U.S. Air Carrier Operations
Calendar Year 2001

Annual Review of Aircraft Accident Data

NTSB/ARC-06/01

PB2006-106641
Notation 7502B

National Transportation Safety Board
Washington, D.C.

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Adopted February 14, 2006

National Transportation Safety Board
490 L'Enfant Plaza, S.W.
Washington, D.C. 20594

National Transportation Safety Board. 2006. *U.S. Air Carrier Operations, Calendar Year 2001*. Annual Review of Aircraft Accident Data NTSB/ARC-04/01. Washington, D.C.

Abstract: The National Transportation Safety Board's Annual Review of Aircraft Accident Data: U.S. Air Carrier Operations is a statistical review of U.S. commercial aviation accidents that occurred in calendar year 2001. In addition to accident statistics, the review provides general economic and aviation industry indicators that may have influenced aircraft activity during the year. Accident data for the 9 years preceding calendar year 2001 provide an historical context.

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INTRODUCTION

The National Transportation Safety Board's *Review of 2001 Aircraft Accident Data: U.S. Air Carrier Operations* covers aircraft operated by U.S. air carriers under Title 14,[1] Parts 121 and 135, of the *Code of Federal Regulations* (CFR). Air carriers are generally defined as operators that fly aircraft in revenue service. To provide an historical context for this 2001 review, data for the years 1992–2000 are also presented. Much of the information in this review is presented in graphs and tables. Readers who prefer to view or manipulate tabular data may access the data set online at http://www.ntsb.gov/aviation/stats.htm. A list of 2001 air carrier accidents is presented in Appendix A.

Part 121	Scheduled Part 135	On-Demand Part 135
Usually includes operators that fly large transport-category aircraft. An operation is scheduled if an air carrier or operator offers in advance the departure location, departure time, and arrival location.[a] Any scheduled or non-scheduled passenger-carrying operation. Regulations limit Part 121 operations to controlled airspace and controlled airports that have available specific weather, navigational, operational, and maintenance support.	A scheduled passenger-carrying operation that flies to smaller airports that do not provide the services required to support Part 121 operations. Includes commercial air carriers flying smaller jet and turboprop aircraft commonly referred to as commuter airlines. The definition for scheduled operations in Part 121 also applies to Part 135.	Any operation for compensation or hire for which the departure location, departure time, and arrival location are negotiated with the customer. Customers can arrange to charter an entire aircraft or book a single seat on an air taxi.[b] Also includes medical evacuation flights when a patient is on board.

a Title 14 CFR Part 119.3.

b FARs restrict on-demand Part 135 operations to passenger-carrying operations conducted as a public charter; scheduled passenger-carrying 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; and all-cargo operations conducted with airplanes having a payload capacity of 7,500 pounds or less, or with rotorcraft. A final rule change effective November 17, 2003 (Federal Register Vol. 68, No. 180, September 17, 2003, pp. 54520-54588), concerning fractional ownership programs (which heretofore operated under Part 91) may significantly affect on-demand Part 135 operations and may require some fractional ownership programs to operate as if they were on-demand Part 135.

In 2001, a total of 121 accidents occurred among U.S. air carriers: 42 Part 121 accidents, 7 scheduled Part 135 accidents, and 72 on-demand Part 135 accidents (table 1). Air carriers flew more than 7.3 billion miles, recorded at least 11.5 million departures, and logged more than 21 million flight hours.

[1] Title 14 is also known as the *Federal Aviation Regulations* (FAR).

Table 1: Accidents and Accident Rates for 2001

	Number of Accidents	Accidents Per Million Flight Hours
Part 121	42*	2.36
Scheduled Part 135	7	23.30
On-Demand Part 135	72	24.02

* The four crashes that occurred on September 11, 2001 are not included in the number of Part 121 accidents or the calculation of the Part 121 accident rate.

Part 121 air carriers continue to exhibit the lowest accident rate and fatal accident rate of all commercial operations (tables 1 and 2). In 2001, the accident rate for Part 135 air carrier operations was 10 times greater than Part 121 operations, and the fatal accident rate for Part 135 operations was more than 50 times greater. Nevertheless, Part 121 accidents typically account for the largest number of fatalities due to the size of transport-category Part 121 aircraft. Only two Part 121 accidents were fatal (table 2), but these two accidents resulted in 266 fatalities.

Table 2: Fatal Accident, Fatalities, and Fatal Accident Rates for 2001

	Number of Fatal Accidents	Fatalities	Fatal Accidents Per Million Flight Hours
Part 121	2	266	0.11
Scheduled Part 135	2	13	6.66
On-Demand Part 135	18	60	6.01

The Events of September 11, 2001

Four fatal aviation events involving Part 121 air carriers occurred on September 11, 2001. These events accounted for 265 fatalities onboard the aircraft and 2,727 fatalities on the ground (table 3). The data associated with these events are not included in this review because criminal acts are typically excluded from aircraft accident reviews.

Table 3: September 11, 2001, Air Carrier Events

	Number of Fatalities Onboard	Number of Fatalities On Ground	Location
American Airlines Flight 11	92	2602*	World Trade Center New York, NY
United Airlines Flight 175	65		World Trade Center New York, NY
American Airlines Flight 77	64	125	Pentagon Arlington, VA
United Airlines Flight 93	44		Shanksville, PA

*Total fatalities at the World Trade Center accident site related to American Airlines flight 11 and United Airlines flight 175. Data from the New York City Medical Examiner's Office as of January 1, 2004.

For about 20 days after September 11, air carrier operations were suspended and gradually re-introduced.[2] This reduction in operations is most evident in air carrier flight hours and departures (shown in figures 2 and 3), two measures used to characterize air carrier activity and calculate accident rates. In 2001, flight hours declined 7 percent from the record set in 2000, and departures declined 12 percent. These reductions affect comparisons of 2001 activity measures and accident rates to data from previous years.

Historical Context for 2001 Air Carrier Accidents

The number of accidents and the accident rates for air carrier operations in 2001 were consistent with previous years. In general, the number of Part 121 accidents rose steadily from 1994–2000, and the number of Part 135 accidents fluctuated and decreased through 2001 (figure 1). As a group, scheduled and on-demand Part 135 operations consistently accounted for more accidents than Part 121. The decrease in both Part 121 and 135 accidents in 2001 was most likely due to decreased flight activity following September 11. This decrease was apparent in both flight hours and departures, as shown in figures 2 and 3, respectively. Reclassification of some scheduled Part 135 operations to Part 121 in 1997, discussed in Appendix C, caused an increase in Part 121 accidents, hours, and departures beginning that year.

[2] Ronald Reagan Washington National Airport in Washington, D.C., was the last major airport serving Part 121 and Part 135 operators to re-open on October 1, 2001. A number of smaller airports, primarily serving general aviation, remained closed after October 1.

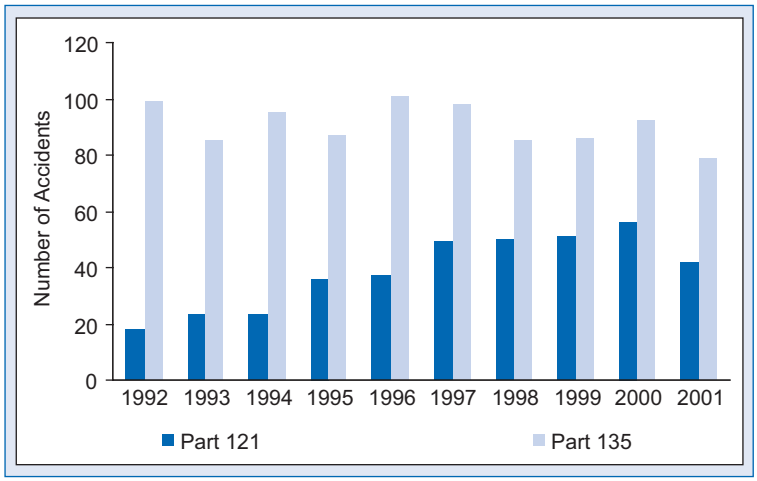

Figure 1: U.S. Air Carrier Accidents by FAR Part, 1992-2001

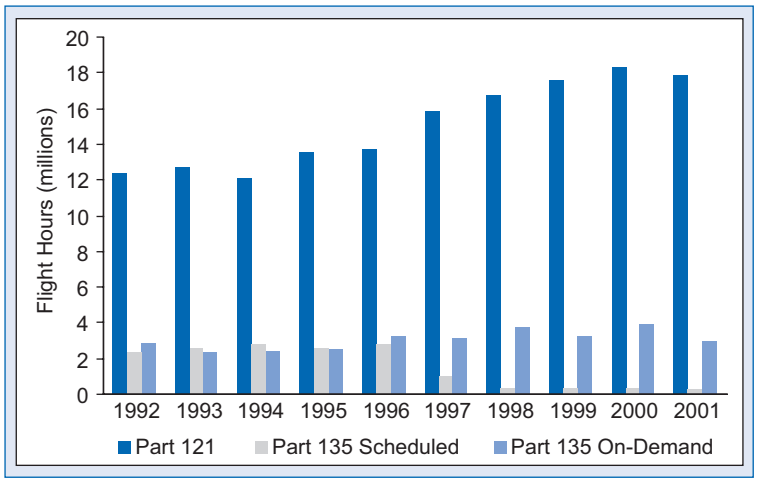

Figure 2: Flight Hours by FAR Part, 1992-2001

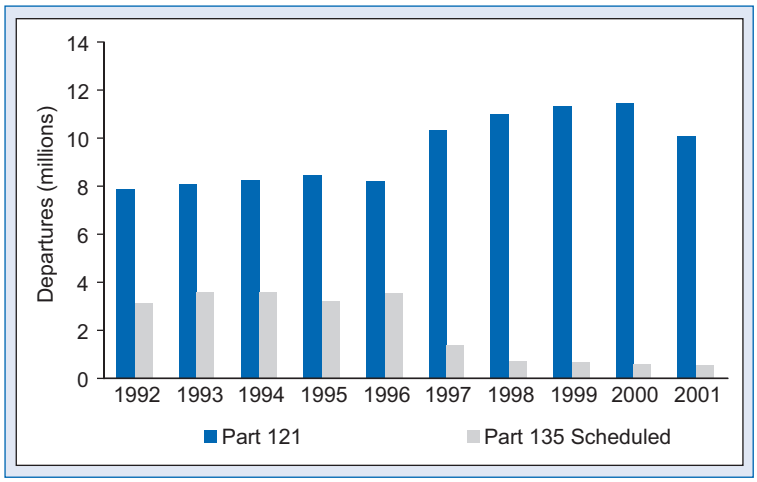

Figure 3: Scheduled Departures by FAR Part, 1992-2001

The flight activity data shown in figures 2 and 3 are compiled differently depending on the type of operation. Part 121 and scheduled Part 135 operations are required to report actual flight hours, and as a result, flight activity data for these operations are considered to be accurate. In contrast, on-demand Part 135 operations are not required to report flight activity data. These data are estimated using the voluntary *General Aviation and Air Taxi Activity (GAATA) Survey*, which is compiled annually by the FAA. This survey gathers information from a sampling of owners of general aviation and on-demand Part 135 aircraft. This information includes flight hours, avionics, base location, and use, but does not include miles flown or departures. The small proportion of on-demand Part 135 aircraft surveyed, combined with a sample based on aircraft owners rather than operators and low survey response rates, produces an imprecise activity estimate. The way in which on-demand Part 135 flight hours are estimated is discussed in more detail in Appendix C.

Estimates of on-demand Part 135 aircraft activity are further complicated by the fact that, in 2002, the FAA changed its estimating method and revised its flight-hour estimates for on-demand Part 135 operations. The revised method calculates activity based on the number of aircraft assumed to operate in on-demand operations[3] and the average number of flight hours reported on the *GAATA Survey*, and is applied retroactively to survey data for 1992–2000. As a result, FAA's flight-hour estimates for on-demand Part 135 flight operations beginning in 1992 are substantially higher than they would be using the previous method, and accident rates are consistently lower. The *Review of 2001 Aircraft Accident Data* uses the revised activity measures for on-demand Part 135 operations.

In 2001, scheduled Part 135 operations represented a small segment of air carrier operations: less than 2% of air carrier flight hours (figure 2) and approximately 5% of scheduled air carrier departures (figure 3). As a result, scheduled Part 135 operations accounted for a small proportion of Part 135 accidents (figure 4). Consequently, the Part 135 discussion in this review emphasizes on-demand operations.

[3] Data are derived from the FAA's Vital Information Subsystem, a database used to track commercial and government operations certificates.

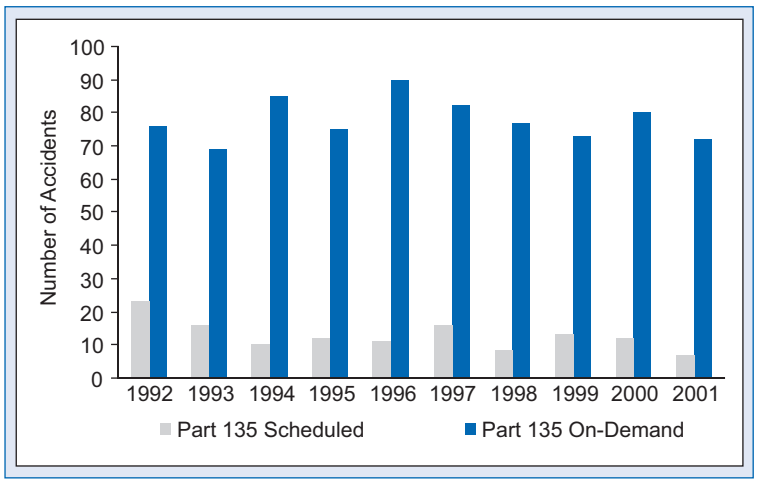

Figure 4: Part 135 Accidents by Type of Operation, 1992-2001

Although the number of Part 121 accidents increased from 1992–2001, the number of fatal Part 121 accidents remained relatively constant and low (figure 5). The number of on-demand Part 135 fatal accidents varied considerably from year to year (also shown in figure 5). In general, fatal Part 121 accidents accounted for less than 2% of all air carrier accidents from 1992–2001, and fatal on-demand Part 135 accidents accounted for only 12% of all air carrier accidents.

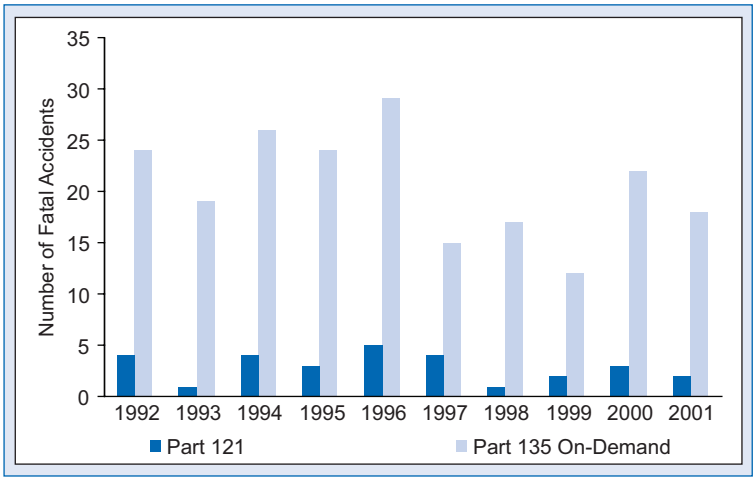

Figure 5: U.S. Air Carrier Fatal Accidents by FAR Part, 1992-2001

Accident rates for Part 121 and on-demand Part 135 operations reflect similar patterns (figure 6). Although the number of Part 121 accidents increased slightly toward the end of the period, the accident rate for Part 121 remained relatively constant from 1992–2001. On-demand Part 135 accident rates decreased overall from 1994–1998, rising slightly thereafter. Throughout the period, the accident rate for on-demand Part 135 operations (and for Part 135 operations in general) remained almost 10 times greater than the Part 121 accident rate. The following sections consider in more detail accident data for Part 121 and Part 135 air carrier operations.

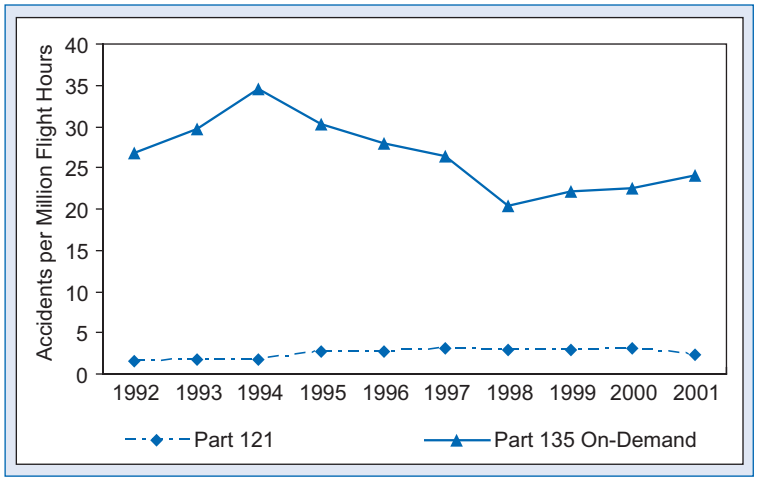

Figure 6: U.S. Air Carrier Accident Rates by FAR Part, 1992-2001

PART 121 ACCIDENTS IN 2001

Part 121 operations in 2001 carried more than 629 million passengers a total of 7.2 billion miles and accumulated more than 17.8 million flight hours. The 42 Part 121 accidents involved 44 aircraft, produced an accident rate of 2.36 accidents per million flight hours, and resulted in 266 fatalities, 19 serious injuries, and 25 minor injuries (as shown in table 4). All 266 fatalities resulted from two accidents:

- On August 5, 2001, a US Airways Express/Piedmont employee at Washington Reagan National Airport was fatally struck by the right propeller blades of a US Airways de Havilland Dash 8 operating as flight 3340.
- On November 12, 2001, American Airlines flight 587, an Airbus A300-605R on a scheduled flight to Santo Domingo, Dominican Republic, crashed into a neighborhood in Belle Harbor, New York, shortly after takeoff from John F. Kennedy International Airport, killing all 260 persons aboard and 5 people on the ground.

