | |
| 11/08/90 | 454 | B757 | 2000 | 2037 | 1 | 7:37 | TO | N | | V1+ | | | | ATB | EWR-LAX | EWR | NEW YORK-NEWARK,NJ | Y | N.AMERICA | | |
| 11/09/90 | 407 | A310 | CF6 | 80A | 2 | | TR | N | 0 | V1 | | DARK | CLEAR | ATO | AMS- | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | "SMALL" | |
| 11/14/90 | 442 | B757 | 2000 | 2037 | 1 | 11:30 | TR | MEMB | 0 | VR | | | | ATO | SNA-DFW | SNA | ORANGE COUNTY,CALIFORNIA | Y | N.AMERICA | COMMON ROCK DOVE | 2 |
| 11/14/90 | 442 | B757 | 2000 | 2037 | 2 | 11:30 | TR | MEMB | 0 | VR | | | | ATO | SNA-DFW | SNA | ORANGE COUNTY,CALIFORNIA | Y | N.AMERICA | COMMON ROCK DOVE | 2 |
| 11/19/90 | 418 | B767 | CF6 | 80C2 | 1 | 7:20 | LD | N | 9 | 125 | VFR | DARK | CLOUDS | N | YMS-WAW | WAW | WARSAW,POLAND | N | EUROPE | BLACK-HEADED GULL | 1 |
| 11/20/90 | 408 | A310 | CF6 | 80A | 2 | | TR | N | 0 | V1+ | | | | N | FNA-AMS | FNA | FREETOWN,SIERRA LEONE | N | AFRICA | | |
| 11/21/90 | 396 | A320 | CFM56 | 5 | 2 | 14:08 | LR | N | 0 | 080 | | | OVERCAST | N | -NUE | NUE | NUREMBERG,GERMANY | N | EUROPE | "BUZZARD"-MEDIUM | |
| 11/21/90 | 426 | B757 | RB211 | 535E4 | 1 | 9:24 | TO | N | 300 | 160 | | | | N | ANS- | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | "SMALL" | |
| 11/23/90 | 397 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -ORY | XFO | PARIS-ORLY,FRANCE?? | N | | | |
| 11/24/90 | 427 | B757 | RB211 | 535C | 1 | 13:41 | TR | MEMB | 0 | 160 | | LIGHT | | ATB | BUD-LHR | BUD | BUDAPEST,HUNGARY | N | EUROPE | COMMON GULL | 1 |
| 11/24/90 | 427 | B757 | RB211 | 535C | 2 | 13:41 | TR | MEMB | 0 | 160 | | LIGHT | | ATB | BUD-LHR | BUD | BUDAPEST,HUNGARY | N | EUROPE | COMMON GULL | 1 |
| 11/26/90 | 398 | A320 | CFM56 | 5 | 1 | | LR | N | 0 | | | | | N | -ESB | ESB | ANKARA-ESENBOGA,TURKEY | N | MID.EAST | | T |
| 11/29/90 | 419 | A300 | CF6 | 80C2 | 2 | | | N | | | | | | N | -BKK | XFO | BANGKOK,THAILAND?? | N | | | |
| 11/29/90 | 449 | B747 | JT9D | 7Q | 2 | | | N | | | | | | | ORD-ANC | XUS | CHICAGO OR ANCHORAGE | Y | N.AMERICA | | |
| 11/30/90 | 399 | A320 | CFM56 | 5 | 2 | | LD | N | | | | | | N | -SNA | SNA | ORANGE COUNTY,CALIFORNIA | Y | N.AMERICA | | |
| 12/02/90 | 409 | A310 | CF6 | 80A | 1 | | DA | N | | | | | | N | -AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | "SMALL" | |
| 12/03/90 | 400 | A320 | CFM56 | 5 | 1 | | TR | MESB | 0 | V1+ | | | | ATB | TUN- | TUN | TUNIS,TUNISIA | N | AFRICA | | |
| 12/03/90 | 400 | A320 | CFM56 | 5 | 2 | | TR | MESB | 0 | V1+ | | | | ATB | TUN- | TUN | TUNIS,TUNISIA | N | AFRICA | | |
| 12/06/90 | 445 | A310 | 4000 | 4152 | 2 | | | N | | | | | | N | | XXX | | U | | | |
| 12/10/90 | 487 | B747 | 4000 | 4056 | 4 | | TC | N | | | | | | N | SIN-TPE | SIN | SINGAPORE | N | PACIFIC | | |
| 12/13/90 | 447 | A300 | JT9D | 7R4H1 | 1 | 8:10 | TR | N | 0 | | | | | N | JED-MED | JED | JEDDAH,SAUDI ARABIA | N | MID.EAST | | |
| 12/15/90 | 401 | A320 | CFM56 | 5 | 1 | | TR | N | 0 | 080 | | | | N | NCE- | NCE | NICE,FRANCE | N | EUROPE | BLACK-HEADED GULL | 1 |

| DNAME | SPEC | #BDS | WT | ALERT | SEE | POWLOSS | VIBE | IFSD | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | NMS | F | REMARKS | EVT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| EAT EGRET | 1152 | 1 | 38 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 336 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 353 |
| CK-HEADED GULL | 14N36 | 2 | 10 | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 382 |
| CK-HEADED GULL | 14N36 | 2 | 10 | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 382 |
| UCOUS-WINGED GULL | 14N22 | 1 | 48 | | | N | | N | | | | Y | | | | | | | | | | | | | | 1 | | 2 FB SHINGLED--WERE UNSHGLD | 383 |
| RRING GULL | 14N14 | 1 | 40 | | | N | 3.5 | N | | | | Y | | | | | | | | | | | | Y | | 1 | | FINL AP.2FB MIDSPN SHRD LCKUP,MINOR SHGL | 364 |
| | | 1 | | | | N | 7.5 | N | Y | Y | Y | | | | | | | | | | | | | | | 2 | | 3 FB TIP CURL, 1 FB TORN | 365 |
| ZZARD"-LARGE(CONFRMD | | 1 | | | SE | N | N | N | | | | | | | | | | | | | | | | | | 0 | | ICAO HAS E1 | 340 |
| | | | | | | | | | | | | | | | | | | | | | | | | | Y | 2 | | SEVERAL FB DMG. | 329 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | PIECE MSING STG1 TE BL.CRACK STG1 LPC BL | 612 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | WALKAROUND | 384 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BORESCOPED | 644 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD.INSP AT DETROIT | 354 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | MAT.MISSING FR LE HPC 2 PLACES.ENG REMVD | 385 |
| | | 1 | | | | N | INC | N | | | | | | | | | | | | | | | | | | 0 | | INC VIBES ON TO. NO CREWAC REPORTED | 386 |
| ICAN FISH EAGLE | 3K34 | 1 | 100 | | | N | HIGH | N | Y | | | Y | | | | | | | | | | | | | | 1 | | 2 FB LE DISTORTION & SHINGLED. | 387 |
| | | 1 | | | N | N | | N | | Y | | | | | | | | | | | | | | | Y | 0 | | 3 FB DMG? 3 SETS RPLCD.WALKAROUND | 332 |
| | | 1 | | | | N | | N | | | | Y | | | | | | | | | | | | | | 1 | | 2 FB SHINGLED-LATER REPLACED | 388 |
| | | 1 | | | | | | N | | | | | | | | | | | | | | | | | Y | 1 | | 3 SETS FB RPLCD.MIL BASE LAHR, GERMANY | 450 |
| CK KITE | 3K28 | 1 | 28 | | | SURGE | | N | | | | | | | | | | | | | | | | | | S | | SURGE, BANG, FLAMES | 331 |
| LOW-RUMPED WARBLER | 63Z20 | 1 | 0.5 | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | 1 SET OF FB RPLCD? TURN ONTO TAXI WAY | 333 |
| NADA GOOSE | 2J30 | 2 | 56 | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | TURN ONTO TAXIWAY | 333 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 366 |
| CK-HEADED GULL | 14N36 | 1 | 10 | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | 50-100 BIRD FLOCK.5 HIT A/C | 389 |
| | | | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | MAIDEN FLITE | 341 |
| ZZARD"-MEDIUM | | | | | SE | N | N | N | | | | | | | | | | | | | | | | | | 0 | | DEBRIS DOWN BYPASS DUCT | 342 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 367 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSPECT. | 390 |
| LL"-MEDIUM | | 1 | | N | 1 | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD.INSPECT.ICAO SHOWS E2 DMG | 391 |
| CK-HEADED GULL | 14N36 | 1 | 10 | N | 1 | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 2 FB BE, 4 FB RPLCD | 438 |
| | | 1 | | | FL | N | | N | | | | | Y | | | | | | | | | | | | Y | 1 | | ACCOU.LINER DMG. 0840Z.SHORT FINALS. | 453 |
| LL-MEDIUM" | | 1 | | Y | SE | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD.INSP.MUNICH. | 724 |
| AINSON'S THRUSH | 41Z246 | 1 | 1 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | WALKAROUND | 432 |
| LL"-MEDIUM | | 1 | | | FL | N | N | N | | | | | Y | | | | | | | | | | | | | 1 | | IDG INTAKE CONTAMINATED | 343 |
| AGULL" 20 oz. | | 1 | | | | N | 6.0 | N | | | | | Y | | | | | | | | Y | | | | Y | 2 | | 10FB UNK DMG,RPLCD.2 HPC BLS TIP MISSING | 368 |
| | | 1 | | | | SURGE | | N | | | | | | | | | | | | | | | | | | S | | HIT SPINNER.SURGE CAUSED ATO. | 497 |
| | | 1 | | | Y | N | | N | | | | | | | | | Y | | | | | | | | Y | 2 | | 8FB DMG.BREAKOUT.BLOOD NOSE COWL INTRIOR | 431 |
| )SIZE" | | >1 | | | FL | SURGE | | N | | | | | | | | | | | | | | | | | | S | | SURGE, HI EGT, PARAMETER FLUX | 437 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | CORE ING. | 430 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | Y | Y | 2 | | 5FB,2 OGV,BLOCKER DOOR DMGD.THRUST RVRSL | 392 |
| | | 1 | | | | N | | N | Y | Y | | | | | | | | | | | | | | Y | | 1 | | 3 FB BE WITHN LIMIT,1 FB RPLCD,OGV BLNDD | 410 |
| NKLIN'S GULL | 14N31 | 1 | 9 | Y | FL | N | HIGH | N | | Y | Y | | | | | | | | | | | | | | | 2 | | 3 FB BE/TORN-1 HAD AXIAL CRACK AT SHROUD | 433 |
| MMON BUZZARD | 3K180 | 1 | 32 | | | N | | N | | | | | Y | | | | | | | | Y | | | Y | | 2 | | 2 STG1 HPC BL LE TIP BRKOUT,3 OGVFAIRING | 403 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | HIT SPINNER, BLADES, OGV | 393 |
| | | 1 | | | | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 2 FB LE DISTORT, RPLCD | 411 |
| ERICAN MOURNING DOVE | 2P105 | 1 | 4 | | N | N | 2.6 | N | | Y | | | | | | | | | | | | | | Y | | 1 | | 3 FB BE, 9 FEGV DMG. | 436 |
| GLE" OR "VULTURE" | | 1 | | N | N | INVLNTRY,NRSURGE | | HI EGT | | | | | Y | Y | | | Y | Y | | | | | | | | 2 | • | 3FB FRAC,LIBTD THRU COWL,TAIL CONE LIBTD | 435 |
| NGARIAN PARTRIDGE | 4L85 | 1 | 14 | | | N | | N | Y | | Y | | | | | | | | | | | | | | | 1 | | 3 FB LE DISTORT,RPLCD,1 FB 3" TEAR | 412 |
| NED LARK | 17Z74 | 1 | 1.5 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | OFF WING, SHOP INSP. | 394 |
| | | 1 | | | | N | | N | Y | | | | | | | | | | | | | | | | | L | | 3 FB LE BE WITHIN LIMITS | 441 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 1 | | HPC STG1 BLADE SHINGLING-ENG CHANGED | 404 |
| | | 1 | | | | N | N | N | | | | | Y | | | | | | | | | | | | | 1 | | ATTRITION LINING DMG | 423 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP SAIPAN | 413 |
| | | 1 | | | | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 2 SETS FB LE DIST, RPLCD | 414 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | INSP. TOKYO | 415 |
| MMON SNIPE | 6N47 | 1 | 4 | | | N | 3.4 | N | Y | | | | | | | | | | | | | | | | | 1 | | 4 FB LE TIP CURL, RPLCD | 416 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD. INSP. HAMBURG,GERMANY | 439 |
| ERICAN MOURNING DOVE | 2P105 | 1 | 4 | | | N | | N | | | | | | | | | | | | | | | | | Y | 1 | | 2 SETS FB'S RPLCD.DRESSED SEVERAL FB'S | 443 |
| RING GULL | 14N14 | 1 | 40 | | | N | | N | Y | | | | Y | | | | | | | | | | | | Y | 2 | | 22 FB DMGD.SEVR ABRDBL.FULLSET FB REPLCD | 395 |
| G-NECKED PHEASANT | 4L161 | 1 | 48 | | | N | N | N | | Y | | | Y | | | | | | | | | | | | | 1 | | 3FB BE/DE,ANNULUS FILLERS DMGD. | 424 |
| | | 1 | | | | | | N | | | | Y | | | | | Y | | | | | | | | | 2 | | SVERE.032"CRACK 1 FB ROOT AREA.2FB SHGLD | 440 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSPECT TYO | 405 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP. OSAKA | 406 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | INTO CORE | 425 |
