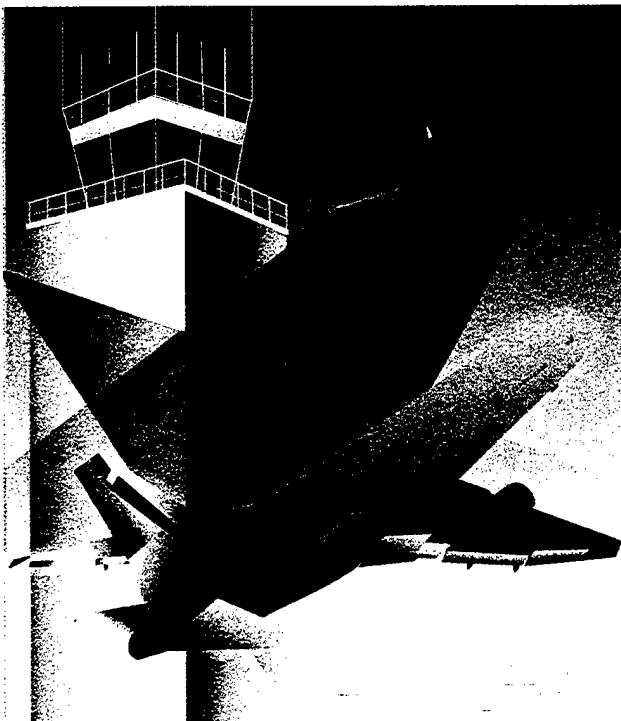


Annual Review of Aircraft Accident Data

# U.S. Air Carrier Operations Calendar Year 1998



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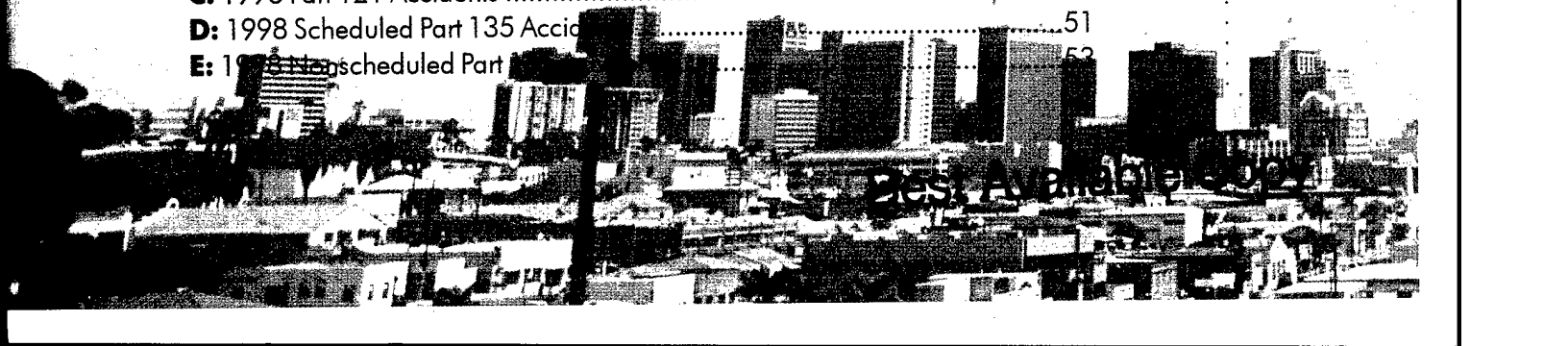


**National  
Transportation  
Safety Board**  
Washington, D.C.

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## INTRODUCTION

### PURPOSE OF THE ANNUAL REVIEW

The *1998 Annual Review of Aircraft Accident Data for U.S. Air Carrier Operations* presents a statistical compilation and review of accidents that occurred in 1998 involving aircraft operated by U.S. air carriers. In addition to providing accident statistics for 1998, the review also includes general economic indicators that may influence aircraft activity for 1998 and contextual accident data from several years preceding the reporting period.

### WHICH AIRCRAFT ARE INCLUDED IN THIS REVIEW?

This review covers accidents involving aircraft operated by U.S. air carriers under Title 14, Parts 121 and 135 of the *Code of Federal Regulations* (CFR). Air carriers are generally defined as operators that fly aircraft in revenue service. Title 14, also known as the *Federal Aviation Regulations* (FAR), describes operating requirements in Part 121 and Part 135. Briefly stated, Part 121 applies to major airlines and cargo carriers that fly large transport-category aircraft while part 135 applies to commercial air carriers commonly referred to as commuter airlines (i.e., scheduled Part 135) and air taxis (i.e., nonscheduled Part 135).

In March 1997, the definition of Part 121 operations changed. Prior to the change, scheduled aircraft with 30 or more seats were operated under Part 121 and those with less than 30 seats were operated under Part 135. After the change, scheduled aircraft with 10 or more seats were classified as Part 121 operations; therefore, since 1997, most carriers that once were popularly known as "commuters" now operate under Part 121.

In this review, the presentation of data for scheduled and nonscheduled Part 135 operations is separated due to the distinct operating characteristics of these groups. According to 14 CFR 119.3, a scheduled operation refers to, "any common carriage passenger-carrying operation for compensation or hire conducted by an air carrier or commercial operator for which the certificate holder or its representative offers in advance the departure location, departure time, and arrival location."

By contrast, a nonscheduled operation refers to, "any operation for compensation or hire that is one of the following:

(1) Passenger-carrying operations conducted as a public charter under part 380 of this title or any operations in which the departure time, departure location, and arrival location are specifically negotiated with the customer or the customer's representative that are any of the following types of operations:

(i) Common carriage operations conducted with airplanes, including turbojet-powered airplanes, having a passenger-seat configuration of 30 seats or fewer, excluding each crewmember seat, and a payload capacity of 7,500 pounds or less, except that operations using a specific airplane that is also used in domestic or flag operations and that is so listed in the operations specifications as required by Sec. 119.49(a)(4) for those operations are considered supplemental operations;

- (ii) Noncommon or private carriage operations conducted with airplanes having a passenger-seat configuration of less than 20 seats, excluding each crewmember seat, and a payload capacity of less than 6,000 pounds; or
- (iii) Any rotorcraft operation.

(2) Scheduled passenger-carrying operations conducted with one of the following types of aircraft with a frequency of operations of less than five round trips per week on at least one route between two or more points according to the published flight schedules:

- (i) Airplanes, other than turbojet powered airplanes, having a maximum passenger-seat configuration of 9 seats or less, excluding each crewmember seat, and a maximum payload capacity of 7,500 pounds or less; or
- (ii) Rotorcraft.

(3) All-cargo operations conducted with airplanes having a payload capacity of 7,500 pounds or less, or with rotorcraft."

In addition to the regulatory differences between scheduled and nonscheduled Part 135 operations, there are other general characteristics that distinguish these two groups. Carriers operating under scheduled Part 135 typically fly aircraft with single/twin turbine engines or single/twin reciprocating engines. They are more likely to fly short routes and a majority of operators are based in Alaska. By contrast, nonscheduled Part 135 operators are more evenly distributed throughout the United States and represent a diverse group ranging from operators with one small aircraft to those with multiple large corporate jets.

While there are many differences in the operating rules for scheduled and nonscheduled Part 135 operations, there are fewer factors that differentiate the operating rules for scheduled and nonscheduled Part 121 operations. In addition, while activity data for scheduled and nonscheduled Part 135 operators is collected using different methods, all Part 121 operators are required to report activity data on a regular basis. Therefore, data for scheduled and nonscheduled Part 121 operations have been combined for analysis.

#### **WHICH AIRCRAFT ARE NOT INCLUDED IN THIS REVIEW?**

- ◆ General aviation aircraft (A separate review, published annually by the NTSB, summarizes accident statistics for these aircraft);
- ◆ Military aircraft;
- ◆ Foreign-operated aircraft;
- ◆ Certain public use aircraft as defined in 49 CFR 830.5;
- ◆ Ultralights (e.g., powered aircraft weighing less than 254 lbs.);
- ◆ Experimental aircraft and;
- ◆ Commercial space launches.

#### **CHANGES TO THE ANNUAL REVIEW**

The 1998 Annual Review has been modified from past years and is now organized into three parts:

1. The first part presents an overview of the state of the economy and the aviation industry in 1998 as well as contextual statistics from previous years. It also includes a historical overview of both the number of accidents and accident rates between the years 1989 and 1998.

2. The second part investigates trends over the past 10 years in terms of various factors such as the types of flight, levels of aircraft damage, and level of human injury. This part is divided into three subsections for Part 121, scheduled Part 135, and nonscheduled Part 135 aircraft accidents.
3. The third part focuses on accidents that occurred during the 1998 calendar year and their circumstances. This part is similarly divided into three subsections for Part 121, scheduled Part 135, and nonscheduled Part 135.

In addition to changing the organization of the 1998 Annual Review, the format has also been changed from an unembellished tabular presentation to a more graphical presentation of statistical data with accompanying text. For readers who wish to view the data in a tabular form or to manipulate the data used in the report, the data set is available online at <<http://www.nts.gov/aviation/Stats.htm>>.

### THE NTSB INVESTIGATIVE PROCESS

The NTSB investigates every civil aviation accident that occurs in the United States. It also provides investigators to serve as U.S. Accredited Representatives as specified in international treaties for aviation accidents overseas involving U.S.-registered aircraft, or involving aircraft or major components of U.S. manufacture.<sup>1</sup> Investigations are conducted from NTSB Headquarters in Washington, D.C., or from one of the six regional or four field offices in the United States (see Appendix A).

Note that there is a distinction between the population of accidents investigated by the NTSB and those that are included in the Annual Review. While the NTSB investigates all civil aviation accidents that occur on U.S. soil (including domestic and foreign operators), the Annual Review describes accidents that occurred among U.S.-operated aircraft in all parts of the world.

### THE NTSB AVIATION ACCIDENT/INCIDENT DATABASE

The NTSB is responsible for maintaining the government's database on civil aviation accidents. The NTSB Accident/Incident database is the official repository of aviation accident data and causal factors. The database was established in 1962 (by the NTSB's predecessor agency, the Civil Aeronautics Board) and approximately 2,000 new event records are added each year. For each record, there are over 650 fields of data concerning the aircraft, environment, engines, injuries, sequence of accident events and other topics. The NTSB Accident/Incident Database is available to the public at <<ftp://www.nts.gov/avdata/>>. Alternatively, there is a Database Query tool at <[http://www.nts.gov/nts/query.asp#query\\_start](http://www.nts.gov/nts/query.asp#query_start)> that allows users to search for sets of accidents using commonly known information such as date, location, and category of aircraft.

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<sup>1</sup> For more detailed information about the criteria for NTSB investigation of an aviation accident or incident, see Title 49 Code of Federal Regulations 831.2.

The NTSB database is primarily composed of aircraft accidents. An "accident" is defined in 49 CFR 830.2 as, "an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death<sup>2</sup> or serious injury,<sup>3</sup> or in which the aircraft receives substantial damage.<sup>4</sup>" The database also contains several aviation "incidents," defined in 49 CFR 830.2 as, "occurrences other than accidents that are associated with the operation of an aircraft and that affect or could affect the safety of operations."

Accident investigators use the NTSB's Accident Data Management System (ADMS) software to enter data into the Accident/Incident Database. Within about a week of the event, a Preliminary Report, containing limited information such as date, location, aircraft operator, and type of aircraft becomes available. A Factual Report with additional information concerning the occurrence is available within a few months. See Appendix B for documents showing the information available in Preliminary and Factual Reports. A Final Report, which includes a statement of the probable cause and other contributing factors, is issued after the investigation has been completed. Five presidential appointees serving as Members of the Safety Board, or their delegates; must approve official statements dealing with the probable cause of an accident. Complete records are made available to the public only after this approval has been granted.

In determining the probable cause(s) of an accident, all facts, conditions, and circumstances are considered. This method enables the investigator to identify cause-and-effect relationships in the accident sequence about which something can be done to prevent similar accidents. Accordingly, for statistical purposes, where there are two or more causes of an accident, each is recorded and no attempt is made to establish a primary cause. The term "factor" is used, in general, to denote those elements of an accident that further explain or supplement the probable cause(s) and provides a means for collecting essential items of information that could not be readily categorized elsewhere in the system.

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<sup>2</sup> "Fatal injury" means any injury that results in death within 30 days of the accident.

<sup>3</sup> "Serious injury" means any injury which: (1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, muscle, or tendon damage; (4) involves any internal organ; or (5) involves second; or third-degree burns, or any burns affecting more than 5 percent of the body surface.

<sup>4</sup> "Substantial damage" means damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered "substantial damage" for the purpose of this part.

# OVERVIEW OF THE STATE OF THE COMMERCIAL AVIATION ENVIRONMENT IN 1998

## GENERAL UNITED STATES SOCIAL, ECONOMIC, AND AVIATION INDICATORS

Since 1980, there have been increases in both general economic indicators as well as the number of air carriers, and person-miles traveled. Between 1990 and 1998, the U.S. resident population increased by 8.6% and the gross domestic product rose by 26.7%. While the number of major air carriers decreased slightly (down 7.1%) during this time, the number of other carriers (including national, large regional, and medium regional) increased by 48.2%. The number of aircraft and the number of air carrier passenger miles traveled grew at a similar pace with increases of 33.3% and 33.9%, respectively. In 1998, the median household income was \$41,032 with an average transportation expenditure of \$6,616 and an average of \$271 spent on airline tickets.<sup>6</sup>

	1980	1990	1998
Resident population (millions) <sup>7</sup>	227.3	248.8	270.2
Civilian labor force participation (percent) <sup>8</sup>	63.8	66.4	67.1
Gross domestic product (billions) <sup>9</sup>	\$4,900.9	\$6,707.9	\$8,508.9
Median household income <sup>10</sup>	\$35,238	\$38,446	\$41,032
Number of households (millions) <sup>11</sup>	80.8	93.3	102.5
Number of aircraft <sup>12</sup>	3,808	6,083	8,111
Number of major air carriers <sup>13</sup>	n/a	14	13
Number of other air carriers <sup>14</sup>	n/a	56	83
Air carrier passenger miles (millions) <sup>14</sup>	204,368	345,873	463,262

<sup>6</sup> U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Survey, 1998, unpublished detailed table 1100, August 2000.

<sup>7</sup> From Bureau of Transportation Statistics (BTS), 2000 National Transportation Statistics (BTS 01-01), Table A. <[http://www.bts.gov/btsprod/nts/table\\_a.pdf](http://www.bts.gov/btsprod/nts/table_a.pdf)>.

<sup>8</sup> Participation rates, for ages 16 and older. From Fullerton, H. N. Jr. (December, 1999). Labor force participation: 75 years of change, 1950-98 and 1998-2025. Monthly Labor Review.

<sup>9</sup> In year 1996 dollars. From the Bureau of Economic Analysis <<http://www.bea.gov/bea/dn/gdplev.xls>>.

<sup>10</sup> From US Census Bureau <<http://www.census.gov/hhes/income/histinc/h07.html>>, in year 2000 dollars, using the CPI-U-RS (Consumer Price Index Research Series Using Current Methods).

<sup>11</sup> BTS, 2000 National Transportation Statistics (BTS 01-01), Table A. <[http://www.bts.gov/btsprod/nts/table\\_a.pdf](http://www.bts.gov/btsprod/nts/table_a.pdf)>.

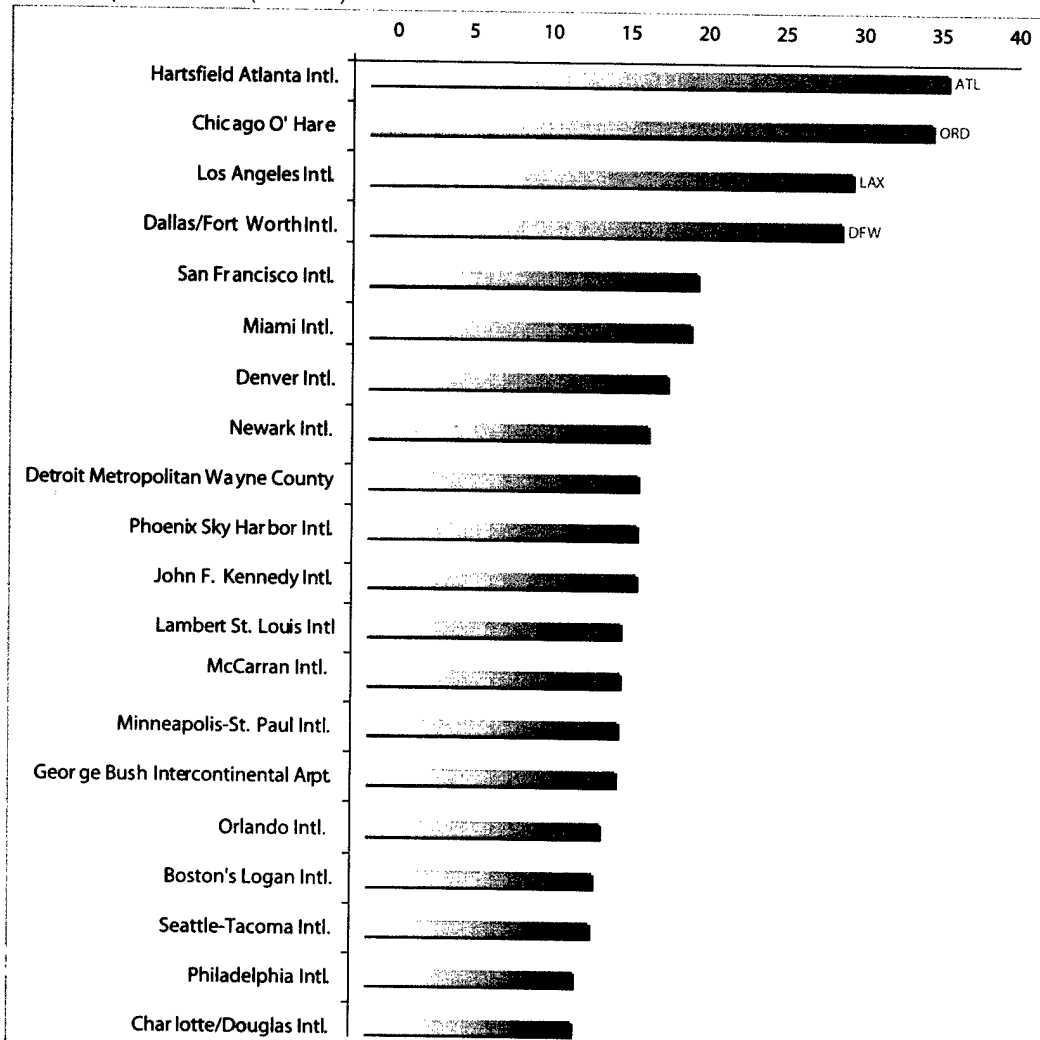
<sup>12</sup> BTS, 2000 National Transportation Statistics (BTS 01-01), Table 4.8 <[http://199.79.179.77/btsprod/nts/Ch4\\_web/W4-8.XLS](http://199.79.179.77/btsprod/nts/Ch4_web/W4-8.XLS)>.

<sup>13</sup> Carrier groups are categorized based on their annual operating revenues as major, national, large regional, and medium regional. The thresholds were last adjusted July 1, 1999, and the threshold for major air carriers is currently \$1 billion. The other air carrier category contains all national, large regional, and medium regional air carriers. Source: BTS, 2000 National Transportation Statistics (BTS 01-01), Table 2 <[http://199.79.179.77/btsprod/nts/Ch1\\_web/W1-2NEW.XLS](http://199.79.179.77/btsprod/nts/Ch1_web/W1-2NEW.XLS)>.