Few passengers were injured in Part 121 accident flights in 2001 (table 4). The risk of injury to Part 121 passengers remained low: only 1 of about 2.1 million passengers who boarded a Part 121 air carrier flight was injured in an accident, and only 1 of every 215,000 Part 121 passengers was involved in an accident. Of the 2,924 passengers involved in Part 121 accidents, less than 10% received any type of injury. The number of flight and cabin crewmembers injured in Part 121 accidents was also small: of the 94 flight crewmembers involved, only 5 sustained injuries, and of the 100 cabin crew involved, 20 sustained injuries. Cabin crewmembers were four times as likely to be injured as flight crewmembers.

Table 4: Part 121 Injuries by Role in 2001

	Fatal	Serious	Minor	None	Total
Flight crew	2		3	89	94
Cabin crew	7	10	3	80	100
Other crew			1	4	5
Passengers	251	7	16	2,650	2,924
Total aboard	**260**	**17**	**23**	**2,823**	**3,123**
On ground	6	2	2		10
Total	**266**	**19**	**25**	**2,823**	**3,133**
Accidents	2	19	6	15	42

Only three Part 121 accidents occurred outside of the United States and its territories. Two of these accidents involved encounters with turbulence at cruising altitudes. In addition, 11 accidents were cargo-only flights, all but 2 of which occurred in Alaska. (See Appendix A.)

Accidents, Accident Severity, and Injuries

The number of Part 121 accidents more than doubled after 1994 (figure 7). The increase was primarily due to nonfatal injury-only and damage-only accidents.[4] Since 1994, nonfatal injury-only accidents doubled and damage-only accidents tripled in frequency, while the most serious types of accidents—those resulting in fatalities and substantial damage to the aircraft (either *major* or *serious* in severity)—remained at a constant, low level. The data for 2001 were consistent with this pattern: almost all of the accidents (95%) were nonfatal injury-only or damage-only accidents. Accident rates based on flight hours (figure 8) and departures (figure 9) showed the same pattern, and highlight how much the rate of damage-only accidents increased and how little the rate of more severe accidents changed from 1992 through 2001. The decline for all measures in 2001 was most likely due to the reduced air carrier activity after September 11. The marked increase in the number of Part 121 accidents in 1997 was due in part to the Part 121/135 reclassification that occurred in March of that year. Since 1982, all aircraft involved in Part 121 accidents were airplanes.

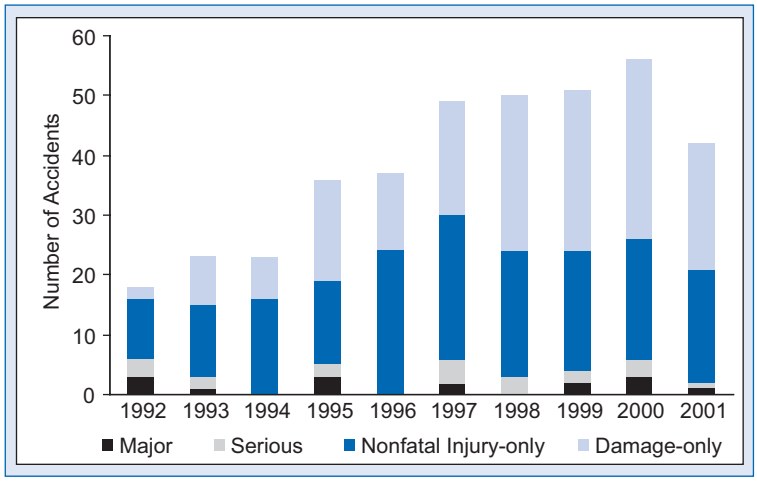

Figure 7: Part 121 Accidents by Severity Classification, 1992-2001

[4] The severity of a Part 121 accident is classified into one of four categories defined in Appendix B. Briefly, an accident is *major* if there is at least one fatality and substantial damage to the aircraft, *serious* if there is at least one serious injury and substantial damage to the aircraft; *injury-only* if there are nonfatal injuries and no damage to the aircraft; and *damage-only* if there are no injuries but the aircraft is substantially damaged.

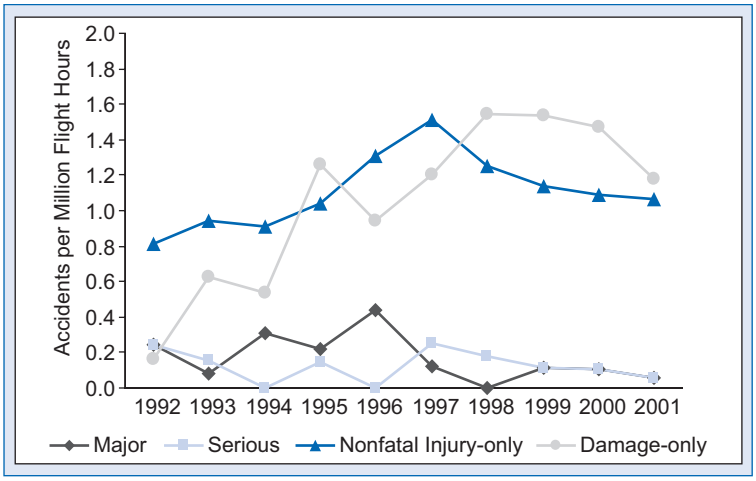

Figure 8: Part 121 Accident Rates (using Flight Hours) by Severity Classification, 1992-2001

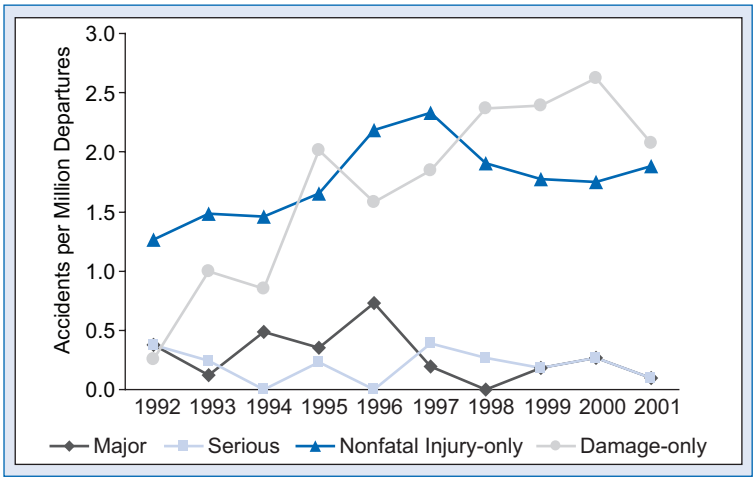

Figure 9: Part 121 Accident Rates (using Departures) by Severity Classification, 1992-2001

These data, especially injury data, can be dramatically affected by a few severe accidents in a given year. For instance, figure 10 shows that a large number of fatalities (1,053 total) occurred in 1994, 1995, 1996, and 2001; almost all of these injuries (965) were attributed to 6 of the 138 Part 121 accidents[5] that occurred in those years. In general, however, the proportion of people injured in Part 121 accidents during the 10-year period was small.[6]

[5] USAir flight 427 on September 8, 1994, resulted in 132 fatalities; American Eagle flight 4184 on October 31, 1994, resulted in 68 fatalities; American Airlines flight 965 on December 20, 1995, resulted in 160 fatalities; ValuJet flight 592 on May 11, 1996, resulted in 110 fatalities; TWA flight 800 on July 17, 1996, resulted in 230 fatalities; and American Airlines flight 587 on November 12, 2001, resulted in 265 fatalities.

[6] *Survivability of Accidents Involving Part 121 U.S. Air Carrier Operations, 1983 through 2000*, Safety Report NTSB/SR-01/01 (Washington, DC: National Transportation Safety Board, 2001).

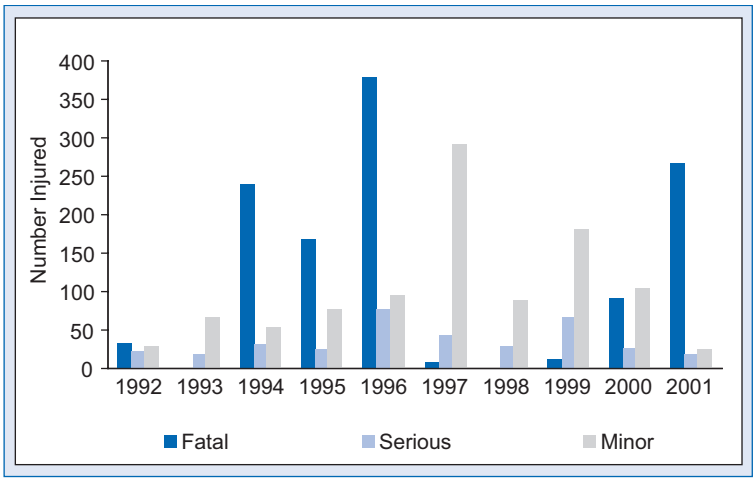

Figure 10: Number Injured by Level of Injury, Part 121 Accidents, 1992-2001

As might be expected, the largest number of fatal accidents from 1992–2001 occurred when the aircraft was destroyed or substantially damaged (table 5). However, the survivability of these more serious accidents was quite good: 87% of the accidents producing minor injuries and 94% of the accidents producing no injuries were associated with substantially damaged aircraft (tables 7 and 8). As shown in figure 7, these types of low-injury, damage-producing accidents increased toward the end of the 10-year period.

Table 5: Part 121 Fatal Accidents for Each Level of Damage, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Destroyed	2		3	3	4	1		1	2	1
Substantial			1		1					
Minor	1	1				1	1	1	1	1
None	1					2				

Table 6: Part 121 Serious-Injury Accidents for Each Level of Damage, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Destroyed	1	1								
Substantial	1	1		2		1	2	1	2	
Minor		1	3		5	5	6	2	3	
None	10	11	9	14	13	19	15	18	17	19

Table 7: Part 121 Minor-Injury Accidents for Each Level of Damage, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Destroyed					1	1		1	1	
Substantial		1	3	1	5	6	7		6	6
Minor										
None										

Table 8: Part 121 No-Injury Accidents for Each Level of Damage, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Destroyed										
Substantial	2	6	4	15	8	13	19	27	23	15
Minor				2	2			1	1	2
None									1	

In 2001, 19 serious-injury accidents involved no damage to the aircraft (table 6). Most of those accidents (63%) were the result of encounters with turbulence, a topic discussed in more detail later in this review. On average, 93% of the accidents in 1992–2001 producing serious injuries resulted only in minor damage or no damage to the aircraft.

The single fatality in 2001 associated with minor damage to an aircraft occurred when an air carrier ramp employee walked into a turning propeller (table 5). Fatalities resulting from contact with a turning propeller occur rarely in Part 121 operations because there are relatively few propeller-driven aircraft in that type of air carrier operation. From 1992–2001, this type of fatal accident occurred only two other times (each time resulting in a single fatality): once in 1993 and once in 1997.

Occurrences, Causes, and Factors

Investigators describe the events that took place during an accident as a sequence of occurrences, each identified with a phase of flight. The first occurrence associated with phase of flight describes the initiating event for an accident flight and the starting point of the accident in the time course of the flight. Table 9 shows first occurrence data by phase of flight for the aircraft involved in Part 121 accidents. Appendix C contains a more detailed discussion of occurrences and how they are coded.

Table 9: Part 121 First Occurrences by Phase of Flight for 2001

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Standing	Taxiing	Total
In-flight Encounter with Weather	2	8				10
On Ground/Water Collision with Object			1	3	2	6
Miscellaneous/Other		2		2	1	5
Airframe/Component/ System Failure		1	3			4
Collision Between Aircraft (not midair)					3	3
Dragged Wing, Tail/Skid	1		1			2
In-flight Loss of Control	1		1			2
In-flight Collision with Object		1	1			2
Abrupt Maneuver	1	1				2
Hard Landing			1			1
On Ground/Water Loss of Control			1			1
Propeller Blast or Jet Exhaust/Suction					1	1
Uncontrolled Altitude Deviation		1				1
Propeller Contact with Person					1	1
Wheels up Landing			1			1
Total Accident Airplanes	5	14	10	5	8	42

In-flight encounters with weather were the most frequently cited accident-initiating events in Part 121 operations, and occurred most frequently during cruise and descent. In 2001, all in-flight encounters with weather during cruise and descent were attributed to turbulence, and all of these accidents resulted in serious injuries. Turbulence is the single most-often cited cause or factor in Part 121 accidents resulting in serious injuries.

In 2001, turbulence was cited as a factor in about a third of all Part 121 accidents and was a factor in 63% of all serious-injury accidents. Turbulence typically accounted for a quarter or more of all Part 121 accidents from 1992–2001 and was the leading cause/factor in all Part 121 serious-injury producing accidents. As tables 10 and 11 show, turbulence accidents almost always resulted in serious injuries, but typically caused little or no damage to the aircraft.

Table 10: Part 121 Turbulence Accidents by Highest Level of Injury, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Fatal						1				
Serious	5	9	6	10	9	13	11	10	14	12
None	3									
% Total Accidents	44.4	39.1	26.1	27.8	24.3	28.6	22.0	19.6	25.0	32.4
% Serious Injury Accidents	80.0	81.8	66.7	71.4	69.2	68.4	73.3	55.6	82.2	63.2

Table 11: Part 121 Turbulence Accidents for Each Level of Damage, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Substantial	3						1			
Minor		1			2	2	2	1	1	
None	5	8	6	10	7	12	8	9	13	10

After cruise and descent, approach/landing was the second-most often cited phase of flight, involving 10 (24%) Part 121 accident airplanes. Three approach/landing accidents resulted from an airframe, component, or system failure: an engine fire on approach to landing, a collapsed right main landing gear on touchdown, and a nose gear that collapsed while the aircraft was towed. Seven additional approach/landing accidents were associated with different first occurrences, including one wheels-up landing.

The two phase-of-flight categories related to ground operations (standing and taxiing) together accounted for 13 of the Part 121 accidents in 2001. Two of these accidents occurred as the aircraft was pushed back from the gate, two as ground vehicles struck the aircraft, two as passengers were injured while exiting the aircraft (once during an emergency evacuation), and one when the wing tip of a taxiing aircraft struck another aircraft. Two accidents involved ramp personnel: one person was fatally injured when struck by a turning propeller, and another was seriously injured by jet blast from a taxiing aircraft. One landing accident (collapsed nose wheel) was traced to damage that had occurred during taxi operations at the departure airport.

Table 12 relates the severity of an accident to phase of flight for the initiating event. Approach/landing accidents most often resulted in a damaged aircraft, but no injuries, while cruise or descent was more often associated with injury-only accidents (which is consistent with the discussion of turbulence). Half the accidents involved only damage to the aircraft, and standing and taxiing accounted for about 15% of the damage-only accidents.

Table 12: Part 121 Accidents, Severity Classification by Phase of Flight for 2001

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Standing	Taxiing	Total
Major	1					1
Serious					1	1
Injury	2	12		2	2	18
Damage	2	2	10	3	5	22
Total	5	14	10	5	8	42

Historically, personnel are cited as a cause or factor in 70–80% of all Part 121 accidents, followed by weather and aircraft-related causes. Calendar year 2001 was consistent with this pattern (as shown in figure 11), with personnel cited in nearly 82% of the Part 121 accidents, weather in 51%, and aircraft in almost 18%. Note that the number of accidents citing the environment (especially weather) increased steadily from 1998 through 2001.

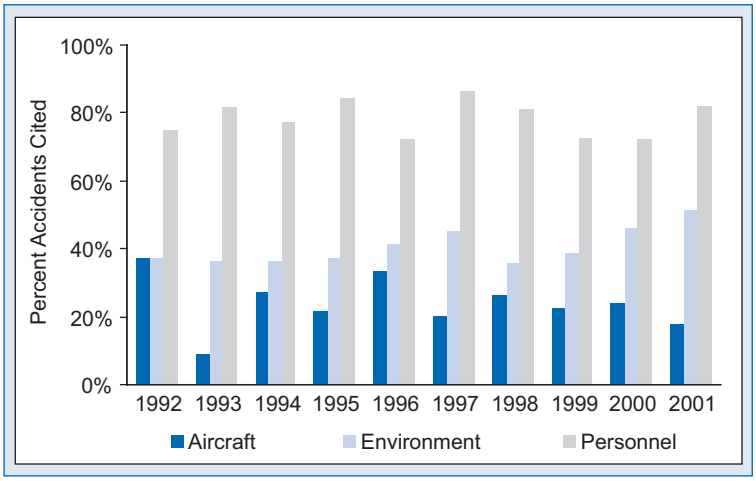

Figure 11: Broad Causes/Factors for Part 121 Accidents 1992-2001

Figure 12 provides more detail about Part 121 accident causes and factors within the broad categories of personnel, aircraft, and environment. These data show the proportion of accidents where a specific cause or factor was cited at least once in the accident. Pilots were the most frequently cited cause or factor (49%), but a quarter of the accidents were attributed to people not aboard the aircraft, such as ground personnel and air traffic controllers. Weather conditions were the most frequently cited environmental cause or factor (30%) and second only to pilots.

