U. S. Air Carrier Operations
Calendar Year 2006

Statistical Review

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Annual Review of Aircraft Accident Data

Review of Aircraft Accident Data:
U.S. Air Carrier Operations Calendar Year 2006

National Transportation Safety Board

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National Transportation Safety Board. 2010. *U.S. Air Carrier Operations, Calendar Year 2006*. Annual Review of Aircraft Accident Data NTSB/NTSB/ARC-10/01. Washington, DC.

Abstract: The National Transportation Safety Board's Review of Aircraft Accident Data: U.S. Air Carrier Operations Calendar Year 2006 covers aircraft operated by U.S. air carriers under Title 14 Parts 121 and 135 of the Code of Federal Regulations (CFR). Air carriers are generally defined as operators that fly aircraft in revenue service. Data for the years 1997–2005 are included to provide a historical context for the 2006 statistics. Readers who prefer to view or manipulate tabular data may access the data set online at http://www.ntsb.gov/aviation/stats.htm.

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Introduction

The National Transportation Safety Board's *Review of Aircraft Accident Data: U.S. Air Carrier Operations Calendar Year 2006* covers aircraft operated by U.S. air carriers under Title 14[1] Parts 121 and 135 of the *Code of Federal Regulations* (CFR). Data for the years 1997–2005 are included to provide a historical context for the 2006 statistics. Readers who prefer to view or manipulate tabular data may access the data set online at http://www.ntsb.gov/aviation/stats.htm.[2] Air carriers are generally defined as operators that fly aircraft in revenue service.

Part 121	Scheduled Part 135	On-Demand Part 135
Includes air carrier operations involving airplanes with a passenger-seat configuration of more than 9 passenger seats—or in the case of cargo operations, airplanes having a payload capacity of more than 7,500 pounds. Part 121 includes both scheduled and nonscheduled operations.[3]	Includes scheduled passenger-carrying operations in airplanes, other than turbojet-powered airplanes, having a maximum passenger-seat configuration of 9 seats or less and a maximum payload capacity of 7,500 pounds or less, or rotorcraft.	Air carrier operations for which the departure location, departure time, and arrival location are negotiated with the customer.[4]

U.S. air carriers experienced a total of 88 accidents in 2006, compared to 111 in 2005, a decline of about 21%.[5] (See table 1.) Air carriers flew more than 8 billion miles in 2006, recorded more than 11 million departures, and logged more than 23 million flight hours.[6]

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

[2] Appendix A lists the 2006 air carrier accidents discussed in this review. Also see definitions in appendix B.

[3] Title 14 CFR Part 119.3. Also see definitions in appendix B of this report.

[4] 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; all-cargo operations conducted with airplanes having a payload capacity of 7,500 pounds or less; and all-cargo operations with rotorcraft.

[5] An aircraft accident is defined in Title 49 Section 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." This definition excludes occurrences that involve no damage to the aircraft or any ground or passenger injuries not related to the operation of the aircraft for the purpose of flight. Classifications of aircraft accident severity for each type of operation are defined in appendix B.

[6] The number of flight hours, miles flown, and departures were provided by the U.S. Department of Transportation, Federal Aviation Administration (FAA), Flight Standards Division. For more details, see appendix C.

Table 1: Accidents and Accident Rates for 2006

	Number of Accidents	Accidents Per Million Flight Hours
Part 121	33	1.7
Scheduled Part 135	3	9.9
On-Demand Part 135	52	13.9

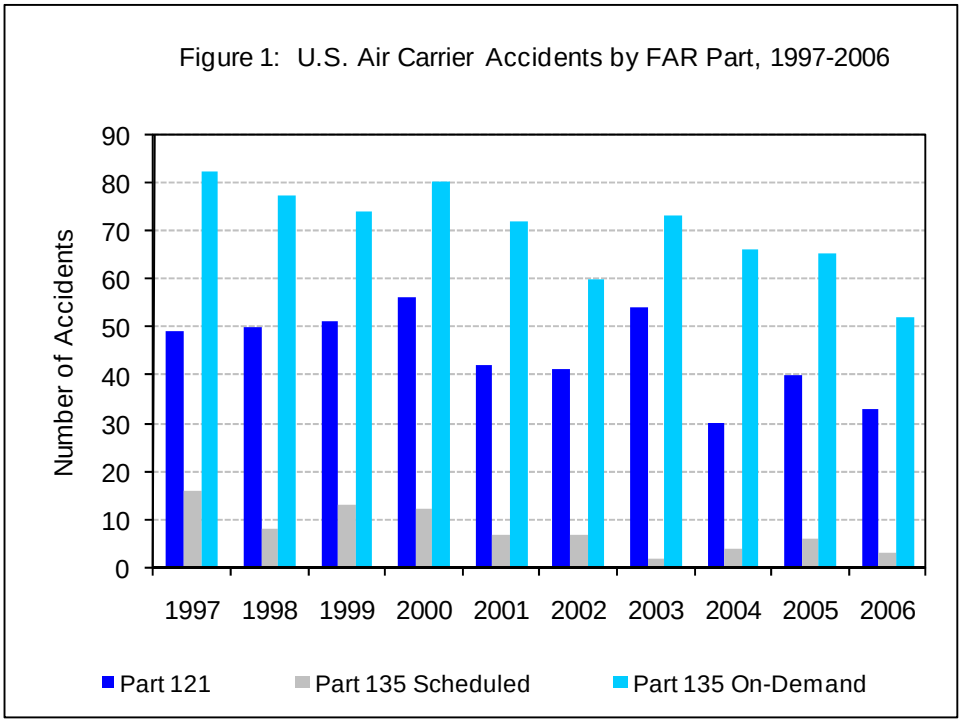
Part 121 air carriers continued to exhibit the lowest accident rates of all commercial operations (tables 1 and 2) in 2006, while the accident rates for both on-demand and scheduled Part 135 air carrier operations were substantially higher. Only 13 of the 88 air carrier accidents resulted in fatalities—2 of the Part 121 accidents, 1 scheduled Part 135, and 10 of the on-demand Part 135 accidents.