| | | 1 | | | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | REMAINS ON IGV'S. TOKYO INSPECT | 417 |
| | | 1 | | | | N | | N | | | | Y | | | Y | | | | | | | | | | | 2 | | 5FB TIP CURL.ATB DUE TO LOUD NOISE | 454 |
| ALL" | | 1 | | | 1 | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 2 FB LE TIP CURL, RPLCD | 407 |
| MMON ROCK DOVE | 2P1 | 4 | 14 | | Y | SURGE | | N | Y | | | | Y | | Y | Y | Y | | | | | | | | | 2 | | 8FB DMGD.SURGE.INVESTIGATED | 442 |
| MMON ROCK DOVE | 2P1 | 2 | 14 | | Y | SURGE | | N | | | | | | | | | Y | | | | Y | | | | | 2 | | 3FB BROKEN.PRIOR HPC BLD FRACT-NOT BIRD | 442 |
| CK-HEADED GULL | 14N36 | 1 | 10 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD HIT SPINNER,EXITED BYPASS | 418 |
| | | 1 | | | | N | | N | Y | Y | | | | | | | | | | | | | | | | 1 | | 1 FB LE DE., 1 SET FB REPLCD | 408 |
| ZZARD"-MEDIUM | | 1 | | N | 1 | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 396 |
| ALL" | | >1 | | | SE | N | N | N | Y | | | | | | | | | | | | | | | | | 1 | | 1 FB LE CUP DMG. | 426 |
| | | 1 | | | | N | | N | | | | Y | | | | | | | | | | | | | | 1 | | 3 FB SHGLD, 5 FB REINSTALLED | 397 |
| MMON GULL | 14N13 | 5 | 18 | | | N | 2.5 | N | | Y | | Y | | | | | | | | | | | | | | 1 | | 2FB BE/DE.3FBSHGLD.FAN SET RPLCD.ROTATON | 427 |
| MMON GULL | 14N13 | 2 | 18 | | | N | N | N | | Y | | Y | | | | | | | | | | | | | | 1 | | 2FB BE/DE.3 SHROUDS SHGLD.FAN SET RPLCD. | 427 |
| | TBI | 1 | | | | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 3 FB LE DISTORTION,REPLACED AT CDG. | 398 |
| | | 1 | | | | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 2 FB LE DISTORT, 2PR FB RPLCD | 419 |
| | | 1 | | | | | | | Y | Y | Y | | | | | | Y | | | | | | | | | 2 | | 6 FB DMG,2 CRACKED.1 PC BROKEN | 449 |
| | | 1 | | | | N | | N | | | | Y | | | | | | | | | | | | | | 1 | | 2 SETS OF FB SHGLD | 399 |
| ALL" | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | TEMP.EGT TRENDSHIFT CAUSD BY BIRD REMANS | 409 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | Y | 1 | | 2 FB DMGD & RPLCD | 400 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | Y | 1 | | 3 FB DMGD & REPLCD | 400 |
| | | | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 445 |
| | | 1 | | | | SURGE | | N | | | | | | | | | | | | | Y | | | | | X | | 2SURGES.1 11TH STG BL DE.DMG NOT BY BIRD | 487 |
| | | 1 | | | 1 | N | | N | | | | | | | | | | | | | | | | | Y | 1 | | 6FB DMGD, 1 BEYOND LIMITS. RUMBLE,SMELL | 447 |
| CK-HEADED GULL | 14N36 | 1 | 10 | Y | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BORESCOPED,RETURNED TO SERVICE LATE. | 401 |

| DATE | EVT | A/C | ENG | DASH | POS | TIME | POF | SIGEVT | ALT | SPD | FLR | LTCON | WEATHER | CREW | CITYPRS | APT | LOCALE | US | REGION | BIRDNAME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12/15/90 | 420 | A310 | CF6 | 80C2 | 2 | 13:48 | TR | N | 0 | 090 | | DARK | CLEAR | ATO | BOM- | BOM | BOMBAY,INDIA | N | ASIA | COMMON BARN OWL |
| 12/19/90 | 446 | B757 | 2000 | 2037 | 2 | | RV | SEMB | 0 | 080 | | | | N | ATL-MIA | MIA | MIAMI,FLORIDA | Y | N.AMERICA | RING-BILLED GULL |
| 12/22/90 | 402 | A320 | CFM56 | 5 | 2 | 12:05 | TR | SEMB | 0 | V1- | | | RAIN | ATO | ABZ- | ABZ | ABERDEEN,SCOTLAND,UK | N | EUROPE | SUSPECT "SEAGULL" |
| 12/22/90 | 421 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -MYJ | XFO | MATSUYAMA,JAPAN?? | N | | |
| 12/23/90 | 422 | A310 | CF6 | 80C2 | 2 | | TR | N | 0 | V1+ | | | | N | MBA-NBO | MBA | MOMBASA,KENYA | N | AFRICA | BLACK KITE |
| 12/23/90 | 448 | B757 | 2000 | 2037 | 1 | | TO | MEMB | 10 | VR+ | | DAWN | FOG | ATB | MSY- | MSY | NEW ORLEANS,LA | Y | N.AMERICA | RING-BILLED GULL |
| 12/23/90 | 448 | B757 | 2000 | 2037 | 2 | | TO | MEMB | 10 | VR+ | | DAWN | FOG | ATB | MSY- | MSY | NEW ORLEANS,LA | Y | N.AMERICA | RING-BILLED GULL |
| 01/01/91 | 451 | B747 | 4000 | 4056 | 4 | | TR | N | 0 | V1+ | | | | ATB | JFK- | JFK | NEW YORK-JFK,NY | Y | N.AMERICA | HERRING GULL |
| 01/02/91 | 459 | B767 | CF6 | 80A | 2 | | TR | N | 0 | V1+ | | | | N | MCO-MSY | MCO | ORLANDO,FLORIDA | Y | N.AMERICA | |
| 01/02/91 | 460 | B767 | CF6 | 80A | 1 | | TR | N | 0 | V1+ | | | | N | HND- | HND | TOKYO-HND,JAPAN | N | PACIFIC | |
| 01/04/91 | 452 | B767 | 4000 | 4056 | 1 | 6:30 | LD | SEMB | | | | | CLEAR | N | LGW-HRE | HRE | HARARE,ZIMBABWE | N | AFRICA | RUFOUS-BREASTED SWALLOW |
| 01/07/91 | 461 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | |
| 01/07/91 | 465 | A300 | CF6 | 80C2 | 1 | | | N | | | | | | N | -PHL | XUS | PHILADELPHIA,PA?? | Y | N.AMERICA | |
| 01/08/91 | 428 | B757 | RB211 | 535E4 | 2 | | | N | | | | | | N | YYZ-YVR | XFO | TORONTO OR VANCOUVER | N | N.AMERICA | COMMON PINTAIL DUCK |
| 01/09/91 | 444 | B747 | JT9D | 7Q | 3 | 8:27 | TR | N | 0 | 160 | | | SCLD | ATB | NAN- | NAN | NADI,FIJI | N | PACIFIC | EURASIAN MARSH HARRIER |
| 01/18/91 | 466 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | BOM-MCT | XFO | BOMBAY OR MUSCAT,OMAN | N | | |
| 01/19/91 | 467 | A300 | CF6 | 80C2 | 1 | | TR | N | 0 | V1+ | | | | ATB | JFK- | JFK | NEW YORK-JFK,NY | Y | N.AMERICA | HERRING GULL |
| 01/21/91 | 468 | A310 | CF6 | 80C2 | 1 | 10:21 | DE | N | 5380 | | VFR | BRIGHT | CLEAR | N | -NBO | NBO | NAIROBI,KENYA | N | AFRICA | BLACK KITE |
| 01/22/91 | 462 | B767 | CF6 | 80A | 2 | 11:29 | AP | N | 610 | 132 | | | RAIN | N | -TAK | TAK | TAKAMATSU,JAPAN | N | PACIFIC | "KITE-LARGE" |
| 01/22/91 | 469 | A310 | CF6 | 80C2 | 1 | 19:00 | | N | | | | | | N | -SHA | XFO | SHANGHAI,CHINA?? | N | | BLACK-CROWNED NITE HERON |
| 01/29/91 | 463 | A310 | CF6 | 80A | 1 | | LD | MESB | | | | | | N | -CAS | CAS | CASCBLANCA,MOROCCO | N | AFRICA | |
| 01/29/91 | 463 | A310 | CF6 | 80A | 2 | | LD | MESB | | | | | | N | -CAS | CAS | CASABLANCA,MOROCCO | N | AFRICA | |
| 01/31/91 | 429 | B747 | RB211 | 524G | 2 | | | N | | | | | | N | -LHR | XFO | LONDON-LHR,ENGLAND?? | N | | |
| 02/04/91 | 470 | A300 | CF6 | 80C2 | 2 | 18:00 | TR | TRANSVERSE FRAC. | 0 | 139 | | | | ATO | HRE- | HRE | HARARE,ZIMBABWE | N | AFRICA | HELMETED GUINEA FOWL |
| 02/13/91 | 471 | A310 | CF6 | 80C2 | 1 | 11:52 | TR | N | 0 | V1- | | | | N | MBA- | MBA | MOMBASA,KENYA | N | AFRICA | BLACK-HEADED HERON |
| 02/13/91 | 499 | B757 | 2000 | 2040 | 1 | | | SEMB | | | | | | N | -PBI | XUS | W.PALM BEACH,FLA?? | Y | N.AMERICA | |
| 02/14/91 | 494 | A310 | JT9D | 7R4D | 1 | | TR | N | 0 | V1- | | | | ATO | | XFO | | N | | |
| 02/14/91 | 498 | B757 | 2000 | 2040 | 1 | | | N | | | | | | | | XUS | | Y | N.AMERICA | AMERICAN MOURNING DOVE |
| 02/18/91 | 500 | A320 | V2500 | A1 | 2 | | | N | | | | | | | -BOM | XFO | BOMBAY,INDIA?? | N | | |
| 02/21/91 | 472 | B767 | CF6 | 80C2 | 2 | 19:10 | DA | N | 1500 | 140 | | | | N | -MYJ | MYJ | MATSUYAMA,JAPAN | N | PACIFIC | "MEDIUM" |
| 02/21/91 | 553 | A320 | V2500 | A1 | 2 | 9:27 | AP | N | | 135 | | | NCLD | N | -BLR | BLR | BANGALORE,INDIA | N | ASIA | "KITE"-MEDIUM |
| 02/24/91 | 455 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -FRA | XFO | FRANKFURT,GERMANY?? | N | | |
| 02/24/91 | 473 | A310 | CF6 | 80C2 | 1 | | | N | | | | | | N | PRG-PRG | PRG | PRAGUE,CZECHOSLAVAKIA | N | EUROPE | |
| 02/26/91 | 474 | A310 | CF6 | 80C2 | 2 | 13:21 | TR | N | 0 | 160 | | | NCLD | N | DUS-JFK | DUS | DUSSELDORF,GERMANY | N | EUROPE | COMMON LAPWING |
| 02/26/91 | 475 | A310 | CF6 | 80C2 | 2 | | TR | N | 0 | V1+ | | | | N | DUS- | DUS | DUSSELDORF,GERMANY | N | EUROPE | |
| 02/27/91 | 476 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN?? | N | | |
| 03/05/91 | 456 | A320 | CFM56 | 5 | 1 | 8:10 | AP | N | 400 | 138 | | | NCLD | N | -AMS | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | COMMON WOOD PIGEON |
| 03/05/91 | 457 | A320 | CFM56 | 5 | 2 | | TR | N | 0 | V1+ | | | | N | NUE-FRA | NUE | NUREMBERG,GERMANY | N | EUROPE | |
| 03/06/91 | 477 | A300 | CF6 | 80C2 | 1 | | CL | N | 400 | | | | | ATB | EWR-SJU | EWR | NEW YORK-NEWARK,NJ | Y | N.AMERICA | HERRING GULL |
| 03/10/91 | 478 | B767 | CF6 | 80C2 | 1 | 7:45 | LR | N | 0 | 120 | | | NCLD | N | -KMJ | KMJ | KUMAMOTO,JAPAN | N | PACIFIC | "PIGEON-MEDIUM" |
| 03/11/91 | 479 | B767 | CF6 | 80C2 | 1 | | TR | N | 0 | V1+ | | | | N | EZE-POA | EZE | BUENOS AIRES-PISTARINI,ARG | N | S.AMERICA | CHIMANGO FALCON |
| 03/13/91 | 496 | B767 | JT9D | 7R4E | 1 | | TR | POWER LOSS | 0 | | | | | ATO | | XFO | AFRICA | N | AFRICA | PEREGRINE FALCON |
| 03/15/91 | 480 | B767 | CF6 | 80C2 | 1 | 8:20 | AP | N | | | | | NCLD | N | -KMJ | KMJ | KUMAMOTO,JAPAN | N | PACIFIC | "MEDIUM" |
| 03/15/91 | 484 | A310 | JT9D | 7R4E | 2 | | LA | N | | | | | | N | -SIN | SIN | SINGAPORE | N | PACIFIC | BLACK KITE |
| 03/16/91 | 481 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -CLT | XUS | CHARLOTTE,N.CAROLINA?? | Y | N.AMERICA | |
| 03/16/91 | 501 | A320 | V2500 | A1 | 1 | | | N | | | | | | | | XFO | EUROPE/MIDDLE EAST | N | | |
| 03/19/91 | 464 | A310 | CF6 | 80A | 2 | | LR | N | 0 | | | | | N | -PFO | PFO | PAPHOS,CYPRUS | N | MID.EAST | SHORT-EARED OWL |
| 03/19/91 | 482 | B747 | CF6 | 80C2 | 1 | | LR | MESB | 0 | | | | | N | -HND | HND | TOKYO-HND,JAPAN | N | PACIFIC | "GULL" 18 oz. |
| 03/19/91 | 482 | B747 | CF6 | 80C2 | 2 | | LR | MESB | 0 | | | | | N | -HND | HND | TOKYO-HND,JAPAN | N | PACIFIC | "GULL" 18 OZ. |
| 03/19/91 | 482 | B747 | CF6 | 80C2 | 3 | | LR | MESB | 0 | | | | | N | -HND | HND | TOKYO-HND,JAPAN | N | PACIFIC | "GULL" 18 OZ. |
| 03/19/91 | 493 | B767 | 4000 | 4060 | 2 | | TR | N | 0 | VR | | | | ATB | BKK-AHU | BKK | BANGKOK,THAILAND | N | PACIFIC | COMMON BARN OWL |
| 03/24/91 | 458 | A320 | CFM56 | 5 | 2 | | TR | N | 0 | V1+ | | | | N | LEJ-FRA | LEJ | LEIPZIG,GERMANY | N | EUROPE | |
| 03/25/91 | 483 | B747 | CF6 | 80C2 | 2 | 19:00 | TR | SEMB | 0 | 165 | | DUSK | CLEAR | ATB | AMS-MNL | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | "DUCK"-MEDIUM |
| 04/02/91 | 502 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -NCE | XFO | NICE,FRANCE?? | N | | |
| 04/03/91 | 538 | A310 | CF6 | 80C2 | 1 | | DA | N | | | | | | N | -BKK | BKK | BANGKOK,THAILAND | N | PACIFIC | |