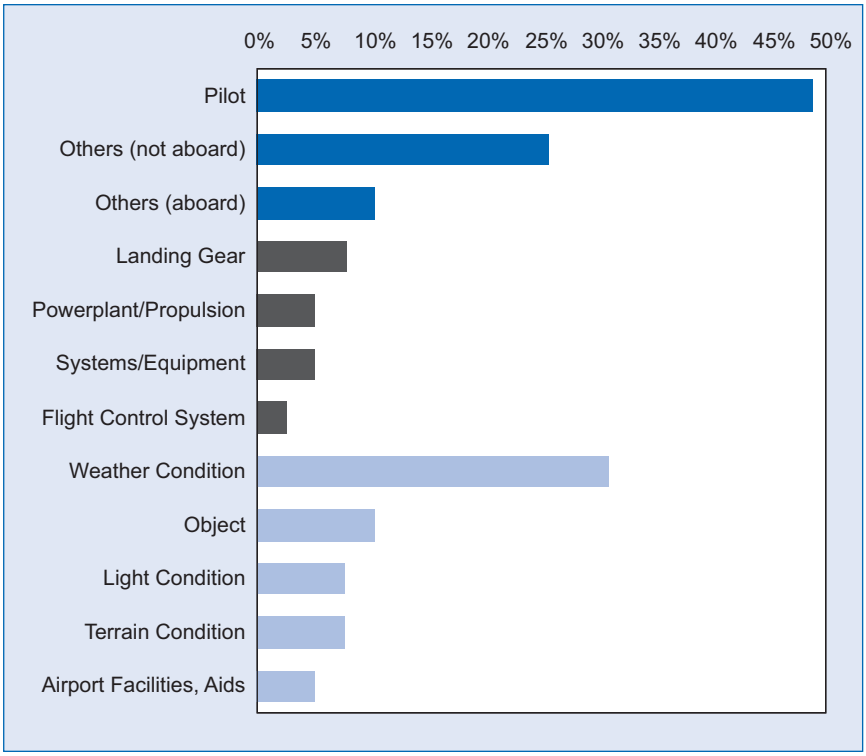

Figure 12: Top Causes/Factors in Part 121 Accidents for 2001

PART 135 ACCIDENTS IN 2001

Part 135 applies to commercial air carriers that operate commuter flights (scheduled Part 135), charters and air taxis (on-demand Part 135), and cargo flights (which can be both scheduled and on-demand). In 2001, there were 79 Part 135 accidents (table 13). Of these, the 7 scheduled and 72 on-demand accidents produced accident rates of 23.3 and 24.0 accidents per million flight hours, respectively. Part 135 accidents resulted in 73 fatalities, 28 serious injuries, and 24 minor injuries (table 14). The following six accidents accounted for 85% of the fatalities:

- On March 29, 2001, a Gulfstream III, operated by Avjet Corporation as an on-demand charter flight, crashed on final approach to Aspen-Pitkin County Airport, Aspen, Colorado, killing the 18 people on board.

- On July 30, 2001, a wheel-equipped Piper PA-32-300 airplane, operated by LAB Flying Service, Inc., as an on-demand air tour flight, was destroyed when it impacted mountainous terrain adjacent to the Davidson Glacier, approximately 13 miles southwest of Haines, Alaska, killing the 6 people on board.

- On August 10, 2001, a Eurocopter AS350-B2 helicopter, operated by Papillon Grand Canyon Helicopters, Inc., as an on-demand air tour flight, collided with terrain during an uncontrolled descent about 4 miles east of Meadview, Arizona, killing the 6 people on board.

- On August 25, 2001, a Cessna 402B, operated by Blackhawk International Airways, Inc., as an on-demand charter flight, crashed shortly after takeoff from Marsh Harbour Airport, Bahamas, killing the 9 people on board.

- On October 3, 2001, a Cessna 172N, operated as West Isle Air scheduled flight 125, crashed shortly after takeoff from the Decatur Shores Airstrip, Decatur Island, Washington, killing the 3 people on board.

- On October 10, 2001, a Cessna CE-208, operated as Peninsula Airways, Inc. (PenAir), scheduled flight 350, crashed shortly after takeoff from the Dillingham Airport, Alaska, killing the 10 people on board.

Table 13: Part 135 Accidents, Highest Injury by Type of Operation in 2001

	Scheduled	On-Demand	Total
Fatal	2	18	20
Serious	2	9	11
Minor	0	7	7
None	3	38	41
Total	**7**	**72**	**79**

Table 14: Part 135 Occupant Injuries, Injury Severity by Type of Operation in 2001

	Scheduled	On-Demand	Total
Fatal	13	59	72
Serious	4	24	28
Minor	2	22	24
None	12	145	157
Total	**31**	**250**	**281**

Although on-demand accidents accounted for most Part 135 accidents and injuries, accident rates for both types of Part 135 operations were approximately the same in 2001 (figure 13), but that has not always been the case in previous years. The on-demand Part 135 accident rate remained generally constant from 1998–2001. During the same period, the scheduled Part 135 accident rate rose considerably above the on-demand rate with the Part 121/Part135 reclassification in 1997, and then declined substantially from 1999 to 2001. Note that the on-demand Part 135 accident rate peaked in 1994, and then steadily declined until 1998.

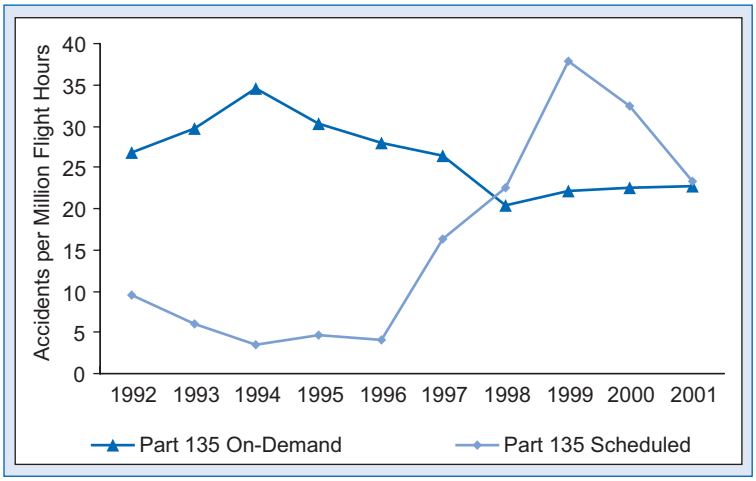

Figure 13: Part 135 Accident Rates, 1992-2001

In general, Part 135 accident rates were substantially higher than Part 121 accident rates in the same years. In 2001, the rates for Part 135 operations were 10 times greater than for Part 121 operations, and the Part 135 fatal accident rates were more than 50 times greater than Part 121 (as shown in tables 1 and 2). These rates were, however, substantially lower than the rates for general aviation, a segment of civilian aviation that flies aircraft similar to those flown by Part 135 operators. In 2001, the general aviation accident rate was 67.8 accidents per million flight hours, and the fatal accident rate was 12.7 fatal accidents per million flight hours.[7] In contrast, the scheduled Part 135 accident rate was 23.3 accidents per million flight hours and the fatal accident rate was 6.66; the on-demand Part 135 accident rate was 24 accidents per million flight hours and the fatal accident rate was 6 accidents per million flight hours.

As previously mentioned, the FAA uses the *GAATA Survey* to estimate on-demand Part 135 flight hours. Although the fleet of on-demand Part 135 aircraft comprises both fixed-wing airplanes and helicopters, the FAA's flight hour estimate does not distinguish between the two types of aircraft. To estimate the flight hours associated with airplanes and helicopters, the FAA uses the fleet composition data in the *GAATA Survey* to estimate the proportion of airplanes and helicopters in the charter and air taxi fleet, and then uses that estimate to determine the proportion of flight hours to be assigned to each type of aircraft. In 2001, airplanes accounted for approximately 71% of the fleet, and helicopters accounted for 20% (table 15). As a result, the flight-hour estimates for fixed-wing airplanes and for helicopters presented in this review are based on the proportion of the fleet accounted for by each type of aircraft. For comparison, table 15 shows 2001 flight hours from the *GAATA Survey* as initially compiled and the estimate reported by the FAA using the revised method, along with the flight hours for each type of aircraft. It is worth noting that, given the larger number of flight hours using FAA's revised method, the overall accident rate is lower than it would be otherwise. See Appendix C for a discussion of FAA's revised estimating method.

Table 15: Comparison of On-Demand Part 135 Flight Hours for 2001

	On-Demand Active Fleet Size	Flight Hours Reported in the GAATA Survey	Flight Hours Using FAA Estimate
Airplane	2,880	1,384,519	2,127,870
Helicopter	819	180,083	599,400
Overall[a]	4,064	1,564,602	2,997,000

[a] In addition to airplanes and helicopters, the GAATA Survey estimate of the on-demand Part 135 fleet includes the following aircraft: 52 lighter-than-air, 123 amateur-built , 253 experimental, and 180 other.

[7] NTSB Press Release SB-04-09, March 22, 2004, Table 10.

On-demand Part 135 accident rates for airplanes and helicopters in 2001, based on the FAA estimate of flight hours, are shown in table 16. Helicopters accounted for 25% of the on-demand Part 135 accidents and produced an accident rate greater than airplanes. The fatal accident rate for helicopters was, however, slightly lower than the rate for airplanes, implying that the more frequent helicopter accidents were perhaps less likely to result in a fatality. The proportion of on-demand Part 135 accidents attributable to helicopters was low and constant in 1995 through 1998, but steadily increased after that period (table 17).

Table 16: On-Demand Part 135 Accidents, Fatal Accidents, and Accident Rates for 2001

	Accidents	Fatal Accidents	Flight Hours	Accidents per million flight hours	Fatal Accidents per million Flight Hours
Airplane	54	15	2,127,870	25.4	7.0
Helicopter	18	3	599,400	30.0	5.0
Overall	72	18	2,997,000	24.0	6.0

Table 17: On-Demand Part 135 Accidents, Airplane and Helicopter, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Airplane	60	55	68	66	80	73	66	59	63	54
Helicopter	16	14	17	10	11	10	11	15	17	18
% Helicopter	21.1%	20.3%	20.0%	13.2%	12.1%	12.0%	14.3%	20.3%	21.3%	25.0%

On-Demand Part 135 Accident Severity and Injuries

The potential for injury in Part 135 accidents is much greater than in Part 121 accidents. Almost half the Part 135 accidents in 2001 resulted in injuries and a quarter of the accidents were fatal (table 13). Although less than 10% of the people in Part 121 accident aircraft in 2001 suffered any injury, fully 43% of the people on board on-demand Part 135 accident aircraft were injured (40% of the crew and 43% of the passengers), and more than half the injuries were fatal (table 18). The pattern of injuries in 2001 is consistent with previous years, as shown in figure 14. Although a few accidents can substantially increase the number of injuries in any single year, the relatively small number of passengers carried by on-demand Part 135 aircraft limits the number of people that can be injured in a single accident.[8]

[8] On-demand Part 135 operators are limited to aircraft with a maximum seating capacity (not including the crew) of 9 passengers in piston-engine airplanes, 30 passengers in turbo-prop or jet airplanes, and 12 passengers in helicopters.

As might be expected, the potential for fatal or serious injury increases with the level of aircraft damage. In 2001, 15 of the 18 fatal on-demand Part 135 accidents occurred when the aircraft was destroyed, and 8 of 9 serious-injury accidents occurred when the aircraft was either destroyed or substantially damaged. The pattern was consistent from 1992–2001: 88% of the fatal accidents occurred when the aircraft was destroyed (table 19) and approximately 91% of the serious-injury accidents occurred when the aircraft was substantially damaged or destroyed (table 20).

Table 18: On-Demand Part 135 Accident Injuries by Role for 2001

	Fatal	Serious	Minor	None	Total
Flight crew	22	6	6	50	84
Cabin crew	1				1
Other crew	1			4	5
Passengers	35	18	16	91	160
Total aboard	**59**	**24**	**22**	**145**	**250**
On ground	1				1
Other aircraft					0
Total	**60**	**24**	**22**	**145**	**251**
Accidents	18	9	7	38	72

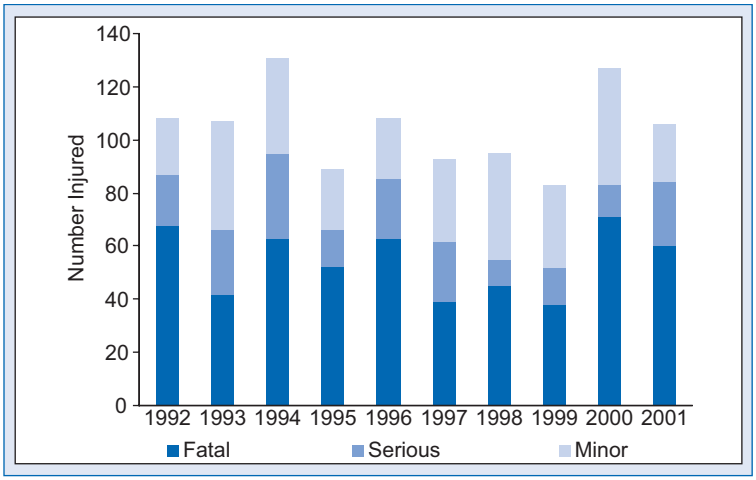

Figure 14: On-Demand Part 135 Accidents
Number Injured by Level of Injury, 1992-2001

However, the survivability of on-demand Part 135 accidents can be quite good: 83% of the minor-injury accidents and 97% of the no-injury accidents from 1992–2001 occurred when the aircraft was substantially damaged (tables 21 and 22). In 2001, the two accidents that involved destroyed aircraft, but caused no injuries, included a helicopter that was severely damaged by fire after landing and a twin-engine Cessna that ditched in the ocean. The single fatality that occurred in a no-damage accident involved a passenger who was attempting to board a Sikorsky SK-76A helicopter and was struck by a main rotor blade. Such fatalities rarely occur in on-demand Part 135 operations and, from 1992–2000, occurred only one other time, in 1994.

Table 19: On-Demand Part 135 Fatal Accidents for Each Level of Damage, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Destroyed	21	19	21	19	28	14	15	11	19	15
Substantial	3		4	5	1	1	2	1	3	2
Minor										
None			1							1

Table 20: On-Demand Part 135 Serious-Injury Accidents for Each Level of Damage, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Destroyed	2	4	1		7	3		2	2	1
Substantial	3	4	7	5	2	9	3	6	3	7
Minor								1		
None			1		2	2				1

Table 21: On-Demand Part 135 Minor-Injury Accidents for Each Level of Damage, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Destroyed	1	2	2	1	1	5	4		2	1
Substantial	8	11	11	6	9	9	12	11	12	6
Minor										
None					1					

Table 22: On-Demand Part 135 No-Injury Accidents for Each Level of Damage, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Destroyed	2			1	1	1				2
Substantial	35	29	37	38	39	38	41	41	38	36
Minor	1			1		1		1	1	

On-demand Part 135 data for 2001 seemed to suggest that a person in a helicopter was more likely to be injured than a person in an airplane: 51% of the people on helicopters suffered some form of injury in an accident compared with 38% of the people in airplanes (table 23). A greater proportion of people injured in helicopter accidents (74%) suffered serious or minor injuries, compared with a much smaller proportion, 25%, in airplanes. However, fatal injuries were much greater in airplanes than in helicopters: 75% of the people in airplane accidents were fatally injured compared with only 26% in helicopter accidents.

Table 23: On-Demand Part 135 Accidents, Injuries by Type of Aircraft in 2001

	Airplane	Helicopter	Total
Fatal	50	10	60
Serious	9	15	24
Minor	8	14	22
None	107	37	144
Total	**174**	**76**	**250**

The difference in injury severity between airplanes and helicopters in 2001 was consistent, for the most part, with data from previous years. Figures 15 and 16 show the proportion of injuries—subdivided into fatal and nonfatal injuries—for airplanes and helicopters from 1992–2001. Except for 1996 and 1998,[9] the proportion of fatal injuries was always less in helicopters than in airplanes, reflecting the similarity in fatal accident rates for the two types of aircraft. These data were tempered, however, by a helicopter accident rate greater than that for airplanes. Some of the difference between helicopters and airplanes appears to be due to the factors underlying on-demand Part 135 accidents, a topic discussed in the next section.

[9] Three accidents accounted for 15 of the 17 fatalities in on-demand helicopters in 1998: a sightseeing flight on the island of Kauai, Hawaii, on June 25 (6 fatalities); an air taxi flight at Indian Trail, North Carolina, on May 25 (5 fatalities); and a medical evacuation flight near Sandy, Utah, on January 11 (4 fatalities).