Table 2: Fatal Accidents, Fatalities, and Fatal Accident Rates for 2006

	Number of Fatal Accidents	Fatalities	Fatal Accidents Per Million Flight Hours
Part 121	2	50	0.10
Scheduled Part 135	1	2	3.32
On-Demand Part 135	10	16	2.67
Total	13	68	

Activity Measures and Accident Rates

The number of accidents in all commercial operations decreased from 2005 to 2006. The 33 Part 121 accidents in 2006 represented the second-lowest number of accidents during the period from 1997 through 2006. The number of on-demand Part 135 accidents decreased substantially from 2005 to 2006, reaching the lowest number of such accidents in the 10-year period. The number of scheduled Part 135 accidents also decreased, reaching the second-lowest number of accidents in the same 10-year period.



Flight hours for both Part 121 and on-demand Part 135 operations remained relatively constant from 2005 to 2006, although Part 121 flight hours were down slightly, having reached a 10-year peak in 2005 (figure 2). The number of flight hours for scheduled Part 135 operations peaked at the beginning of the 10-year period in 1997.[7]

Scheduled departures among Part 121 operations decreased in 2006 after rising substantially through 2004 and peaking in 2005; the lowest numbers were seen in 2002 and 2003. Departures among scheduled Part 135 operations increased in 2006 but remained stable from 1998 through 2006 at slightly over 0.5 million departures a year (figure 3).

[7] The FAA requires Part 121 and scheduled Part 135 operators to report flight hours and departures. Part 121 operators report activity monthly, and scheduled Part 135 operators report quarterly. The FAA estimates on-demand Part 135 flight hours using the voluntary General Aviation and Air Taxi and Avionics Survey, which is compiled annually by the FAA. There are no estimates of departures. See appendix C for more details.

Figure 2: Flight Hours by FAR Part, 1997-2006

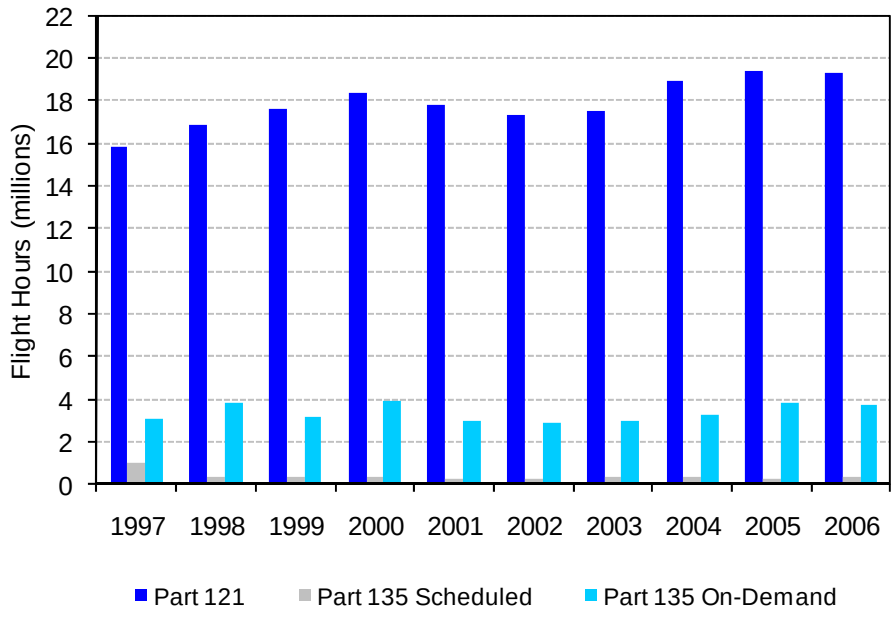
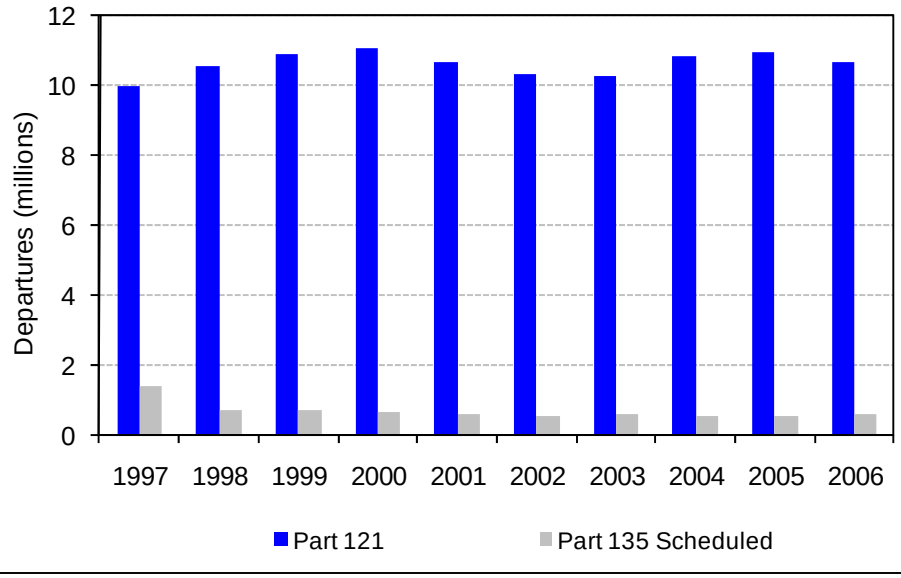