<sup>14</sup> Certificated, domestic, all services. Source: BTS, 2000 National Transportation Statistics (BTS 01-01), Table 1-31 <[http://199.79.179.77/btsprod/nts/Ch1\\_web/W1-31NEW.XLS](http://199.79.179.77/btsprod/nts/Ch1_web/W1-31NEW.XLS)>

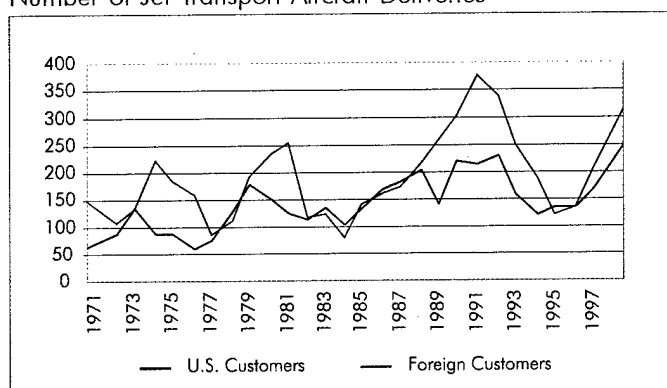
In 1998, there were 652.3 million passenger enplanements at U.S. airports. The following graph depicts the number of enplanements at the top 20 airports in the United States in 1998.<sup>15</sup> With 35.3 million, Hartsfield Atlanta International Airport surpassed Chicago's O'Hare airport, the leader in 1997, as the airport with the largest number of enplanements.

1998 Enplanements (millions)



<sup>15</sup> Federal Aviation Administration "Terminal Area Forecast - Fiscal years 1999-2015" (November, 1999) FAA-APO-99-7 <<http://api.hq.faa.gov/taf99/tafpub.pdf>>.

Number of Jet Transport Aircraft Deliveries



Total Aircraft Reported in Operation by Air Carriers by Type of Aircraft for 1987-1998

Year	Part 121	Part 135	Part 135 (Nonscheduled)	Part 135 (Scheduled)	Total
1987	5,250	3,575	1,241	421	13
1988	5,660	3,915	1,375	362	8
1989	5,778	3,942	1,476	353	7
1990	6,083	4,148	1,595	329	11
1991	6,054	4,167	1,598	283	6
1992	7,320	4,446	1,894	847	133
1993	7,297	4,584	1,868	721	124
1994	7,370	4,636	1,782	824	128
1995	7,411	4,832	1,713	748	118
1996	7,478	4,922	1,696	739	121
1997	7,616	5,108	1,646	728	134
1998	8,111	5,411	1,832	751	117

Since 1971, the annual number of new U.S. jet transport aircraft deliveries has more than doubled for both U.S. and foreign customers. Shipments showed peaks in the mid 1970s, early 1980s, and early 1990s with more dramatic increases for foreign customers.<sup>16</sup> The total number of U.S. air carrier aircraft in operation between 1987-1998 shows a similar trend with a steady increase punctuated by a sharper increase in the early 1990s.<sup>17</sup>

### AIRCRAFT ACTIVITY

The following charts depict aircraft activity for Part 121, scheduled Part 135, and nonscheduled Part 135 aircraft between 1989 and 1998. Aircraft activity can be measured in several ways:

Flight hours, departures, and miles flown are often used for commercial operations. All Part 121 air carriers and scheduled Part 135 carriers are required to report revenue flight activity<sup>18</sup> to the Department of Transportation's (DOT) Research and Special Programs Administration (RSPA).<sup>19</sup> This information is maintained by the Bureau of Transportation Statistics (BTS) and is aggregated by the Federal Aviation Administration Systems Process Audit staff (AFS-40) to produce annual reports of flight activity.

By contrast, nonscheduled Part 135 operators are not required to report activity data for their revenue flights. Instead, activity for this group of aircraft is estimated using the annual General Aviation and Air Taxi Activity (GAATA) Survey. The GAATA Survey was established in 1978 to gather information such as flight hours, avionics, base location, and use from owners of general aviation and nonscheduled Part 135 aircraft. However, since reporting is not required for nonscheduled Part 135 revenue flights, the activity data for this segment may not be as reliable as those from other segments of commercial aviation.

<sup>16</sup> Includes 707, 737, 747, 757, 767, 777, MD-11, MD-80, MD-90, MD-95, DC-8, DC-9, DC-10, and L-1011. From Aerospace Industries Association <[http://www.aia-aerospace.org/stats/aero\\_stats/stat21.pdf](http://www.aia-aerospace.org/stats/aero_stats/stat21.pdf)>.

<sup>17</sup> The number of aircraft is the monthly average of the number of aircraft reported in use for the last three months of the year and does not include on-demand air taxis. Source: 1983 - 1991 Air Carrier Aircraft Utilization and Propulsion Reliability Report; Aviation Standards National Field Office, Federal Aviation Administration. Beginning in 1992 the source is the Vital Information System.

<sup>18</sup> Activity data includes revenue aircraft hours, revenue aircraft departures, revenue aircraft miles flown, and several others.

<sup>19</sup> Part 121 operators report activity on a monthly basis, and scheduled Part 135 operators report quarterly.

In previous Annual Reviews, activity rates were presented using metrics of 100,000 flight hours, 100,000 departures, and 1,000,000 miles flown. However, due to an increase in activity and a decrease in accident numbers, the use of these metrics to calculate accident rates in recent years has produced fractional numbers. For that reason, this report presents activity in 1,000,000 flight hours, 1,000,000 departures, and 1,000,000,000 miles flown. In addition, while aircraft activity is presented using all three metrics, accident rates in this report are calculated using flight hours and departures only.

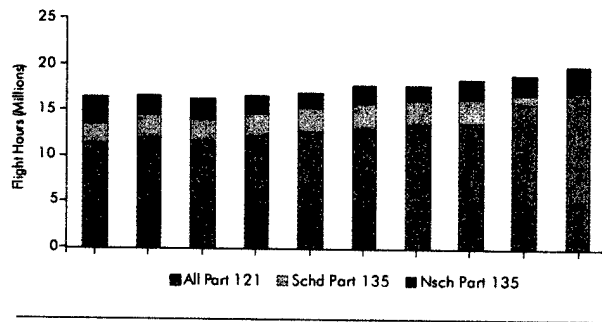
For all of the Part 121 aviation activity indicators, there is an increase over the 10-year period. The notable increases observed beginning in 1997 are most likely attributable to the 1997 change in the FARs that reclassified many Part 135 operations into Part 121 operations. In 1998, flight hours and departures increased by 6.2% and 6.5%, respectively; however, total miles flown increased by only 0.7%. It is possible that this is due to the fact that many of the former Part 135 aircraft that were added to this sample fly slower and make shorter trips than larger Part 121 aircraft.

For scheduled Part 135 aircraft, there was a substantial decrease in all activity indicators beginning in 1997 and continuing through 1998. Between 1997 and 1998, total flight hours decreased by 64.0%, total miles flown decreased by 79.8%, and total departures decreased by 49.3%.

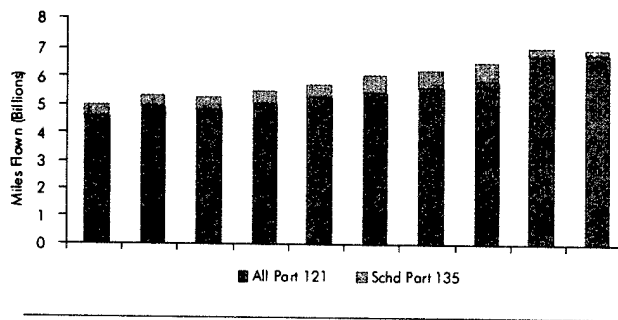
While one would typically expect a high degree of correlation among these aircraft activity indicators, it is likely that this variation is due to the fact that many of the aircraft reclassified from Part 135 to Part 121 in 1997 were larger aircraft that traveled further, traveled faster, and had fewer departures than those that maintained their Part 135 status.

No similar decrease is observed in nonscheduled Part 135. In fact, between 1997 and 1998, there was a 22.3% increase in the total flight hours flown. Nonscheduled Part 135 aircraft are largely represented by air taxis and small cargo planes; therefore, few of them were reclassified to Part 121 in 1997. It is possible that the observed increase in flight hours flown represents a natural increase in activity for these aircraft.

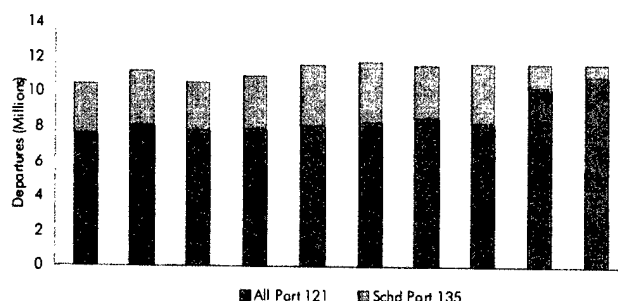
Flight Hours by FAR Part, 1989 - 1998



Miles Flown by FAR Part, 1989 - 1998



Departures by FAR Part, 1989 - 1998

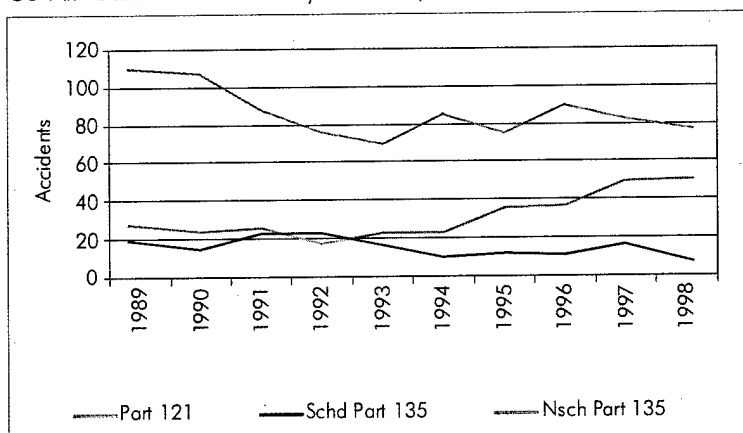


# HISTORICAL AND CURRENT ACCIDENT DATA

## UNITED STATES COMMERCIAL AIRCRAFT ACCIDENTS

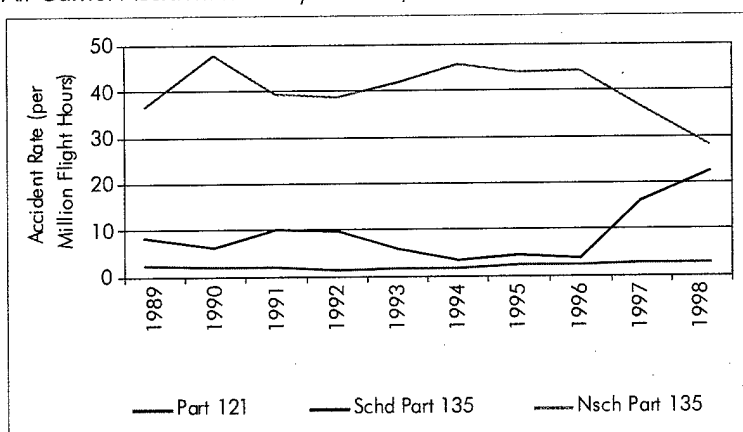
There are consistently more Part 135 accidents per year compared to Part 121, as shown in the following graph. In 1998, there were 50 Part 121 accidents, 8 scheduled Part 135 accidents, and 77 nonscheduled Part 135 accidents.

US Air Carrier Accidents by FAR Part, 1989- 1998



Accident rates are also higher for Part 135 aircraft operations compared to Part 121 operations. As shown in the following graph, Part 121 rates have stayed fairly stable while rates for scheduled Part 135 increased between 1996 and 1998 and those for nonscheduled Part 135 decreased during this same time period. In 1998, the accident rate for Part 121 was 2.97 accidents per million flight hours. For scheduled Part 135, it was 22.62 accidents per million flight hours, and for nonscheduled Part 135, it was 27.99 per million flight hours.

Air Carrier Accident Rates by FAR Part, 1989 - 1998

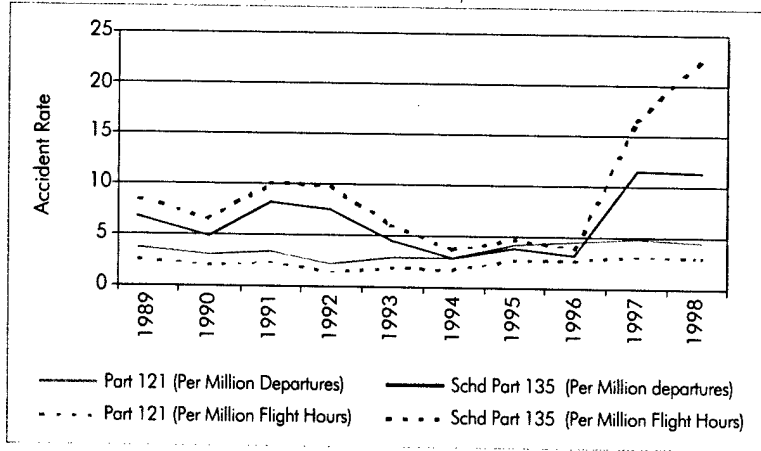


The following graph demonstrates the effects of using different activity measures on the presentation of accident rates. Regardless of whether flight hours or departures are used to calculate accident rates, the same general pattern emerges. Scheduled Part 135 accident rates are higher than Part 121 rates until 1994 when rates for the two groups converge. After 1996, and the reclassification of many scheduled Part 135 operations to Part 121, there is a notable divergence with increases in scheduled Part 135 rates attributable to the

reduction in activity for this group. However, the divergence is more dramatic when using flight hours to calculate the rate. One explanation is that aircraft remaining in Part 135 after the reclassification fly shorter duration trips than those that were reclassified to Part 121.

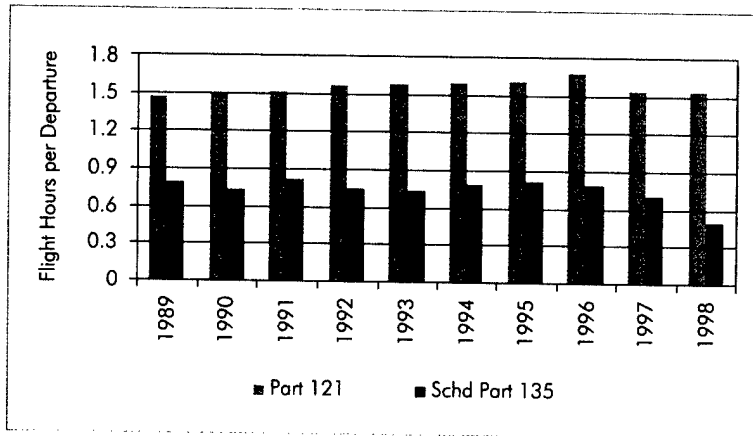
Comparison of Part 121 and Scheduled Part 135 Accident Rates Using Flight Hours and Departures to Calculate Rates.

(Note: Nonscheduled Part 135 Departure Data not Available)



The next graph further clarifies the difference between Part 121 and scheduled Part 135 aircraft in terms of the average number of flight hours per departure.

Flight Hours Per Departure by FAR Part, 1989 -1998



Throughout the Annual Review, rates will be calculated using both flight hours and departures as exposure measures. The benefit of using flight hours as an exposure measure is that it is the only exposure measure available for nonscheduled Part 135 as well as Part 121 and scheduled Part 135 aircraft. However, because Part 121 and Part 135 do not have similar flight hours-per-departure rates, departures are also used to calculate accident rates. Again, the 1998 Annual Review has changed from using a base rate of 100,000 flight hours/departures to using 1,000,000 (one million). Any comparisons with reports from previous years should take this into account.

## PART 121 OPERATIONS: 10-YEAR SUMMARY

### NTSB SEVERITY CLASSIFICATION

Historically, the NTSB has defined a "Fatal Accident" as one in which there was at least one fatality. However, some accidents involving ground crew fatalities pose no threat to the aircraft or its occupants. While the Safety Board has found no single index that perfectly indicates the state of airline safety, it developed a new classification system for Part 121 accidents in response to a congressional mandate issued October 9, 1996.<sup>20</sup> The following definitions were developed to gauge accident severity for Part 121 accidents. Part 135 classifications continue to use the traditional definitions.

### DEFINITIONS OF NTSB SEVERITY CLASSIFICATIONS

**Major**-an accident in which any of three conditions is met:

- ◆ A Part 121 aircraft was destroyed,
- ◆ There were multiple fatalities, or
- ◆ There was one fatality and a Part 121 aircraft was substantially damaged.

**Serious**-an accident in which at least one of two conditions is met:

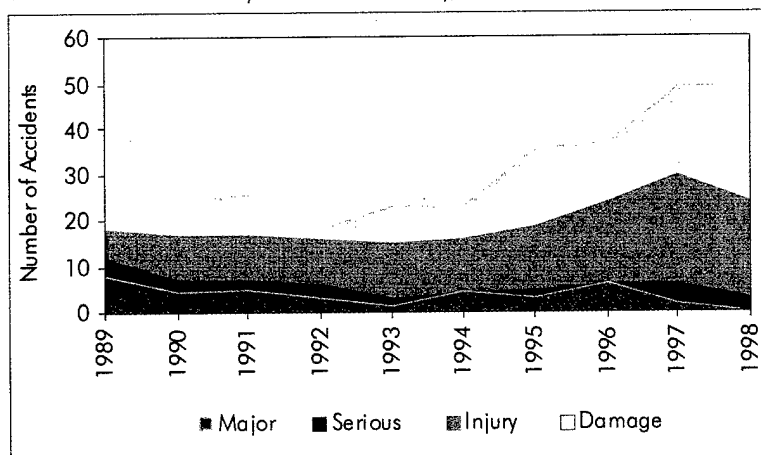
- ◆ There was one fatality without substantial damage to a Part 121 aircraft, or
- ◆ There was at least one serious injury and a Part 121 aircraft was substantially damaged.

**Injury**-a nonfatal accident with at least one serious injury and without substantial damage to a Part 121 aircraft.

**Damage**-an accident in which no person was killed or seriously injured, but in which any aircraft was substantially damaged.

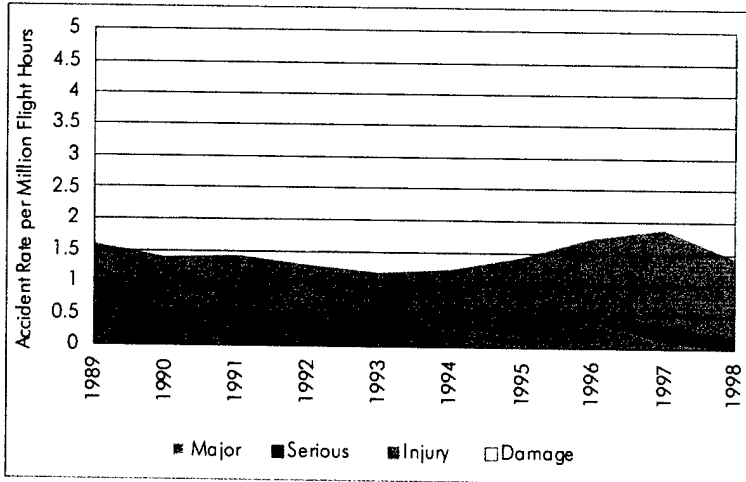
The following graphs depict both the number and rate of Part 121 accidents and the severity of the accidents. In 1998 there were 50 Part 121 accidents and, as in preceding years, major and serious accidents made up the smallest proportion of these accidents.

Part 121 Accidents by Accident Severity, 1989 - 1998

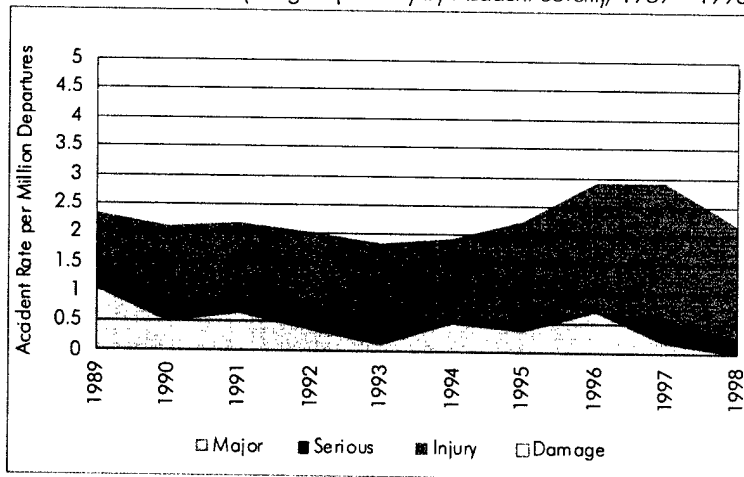


<sup>20</sup> Title 49, Subtitle II, Chapter 11, Subchapter II, Section 1119, "Accident and Safety Data Classification and Publication" was enacted on October 9, 1996, to be applicable to fiscal years beginning after September 30, 1996.