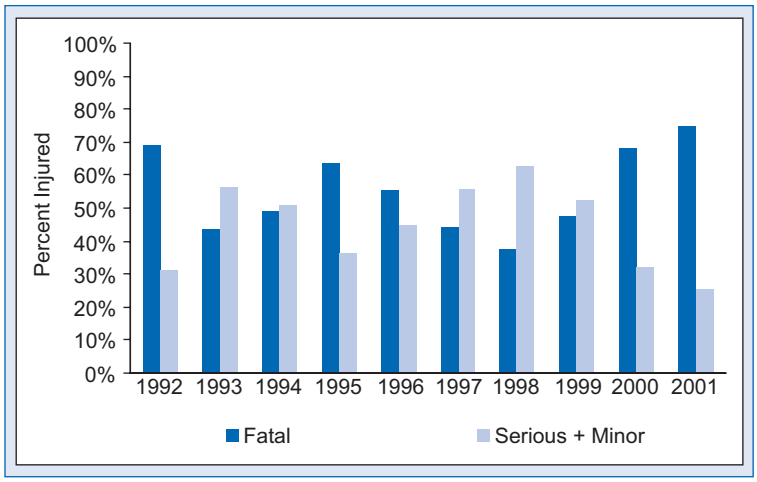

Figure 15: On-Demand Part 135 Accidents, Airplanes
Percent Injured by Level of Injury, 1992-2001

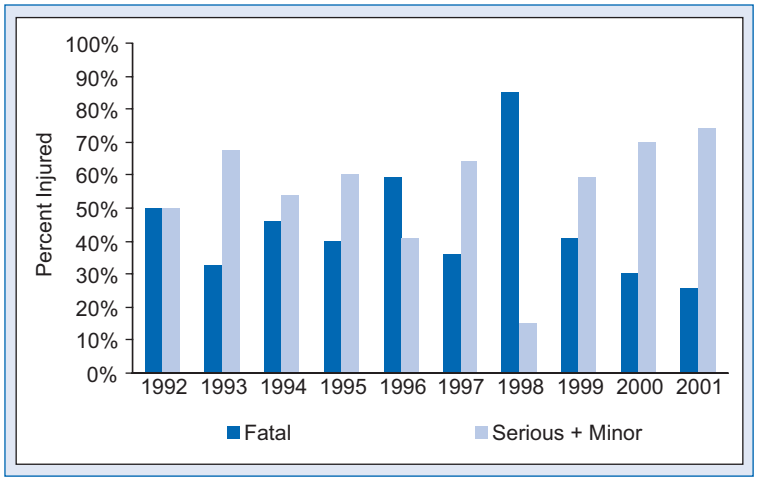

Figure 16: On-Demand Part 135 Accidents, Helicopters
Percent Injured by Level of Injury, 1992-2001

Occurrences, Causes, and Factors

The factors underlying on-demand Part 135 accidents are characterized in the data in the same way as for Part 121 accidents: as a sequence of occurrences, each identified with a phase of flight, that describe the events that took place during the accident. In association with occurrences, investigators also indicate the causes and factors in an accident. The first occurrence associated with phase of flight describes the initiating event for an accident flight. Tables 24 and 26 show first occurrence data by phase of flight for airplanes and for helicopters involved in on-demand Part 135 accidents. A more detailed discussion of occurrences and how they are used is presented in Appendix C.

For airplanes, 25% of the first occurrences were associated with in-flight collisions with terrain, water, or an object. Approximately 20% of the airplane accidents were initiated by airframe, component, or system failures or loss of engine power. Takeoff or climb and approach or landing accounted for most (78%) of the airplane accidents and most (76%) of the fatal and serious airplane accidents (table 25). This pattern was consistent with Part 121 accidents with one notable exception: although most of the injury-producing accidents in Part 121 operations occurred during cruise flight (table 12) and were typically associated with turbulence, turbulence was rarely cited as a cause or factor in on-demand Part 135 accidents.

For on-demand Part 135 helicopter accidents in 2001, most of the initiating events were the result of an airframe, component, or system failure, or a total or partial loss of engine power, and usually occurred during cruise flight (table 26). In-flight collision with terrain, water, or an object was the second-most frequently cited first occurrence, accounting for 22% of the on-demand Part 135 helicopter accidents in 2001. As might be expected, helicopter loss-of-control accidents occurred during approach or landing, or while maneuvering or hovering.

In contrast to airplane accidents, the on-demand Part 135 helicopter accidents that produced fatal or serious injuries were distributed across all phases of flight (table 27). Only 3 of the 18 helicopter accidents were fatal, and one of the fatal accidents occurred when a passenger was struck by a helicopter main rotor blade while boarding. Slightly more than half of the helicopter accidents resulted in either minor injuries or no injuries.

Table 24: On-Demand Part 135 Airplanes, First Occurrences by Phase of Flight for 2001

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Maneuver	Taxiing or Standing	Total
In-flight Collision with Terrain or Water	1		4	2		7
In Flight Collision with Object	1	1	3	1		6
Loss of Engine Power	3	3				6
Airframe, Component, System Failure		1	3			4
In-flight Encounter with Weather	3	1				4
Loss of Control - In flight			4			4
Loss of Control - On Ground/Water			3			3
Gear Collapsed			2			2
Miscellaneous/Other	2					2
On-surface Encounter with Terrain or Water	1				1	2
On-surface Encounter with Weather	1		1			2
Collision between Aircraft (Not Midair)					1	1
Gear Retraction on Ground			1			1
Loss of Engine Power (Partial) Nonmechanical	1					1
Loss of Engine Power Mechanical	1					1
Loss of Engine Power Nonmechanical			1			1
On-surface Encounter with Object	1					1
Overrun	1					1
Undershoot			1			1
Main Gear Collapsed			1			1
Total	16	6	24	3	2	51

Table 25: On-Demand Part 135 Airplane Accident Severity by Phase of Flight for 2001

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Maneuver	Taxiing	Total
Fatal	2	2	7	2		13
Serious	1		3			4
Minor	1	1	1			3
None	12	3	13	1	2	31
	16	6	24	3	2	51

Table 26: On-Demand Part 135 Helicopters, First Occurrences by Phase of Flight for 2001

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Maneuver or Hover	Standing	Other	Total
Loss of Control - In Flight			1	2			3
Airframe, Component, System Failure		1	1		1		3
Loss of Engine Power Mechanical		2					2
Loss of Engine Power	1	1					2
In-flight Collision with Terrain or Water		1	1				2
In-flight Collision with Object		1		1			2
Rotor Contact with Person					1		1
Miscellaneous/Other				1			1
Loss of Engine Power Nonmechanical	1						1
Fire						1	1
Total	2	6	3	4	2	1	18

Table 27: On-Demand Part 135 Helicopter Accident Severity by Phase of Flight for 2001

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Maneuver or Hover	Standing	Total
Fatal		1		1	1	3
Serious	2	1	1	1		5
Minor		2	1		1	4
None		2	1	2		5
	2	6	3	4	2	17

For each on-demand Part 135 accident, the role played by personnel, aircraft, and the environment is cited by the investigator. In 2001, pilots of on-demand Part 135 accident aircraft were the most frequently cited cause or factor as shown in table 28. Note, however, that helicopter pilots were cited less frequently than airplane pilots as causes or factors. Although weather and terrain were the most-frequently cited environmental causes or factors for both airplanes and helicopters, terrain was cited more than twice as often for helicopters as for airplanes, underscoring the different operational environment for helicopters. Interestingly, aircraft factors were cited more frequently than environmental factors in helicopter accidents, with the engine and propulsion system being cited more than twice as often in helicopter as in airplane accidents. Although aircraft factors were cited less frequently than either personnel or the environment, those factors were cited in twice as many on-demand Part 135 accidents as Part 121 accidents.

Table 28: On-Demand Part 135 Accidents, Top Causes/Factors in 2001

	Percent Airplane Accidents	Percent Helicopter Accidents
Personnel	84%	78%
Pilot	84%	56%
Others (aboard)		6%
Others (not aboard)	16%	17%
Aircraft	31%	50%
Powerplant/propulsion	12%	22%
Flight control systems	2%	6%
Aircraft structure	8%	6%
Landing gear	10%	6%
Systems and equipment	2%	6%
Environment	65%	44%
Weather condition	39%	22%
Terrain condition	20%	39%
Light condition	16%	6%
Object	12%	
Airport/airways facilities, aids	4%	

The pattern of causes and factors for on-demand Part 135 accidents in 2001 was consistent with previous years, as shown in tables 29 and 30. Pilots were the most frequently cited cause/factor in on-demand Part 135 accidents, followed by the environment. For both airplanes and helicopters, weather and terrain led the environmental category, and powerplants were the most frequently cited aircraft-related causes or factors. Historically, these patterns are consistent with Part 121 data; however, aircraft-related causes/factors were cited more frequently in on-demand Part 135 accidents than in Part 121 accidents, and the recent increase in environment-related causes and factors in Part 121 accidents was not evident in on-demand Part 135.

Table 29: On-Demand Part 135 Airplane Accidents, Top Causes/Factors, 1997-2001

	1997	1998	1999	2000	2001
Personnel					
Pilot	87%	79%	75%	80%	84%
Others (aboard)	4%		2%		
Others (not aboard)	13%	16%	21%	23%	16%
Aircraft					
Powerplant/propulsion	20%	16%	13%	18%	12%
Flight control systems		3%	2%		2%
Aircraft structure	4%	5%	5%	3%	8%
Landing gear	6%	16%	2%	5%	10%
Systems and equipment	3%	3%	2%	8%	2%
Environment					
Weather condition	30%	30%	23%	37%	39%
Terrain condition	36%	24%	25%	32%	20%
Light condition	13%	2%	7%	15%	16%
Object	7%	8%	7%	8%	12%
Airport/airways facilities, aids	4%	5%	7%	12%	4%

Table 30: On-Demand Part 135 Helicopter Accidents, Top Causes/Factors, 1997-2001

	1997	1998	1999	2000	2001
Personnel					
Pilot	60%	91%	94%	71%	56%
Others (aboard)	20%				6%
Others (not aboard)	40%	27%	19%	18%	17%
Aircraft					
Powerplant/propulsion	40%	36%		35%	22%
Flight control systems					6%
Aircraft structure	10%	9%			6%
Landing gear			6%		6%
Systems and equipment	10%				6%
Environment					
Weather condition	30%	27%	44%	35%	22%
Terrain condition	30%	9%	31%	29%	39%
Light condition	10%	18%	19%	18%	6%
Object	10%	18%		18%	
Airport/airways facilities, aids					

Scheduled Part 135 Accidents

Scheduled Part 135 operations represent a small segment of scheduled air carrier operations and accounted for less than 1.4% of the total air carrier flight hours in 2001. Seven accidents occurred in 2001 (table 13), resulting in 19 injuries (table 14). These accidents occurred in the United States: five in Alaska, one in Washington, and one in Massachusetts.[10]

As discussed previously, 4 of the 7 scheduled Part 135 accidents resulted in injuries, and 13 of the 31 people on board were fatally injured. All the fatalities were the result of two accidents:

- On October 3, 2001, a Cessna 172N, operated as West Isle Air flight 125, was substantially damaged after colliding with forested terrain shortly after takeoff from Decatur Shores Airstrip, Decatur Island, Washington, killing the 3 people on board.

[10] The preponderance of accidents in Alaska was due in part to the fact that over half of all scheduled Part 135 operators were certificated there. See *Aviation Safety in Alaska*, Safety Study NTSB/SS-95/03 (Washington, DC: National Transportation Safety Board, 1995).

- On October 10, 2001, Peninsula Airways, Inc. (PenAir), flight 350, a Cessna CE-208 Caravan, crashed shortly after takeoff from the Dillingham Airport (DLG), Dillingham, Alaska, killing the 10 people on board.

In 2001, 4 of the 7 scheduled Part 135 accidents resulted in injuries, and 13 of the 31 people on board were fatally injured (tables 13 and 14). Because both the number of scheduled Part 135 accidents and the number of people involved in those accidents are small, accident and injury data can vary widely as it did from 1992–2001 (figure 17). The relatively few scheduled Part 135 accidents every year make stable patterns in the data difficult to discern.

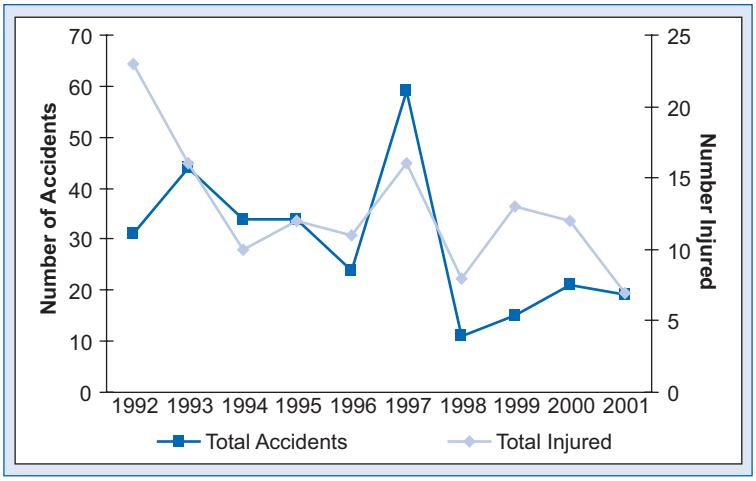

Figure 17: Scheduled Part 135 Accidents and Number People Injured, 1992-2001

Table 31: Scheduled Part 135 Accidents, First Occurrences by Phase of Flight for 2001

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Maneuver	Taxiing or Standing	Total
Loss of Control - In flight	2					2
In-flight Collision with Object	1		1			2
In Flight Collision with Terrain or Water				1		1
Overrun	1					1
Airframe/Component/ System Failure/Malfunction	1					1
Total	5	0	1	1	0	7

In 2001, five scheduled Part 135 accidents occurred during takeoff or climb, and the initiating events ranged from loss of control to overrun (table 31). Two fatal accidents occurred during takeoff and climb. The causes and factors cited in scheduled Part 135 accidents in 2001 were consistent with on-demand Part 135 accidents, as shown in table 32. The pilot was cited in all of the accidents as a cause or factor, with the environment (especially weather and terrain) cited in three accidents, and aircraft-related factors cited in two.

Table 32: Scheduled Part 135 Accidents
Causes/Factors Cited in 2001

	Causes and Factors Cited
Personnel	7
Pilot	7
Others (not aboard)	2
Aircraft	2
Flight control systems	1
Aircraft structure	1
Systems and equipment	1
Environment	3
Weather condition	2
Terrain condition	2
Light condition	1
Airport/airways facilities, aids	1

Appendix A

2001 Air Carrier Accident Data

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 8, 2001	N784CA	Passenger	Detroit, MI	Comair	Bombardier CL-600-2B19	Substantial	Minor	Damage	0	On Ground/Water Collision With Object	Standing - Engines(s) Not Operating
Probable Cause: The vehicle driver's inadvertent failure to place the column shifter into the parking gear. A factor to the accident was the vehicle.											
February 3, 2001	N3735D	Passenger	Boston, MA	Delta Airlines	Boeing B-737-832	Substantial	None	Damage	0	Collision Between Aircraft (Other Than Midair)	Taxi - From Landing
Probable Cause: The inadequate visual lookout by the MD-81's tug driver during the pushback operation.											
February 3, 2001	N802US	Passenger	Boston, MA	US Airways	McDonnell Douglas MD-81	Minor	None	Damage	0	Collision Between Aircraft (Other Than Midair)	Taxi - Pushback/tow
Probable Cause: The inadequate visual lookout by theMD-81's tug driver during the pushback operation.											
February 6, 2001	N1457B	Passenger and Cargo	Boston, MA	American Airlines	Fokker F28 MK 0100	Substantial	None	Damage	0	On Ground/Water Collision With Object	Standing - Engines(s) Operating
Probable Cause: The failure of the flight crew to follow the checklist prior to engine start, and their subsequent diverted attention during engine start.											
February 10, 2001	N97UX	Passenger	Chicago, IL	Great Lakes Aviation, Ltd., DBA United Express	Beech 1900D	Substantial	Minor	Damage	0	Wheels Up Landing	Landing - Flare/touchdown
Probable Cause: The flightcrew not lowering the landing gear and/or verifying the landing gear position as required by three separate checklists, which resulted in an inadvertent gear-up landing. A factor to the accident was the flightcrew not complying with the required minimum equipment list placard that prohibited the silencing of the landing gear warning horn.											
February 25, 2001	N288SW	Passenger	Monterey, CA	Skywest Airlines	Embraer EMB-120	None	Serious	Injury	0	Airframe/Component/System Failure/Malf	Descent - Normal
Probable Cause: Moisture contamination of the elevator trim actuators, which allowed the units to freeze at altitude resulting in an abrupt pitch change when the units thawed at lower altitudes.											
March 6, 2001	N822PH	Passenger and Cargo	Portland, OR	Horizon Air	de Havilland DHC-8-102	Substantial	None	Damage	0	Airframe/Component/System Failure/Malf	Approach
Probable Cause: The failure of the number 5 engine bearing assembly followed by the disconnection of the P2.5/P3 switching valve to rear inlet case sealing air tube and the melting of the NL probe port (sealing tube) which allowed an oil fed fire beyond the constraints of the engine casing and into the engine nacelle. A contributing factor was the company's failure to follow several maintenance procedures within the maintenance manual after a previous oil loss event. A second factor was the omission of the PW120A engine from the airworthiness directive issued by the FAA which mandated the completion of Pratt & Whitney service bulletin 20914. The lack of inclusion of the PW120A engine in the AD resulted in the company's correct interpretation that the service bulletin was not mandatory.											
March 11, 2001	N701NE	Cargo	Pohnpei Island, Federated States of Micronesia	Express One International	Boeing 727-223B	Substantial	None	Damage	0		
Probable Cause: Not available.											
March 17, 2001	N357NW	Passenger	Detroit, MI	Northwest Airlines	Airbus Industrie A320-200	Substantial	Minor	Damage	0	Loss Of Control - In Flight	Takeoff
Probable Cause: The pilot induced oscillations and the delay in aborting the takeoff. Factors associated with the accident were the first officer used an improper trim setting and the captain did not identify and correct the setting during the taxi checklist, and the wet runway conditions.											
March 19, 2001	N266CA	Passenger	West Palm Beach, FL	Comair	Embraer EMB-120	Substantial	None	Damage	0	Altitude Deviation,Uncontrolled	Cruise
Probable Cause: The failure of the flight crew to maintain airspeed during an encounter with severe icing conditions, which resulted in an inadvertent stall, loss of control, and structural damage to the airplane.											
March 23, 2001	N275US	Passenger	Memphis, TN	Northwest Airlines	Boeing 727-200	None	Serious	Injury	0	Propeller Blast Or Jet Exhaust/Suction	Taxi - Pushback/tow
Probable Cause: The Powerback Coordinator's failure to follow powerback procedures which resulted in jet blast injuries to the wing walker. A factor was the stuck wheel chock.											