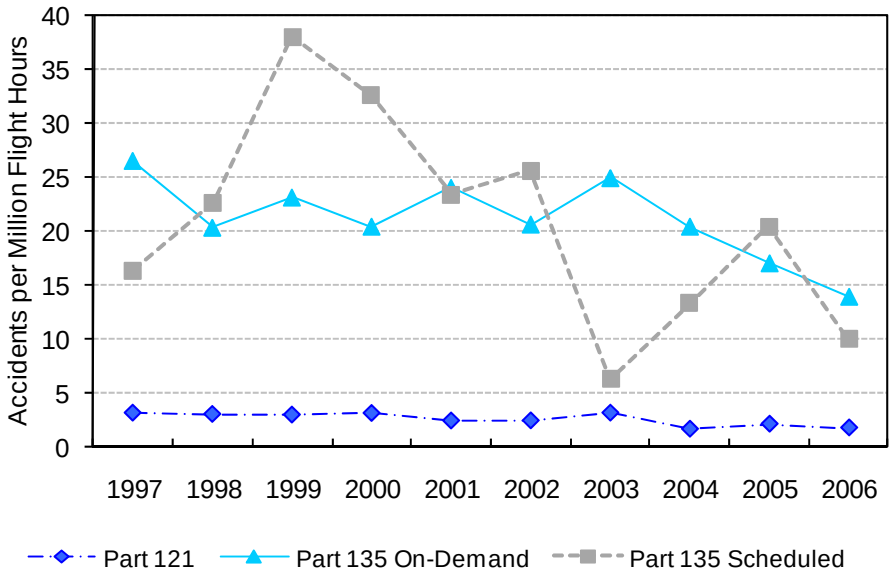
Figure 3: Scheduled Departures by FAR Part, 1997-2006



As shown in figure 4, on-demand Part 135 accident rates showed a substantial decrease from 1997 through 2006, dropping below 14 accidents per million flights in 2006. Throughout the period, the accident rate for on-demand Part 135 operations (and for Part 135 operations in general) remained significantly higher than the Part 121 rate. The accident rate for on-demand Part 135 operations varied between 20-27 accidents per million flight hours for most of the 10-year period before

starting a steady decline in 2004 while the Part 121 accident rate ranged from a high of 3.09 per million flight hours in 1997 to a low of 1.59 in 2004. The Part 121 accident rate was 1.71 per million flight hours in 2006.

Figure 4: U.S. Air Carrier Accident Rates by FAR Part
1997-2006



Fatal Accidents, 1997 through 2006

The number of fatal Part 121 accidents remained low (ranging from 0 to 4 per year from 1997 through 2006). The number of on-demand Part 135 fatal accidents exhibited greater year-to-year variability (figure 5). The number of on-demand Part 135 fatal accidents in 2006 was the lowest for the 10-year period, less than half that recorded in the peak year of 2004.