Part 121 Accidents Rate (Using Flight Hours) by Accident Severity, 1989 - 1998

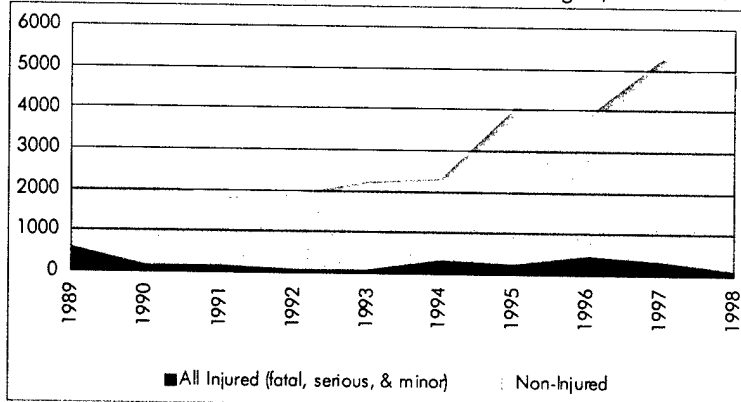


Part 121 Accidents Rate (Using Departures) by Accident Severity, 1989 - 1998

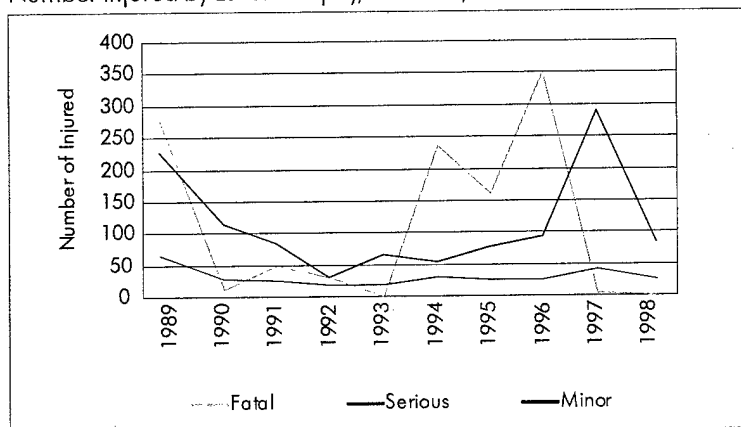


There is a consistent trend over time showing that a very small proportion of people aboard Part 121 flights involved in accidents sustain injuries. In 1998, there were over 652 million passengers enplaned on aircraft flying under Part 121. Of these, 4,552 people boarded Part 121 flights that were involved in accidents and 110 people sustained injuries.

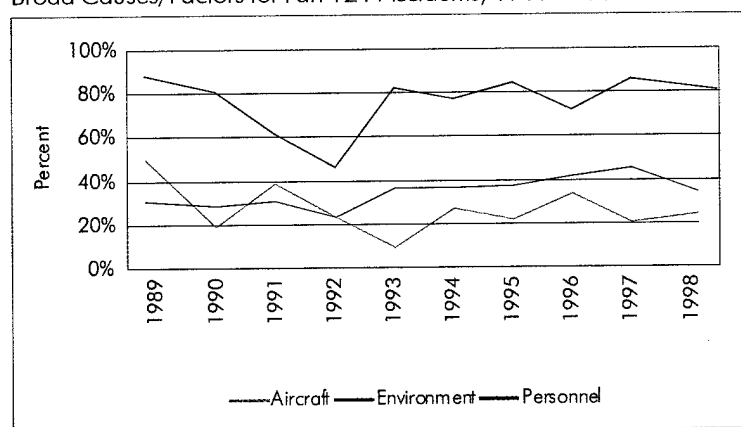
Injured Compared to Non-injured Aboard Part 121 Flights, 1989 - 1998



Number Injured by Level of Injury, Part 121, 1989 - 1998



Broad Causes/Factors for Part 121 Accidents, 1989 - 1998



In 1998, there were no fatalities, 25 serious injuries, and 85 minor injuries among those aboard Part 121 flights involved in accidents. These numbers are relatively low compared to preceding years; however, it is difficult to define a trend in the number of people injured since one or two major accidents can lead to a dramatic increase in the number of injuries in a given year.

#### PROBABLE CAUSES, FACTORS, AND THE BROAD CAUSE/FACTOR CLASSIFICATION

In determining the probable cause(s) of an accident, all facts, conditions, and circumstances are considered. This method

enables the investigator to identify cause-and-effect relationships in the accident sequence about which something can be done to prevent similar accidents. The term "factor" is used to denote elements of an accident that further explain or supplement the probable causes(s). This provides a means for documenting essential items of information that could not be readily categorized elsewhere in the system.

The broad cause/factor classification divides all accident causes and factors into three groups – aircraft, environment, and personnel – to provide an overview of fundamental accident origins. When there are two or more causes/factors for an accident, each is recorded and no attempt is made to identify one as the primary cause. Therefore, as depicted in the following figure, percentages of causes/factors in a given set of accidents will generally sum to more than 100%.

For 1998 Part 121 accidents, cause/factor information was available in 41 of 50 cases. Within this set, aircraft were cited as causes/factors in 24.4% of accidents, environmental causes/factors were present in 34.2% of accidents, and personnel-related causes/factors were present in 80.5% of accidents. This distribution is fairly consistent with the preceding 9-year period with the exception of aircraft-related causes/factors, which have shown a moderate decline.

## SCHEDULED PART 135 OPERATIONS 10-YEAR SUMMARY



Part 135 regulates scheduled commercial air carriers that fly small commuter aircraft, cargo planes, and air taxis. Scheduled Part 135 operations refer to revenue-earning, passenger-carrying operations for which the certificate holder or its representative offers departure/arrival locations and departure times in advance of the flights.

Unlike Part 121, all Part 135 accidents are classified by traditional definitions including highest level of injury (fatal, serious, minor, or none), and level of aircraft damage (destroyed, substantial, minor, or none).

### DEFINITIONS FOR HIGHEST LEVEL OF INJURY

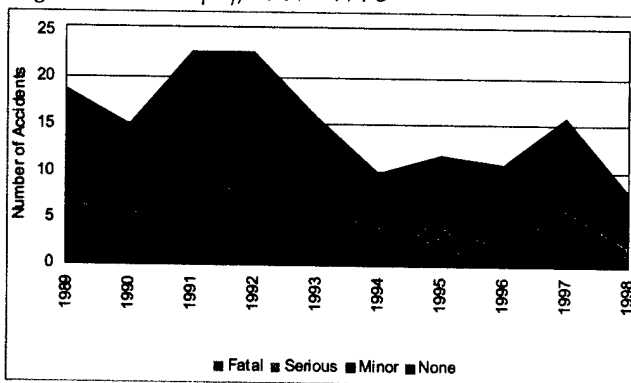
**Fatal**-Any injury that results in death within 30 days of the accident.

**Serious**-Any injury which: (1) requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, muscle, or tendon damage; (4) involves any internal organ; or (5) involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface

**Minor**-Any injury that is neither fatal nor serious.

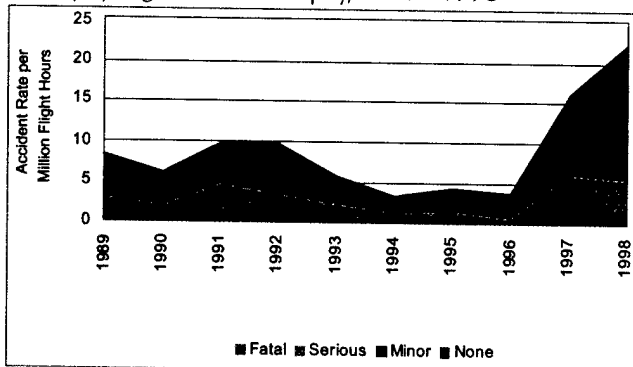
**None**-No injury.

Scheduled Part 135 Accidents by Highest Level of Injury, 1989 - 1998



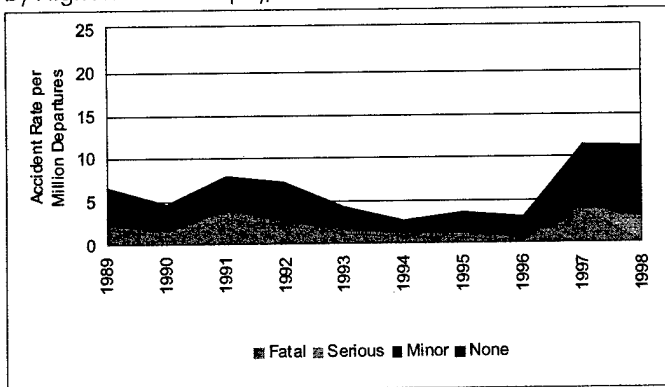
In 1998, there were eight scheduled Part 135 accidents. This is a relatively small number compared to other years; however, this reduction is likely associated with the reclassification of aircraft from Part 135 to Part 121 in 1997.

Scheduled Part 135 Accidents Rates (per million Flight Hours) by Highest Level of Injury, 1989 - 1998



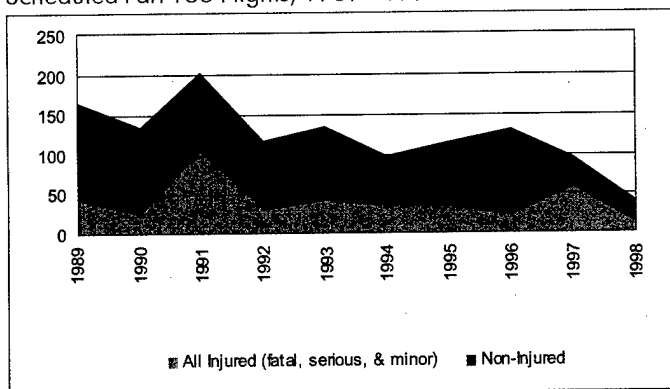
While the number of scheduled Part 135 accidents declined following the 1997 aircraft reclassification, the accident rate showed a marked increase. This is likely attributable to the sharp decrease in activity among scheduled Part 135 operators as a result of the reclassification. There was an 87.2% decrease in flight hours and a 79.9% decrease in departures for scheduled Part 135 operations between 1996 and 1998. It also suggests that those aircraft that were reclassified to Part 121 in 1997 comprised a relatively safe segment of the former Part 135 group.

Scheduled Part 135 Accidents Rates (per Departures) by Highest Level of Injury, 1989 - 1998



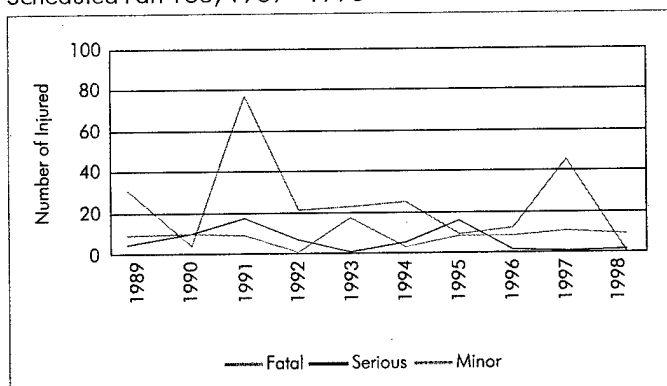
In 1998, 42 people boarded scheduled Part 135 flights that were involved in accidents and from this group, 11 people received injuries. The relative proportion of people who were injured in scheduled Part 135 accidents is notably higher than in Part 121 accidents.

Injured Compared to Non-injured Aboard Scheduled Part 135 Flights, 1989 - 1998



In 1998, there were no fatal injuries that resulted from scheduled Part 135 accidents. However, there were two serious injuries and nine minor injuries.

Number of Injured by Level of Injury Scheduled Part 135, 1989 - 1998



As noted earlier, Part 135 accidents are also classified by the level of damage (destroyed, substantial, minor, or none) sustained by the aircraft.

**DEFINITIONS FOR LEVEL OF AIRCRAFT DAMAGE**

**Destroyed**-Damage due to impact, fire, or in-flight failures to the extent to not be economically repairable.

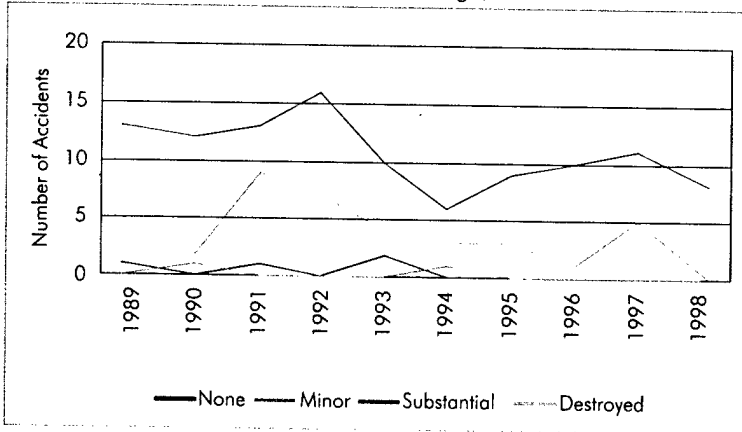
**Substantial Damage**-Damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent fairings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered "substantial damage" for the purpose of this part.<sup>21</sup>

**Minor Damage**-Any damage that neither destroys the aircraft nor causes substantial damage.

**None**-No damage.

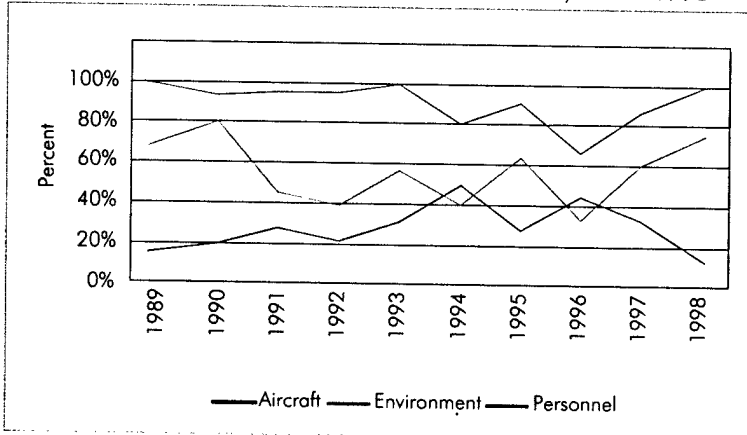
All eight of the aircraft involved in scheduled Part 135 accidents in 1998 were classified as having substantial damage. The following graph also shows that, over the past 10-year period, most scheduled Part 135 aircraft that were involved in accidents received either substantial damage or were destroyed.

Scheduled Part 135 Level of Aircraft Damage, 1989 - 1998



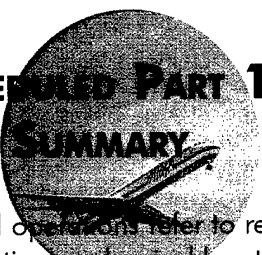
In 1998, 12.5% of all scheduled Part 135 accidents listed aircraft as a cause or factor in the accident. Environmental causes/factors were present in 75.0% of accidents and personnel-related causes/factors were present in 100% of accidents.

Broad Cause/Factors for Scheduled Part 135 Accidents, 1989 - 1998



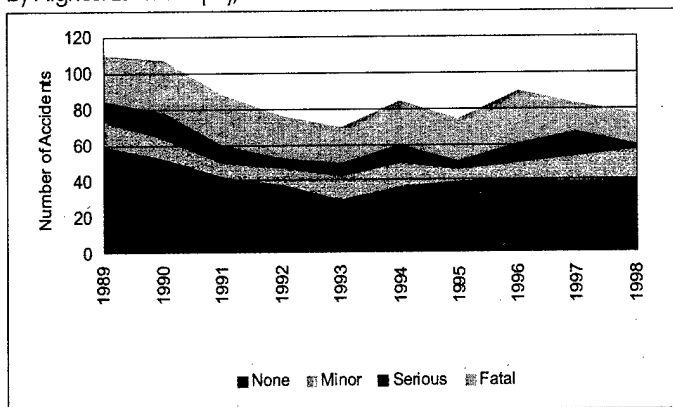
<sup>21</sup> 49 CFR 830.2.

# NONSCHEDULED PART 135 OPERATIONS 10-YEAR SUMMARY

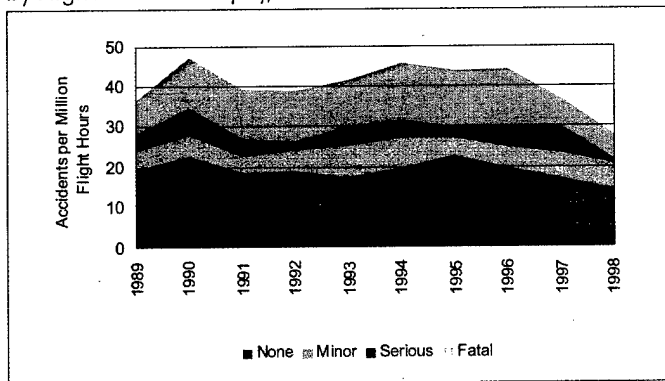


Nonscheduled operations refer to revenue-earning flights in which the departure time, departure location, and arrival location are specifically negotiated with the customer or the customer's representative. They include all cargo flights and some passenger flights. The definitions for highest level of injury and level of aircraft damage for nonscheduled Part 135 operations are identical to those for scheduled Part 135 operations.

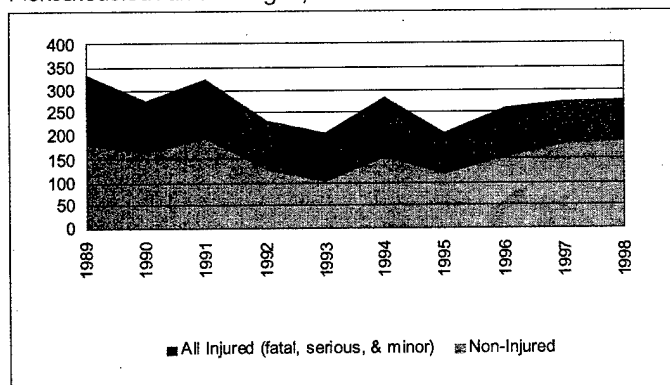
Nonscheduled Part 135 Accidents by Highest Level of Injury, 1989 - 1998



Nonscheduled Part 135 Accident Rates by Highest Level of Injury, 1989 - 1998



Injured Compared to Non-injured Aboard Nonscheduled Part 135 Flights, 1989-1998

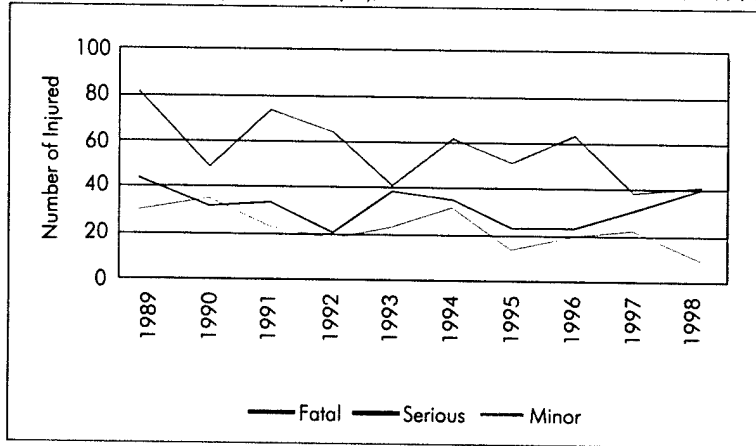


There were 77 nonscheduled Part 135 accidents in 1998. Over the past 10 years, both the number of accidents and the accident rates for nonscheduled Part 135 accidents have declined. Like scheduled Part 135 activity levels, nonscheduled Part 135 activity levels decreased, with a 26.2% reduction in flight hours between 1996 and 1998. However, because nonscheduled Part 135 operators are not required to report revenue activity to the FAA like other commercial operations, the activity data and rates presented for this segment of aviation are not as reliable (for a more detailed discussion of this issue, see Aircraft Activity on page 7).