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
April 9, 2001	N328AA	Passenger and Cargo	Boston, MA	American Airlines	Boeing 767-200ER	Minor	None	Damage	0	Collision Between Aircraft (Other Than Midair)	Taxi
Probable Cause: The Boeing 767 captain's misjudgment of the distance between his airplane and the stationary Boeing 737, which resulted in a ground collision. A factor was sunglare.											
April 9, 2001	N3731T	Passenger and Cargo	Boston, MA	Delta Airlines	Boeing 737-832	Substantial	None	Damage	0	On Ground/Water Collision With Object	Taxi - To Takeoff
Probable Cause: The Boeing 767 captain's misjudgment of the distance between his airplane and the stationary Boeing 737, which resulted in a ground collision. A factor was sunglare.											
April 9, 2001	N423JS	Passenger	Springfield, VA	PSA Airlines	Dornier 328-100	None	Serious	Injury	0	In Flight Encounter With Weather	Descent
Probable Cause: An inadvertent encounter with turbulence during descent.											
April 17, 2001	N253UA	Passenger	Jacksonville, FL	U.S. Airways	Boeing 737-200	None	Serious	Injury	0	In Flight Encounter With Weather	Climb - To Cruise
Probable Cause: The flight dispatcher failure to provide the flight crew with current in-flight turbulence information that resulted in the in-flight encounter with turbulence during climb. A factor was the pilots failure to obtain adequate weather information.											
April 19, 2001	N654AW	Passenger	Las Vegas, NV	America West Airlines	Airbus Industrie A320-232	None	Serious	Injury	0	In Flight Encounter With Weather	Cruise - Normal
Probable Cause: The failure of the pilot-in-command to properly evaluate a hazardous weather advisory and his failure to adequately alter course and flight altitude to avoid the area of hazardous weather.											
April 26, 2001	N223AT	Passenger	Atlantic Ocean, AO	American Eagle Airlines	Aerospatiale ATR 42-300	None	Serious	Injury	0	In Flight Encounter With Weather	Cruise
Probable Cause: The in-flight encounter with moderate to severe turbulence in clouds resulting in the serious injury to the flight attendant. A contributing factor in the accident was the poor in-flight planning by the captain for his allowing beverage service to continue after being advised by ATC of an area of turbulence that was approximately 4 minutes ahead of their position.											
May 1, 2001	N9333	Passenger	Minneapolis, MN	Northwest Airlines	Douglas DC-9-31	Substantial	Minor	Damage	0	On Ground/Water Collision With Object	Standing - Engines(s) Not Operating
Probable Cause: The partial failure of the aircraft tug for undetermined reasons.											
May 23, 2001	N1419D	Passenger	DFW Airport, TX	American Airlines	Fokker F28 Mk-0100	Substantial	None	Damage	0	Airframe/Component/System Failure/Malf	Landing - Flare/touchdown
Probable Cause: A forging fold that was introduced during the manufacture of the right main landing, which resulted in a fatigue crack in the right main landing gear cylinder, and its subsequent failure during landing.											
May 28, 2001	N349US	Passenger	Toccoa, GA	US Airways	Boeing 737-301	None	Serious	Injury	0	In Flight Encounter With Weather	Climb
Probable Cause: An in-flight encounter with unforecasted weather (turbulence) during an enroute climb resulting in one flight attendant sustaining serious injury.											
June 5, 2001	N563UA	Passenger	Kokomo, IN	United Airlines	Boeing B757-200	None	Serious	Injury	0	In Flight Encounter With Weather	Cruise
Probable Cause: The turbulence encountered during descent and the passenger failure to return to his seat.											
June 15, 2001	N661AW	Passenger	San Diego, CA	America West Airlines	Airbus Industrie A320-232	None	Serious	Injury	0	Miscellaneous/Other	Descent
Probable Cause: The flight crew's excessive descent rate, which resulted in an injury to a flight attendant.											
July 2, 2001	N401LC	Cargo	Lake Minchumina, AK	Lynden Air Cargo LLC	Lockheed L-382G	Substantial	None	Damage	0	Dragged Wing, Rotor, Pod,Float Or Tail/Skid	Landing - Flare/touchdown
Probable Cause: The flight crew's improper recovery from a bounced landing. Factors associated with the accident were the selection of an unsuitable landing area, and a rough/uneven landing surface.											
July 11, 2001	N644DL	Passenger	San Francisco, CA	Delta Airlines	Boeing 757-232	None	Serious	Injury	0	Abrupt Maneuver	Descent
Probable Cause: The captain's excessive use of the flight controls to level off from a descent, which resulted in a passenger injury.											

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
July 25, 2001	N780NC	Passenger	Detroit, MI	Northwest Airlines	McDonnell Douglas DC-9-51	None	Serious	Injury	0	Miscellaneous/Other	Descent - Normal
Probable Cause: The passenger (an off duty flight attendant) disregarded the flight crews warning regarding turbulence along with the seat belt sign which had been turned on.											
August 5, 2001	N935HA	Passenger	Washington, DC	US Airways	de Havilland Dash 8-100	Minor	Fatal	Serious	1	Propeller/Rotor Contact To Person	Taxi - To Takeoff
Probable Cause: The ramp agent's impaired performance due to his hyperthyroidism, which was exacerbated by the heat and was inadequately controlled by medication, and possibly also due to the use of an antianxiety medication.											
August 9, 2001	N512SW	Passenger	Klamath Falls, OR	Southwest Airlines	Boeing 737-500	None	Serious	Injury	0	In Flight Encounter With Weather	Cruise - Normal
Probable Cause: An encounter with turbulence from a developing thunderstorm during cruise flight.											
August 9, 2001	N2417F	Passenger	Mascoutah, IL	Trans World Airlines	Boeing 717-200	Substantial	None	Damage	0	On Ground/Water Collision With Object	Taxi - To Takeoff
Probable Cause: The malfunction of the nose gear extension system, which resulted from a previous ground collision with a wheel chock. A factor was the wheel chock.											
August 20, 2001	N605AW	Passenger	Needles, CA	America West	Airbus Industrie A320-232	None	Serious	Injury	0	In Flight Encounter With Weather	Cruise
Probable Cause: An inadvertent in-flight encounter with turbulence.											
August 25, 2001	N306AW	Passenger	Kansas City, MO	America West Airlines	Boeing 737-3G7	Substantial	Minor	Damage	0	Loss Of Control - On Ground/Water	Landing
Probable Cause: The second in command failed to maintain proper runway alignment, directional control, and landed long. The pilot in command failed to execute a go-around and failed to provide adequate supervision. Additional factors included the thunderstorm, the dark night, the muddy terrain, and the FODed engines.											
August 30, 2001	N25504	Passenger	Richmond, VA	Continental Express	Embraer ERJ-135ER	None	Serious	Injury	0	In Flight Encounter With Weather	Descent - Normal
Probable Cause: Inadequate company procedures/directives, which resulted in the flight attendant leaving her seat prematurely, while the airplane was still in an area of turbulence.											
September 7, 2001	N194DN	Passenger	Buenos Aires, Argentina	Delta Airlines	Boeing B767-332	None	Serious	Injury	0	In Flight Encounter With Weather	Descent - Normal
Probable Cause: Not available.											
September 11, 2001	N612UA	Passenger	New York City, NY	United Airlines	Boeing 767-200ER	Destroyed	Fatal	Major	65	In Flight Collision With Object	Cruise
Probable Cause: Act of terrorism.											
September 11, 2001	N644AA	Passenger	Arlington, VA	American Airlines	Boeing 757-200	Destroyed	Fatal	Major	64	In Flight Collision With Terrain/Water	Cruise
Probable Cause: Act of terrorism.											
September 11, 2001	N591UA	Passenger	Shanksville, PA	United Airlines	Boeing 757	Destroyed	Fatal	Major	44	In Flight Collision With Terrain/Water	Cruise
Probable Cause: Act of terrorism.											
September 11, 2001	N334AA	Passenger	New York City, NY	American Airlines	Boeing 767-200ER	Destroyed	Fatal	Major	92	In Flight Collision With Object	Cruise
Probable Cause: Act of terrorism.											
September 23, 2001	N570UA	Passenger	Indianapolis, IN	United Airlines	Boeing 757-222	None	Serious	Injury	0	Miscellaneous/Other	Taxi - Pushback/tow
Probable Cause: The inadequate crew/group coordination and the parking brakes not set by the pilot in command.											

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
September 25, 2001	N867TA	Cargo	Nuiqsut, AK	Northern Air Cargo	Douglas DC-6B	Substantial	Minor	Damage	0	Hard Landing	Landing - Flare/touchdown
Probable Cause: The flightcrew's continued use of an unstabilized GPS approach. Factors associated with the accident were low ceilings, and the inadequate coordination between the crew.											
October 3, 2001	N1448A	Passenger	DFW Airport, TX	American Airlines	Fokker F28 Mk 0100	Substantial	None	Damage	0	Airframe/Component/System Failure/Malf	Approach
Probable Cause: The collapse of the nose landing gear as a result of the failure of company maintenance personnel to follow the proper procedures for a towing the airplane with an unsafe nose landing gear indication. Contributing factors were the inadequate communication between the company maintenance personnel, the inaccurate instructions provided to the maintenance crew, and the failure of the nose landing gear's locking mechanism.											
October 13, 2001	N34820	Passenger	Yardley, PA	Continental Express	Aerospatiale ATR 42-320	Substantial	None	Damage	0	In Flight Collision With Object	Cruise
Probable Cause: An in flight collision with birds.											
October 16, 2001	N825MJ	Passenger and Cargo	Roanoke, VA	Mesa Airlines, DBA US Airways Express	Embraer 145LR	Substantial	None	Damage	0	Loss Of Control - In Flight	Landing
Probable Cause: The captain's failure to maintain airspeed which resulted in an inadvertent stall/mush, and hard landing. Factors were the failure of both pilots to follow company CRM and flight manual procedures, and the captains improper approach briefing.											
October 29, 2001	N640A	Passenger	Dulles, VA	American Airlines	Boeing 757-223	None	Serious	Injury	0	Miscellaneous/Other	Standing
Probable Cause: A passenger sustained a broken ankle during an emergency evacuation.											
November 1, 2001	N210CJ	Passenger	Bar Harbor, ME	Colgan Air, DBA U.S. Airways Express	Beech 1900C	Substantial	None	Damage	0	On Ground/Water Collision With Object	Landing - Roll
Probable Cause: A deer, which had been crossing the runway as the airplane touched down. A factor was the dark night conditions.											
November 12, 2001	N14053	Passenger	Belle Harbor, NY	American Airlines	Airbus Industrie A300-600	Destroyed	Fatal	Major	265	Abrupt Maneuver	Takeoff - Initial Climb
Probable Cause: The National Transportation Safety Board determines that the probable cause of this accident was the in-flight separation of the vertical stabilizer as a result of the loads beyond ultimate design that were created by the first officer's unnecessary and excessive rudder pedal inputs. Contributing to these rudder pedal inputs were characteristics of the A300-600 rudder system design and elements of the American Airlines Advanced Aircraft Maneuvering Program.											
November 20, 2001	N277FE	Cargo	Memphis, TN	Federal Express	Boeing 727-233	Substantial	None	Damage	0	In Flight Collision With Object	Approach - IAF To FAF/Outer Marker (IFR)
Probable Cause: The inadvertent collision with birds while on final approach to land resulting in substantial damage to the airplane.											
November 30, 2001	N488AA	Passenger	Romulus, MI	American Airlines	McDonnell Douglas DC-9-82	None	Serious	Injury	0	In Flight Encounter With Weather	Cruise
Probable Cause: The turbulence encountered in-flight and the passenger not complying with the flight and cabin crew's warning of the turbulance.											
December 20, 2001	N858CA	Passenger	Boston, MA	Champlain Enterprises, DBA CommutAir	Raytheon BE-1900D	None	Serious	Injury	0	Miscellaneous/Other	Standing
Probable Cause: The passengers misjudged step, which resulted in a loss of balance and subsequent fall.											
December 28, 2001	N3203Y	Cargo	Anchorage, AK	Evergreen International Airlines	Boeing 747-128	Substantial	None	Damage	0	Dragged Wing, Rotor, Pod,Float Or Tail/Skid	Takeoff - Initial Climb
Probable Cause: The flight crew's inadequate preflight planning, and failure to calculate the airplane weight and balance prior to departure.											

Appendix A — Scheduled Part 135 Accidents in Calender Year 2001

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 30, 2001	N6837Y	Passenger	Edgartown, MA	Hyannis Air Service Inc, DBA Cape Air	Cessna 402C	Destroyed	Serious	0	In Flight Collision With Object	Approach - FAF/Outer Marker To Threshold (IFR)
Probable Cause: The pilot's failure to maintain a stabilized approach with an adequate vertical and lateral track. Also causal was his failure to maintain obstacle clearance.										
April 3, 2001	N1581U	Passenger and Cargo	Nightmute, AK	Grant Aviation Inc.	Cessna 207	Substantial	Serious	0	In Flight Collision With Terrain/Water	Maneuvering
Probable Cause: The pilot's continued VFR flight into instrument meteorological conditions, and his failure to maintain adequate distance/altitude from terrain, resulting in a collision with terrain while maneuvering. Factors in the accident were flat light conditions,										
May 15, 2001	N756DJ	Passenger and Cargo	Stebbins, AK	Warbelow's Air Ventures, Inc.,	Cessna 206	Substantial	None	0	Airframe/Component/System Failure/Malfunction	Takeoff - Initial Climb
Probable Cause: A jammed control yoke during landing, an entangled wiring harness, and inadequate maintenance by company personnel. A factor associated with the accident was the pilot's inability to flare the airplane during landing, due to the mechanical malfunction.										
July 25, 2001	N9973M	Passenger	Kalskag, AK	Grant Aviation, Inc.	Cessna 207	Substantial	None	0	In Flight Collision With Object	Takeoff - Initial Climb
Probable Cause: The pilot's failure to maintain adequate clearance from an object during the initial climb after takeoff.										
August 13, 2001	N562CT	Passenger and Cargo	Akiachak, AK	Grant Aviation Inc.	Cessna 207	Substantial	None	0	Overrun	Takeoff - Roll/Run
Probable Cause: The pilot's selection of a the wrong runway, which resulted in a tailwind for the takeoff attempt. Factors associated with the accident are a short takeoff area, a tailwind, and the pilot's inadequate evaluation of the weather conditions.										
October 3, 2001	N733SW	Passenger	Decatur Island, WA	West Isle Air	Cessna 172N	Substantial	Fatal	3	Loss Of Control - In Flight	Takeoff - Initial Climb
Probable Cause: The pilot's failure to maintain airspeed during a low altitude turn, resulting in a stall. The pilot exceeding the aircraft's maximum gross takeoff weight was a factor.										
October 10, 2001	N9530F	Passenger	Dillingham, AK	Peninsulas Airways Inc., DBA Pen Air	Cessna 208	Destroyed	Fatal	10	Loss Of Control - In Flight	Climb
Probable Cause: An in-flight loss of control resulting from upper surface ice contamination that the pilot-in-command failed to detect during his preflight inspection of the airplane. Contributing to the accident was the lack of a preflight inspection requirement for CE-208 pilots to examine at close range the upper surface of the wing for ice contamination when ground icing conditions exist.										

Appendix A — On-Demand Part 135 Accidents in Calender Year 2001

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Category	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
January 3, 2001	N19771	Passenger	Atmautluak, AK	Village Aviation	Airplane	Cessna 172	Substantial	None	0	Undershoot	Approach - VFR Pattern - Final Approach
Probable Cause: The pilot's failure to maintain a proper glidepath during final approach. A factor associated with the accident was soft terrain.											
January 9, 2001	N6384X	Cargo	Ontario, OR	Ameriflight	Airplane	Cessna 402B	Substantial	None	0	Loss Of Control - On Ground/Water	Landing - Roll
Probable Cause: Pilot's failure to maintain aircraft control while landing. Factors include a snow covered runway.											
January 11, 2001	N2468G	Cargo	Vandiver, AL	Air Carriers Inc.	Airplane	Cessna 206H	Destroyed	Fatal	1	In Flight Collision With Object	Cruise
Probable Cause: The pilot's inflight decision to continued visual flight into instrument meteorological conditions resulted in the inflight collision with trees. Low ceilings and trees were factors.											
January 18, 2001	N80KA	Passenger	Tyonek, AK	Kenai Air Alaska	Helicopter	Bell 206L-1	Substantial	None	0	In Flight Collision With Object	Maneuvering
Probable Cause: The pilot's failure to maintain adequate tail rotor clearance while maneuvering to land.											
January 19, 2001	N7340U	Cargo	Kongiganak, AK	Hageland Aviation Services	Airplane	Cessna 207	Substantial	None	0	On Ground/Water Encounter With Weather	Takeoff - Roll/Run
Probable Cause: The pilot's inadequate compensation for wind conditions during the takeoff roll. A factor associated with the accident was a crosswind.											
January 23, 2001	N19454	Cargo	Unalaska, AK	Galaxy Air Cargo Inc., DBA Majestic Air Cargo	Airplane	Douglas DC-3	Destroyed	Fatal	2	In Flight Collision With Terrain/Water	Climb - To Cruise
Probable Cause: The airplane flightcrew's failure to maintain adequate distance/altitude from mountainous terrain during a departure climb to cruise flight, and the captain's impairment from drugs. Factors in the accident were dark night conditions, and the first officer's impairment from drugs.											
January 31, 2001	N208KW	Passenger	Key West, FL	Seaplanes Of Key West	Airplane	Cessna 208	Substantial	None	0	Loss Of Control - On Ground/Water	Landing - Flare/Touchdown
Probable Cause: The airplanes' inadvertent collision with a swell during a water landing near a ferry boat that resulted the overload failure of the rear float/strut assembly.											
February 1, 2001	N985SA	Passenger	Lihue, HI	Safari Helicopter Tours	Helicopter	Eurocopter AS-350-B2	Substantial	Minor	0	Airframe/Component/System Failure/Malfunction	Standing - Engine(s) Operating
Probable Cause: The manufacturer's inadequate collective lock design, which resulted in the collective unlocking during a preflight check and subsequent unintentional liftoff and loss of helicopter control. The pilot's loss of control was due in part to the unavailability of the hydraulic system.											
February 7, 2001	N107BA	Cargo	Sioux Falls, SD	Bemidji Airlines	Airplane	Beech 65-B80	Substantial	Serious	0	Loss Of Control - In Flight	Approach - Circling (IFR)
Probable Cause: The pilot initiated the flight into known icing conditions which resulted in his inability to maintain control of the airplane. Factors associated with the accident were the ice accumulation and the company induced pressure for the pilot to make the flight into the adverse weather conditions.											
February 7, 2001	N52BA	Cargo	Ainsworth, NE	Silverhawk Aviaton	Airplane	Beech 58	Destroyed	Fatal	1	In Flight Collision With Terrain/Water	Approach
Probable Cause: The pilot's improper in-flight decision to continue flight into known adverse weather. A factor was the icing conditions.											
February 8, 2001	N318DH	Passenger	Beaver Island, MI	Northern Illinois Flight Center	Airplane	Swearingen SA227-AT	Destroyed	Fatal	2	In Flight Collision With Object	Approach - Circling (IFR)
Probable Cause: The flightcrew not maintaining altitude/clearance during the circling instrument approach. Factors were the pilot in command initiating the flight without proper weather reporting facilities at the destination, the flightcrew not flying to an alternate destination, the flightcrew not following company and FAA procedures/directives, the lack of certification of the second pilot, the operator not following company and FAA procedures/directives, and the dark night and the low ceiling.											