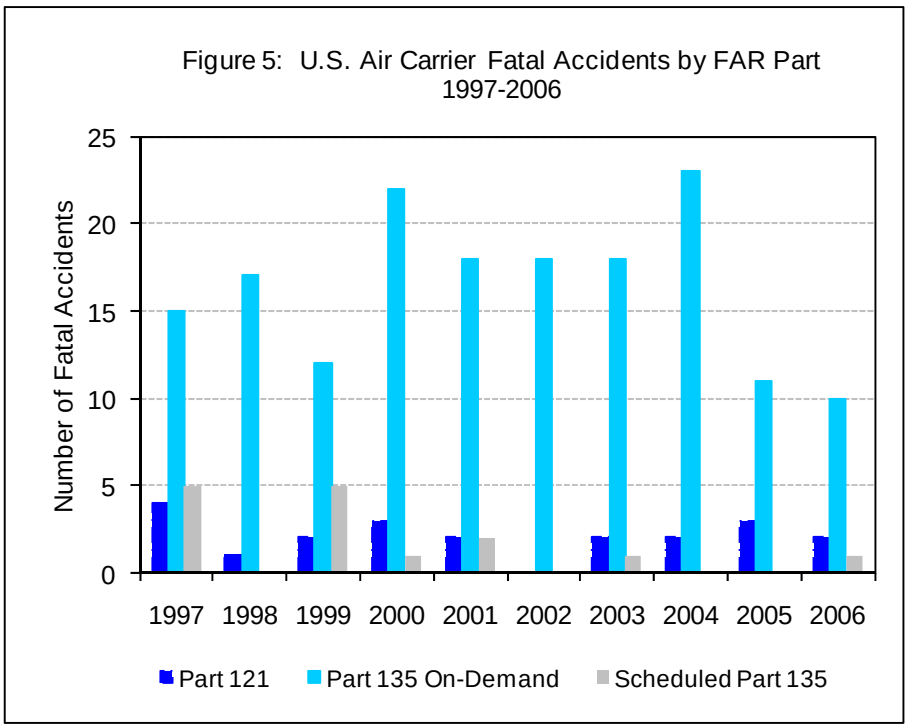


Figure 5: U.S. Air Carrier Fatal Accidents by FAR Part
1997-2006
Number of Fatal Accidents
25
20
15
10
5
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
Part 121
Part 135 On-Demand
Scheduled Part 135

Part 121 Accidents in 2006

Part 121 air carriers carried more than 691 million passengers 8.1 billion miles and accumulated 19.3 million flight hours in 2006. The 33 Part 121 accidents involved 36 aircraft[8] and produced an accident rate of 1.7 accidents per million flight hours and a fatal accident rate of 0.10 accidents per million flight hours. These accidents resulted in 50 fatalities, 9 serious injuries, and 12 minor injuries, as shown in table 3.

Approximately 1 of every 244,000 passengers who boarded a Part 121 air carrier flight was involved in an accident in 2006, and only 1 of every 12.6 million passengers was injured: of the 2,829 passengers involved in Part 121 accidents, only 1.9% received any type of injury. Four Part 121 accidents occurred outside of the United States and its territories. In addition, 7 of the 33 accidents were cargo-only flights.

Table 3: Part 121 Injuries by Role in 2006

	Fatal	Serious	Minor	None	Total
Flight crew	1	1	3	69	74
Cabin crew	1	4	4	73	82
Other crew				7	7
Passengers	47	4	4	2,774	2,829
Total aboard	**49**	**9**	**11**	**2,923**	**2,992**
Other aircraft	0	0	0	109	109
On ground	1	0	1	0	2
Total	**50**	**9**	**12**	**3,032**	**3,103**
Accidents	2	8	3	20	**33**

Accidents, Accident Severity, and Injuries

For the 10 years beginning in 1997, the number of Part 121 accidents reached its peak in 2000, and its lowest level in 2004 (table 4). Almost all accidents during that period (90%) were nonfatal injury-only or damage-only accidents.[9] Accident rates based on flight hours (figure 6) show the same pattern and highlight how much higher the rates were for nonfatal injury-only and damage-only accidents than for the more severe accidents. Over the decade, the rates for major and serious accidents remained low.

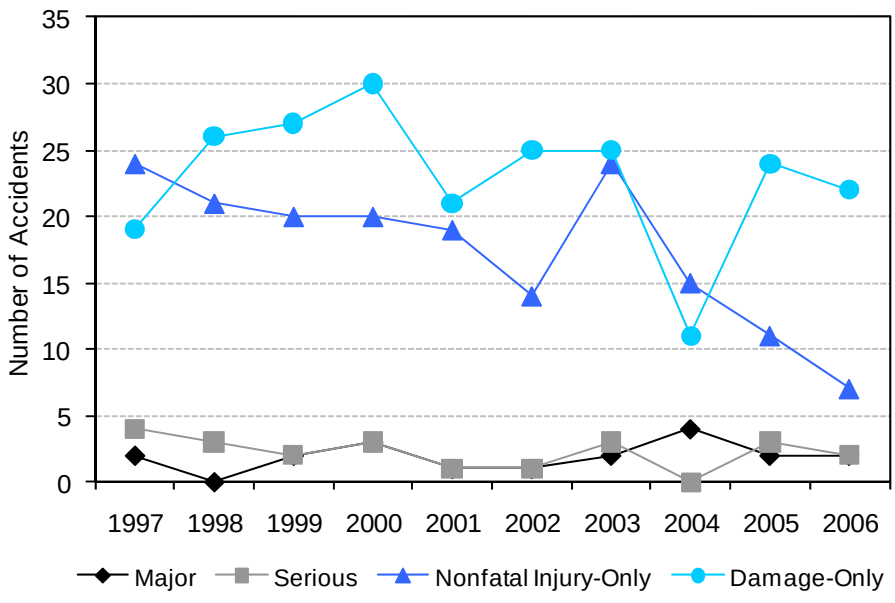
[8] Three accidents in 2006 involved the collision of two aircraft. Each of these collisions is recorded as one accident.