In 1998, 278 people who boarded nonscheduled Part 135 flights were involved in accidents and, of these, 90 sustained injuries. As with scheduled Part 135 accidents, the relative proportion of people who are injured in nonscheduled Part 135 accidents is higher than in Part 121 accidents.

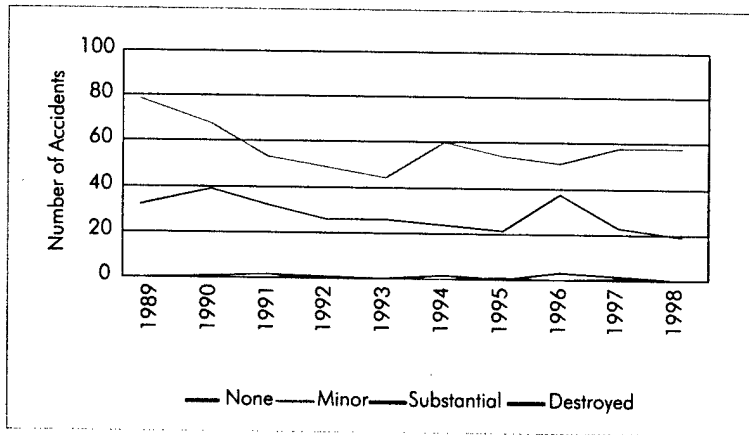
In 1998, 41 people were fatally injured as the result of nonscheduled Part 135 aircraft accidents. In addition, 9 people sustained serious injuries and 40 people received minor injuries. With the exception of minor injuries, these numbers are lower than preceding years.

Number of Injured by Level of Injury, Nonscheduled Part 135 1989 -1998



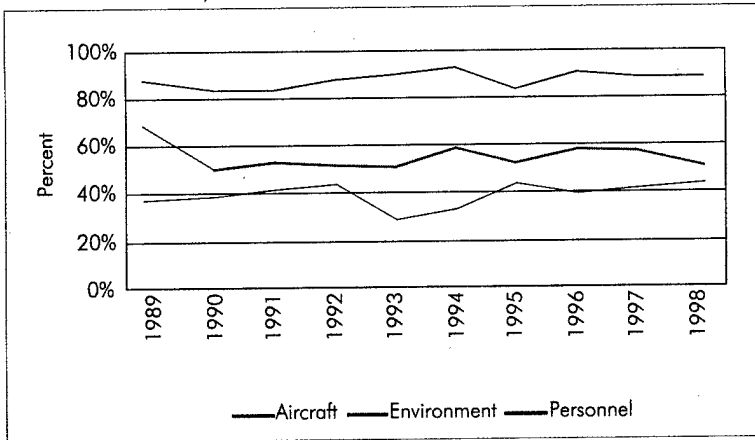
Of the 77 aircraft involved in nonscheduled Part 135 accidents in 1998, 19 were destroyed and 58 were classified as having substantial damage. Similar to scheduled Part 135 aircraft, the following graph shows that, over the past 10-year period, most nonscheduled Part 135 aircraft that were involved in accidents received either substantial damage or were destroyed.

Nonscheduled Part 135 Level of Aircraft Damage, 1989 - 1998



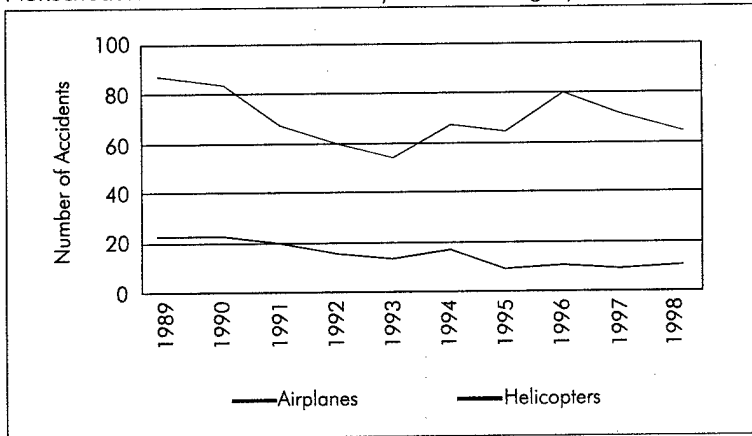
In 1998, cause/factor information was available for 71 of 77 accidents. In 43.7% of these cases, aircraft were listed as causes/factors in the accident. Environmental causes/factors were present in 50.7% of accidents and personnel-related causes/factors were present in 88.7% of accidents.

Broad Causes/Factors for Nonscheduled Part 135 Accidents, 1989-1998



Of the 77 nonscheduled Part 135 accidents that occurred in 1998, 66 involved airplanes and 11 involved helicopters. This ratio of helicopter to airplane accidents has been fairly stable over the past several years.

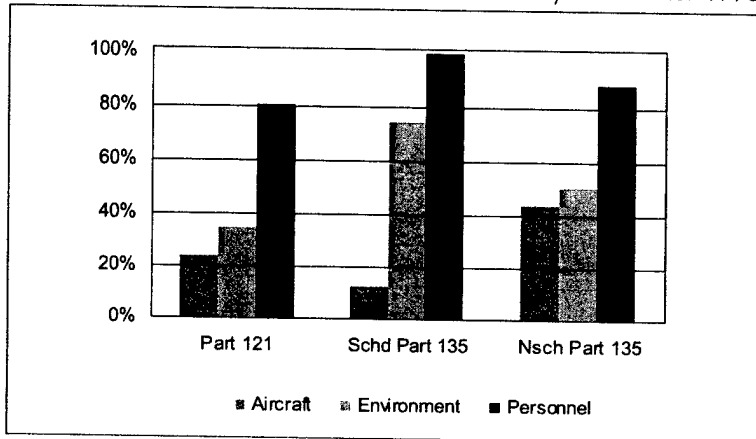
Nonscheduled Part 135 Accidents by Aircraft Category, 1989-1998



# Focus on 1998

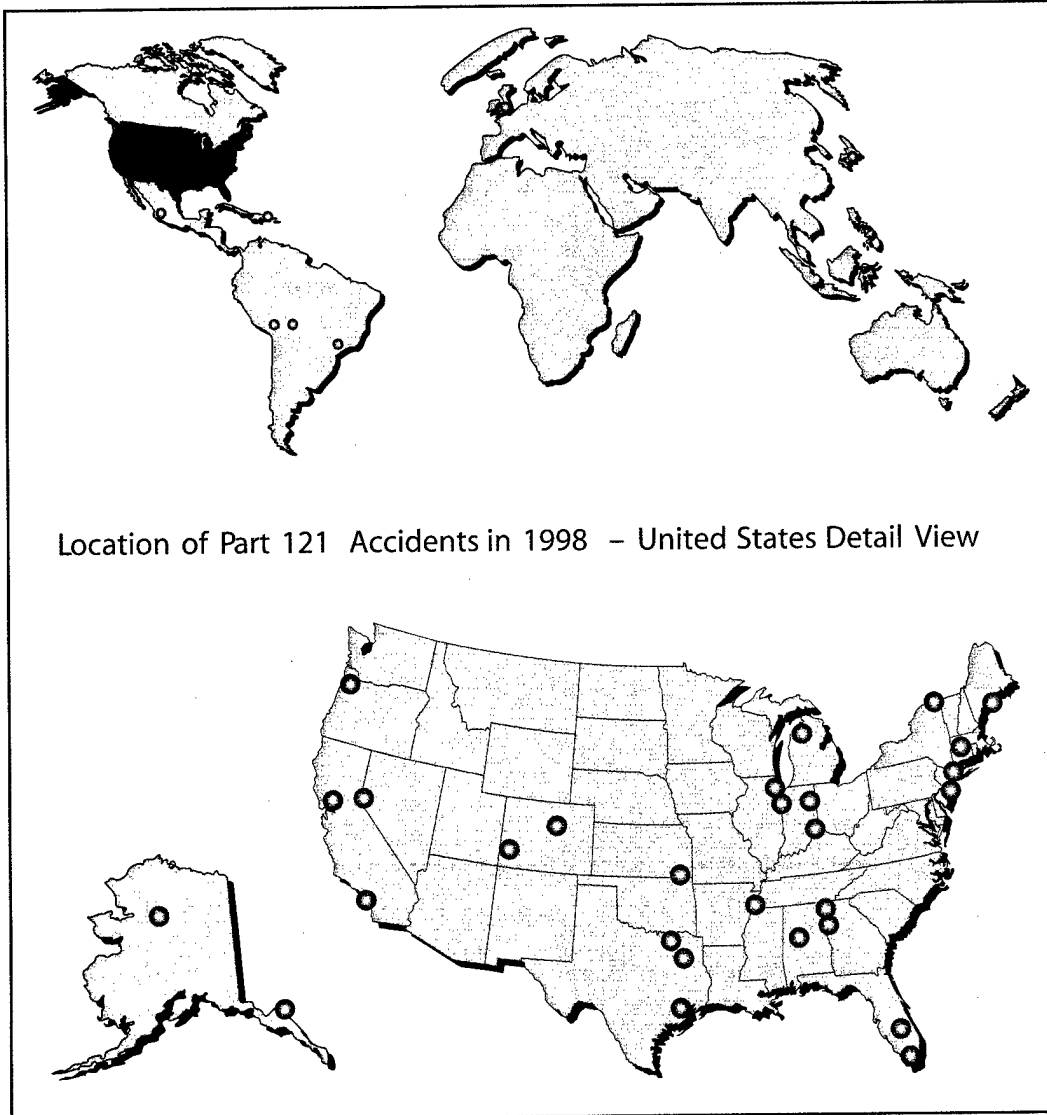
While the previous section described trends in accidents among U.S. air carriers over a 10-year period, this section focuses on events specific to 1998. As an overview, the following graph provides a comparison of the role that personnel, environment, and aircraft played in all air carrier accidents that occurred in 1998. Most notable is the fact that personnel were cited as a cause or factor in the largest percent of accidents for all categories of commercial operations described in this report. Environment accounted for the second largest contribution, and aircraft-related problems contributed the least. While the graph suggests that aircraft-related problems were especially low among scheduled Part 135 accidents, it is important to note that this group comprises only eight accidents, which limits the representativeness of the sample.

Contribution of Broad Cause/Factors to Accidents by FAR Part for 1998



## 1998 PART 121 ACCIDENTS

As discussed in the Introduction, Part 121 applies to major airlines and cargo carriers that fly large transport-category aircraft. Of the 50 Part 121 accidents in 1998, 43 occurred in the United States, 6 in foreign countries, and 1 over the Atlantic Ocean.



Within the group of 50 Part 121 accidents in 1998, 64.0% were passenger flights, 20.0% carried both passengers and cargo, and 16.0% were cargo-only. In addition, 14.0% of Part 121 accidents occurred during nonscheduled flights while 86.0% occurred during scheduled operations. This is particularly notable since nonscheduled flights accounted for only 5.3% of total Part 121 flight hours and just 4.0% of Part 121 departures. However, with such a small sample size, it is difficult to make inferences based on these data.

The majority of 1998 Part 121 accident aircraft had turbofan engines (58.0%). Turboprop engines were used in 24.0% of accident aircraft, turbojet in 16.0%, and reciprocating in 2.0%.

Part 121 Accident Severity Classifications by Type of Operation for 1998

	Nonscheduled		Scheduled			Total
	Cargo	Passenger	Cargo	Passenger	Passenger and Cargo	
Major	0	0	0	0	0	0
Serious	0	0	0	3	0	3
Injury	1	1	0	15	4	21
Damage	5	0	2	13	6	26
Total	6	1	2	31	10	50

Part 121 Accidents, Engine Type by Highest Injury for 1998

Category	Turbofan	Turbojet	Turboprop	Reciprocating	Total
Major	0	0	0	0	0
Serious	2	0	1	0	3
Injury	15	3	3	0	21
Damage	12	5	8	1	26
Total	29	8	12	1	50

Occurrences are documented within an accident's "sequence of events." The concept of sequence of events as a method to classify accidents was introduced in 1982 to describe the circumstances of an accident. There are a total of 52 occurrence codes that may be used to outline the events in any given accident. The following table displays the first occurrences for all of the 1998 Part 121 accidents for which sequence of events data were available. The most frequently cited first occurrences for Part 121 accidents in 1998 were on ground/water collisions with object (31.7%), in-flight encounter with weather (19.5%), and uncontrolled altitude deviations (9.8%).

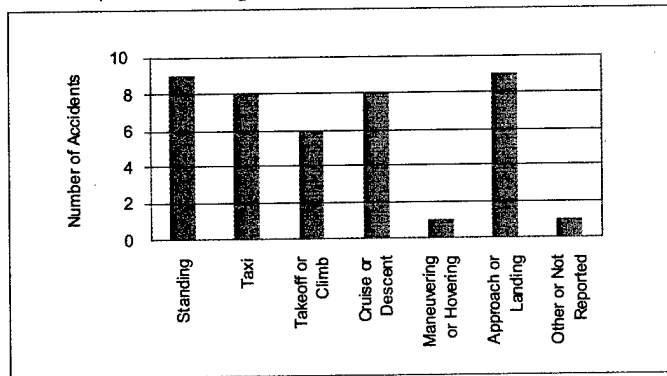
Part 121 Accident First Occurrences for 1998

First Occurrence	Number of Accidents	Percentage
On Ground/Water Collision With Object	13	31.7%
In Flight Encounter With Weather	8	19.5%
Altitude Deviation, Uncontrolled	4	9.8%
Airframe/Component/System Failure/Malfunction	3	7.3%
Fire	3	7.3%
Dragged Wing, Rotor, Pod, Float Or Tail/Skid	2	4.9%
Miscellaneous/Other	2	4.9%
Abrupt Maneuver	1	2.4%
Loss Of Control - On Ground/Water	1	2.4%
Loss Of Engine Power	1	2.4%
Loss Of Engine Power (Partial) - Mech Failure/Malf	1	2.4%
On Ground/Water Encounter With Terrain/Water	1	2.4%
Vortex Turbulence Encountered	1	2.4%
Total	41*	100.0%

\* 41 of 50 of Part 121 Accidents included Sequence of Events Data

The following graph displays the aircraft's phase of flight during the first occurrence. There are 50 distinct phase-of-flight codes that investigators may use to describe the chronology of occurrences. However, these detailed phases have been condensed for this graph. For example, the category "Standing" includes standing with engines operating, standing with engines not operating, and standing while starting engines. For the 41 of 50 Part 121 accidents with sequence of events information, the phase of flight during first occurrence was fairly evenly distributed with the exception of Maneuvering or Hovering, which is not a typical activity for aircraft that operate under Part 121.

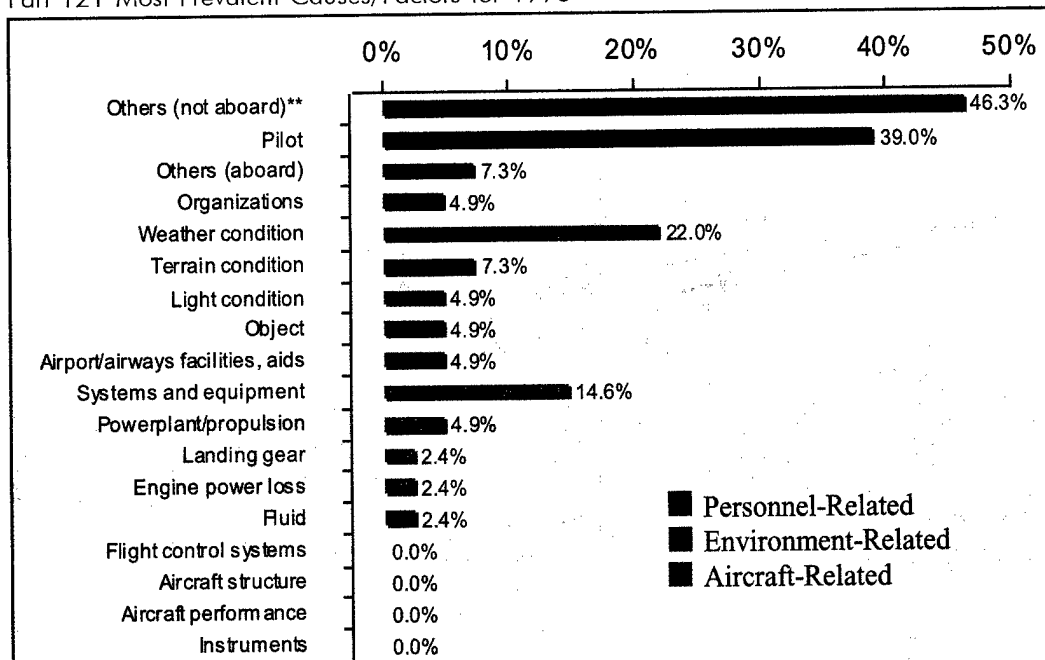
Part 121, Phase of Flight During First Occurrences for 1998



The following graph displays the causes and factors of 1998 Part 121 accidents with sequence of events information available. While there are about 2,000 unique codes that investigators may use to document causes/factors, this graph summarizes them using both the Broad Causes/Factors (Personnel, Environment, and Aircraft) as well as the next level of subcategory.

This graph shows that many accidents are attributed to personnel-related causes and factors. With 39.0%, the pilot is the most frequently cited individual in the personnel category; however, 43.3% of accidents were attributed to other people not aboard the aircraft, such as ground personnel, manufacturer personnel, and

Part 121 Most Prevalent Causes/Factors for 1998\*



\*41 of 50 of Part 121 Accidents included Cause/Factor Data

\*\* Others (not aboard) refers to 33 different parties including air traffic control personnel, manufacturers, ground personnel and Federal Aviation Administration personnel

several others. In the broad category of environmental factors, weather conditions were cited most (22.0%) with no other category exceeding 10%. Similarly, in the broad category of aircraft, systems and equipment causes/factors were present in 14.0% of Part 121 accidents in 1998 with no other category accounting for more than 5% of accidents.

Among the 50 Part 121 accidents that occurred in 1998, only 1 accident resulted in a fatality: A ground crewmember inadvertently walked into a rotating propeller. In addition to this fatality, there were 30 serious injuries and 90 minor injuries that resulted from Part 121 accidents in 1998. Cabin crewmembers suffered the highest percentage of injury with 14.7% of all cabin crewmembers involved in accidents sustaining some level of injury. Of the 4,258 passengers involved in accidents, only 2.0% received injuries. The Safety Board does not document people on the ground who were at the accident site but received no injuries.

Part 121 Accident Injuries by Role for 1998

	Fatal	Serious	Minor	None	TOTAL
Flight Crew	0	0	0	113	113
Cabin Crew	0	13	12	145	170
Other Crew	0	0	0	11	11
Passengers	0	12	73	4173	4258
Total Aboard	0	25	85	4442	4552
On Ground	1	5	5	—	11
Total	1	30	90	4442	4563
Accidents	1	23	7	19	50

### 1998 PART 135 ACCIDENTS

As noted in the Introduction, Part 135 applies to small commercial air carriers (i.e., scheduled Part 135) and air taxis (i.e., nonscheduled Part 135). The presentation of data for scheduled and non-scheduled Part 135 operations is separated due to the distinct operating characteristics of these groups.

Scheduled Part 135 operations consist of common carriage passenger-revenue flights using aircraft with fewer than 10 seats. In addition, to be considered a scheduled operation, the departure location, departure time, and arrival location must be offered in advance by the operator, and the operator must include five or more round trips per week between two or more points.

Nonscheduled operations are passenger-carrying operations in which the departure time, departure location, and arrival location are specifically negotiated with the customer. These include common carriage operations conducted with airplanes having a passenger-seat configuration of 30 seats or fewer and a payload capacity of 7,500 pounds or less; private carriage operations conducted with airplanes having a passenger-seat configuration of less than 20 seats and a payload capacity of less than 6,000 pounds; and cargo operations conducted with airplanes having a payload capacity of 7,500 pounds or less.

Of the 85 Part 135 accidents in 1998, 77 were flying nonscheduled operations and 8 were flying scheduled operations. Among the accidents that occurred flying under

nonscheduled operations, 61.0% were passenger flights, 2.6% carried both passengers and cargo, and 36.4% carried either cargo or mail. Among the scheduled Part 135 accidents, seven out of eight (87.5%) were passenger flights, and one (12.5%) carried passengers and cargo. In both nonscheduled and scheduled Part 135 accidents, few accidents were fatal or serious with 11.6% of nonscheduled accidents and 12.5% of scheduled accidents falling into one of these two categories.