Appendix A — On-Demand Part 135 Accidents in Calender Year 2001

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Category	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
February 26, 2001	N7383R	Cargo	Shreveport, LA	Airnet Systems Inc.	Airplane	Beech 58	Substantial	None	0	Collision Between Aircraft (Other Than Midair)	Taxi
Probable Cause: The pilot's failure to maintain visual separation with a parked airplane while taxing. Contributory factors were the dark night light conditions, the rain, and the non-lighted ramp area where the unoccupied airplane was parked.											
March 11, 2001	N189EH	Passenger	Mazama, WA	Era Aviation, Inc.	Helicopter	Eurocopter AS-350 B2 Ecureuil	Substantial	Minor	0	In Flight Collision With Terrain/Water	Landing
Probable Cause: The pilot's failure to maintain aircraft control. Snow covered terrain, high and variable wind conditions, and failure of attaining the proper touchdown point were factors.											
March 15, 2001	N842MB	Cargo	Donalsonville, GA	Jim Hankins Air Service	Airplane	Douglas DC-3	Substantial	None	0	Loss Of Engine Power	Cruise
Probable Cause: The failure and separation of No.12 cylinder from the engine case that resulted in an in-flight oil fed fire; and the subsequent separation of the right engine from airframe.											
March 20, 2001	N376AL	Passenger	EC 270, GM	Air Logistics	Helicopter	Sikorsky SK-76A	None	Fatal	1	Propeller/Rotor Contact To Person	Standing - Idling Rotors
Probable Cause: The passenger's inadvertent encounter with the rotating main rotor blades.											
March 28, 2001	N8247Q	Passenger	Minneapolis, MN	Air Transport Service	Airplane	Cessna 414	Substantial	Serious	0	In Flight Collision With Terrain/Water	Approach - Circling (IFR)
Probable Cause: The pilot not maintaining the proper airspeed during the circling approach, the inadvertent stall and the subsequent loss of control. Factors were the pilot's decision to continue the approach in weather conditions below the approach/landing minimums, the continued flight below the minimum descent altitude, the pilot not following the approach airspeed listed in the owner's manual, the air traffic controllers not issuing weather information to the pilot, and the weather conditions.											
March 29, 2001	N303GA	Passenger	Aspen, CO	Avjet Corp	Airplane	Grumman Gulfstream III	Destroyed	Fatal	18	In Flight Collision With Terrain/Water	Approach
Probable Cause: The flight crew's operation of the airplane below the minimum descent altitude without an appropriate visual reference for the runway. Contributing to the cause of the accident were the Federal Aviation Administration's (FAA) unclear wording of the March 27, 2001, Notice to Airmen regarding the nighttime restriction for the VOR/DME-C approach to the airport and the FAA's failure to communicate this restriction to the Aspen tower; the inability of the flight crew to adequately see the mountainous terrain because of the darkness and the weather conditions; and the pressure on the captain to land from the charter customer and because of the airplane's delayed departure and the airport's nighttime landing restriction.											
March 30, 2001	N42Y	Cargo	Concord, NC	Corporate Air Fleet	Airplane	Piper PA-32RT-300	Destroyed	Fatal	1	In Flight Collision With Terrain/Water	Maneuvering
Probable Cause: An in-flight collision with terrain for undetermined reasons.											
April 24, 2001	N1750U	Cargo	Kongiganak, AK	Frontier Flying Service	Airplane	Cessna 207	Substantial	None	0	On Ground/Water Encounter With Terrain/Water	Taxi - From Landing
Probable Cause: The pilot's selection of an unsuitable area for taxi. A factor associated with the accident was a rough/uneven taxiway.											
April 25, 2001	N6295H	Passenger	Deadhorse, AK	Cape Smythe Air Service	Airplane	Cessna 207A	Substantial	None	0	In Flight Collision With Terrain/Water	Maneuvering
Probable Cause: The pilot's failure to maintain altitude/clearance while maneuvering. Factors associated with the accident were flat light conditions, and snow-covered terrain.											
April 26, 2001	N974FE	Cargo	Plattsburgh, NY	Wiggins Airways, DBA Federal Express	Airplane	Cessna 208B	Substantial	None	0	Loss Of Engine Power	Climb - To Cruise
Probable Cause: The incorrect installation of the propeller reversing lever and carbon block assembly, which resulted in a loss of propeller thrust.											

Appendix A

On-Demand Part 135 Accidents in Calender Year 2001

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Category	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
April 26, 2001	N80Q	Cargo	Del Rio, TX	Texair Charters	Airplane	Cessna 402B	Destroyed	Fatal	1	Airframe/Component/System Failure/Malfunction	Approach - VFR Pattern - Final Approach
Probable Cause: the loss of control due to a jammed trim tab, which resulted from the failure of maintenance personnel to properly secure the trim tab actuator rod when installing a replacement elevator.											
April 26, 2001	N6585A	Cargo	Gainesville, FL	Air Carriers, Inc.	Airplane	Cessna 210N	Substantial	None	0	Airframe/Component/System Failure/Malfunction	Cruise - Normal
Probable Cause: The pilot's delay in securing all non-essential electrical equipment in-flight resulting in battery depletion before complete gear extension was accomplished using the normal system and subsequent collapse of the main landing gear. A contributing factor in the accident was the inadequate manufacture of an electrical cable by company maintenance personnel resulting in separation of one end of the cable in-flight.											
April 27, 2001	N27367	Cargo	St. George, UT	American Aviation	Airplane	Piper PA-31-350	Substantial	None	0	Loss Of Engine Power(Partial) - Nonmechanical	Takeoff - Initial Climb
Probable Cause: The pilot's failure to sump all the fuel drains during preflight and the subsequent loss of power in the right engine during takeoff, the pilot feathering the wrong engine's propeller during the forced landing, the pilot improperly raising the landing gear with usable runway in front of him, and lack of suitable terrain for the forced landing. Contributing factors were the water in the fuel, the terrain induced turbulent cross wind condition, and the mountainous/hilly terrain for the forced landing.											
May 3, 2001	N4089W	Mail	Chefornak, AK	Bellair, Inc.	Airplane	Piper PA-32-300	Substantial	None	0	Loss Of Control - In Flight	Approach - VFR Pattern - Final Approach
Probable Cause: The pilot's inadvertent stall/mush during the final phase of the landing approach. A factor associated with the accident is a crosswind.											
May 4, 2001	N917AL	Passenger and Cargo	Vermillion 44, GM	Air Logistics L.L.C.	Helicopter	Bell 407	Substantial	None	0	Airframe/Component/System Failure/Malfunction	Cruise
Probable Cause: Failure of the engine-to-transmission driveshaft coupling due to fatigue.											
May 5, 2001	N35854	Passenger	Imnaha, OR	Spence Air Service	Airplane	Cessna U206F	Substantial	None	0	On Ground/Water Encounter With Weather	Landing - Roll
Probable Cause: The pilot's inadequate compensation for the wind conditions. Wind gusts were a factor.											
May 5, 2001	N948FE	Cargo	Steamboat Springs, CO	Corporate Air	Airplane	Cessna 208B	Destroyed	Fatal	1	Loss Of Control - In Flight	Approach - IAF To Faf/Outer Marker (IFR)
Probable Cause: An inadvertent stall during an instrument approach, which resulted in a loss of control. Contributing factors were the pilot's attention being diverted by an abnormal indication, conditions conducive to airframe icing, and the pilot's lack of total experience in the type of operation (icing conditions) in aircraft make/model.											
May 5, 2001	N105RH	Passenger	Medford, OR	TI Forest Products	Helicopter	MBB BO-105C	Destroyed	None	0	Fire	Unknown
Probable Cause: A leaking engine oil outlet line fitting in the #1 engine compartment, resulting in an oil fire in the engine compartment.											
May 18, 2001	N2479S	Passenger	Paauilo, HI	Mokulele Flight Service	Airplane	Cessna 337C	Destroyed	None	0	Loss Of Engine Power	Cruise - Normal
Probable Cause: A dual loss of engine power for undetermined reasons.											
May 22, 2001	N35WT	Cargo	Uniontown, OH	Castle Aviation	Airplane	Piper PA-31-310	Substantial	Serious	0	Loss Of Engine Power(Total) - Nonmechanical	Approach - IAF To Faf/Outer Marker (IFR)
Probable Cause: Fuel exhaustion due to the pilot's failure to perform fuel calculations. A factor was the inboard fuel tank probes not being within the manufacturer's resistance limits, which resulted in inaccurate fuel gauges.											

Appendix A — On-Demand Part 135 Accidents in Calender Year 2001

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Category	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
June 3, 2001	N225BL	Passenger	Seward, AK	Manufactured Homes Of Alaska, DBA Bear Lake Air	Airplane	Noorduyn Aviation UC-64A	Substantial	None	0	In Flight Encounter With Weather	Takeoff - Initial Climb
Probable Cause: The pilot's inadvertent stall of the airplane during takeoff. Factors associated with the accident were the pilot's inadequate weather evaluation, his inadequate compensation for wind conditions, and turbulence.											
June 3, 2001	N1109V	Passenger	Hanapepe, HI	Smokey Mountain Helicopters	Helicopter	Hughes 369D	Substantial	None	0	Loss Of Engine Power(Total) - Mech Failure/Malf	Cruise
Probable Cause: A loss of engine power while in cruise flight resulting from the failure and liberation of several turbine blades due to hot corrosion effects which weakened the blades. The hot corrosion damage was the result of multiple turbine over temperature events which occurred over several flights. Contributing factors were the lack of suitable terrain, and high vegetation.											
June 4, 2001	N209TA	Passenger	North Las Vegas, NV	Aviation Ventures, DBA Vision Air	Airplane	Piper PA-31-350	Substantial	None	0	Main Gear Collapsed	Landing - Roll
Probable Cause: Fatigue failure of the right main landing gear retraction arm.											
June 14, 2001	N555LH	Passenger	Hopewell, NJ	Liberty Helicopters	Helicopter	Eurocopter France AS-350-BA	Substantial	Minor	0	In Flight Collision With Object	Cruise
Probable Cause: The pilot's improper decision to continue flight in instrument meteorological conditions, and which resulted in an in-flight collision with trees. Factors were the fog, and dark night conditions.											
June 26, 2001	N4063R	Passenger	Watch Hill, RI	Kat, Inc., DBA Eagle Avition	Airplane	Piper PA-32-300	Substantial	Minor	0	Loss Of Engine Power	Climb - To Cruise
Probable Cause: Loss of engine power for undetermined reason.											
June 28, 2001	N72218	Passenger	Boulder City, NV	Lake Mead Air	Airplane	Cessna U206D	Substantial	None	0	Loss Of Control - On Ground/Water	Landing - Flare/Touchdown
Probable Cause: The pilot's inadequate compensation for the tailwind gust and subsequent failure to maintain directional control of the airplane while landing.											
July 17, 2001	N100PC	Passenger	Pilot Point, AK	Rediske Air	Airplane	Cessna 207	Substantial	None	0	On Ground/Water Collision With Object	Takeoff - Roll/Run
Probable Cause: The pilot's selection of an unsuitable takeoff area, and failure to maintain clearance. A factor associated with the accident was a vehicle mounted gantry.											
July 17, 2001	N1448Z	Cargo	Oak Creek, WI	Heartland Aviation	Airplane	Cessna 310R	Destroyed	Fatal	1	In Flight Collision With Object	Approach - FAF/Outer Marker To Threshold (IFR)
Probable Cause: The pilot not maintaining clearance from objects during an ILS approach in low night IFR conditions and his descent below decision height. Factors were the dark night, mist, low ceiling, and the trees west of the approach.											
July 20, 2001	N756DM	Passenger	Freemont, MI	Scenic Seaplanes	Airplane	Cessna U206G	Substantial	Minor	0	Loss Of Engine Power	Cruise
Probable Cause: The broken throttle cable during cruise flight and the pilot's inadequate flare during the forced landing attempt. Factors relating to this accident were the low airspeed during the forced landing attempt and the short, corn stubble field.											
July 26, 2001	N3800Q	Passenger	Yakutat, AK	Gulf Air Taxi	Airplane	Cessna 185	Substantial	Fatal	1		
Probable Cause: Not available.											
July 29, 2001	N114SA	Cargo	Grand Junction, CO	American Aviation	Airplane	Piper PA-31-350	Substantial	None	0	Airframe/Component/System Failure/Malfunction	Landing
Probable Cause: The failure of the nose landing gear right drag brace (link assembly) due to fatigue.											

Appendix A

On-Demand Part 135 Accidents in Calender Year 2001

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Category	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
July 30, 2001	N39586	Passenger	Haines, AK	Lab Flying Service	Airplane	Piper PA-32-300	Destroyed	Fatal	6	In Flight Encounter With Weather	Cruise - Normal
Probable Cause: The pilot's continued flight into known adverse weather conditions, and his poor in-flight decision making. Factors associated with the accident were clouds and mountainous terrain. A finding is the pilot's use of FAA prohibited drugs.											
July 30, 2001	N5371U	Passenger	Yakutat, AK	Gulf Air Taxi	Airplane	Cessna U206	Substantial	None	0	On Ground/Water Encounter With Terrain/Water	Takeoff - Roll/Run
Probable Cause: The pilot's failure to maintain clearance from high vegetation during the takeoff roll.											
July 31, 2001	N5312T	Passenger	Eagle River, AK	Beaver Air Taxi	Airplane	Cessna 172	Substantial	Serious	0	Loss Of Engine Power(Total) - Mech Failure/Malf	Climb
Probable Cause: The fatigue induced fracture of a connecting rod wrist pin, resulting in a complete loss of engine power.											
August 3, 2001	N9794M	Passenger	Healy, AK	Denali Air Taxi	Airplane	Cessna 207	Substantial	None	0	In Flight Encounter With Weather	Climb
Probable Cause: The pilot's continued flight into adverse weather conditions after becoming lost/disoriented. Factors in the accident were rising terrain, a blind/box canyon, low clouds, and rain.											
August 5, 2001	N2755N	Passenger	WC 173, GM	Air Logistics	Helicopter	Bell 206-L1	Substantial	Serious	0	Loss Of Control - In Flight	Approach - VFR Pattern - Final Approach
Probable Cause: the pilot's failure to maintain yaw control of the helicopter during approach.											
August 10, 2001	N169PA	Passenger	Meadview, AZ	Papillon Grand Canyon Helicopters	Helicopter	Eurocopter AS350-B2	Destroyed	Fatal	6	Loss Of Control - In Flight	Maneuvering
Probable Cause: The pilot's in-flight decision to maneuver the helicopter in a flight regime, and in a high density altitude environment, in which the aircraft's performance capability was marginal, resulting in a high rate of descent from which recovery was not possible. Factors contributing to the accident were high density altitude and the pilot's decision to maneuver the helicopter in proximity to precipitous terrain, which effectively limited any remedial options available.											
August 18, 2001	N53LH	Passenger	Vinton, CA	Rocky Mountain Helicopters	Helicopter	Aerospatiale AS 355F1	Substantial	None	0	Loss Of Control - In Flight	Hover - In Ground Effect
Probable Cause: The pilot's selection of an unsuitable landing site, which caused "brown-out" conditions during departure liftoff and resulted in loss of control of the helicopter.											
August 21, 2001	N10395	Passenger	Nondalton, AK	Alaska Air Taxi	Airplane	de Havilland DHC-2	Substantial	None	0	In Flight Encounter With Weather	Takeoff - Initial Climb
Probable Cause: The pilot's inadequate compensation for gusty wind conditions. Factors associated with the accident were the pilot's inadequate weather evaluation, and wind gusts.											
August 24, 2001	N350AL	Passenger and Cargo	Cameron, LA	Air Logistics	Helicopter	Bell 206L-3	Destroyed	Serious	0	Loss Of Engine Power(Total) - Nonmechanical	Climb
Probable Cause: Fuel contamination due to the combination of DIEGME, water, and bacterial growth, which resulted in formation of an apple-jelly type material that blocked the fuel nozzle screen and led to a loss of engine power.											
August 24, 2001	N153TW	Cargo	Ithaca, NY	Ameristar Jet Charter	Airplane	Learjet 25	Destroyed	Fatal	2	In Flight Collision With Object	Takeoff - Initial Climb
Probable Cause: The pilot's failure to maintain a proper climb rate while taking off at night, which was a result of spatial disorientation. Factors in the accident were the low visibility and cloud conditions, and the dark night.											
August 25, 2001	N8097W	Passenger	Marsh Harbour, Bahamas	Blackhawk Intl Airways	Airplane	Cessna 402B	Destroyed	Fatal	9	In Flight Collision With Terrain/Water	Climb
Probable Cause: Not available.											