| 04/03/91 | 539 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -OSA | XFO | OSAKA,JAPAN?? | N | | |
| 04/07/91 | 540 | A300 | CF6 | 80C2 | 2 | 8:30 | CL | N | | | | | | ATB | CCS-MIA | CCS | CARACAS,VENEZUELA | N | S.AMERICA | TURKEY VULTURE |
| 04/08/91 | 503 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -CDG | XFO | PARIS-CDG,FRANCE?? | N | | |
| 04/09/91 | 541 | B767 | CF6 | 80C2 | 1 | 7:00 | | N | | | VFR | BRIGHT | CLEAR | N | -SEL | SEL | SEOUL,KOREA | N | ASIA | COMMON SKYLARK |
| 04/11/91 | 542 | B747 | CF6 | 80C2 | 4 | | LD | N | | | | OVRCST | CLEAR | N | SIN-NRT | NRT | TOKYO-NRT,JAPAN | N | PACIFIC | SPOT-BILLED DUCK |
| 04/15/91 | 504 | A320 | CFM56 | 5 | 1 | | LR | N | 0 | | | | | N | -CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | |
| 04/15/91 | 525 | B767 | CF6 | 80A | 1 | | CL | N | | | | | | N | REC-FOR | REC | RECIFE,BRAZIL | N | S.AMERICA | |
| 04/16/91 | 526 | B767 | CF6 | 80A | 2 | 16:04 | AP | N | 500 | 125 | | | NCLD | N | -KCZ | KCZ | KOCHI,JAPAN | N | PACIFIC | "SPARROW"-SMALL |
| 04/18/91 | 527 | B767 | CF6 | 80A | 1 | | DA | N | | | | | | N | -BOS | BOS | BOSTON,MASS. | Y | N.AMERICA | |
| 04/20/91 | 505 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | |
| 04/27/91 | 506 | A320 | CFM56 | 5 | 2 | 12:39 | AP | N | 1500 | 150 | | | | N | -NAP | NAP | NAPLES,ITALY | N | EUROPE | "COMMON SWIFT-SMALL" |
| 04/29/91 | 507 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -TLS | XFO | TOULOUSE,FRANCE?? | N | | |
| 04/29/91 | 543 | A310 | CF6 | 80C2 | 1 | | | N | | | | | | N | SIN-PRG | XFO | SINGAPORE OR PRAGUE | N | | COMMON SKYLARK |
| 04/30/91 | 508 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -VCE | XFO | VENICE,ITALY?? | N | | |
| 05/01/91 | 544 | B747 | CF6 | 80C2 | 2 | 17:00 | TR | N | 0 | V1+ | VFR | BRIGHT | CLEAR | N | CDG-NRT | CDG | PARIS-CDG,FRANCE | N | EUROPE | BLACK-HEADED GULL |
| 05/02/91 | 509 | A320 | CFM56 | 5 | 2 | | TR | N | 0 | 130 | | | | ATO | ORY- | ORY | PARIS-ORLY,FRANCE | N | EUROPE | |
| 05/06/91 | 545 | A310 | CF6 | 80C2 | 1 | | TR | N | 0 | V1+ | | | CLEAR | N | NBO-LHR | NBO | NAIROBI,KENYA | N | AFRICA | |
| 05/07/91 | 809 | B747 | CF6 | 80C2 | 4 | | | N | | | | | | N | -MWH | XXX | MOSES LAKE,WASH.?? | U | | |
| 05/08/91 | 528 | A310 | CF6 | 80A | 1 | | LD | N | | | | | | N | -IST | IST | ISTANBUL,TURKEY | N | MID.EAST | |
| 05/08/91 | 810 | B747 | CF6 | 80C2 | 1 | | | N | | | | | | N | -MWH | XXX | MOSES LAKE,WASH.?? | U | | |
| 05/09/91 | 510 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -CDG | XFO | PARIS-CDG,FRANCE?? | N | | |
| 05/13/91 | 546 | A310 | CF6 | 80C2 | 2 | | | N | | | | | | N | -LIS | XFO | LISBON,PORTUGAL?? | N | | |
| 05/14/91 | 511 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -HAJ | XFO | HANOVER,GERMANY?? | N | | |
| 05/14/91 | 529 | B767 | CF6 | 80A | 2 | | | N | | | | | | N | -ZRH | XFO | ZURICH,SWITZERLAND?? | N | | |
| 05/17/91 | 530 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | |
| 05/22/91 | 512 | A320 | CFM56 | 5 | 1 | 10:39 | CL | N | 1200 | 160 | | | NCLD | DIV | SXB- | SXB | STRASBOURG,FRANCE | N | EUROPE | COMMON BUZZARD |
| 05/27/91 | 513 | A320 | CFM56 | 5 | 1 | | TR | N | 0 | V1+ | | | | ATB | TUN-DJE | TUN | TUNIS,TUNISIA | N | AFRICA | |
| 05/27/91 | 547 | A310 | CF6 | 80C2 | 1 | 6:40 | TR | N | 0 | 115 | VFR | DAWN | CLEAR | ATO | NBO- | NBO | NAIROBI,KENYA | N | AFRICA | BLACK-HEADED HERON |
| 05/30/91 | 514 | A320 | CFM56 | 5 | 1 | 9:05 | TR | N | 0 | V1- | | | NCLD | N | HAM-FRA | HAM | HAMBURG,GERMANY | N | EUROPE | "SMALL" |
| 05/30/91 | 548 | MD11 | CF6 | 80C2 | 3 | | | N | | | | | | N | -DFW | XUS | DALLAS-DFW,TEXAS?? | Y | N.AMERICA | |
| 05/31/91 | 515 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -HAM | XFO | HAMBURG,GERMANY?? | N | | "HAWK" |
| 05/31/91 | 549 | B747 | CF6 | 80C2 | 1 | | | N | | | | | | N | SIN-NRT | XFO | SINGAPORE OR TOKYO-NRT | N | PACIFIC | |

| BIRDNAME | SPEC | #BDS | WT | ALERT | SEE | POWLOSS | VIBE | IFSD | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | NMS | F | REMARKS | EVT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COMMON BARN OWL | 1S2 | 1 | 11 | N | 1 | N | | N | | | | | | | | | | | | | | | | | Y | 2 | | 4 FB DMG, RPLCD. TYPE DMG?? | 420 |
| RING-BILLED GULL | 14N12 | 2 | 17 | Y | FL | N | | N | | | | | Y | | Y | | | | | | | | | | | 2 | | 4FB DMGD.RUBSTRP.INVSTGTD.1 BIRD TO CORE | 446 |
| SUSPECT "SEAGULL" | TBI | 2 | | | FL | N | HEAVY | N | | | | | Y | | | | Y | | | | | | | | | 2 | | 5FB CRACKED.36 FB,2 OGV,2 ACC PAN RPLCD | 402 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD INTO CORE | 421 |
| BLACK KITE | 3K28 | 1 | 28 | | | N | | N | | | | | | | | | | | | | | | | | Y | 1 | | UNK FB DMG,6FB RPLCD.TYPE DMG?? | 422 |
| RING-BILLED GULL | 14N12 | 7 | 17 | Y | FL | SURGE | | N | Y | | | Y | Y | | Y | Y | Y | | | | Y | | | | | 2 | | SURGE/RECVD.20FBDMG,8PCS BRKOUT. | 448 |
| RING-BILLED GULL | 14N12 | 1 | 17 | Y | FL | SURGE | | N | Y | Y | | | | | | | | | | | | | | | | 1 | | 3FB LE DEF.BIRD THRU CORE.SURGE/RCVD | 448 |
| HERRING GULL | 14N14 | 1 | 40 | N | | U | HIGH | N | | | | | | | Y | | | | | | | | | | | 2 | | 6SETS FB RPLCD.TIP DMG.VOL PWR RED.VIBES | 451 |
| | | 1 | | | FL | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 2FB LE DIST. | 459 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 460 |
| RUFOUS-BREASTED SWALLOW | 18Z55 | >1 | 1 | | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD REMAINS 1ST STAGE STATORS. | 452 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD. INSP. AT TYO | 461 |
| | | 1 | | | | N | | N | Y | | | Y | | | | | | | | | | | | | | 1 | | 3 FB SHNGLD, 2FB LE BE, 3 SETS RPLCD. | 465 |
| COMMON PINTAIL DUCK | 2J95 | 1 | 30 | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | POST FLIGHT CHECK | 428 |
| EURASIAN MARSH HARRIER | 3K75 | 1 | 23 | N | 1 | N | INC | N | | | | | Y | Y | | | Y | | | | | | | | | 2 | | 3 BROKEN FB'S.ENGINE & NOSECOWL RPLCD | 444 |
| | | 1 | | | | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 4 FB LE DIST. 4 SETS RPLCD. | 466 |
| HERRING GULL | 14N14 | 1 | 40 | | | N | | N | Y | | | | Y | | | | Y | | | | | | | Y | | 2 | | 5.4"4 IN FRAGMNT. OGV DMG, F. CASE PEN. | 467 |
| BLACK KITE | 3K28 | 1 | 28 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD HIT SPLITTER. SOME INTO CORE | 468 |
| "KITE-LARGE" | | 1 | | | | N | | N | Y | | | Y | | | | | | | | | | | | | | 1 | | 1 FB OUT OF LIMIT,2FB SHINGLED,7FB RPLCD | 462 |
| BLACK-CROWNED NITE HERON | 1I24 | 1 | 24 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD. INSP. SHANGHAI | 469 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD. INSP. AT CAS. | 463 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 463 |
| | | 1 | | | | N | N | N | | | | | Y | | | | | | | | | | | | | 1 | | INFILL & ACOUSTIC PNL.DMG. | 429 |
| HELMETED GUINEA FOWL | 5L3 | 1 | 52 | | | 90% | | N | Y | | | | | | | | Y | Y | | | | | | | | 2 | * | 4 FB DMGD, 58of69 KEVLAR LAYERS PENTRD. | 470 |
| BLACK-HEADED HERON | 1I59 | 1 | 38 | | | N | 2.6 | N | Y | | | | | | | | | | | | | | | | | 1 | | 4 FB LE., BIRD INTO CORE. | 471 |
| | | 2 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | CREW UNAWARE.BIRD INTO CORE. | 499 |
| | | 1 | | | | N | | N | | | | | | Y | | | | | | | | | | Y | | 1 | | THRUST REV DAMAGE, | 494 |
| AMERICAN MOURNING DOVE | 2P105 | 1 | 4 | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | INTO CORE | 498 |
| | | 1 | | | | N | | N | | | | | Y | | | | | | | | | | | | | 1 | | OUTSIDE SHROUD.ACOUSTIC PANEL DMG | 500 |
| "MEDIUM" | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 472 |
| "KITE"-MEDIUM | | 1 | | N | SE | N | | N | | | | | Y | | | | | | | | | | | | | 1 | | ACOU.PANEL HOLES.FAN SHROUD HONEYCOMB. | 553 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD. INSP. | 455 |
| | | 1 | | N | | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 3 FB MINOR NICKS,BLENDABLE,TOUCH&GOS | 473 |
| COMMON LAPWING | 5N1 | 1 | 8 | N | FL | N | | N | | | | | | | | | Y | | | | | | | | Y | 2 | | 6 FB. DMGD, 6"8 CM PIECE PEN. NOSE COWL. | 474 |
| | | 1 | | | | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 2 FB LE. BLENDABLE. | 475 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD. INSP. | 476 |
| COMMON WOOD PIGEON | 2P9 | 1 | 18 | N | SE | N | | N | | | | | | | | | | | | | | | | | | 0 | | FINAL APPROACH AMS | 456 |
| | TBI | 1 | | | | N | 6.3 | N | Y | Y | | | | | | | Y | | | | | | | | | 2 | | HARD FOD TO 1FB FROM FRAGS.OF 2 OTHER FB | 457 |
| HERRING GULL | 14N14 | 1 | 40 | | SE | SURGE | INC | N | Y | | | | Y | | Y | | | | | | | | | | | 2 | | 13FB LE TIPCURL,BANG,FLMS,4TIRES,ENGRMVD | 477 |
| "PIGEON-MEDIUM" | | 1 | | N | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | 5X5.25mm MISSNG LE TIP S1 HPC BL.ENG CHG | 478 |
| CHIMANGO FALCON | 5K8 | 1 | 12 | | 1 | N | | N | | | | | | | | | | | | | | | | Y | | 1 | | 3 OGV'S REPLACED | 479 |
| PEREGRINE FALCON | 5K59 | 1 | 22 | | | NR SURGE,HI EGT | | N | | | | | | | | | | | | | | | | | | 2 | * | NON-RECOV.SURGE,HIEGT. | 496 |
| "MEDIUM" | | 1 | | N | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BSI'D.NO DMG. | 480 |
| BLACK KITE | 3K28 | 1 | 28 | N | N | N | | N | | | | Y | | | Y | | | | | | | | | | | 2 | | 4FB BE TIPS.PILOT UNAWARE OF STRIKE. | 484 |
| | | 1 | | | N | N | | N | Y | | | | | | | | | | | | | | | | | L | | 1 FB LE WITHIN LIMITS | 481 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | EUROPE OR MIDDLE EAST | 501 |
| SHORT-EARED OWL | 2S124 | 1 | 13 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | STRUCK MIDSTREAM SHROUD AREA | 464 |
| "GULL" 18 oz. | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | 3 ENG. ING. | 482 |
| "GULL" 18 OZ. | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | 3 ENG. ING. | 482 |
| "GULL" 18 OZ. | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | 3 ENG. ING. | 482 |
| COMMON BARN OWL | 1S2 | 1 | 12 | | | SURGE | INC | N | | | | | | | | | | | | | | | | | | S | | BANG,FLAMES,VIBES,INC EGT. AT ROTATION. | 493 |