Part 135 Accident Classifications by Type of Operation for 1998

	Nonscheduled			Scheduled			Total
	Cargo	Mail	Passenger and Cargo	Passenger	Passenger and Cargo	Passenger	
Fatal	9	1	0	7	0	0	17
Serious	1	0	0	2	1	1	5
Minor	4	1	1	10	0	1	17
None	11	1	1	28	0	5	46
<b>Total</b>	<b>25</b>	<b>3</b>	<b>2</b>	<b>47</b>	<b>1</b>	<b>7</b>	<b>85</b>

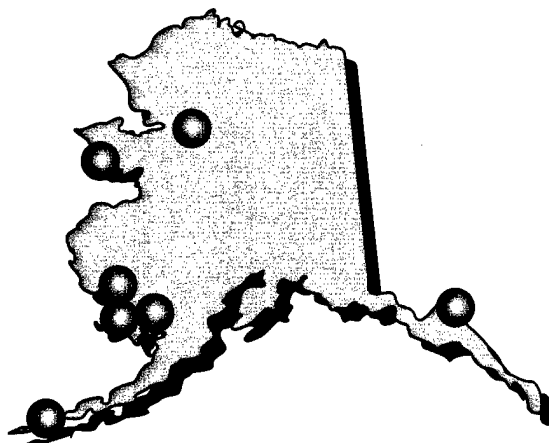
There are two main types of flight plans that are filed: visual flight rules (VFR) and instrument flight rules (IFR). VFR govern the conduct of flight under visual meteorological conditions (VMC), and IFR govern the conduct of flight under instrument meteorological conditions (IMC). In 1998, the flight plans of 59.7% of non-scheduled Part 135 accidents were under VFR and 32.5% were under IFR. In 7.8% of cases, the flight plan was unknown or there was no flight plan. For scheduled Part 135, all accidents that occurred in 1998 happened under VFR.

Part 135-Accidents by Scheduled Type and Flight Plan for 1998

	Nonscheduled	Scheduled	Total
Visual Flight Rules (VFR)	46	8	14
Instrument Flight Rules (IFR)	25	0	25
None	4	0	4
Unknown	2	0	2
<b>Total</b>	<b>77</b>	<b>8</b>	<b>85</b>

### 1998 SCHEDULED PART 135 ACCIDENTS

There were eight scheduled Part 135 accidents in 1998. All of these accidents occurred in Alaska where more than half of all scheduled Part 135 operators are certified.



Seven of eight scheduled Part 135 accidents involved airplanes with reciprocating engines, and one accident involved an airplane with a turboprop engine.

Scheduled Part 135 Accidents – Engine Type by Highest Injury for 1998

	Reciprocating	Turbo Prop	Total
Fatal	0	0	0
Serious	1	1	2
Minor	1	0	1
None	5	0	5
Total	7	1	8

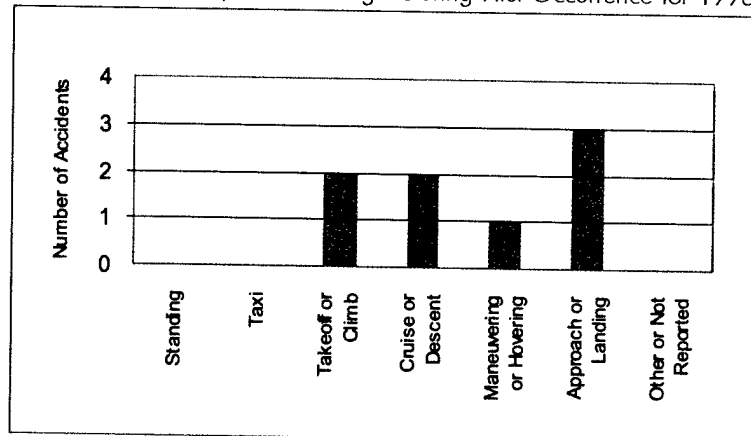
Although there were only eight scheduled Part 135 accidents in 1998, the first occurrence for three of these accidents was an in-flight collision with terrain or water.

First Occurrences for Scheduled Part 135 Accidents in 1998

First Occurrence	Number of Accidents	Percent of Accidents
In Flight Collision With Terrain/Water	3	37.5%
Airframe/Component/System Failure/Malfunction	1	12.5%
In Flight Collision With Object	1	12.5%
On Ground/Water Encounter With Terrain/Water	1	12.5%
Undershoot	1	12.5%
Wheels Up Landing	1	12.5%
<b>Total</b>	<b>8</b>	<b>100.0%</b>

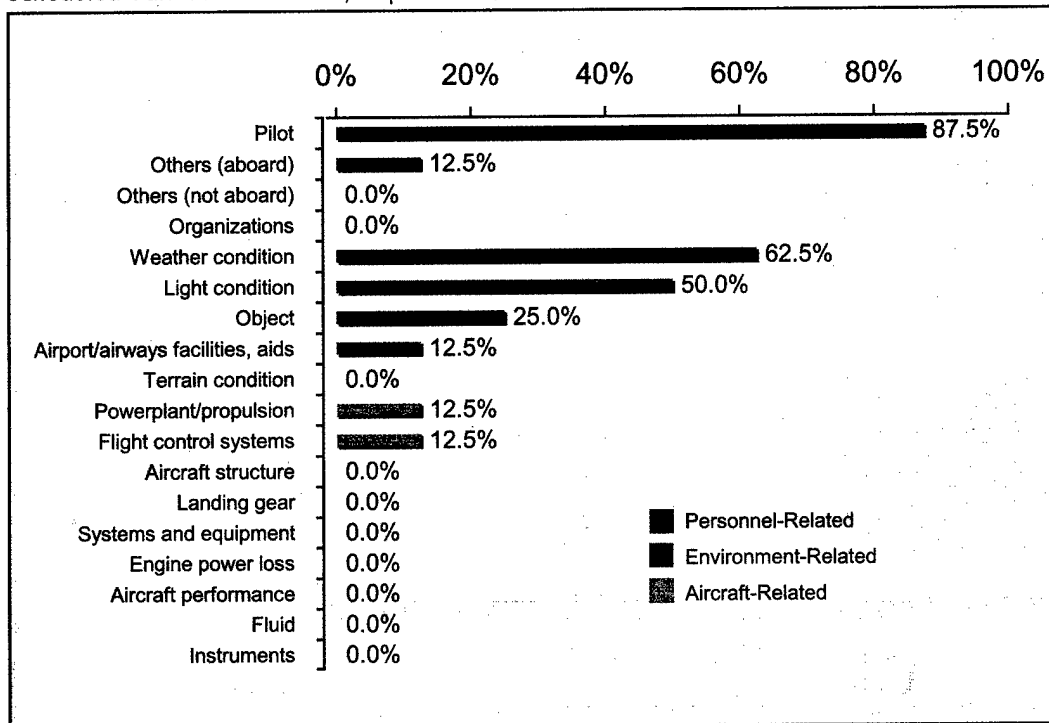
Of the eight scheduled Part 135 accidents that occurred in 1998, the phase of flight during the first accident occurrence was takeoff or climb in two cases, cruise or descent in two cases, maneuvering or hovering in one case, and approach or landing in three cases.

Scheduled Part 135, Phase of Flight During First Occurrence for 1998



As with Part 121, the pilot was identified as a cause/factor in a majority of scheduled Part 135 accidents (87.5%). In the broad category of environmental factors, weather conditions were cited in five of eight accidents (62.5%) and light conditions were cited in four of eight accidents (50.0%). Aircraft-related factors were cited in two accidents.

Scheduled Part 135 Accidents, Top Causes/Factors for 1998



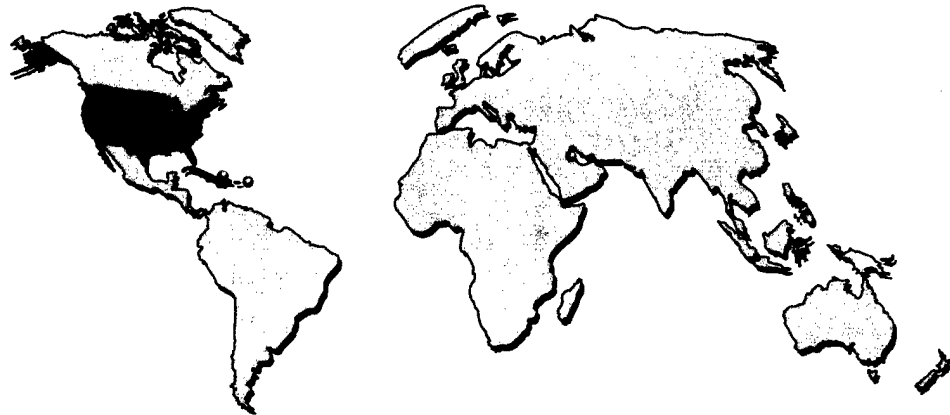
There were no fatalities that resulted from scheduled Part 135 accidents in 1998. However, there were 2 serious injuries and 9 minor injuries. The proportion of people injured in flights was approximately equal for crewmembers and passengers with 25.0% and 26.5%, respectively.

Scheduled Part 135 Injuries by Role for 1998

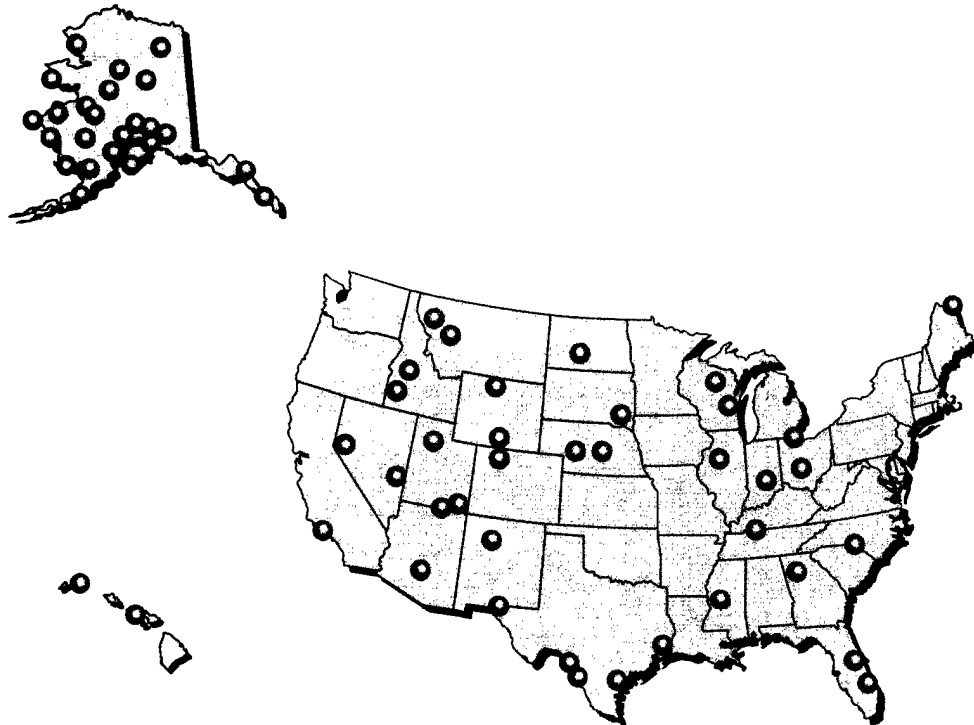
	Fatal	Serious	Minor	None	Total
Flight Crew	0	0	2	6	8
Cabin Crew	0	0	0	0	0
Other Crew	0	0	0	0	0
Passengers	0	2	7	25	34
Total Aboard	0	2	9	31	42
On Ground	0	0	0	-	0
Total	0	2	9	31	42
Accidents	0	2	1	5	8

### 1998 NONSCHEDULED PART 135 ACCIDENTS

There were 77 nonscheduled Part 135 accidents in 1998 with 73 occurring in the United States. Within this group, 31, or 42.5% occurred in Alaska with the remainder distributed among the lower 49 states.



Nonscheduled Part 135 Accidents – Detail View



The majority of 1998 nonscheduled Part 135 accident aircraft had reciprocating engines (66.2%). Turboprop and turboshaft engines were used in 14.3%, and 13.0% of accident aircraft respectively whereas turbofan and turbojet engines each accounted for less than 5% of the total.

Nonscheduled Part 135 Accidents, Engine Type  
by Highest Injury for 1998

Highest Injury	Reciprocating	Turboprop	Turboshaft	Turbofan	Turbojet	Total
Fatal	11	2	4	0	0	17
Serious	2	0	0	1	0	3
Minor	12	2	2	0	0	16
None	26	7	4	2	2	41
<b>Total</b>	<b>51</b>	<b>11</b>	<b>10</b>	<b>3</b>	<b>2</b>	<b>77</b>

Of the 77 nonscheduled Part 135 accidents that occurred in 1998, 66 involved airplanes and 11 involved helicopters. Of the 66 aircraft accidents, only 59 had cause/factor information available. Within this set, nonmechanical losses of engine power and in-flight encounters with weather were the most frequently cited first occurrences. In addition, other engine power losses accounted for 9 other accidents in this group. For helicopter accidents, the most frequently cited first occurrence was in-flight encounters with weather. For a more detailed itemization of first occurrences, see the following table.

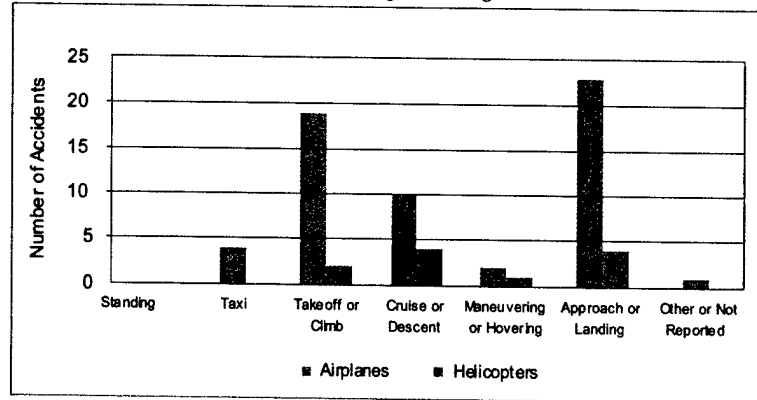
First Occurrences for Nonscheduled Part 135 Accidents in 1998

First Occurrence	Airplane	Helicopter
Loss Of Engine Power (Total) - Nonmechanical	8	
In Flight Encounter With Weather	6	3
Hard Landing	4	
In Flight Collision With Terrain/Water	4	
Loss Of Control - On Ground/Water	4	
Wheels Up Landing	4	
Loss Of Control - In Flight	3	1
Loss Of Engine Power	3	1
Loss Of Engine Power (Partial) - Mech Failure/Malf	3	1
Loss Of Engine Power (Total) - Mech Failure/Malf	3	2
On Ground/Water Collision With Object	3	
Airframe/Component/System Failure/Malfunction	2	1
Main Gear Collapsed	2	
Overrun	2	
Gear Collapsed	1	
In Flight Collision With Object	1	1
Loss Of Engine Power (Partial) - Nonmechanical	1	
Midair Collision	1	1
Miscellaneous/Other	1	
On Ground/Water Encounter With Terrain/Water	1	
On Ground/Water Encounter With Weather	1	
Vortex Turbulence Encountered	1	
<b>Total</b>	<b>59</b>	<b>11</b>

\* 70 of 77 nonscheduled Part 135 accidents included cause/factor data.

Of the 59 nonscheduled Part 135 airplane accidents with sequence of event data, the majority of first occurrences happened during approach/landing (39.0%) or during takeoff/climb (32.2%) with a smaller number (16.9%) during cruise/descent. For the 11 helicopter accidents, there were four each during cruise/descent and approach/landing, two during takeoff/climb, and one during maneuvering/hovering.

Nonscheduled Part 135 Phase of Flight During First Occurrence for 1998



For both nonscheduled Part 135 airplane and helicopter accidents, the pilot was the most frequently cited cause/factor. For airplanes, the next most frequently cited causes/factors were environmental factors including weather conditions and terrain conditions. However, for helicopter accidents, power plant/propulsion issues were the second most frequently cited cause/factor. In addition, for both airplanes and helicopters, several other causes/factors were cited in 1998 including other personnel not aboard, aircraft structure, and light conditions.

## Nonscheduled Part 135 Accidents, Top Causes/Factors for 1998\*

	Airplanes	Helicopters
<b>Personnel</b>		
Pilot	79.7%	90.9%
Others (not aboard)	16.9%	27.3%
Others (aboard)	0.0%	0.0%
Organizations	0.0%	9.1%
<b>Aircraft</b>		
Power plant/propulsion	16.9%	36.4%
Landing gear	11.9%	0.0%
Fluid	11.9%	9.1%
Aircraft structure	5.1%	9.1%
Flight control systems	3.4%	0.0%
Systems and equipment	1.7%	0.0%
Aircraft performance	1.7%	0.0%
Instruments	1.7%	0.0%
Engine power loss	0.0%	0.0%
<b>Environment</b>		
Weather condition	30.5%	27.3%
Terrain condition	25.4%	9.1%
Object	6.8%	18.2%
Airport/airways facilities, aids	5.1%	0.0%
Light condition	1.7%	18.2%

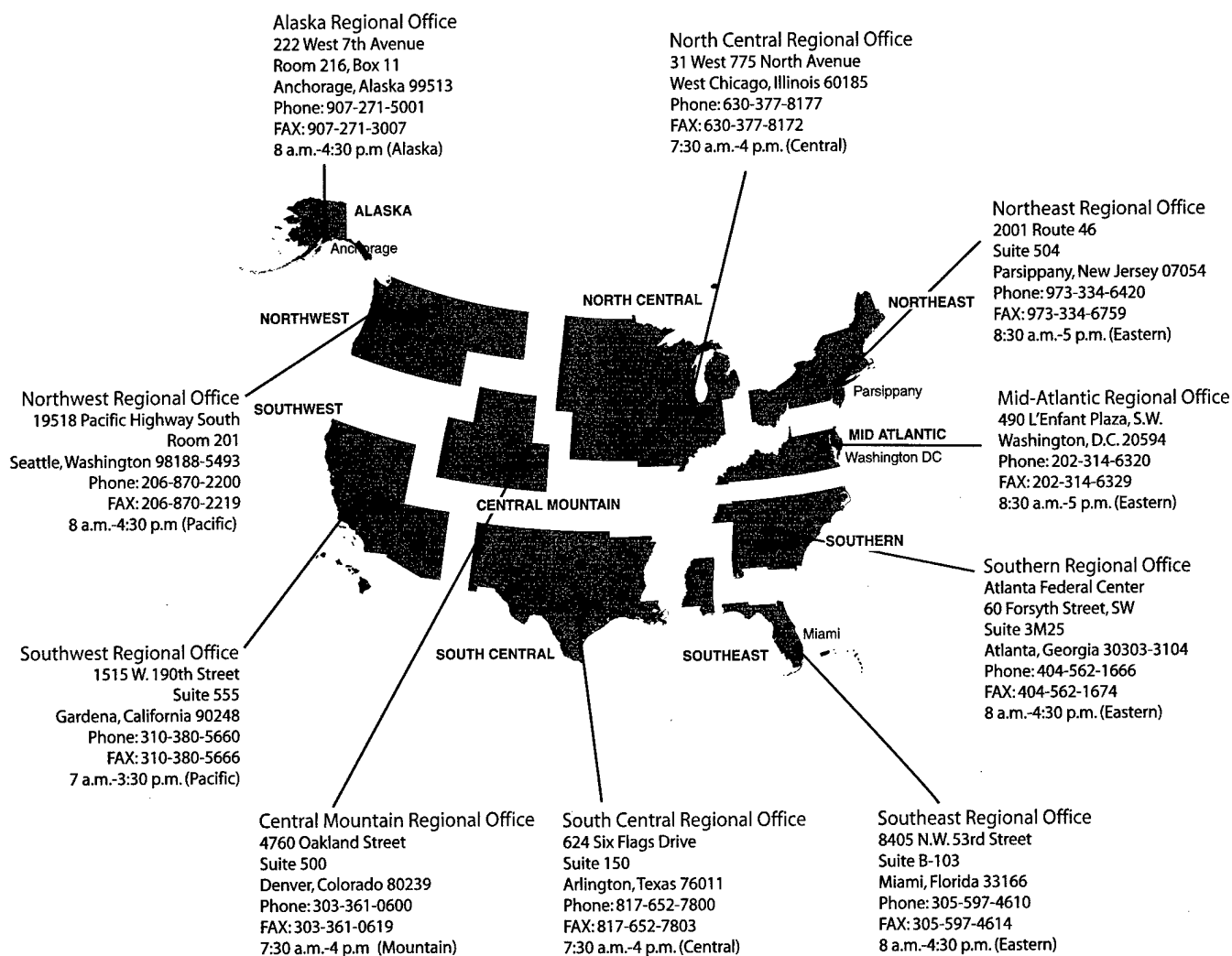
\* 59 airplane accidents and 11 helicopter accidents included cause/factor data

Among the 77 nonscheduled Part 135 accidents that occurred in 1998, 17 accidents resulted in 42 fatalities. In addition to these fatalities, there were 10 serious injuries and 40 minor injuries. Flight crewmembers suffered the highest percentage of injury with 50.6% of all flight crewmembers involved in accidents sustaining some level of injury. Of the 184 passengers involved in accidents, 29.3% received injuries.