[9] See appendix B for definitions.

Table 4: Part 121 Accidents by Severity Classification, 1997-2006

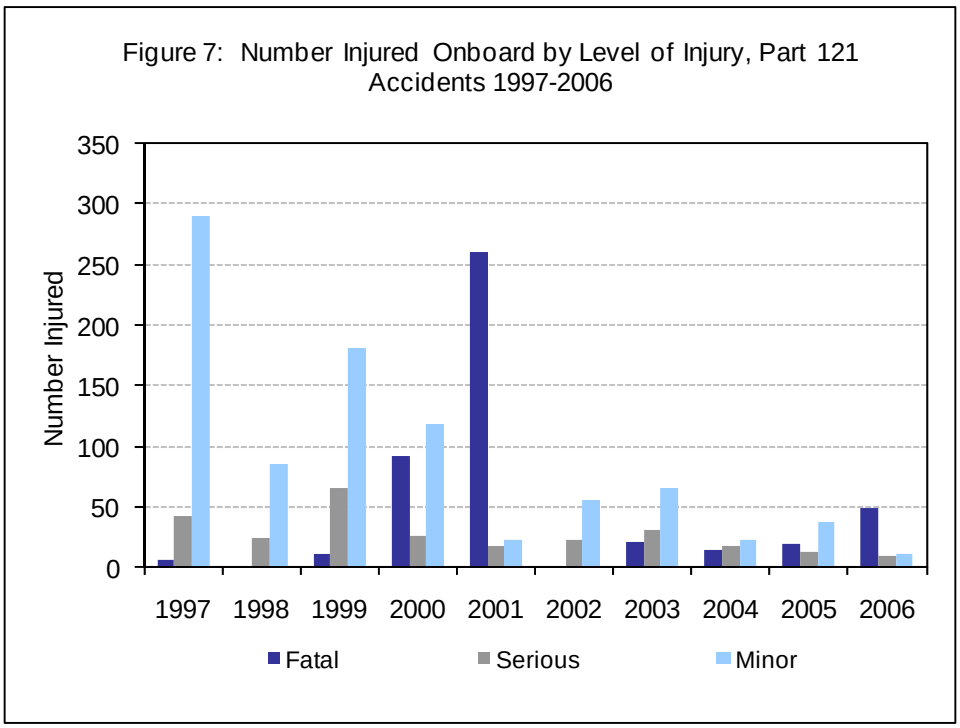
Severity Classification	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Major	2	0	2	3	1	1	2	4	2	2
Serious	4	3	2	3	1	1	3	0	3	2
Nonfatal Injury-Only	24	21	20	20	19	14	24	15	11	7
Damage-Only	19	26	27	30	21	25	25	11	24	22
Total	49	50	51	56	42	41	54	30	40	33

Figure 6: Part 121 Accidents by Severity Classification 1997-2006



These data, especially the number of injuries, can be dramatically affected by a few severe accidents. For instance, figure 7 shows that most of the Part 121 fatalities during the period (397 of 473) were attributed to just 3 of the 446 Part 121 accidents[10] that occurred in 2000, 2001, and 2006. In other years, the proportion of people injured in Part 121 accidents was small.

[10] Alaska Airlines flight 261 on January 31, 2000, resulted in 88 fatalities; American Airlines flight 587 on November 12, 2001, resulted in 260 fatalities; and Comair flight 191 on August 27, 2006, resulted in 49 fatalities.



The survivability of serious accidents over the 10 years remained quite high (tables 5, 6, 7, and 8); all of the accidents producing minor injuries and 94% of the accidents producing no injuries were associated with substantially damaged or destroyed aircraft. Table 4 shows that such low-injury accidents dominate during the 10-year period.

In contrast, 92% of the accidents in 1997–2006 that produced serious injuries resulted in minor or no damage to the aircraft. Seven no-damage accidents resulted in serious injuries in 2006 (table 6). Most of those accidents—6 out of 7, or 86%— were the result of encounters with turbulence. (See tables 6 and 12.)

Table 5: Part 121 Fatal Accidents for Each Level of Damage, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Destroyed	1		1	2	1		1	2	1	1
Substantial									1	
Minor	1	1	1	1	1		1		1	1
None	2									

Table 6: Part 121 Serious-Injury Accidents for Each Level of Damage, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Destroyed						1		2		
Substantial	1	2	1	2		1	2		2	1
Minor	5	6	2	3		2	1		2	
None	19	15	18	17	19	12	23	15	9	7

Table 7: Part 121 Minor-Injury Accidents for Each Level of Damage, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Destroyed	1		1	1			1			1
Substantial	6	7		6	6	1	2	2	3	2
Minor										
None										

Table 8: Part 121 No-Injury Accidents for Each Level of Damage, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Destroyed										
Substantial	13	19	27	23	15	23	23	9	20	19
Minor			1	1	2				3	3
None				1		1				

Occurrences, Causes, and Factors

Investigators describe the events that take place during an accident as a sequence of occurrences, each identified with a phase of flight. The first occurrence describes the starting point for an accident. Table 9 shows first occurrence data by phase of flight for Part 121 accidents in 2006. Appendix C discusses occurrences in more detail and how they are coded. First occurrence data for 28 of the 33 Part 121 accidents in 2006 were available for this analysis.