Appendix A

On-Demand Part 135 Accidents in Calender Year 2001

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Category	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
August 28, 2001	N617GA	Cargo	Detroit, MI	Grand Aire Express	Airplane	Dassault/SUD Fan Jet Falcon	Substantial	None	0	Miscellaneous/Other	Takeoff - Initial Climb
Probable Cause: The wheels up landing performed by the flightcrew during the emergency landing and improper aircraft preflight by the pilot in command. Factors were the unsecured cargo door, the cemetery fence, and the lack of crew coordination during the flight.											
September 17, 2001	N9455M	Cargo	Bessemer, AL	Air Carriers Inc.	Airplane	Cessna 210K	Substantial	None	0	Gear Collapsed	Landing - Roll
Probable Cause: Failure of the landing gear-down lock mechanism, which resulted in the pilot's inability to control the airplane. A factor was the trees.											
September 21, 2001	N4352F	Cargo	Tanana, AK	Tanana Air Service	Airplane	Piper PA-32R-300	Substantial	None	0	Gear Collapsed	Landing - Roll
Probable Cause: An unlocked landing gear mechanism during landing roll. A factor associated with the accident was an electrical system failure.											
September 24, 2001	N161RB	Cargo	Pagosa Springs, CO	Key Lime Air	Airplane	Piper PA-31-350	Destroyed	Fatal	2	In Flight Collision With Object	Maneuvering
Probable Cause: The flight crews' intentional low altitude flight, and failure to maintain obstacle clearance.											
September 26, 2001	N1067D	Passenger	W Cameron 168, GM	Air Logistics	Helicopter	Bell 206L-1	Substantial	None	0	Airframe/Component/System Failure/Malfunction	Approach - VFR Pattern - Base Leg/Base To Final
Probable Cause: The failure of the rotor tachometer generator, which resulted in a precautionary landing in the Gulf of Mexico. A contributing factor to the accident was the rough water condition.											
September 29, 2001	N206KS	Passenger	Hilo, HI	K&S Helicopters	Helicopter	Bell 206B	Destroyed	Minor	0	Loss Of Engine Power(Total) - Mech Failure/Malf	Cruise
Probable Cause: The failure of the mechanic to secure the No. 8 bearing thrust nut during maintenance work, which resulted in the total failure of the first stage turbine wheel shaft. Also causal was his misjudgment of his height during the flare resulting in a hard landing. A contributing factor was the high vegetation in the forced landing field, which resulted in a hard landing.											
October 9, 2001	N622WA	Passenger	Kahoolawe Isle, HI	Windward Aviation	Helicopter	Hughes 369D	None	Serious	0	Miscellaneous/Other	Hover - In Ground Effect
Probable Cause: Inadequate visual surveillance by the pilot before takeoff resulting in liftoff with a deplaning passenger still partially aboard the helicopter. A factor in the accident was the operator's inadequate procedures.											
October 16, 2001	N120AX	Cargo	Bethel, AK	Alaska Central Express	Airplane	Embraer 120ER	Substantial	Minor	0	In Flight Collision With Terrain/Water	Approach - Faf/Outer Marker To Threshold (IFR)
Probable Cause: The captain's continued descent below the minimum descent altitude which resulted in impact with terrain during an instrument landing approach. Factors contributing to the accident were the flightcrew's failure to reset the altimeters to the correct altimeter setting, and meteorological conditions consisting of snow obscuration that limited visibility, and the ambient night light conditions.											
October 17, 2001	N943V	Passenger	Gulfport, MS	Apollo Aviation Company	Airplane	Beech 58	Substantial	None	0	Miscellaneous/Other	Takeoff - Initial Climb
Probable Cause: The failure of the pilot to use the checklist resulting in a gear-up landing. Contributing factors in the accident were: 1) The inoperative landing gear warning system, 2) Inadequate preflight of the airplane by the pilot for his failure to assure that the cabin door was closed and latched before takeoff, and, 3) Distraction of the pilot due to the open door. Findings in the investigation were several discrepancies related to the cabin door.											
October 18, 2001	N400EH	Passenger	Anchorage, AK	Era Aviation	Helicopter	Bell 206L	Substantial	Fatal	3	In Flight Collision With Terrain/Water	Cruise
Probable Cause: The pilot's failure to maintain clearance from the surface of an open body of water while intentionally attempting to maintain a very low altitude while in cruise flight. Factors include falling snow, low ceilings, whiteout/greyout conditions, and flat/glassy water.											
October 18, 2001	N348AL	Passenger and Cargo	East Cameron 78, GM	Air Logistics	Helicopter	Bell 206L-3	Substantial	Serious	0	Loss Of Engine Power	Cruise - Normal
Probable Cause: The hard landing due to the pilot's failure to maintain proper main rotor rpm. Contributing factors were the loss of engine power for undetermined reasons, and the pilot's failure to deploy the emergency floats.											

Appendix A — On-Demand Part 135 Accidents in Calender Year 2001

Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Category	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
October 26, 2001	N715MH	Passenger	Ciudad Victoria, Mexico	American Jet International	Airplane	Learjet 25B	Substantial	None	0	Gear Collapsed	Landing - Flare/Touchdown
Probable Cause: Not available.											
November 29, 2001	N228BH	Cargo	Flagstaff, AZ	Ameriflight	Airplane	Beech C-99	Substantial	None	0	Loss Of Control - In Flight	Go-Around (VFR)
Probable Cause: The pilot's failure to maintain adequate airspeed and his failure to maintain directional control. Contributing factors were the icing conditions, icing, and the improper use of the anti-ice/deicing equipment.											
December 1, 2001	N911KH	Passenger	Bryce, UT	Alladin Air Service	Helicopter	Bell 206B	Substantial	Serious	0	Loss Of Engine Power	Takeoff - Initial Climb
Probable Cause: Loss of engine power for reasons undetermined. Contributing factors were the low airspeed and altitude at which to perform an autorotation.											
December 1, 2001	N499BA	Cargo	Bessemer, AL	Air Carriers, Inc.	Airplane	Cessna 208B	Destroyed	Fatal	2	In Flight Collision With Object	Missed Approach (IFR)
Probable Cause: The poor in-flight planning by the pilot-in-command for his initiation of the ILS approach to runway 05 with weather conditions below minimums for the approach contrary to the federal aviation regulations, and the failure of the pilot to maintain control of the airplane during a missed approach resulting in the in-flight collision with trees then terrain.											
December 6, 2001	N5043J	Cargo	Sidney, MT	Exec Air	Airplane	Cessna 310	Substantial	None	0	Loss Of Engine Power	Takeoff - Roll/Run
Probable Cause: The pilot's improper abort procedure and inadequate remedial action, leading to a loss of directional control after losing power in one engine during the takeoff roll. Factors include the loss of power from one engine, and a fence around the perimeter of the airport.											
December 7, 2001	N5NM	Passenger	Santa Rosa, NM	Seven Bar Aviation	Airplane	Beech BE-90-E90	Substantial	None	0	Gear Retraction On Ground	Landing - Roll
Probable Cause: The pilot's inadvertent retraction of the landing gear during the landing roll which resulting in the collapse of all 3 landing gears.											
December 9, 2001	N819GY	Passenger	Boston, MA	Eagle Jet Charter	Airplane	Rockwell NA-265-80	Substantial	None	0	Airframe/Component/System Failure/Malfunction	Landing - Roll
Probable Cause: The failure of the left thrust reverser assembly due to fatigue.											
December 20, 2001	N207TA	Cargo	Lewiston, ME	Teleford Aviation Inc, DBA UPS	Airplane	Cessna 208B	Substantial	None	0	Overrun	Takeoff - Aborted
Probable Cause: The pilot's failure to adequately ensure the wings were free of contamination prior to departure. Factors included the operator's inadequate de-icing procedures and the snowy weather conditions.											

Appendix B

Definitions of Terms Used in The Review

Air Carrier Operations

Air carriers are generally defined as operators that fly aircraft in revenue service. The *Review of 2001 Aircraft Accident Data: U.S. Air Carrier Operations* covers accidents involving aircraft operated by U.S. air carriers under Title 14[1] Parts 121 and 135 of the *Code of Federal Regulations* (CFR). This review discusses aircraft operations that are covered by 14 CFR Parts 121 and 135, and excludes general aviation aircraft,[2] foreign-operated aircraft, ultralight vehicles, experimental aircraft, and commercial space launches.

Part 121 Operations

Part 121 operations are any scheduled or non-scheduled passenger-carrying operations that adhere to regulations that limit operations to controlled airspace and controlled airports that have available specific weather, navigational, operational, and maintenance support. These operations usually include operators that fly large transport-category aircraft. An operation is scheduled if an air carrier or operator offers in advance the departure location, departure time, and arrival location.[3] As a result, "Part 121" typically applies to major airlines and cargo carriers that fly large transport-category aircraft serving large airports. The operating rules for scheduled and nonscheduled Part 121 operators are generally the same.

Part 135 Operations

Part 135 operations must adhere to similar requirements as Part 121 operations (with some notable differences with respect to aircraft and airport characteristics, and to crew training and experience). However, Part 135 operations are allowed to service routes to smaller airports that do not have the weather, communications, and navigational capabilities required of the larger airports serving Part 121 operations. Part 135 typically applies to commercial carriers flying smaller jet and turboprop aircraft commonly referred to as commuter airlines (*scheduled* Part 135) and air taxis (*on-demand* Part 135).

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[1] Title 14 is also known as the *Federal Aviation Regulations* (FAR).

[2] A separate review, published annually by the Safety Board, summarizes accident statistics for these aircraft.

[3] Title 14 CFR Part 119.3.

In March 1997, the regulations defining Part 121 operations changed to include scheduled aircraft with more than 10 seats. Previously, scheduled aircraft with fewer than 30 passenger seats were operated under Part 135. As a result, after 1997, most carriers once popularly known as "commuters" began operating as Part 121 flights.

Scheduled Part 135 Operations

According to 14 CFR Part 119.3, a *scheduled* operation is any "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." Scheduled Part 135 carriers typically fly aircraft with single/twin turbine engines or single/twin piston engines. Such carriers are more likely to fly short routes and are concentrated for the most part in Alaska.

On-Demand Part 135 Operations

An *on-demand* Part 135 operation is any operation for compensation or hire for which the departure location, departure time, and arrival location are negotiated with the customer. Customers can charter an entire aircraft or book a single seat on an air taxi. According to the Federal Aviation Administration (FAA), there are about 3,000 on-demand Part 135 operators; of those operators, approximately 2,500 offer service in airplanes and 500 offer service in helicopters.[4] Historically, on-demand Part 135 operations represent about half of the air carrier fleet and account for about 15% of all air carrier flight hours.

Its *on-demand* nature is the important characteristic of this type of operation. On-demand Part 135 operators offer charter or air taxi flights on a flexible schedule and carry passengers or cargo (and in some cases, both) to a variety of airports that are not usually serviced by scheduled airlines.[5] An on-demand operation can serve corporate customers who need a flexible schedule but do not wish to support their own corporate flight department. On-demand Part 135 operations also include medical evacuation flights when a patient is on board the aircraft and helicopter flights serving offshore drilling platforms in the Gulf of Mexico. On-demand Part 135 operations are evenly distributed throughout the United States and include both short and long routes that serve the specific needs of charter and air taxi customers. On-demand Part 135 aircraft range from single-engine piston aircraft to large corporate jets that are typically smaller than those used in Part 121 operations.

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[4] Accurate data for on-demand Part 135 operators and aircraft are difficult to obtain. The figures cited in this review are from *Chartering an Aircraft: A Consumer Guide* (Washington, DC: Federal Aviation Administration, Office of Public Affairs). The 2000 *General Aviation and Air Taxi Activity (GAATA) Survey* shows a total of 4,000 air taxi and air tour aircraft (not separated into airplanes and helicopters) in Table GA 00 1-3.

[5] FARs restrict on-demand Part 135 operations to passenger-carrying operations conducted as a public charter; scheduled passenger-carrying 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; and all-cargo operations conducted with airplanes having a payload capacity of 7,500 pounds or less, or with rotorcraft. A final rule change to the FARs effective November 17, 2003 (*Federal Register*, vol. 68, no. 180, September 17, 2003, pp. 54520-54588), concerning fractional ownership programs (which heretofore operated under Part 91) may significantly affect on-demand Part 135 operations. The rule change may require some fractional ownership programs to operate as if they were certified as on-demand Part 135.

Safety Board Severity Classification of Part 121 Accidents

Since 1997, the Safety Board has used a classification system for Part 121 and other air carrier accidents based on accident severity. Developed in response to a congressional requirement,[1] the system uses classifications that characterize both injury and damage. Definitions for level of injury and level of damage in Part 121 accidents are the same as those used to classify Part 135 accidents. The definitions of Safety Board Severity Classifications for Part 121 accidents are provided below:

Major An accident in which any of three conditions is met:

- Part 121 aircraft was destroyed, or
- 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 an aircraft.

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

Safety Board Classification of Part 135 Accidents

Like Part 121 accidents, Part 135 accidents (both scheduled and on-demand) are classified by highest *level of injury* (fatal, serious, minor, or none) and *level of aircraft damage* (destroyed, substantial, minor, or none), as summarized below.

[1] The classification system was introduced in 1997 as a requirement of the FAA Reauthorization Act of 1996 (and put into effect by Public Law 104-264, Sec. 407; amendment to *United States Code*, Title 49, Subtitle II, Chapter 11, Section 1119) for the Safety Board to provide "clearer descriptions of accidents associated with air transportation, including a more refined classification of accidents which involve fatalities, injuries, or substantial damage and which are only related to the operation of an aircraft." Before 1997, accident severity was characterized in terms of injuries (fatal, serious, minor, or none) or aircraft damage (destroyed, substantial, minor, or none).

Definitions for 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.

Definitions for Level of Aircraft Damage

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

Substantial 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 puncture 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.

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

None No damage.

Appendix C

How Accident Data in the Review Are Collected and Analyzed

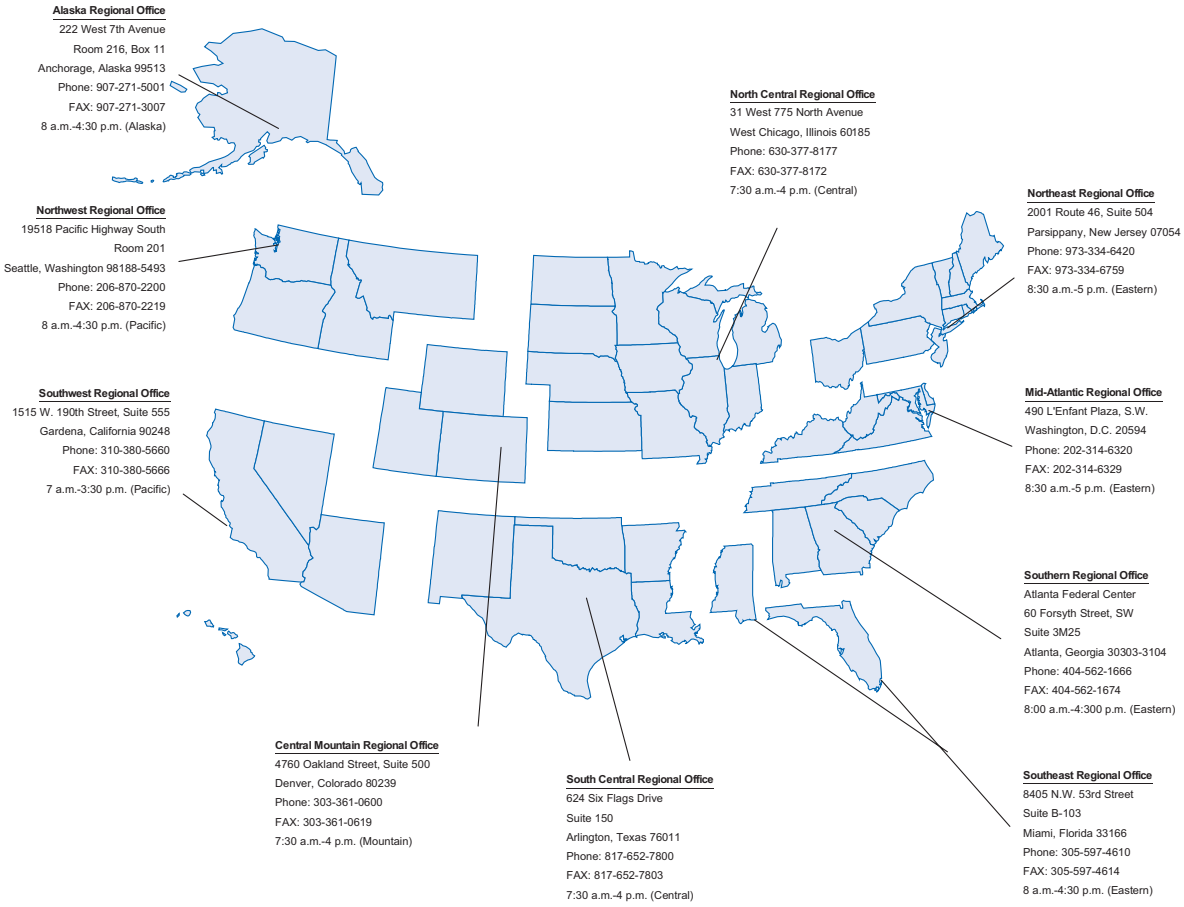
National Transportation Safety Board aircraft accident data reviews present accident data in two ways: by the number of accidents and by accident rate. For Part 121 and scheduled Part 135 operations, accident rates are calculated using three flight activity measures: flight hours, departures, and miles flown. Appendix C describes the data collection process, how those data are coded, and how the flight activity measures are compiled and used to calculate accident rates.