| | | 1 | | U | | N | | N | Y | | | | | | | | | | | | | | | Y | | 1 | | 2 FB LE DIST, 6 OGV'S RPLCD | 458 |
| "DUCK"-MEDIUM | | >1 | | N | 1 | N | 5.0 | N | | | | | | | | Y | Y | | | | Y | | | | | 2 | | 8 FB TORN TIPS, METAL MISSING, HPC DMG | 483 |
| | | 1 | | | | N | 5.0 | N | | | | | | | | | | | | | | | | | Y | 1 | | 2 FB DMGD. FAN SET RPLCD | 502 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | DESC/APP INTO BKK.FAN HIT 12 O'CLOCK. | 538 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP AT OSA.POSSIBLE US? | 539 |
| TURKEY VULTURE | 1K1 | 1 | 52 | | 1 | SURGE | INC | N | | | | | Y | Y | | | Y | | | | | | | Y | Y | 2 | | BANG.5 OGV,7FB DMGD.2FB PIECES MISSING. | 540 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP, CREW UNAWARE | 503 |
| COMMON SKYLARK | 17Z72 | 1 | 2 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | INTO LPC INLET(CORE) | 541 |
| SPOT-BILLED DUCK | 2J91 | 1 | 40 | N | | N | | N | | | | | | | | | | | | | | | | | | 0 | | HIT OGV'S,FB'S,INLT COWL,SPINNR,VBV PORT | 542 |
| | | 1 | | | Y | N | | N | | | | | | | | | | | | | | | | | | 0 | | CREW REPORTED BIRD INGESTION | 504 |
| | | 1 | | | | N | 2.3 | N | Y | | | | | | | | | | | | | | | | | 1 | | 3 FB IMPACT DISTORTION,RPLCD. | 525 |
| "SPARROW"-SMALL | | 1 | | N | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP KOCHI, JAPAN | 526 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | DES/APP TO LOGAN.HIT NOSE COWL,ACOU.PNLS | 527 |
| | | 1 | | | Y | N | | N | | | | | | | | | | | | | | | | | | 0 | | PILOT AWARE OF STRIKE | 505 |
| "COMMON SWIFT-SMALL" | | 1 | | N | SE | N | | N | | | | | | | | | | | | | | | | | | 0 | | FLIGHT DELAY DUE TO ENGINE INSPECTION. | 506 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | Y | | 1 | | 1 OGV RPLCD. TRAINING FLIGHT | 507 |
| COMMON SKYLARK | 17Z72 | 1 | 2 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | HIT FAN CASE, SPINNER | 543 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | FOUND AT GRD INSP | 508 |
| BLACK-HEADED GULL | 14N36 | 1 | 10 | | SE | N | 3.5 | N | | | | | Y | | | | | | | | | | | Y | Y | 2 | | 4 FB,T1.2 SENSOR(ALFA),ACOU.LINER DMGD. | 544 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | LOUD NOISE, ODOR | 509 |
| | | 1 | | | | N | | N | Y | | | | Y | | | | | | | | | | | Y | | 1 | | 2FB LE,4 OGV'S RPLCD.2"HOLE ACOU.LINER | 545 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | ENG REMOVED 1/23/92-HPC DAMAGE. | 809 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 1 | | 4 FB MIDSPAN SHROUDS OUT OF ALIGNMENT. | 528 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 810 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP AT CDG | 510 |
| | | 1 | | | | N | | N | | Y | | | | | | | | | | | | | | | | 1 | | 1 FB BE AT TIP | 546 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP AT HANOVER, GERMANY | 511 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | WALKAROUND AT ZRH. | 529 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 530 |
| COMMON BUZZARD | 3K180 | 1 | 32 | N | 1 | N | 0.7 | N | Y | | | | | | Y | | | | | | | | | | | 2 | | 4 FB OUT OF LIMITS.FAN SET RPLCD. | 512 |
| | | 1 | | | | Y | HIGH | VIBES | Y | | | Y | | | | | | | | | | | | | | 2 | | 9 FB DEFORM.& SHINGLING | 513 |
| BLACK-HEADED HERON | 1I59 | 1 | 38 | | | N | INC | N | Y | | | | | | | | Y | | | | | | | | | 2 | | 6FB DMGD,5FB LE DIST,1FB 2"PIECE MISSING | 547 |
| "SMALL" | | 1 | | N | | N | | N | | | | | | | | | | | | | | | | | | 0 | | ODOR IN COCKPIT | 514 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | MASSIVE HPC BLD.FRAGMENTATION.ENG FAIL? | 548 |
| "HAWK" | | 1 | | | N | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP HAM | 515 |
| | | 1 | | | | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 1 FB LE DIST, RPLCD | 549 |

| DATE | EVT | A/C | ENG | DASH | POS | TIME | POF | SIGEVT | ALT | SPD | FLR | LTCON | WEATHER | CREW | CITYPRS | APT | LOCALE | US | REGION | BIRDNAME |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 06/03/91 | 550 | B767 | CF6 | 80C2 | 1 | | | MESB | | | | | | N | -NRT | XFO | TOKYO-NRT,JAPAN?? | N | | |
| 06/03/91 | 550 | B767 | CF6 | 80C2 | 2 | | | MESB | | | | | | N | -NRT | XFO | TOKYO-NRT,JAPAN?? | N | | |
| 06/08/91 | 531 | A310 | CF6 | 80A | 1 | 0:15 | LR | N | 0 | | | DARK | | N | FRA-ESB | ESB | ANKARA-ESENBOGA,TURKEY | N | MID.EAST | |
| 06/08/91 | 551 | A300 | CF6 | 80C2 | 2 | | | N | | | | | | N | -JFK | XUS | NEW YORK-JFK,NY?? | Y | N.AMERICA | |
| 06/09/91 | 516 | A320 | CFM56 | 5 | 1 | | TR | N | 0 | V1+ | | | | N | CDG-DUB | CDG | PARIS-CDG,FRANCE | N | EUROPE | |
| 06/11/91 | 517 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -YEG | XFO | EDMONTON,CANADA?? | N | | |
| 06/14/91 | 518 | A320 | CFM56 | 5 | 2 | | TR | N | 0 | V1+ | | | | N | ABZ-LHR | ABZ | ABERDEEN,SCOTLAND,UK | N | EUROPE | |
| 06/15/91 | 532 | B767 | CF6 | 80A | 1 | | | N | | | | | | N | -ORD | XUS | CHICAGO-ORD,ILL?? | Y | N.AMERICA | |
| 06/16/91 | 533 | A310 | CF6 | 80A | 2 | 1:15 | AP | N | 500 | | | DARK | | N | -FRA | FRA | FRANKFURT,GERMANY | N | EUROPE | COMMON SWIFT |
| 06/17/91 | 534 | A310 | CF6 | 80A | 1 | | RV | N | 0 | | | | | N | -FNA | FNA | FREETOWN,SIERRA LEONE | N | AFRICA | |
| 06/19/91 | 535 | B767 | CF6 | 80A | 1 | 8:45 | AP | N | 100 | 132 | | | OVERCAST | N | -MYJ | MYJ | MATSUYAMA,JAPAN | N | PACIFIC | "SMALL" |
| 06/19/91 | 552 | B767 | CF6 | 80C2 | 1 | 8:45 | AP | N | 50 | 135 | | | RAIN | N | -MYJ | MYJ | MATSUYAMA,JAPAN | N | PACIFIC | "SMALL" |
| 06/22/91 | 519 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -LHR | XFO | LONDON-LHR,UK?? | N | | |
| 06/22/91 | 520 | A320 | CFM56 | 5 | 2 | 10:10 | TO | N | 20 | 160 | | | NCLD | N | -ORY | XFO | FRANCE?? | N | | "KITE/EAGLE/HAWK"-MEDIU |
| 06/23/91 | 536 | A310 | CF6 | 80A | 1 | | LR | MESB | 0 | | | | | N | -FRA | FRA | FRANKFURT,GERMANY | N | EUROPE | |
| 06/23/91 | 536 | A310 | CF6 | 80A | 2 | | LR | MESB | 0 | | | | | N | -FRA | FRA | FRANKFURT,GERMANY | N | EUROPE | |
| 06/25/91 | 521 | A320 | CFM56 | 5 | 2 | | DA | N | | | | | | N | -MYJ | XFO | MATSUYAMA,JAPAN?? | N | | |
| 06/27/91 | 522 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -NTE | XFO | NANTES,FRANCE?? | N | | |
| 06/29/91 | 523 | A320 | CFM56 | 5 | 2 | | | N | | | | | | N | -YUL | XFO | MONTREAL,CANADA?? | N | | |
| 06/29/91 | 537 | A310 | CF6 | 80A | 1 | 4:30 | LD | N | 10 | | | | | N | -LEJ | LEJ | LEIPZIG,GERMANY | N | EUROPE | |
| 06/30/91 | 524 | A320 | CFM56 | 5 | 2 | | TO | N | | | | | | N | ORY- | ORY | PARIS-ORLY,FRANCE | N | EUROPE | COMMON WOOD PIGEON |
| 07/02/91 | 555 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -CDG | XFO | PARIS-CDG,FRANCE?? | N | | |
| 07/07/91 | 578 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -MYJ | XFO | MATSUYAMA,JAPAN?? | N | | |
| 07/09/91 | 579 | B767 | CF6 | 80C2 | 2 | | CL | N | 1000 | | | | | ATB | YVR- | YVR | VANCOUVER,CANADA | N | N.AMERICA | HERRING GULL |
| 07/16/91 | 556 | A320 | CFM56 | 5 | 1 | | | N | | | | | | N | -MSP | XUS | MINEAPOLIS,MINN?? | Y | N.AMERICA | |
| 07/16/91 | 557 | A320 | CFM56 | 5 | 2 | | TR | N | 0 | V1- | | | | N | ORY- | ORY | PARIS-ORLY,FRANCE | N | EUROPE | EURASIAN KESTREL |
| 07/16/91 | 580 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | |
| 07/19/91 | 558 | A320 | CFM56 | 5 | 1 | | DA | N | | | | | | N | -LHR | LHR | LONDON-LHR,ENGLAND,UK | N | EUROPE | |
| 07/20/91 | 581 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | LEAST TERN |
| 07/20/91 | 582 | A300 | CF6 | 80C2 | 2 | 8:00 | LR | N | 0 | 110 | | | RAIN | N | DXB-BOM | BOM | BOMBAY,INDIA | N | ASIA | "CROW"-MEDIUM |
| 07/21/91 | 559 | A320 | CFM56 | 5 | 1 | 20:55 | LD | MESB | 50 | 135 | | | NCLD | N | -CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | HERRING GULL |
| 07/21/91 | 559 | A320 | CFM56 | 5 | 2 | 20:55 | LD | MESB | 50 | 135 | | | NCLD | N | -CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | HERRING GULL |
| 07/21/91 | 563 | A320 | CFM56 | 5 | 1 | 20:04 | LD | MESB | 30 | 135 | | | NCLD | N | -FCO | FCO | ROME-DA VINCI,ITALY | N | EUROPE | BLACK-HEADED GULL |
| 07/21/91 | 563 | A320 | CFM56 | 5 | 2 | 20:04 | LD | MESB | 30 | 135 | | | NCLD | N | -FCO | FCO | ROME-DA VINCI,ITALY | N | EUROPE | BLACK-HEADED GULL |
| 07/22/91 | 560 | A320 | CFM56 | 5 | 1 | | TR | N | 0 | V1+ | | | | N | DUS-FRA | DUS | DUSSELDORF,GERMANY | N | EUROPE | |
| 07/22/91 | 561 | A320 | CFM56 | 5 | 1 | 18:20 | LR | N | 0 | 140 | | | CLEAR | N | -MLH | MLH | MULHOUSE/BASEL,FRANCE | N | EUROPE | |
| 07/22/91 | 583 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | |
| 07/22/91 | 823 | A320 | CFM56 | 5 | 2 | 7:05 | TR | N | 0 | 090 | | | CLOUDS | N | NUE-FRA | NUE | NUREMBERG,GERMANY | N | EUROPE | "FALCON-MEDIUM" |
| 07/24/91 | 562 | A320 | CFM56 | 5 | 2 | | TR | N | 0 | V1+ | | | | ATB | SAP- | SAP | SAN PEDRO,SULA,HONDURAS | N | S.AMERICA | |
| 07/24/91 | 585 | B747 | CF6 | 80C2 | 1 | 15:58 | LR | N | 0 | 110 | | | OVERCAST | N | -AXT | AXT | AKITA,JAPAN | N | PACIFIC | "KITE-MEDIUM" |
| 07/25/91 | 584 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -TYO | XFO | TOKYO-TYO,JAPAN?? | N | | |
| 07/26/91 | 571 | A310 | CF6 | 80A | 2 | | RV | N | 0 | | | | | N | -PMO | PMO | PALERMO,ITALY | N | EUROPE | COMMON ROCK DOVE |
| 07/26/91 | 586 | B767 | CF6 | 80C2 | 2 | 12:20 | TR | N | 0 | 124 | | | OVERCAST | N | SDJ- | SDJ | SENDAI,JAPAN | N | PACIFIC | "KITE"-LARGE |
| 07/27/91 | 587 | B747 | CF6 | 80C2 | 3 | | CL | N | | | | | | N | CDG-LHR | CDG | PARIS-CDG,FRANCE | N | EUROPE | COMMON WOOD PIGEON |
| 07/29/91 | 564 | A320 | CFM56 | 5 | 2 | 14:30 | LR | N | 0 | | | | | N | -LIN | LIN | MILAN-LIN,ITALY | N | EUROPE | |
| 07/29/91 | 565 | A320 | CFM56 | 5 | 1 | 19:45 | AP | MESB | 50 | 140 | | | NCLD | N | -FCO | FCO | ROME-DA VINCI,ITALY | N | EUROPE | GREAT BLACK-BACKED GUL |
| 07/29/91 | 565 | A320 | CFM56 | 5 | 2 | 19:45 | AP | MESB | 50 | 140 | | | NCLD | N | -FCO | FCO | ROME-DA VINCI,ITALY | N | EUROPE | GREAT BLACK-BACKED GUL |
| 07/30/91 | 572 | A310 | CF6 | 80A | 1 | | | N | | | | | | N | -AMS | XFO | AMSTERDAM,NETHERLANDS?? | N | | |