Table 9 relates the type of first occurrence to the phase of flight. On-ground collisions with objects during taxiing or standing were the most frequently cited first occurrences for Part 121 operations and accounted for 25% of Part 121 accidents in 2006. The second most frequent first occurrences were in-flight encounters with weather during cruise or descent, accounting for five Part 121 accidents.

Table 9: Part 121 First Occurrences by Phase of Flight for 2006

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Maneuver	Taxiing or Standing	Total
On Ground Collision with Object					7	7
In-flight Encounter with Weather		5				5
Miscellaneous/Other				1	4	5
Airframe, Component, System Failure	1		2		1	4
Collision Between Aircraft (Excludes Midair)					2	2
Dragged Wing, Rotor, Pod, Float or Tail/Skid			1			1
Fire		1				1
Gear Collapsed			1			1
On Ground/Water Encounter with Terrain/Water					1	1
Propeller Blast or Jet Exhaust/Suction					1	1
Total Accidents	1	6	4	1	16	28

Table 10 relates the severity of an accident to phase of flight for the first occurrence. Standing or taxiing accidents most often resulted in a damaged aircraft but few injuries, while cruise or descent accidents were more often associated with non-fatal injury-only accidents (consistent with turbulence).

Table 10: Part 121 Accident Initiating Event, Severity Classification by Phase of Flight, 2006

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Maneuver	Taxiing or Standing	Total
Major		1			1	2
Serious	1				1	2
Injury		5		1		6
Damage			4		14	18
Total	1	6	4	1	16	28

Within each accident occurrence, any information that helps explain why that event happened is designated as either a "cause" or "factor." For most of the 10-year period, personnel were cited as a cause or factor in 70 to 80% of all Part 121 accidents. Calendar year 2006 was no exception, as shown in figure 8: personnel factors were cited in 82% of the accidents, environmental factors in 50%, and aircraft factors in 25%.

Figure 8: Broad Causes/Factors for Part 121 Accidents 1997-2006

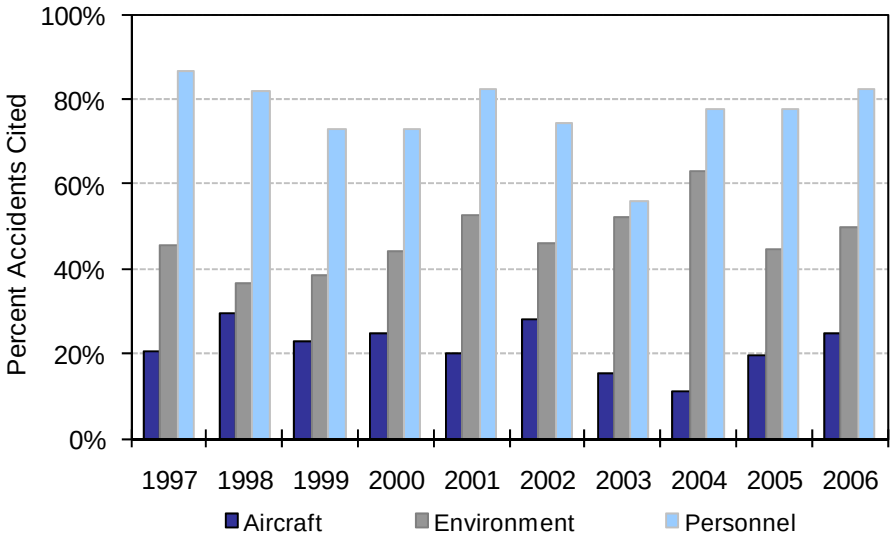
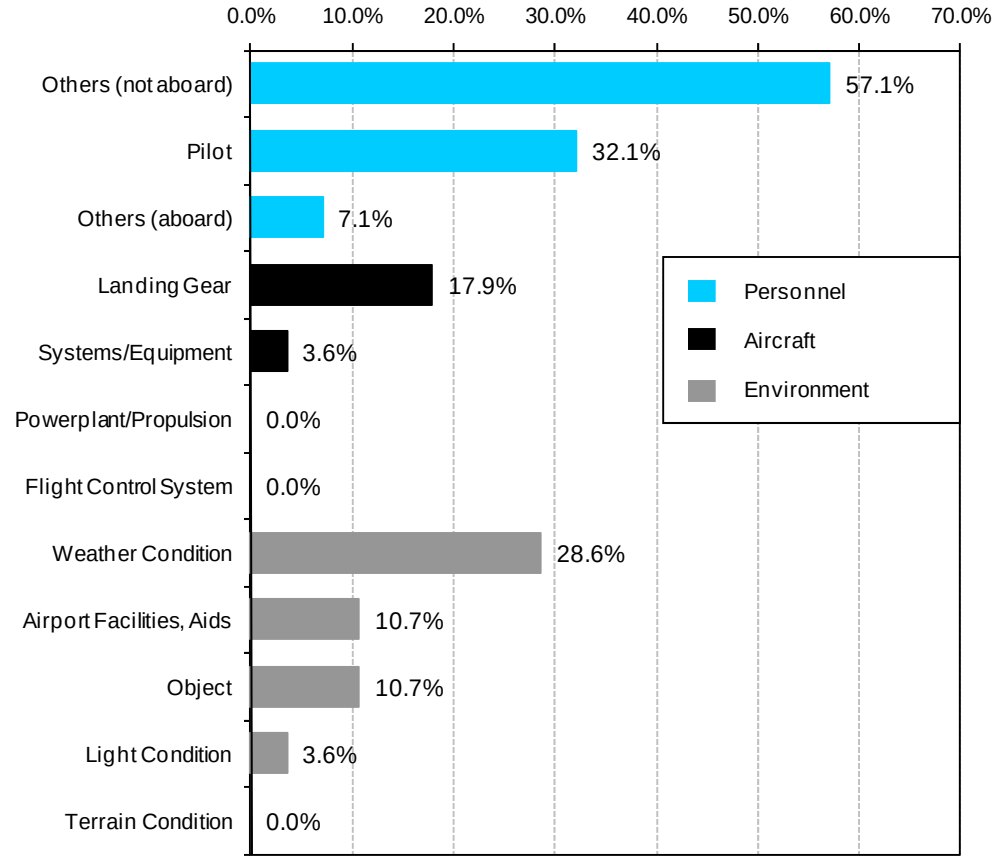