## Injuries by Role for Nonscheduled Part 135 Accidents in 1998

	Fatal	Serious	Minor	None	Total
Flight Crew	14	2	18	53	87
Other Crew	0	0	2	5	7
Passengers	27	7	20	130	184
Total Aboard	41	9	40	188	278
On Ground	1	1	0	-	2
Total	42	10	40	188	280
Accidents	17	3	16	41	77

## NTSB REGIONAL OFFICES FOR AVIATION ACCIDENT INVESTIGATION



# NTSB FORMS

 <p>National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION</p>	NTSB ID:	Aircraft Registration Number:
	Occurrence Date:	Most Critical Injury:
	Occurrence Type:	Investigated By:

<b>Location/Time</b>					
Nearest City/Place	State	Zip Code	Local Time	Time Zone	
Airport Proximity:	Distance From Landing Facility:		Direction From Airport:		

<b>Aircraft Information Summary</b>		
Aircraft Manufacturer	Model/Series	Type of Aircraft

<b>Sightseeing Flight:</b>	<b>Air Medical Transport Flight:</b>
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<p><b>Narrative</b></p> <p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>There is no narrative file for this case.</p>
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BEST AVAILABLE COPY

National Transportation Safety Board

**FACTUAL REPORT  
AVIATION**

NTSB ID:

Occurrence Date:

Occurrence Type:

NOT FOR RELEASE

**Landing Facility/Approach Information**

Airport Name	Airport ID:	Airport Elevation Ft. MSL	Runway Used	Runway Length	Runway Width
--------------	-------------	------------------------------	-------------	---------------	--------------

Runway Surface Type:

Runway Surface Condition:

Type Instrument Approach:

IFR Approach/Landing:

**Aircraft Information**

Aircraft Manufacturer	Model/Series	Serial Number
-----------------------	--------------	---------------

Airworthiness Certificate(s):

Landing Gear Type:

Homebuilt Aircraft <input type="checkbox"/>	Number of Seats:	Certified Max Gross Wt. LBS	Number of Engines:
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:

**Aircraft Inspection Information**

Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection Hours	Airframe Total Time Hours
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**Emergency Locator Transmitter (ELT) Information**

ELT Installed <input type="checkbox"/>	ELT Operated <input type="checkbox"/>	ELT Aided in Locating Accident Site <input type="checkbox"/>
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**Owner/Operator Information**

Registered Aircraft Owner	Street Address		
	City	State	Zip Code
Operator of Aircraft	Street Address		
	City	State	Zip Code

Operator Does Business As: \_\_\_\_\_ Operator Designator Code: \_\_\_\_\_

**Type of U.S. Certificate(s) Held:**

Air Carrier Operating Certificate(s):

Operating Certificate: \_\_\_\_\_ Operator Certificate: \_\_\_\_\_

Regulation Flight Conducted Under:

Type of Flight Operation Conducted: ; ;

National Transportation Safety Board  
**FACTUAL REPORT**  
**AVIATION**

NTSB ID:

Occurrence Date:

Occurrence Type:

NOT FOR RELEASE

**First Pilot Information**

Name	City	State	Date of Birth	Age
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Sex:	Seat Occupied:	Principal Profession:	Certificate Number:
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Certificate(s):

Airplane Rating(s):

Rotorcraft/Glider/LTA:

Instrument Rating(s):

Instructor Rating(s):

Type Rating/Endorsement for Accident/Incident Aircraft

Current Biennial Flight Review

Medical Cert.:	Medical Cert. Status:	Date of Last Medical Exam:
----------------	-----------------------	----------------------------

- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time										
Pilot In Command (PIC)										
Instructor										
Last 90 Days										
Last 30 Days										
Last 24 Hours										

Seatbelt Used <input type="checkbox"/>	Shoulder Harness Used <input type="checkbox"/>	Toxicology Performed <input type="checkbox"/>	Second Pilot <input type="checkbox"/>
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**Flight Plan/Itinerary**

Type of Flight Plan Filed:

Departure Point	State	Airport Identifier	Departure Time	Time Zone
-----------------	-------	--------------------	----------------	-----------

Destination	State	Airport Identifier
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Type of Clearance:

Type of Airspace:

**Weather Information**

Source of Briefing:

Method of Briefing:

National Transportation Safety Board

**FACTUAL REPORT  
AVIATION**



NTSB ID:

Occurrence Date:

Occurrence Type:

NOT FOR RELEASE

**Weather Information**

WOF ID	Observation Time	Time Zone	WOF Elevation Ft. MSL	WOF Distance From Accident Site NM	Direction From Accident Site Deg. Mag.
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Sky/Lowest Cloud Condition: \_\_\_\_\_ Ft. AGL      Condition of Light: \_\_\_\_\_

Lowest Ceiling: \_\_\_\_\_ Ft. AGL      Visibility: \_\_\_\_\_ SM      Altimeter:  Hg

Temperature: \_\_\_\_\_ °C      Dew Point: \_\_\_\_\_ °C      Wind Direction: \_\_\_\_\_      Density Altitude: \_\_\_\_\_ Ft.

Wind Speed: \_\_\_\_\_      Gusts: \_\_\_\_\_      Weather Conditions at Accident Site: \_\_\_\_\_

Visibility (RVR): \_\_\_\_\_ Ft.      Visibility (RVV) \_\_\_\_\_ SM      Intensity of Precipitation: \_\_\_\_\_

Restrictions to Visibility: \_\_\_\_\_

Type of Precipitation: \_\_\_\_\_

**Accident Information**

Aircraft Damage: Unknown      Aircraft Fire: \_\_\_\_\_      Aircraft Explosion \_\_\_\_\_

Classification: \_\_\_\_\_

Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot					
Second Pilot					
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants					
Other Crew					
Passengers					
- TOTAL ABOARD -					
Other Ground					
- GRAND TOTAL -					

National Transportation Safety Board

**FACTUAL REPORT  
AVIATION**



NTSB ID:

Occurrence Date:

Occurrence Type:

NOT FOR RELEASE

**Administrative Information**

Investigator-In-Charge (IIC)

Additional Persons Participating in This Accident/Incident Investigation:

National Transportation Safety Board  
**PRELIMINARY REPORT**  
 AVIATION

NTSB ID:

Most Critical Injury:

Occurrence Date:

Investigated By:

Occurrence Type:

ICAO Report Submitted:

**Location/Time**

Nearest City/Place

State

Zip Code

Local Time

Time Zone

**Aircraft Information**

Registration Number

Aircraft Manufacturer

Model/Series Number

Type of Aircraft:

Homebuilt Aircraft

Injury Summary:

Fatal

Serious

Minor

None

**Sightseeing Flight:**

**Air Medical Transport Flight:**

**Narrative**

Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:

There is no narrative file for this case.

National Transportation Safety Board  
**PRELIMINARY REPORT**  
 AVIATION

NTSB ID:
Occurrence Date:
Occurrence Type:

**Other Aircraft Involved**

Registration Number	Aircraft Manufacturer	Model/Series Number
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**Accident Information**

Aircraft Damage: Unknown	Accident Occurred During:
Property Damage:	

Crew	Name	Certificate No.	Injury
Pilot			
2			
3			
4			
5			
6			

**Operator Information**

Name	Operator Designator Code	Doing Business As	
Street Address	City	State	Zip Code

**-Type of U.S. Certificate(s) Held:**

Air Carrier Operating Certificate(s):	
Operating Certificate:	Operator Certificate:
Regulation Flight Conducted Under:	
Type of Flight Operations Conducted: ; ;	

**Flight Plan/Itinerary**

Type of Flight Plan Filed:		
Last Departure Point	State	Airport Identifier
Destination	State	Airport Identifier

**Weather Information**

Investigator's Source:	Facility ID:	Observation Time (Local):
Sky/Lowest Cloud Condition:	Ft. AGL	
Lowest Ceiling:	Ft. AGL	Visibility: SM Altimeter: <input type="checkbox"/>

**PRELIMINARY INFORMATION - SUBJECT TO CHANGE**

National Transportation Safety Board  
**PRELIMINARY REPORT**  
AVIATION

NTSB ID:

Occurrence Date:

Occurrence Type:

**Weather Information** (Continued from page 2)

Temperature: °C	Dew Point: °C	Wind Direction:	
Wind Speed: Kts.	Gusts: Kts.	Weather Conditions at Accident Site:	

**Administration Data**

Notification From	Date	Local Time
FAA District Office/Coordinator	Investigator-In-Charge (IIC)	

**1998 PART 121  
ACCIDENTS**

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Accident Severity	Total Fatalities	First Occurrence	Phase of Flight
January 6, 1998	N618DL	Passenger	Orlando, FL	Delta Air Lines	Boeing 757-232	None	Serious Injury	0	0	In flight encounter with weather	Cruise - normal
<b>Probable Cause:</b> Inadvertent encounter with turbulence, which resulted in spillage of hot coffee in a passenger's lap.											
January 6, 1998	N845AA	Passenger	Philadelphia, PA	American Airlines	Boeing 727-223	Minor	Serious Injury	0	0	On ground/water collision with object	Taxi - to takeoff
<b>Probable Cause:</b> Failure of the tug driver to see-and-avoid the taxiing airplane.											
January 9, 1998	N653UA	Passenger	London, England	United Airlines	Boeing 767-322ER	Minor	Serious Injury	0	0		
<b>Probable Cause:</b> None. Foreign investigation, NTSB accredited representative present.											
January 20, 1998	N854CA	Passenger	Saranac Lake, NY	Commutair	Beech 1900D	Substantial	None	Damage	0	On ground/water collision with object	Landing - roll
<b>Probable Cause:</b> The inadequate snow removal from the runway by airport personnel, which left a snow bank extending onto the runway.											
January 21, 1998	N158Z7	Passenger and Cargo	Windsor Locks, CT	Continental Express	Aerospatiale ATR-42-320	Substantial	Minor	Damage	0	Airframe/component/system failure/malfunction	Landing - roll
<b>Probable Cause:</b> The improper overhaul of lug holes on the fuel/oil heat exchanger. A factor was the lack of direction contained in the manufacturer's overhaul manual for working with the lug holes.											
February 9, 1998	N845AA	Passenger	Chicago, IL	American Airlines	Boeing 727-223	Substantial	Minor	Damage	0	Altitude deviation, uncontrolled	Approach - final approach fix/outer marker to threshold (instrument flight rules)
<b>Probable Cause:</b> The failure of the flight crew to maintain a proper pitch attitude for a successful landing or go-around. Contributing to the accident were the divergent pitch oscillations of the airplane, which occurred during the final approach and were the result of an improper autopilot desensitization rate.											
February 26, 1998	N867US	Passenger and Cargo	Birmingham, AL	US Airways	Fokker F28 MK 0100	Substantial	None	Damage	0	In flight encounter with weather	Descent - normal
<b>Probable Cause:</b> The 1) the inoperative alternate anti-skid control valve due to the disconnected electrical connector on the parking brake shut-off valve, the area was inspected 2 days earlier 2) the total loss of the hydraulic system resulting in the inability of the flight crew to maintain directional control. Factors in the accident were the 1) inadequate lightning protection design of the airplane by the manufacturer between the horizontal and vertical stabilizers which resulted in arching damage to hydraulic lines and depletion of the hydraulic fluid from the Nos. 1 and 2 hydraulic systems 2) inadequate weather information disseminated to the flight crew during the preflight briefing by the company dispatcher for failing to provide current up-to-date information of the intensity, and location of adverse weather 3) the failure of the company dispatcher to relay pertinent weather information to the flight crew while en route which included convective sigmets, and the current extent and intensity of the squall line 4) the operation of the airplane by the flight crew within 10 miles from the northern edge of a ground based weather radar depicted level 5 thunderstorm resulting in a lightning strike 5) insufficient standards/requirements, operation/operator by the company management to require weather radar training in recurrent, upgrade, and requalification training, and 6) the limitations of the weather products provided to the flight crew by the airline for failure to include convective sigmets for the central U.S., based on the geographic location of the destination airport being east of the eastern/central boundary.											
March 4, 1998	N746AS	Passenger	Reno, NV	Alaska Airlines	Boeing 737-242C	None	Serious Injury	0	0	In flight encounter with weather	Cruise (includes low altitude straight and level flight)
<b>Probable Cause:</b> Unforecasted and sudden encounter with clear air turbulence when passengers and flight attendants were not secured in their seats.											
March 6, 1998	N303FE	Cargo	Memphis, TN	Federal Express	Douglas DC-10-30F	None	Serious Injury	0	0	Airframe/component/system failure/malfunction	Standing - engine(s) operating
<b>Probable Cause:</b> Ground personnel (an equipment loader) failed to follow established written procedures (ramp safety policy), resulting in a pressurized entry door being opened before it was fully depressurized, subsequently injuring the equipment loader. The malfunctioning outflow valve was a related factor.											

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Accident Severity	Total Fatalities	First Occurrence	Phase of Flight
March 9, 1998	N937CA	Passenger	Covington, KY	Comair doing business as Delta Connection	Canadair CL600-2B19	Substantial	Minor	Damage 0	0	On ground/water collision with object	Standing
Probable Cause: The driver's operation of a ground vehicle at night with an inoperative windshield wiper and an obscured windshield against company regulations which resulted in a collision with a parked aircraft.											
March 11, 1998	N730C	Passenger	Tyler, TX	Austin Express	Fairchild SA227-AC	Substantial	None	Damage 0	0	On ground/water collision with object	Taxi - from landing
Probable Cause: The failure of the golf cart's driver to shutdown the engine and set the parking brake before exiting, which resulted in an unmanned runway cart.											
March 11, 1998	N863US	Passenger	Philadelphia, PA	US Airways	Fokker F-100	Substantial	Serious	Serious	0	On ground/water collision with object	Standing - engine(s) operating
Probable Cause: The driver's failure to maintain clearance from the parked airplane. Related factors were night conditions and the driver's diverted attention.											
April 4, 1998	N68053	Cargo	Memphis, TN	Federal Express	Douglas DC-10-10F	Substantial	None	Damage 0	0	On ground/water collision with object	Taxi - pushback/tow
Probable Cause: The tug operator's (maintenance representative) inadequate visual lookout during pushback.											
April 18, 1998	N623FF	Passenger and Cargo	Atlantic Ocean	Tower Air	Boeing 747-200	Minor	Serious	Injury 0	0	In flight encounter with weather	Cruise - normal
Probable Cause: The injured passengers failure to follow the directions to fasten their seat belts, prior to an encounter with clear air turbulence.											
April 19, 1998	N722AA	Passenger	Chicago, IL	American Airlines	Boeing 727-227	Minor	Serious	Injury 0	0	Fire	Standing - starting engine(s)
Probable Cause: The passenger initiated evacuation of the airplane. A factor was the auxiliary power unit fire.											
May 7, 1998	N948VV	Passenger	Calhoun, GA	AirTran Airways	Douglas DC-9-32	Substantial	Serious	Serious	0	In flight encounter with weather	Climb - to cruise
Probable Cause: The failure of the flight crew to maintain adequate separation from hazardous meteorological conditions. Factors contributing to the accident were: (1) the failure of AirTran Airlines to provide adequate crewmember training and guidance regarding hazardous weather encounters; (2) the failure of the flight crew to provide an adequate and timely briefing to the flight attendants regarding turbulence; and (3) the presence of hail and turbulence.											
May 11, 1998	N179JA	Passenger	Narita, Japan	United Airlines	Boeing 747	None	Serious	Injury			
Probable Cause: None. Foreign investigation.											
May 13, 1998	N1400H	Passenger	Ft. Wayne, IN	American Airlines	Fokker F-28 MK100	None	Serious	Injury 0	0	Altitude deviation, uncontrolled	Descent
Probable Cause: In-flight encounter with turbulence.											
May 21, 1998	N68043	Passenger	Los Angeles, CA	Continental Airlines	McDonnell Douglas DC-10-10	None	Serious	Injury 0	0	Altitude deviation, uncontrolled	Climb - to cruise
Probable Cause: The contaminated strain gage, which resulted in shorting of the strain gage's terminal lugs which lead to excessive autopilot initiated elevator movement, and excessive elevator actuation during recovery by the captain. Contributing factors were the failure of the airline maintenance department to diagnose and correct a historical problem with the autopilot system and the manufacturer's inadequate quality assurance program.											
May 24, 1998	N619AU	Passenger	Wichita, KS	US Airways	Boeing 757-2B7	None	Serious	Injury 0	0	In flight encounter with weather	Cruise (includes low altitude straight and level flight)
Probable Cause: The severe turbulence encountered as a result of the flightcrew's inadvertent flight into a rapidly developing thunderstorm.											