| 07/31/91 | 588 | A310 | CF6 | 80C2 | 1 | | | N | | | | | | N | -IST | XFO | ISTANBUL,TURKEY?? | N | | |
| 08/04/91 | 566 | A320 | CFM56 | 5 | 1 | 10:50 | TO | N | 30 | 140 | | | OVERCAST | N | BRE-FRA | BRE | BREMEN,GERMANY | N | EUROPE | "GULL" 18 oz. |
| 08/04/91 | 567 | A320 | CFM56 | 5 | 1 | | AP | MESB | | | | | | N | -CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | |
| 08/04/91 | 567 | A320 | CFM56 | 5 | 2 | | AP | MESB | | | | | | N | -CDG | CDG | PARIS-CDG,FRANCE | N | EUROPE | |
| 08/06/91 | 589 | A310 | CF6 | 80C2 | 2 | | AP | N | | | | | | N | -IST | IST | ISTANBUL,TURKEY | N | MID.EAST | |
| 08/07/91 | 590 | B767 | CF6 | 80C2 | 1 | | TO | SEMB | | V1+ | | | | ATB | YYC- | YYC | CALGARY,CANADA | N | N.AMERICA | |
| 08/11/91 | 573 | B767 | CF6 | 80A | 1 | | TR | MESB | 0 | 110 | | | | ATO | TAK- | TAK | TAKAMATSU,JAPAN | N | PACIFIC | |
| 08/11/91 | 573 | B767 | CF6 | 80A | 2 | | TR | MESB | 0 | 110 | | | | ATO | TAK- | TAK | TAKAMATSU,JAPAN | N | PACIFIC | |
| 08/11/91 | 591 | B747 | CF6 | 80C2 | 1 | | | N | | | | | | N | -IAD | XXX | WASHINGTON-DULLES,VA?? | U | | |
| 08/16/91 | 568 | A320 | CFM56 | 5 | 1 | | AP | N | | | | | | N | CDG-NCE | NCE | NICE,FRANCE | N | EUROPE | |
| 08/16/91 | 575 | B767 | CF6 | 80A | 1 | 12:53 | AP | N | 100 | 134 | | | NCLD | N | -MAN | MAN | MANCHESTER,ENGLAND,UK | N | EUROPE | |
| 08/18/91 | 592 | B767 | CF6 | 80C2 | 2 | | | N | | | | | | N | -AUH | XFO | ABU DHABI,UA EMIRATES?? | N | | |
| 08/21/91 | 576 | B767 | CF6 | 80A | 1 | 15:07 | LR | N | 0 | 130 | | | OVERCAST | N | -AXT | AXT | AKITA,JAPAN | N | PACIFIC | "KITE"-MEDIUM |
| 08/25/91 | 569 | A320 | CFM56 | 5 | 2 | | AP | N | | | | | | N | -FCO | FCO | ROME-DA VINCI,ITALY | N | EUROPE | |
| 08/26/91 | 593 | B747 | CF6 | 80C2 | 4 | | | N | | | | | | N | AMS-NRT | XFO | AMSTERDAM OR TOKYO-NRT | N | | |
| 08/27/91 | 570 | A320 | CFM56 | 5 | 2 | 17:50 | TR | N | 0 | | | | | N | ORY- | ORY | PARIS-ORY,FRANCE | N | EUROPE | CORN BUNTING |
| 08/29/91 | 577 | A310 | CF6 | 80A | 2 | | TR | N | 0 | V1- | | | | N | HAM-FRA | HAM | HAMBURG,GERMANY | N | EUROPE | |
| 08/29/91 | 594 | B747 | CF6 | 80C2 | 4 | | TR | N | 0 | V1+ | | | | N | AMS-SIN | AMS | AMSTERDAM,NETHERLANDS | N | EUROPE | |
| 08/29/91 | 645 | B767 | CF6 | 80C2 | 1 | | | N | | | | | | N | -PER | XFO | PERTH,AUSTRALIA?? | N | | |

| RDNAME | SPEC | #BDS | WT | ALERT | SEE | POWLOSS | VIBE | IFSD | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | NMS | F | REMARKS | EVT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP NRT | 550 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP NRT | 550 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | STAINS IN FAN AREA | 531 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | Y | 1 | | 1 FB UNK DMG, RPLCD | 551 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 516 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | WALKAROUND AT YEG | 517 |
| | | 1 | | | Y | N | | N | | | | | | | | | | | | | | | | | | 0 | | CREW REPORTED INGESTION DURING TAKEOFF. | 518 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | Y | 1 | | 2 FB UNK DMG, RPLCD. | 532 |
| MMON SWIFT | 1U55 | 1 | 1.5 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | FINAL APPROACH | 533 |
| | | 1 | | | | N | | N | | | | | Y | | | | | | | | | | | | Y | 2 | | THRUST REVERSAL.6FB UNK DMG. | 534 |
| ALL* | | 1 | | N | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 535 |
| ALL* | | 1 | | N | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP MYJ | 552 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | GRD INSP AT LHR | 519 |
| E/EAGLE/HAWK*-MEDIUM | | 1 | | N | | N | 7.2 | N | Y | | | | | | Y | | | | | | | | | | | 2 | | 7 FB OUT OF LIMITS. FAN SET RPLCD | 520 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | STAINS IN FAN & CORE INLET | 536 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BLOOD IN FAN & CORE INLET | 536 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | STRIKE REPORTED EN ROUTE TO MYJ. CRUISE? | 521 |
| | | 1 | | | | N | | N | Y | | | | | | | | | | | | | | | | | 1 | | 2 FB LE TIP CURL. RPLCD AT ORLY | 522 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | Y | 1 | | 2 FB UNKNOWN DMG.-RPLCD. | 523 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | JUST BEFORE TOUCHDOWN | 537 |
| MMON WOOD PIGEON | 2P9 | 1 | 18 | · | | N | | N | | | | | | | | | | | | | | | | | Y | 1 | | 3 FB UNKNOWN DMG, FAN SET RPLCD | 524 |
| | TBi | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | FEATHERS BOOSTER INLET & FAN OGV'S | 555 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD INTO CORE | 578 |
| RRING GULL | 14N14 | 1 | 40 | | | Y | 5.5 | VIBES | Y | | | | Y | | Y | | Y | | | | | | | Y | | 2 | | 8 OGV,7FB DMG.1FB PIECE BREAK. | 579 |
| | | 1 | | | | N | | N | Y | | | | | | | | | | | | | | | Y | | 1 | | 1FB LE TIP CRL.2FB MDSPN.SHRD.HRDCOATDMG | 556 |
| RASIAN KESTREL | 5K272 | 1 | 7 | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 557 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 580 |
| | TBi | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | DESC/APP INTO LHR FEATHER IN FAN OGV'S | 558 |
| ST TERN | 14N74 | 1 | 1.6 | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | PIECES MISSING STG 1 HPC BLADE | 581 |
| OW*-MEDIUM | | 1 | | N | SE | N | | N | | | | | | Y | | | | | | | | | | Y | | 1 | | BLOCKER DOOR DMGD.(FAN REVERSER) | 582 |
| RRING GULL | 14N14 | 1 | 40 | N | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRDS HIT ENGS,WING,FUSELAGE,LDG GEAR | 559 |
| RRING GULL | 14N14 | 1 | 40 | N | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | SEE ENG POS 1 | 559 |
| CK-HEADED GULL | 14N36 | 1 | 10 | | FL | N | | N | Y | | | | | | | | | | | | Y | | | Y | | 1 | | 7 OGV FAIRINGS BRKN.1HPC S1 BL TIP CURL | 563 |
| CK-HEADED GULL | 14N36 | 1 | 10 | | FL | N | | N | | | | | | | | | | | | | | | | | | 0 | | 100+ BIRDS SEEN. | 563 |
| | | 1 | | | | N | 7.0 | N | | | | Y | | | | | | | | | | | | | Y | 1 | | 2 FB UNK DMG & SHINGLED. 2PR FB RPLCD | 560 |
| | | 1 | | N | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 561 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | HPC STG1:2 BL PIECES BKN.5BL TE CRACKS | 583 |
| CON-MEDIUM* | | 1 | | N | | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 823 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | Y | Y | 2 | | 5 FB UNK DMG, 5 PR RPLCD, 11 OGV'S DMG | 562 |
| E-MEDIUM* | | 1 | | N | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | SEVERAL HPC BLADES DAMAGED(OF UNK.TYPE) | 585 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | IGV DMG,UNK HPC DMG,ENG REMOVED | 584 |
| MMON ROCK DOVE | 2P· | 1 | 14 | | | N | | N | Y | | | | Y | | | | | | | | | | | | | 1 | | 3FB DEF.3-5CM.5PR FB RPLCD.ABB SHRD DMGD | 571 |
| E*-LARGE | | 1 | | N | | N | INC | N | Y | | | | | | | | | | | | | | | Y | | 1 | | 3 FB LE BE.MIDSPAN SHROUD DMGD. | 586 |
| MMON WOOD PIGEON | 2P9 | 1 | 18 | | 1 | Y | 5 | N | Y | | | Y | Y | | | | Y | | | | | | | Y | | 2 | | 4FB LE TIP CURL.IFB BKN PIECE.OGV LE DMG | 587 |
| | TB· | 1 | | N | | N | | N | | | | | | | | | | | | | | | | | | 0 | | NO ABNORMAL ENGINE BEHAVIOR | 564 |
| EAT BLACK-BACKED GULL | ·4N21 | 1 | 60 | N | FL | N | | N | | | | Y | | | | | | | | | | | | Y | | 1 | | 1 OGV OUTER FAIRING BRKN.2FB SHRD SHNGLD | 565 |
| EAT BLACK-BACKED GULL | ·4N21 | 1 | 60 | N | FL | N | | N | | | | | | | | | | | | | Y | | | | | 1 | | 1 BOOSTER IGV NICKED WITHIN LIMITS. | 565 |
| | | 1 | | | | N | | N | Y | | | | Y | | | | | | | | | | | | | 1 | | MINOR FB DISTORT.2 ACCOUSTIC PANLS RPLCD | 572 |
| | | 1 | | | | N | | N | | | | | | Y | | | | | | | | | | | | 1 | | 30 SQ.IN.OF INLET COWL DMGD.COWL REMOVED | 588 |
| L* 18 oz. | | 1 | | Y | 1 | N | N | N | | | | | | | | | | | | | | | | | Y | 1 | | 3 FB UNK DMG, RPLCD. | 566 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | FINAL APPROACH | 567 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | FINAL AP.1 HPC BL TIP CURL, SERVICABLE | 567 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | Y | 1 | | 3 FB UNK DMG.,REPLACED | 589 |
| | | 3-4 | | | | 5% | INC | VIBES | Y | Y | | | | | | | | | | | | | | Y | | 2 | | 3FB LE TIP BE.1 OGV BKN.PWLOSS.1IN CORE? | 590 |
| | | 1 | | | Y | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 573 |
| | | 1 | | | Y | N | | N | | | | | | | | | | | | | | | | | | 0 | | | 573 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BIRD DIDNT ENTER CORE INLET | 591 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | FINAL APPROACH NCE | 568 |
| | | 1 | | | SE | N | N | N | | | | Y | | | | | | | | | | | | | | 1 | | 3 FB SHINGLED.ICAO HAS 9FB DMGD | 575 |
| | | 1 | | | | N | | N | | | | Y | | | | | | | | | Y | | | | | 2 | | HPC STG1 LE DMG.MDSPN SHRD SHGLD.ENGRMVD | 592 |
| E*-MEDIUM | | 1 | | N | | N | | N | | | | | Y | | | | | | | | | | | | | 1 | | 1 FWD.ACCOUSTIC LINER RPLCD. | 576 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | | 0 | | FINAL INTO FCO | 569 |
| | | 1 | | | | N | | N | Y | | | Y | | | | | | | | | | | | | | 1 | | 1 FB LE SHINGLED.I FB REPLACED | 593 |
| N BUNTING | 68Z166 | 1 | 1.7 | N | 1 | N | | N | | | | | | | | | | | | | Y | | | | | 2 | | 1 BROKEN HPC S6 BL.S1,S5,S9 IMPACT DMG. | 570 |
| | | 1 | | | | N | N | N | | | | | | | | | | | | | | | | | Y | 1 | | 3 FB UNK TYPE DMG | 577 |
| | | 1 | | | | N | 5 | N | Y | Y | | | | | | | | | | | | | | | | 1 | | 1 FB BE. 2 FB LE TIP CURL. 6 FB RPLCD. | 594 |
| | | 1 | | | | N | | N | | | | | | | | | | | | | | | | | | 0 | | BORESCOPED. | 645 |

# APPENDIX G

## SUMMARY OF ICAO DATA

This appendix summarizes pertinent data from the ICAO Bird Strike Information System (IBIS) that were unreported by the engine manufacturers. Each line of information pertains to a unique "bird strike to an engine". It is unknown, in general, whether a bird ingestion took place. The events are listed chronologically. Unless otherwise specified, "N" denotes "no" or "none" and a "blank" entry means the information is "unknown."