Figure 9 provides more detail about 2006 Part 121 accident causes and factors within the broad categories of personnel, aircraft, and environment. These data show the proportion of accidents where a specific cause or factor was cited at least once in the accident.[11] In 2006, in the personnel category, others not on board were the most frequently cited cause or factor, reflecting the substantial number of accidents attributable to ramp personnel. In contrast to previous years, pilots were cited less frequently than other personnel but still accounted for a substantial proportion of the accidents (32%). In the environment category, weather was the leading cause or factor (28.6%), reflecting the fact that Part 121 air carriers must frequently operate in adverse weather conditions. In 2006, landing gear were, by far, the most frequently cited aircraft component or equipment cause or factor cited.

[11] Each accident can have more than one cause or factor identified.

Figure 9: Top Causes/Factors in Part 121 Accidents for 2006



Turbulence was cited as a cause or factor in 6 (18%) of the Part 121 accidents in 2006 and accounted for 75% of all serious-injury accidents (table 11). Turbulence was a cause or factor in 21.5% of all (190) Part 121 accidents from 1997–2006 and produced half (95) of the serious-injury accidents. (See tables 6 and 11.) Tables 11 and 12 show that turbulence resulted in serious injuries but caused little or no damage to the aircraft.

Table 11: Part 121 Turbulence Accidents by Highest Level of Injury, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Fatal	1									
Serious	12	8	11	12	9	7	14	10	6	6
% Total Accidents	26.5%	16.0%	21.6%	21.4%	19.6%	17.1%	25.9%	33.3%	15.0%	18.2%
% Serious Injury Accidents	48.0%	34.8%	52.4%	54.5%	47.4%	43.8%	53.8%	58.8%	46.2%	75.0%

Table 12: Part 121 Turbulence Accidents for Each Level of Damage, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Substantial		1								
Minor	2	1	2	2		1			1	
None	11	6	9	10	9	6	14	10	5	6

International Major Air Carrier Accidents

The Part 121 accidents that occurred in the United States accounted for about 20% of all scheduled major air carrier accidents worldwide in 2006. According to the International Civil Aviation Organization (ICAO),[12] 106 reportable major air carrier accidents occurred outside the United States and Canada (table 13).[13] A summary of the accidents by world region is shown in table 13.[14]

[12] ICAO was established in 1944 by 52 member states to secure international cooperation in establishing uniformity in regulations and standards, procedures, and organization in civil aviation. One of ICAO's activities is to provide the aviation community with safety-related information, including accident and activity data. More about ICAO can be found at http://www.icao.int/.

[13] ICAO collects data on accidents involving aircraft over 12.5 tons whereas Safety Board numbers refer to air carrier accidents by operation.

[14] Three nonfatal accidents occurred over oceans. Two of the accidents occurred over the North Atlantic Ocean and one over the North Pacific Ocean.

Table 13: International Reportable Accidents by World Region in 2006

	Number of Accidents	Number of Fatal Accidents
United States & Canada	55	9
Central & South America	15	5
Europe & Russian Federation	36	7
Africa & Middle East	34	6
Asia & Pacific	21	2
Total	**161**	**29**

The fact that the United States accounts for such a large proportion of the worldwide accident total is not surprising when air carrier activity is considered. The top 10 countries for flight hours and departures in 2006, as reported by ICAO, are shown in tables 14 and 15, respectively.