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Accident Severity	Total Fatalities	First Occurrence	Phase of Flight
June 17, 1998	N364UA	Passenger	Denver, CO	United Airlines	Boeing 737-322	Substantial	Minor	Damage 0	0	On ground/water collision with object	Taxi - pushback/tow
<b>Probable Cause:</b> Inadequate visual lookout by ground personnel (tug operator). Factors include failure of the airline to provide proper assistance (wing walkers) to the tug operator, and inadequate pushback procedures by the airline, inattention of the catering truck driver, and failure of the flight crew to illuminate the rotating beacon prior to or during pushback.											
June 26, 1998	N402LC	Cargo	Huslia, AK	Lynden Air Cargo	Lockheed L-382G	Substantial	None	Damage 0	0	On ground/water collision with object	Landing - roll
<b>Probable Cause:</b> The pilot's failure to maintain proper alignment of the airplane during the landing roll.											
July 22, 1998	N335AA	Passenger	Peotone, IL	American Airlines	Boeing 767-223	None	Serious	Injury 0	0	Altitude deviation, uncontrolled	Climb - to cruise
<b>Probable Cause:</b> In-flight encounter with turbulence.											
July 27, 1998	N449YV	Passenger	Telluride, CO	Mesa Air Group doing business as America West	Dehaviland DH-8-202	Substantial	None	Damage 0	0	On ground/water collision with object	Other
<b>Probable Cause:</b> The inadequate chocks and inadequate chocking procedures by the operator. Factors were the unavailability of the parking brake and sloping terrain.											
August 8, 1998	N302ML	Passenger	Denver, CO	Prime Air doing business as Transmeridan Airlines	Airbus A-320-231	None	Serious	Injury 0	0	On ground/water collision with object	Taxi (includes runway while hand-propping)
<b>Probable Cause:</b> The failure of the flight crew to comply with braking instructions after being instructed by ground personnel.											
August 14, 1998	N799AS	Passenger	Juneau, AK	Alaska Airlines	Boeing 737-400	Substantial	None	Damage 0	0	Dragged wing, rotor, pod, float or tail/skid	Landing - flare/touchdown
<b>Probable Cause:</b> The flight crew's inadequate recovery from a bounced landing.											
August 19, 1998	N251ZV	Passenger	Denver, CO	Great Lakes Aviation doing business as United Express	Beech 1900D	Substantial	Minor	Damage 0	0	Airframe/component/system failure/ malfunction	Takeoff - initial climb (to first power reduction or pattern altitude; includes crosswind leg)
<b>Probable Cause:</b> Debonding of the propeller erosion shield due to an improper overhaul and repair by other maintenance personnel.											
August 31, 1998	N722DH	Cargo	Jamaica, NY	DHL Airways	Boeing 727-200	Substantial	None	Damage 0	0		
<b>Probable Cause:</b> None. Investigation not complete at time of publication.											
September 2, 1998	N927VJ	Passenger and Cargo	Philadelphia, PA	USAIR	Douglas DC-9-30	Substantial	None	Damage 0	0	On ground/water collision with object	Taxi - from landing
<b>Probable Cause:</b> The failure of the fuel truck driver to follow airport operating procedures, and yield the right-of-way to the airplane. Factors were the stopped airplane, which obscured the fuel truck from the approaching airplane and the approaching airplane from the fuel truck, and the lack of visual aids on the vehicle to help compensate for restricted driver visibility to the right.											
September 11, 1998	N316UP	Cargo	Houston, TX	United Parcel Service	Boeing 767-34AF	Substantial	None	Damage 0	0		
<b>Probable Cause:</b> None. Investigation not complete at time of publication.											
September 16, 1998	N20643	Passenger and Cargo	Guadalajara, Mexico	Continental Airlines	Boeing 737-524	Substantial	None	Damage 0	0		
<b>Probable Cause:</b> None. Foreign investigation, NTSB accredited representative present.											
September 17, 1998	N233RM	Passenger	Chicago, IL	American Eagle	Aerospatiale ATR-42-300	None	Serious	Injury 0	0	Vortex turbulence encountered	Approach
<b>Probable Cause:</b> The wake turbulence encountered by Flight 146.											
September 20, 1998	N650AA	Passenger	La Paz, Bolivia	American Airlines	Boeing 757-223	Substantial	None	Damage 0	0		

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury Severity	Total Fatalities	First Occurrence	Phase of Flight
Probable Cause: None. Foreign investigation.										
September 24, 1998	N81237	Cargo	Loiza, PR	Trans Florida Airlines	Convair 240	Substantial	None	Damage 0	Loss of engine power	Takeoff - initial climb (to first power reduction or pattern altitude; includes crosswind leg)
Probable Cause: The loss of power in the No. 2 engine for undetermined reasons, and the inability of the pilot to establish a climb and/or maintain altitude. A factor was the incompletely feathered No. 2 propeller.										
September 27, 1998	N810EX	Passenger	Islip, NY	Allegheny Airlines, doing business as US Airways Express	Boeing DHC-8-102	Minor	Serious	Injury 0	In flight encounter with weather	Approach
Probable Cause: Clear air turbulence.										
October 4, 1998	N1200K	Passenger and Cargo	Sao Paulo, Brazil	Delta Air Lines	Boeing 767-332	None	Serious	Injury 0		
Probable Cause: None. Foreign investigation.										
October 7, 1998	N66734	Passenger	Miami, FL	Continental Airlines	Boeing 727-224	Substantial	None	Damage 0	Loss of engine power (partial) - mechanical failure/malfunction	Takeoff - roll/run (ground or water)
Probable Cause: The catastrophic failure of the 8th stage high pressure compressor disk from cadmium embrittlement as a result of improper adherence to the prescribed plating procedures and requirements by the company that last plated the disk. Contributing to the accident was the failure of the engine repair company to provide adequate surveillance and oversight of the plating company, the engine repair companies use of an unauthorized repair vendor, the plating company, and the engine repair companies failure to inform the aircraft operator that they had used the plating company which was not on the aircraft operators vendor list. Also contributing to the accident was the aircraft operators failure to audit the engine repair company to the level of detail that they would have discovered the engine repair company was using an unauthorized repair vendor.										
October 11, 1998	N997DL	Passenger and Cargo	Covington, KY	Delta Air Lines	McDonnell Douglas MD-88	Substantial	None	Damage 0	On ground/water collision with object	Taxi - to takeoff
Probable Cause: The tug driver's failure to maintain a proper visual lookout.										
October 25, 1998	N143DD	Passenger and Cargo	San Juan, PR	Executive Airlines doing business as American Eagle Airlines	Aerospatiale ATR-42-300	Substantial	Minor	Damage 0	On ground/water collision with object	Standing - engine(s) operating
Probable Cause: The pilot's failure to verify that the parking brake was applied prior to engine start, and the resultant inadvertent movement of the aircraft and collision with the ground power cart once No. 2 was started.										
November 1, 1998	E1CJW	Passenger	Atlanta, GA	AirTran	Boeing 737-200	Substantial	Minor	Damage 0		
Probable Cause: None. Investigation not complete at time of publication.										
November 3, 1998	N325PX	Passenger	Memphis, TN	Express Airlines One doing business as Northwest Airlink	Saab-Scania AB (Saab) 340A	Minor	Fatal	Serious 1	Miscellaneous/other	Standing - engine(s) operating
Probable Cause: The ground crewmembers inadvertent walking into the path of a rotating propeller resulting in her being struck and fatally injured.										
November 3, 1998	N919DL	Passenger and Cargo	Covington, KY	Delta Airlines	McDonnell Douglas MD-88	Minor	Serious	Injury 0	Miscellaneous/other	Standing
Probable Cause: The driver's failure to maintain control of the belt loader. A factor in the accident was the precipitation which may have contributed to the driver's foot slipping off the brake and onto the accelerator, as he approached the airplane.										
November 11, 1998	N784UA	Passenger	Concepcion, Bolivia	United Air Lines	Boeing 777-222B	None	Serious	Injury 0		
Probable Cause: None. Foreign investigation.										

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Accident Severity	Total Fatalities	First Occurrence	Phase of Flight
November 11, 1998	N801DE	Passenger	Portland, OR	Delta Air Lines	McDonnell Douglas MD-11	Substantial	None	Damage 0	0	Dragged wing, rotor, pod, float or tail/skid	Landing - flare/touchdown
<b>Probable Cause:</b> The flight crew's entry of an incorrect weight figure in the Flight Management System (FMS) computer, resulting in the approach being flown at an improper (low) Vref speed and an excessively nose-high attitude through the landing flare.											
December 1, 1998	N414WF	Passenger	Fort Lauderdale, FL	American Eagle	Aerospatiale ATR-72-212	None	Serious	Injury 0	0	Abrupt maneuver	Cruise (includes low altitude straight and level flight)
<b>Probable Cause:</b> An abrupt maneuver in response to a traffic avoidance system alert, resulting in a flight attendant falling and breaking a leg.											
December 1, 1998	N621FF	Cargo	Miami, FL	Tower Air	Boeing 747-259B	Substantial	None	Damage 0	0	Fire	Standing - engine(s) not operating
<b>Probable Cause:</b> A fire that started under the fuel truck's cab from an undetermined fuel leak, resulting in fire damage to the airplane.											
December 13, 1998	N328AW	Passenger	Sacramento, CA	America West Airlines	Boeing 737-300	None	Serious	Injury 0	0	In flight encounter with weather	Descent
<b>Probable Cause:</b> The failure of the second and third flight attendants to comply with instructions to remain seated in anticipation of turbulence.											
December 17, 1998	N47AE	Passenger	Traverse City, MI	American Eagle	Aerospatiale ATR-42-300	Substantial	None	Damage 0	0	Loss of control - on ground/water	Landing - roll
<b>Probable Cause:</b> The crew's failure to execute a missed approach and the flying pilot's (captain) failure to maintain directional control upon touchdown with a seven degree left bank and a right quartering tailwind. Factors were the snow covered runway/landing area and the night conditions.											
December 21, 1998	N269FE	Cargo	Denver, CO	Federal Express	Boeing 727-233	Substantial	None	Damage 0	0	On ground/water collision with object	Taxi - pushback/low
<b>Probable Cause:</b> Snow removal not done by other person.											
December 26, 1998	N907DE	Passenger and Cargo	DFW Airport, TX	Delta Air Lines	McDonnell Douglas MD-88	None	Serious	Injury 0	0	Fire	Standing - engine(s) operating
<b>Probable Cause:</b> A passenger sustained a hairline fracture during an emergency evacuation of the airplane.											

**1998 SCHEDULED PART 135  
ACCIDENTS**

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
February 24, 1998	N81844	Passenger	Kongiganak, AK	Peninsula Airways	Piper PA-32-300	Substantial	None	0	Undershoot	Approach - VFR pattern - final approach
Probable Cause: The pilot misjudged distance/altitude and airspeed, and his delay initiating a go-around, and related factors were the downdraft and snowbank.										
April 15, 1998	N22932	Passenger	Dutch Harbor, AK	Peninsula Airways doing business as PenAir	Grumman G-21	Substantial	None	0	On ground/water encounter with terrain/water	Landing
Probable Cause: The pilot-in-command's failure to identify the swells prior to landing. A factor was the water swells.										
May 14, 1998	N192AV	Passenger	Nome, AK	Baker Aviation	Cessna 208	Substantial	Serious	0	In flight collision with terrain/water	Maneuvering - turn to reverse direction
Probable Cause: The pilot's continued VFR flight into instrument meteorological conditions. Factors in the accident were low ceilings, whiteout conditions, and snow covered terrain.										
May 21, 1998	N755AB	Passenger	Quinhagak, AK	Yute Air Alaska	Cessna 207	Substantial	None	0	In flight collision with object	Takeoff
Probable Cause: The pilot's failure to maintain directional control of the airplane, and his premature liftoff, resulting in a collision with a runway light fixture. Factors in the accident were wet runway conditions, and a rough and uneven runway surface with potholes.										
June 9, 1998	N96AK	Passenger	Juneau, AK	Alaska Juneau Aeronautics doing business as Wings of Alaska	Cessna 207A	Substantial	None	0	Airframe/component/system failure/malfunction	Climb - to cruise
Probable Cause: The failure of company maintenance personnel to properly install a wire bundle clamp, chafing, electrical arcing, and subsequent leaking of a fuel line, which resulted in an in-flight fire. A factor associated with the accident was company maintenance personnel's failure to discover a missing clamp during a 100-hour inspection.										
September 17, 1998	N4112D	Passenger	Noorvik, AK	Bering Air	Piper PA-31-350	Substantial	None	0	Wheels up landing	Landing - flare/touchdown
Probable Cause: A failure of the pilot to follow the aircraft checklist, and an inadvertent wheels up landing.										
October 25, 1998	N9400M	Passenger	Noorvik, AK	Hageland Aviation Services	Cessna 207A	Substantial	Minor	0	In flight collision with terrain/water	Cruise (includes low altitude straight and level flight)
Probable Cause: The pilot's continued VFR flight into instrument meteorological conditions. Factors in the accident were a dark night and low ceilings.										
December 17, 1998	N1764U	Passenger and Cargo	Manokotak, AK	Yute Air Alaska	Cessna 207A	Substantial	Serious	0	In flight collision with terrain/water	Cruise (includes low altitude straight and level flight)
Probable Cause: The pilot's continued VFR flight into instrument meteorological conditions. Factors in the accident were dark night conditions, snow covered terrain, and low ceilings.										

**1998 NONSCHEDULED PART 135  
ACCIDENTS**

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
January 8, 1998	N752JX	Passenger	Phoenix, AZ	Native American Air Ambulance	British Aerospace Jetstream 3101	Substantial	None	0	On ground/water collision with object	Taxi (includes runway while hand-propping)
<p><b>Probable Cause:</b> The pilot's exercising poor judgment to continue to taxi under a covered T-hanger during nighttime conditions without proper clearance between the hanger and the aircraft.</p>										
January 11, 1998	N222JH	Passenger	Sandy, UT	Air Methods	Bell 222UT	Destroyed	Fatal	4	In flight encounter with weather	Takeoff - initial climb (to first power reduction or pattern altitude; includes crosswind leg)
<p><b>Probable Cause:</b> Flight by the pilot into known adverse weather conditions, and his failure (or inability) to maintain sufficient clearance or altitude from mountainous terrain. Related factors were: darkness, heavy snow, high winds, the pilot's perception of pressure that was induced by the conditions and events, and mountainous terrain.</p>										
January 20, 1998	N738FX	Cargo	Grand Island, NE	Baron Aviation Services doing business as Federal Express	Cessna 208B	Substantial	None	0	Hard landing	Landing - flare/touchdown
<p><b>Probable Cause:</b> Ice build-up on the airplane's wings and empennage which led to an inadvertent stall and hard landing. Factors contributing to this accident were the pilot's inadvertent flight into icing conditions, and the icing conditions.</p>										
January 30, 1998	N9316F	Cargo	Port Heiden, AK	Peninsula Airways doing business as PenAir	Cessna 208A	Destroyed	Minor	0	In flight encounter with weather	Climb - to cruise
<p><b>Probable Cause:</b> The pilot's inadequate in-flight decision resulting in airframe ice accumulation to the extent that degraded aircraft performance and insufficient airspeed occurred followed by a stall. Contributing factors were freezing rain and icing conditions.</p>										
February 1, 1998	N27MJ	Passenger	Al Manamah, Bahrain	Medical Jets International	Learjet 36A	Substantial	None	0		
<p><b>Probable Cause:</b> None. Foreign investigation.</p>										
February 6, 1998	N7678L	Passenger	Nome, AK	Larry's Flying Service	Piper PA-31-350	Substantial	None	0	Loss of engine power (total) - nonmechanical	Cruise (includes low altitude straight and level flight)
<p><b>Probable Cause:</b> The pilot's poor in-flight planning/decision which led to fuel exhaustion and subsequent loss of engine power.</p>										
February 6, 1998	N91029	Cargo	Homer, AK	South Central Air	Cessna 207	Destroyed	Fatal	1	Loss of engine power (partial) - mechanical failure/malfunction	Takeoff - initial climb (to first power reduction or pattern altitude; includes crosswind leg)
<p><b>Probable Cause:</b> A fatigue failure, and partial separation of the number 6 engine cylinder head assembly, the operator's inadequate progressive inspection performed by company maintenance personnel, and the pilot's inadvertent stall during a maneuvering turn toward an emergency landing area.</p>										
February 23, 1998	N54231	Cargo	Peoria, IL	Gail Force	Piper PA-23-250	Substantial	None	0	Loss of engine power (total) - nonmechanical	Climb - to cruise
<p><b>Probable Cause:</b> An improper preflight inspection of the airplane by the pilot and the inadvertent stall/mush which was encountered. A factor associated with this accident was the pilot's decision to continue to use the emergency hydraulic hand pump rather than the CO2 bottle to extend the landing gear which resulted in the landing gear not fully extending.</p>										
February 26, 1998	N38186	Passenger	Naknek, AK	King Air	Piper PA-32-300	Substantial	None	0	On ground/water collision with object	Taxi - from landing
<p><b>Probable Cause:</b> The pilot's failure to maintain an adequate visual lookout. Factors in the accident were flat lighting conditions, and inadequate airport facilities.</p>										
March 5, 1998	N840FE	Cargo	Clarksville, TN	Baron Aviation Services doing business as Federal Express	Cessna 208B	Destroyed	Fatal	1	In flight encounter with weather	Cruise - normal
<p><b>Probable Cause:</b> The pilot did not maintain control of the airplane due to undetected airframe ice, resulting in an inadvertent stall, and subsequent impact with the ground. Factors in this accident were: flight into clouds, below freezing temperatures, and the inability of the pilot to detect ice, due to the lack of an ice detection system to determine ice build up on portions of the airframe that are not visible from the cockpit.</p>										

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
March 19, 1998	N8274M	Passenger	Fallon, NV	Fallon Airmobile	Cessna 210K	Substantial	None	0	Loss of engine power (total) - mechanical failure/malfunction	Takeoff - initial climb (to first power reduction or pattern altitude; includes crosswind leg)
Probable Cause: The aircraft owner/pilot's improper assembly of the engine oil pump, which resulted in failure of the unit and oil starvation failure of the engine. A factor was the lack of supervision of the owner/pilot's work by the A & P mechanic.										
March 24, 1998	N73780	Passenger	Monument Valley, UT	Scenic Airlines	Cessna T207A	Substantial	Serious	0	Loss of engine power (total) - nonmechanical	Descent - emergency (pilot initiated; i.e., after decompression)
Probable Cause: The engine's total power loss due to the induction air ducting separating because of inadequate maintenance by company personnel. Factors were the failure of the manufacturer to provide non-standard operating procedures in their airplane's information manual, and the failure of the FAA to require non-standard operating procedures in the manufacturer's airplane information manual; and the soft, sandy, unsuitable terrain on which to perform a forced landing.										
March 26, 1998	N3700G	Cargo	Sioux Falls, SD	Airnet Systems	Cessna 310R	Substantial	None	0	Wheels up landing	Landing - flare/touchdown
Probable Cause: The pilot's failure to extend the landing gear for landing. Factors associated with the accident were: the crosswind, and the pilot not following his normal habit pattern of lowering the landing gear on base leg.										
April 3, 1998	N1205F	Passenger	Coldfoot, AK	North Quest Aviation	Cessna 185F	Substantial	None	0	On ground/water encounter with terrain/water	Taxi (includes runaway while hand-propping)
Probable Cause: The pilot's selection of unsuitable terrain for takeoff. Soft, snow covered terrain was a factor in the accident.										
April 3, 1998	N400AR	Passenger	West Palm Beach, FL	Dove One	Cessna 402B	Substantial	None	0	Main gear collapsed	Landing - flare/touchdown
Probable Cause: The pilot allowed the airplane to improperly touchdown on the right main landing gear, resulting in the gear collapsing, and subsequent impact with runway visual range equipment.										
April 7, 1998	N868FE	Cargo	Bismarck, ND	Corporate Air doing business as Federal Express	Cessna 208B	Destroyed	Fatal	1	Loss of control - in flight	Approach - final approach fix/outer marker to threshold (instrument flight rules)
Probable Cause: The pilot's failure to maintain adequate airspeed during the approach which resulted in an inadvertent stall. Factors associated with the accident were the icing conditions and the pilot's low level experience in this make and model of airplane.										
April 8, 1998	N2083C	Cargo	Del Rio, TX	Phillips Air Service	Beech E18S	Substantial	Minor	0	Loss of engine power	Takeoff - initial climb (to first power reduction or pattern altitude; includes crosswind leg)
Probable Cause: A loss of engine power on the right engine for undetermined reasons, and the pilot's failure to maintain control of the airplane.										
April 10, 1998	N7527S	Mail	Mapleton, ME	Maine Flight Center	Aerostar 600A	Destroyed	Fatal	1	Loss of control - in flight	Takeoff - initial climb (to first power reduction or pattern altitude; includes crosswind leg)
Probable Cause: The failure of the pilot to maintain control of the airplane during takeoff for undetermined reasons.										
April 17, 1998	N59604	Passenger	Cameron, LA	Houston Helicopters	Bell 206B	Substantial	None	0	Loss of engine power	Approach - visual flight rules pattern - final approach
Probable Cause: The loss of engine power for undetermined reasons and the pilot's improper flare which resulted in a hard landing.										
April 20, 1998	N87WC	Cargo	Los Angeles, CA	Helinet	Bell 206L-1	Substantial	None	0	Loss of engine power (total) - mechanical failure/malfunction	Approach
Probable Cause: An overtemp of the engine during start within 10 hours of the accident, and the failure to report the event to the maintenance facility.										