The column headings are defined as follows:

| | |
|---|---|
| DATE | Date of Occurence |
| ICAO# | ICAO File Number |
| A/C | Aircraft Type |
| REG | Aircraft Registration |
| ENG | Engine Model |
| DASH | Engine Model Dash |
| POS | Engine Position |
| TIME | Local Time of Occurance |
| POF | Phase of Flight (TR=takeoff roll, TO=takeoff, CL=climb, DE=descent, AP=approach, LR=landing roll) |
| SIGEVT | Significant Event (ME=multiple engines, MB=multiple birds) |
| ALT | Altitude of Aircraft (feet AGL) |
| SPD | Speed of Aircraft (KIAS) |
| WEATHER | Weather/Sky Condition (NCLD=no clouds, SCLD=some clouds) |
| CREW | Crew Action (ATO=aborted takeoff, ATB=precautionary landing) |
| CITYPRS | Scheduled Departure-Arrival airports |
| APT | Airport Code |
| LOCALE | Location of Airport |
| US | Y=US (50 states), N=Foreign (non-US), U=Unknown |
| BIRDNAME | Bird Name, Description, or Perceived Size |
| SPEC | Confirmed Bird Species Code (from [4]) |
| #BDS | Number of birds striking aircraft (See also REMARKS) |
| WT | Bird Weight (ounces) for Confirmed Species |
| ALERT | Pilot Warned of Birds |
| SEE | Number of birds seen |
| POWLOSS | Power Loss |
| IFSD | In-Flight Engine Shutdown Reasons |
| DMG | Damage to Aircraft (1=damage, 0=no damage) - See REMARKS |
| REMARKS | The Remarks often contain more specific descriptions of damage as well as other pertinent information |
| ICAO# | ICAO File Number (repeated) |

| DATE | ICAO# | A/C | REG | ENG | DASH | POS | TIME | POF | SIGEVT | ALT | SPD | WEATHER | CREW | CITYPRS | APT | LOCALE | US | BIF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02/24/89 | 89014610 | B757 | G-BIKS | RB211 | 535C | 2 | 7:50 | LR | | 0 | 115 | RAIN | N | -IST | IST | ISTANBUL,TURKEY | N | "GU |
| 03/11/89 | 90001050 | B767 | | JT9D | 7R4D | | | TR | | 0 | | SCLD | N | SNA- | SNA | ORANGE COUNTY,CAL | Y | "DU |
| 03/30/89 | 89100721 | B767 | VH-EAK | JT9D | 7R4E | 2 | 22:51 | LR | MB? | 0 | | | N | -TSV | TSV | TOWNSVILLE,AUSTRALIA | N | "LA |
| 04/12/89 | 89021160 | B747 | 9V-SMA | 4000 | 4056 | 3 | 16:12 | AP | MB? | 600 | 150 | | N | -HKG | HKG | HONG KONG | N | "ME |
| 04/17/89 | 89014110 | B757 | G-000G | RB211 | 535E4 | 1 | 18:50 | AP | ME | 75 | 127 | NCLD | N | -PMI | PMI | PALMA,MALLORCA,SPAIN | N | "GU |
| 04/17/89 | 89014110 | B757 | G-000G | RB211 | 535E4 | 2 | 18:50 | AP | ME | 75 | 127 | NCLD | N | -PMI | PMI | PALMA,MALLORCA,SPAIN | N | "GU |
| 04/20/89 | 89014150 | B757 | G-BIKV | RB211 | 535C | 2 | 17:50 | AP | N | 800 | 124 | SCLD | N | -BRU | BRU | BRUSSELS,BELGIUM | N | |
| 05/14/89 | 89014380 | B767 | N605TW | JT9D | 7R4D | 1 | 7:57 | TR | | 0 | | SCLD | N | FRA- | FRA | FRANKFURT,GERMANY | N | |
| 06/14/89 | 89015260 | B757 | G-BMRG | RB211 | 535C | 2 | | TO | N | 10 | 135 | NCLD | N | FLR- | FLR | FLORENCE,ITALY | N | "SW |
| 06/15/89 | 89015290 | B757 | G-BOZH | RB211 | 535C | 1 | 17:50 | CL | | 3000 | 200 | | N | LHR- | LHR | LONDON-LHR,ENGLAND,UK | N | "SW |
| 06/20/89 | 89023000 | B747 | N221GE | JT9D | 7R4G2 | 3 | 17:26 | TR | | 0 | 100 | NCLD | N | JFK- | JFK | NEW YORK-JFK,NY | Y | "GU |
| 06/30/89 | 89019530 | B747 | TJ-CAB | JT9D | 7Q | 3 | 21:23 | | N | | | | N | | XFO | GAROUA,CAMEROON?? | N | "OW |
| 07/10/89 | 89021110 | A300 | B1810 | 4000 | 4158 | 1 | 12:50 | AP | | 7000 | 200 | NCLD | N | -HKG | HKG | HONG KONG | N | "ME |
| 07/12/89 | 89102271 | B767 | ZK-NBD | JT9D | 7R4D | 2 | 18:40 | AP | N | 800 | | | N | -SYD | SYD | SYDNEY,AUSTRALIA | N | "ME |
| 07/21/89 | 89020100 | A310 | VT-EJK | CF6 | 80C2 | 2 | 8:40 | AP | | 50 | 145 | | N | -BOM | BOM | BOMBAY,INDIA | N | "KIT |
| 07/28/89 | 89016650 | B757 | G-MOND | RB211 | 535E4 | 1 | 8:29 | LR | MB? | 0 | 160 | OVERCAST | N | -VCE | VCE | VENICE,ITALY | N | "SW |
| 08/03/89 | 89006310 | B757 | DAMUR? | RB211 | 535E4 | 1 | 20:15 | TR | | 0 | 110 | SCLD | ATO | GRO | GRO | GERONA,SPAIN | N | "ME |
| 08/04/89 | 89012270 | B767 | A40-GK | CF6 | 80C2 | 1 | 9:14 | AP | | 500 | 145 | NCLD | N | -BKK | BKK | BANGKOK,THAILAND | N | "SM |
| 08/10/89 | 89019790 | A320 | VTEPE | V2500 | A1 | 2 | 12:45 | AP | AIRWORTHY | 2500 | 240 | SCLD | | -DEL | DEL | DELHI,INDIA | N | "LA |
| 08/11/89 | 89019520 | B747 | TJ-CAB | JT9D | 7Q | 4 | 19:59 | TR | MB | 0 | | NCLD | N | GOU- | GOU | GAROUA,CAMEROON | N | "ME |
| 08/14/89 | 89002610 | B747 | TJ-CAS | JT9D | 7Q | 1 | | | N | | | | N | | XFO | FRANCE | N | "BU |
| 08/20/89 | 89009770 | B757 | D-AMUY | RB211 | 535E4 | 2 | 8:13 | TR | N | 0 | 150 | OVERCAST | ATB | HAM- | HAM | HAMBURG,GERMANY | N | "GU |
| 09/10/89 | 89017560 | B757 | G-BNSF | RB211 | 535E4 | 2 | 19:10 | TR | | 0 | 120 | SCLD | N | | ACA | ACAPULCO,MEXICO | N | |
| 10/05/89 | 89018030 | B767 | CGAVC | JT9D | 7R4D | 2 | 5:56 | AP | | 250 | 140 | RAIN | N | -PIK | PIK | PRESTWICK,SCOTLAND | N | |
| 11/06/89 | 89007720 | B747 | D-ABVB | CF6 | 80C2 | 3 | 10:00 | TR | ME | 0 | 145 | OVERCAST | N | LHA- | LHA | LAHR,GERMANY | N | "SW |
| 11/06/89 | 89007720 | B747 | D-ABVB | CF6 | 80C2 | 4 | 10:00 | TR | ME | 0 | 145 | OVERCAST | N | LHA- | LHA | LAHR,GERMANY | N | "SW |
| 11/06/89 | 89018740 | B757 | G-BMRT | RB211 | 535C | 1 | 9:30 | LR | ME | 0 | 100 | FOG | N | -MAN | MAN | MANCHESTER,ENGLAND | N | "BL |
| 11/06/89 | 89018740 | B757 | G-BMRT | RB211 | 535C | 2 | 9:30 | LR | ME | 0 | 100 | FOG | N | -MAN | MAN | MANCHESTER,ENGLAND | N | "BL |
| 11/27/89 | 89415150 | B767 | | CF6 | 80C2 | 1 | | AP | | | 250 | | N | -SCK | SCK | STOCKTON,CALIFORNIA | Y | "CO |
| 12/11/89 | 89103321 | B767 | ZK-NBC | CF6 | 80A | 1 | 22:10 | TO | ME | 100 | 150 | | N | SYD- | SYD | SYDNEY,AUSTRALIA | N | "SIL |
| 12/11/89 | 89103321 | B767 | ZK-NBC | CF6 | 80A | 2 | 22:10 | TO | ME | 100 | 150 | | N | SYD- | SYD | SYDNEY,AUSTRALIA | N | "SIL |
| 12/17/89 | 89019250 | B757 | G-BIKD | RB211 | 535C | 1 | 8:20 | TO | N | 20 | 120 | FOG | N | LIN- | LIN | MILAN-LIN,ITALY | N | "LA |
| 02/17/90 | 90016410 | A320 | F-GHKB | CFM56 | 5 | 2 | 11:07 | TR | N | 0 | 100 | FOG | N | ORY- | ORY | PARIS-ORY,FRANCE | N | |
| 02/26/90 | 90042300 | B757 | 22193 | RB211 | 535E4 | 2 | | DE | AIRWORTHY | 10000 | | | | -ATL | ATL | ATLANTA,GA. | Y | |
| 03/17/90 | 89025270 | B747 | HBIGC | JT9D | 7R4G2 | 2 | 12:59 | CL | | 1400 | 145 | OVERCAST | N | ZRH- | ZRH | ZURICH,SWITZERLAND | N | "ME |
| 04/20/90 | 90006370 | B747 | HBIGD | JT9D | 7R4G2 | 1 | 18:27 | AP | | 10 | 135 | SCLD | N | -ZRH | ZRH | ZURICH,SWITZERLAND | N | "HE |
| 05/03/90 | 90016700 | A310 | F-GEMB | CF6 | 80A | 2 | | AP | | 10 | 135 | SCLD | N | -CMN | CMN | CASABLANCA,MOROCCO | N | "SM |
| 05/10/90 | 90005903 | B747 | HBIGD | JT9D | 7R4G2 | 3 | 18:53 | CL | | 700 | 165 | NCLD | N | SEL- | SEL | SEOUL,KOREA | N | |
| 05/26/90 | 90005570 | B757 | D-AMUV | RB211 | 535E4 | 1 | 10:03 | TO | N | 100 | 150 | NCLD | N | ???- | ??? | TANIA,ITALY | N | "SM |
| 05/28/90 | 90011250 | B757 | G-BIKB | RB211 | 535C | 2 | 18:30 | TO | N | 10 | 140 | NCLD | | CPH- | CPH | COPENHAGEN,DENMARK | N | "GU |
| 06/28/90 | 90002270 | A320 | D-AIPB | CFM56 | 5 | 2 | 18:35 | TR | | 0 | 150 | SCLD | N | BRE- | BRE | BREMEN,GERMANY | N | "GU |
| 07/04/90 | 90026080 | B767 | A40-GF | CF6 | 80C2 | 1 | | | ME | | | SCLD | N | | XXX | | U | |
| 07/04/90 | 90026080 | B767 | A40-GF | CF6 | 80C2 | 2 | | | ME | | | SCLD | N | | XXX | | U | |
| 07/16/90 | 90001870 | A320 | D-AIPD | CFM56 | 5 | 2 | 11:23 | AP | N | 500 | 140 | NCLD | N | -FRA | FRA | FRANKFURT,GERMANY | N | "SM |
| 07/20/90 | 91020290 | B747 | JA8289 | CF6 | 80C2 | 1 | 11:52 | LR | N | 0 | 130 | RAIN | N | -AXT | AXT | AKITA,JAPAN | N | "SM |
| 08/07/90 | 90022840 | B767 | ZK-??? | CF6 | 80? | 1 | 9:19 | LR | | 0 | 130 | SCLD | N | -WLG | WLG | WELLINGTON,NEW ZEALAND | N | "GU |
| 08/28/90 | 90009210 | B747 | PH-BFE | CF6 | 80C2 | 3 | 12:00 | TR | ME | 0 | | SCLD | N | ANC- | ANC | ANCHORAGE,ALASKA | Y | |
| 08/28/90 | 90009210 | B747 | PH-BFE | CF6 | 80C2 | 4 | 12:00 | TR | ME | 0 | | SCLD | N | ANC- | ANC | ANCHORAGE,ALASKA | Y | |
| 09/04/90 | 90001400 | A310 | D-AHLW | CF6 | 80C2 | 2 | | AP | | | | NCLD | N | -PMI | PMI | PALMA,MALLORCA,SPAIN | N | "SM |
| 09/24/90 | 90014390 | B757 | G-OOOI | RB211 | 535E4 | 2 | 16:05 | LR | | 0 | 15 | NCLD | N | -MIR | MIR | MONASTIR,TUNISIA | N | |
| 09/25/90 | 90014410 | B757 | G-BMRI | RB211 | 535C | 1 | 10:00 | AP | | 50 | | SCLD | N | -MAN | MAN | MANCHESTER,ENGLAND | N | BLA |
| 09/26/90 | 90001330 | B757 | D-AMUW | RB211 | 535E4 | 1 | 11:19 | TR | N | 0 | 140 | SCLD | N | MLA- | MLA | MALTA | N | "SM |