Accident Data: The Safety Board's Investigative Process

The Safety Board 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 and agreements, for aviation accidents that occur overseas and that involve aircraft registered in the U.S. or aircraft or major components of U.S. manufacture.[1] Investigations are conducted by Safety Board Headquarters staff based in Washington, D.C., or by staff based in one of the regional offices.

[1] For more detailed information about the criteria for Safety Board investigation of an aviation accident or incident, see Title 49 *Code of Federal Regulations* (CFR) 831.2.

National Transportation Safety Board Regional Offices[2]



Although the Safety Board investigates all civil aviation accidents that occur on U.S. soil (including those involving domestic and foreign operators), the *Review of 2001 Aircraft Accident Data: U.S. Air Carrier Operations* describes accidents that occur among U.S.-operated aircraft in all parts of the world.

The Safety Board's Aviation Accident/Incident Database

The Safety Board maintains the Accident/Incident Database, the government's official repository of aviation accident data and causal factors for civil aviation accidents. The database was established in 1962 by the Safety Board's predecessor agency, the Civil Aeronautics Board, and approximately 2,000 new event records are added each year. Each record contains data about the aircraft, environment, injuries, sequence of accident events, and other topics. The database is available to the public at <ftp://www.ntsb.gov/avdata/>. A database query tool is also available at <http://www.ntsb.gov/ntsb/query.asp#query_start> to search for sets of accidents using such information as date, location, and category of aircraft.

[2] As of fiscal year 2004

The Safety Board's database is primarily composed of aircraft accidents. An "accident" is defined in 49 CFR Part 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 or serious injury, or in which the aircraft receives substantial damage.[3]

The database also contains fields for documenting selected aviation "incidents," defined in 49 CFR Part 830.2 as "an occurrence other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operations."

During an investigation, Safety Board investigators collect information from a variety of sources, including the aircraft crew, the FAA, manufacturers, and witnesses. Investigators use the Board's Accident Data Management System (ADMS) to document those data in the Accident/Incident Database. There are five types of data in the database:

- Factual information that documents the accident situation.
- Occurrence codes to document what happened during an accident.
- Phase-of-flight codes to designate when each occurrence took place.
- Explanatory causes, factors, and findings to identify the cause-and-effect relationships that help explain why the accident happened.
- Narrative data that describe the accident in natural language and state the probable cause of the accident.

Factual Information. Investigators enter information in the database that describes the accident aircraft, crew and passengers, and accident environment. These data typically include aircraft type, make and model, aviation-related demography of flight and cabin crew, weather conditions, and accident site details.

Occurrence Data. The circumstances of an accident are documented in the Safety Board's accident report as accident "occurrences" within a "sequence of events." As stated above, occurrence data indicate *what* happened during the accident. A total of 54 occurrence codes[4] are available to describe the events for any given accident. Because aviation accidents are rarely limited to a single event, each accident is coded as a sequence (that is, occurrence 1, occurrence 2, etc.), with as many as five different occurrence codes. For accidents that involve more than one aircraft, the list of occurrences is unique to each aircraft.

[3] The definitions of a "death" (fatality), "serious injury," or "substantial damage" are presented in Appendix B.

[4] Two of the codes, "missing aircraft" and "undetermined," do not represent operational events.

Occurrence data do not include any information about why an accident may have happened; the first occurrence can instead be considered the first observable link in the accident chain of events. First occurrence data are used with phase-of-flight data to characterize the initiating event in an accident sequence.

Phase-of-Flight Data. Investigators use phase-of-flight codes to describe *when* an occurrence took place in the chronology of flight. These 50 distinct codes are classified into six major categories describing typical flight operations: takeoff or climb, approach or landing, maneuvering or hovering, cruise or descent, standing, and taxiing. Each category contains more specific detail about that phase of flight; for example, the category "standing" includes standing with engines operating, standing with engines not operating, and standing while starting engines.

Findings, Factors, and Probable Cause Data. In addition to coding accident occurrences and phase-of-flight data, the Safety Board determines probable cause. The objective of this determination is to discern the cause-and-effect relationships in the accident sequence. This could be described as *why* the accident happened. In determining probable cause, the Safety Board considers all facts, conditions, and circumstances associated with the accident. Within each accident occurrence, any information that contributes to the Board's determination of probable cause is identified as a "finding" and may be further designated as either a "cause" or "factor." The term "factor" is used to describe situations or circumstances that contribute to the accident cause. The details of probable cause are coded as the combination of all causes, factors, and findings associated with the accident. Just as accidents often include a series of events, several causes and factors can contribute to the explanation of why an accident occurred. For this reason, a single accident report can include multiple cause and factor codes. Hundreds of unique codes are available to document probable cause information. These codes have been grouped into three broad cause/factor categories: aircraft, environment, and personnel.

Narrative Data. Natural language textual descriptions of the accident and accident probable cause are maintained in the database and can be retrieved with other specific information about the accident.

The five types of data can also be related to the factual component of the accident investigation and the analysis component of the investigation. The factual information and the narratives describing the accident represent the encoding in the database of the factual component of the investigation. The narrative describing the probable cause, and the occurrence codes, phase-of-flight codes, and causes, factors, and findings represent the encoding of the analysis component of the investigation.

Shortly after completing the on-scene investigation, investigators submit a preliminary factual report containing limited information about the accident or incident, such as date, location, aircraft operator, and type of aircraft. Once investigators have finished gathering and compiling information, they submit a factual report. After the investigation is complete, a final report is issued, which includes an analysis of the factual information, statement of probable cause and other contributing factors, and, if appropriate, a list of recommendations. For major accident investigations, the probable cause is approved by the five Members of the Safety Board or their designees; for general aviation accident investigations, approval authority may be delegated to the Director of Aviation Safety. Information about the accident and the investigation is available to the public after approval by the Safety Board or their designees.

Accident Rate Data: Compiling Aircraft Flight Activity

All Part 121 and scheduled Part 135 carriers are required by regulation to report revenue flight activity[5] data to the Department of Transportation,[6] while on-demand Part 135 carriers are not. As a result, accident data in this review—and the method used to calculate accident rates—differ depending on the type of operation.

Part 121 and scheduled Part 135 flight activity data, including flight hours, number of departures, and miles, are maintained by the Bureau of Transportation Statistics (BTS). These data are aggregated by the FAA's Systems Process Audit staff (AFS-40) to produce annual reports of flight activity. The flight activity measures are based on a full census of the active Part 121 and scheduled Part 135 fleet.

In contrast, flight activity data for on-demand Part 135 operations are estimated using the voluntary *General Aviation and Air Taxi Activity (GAATA) Survey*, which is compiled annually by the FAA. The *GAATA Survey* was established in 1978 to gather a sampling of information from owners of general aviation and on-demand Part 135 aircraft. The information includes flight hours, avionics, base location, and use, but does not include miles flown or number of departures. To conduct the survey, the FAA selects registered aircraft from its Civil Aviation Registry using a stratification procedure based on aircraft type and geographic region. Note that the small proportion of on-demand Part 135 aircraft in the survey, combined with low survey response rates, and the fact that the survey goes to aircraft owners rather than operators, results in an imprecise activity estimate.

[5] Activity data include revenue aircraft hours, revenue aircraft departures, revenue aircraft miles flown, and several others.

[6] Part 121 operators report activity monthly using Traffic Reporting System Form 41, Schedules T-100 and T-100(f), and quarterly using Scheduled Part 135 Operators Report, U.S. Bureau of Transportation Statistics (BTS) Form 298-C, Schedules A-1 and T-1.

Once GAATA data are compiled, the FAA estimates flight hours, which the Safety Board includes in its annual reviews. Prior to 2002, the FAA estimated flight hours based strictly on *GAATA Survey* data. In 2002, the FAA changed its estimating method and revised its flight-hour estimates for on-demand Part 135 operations for the years 1992-2000. The revised activity estimate uses calculations that are based on the number of aircraft assumed to operate on-demand operations[7] and the average number of flight hours reported on the *GAATA Survey*. FAA's flight-hour estimates as revised for on-demand Part 135 flight operations are substantially higher than they would be using the previous method. For example, before the FAA changed its estimating method, the flight-hour estimate for the year 2000 would have been 2,430,000; estimated using the revised method, it is 3,552,881, an estimate that is 46.2% higher. This change in estimated flight activity results in a consistently lower accident rate calculation for the years 1992-2004. The change is so dramatic that the Safety Board maintains on its Web site[8] a comparison of flight-hour estimates for each year using both estimating methods. This review uses the revised activity measures for on-demand Part 135 operations.

The only flight-activity measure that is common for Part 121, scheduled Part 135, and on-demand Part 135 operations is flight hours. Although the number of departures is available for Part 121 and scheduled Part 135 operations, the flight-hour-per-departure rates for those operations differ greatly. Accordingly, the review calculates accident rates for Part 121 and scheduled Part 135 operations using the number of flight hours and departures. The number of departures or miles flown is not available for on-demand Part 135 operations and cannot therefore be used to calculate rates for those operations.

Prior to the 1998 review, activity rates were presented in units of hundred-thousands for flight hours and departures and in millions for miles flown. Because of an increase in activity and a decrease in accident numbers, and to facilitate interpretation of rate data, the review now presents aircraft activity data in units of millions for flight hours and departures and billions for miles flown; accident rates are calculated using flight hours and number of departures only.[9] Any comparisons with Safety Board data published before the 1998 review should take this change into account.

[7] Data are derived from the FAA's Vital Information Subsystem (VIS), a database used to track commercial aircraft operating certificates.

[8] See table 9a at <http://www.ntsb.gov/aviation/Table9a.htm>.

[9] From BTS, 2002 National Transportation Statistics (BTS-02-08), Table 2-9 for Part 121 Operations, Table 2-10 for Scheduled Part 135 Operations, and Table 2-13 for On-Demand Part 135 Operations.

Appendix D

Characteristics of the Air Carrier Fleet

The number of major air carriers did not change greatly between 1990 and 2001, ranging from 11 in 1995 to 15 in 2001 (table D1). However, the number of other carriers (including national, large regional, and medium regional) decreased after 1995 from a peak of 85 carriers.

Table D1: Number of Air Carriers, 1990-2001[1]

	1990	1995	1996	1997	1998	1999	2000	2001
Major Air Carriers	14	11	12	13	13	13	15	15
Other Air Carriers	56	85	84	83	83	81	76	72
Total	**70**	**96**	**96**	**96**	**96**	**94**	**91**	**87**

The number of air carrier aircraft in the fleet increased 16% from 1992 to 2001 to a peak of 8,497 in 2001 (table D2). All of the increase was in turbojets, which increased 42%. The number of turboprop and piston aircraft steadily decreased during that same period, and the number of helicopters in the air carrier fleet remained generally constant.

Table D2: Air Carrier Aircraft Characteristics, 1992-2001

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Fixed Wing	7,187	7,173	7,242	7,293	7,357	7,482	7,994	8,106	8,016	8,370
Turbojet	4,446	4,584	4,636	4,832	4,922	5,108	5,411	5,630	5,956	6,296
Turboprop	1,894	1,868	1,782	1,713	1,696	1,646	1,832	1,788	1,475	1,494
Piston	847	721	824	748	739	728	751	688	585	580
Helicopter	133	124	128	118	121	134	117	122	39	127

[1] Bureau of Transportation Statistics (BTS), 2003 National Transportation Statistics, Table 1-2. Air 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.

Between 1990 and 2001, air carrier passenger miles increased 49.2%, and the average number of miles flown per aircraft increased 12.8%. Similarly, per-passenger-mile revenues for domestic scheduled air carriers increased steadily over the last two decades, with a record average high of 14.6 cents per mile in 2001.

The number of enplanements is another indicator of the aviation environment. In 2000, 639 million passengers boarded airplanes at U.S. airports. Figure D1 lists the number of enplanements at the top 20 airports in the United States in 2001.[2] As in previous years, Hartsfield Atlanta International Airport had the highest traffic volume with 39.4 million enplanements.

The number of jet transport aircraft deliveries also increased overall from 1985 through 2001 although the trend was cyclical (see figure D2); deliveries both to U.S. and foreign customers peaked in 1991 and 1999.[3] An average of 46.2% of all deliveries went to U.S. customers from 1985 through 2001, with a low of 35% in 1989 and a high of 69% in 2001. The total number of aircraft deliveries increased after 1994, and the proportion of aircraft delivered to U.S. customers also increased, reaching a new peak in 2001 of 69% of all deliveries. The overall increase in aircraft deliveries after 1997, including a greater proportion of deliveries to U.S. customers, resulted in a steady decrease in deliveries to foreign customers in that period.

[2] BTS, 2000 National Transportation Statistics (BTS-01-01), Table 1-36.

[3] 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 Web site <www.aia-aerospace.org/stats/aero_stats/stat21.pdf>.

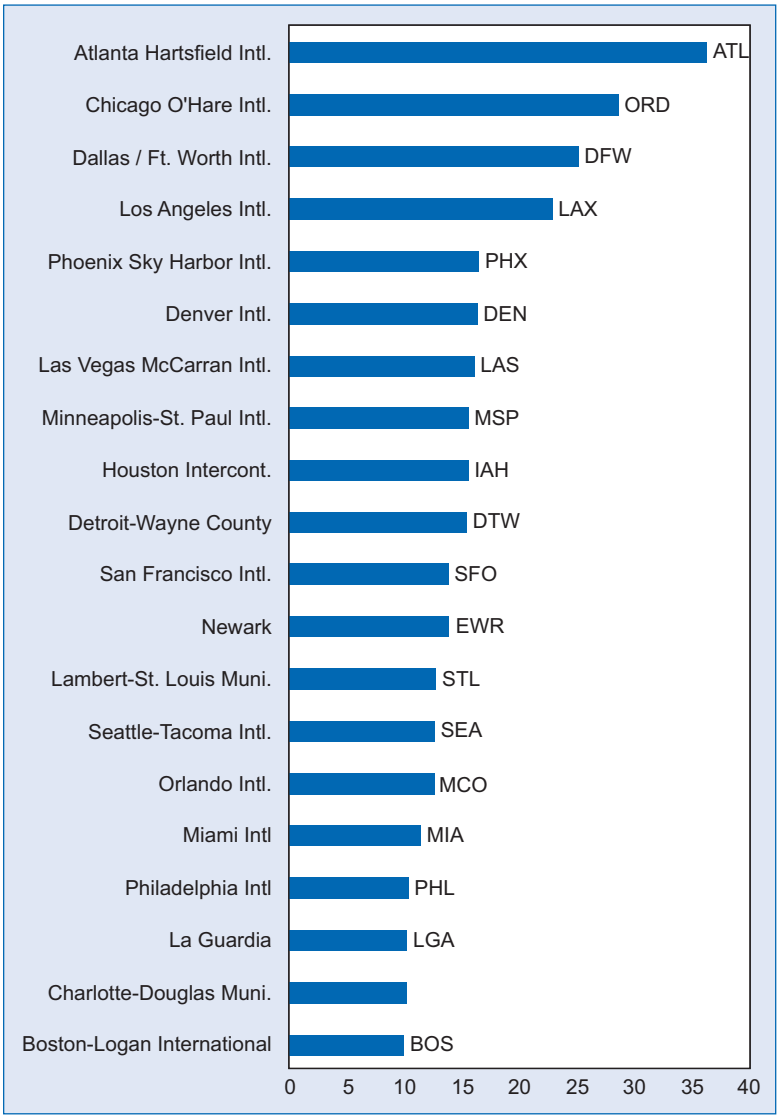


Figure D1: Enplanements (millions) in 2001, Top 20 U.S. Airports

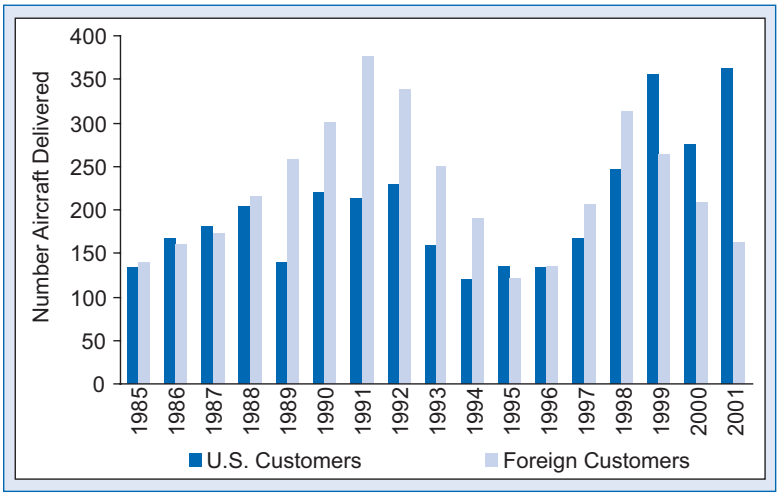


Figure D2: Number of Jet Transport Aircraft Deliveries 1985-2001