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
April 22, 1998	N7438U	Passenger	Scammon Bay, AK	Hageland Aviation Services	Cessna 207A	Substantial	Minor	0	In flight encounter with weather	Cruise (includes low altitude straight and level flight)
Probable Cause: The pilot's continued visual flight rules flight into instrument meteorological conditions. Factors in the accident were low ceilings, and whiteout conditions.										
April 23, 1998	N258B	Cargo	Columbus, OH	Aimet Express	Beech 58	Destroyed	Fatal	1	Vortex turbulence encountered	Approach
Probable Cause: The pilot's inadequate planned approach and his failure to follow wake turbulence avoidance procedures by not staying above the glide-path of the preceding Boeing 757, which resulted in a vortex turbulence encounter. Contributing to the accident was the wake turbulence, and night conditions.										
May 1, 1998	N3316Q	Passenger	Greybull, WY	Star West Industries doing business as Star West Aviation	Cessna 320D	Substantial	None	0	Airframe/component/system failure/malfunction	Approach
Probable Cause: Stress overload failure of the bellcrank assembly of the left landing gear.										
May 12, 1998	N617GA	Passenger and Cargo	Monroe, MI	Grand Aire Express	Dassault DA-20	Substantial	None	0	Airframe/component/system failure/malfunction	Takeoff - roll/run (ground or water)
Probable Cause: The pilot-in-command's inability to rotate during takeoff due to restricted movement of the elevator controls for undetermined reasons.										
May 16, 1998	N1473F	Passenger	Talkeetna, AK	Doug Geeting Aviation	Cessna A185F	Substantial	Minor	0	Overrun	Landing - roll
Probable Cause: The pilot selected the wrong runway and intentionally ground looped to stop the airplane. Related factors were the tailwind and whiteout conditions.										
May 17, 1998	N65759	Passenger	Monument Valley, UT	Scenic Airlines	Cessna 172P	Substantial	Minor	0	In flight encounter with weather	Landing - flare/touchdown
Probable Cause: The pilot's failure to maintain directional control of the aircraft during landing. Factors were gusty, crosswind conditions, the pilot's lack of experience in type of operation and geographic area, mountainous terrain, and high density altitude.										
May 20, 1998	N112HD	Passenger	Lanai City, Maui, HI	Windward Aviation	McDonnell Douglas 520N	Destroyed	Minor	0	Loss of engine power (total) - mechanical failure/malfunction	Cruise (includes low altitude straight and level flight)
Probable Cause: An oil starvation failure of the number 5 bearing for undetermined reasons.										
May 23, 1998	N100DL	Passenger	Orlando, FL	Panther Aviation	Learjet 24-B	Substantial	None	0	Overrun	Landing - roll
Probable Cause: The first officer's failure to perform proper emergency braking procedures.										
May 23, 1998	N8578D	Passenger	Glennallen, AK	Tundra	Piper PA-18	Substantial	Minor	0	Loss of engine power (total) - nonmechanical	Cruise (includes low altitude straight and level flight)
Probable Cause: The pilot's inadequate preflight of the airplane's fuel system, and presence of water in the fuel system.										
May 25, 1998	N96CW	Passenger	Indian Trail, NC	US Helicopters	Bell 206L-3	Destroyed	Fatal	5	In flight encounter with weather	Cruise - normal
Probable Cause: The pilot's failure to maintain altitude while operating in adverse weather. A contributing factor was the incoming fog and high tension static wire.										
May 28, 1998	N888AA	Passenger	North Platte, NE	Silverhawk Security Spec.	Cessna 414	Destroyed	Minor	0	Loss of engine power (total) - mechanical failure/malfunction	Takeoff - initial climb (to first power reduction or pattern altitude; includes crosswind leg)
Probable Cause: The slipped number two bearing in the airplane's right engine, which blocked the bearing's oil feed line, causing the bearing and the crankshaft to overheat and fracture. A factor contributing to this accident was the trees.										
May 29, 1998	N9956M	Cargo	Bethel, AK	Arctic Transportation Service	Cessna 207	Substantial	None	0	Loss of engine power	Climb - to cruise
Probable Cause: The throttle arm disconnecting from the throttle linkage to the engine as a result of inadequate inspection by company maintenance personnel. Factors associated with this accident were the company maintenance personnel not following the repetitive Service Bulletin inspection, and the inadequate design of the throttle arm by the manufacturer.										

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
May 30, 1998	N187EH	Passenger	Juneau, AK	Era Helicopters	Aerospatiale AS-350-B2	Substantial	Fatal	2	Midair collision	Cruise (includes low altitude straight and level flight)
Probable Cause: The failure of both command pilots to maintain an adequate lookout to see and avoid each other's aircraft. Factors associated with the accident were the other pilot's failure to follow published advisory procedures to monitor/issue position reports on the appropriate radio frequency, and his lack of familiarity with the geographic area.										
June 7, 1998	N18814	Passenger	Corpus Christi, TX	Houston Helicopters	Bell 206B	Substantial	None	0	Airframe/component/system failure/malfunction	Approach - visual flight rules pattern - final approach
Probable Cause: The failure of the tail rotor drive shaft due to the separation of a bolt at one of the drive shaft disc couplings for an undetermined reason, which resulted in the pilot's inability to maintain directional control during landing.										
June 9, 1998	N9855X	Passenger	Chickaloon, AK	Hudson Air Service	Cessna 185	Substantial	None	0	Loss of engine power (total) - nonmechanical	Approach - visual flight rules pattern - final approach
Probable Cause: The pilot's inadvertent activation of the fuel boost pump selector switch during final approach, which resulted in an overly rich mixture and subsequent loss of engine power.										
June 16, 1998	N185DG	Passenger	Talkeetna, AK	Douglas Greeting Aviation	Cessna A185F	Substantial	None	0	Miscellaneous/other	Takeoff (modify with operational code 24563, if on touch-&-go)
Probable Cause: The failure of the right main landing gear leg due to fatigue cracking. A factor associated with this accident is the inadequate inspection procedure specified by the manufacturer.										
June 16, 1998	N446JR	Cargo	Helena, MT	Corporate Air	Aero Commander 680FL	Destroyed	Fatal	1	In flight collision with terrain/water	Approach - iaf to final approach fix /outer marker (instrument flight rules)
Probable Cause: The pilot's failure to maintain the correct altitude while turning inbound during a procedure turn to the ILS final approach course. Factors include hilly/mountainous terrain and clouds in the area where the course reversal was performed.										
June 17, 1998	N2162C	Passenger	Bethel, AK	Kusko Aviation	Cessna 207	Substantial	None	0	In flight collision with object	Approach - visual flight rules pattern - downwind
Probable Cause: An in-flight collision with a large bird.										
June 19, 1998	N1673U	Passenger	Holy Cross, AK	Inland Aviation Services	Cessna 207	Substantial	None	0	Loss of engine power (total) - mechanical failure/malfunction	Cruise (includes low altitude straight and level flight)
Probable Cause: The improper installation/undertorquing of the engine crankcase bolts by company maintenance personnel, and a subsequent fracture of the engine crankshaft. A factor in the accident was unsuitable terrain for a forced landing.										
June 25, 1998	N594BK	Passenger	Mt. Waialeale, HI	Ohana Helicopter Tours	Eurocopter AS-350-BA	Destroyed	Fatal	6	In flight encounter with weather	Cruise (includes low altitude straight and level flight)
Probable Cause: The pilot's decision to continue VFR flight into deteriorating weather conditions consisting of lowering ceilings and visibility in mountainous terrain, which resulted in the inadvertent entry into instrument meteorological conditions and a collision with a mountain side. A factor in the accident was the failure of the chief pilot, who had directly observed the deteriorating weather conditions, to direct the following pilots to avoid the area.										
July 16, 1998	N1763U	Mail	King Salmon, AK	Yute Air	Cessna 207	Substantial	Minor	0	Loss of engine power (partial) - mechanical failure/malfunction	Cruise (includes low altitude straight and level flight)
Probable Cause: The disconnection of the mixture control cable from the mixture control arm. Factors associated with this accident were the inadequate 100 hour inspections performed by company mechanics.										
July 25, 1998	N8622U	Passenger	Skwentna, AK	Talaheim Lodge & Air Service	Enstrom F-28F	Substantial	None	0	Loss of engine power (partial) - mechanical failure/malfunction	Hover (stationary; excludes aerial taxi)
Probable Cause: A loss of engine power due to a fractured number three cylinder intake manifold flange, and the pilot's inability to maintain the proper rate of descent during the autorotation flare. A contributing factor associated with the accident was the downwind (tailwind) landing condition.										

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
August 5, 1998	N5314R	Passenger	Ketchikan, AK	Taquan Air Service	Cessna A185F	Destroyed	Fatal	1	Loss of engine power (total) - nonmechanical	Cruise (includes low altitude straight and level flight)
<b>Probable Cause:</b> Fuel starvation and the pilot's improper fuel tank selection. Factors associated with the accident were the pilot's failure to follow the pre-takeoff checklist and trees.										
August 6, 1998	N5MJ	Passenger	Columbus, IN	Rhodes Aviation	Cessna 421B	Substantial	Serious	0	Miscellaneous/other	Takeoff - initial climb (to first power reduction or pattern altitude; includes crosswind leg)
<b>Probable Cause:</b> The pilot-in-command's failure to maintain airspeed and the subsequent stall/mush. Factors associated with the accident were the open baggage door and the inadequate aircraft preflight.										
August 7, 1998	N732RD	Cargo	Albuquerque, NM	New Mexico Flying Service, doing business as B & M Enterprises	Cessna 210M	Substantial	None	0	Loss of engine power	Approach - visual flight rules pattern - final approach
<b>Probable Cause:</b> A power loss for reasons undetermined. A factor was unsuitable terrain on which to make a forced landing.										
August 7, 1998	N7494Q	Passenger	Stanley, ID	Stanley Air Taxi	Cessna U206F	Substantial	None	0	Loss of control - on ground/water	Takeoff - roll/run (ground or water)
<b>Probable Cause:</b> The pilot-in-command's not lowering flaps prior to takeoff and overload of the nose landing gear. Contributing factors were high density altitude conditions and high brush.										
August 11, 1998	N3527U	Passenger	Fort Yukon, AK	Warbelow's Air Ventures	Piper PA-31-350	Substantial	None	0	Wheels up landing	Landing - flare/touchdown
<b>Probable Cause:</b> The pilot's failure to follow the pre-landing checklist. A factor associated with the accident was the pilot's diverted attention.										
August 13, 1998	N6935C	Passenger	Blanding, UT	Scenic Aviation	Piper PA-34-200T	Substantial	None	0	Hard landing	Landing - flare/touchdown
<b>Probable Cause:</b> The pilot's inadequate landing flare, causing components of the nose wheel landing gear to fracture.										
August 23, 1998	N2748J	Passenger	Melville Hall, Dominica	Air Anguilla doing business as Cardinal Airlines	Cessna 402C	Destroyed	Fatal	11		
<b>Probable Cause:</b> None. Foreign investigation, NTSB accredited representative present.										
August 28, 1998	N126R	Cargo	El Paso, TX	Reliant Airlines	Dassault Falcon DA-20	Substantial	Serious	0		
<b>Probable Cause:</b> None. Investigation not complete.										
August 31, 1998	N333DG	Passenger	Talkeetna, AK	Doug Geeting Aviation	Cessna 185E	Substantial	None	0	Loss of control - on ground/water	Landing - roll
<b>Probable Cause:</b> The pilot's failure to maintain directional control resulting in an inadvertent ground loop. A contributing factor was the induced pressure on the pilot by a sick passenger.										
August 31, 1998	N5056J	Cargo	Seymour Township, WI	Heartland Aviation	Cessna 310R	Destroyed	Fatal	2	Midair collision	Climb - to cruise
<b>Probable Cause:</b> The pilots of both airplanes not maintaining visual separation from the other airplane.										
September 2, 1998	N139F	Passenger	Dillingham, AK	Fresh Water Adventures	Grumman G-44	Substantial	None	0	In flight collision with terrain/water	Maneuvering - turn to reverse direction
<b>Probable Cause:</b> The pilot's failure to maintain clearance with terrain. Contributing factors were the pilot's delayed remedial action (course reversal), low ceilings, rain, fog, and mountainous terrain.										
September 9, 1998	N1433Z	Passenger	Port Alsworth, AK	Rust's Flying Service	de Havilland DHC-2	Substantial	Fatal	5	Loss of control - in flight	Cruise (includes low altitude straight and level flight)
<b>Probable Cause:</b> The pilot's failure to maintain adequate airspeed which resulted in an inadvertent stall. Factors associated with this accident were the pilot's unfamiliarity with the geographic area, the low clouds, his becoming disoriented, and the blind canyon into which he flew. An additional factor was the intentionally disabled stall warning system.										

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
September 10, 1998	N7380U	Passenger	Hughes, AK	Warbelow's Air Ventures	Cessna 207A	Substantial	None	0	Hard landing	Landing - flare/touchdown
Probable Cause: The pilot's inadequate compensation for the wind conditions, and an inadvertent stall. A factor in the accident was the presence of a tail wind.										
September 11, 1998	N1563C	Cargo	St. Mary's, AK	Alaska Central Express	Beech 1900C	Substantial	None	0	Wheels up landing	Landing - flare/touchdown
Probable Cause: The pilot's failure to follow the aircraft checklist, and an inadvertent wheels up landing. A factor was the pilot's distraction due to a malfunction of the flap system.										
September 13, 1998	N1754U	Passenger	Sleetmute, AK	Inland Aviation Services	Cessna 207	Substantial	None	0	On ground/water collision with object	Takeoff - roll/run (ground or water)
Probable Cause: The pilot's selection of unsuitable terrain for departure. A factor in the accident was a narrow runway.										
September 17, 1998	N1809Q	Cargo	Kotzebue, AK	Village Aviation	Cessna 207	Destroyed	Fatal	1	In flight encounter with weather	Not reported
Probable Cause: The pilot's continued visual flight rules flight into instrument meteorological conditions. Factors associated with the accident were low ceilings, mountainous/hilly terrain features, rain, and fog.										
September 25, 1998	N300EW	Mail	Orlando, FL	Flight Express	Cessna 210L	Substantial	None	0	Gear collapsed	Landing
Probable Cause: A 6-8 inch crack on the right main landing gear strut, which allowed the hydraulic fluid to escape from the system, along with a power pack sequencing valve failure which allowed the main landing gear to fold on landing. A factor in the accident was the pilot's execution of a night landing without her prescribed eye glasses.										
September 25, 1998	N900JH	Passenger and Cargo	Schofield, WI	Wisconsin Aviation	Piper PA-34-220T	Substantial	Minor	0	Loss of engine power	Climb
Probable Cause: The inadvertent deactivation of the fuel selector, and the emergency procedure not followed by the pilot-in-command. The tree was a contributing factor.										
September 26, 1998	N5697Y	Cargo	Sleetmute, AK	Alaska Trophy Connection	Piper PA-18	Substantial	Minor	0	Loss of control - on ground/water	Takeoff - roll/run (ground or water)
Probable Cause: The pilot's failure to maintain directional control. Contributing factors were the gusty crosswind conditions.										
October 8, 1998	N6874M	Passenger	Napaskiak, AK	Hageland Aviation Services	Cessna 207A	Substantial	Minor	0	Loss of engine power (partial) - nonmechanical	Takeoff - aborted
Probable Cause: The pilot's inadequate preflight inspection to remove all contaminated fuel from the fuel system. Factors in the accident were the pilot's inadequate planning/decision to continue a second takeoff following an engine surge and aborted takeoff, and unsuitable terrain for a forced landing.										
October 16, 1998	N6522T	Passenger	English Bay, AK	C and L doing business as Homer Air Service	Britten-Norman BN-2A	Substantial	None	0	On ground/water encounter with weather	Takeoff - roll/run (ground or water)
Probable Cause: The pilot-in-command's inadequate compensation for the crosswind conditions, and failure to maintain adequate clearance from the parked airplane. Factors associated with this accident were the gusty crosswinds, and the congested takeoff area due to no parking ramp.										
October 17, 1998	N298GL	Cargo	Missoula, MT	CLB Corporation, doing business as Alpine Aviation	Beech 99	Substantial	Minor	0	In flight collision with terrain/water	Go-around (visual flight rules) before touchdown
Probable Cause: The pilot-in-command's delayed remedial action in response to the co-pilot's improper landing flare, and the co-pilot's application of excessive (full nose-up) trim during the landing flare as taught in the operator's initial aircrew training program. Factors include the co-pilot's improper flare and his lack of total experience in this type of aircraft.										
October 18, 1998	N19MH	Passenger	Eagle Pass, TX	Critical Air Medicine doing business as Critical Air Medicine	Cessna 421C	Destroyed	Minor	0	In flight encounter with weather	Takeoff - initial climb (to first power reduction or pattern altitude; includes crosswind leg)
Probable Cause: A downdraft, which exceeded the aircraft's climb performance. A factor was the thunderstorms in the vicinity of the airport.										
October 19, 1998	N310E	Cargo	Jackson, MS	Paragon Air Express	Beech BE-58	Substantial	None	0	Wheels up landing	Landing - flare/touchdown
Probable Cause: The pilot's failure to ensure the landing gear was down resulting in a wheels up landing.										

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damages to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
October 26, 1998	N73533	Passenger	Aniak, AK	Arctic Circle Air	Cessna 207A	Substantial	Minor	0	Loss of engine power - nonmechanical	Takeoff - initial climb (to 1st power reduction or pattern altitude; includes crosswind leg)
<p><b>Probable Cause:</b> A loss of engine power due to fuel contamination. A factor in the accident was unsuitable terrain for a forced landing.</p>										
October 26, 1998	N860FE	Cargo	Lahaina, HI	Corporate Air	Cessna 208B	Substantial	None	0	Main gear collapsed	Landing
<p><b>Probable Cause:</b> Structural failure of the main landing gear strut due to metallurgical fatigue. The fatigue cracks originated at an internal structural flaw placed in the part during manufacture.</p>										
October 28, 1998	N35533	Cargo	Hayden, CO	Sundance Air	Piper PA-31-350	Destroyed	Fatal	1	In flight collision with terrain/water	Approach - initial approach fix to final approach fix/outer marker (instrument flight rules)
<p><b>Probable Cause:</b> The pilot not following instrument procedures and subsequently descended to minimums prematurely. Factors were the mountainous terrain and the falling snow.</p>										
October 28, 1998	N8554C	Cargo	Roswell, GA	Air Carriers	Piper PA-32R-300	Destroyed	Fatal	1	Loss of engine power (partial) - mechanical failure/malfunction	Cruise (includes low altitude straight and level flight)
<p><b>Probable Cause:</b> A loss of engine power due to the failure of the number five connecting rod assembly as a result of fatigue cracks that were initiated in areas of galling. A factor was the lack of suitable terrain for a forced landing.</p>										
November 3, 1998	N946L	Passenger	Pioche, NV	Sundance Helicopters	Bell 206L-3	Substantial	Minor	0	Loss of control - in flight	Approach - visual flight rules pattern - final approach
<p><b>Probable Cause:</b> The loss of tail rotor effectiveness, due to the installation of incorrect pitch links by the maintenance facility. A factor in the accident was the lack of an adequate quality assurance program in the maintenance facility.</p>										
November 26, 1998	N27MG	Cargo	Hamilton, Canada	Castle Aviation	Cessna 208B	Substantial	None	0	In flight collision with object	Climb - to cruise
<p><b>Probable Cause:</b> None. Foreign investigation.</p>										
November 29, 1998	N977LF	Passenger	Idaho City, ID	Idaho Helicopters	McDonnell Douglas MD-900	Substantial	None	0	Loss of engine power (total) - nonmechanical	Cruise (includes low altitude straight and level flight)
<p><b>Probable Cause:</b> The pilot-in-command's not obtaining/maintaining clearance with the unmarked transmission lines. Contributing factors were environmental (dusk) conditions, the transmission lines, and both the pilot-in-command and the ground personnel not identifying the existence of the hazardous condition (high wires).</p>										
December 4, 1998	N36755	Passenger	Nondalton, AK	Lake Clark Air	Stinson 10A	Substantial	None	0	Loss of engine power (total) - nonmechanical	Cruise (includes low altitude straight and level flight)
<p><b>Probable Cause:</b> The pilot's continued operation of the airplane with known deficiencies, a failure of company maintenance personnel to replace an inoperative fuel gauge, and subsequent fuel exhaustion. Factors in the accident were siphoning of fuel from the right wing fuel cap, and slush covered terrain.</p>										
December 10, 1998	N555NJ	Cargo	Charlotte Amali, Virgin National Islands	Virgin National Jets	Beech C-45G	Substantial	None	0	Hard landing	Landing - flare/touchdown
<p><b>Probable Cause:</b> The inadequate flare by the pilot-in-command resulting in a hard landing on the nose landing gear causing it to collapse.</p>										
December 17, 1998	N554CL	Passenger	Los Angeles, CA	Clay Lacy Aviation	Learjet 55B	Substantial	None	0	Loss of control - on ground/water	Takeoff - roll/run (ground or water)
<p><b>Probable Cause:</b> None. Investigation not complete at time of publication.</p>										
December 18, 1998	N502FS	Passenger	McGrath, AK	F. S. Air Service	Casa C-212	Substantial	None	0	Loss of control - on ground/water	Takeoff - roll/run (ground or water)
<p><b>Probable Cause:</b> The flightcrew's inadequate compensation for wind conditions. A factor associated with the accident was a crosswind.</p>										