| 10/04/90 | 90017900 | A320 | F-GHQD | CFM56 | 5 | 2 | 10:25 | AP | N | | | NCLD | N | -LRT | LRT | LORIENT,FRANCE | N | "SM |
| 10/09/90 | 90027760 | B747 | ZSSAT | JT9D | 7R4G2 | 2 | | LR | | 0 | 135 | NCLD | N | -WDH | WDH | WINDHOEK,NAMIBIA | N | |
| 10/18/90 | 90027750 | B747 | ZSSAL | JT9D | 7R4G2 | 3 | | AP | | 350 | 137 | NCLD | N | -DUR | DUR | DURBAN,S.AFRICA | N | "SM |
| 10/22/90 | 90027040 | A310 | H-STIC | CF6 | 80C2 | 2 | 1:38 | AP | | 10 | 139 | NCLD | N | -CNX | CNX | CHIANG MAI,THAILAND | N | "ME |
| 11/05/90 | 90018120 | A320 | F-GHQE | CFM56 | 5 | 2 | | AP | | | | NCLD | N | -BIQ | BIQ | BIARRITZ,FRANCE | N | "CO |
| 11/08/90 | 90405200 | A300 | | CF6 | 80C2 | 1 | | AP | | | | NCLD | N | -JFK | JFK | NEW YORK-JFK,NY | Y | |
| 11/19/90 | 90026710 | B767 | OY-KDI | 4000 | 4060 | 2 | 19:07 | TR | | 0 | 130 | NCLD | N | EWR- | EWR | NEWARK,NJ | Y | "ME |
| 12/09/90 | 90104431 | B747 | VH-OJH | RB211 | 524G | 1 | 19:51 | TO | MB? | 200 | 200 | | N | AKL- | AKL | AUKLAND,NEW ZEALAND | N | |
| 01/07/91 | 91018910 | B767 | JA8489 | CF6 | 80A | 2 | | | | | | NCLD | | -TOY | XFO | TOYAMA,JAPAN?? | N | |
| 01/08/91 | 91018890 | B767 | JA8244 | CF6 | 80A | 1 | 18:25 | LR | | 0 | 120 | SCLD | N | -TAK | TAK | TAKAMATSU,JAPAN | N | "ME |
| 01/17/91 | 91011850 | DC10 | JA8535 | JT9D | 59A | 1 | | | | | | | N | -SHI | XFO | SHIMOJISHAMA,JAPAN?? | N | |
| 01/26/91 | 91030280 | A320 | F-GHQE | CFM56 | 5 | 1 | 10:55 | TO | N | 150 | 160 | OVERCAST | N | ORY- | ORY | PARIS-ORY,FRANCE | N | "CO |
| 01/28/91 | 91034510 | B747 | PH-BFD | CF6 | 80C2 | 3 | 13:20 | TR | ME | 0 | | | N | AMS- | AMS | AMSTERDAM,NETHERLANDS | N | "LA |
| 01/28/91 | 91034510 | B747 | PH-BFD | CF6 | 80C2 | 4 | 13:20 | TR | ME | 0 | | | N | AMS- | AMS | AMSTERDAM,NETHERLANDS | N | "LA |
| 02/06/91 | 91023560 | A320 | G-BUSG | CFM56 | 5 | 1 | 8:57 | CL | | 3000 | 250 | SCLD | N | LHR- | LHR | LONDON-LHR,ENGLAND | N | "LA |
| 02/09/91 | 91011950 | B747 | JA8186 | JT9D | 7R4G2 | 2 | 19:59 | AP | | 150 | 145 | NCLD | N | -HND | HND | TOKYO-HND,JAPAN | N | |

| US | BIRDNAME | SPEC | #BDS | WT | ALERT | SEE | POWLOSS | IFSD | DMG | REMARKS | ICAO# |
|---|---|---|---|---|---|---|---|---|---|---|---|
| N | "GULL-MEDIUM" | | | | | 2-10 | | N | | SEVERE DMG ACOU.LINER. HIT LDG.GEAR | 89014610 |
| Y | "DUCK-LARGE" | | 1 | | N | | | N | 1 | ENG. DAMAGED | 90001050 |
| N | "LARGE" | | | | | 2-10 | | N | 0 | POSSIBLE MULT.BIRD | 89100721 |
| N | "MEDIUM" | | | | N | | | N | | STRUCK 2-10 BIRDS.HIT RADOME | 89021160 |
| N | "GULL-MEDIUM" | | | | | 1 | | N | | | 89014110 |
| N | "GULL-MEDIUM" | | | | | | | N | | | 89014110 |
| N | | | 1 | | | | | N | 0 | NO DMG INDICATED | 89014150 |
| N | | | | | | | | N | | | 89014380 |
| N | "SWIFT-SMALL" | | 1 | | | 2-10 | | N | 0 | | 89015260 |
| N | "SWALLOW-SMALL" | | 1 | | | | | N | | | 89015290 |
| Y | "GULL-MEDIUM" | | | | N | | | N | | HIT WING | 89023000 |
| N | "OWL-MEDIUM" | | 1 | | N | | | N | 1 | 1FB DEFORM."SUBSTANTIAL DMG." | 89019530 |
| N | "MEDIUM" | | 1 | | N | 2-10 | | N | | | 89021110 |
| N | "MEDIUM" | | | | | | | N | 0 | | 89102271 |
| N | "KITE-LARGE" | | 1 | | | 1 | | N | | | 89020100 |
| N | "SWALLOW-SMALL" | | | | | 11-100 | | N | 0 | HIT 11-100.MINOR DMG TO LIGHTS | 89016650 |
| N | "MEDIUM" | | 1 | | N | 2-10 | | | | BRIEF COMPRESSOR STALL | 89006310 |
| N | "SMALL" | | | | N | | | N | | HIT RADOME, ENGINE | 89012270 |
| N | "LARGE" | | 1 | | | 1 | FLAMEOUT | FLAMEOUT | | WNDSHLD DMG.INSTRMNT FAILS.NO ENG DMG. | 89019790 |
| N | "MEDIUM" | | >1 | | N | | | YES | | FLIGHT CONTINUED ON 3 ENG."NO DMG" | 89019520 |
| N | "BUNTING" | | 1 | | N | | | N | 0 | SAME A/C AS #708 | 89002610 |
| N | "GULL-MEDIUM" | | | | N | 2-10 | | | | ATB DUE TO VIBES | 89009770 |
| N | | | | | | 2-10 | | N | 0 | HIT LDG.GEAR. LIGHTS DMGD, NOT ENGINE. | 89017560 |
| N | | | | | | | | N | | | 89018030 |
| N | "SWALLOW-SMALL" | | | | N | 2-10 | | N | | HIT WINDSHIELD,WING,FUSELAGE,ENGS. | 89007720 |
| N | "SWALLOW-SMALL" | | | | N | 2-10 | | N | | HIT WINDSHIELD,WING,FUSELAGE,ENGS. | 89007720 |
| N | "BLACK-HEADED GULL" | | 1 | | | | | N | | | 89018740 |
| N | "BLACK-HEADED GULL" | | 1 | | | 2-10 | | | | | 89018740 |
| Y | "COMMON GULL-MEDIUM" | | 1 | | N | | | N | | | 89415150 |
| N | "SILVER GULL" | | | | | | BRIEF INC.EGT | | 1 | 2-10 HIT WING,ENGS."SUBSTANTIAL"DMG. | 89103321 |
| N | "SILVER GULL" | | | | | | | N | 1 | "SUBSTANTIAL" DMG.WING,ENGINES | 89103321 |
| N | "LAPWING-MEDIUM" | | | | | 11-100 | | N | 0 | | 89019250 |
| N | | | 1 | | N | | | N | 0 | | 90016410 |
| Y | | | | | | | YES | HI EGT | | ENGINE FAILED.BLEED CONTROL REPLACED. | 90042300 |
| N | "MEDIUM" | | 1 | | N | 1 | | N | | HIT NOSE | 89025270 |
| N | "HERON-LARGE" | | | | N | | | N | 1 | ENG.DMG. | 90006370 |
| N | "SMALL" | | | | N | 11-100 | | N | | 2-10 BIRDS HIT RADOME,WING,FUSELAGE,ENG. | 90016700 |
| N | | | | | N | | | N | 1 | 46 FB REPLACED-COST $340,000. | 90005903 |
| N | "SMALL" | | | | N | 2-10 | | N | 0 | | 90005570 |
| N | "GULL-MEDIUM" | | | | | 11-100 | | | 0 | | 90011250 |
| N | "GULL-MEDIUM" | | 1 | | N | 2-10 | | N | 0 | | 90002270 |
| U | | | | | | | | N | | | 90026080 |
| U | | | | | | | | N | | | 90026080 |
| N | "SMALL" | | | | N | 1 | | N | 1 | "SEVERE" DMG.RADOME,ENGINE. | 90001870 |
| N | "SMALL" | | 1 | | N | | | N | 0 | | 91020290 |
| N | "GULL-MEDIUM" | | | | N | | | N | | | 90022840 |
| Y | | | | | N | | | N | | 2-10 BIRDS HIT AIRCRAFT | 90009210 |
| Y | | | | | N | | | N | | 2-10 BIRDS HIT AIRCRAFT | 90009210 |
| N | "SMALL" | | | | N | | | N | | | 90001400 |
| N | | | 1 | | | 1 | | N | | | 90014390 |
| N | BLACK-HEADED GULL | P5a35 | 1 | 10 | | | | N | | | 90014410 |
| N | "SMALL" | | 1 | | N | 2-10 | | N | | | 90001330 |
| N | "SMALL" | | 1 | | N | | | N | 0 | | 90017900 |
| N | | | | | | 1 | | N | 1 | 2FB CHANGED."SEVERE DMG." | 90027760 |
| N | "SMALL" | | 1 | | N | | | N | 0 | | 90027750 |
| N | "MEDIUM" | | | | N | | | N | | | 90027040 |
| N | "COMMON SONG THRUSH-SM." | | 1 | | N | | | N | 0 | SMALL BIRD | 90018120 |
| Y | | | | | N | | | N | 1 | "E2 DAMAGED"(SIC) | 90405200 |
| Y | "MEDIUM" | | | | N | | | N | 1 | "MINOR" ENG. DMG. | 90026710 |
| N | | | | | | 11-100 | | N | | HIT WING | 90104431 |
| N | | | | | N | | | | | | 91018910 |
| N | "MEDIUM" | | 1 | | N | | | N | | | 91018890 |
| N | | | | | | | | N | | | 91011850 |
| N | "COMMON LAPWING-MEDIUM" | | 1 | | Y | 2-10 | | N | 0 | SPECIES NOT CONFIRMED | 91030280 |
| N | "LAPWING-SMALL" | | | | N | 11-100 | | N | | 2-10 BIRDS HIT WING,ENGINES. | 91034510 |
| N | "LAPWING-SMALL" | | | | N | 11-100 | | N | | 2-10 BIRDS HIT WING,ENGINES. | 91034510 |
| N | "LARGE" | | | | | 11-100 | | N | | HIT RADOME | 91023560 |
| N | | | | | N | | | N | | | 91011950 |

| DATE | ICAO# | A/C | REG | ENG | DASH | POS | TIME | POF | SIGEVT | ALT | SPD | WEATHER | CREW | CITYPRS | APT | LOCALE | US | B |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 02/16/91 | 91012010 | B747 | JA8183 | JT9D | 7R4G2 | 4 | 17:00 | AP | | 800 | 150 | NCLD | N | -HND | HND | TOKYO-HND,JAPAN | N | "G |
| 02/19/91 | 91012030 | B747 | JA8186 | JT9D | 7R4G2 | 3 | 20:30 | AP | ME | 230 | 155 | NCLD | N | -HND | HND | TOKYO-HND,JAPAN | N | "G |
| 02/19/91 | 91012030 | B747 | JA8186 | JT9D | 7R4G2 | 4 | 20:30 | AP | ME | 230 | 155 | NCLD | N | -HND | HND | TOKYO-HND,JAPAN | N | "G |
| 02/20/91 | 91032910 | A320 | VTEPT | V2500 | A1 | 1 | 13:00 | AP | | 1250 | 140 | | N | -DEL | DEL | DELHI,INDIA | N | |
| 03/04/91 | 91033360 | B767 | PH-MCH | 4000 | 4060 | 1 | 11:00 | TR | ME | 0 | 168 | NCLD | ATB | AMS- | AMS | AMSTERDAM,NETHERLANDS | N | "L |
| 03/04/91 | 91033360 | B767 | PH-MCH | 4000 | 4060 | 2 | 11:00 | TR | ME | 0 | 168 | NCLD | ATB | AMS- | AMS | AMSTERDAM,NETHERLANDS | N | "L |
| 03/10/91 | 91012170 | B767 | JA8266 | JT9D | 7R4D | 2 | | | | | | | N | HKG-NRT | XFO | HONG KONG OR TOKYO | N | |
| 03/15/91 | 91012250 | B767 | JA8234 | JT9D | 7R4D | 1 | 17:45 | AP | | | 135 | SCLD | N | -HKD | HKD | HAKODATE,JAPAN | N | "L |
| 03/20/91 | 90101381 | B767 | VH-RME | CF6 | 80A | 2 | 11:30 | TR | | 0 | 135 | RAIN | N | TSV- | TSV | TOWNSVILLE,AUSTRALIA | N | "H |
| 03/22/91 | 91019070 | B767 | JA8489 | CF6 | 80A | 1 | 11:00 | LR | | 0 | 130 | OVERCAST | N | -SHI | SHI | SHIMOJISHIMA,JAPAN | N | "S |
| 04/05/91 | 91024000 | A320 | G-BUSF | CFM56 | 5 | 2 | 10:10 | TR | | 0 | 90 | OVERCAST | N | LHR- | LHR | LONDON-LHR,ENGLAND,UK | N | "P |
| 04/14/91 | 91019200 | B767 | JA8251 | CF6 | 80A | 1 | 19:10 | AP | | | 130 | NCLD | N | | ??? | YAMAGUCH-UBE,JAPAN | N | "S |
| 04/23/91 | 91030570 | A320 | F-GJVA | CFM56 | 5 | 1 | 13:24 | AP | | 500 | 140 | | N | -NTE | NTE | NANTES,FRANCE | N | "C |
| 04/28/91 | 91019360 | B767 | JA8257 | CF6 | 80C2 | 1 | | | | | | NCLD | N | | XFO | | N | "S |
| 04/30/91 | 91019230 | B767 | JA8271 | CF6 | 80C2 | 1 | 12:58 | AP | | 300 | 130 | NCLD | N | -HIJ | HIJ | HIROSHIMA,JAPAN | N | "K |
| 05/02/91 | 91001130 | A320 | D-AIPL | CFM56 | 5 | 2 | 16:20 | LR | | 0 | 100 | SCLD | N | -AGP | AGP | MALAGA,SPAIN | N | "D |
| 05/06/91 | 91030700 | A320 | F-GHQG | CFM56 | 5 | 2 | 20:07 | LR | N | 0 | 110 | SCLD | N | -XHE | XHE | HYERES,FRANCE | N | "C |
| 05/07/91 | 91019400 | B767 | JA8485 | CF6 | 80A | 1 | | | | | | | N | | XFO | | N | |
| 05/09/91 | 91001080 | A320 | D-AIPS | CFM56 | 5 | 2 | 12:15 | AP | | 20 | 135 | RAIN | | -BCN | BCN | BARCELONA,SPAIN | N | "M |
| 05/15/91 | 91030800 | A320 | F-GHQD | CFM56 | 5 | 1 | 15:43 | TO | | 100 | 140 | SCLD | N | TLS- | TLS | TOULOUSE,FRANCE | N | CC |
| 05/17/91 | 91000990 | A320 | D-AIPF | CFM56 | 5 | 1 | 11:33 | AP | | 50 | 140 | SCLD | N | -CGN | CGN | COLOGNE/BONN,GERMANY | N | "S |
| 05/18/91 | 91019510 | B767 | JA8257 | CF6 | 80C2 | 1 | 19:00 | LR | | 0 | 100 | NCLD | | -OIT | OIT | OITA,JAPAN | N | "S |
| 05/19/91 | 91000940 | A320 | D-AIPK | CFM56 | 5 | 1 | | | | | | | N | | XFO | GERMANY | N | |
| 05/26/91 | 91024620 | A320 | G-BUSJ | CFM56 | 5 | 1 | 22:02 | AP | | 150 | 135 | OVERCAST | N | -ABZ | ABZ | ABERDEEN,SCOTLAND,UK | N | "M |
| 05/28/91 | 91000810 | A310 | D-AIDE | CF6 | 80C2 | 1 | 7:00 | TR | | 0 | 115 | | ATO | NBO- | NBO | NAIROBI,KENYA | N | "S |
| 06/02/91 | 91019650 | B767 | JA8290 | CF6 | 80C2 | 1 | 17:29 | AP | | 50 | 130 | OVERCAST | N | -OIT | OIT | OITA,JAPAN | N | "G |
| 06/06/91 | 91034980 | B747 | PH-BFF | CF6 | 80C2 | 4 | 6:20 | LR | | 0 | 80 | RAIN | N | -AMS | AMS | AMSTERDAM,NETHERLANDS | N | "P |
| 06/14/91 | 91019720 | B767 | JA8288 | CF6 | 80C2 | 1 | 17:00 | AP | | 100 | 140 | NCLD | N | -HND | HND | YOKYO-HND,JAPAN | N | "M |
| 06/15/91 | 91019760 | B767 | JA8484 | CF6 | 80A | 1 | | AP | | 50 | 130 | SCLD | N | -MYJ | MYJ | MATSUYAMA,JAPAN | N | "M |
| 06/17/91 | 91019740 | B767 | JA8243 | CF6 | 80A | 1 | 8:42 | LR | | 0 | 100 | OVERCAST | N | -TTJ | TTJ | TOTTORI,JAPAN | N | "S |
| 06/17/91 | 91019980 | B767 | JA8489 | CF6 | 80A | 1 | 8:40 | LR | | 0 | 140 | RAIN | N | -FUK | FUK | FUKUOKA,JAPAN | N | "L |
| 06/28/91 | 91019920 | B767 | JA8482 | CF6 | 80A | 1 | | | | | | | N | OSA-OIT | XFO | OSAKA OR OITA,JAPAN | N | "S |
| 06/30/91 | 91019780 | B767 | JA8274 | CF6 | 80C2 | 1 | 19:52 | | | | | RAIN | N | | XFO | MATSUYAMA,JAPAN?? | N | "S |
| 07/01/91 | 91020570 | B767 | JA8273 | CF6 | 80C2 | 1 | | | | | | | N | | XFO | | N | |
| 07/02/91 | 91020540 | B767 | JA8251 | CF6 | 80A | 1 | 16:53 | LR | | 0 | 80 | SCLD | N | -TOY | TOY | TOYAMA,JAPAN | N | "S |
| 07/08/91 | 91002370 | A320 | D-AIPS | CFM56 | 5 | 2 | 7:23 | TO | | 5 | 155 | CLEAR | N | VIE- | VIE | VIENNA,AUSTRIA | N | "B |
| 07/13/91 | 91020510 | B767 | JA8489 | CF6 | 80A | 1 | 7:43 | TO | | 50 | 143 | RAIN | N | HND- | HND | TOKYO-HND,JAPAN | N | "M |
| 07/24/91 | 91031460 | A320 | F-GJVA | CFM56 | 5 | 1 | 11:03 | TO | | 50 | 160 | NCLD | N | ORY- | ORY | PARIS-ORY,FRANCE | N | "E |
| 07/24/91 | 91020230 | B767 | JA8287 | CF6 | 80C2 | 1 | 8:27 | AP | | 50 | 126 | NCLD | N | -KCZ | KCZ | KOCHI,JAPAN | N | "S |
| 07/24/91 | 91020150 | B767 | JA8272 | CF6 | 80C2 | 1 | 8:40 | TR | | 0 | 125 | SCLD | N | SDJ- | SDJ | SENDAI,JAPAN | N | "K |
| 07/26/91 | 91031500 | A320 | F-GFKP | CFM56 | 5 | 1 | 17:06 | AP | MB? | 80 | 145 | SCLD | N | -CDG | CDG | PARIS-CDG,FRANCE | N | "M |
| 07/31/91 | 91026360 | B767 | G-BRIG | CF6 | 80A | 1 | 19:10 | TR | MB? | 0 | 140 | | N | DLM- | DLM | DALAMAN,TURKEY | N | "S |
| 08/06/91 | 91020780 | B767 | JA8271 | CF6 | 80C2 | 1 | 20:11 | | | | | OVERCAST | N | | XFO | MATSUYAMA,JAPAN?? | N | |
| 08/06/91 | 91020730 | B767 | JA8486 | CF6 | 80A | 1 | 17:13 | TR | | 0 | 120 | NCLD | N | SHI- | SHI | SHIMOJISHIMA,JAPAN | N | "S |
| 08/12/91 | 91020710 | B747 | JA8096 | CF6 | 80C2 | 1 | | | | | | | N | | XXX | | U | |
| 08/16/91 | 91021180 | B767 | JA8274 | CF6 | 80C2 | 1 | 19:50 | AP | | 10 | 135 | NCLD | N | -MYJ | MYJ | MATSUYAMA,JAPAN | N | "M |
| 08/19/91 | 91021170 | B767 | JA8288 | CF6 | 80C2 | 1 | 19:04 | LR | | 0 | 110 | OVERCAST | N | -TOY | TOY | TOYAMA,JAPAN | N | "B |
| 08/20/91 | 91021160 | B767 | JA8275 | CF6 | 80C2 | 1 | 19:12 | LR | | 0 | 135 | | N | -TOY | TOY | TOYAMA,JAPAN | N | "B |
| 08/21/91 | 91021130 | B767 | JA8288 | CF6 | 80C2 | 1 | 10:48 | LR | MB? | 0 | | OVERCAST | N | -MYJ | MYJ | MATSUYAMA,JAPAN | N | "S |
| 08/22/91 | 91003990 | A320 | D-AIPS | CFM56 | 5 | 2 | 10:55 | TR | | 0 | 120 | NCLD | ATO | DUS- | DUS | DUSSELDORF,GERMANY | N | "M |
| 08/31/91 | 91020930 | B767 | JA8289 | CF6 | 80C2 | 1 | 19:01 | | MB | | | SCLD | N | -TOY | XFO | TOYAMA,JAPAN?? | N | "B |

| | US | BIRDNAME | SPEC | #BDS | WT | ALERT | SEE | POWLOSS | IFSD | DMG | REMARKS | ICAO# |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | N | "GULL-MEDIUM" | | | | Y | 1 | | N | 1 | ENG.DAMAGED | 91012010 |
| | N | "GULL-MEDIUM" | | | | Y | 2-10 | | N | 0 | HIT WING,LDG.GEAR. | 91012030 |
| | N | "GULL-MEDIUM" | | | | Y | 2-10 | | N | 0 | HIT WING,LDG.GEAR. | 91012030 |
| | N | | | 1 | | | | | N | | | 91032910 |
| IDS | N | "LAPWING-MEDIUM" | | | | N | 2-10 | | | 1 | 3FB "SEVERE DMG",FUSELAGE HIT | 91033360 |
| IDS | N | "LAPWING-MEDIUM" | | | | N | 2-10 | | | 1 | MINOR ENG.DMG. FUSELAGE HIT | 91033360 |
| | N | | | | | | | | N | | | 91012170 |
| | N | "LARGE" | | | | N | 1 | | N | 0 | | 91012250 |
| | N | "HAWK-MEDIUM" | | 1 | | | | | N | 0 | 2-10 HAWKSSTRUCK NOSE, ENGINE. | 90101381 |
| | N | "SPARROW-SMALL" | | | | N | | | N | | 2-10 BIRDS HIT AIRCRAFT | 91019070 |
| IK | N | "PIGEON-MEDIUM" | | 1 | | | | | N | | | 91024000 |
| | N | "SMALL" | | | | N | | | N | | | 91019200 |
| | N | "COMMON SONG THRUSH-SM." | | 1 | | N | 2-10 | | N | 0 | SPECIES NOT CONFIRMED. | 91030570 |
| | N | "SMALL" | | | | N | | | N | | | 91019360 |
| | N | "KITE" | | 1 | | N | | | N | 0 | | 91019230 |
| | N | "DOVE-MEDIUM" | | 1 | | N | 2-10 | | N | | | 91001130 |
| | N | "COMMON SWIFT-SMALL" | | 1 | | Y | 11-100 | | N | 0 | | 91030700 |
| | N | | | | | N | | | N | | | 91019400 |
| | N | "MEDIUM" | | | | | 1 | | | | | 91001080 |
| | N | COMMON SWIFT | U3b68 | 1 | 1 | | 2-10 | | N | 0 | SPECIES CONFIRMED | 91030800 |
| IY | N | "SMALL" | | 1 | | N | 2-10 | | N | | | 91000990 |
| | N | "SMALL" | | 1 | | | | | N | | | 91019510 |
| | N | | | 1 | | N | | | N | | | 91000940 |
| ( | N | "MEDIUM" | | 1 | | | 2-10 | | N | | | 91024620 |
| | N | "STORK-LARGE" | | | | N | 2-10 | | | 1 | "SEVERE"ENG.DMG.FB CHANGED.HIT LDG GEAR | 91000810 |
| | N | "GULL-MEDIUM" | | 1 | | N | | | N | | | 91019650 |
| IDS | N | "PHEASANT-MEDIUM" | | 1 | | N | 1 | | N | 0 | WING, ENGINE STRUCK. | 91034980 |
| | N | "MEDIUM" | | 1 | | N | | | N | 0 | | 91019720 |
| | N | "MEDIUM" | | | | N | | | N | | 2-10 BIRDS STRUCK AIRCRAFT. | 91019760 |
| | N | "SWALLOW-SMALL" | | 1 | | N | | | N | | | 91019740 |
| | N | "LARGE" | | 1 | | N | | | N | | | 91019980 |
| | N | "SMALL" | | 1 | | N | | | N | | | 91019920 |
| | N | "SMALL" | | | | N | | | N | | | 91019780 |
| | N | | | | | N | | | N | | | 91020570 |
| | N | "SPARROW-SMALL" | | 1 | | N | | | N | | | 91020540 |
| | N | "BUZZARD-LARGE" | | | | N | 1 | | N | 1 | "SUBSTANTIAL" ENGINE DMG. | 91002370 |
| | N | "MEDIUM" | | 1 | | N | | | N | | HIT NOSE,WING,ENGINE. | 91020510 |
| | N | "EURASIAN KESTREL-MED." | | 1 | | Y | | | N | 0 | SPECIES UNCONFIRMED. | 91031460 |
| | N | "SPARROW-SMALL" | | 1 | | N | | | N | | | 91020230 |
| | N | "KITE-MEDIUM" | | 1 | | N | | | N | | | 91020150 |
| | N | "MEDIUM" | | | | N | 2-10 | | N | 0 | HIT NOSE, ENGINE. | 91031500 |
| | N | "SWALLOW-SMALL" | | | | | 11-100 | | N | | 11-100 BIRDS STRICK AIRCRAFT | 91026360 |
| | N | | | | | N | | | N | | | 91020780 |
| | N | "SMALL" | | | | N | | | N | | HIT RADOME.STRUCK 2-10 BIRDS. | 91020730 |
| | U | | | | | N | | | N | | | 91020710 |
| | N | "MEDIUM" | | 1 | | N | | | N | | HIT NOSE, ENGINE | 91021180 |
| | N | "BAT-SMALL" | | | | N | | | N | | 2-10 BATS HIT WING, ENGINE | 91021170 |
| | N | "BAT-SMALL" | | 1 | | N | | | | | HIT WING, ENGINE. | 91021160 |
| | N | "SPARROW-SMALL" | | | | N | | | N | | 2-10 STRUCK AIRCRAFT | 91021130 |
| | N | "MEDIUM" | | 1 | | N | | SURGE | U | 0 | LOUD BANG(SURGE).30 MIN. DELAY. | 91003990 |
| | N | "BAT" | | | | N | | | N | | 11-100 BATS HIT AIRCRAFT | 91020930 |