Table 14: 2006 Top 10 Most Active Countries Based on Flight Hours

	Domestic	International	Total
United States	14,252,135	3,238,932	17,491,067
China	2,599,676	486,295	3,085,971
United Kingdom	395,421	1,911,378	2,306,800
Germany	291,421	1,912,767	2,204,188
Japan	730,248	579,918	1,310,166
France	310,915	970,367	1,281,282
Spain	567,604	553,227	1,120,830
India	590,973	261,683	852,656
Brazil	675,616	146,986	822,602
Canada	275,006	489,026	764,032

Table 15: 2006 Top 10 Most Active Countries Based on Departures

	Domestic	International	Total
United States	8,614,970	900,525	9,515,495
China	1,401,626	115,501	1,517,127
United Kingdom	398,881	638,151	1,037,032
Germany	271,609	746,239	1,017,848
Spain	441,178	188,376	629,554
Japan	519,180	103,023	622,203
France	261,233	306,415	567,648
Brazil	534,342	26,496	560,838
India	386,816	59,134	445,950
Italy	189,163	159,305	348,468

Accident rates provide a way to compare accident risk in different parts of the world. Tables 16 and 17 show the accident rates and fatal accident rates based on the number of fatal accidents, flight hours, and departures reported by ICAO. North America, Europe, and Asia produced the lowest fatal accident rates in 2006, while Central and South America, Africa, and the Middle East produced the highest rates. Further, the fatal accident rates for Africa and the Middle East were at least 7 times greater than the North American rates by both flight hours and departures.

Table 16: 2006 Accident Rates by World Region

	Accidents per Million Flight Hours	Accidents per Million Departures
United States & Canada	3.01	5.65
Central & South America	6.69	11.89
Europe & Russian Federation	2.79	5.76
Africa & Middle East	13.83	37.01
Asia & Pacific	2.29	5.43

Table 17: 2006 Fatal Accident Rates by World Region

	Fatal Accidents per Million Flight Hours	Fatal Accidents per Million Departures
United States & Canada	0.49	0.93
Central & South America	2.23	3.96
Europe & Russian Federation	0.54	1.12
Africa & Middle East	2.44	6.53
Asia & Pacific	0.22	0.52

Part 135 Accidents in 2006

Part 135 regulates commercial air carriers that operate commuter flights (scheduled Part 135), charters and air taxis (on-demand Part 135), and cargo flights (which can be either scheduled or on-demand). Most of the Part 135 accidents were experienced by on-demand operations. Of the 55 Part 135 accidents that occurred in 2006 (table 18), 52 on-demand and 3 scheduled accidents produced accident rates of 13.9 and 9.9 accidents per million flight hours, respectively. Part 135 accidents resulted in 18 fatalities (including 2 fatalities in a midair collision between two Part 135 aircraft), 12 serious injuries (including two injuries to persons not in the aircraft), and 47 minor injuries (table 19). The six on-demand Part 135 accidents that resulted in multiple fatalities are described below and details about these accidents can be found in appendix A:

- On February 22, 2006, a Cessna 182P, N888SR, was destroyed when it collided with terrain while maneuvering near Goldendale, Washington, at night. The aircraft was being operated by Wings of Wenatchee, Inc., Wenatchee, Washington, as a nonscheduled cargo flight. The pilot and passenger were killed.
- On March 14, 2006, a Bell 206L-1 helicopter, N370RL, was destroyed when it impacted terrain following a loss of engine power while in cruise flight near Patterson, Louisiana. The flight was destined for an offshore platform located in the Gulf of Mexico. The pilot and one passenger were killed, and the two remaining passengers sustained minor injuries.
- On March 18, 2006, a Beech C99, N54RP, operated by Ameriflight LLC as a cargo flight, collided with trees and terrain approximately 7 nautical miles southwest of the Bert Mooney Airport, Butte, Montana. Visual meteorological conditions prevailed at the airport; however, instrument meteorological conditions were reported in the area of the accident site. The two pilots were killed.
- On June 2, 2006, a Gates Learjet 35A, N182K, operated by International Jet Charter, Inc., was destroyed when it struck water and light stanchions while approaching Groton-New London Airport, Groton, Connecticut. Instrument meteorological conditions prevailed at the time of the accident. The two pilots were killed, and three passengers incurred minor injuries.
- On June 8, 2006, a Cessna TU206G, N5136X, registered to and operated by Majestic Alliance of Everett, Washington, as an air taxi flight, collided with trees and rising terrain near Mullan, Idaho. Instrument meteorological conditions were reported in the area of the accident. The pilot and passenger were fatally injured.
- On December 14, 2006, a Bell 407, N407JJ, operated by HeloAir, Inc., as an air taxi flight, was destroyed when it impacted terrain during takeoff from a private farm field near Dagsboro, Delaware. Instrument meteorological conditions prevailed at the time of the accident. The pilot and passenger were killed.

Table 18: Part 135 Accidents, Highest Injury by Type of Operation in 2006

	Scheduled	On-Demand	Total
Fatal	1	10	11
Serious	1	6	7
Minor	0	10	10
None	1	26	27
Total	**3**	**52**	**55**

Table 19: Part 135 Occupant Injuries, Injury Severity by Type of Operation in 2006

	Scheduled	On-Demand	Total
Fatal	2	16	18
Serious	1	11	12
Minor	2	45	47
None	16	110	126
Total	**21**	**182**	**203**

Flight hours are used to calculate accident rates for Part 135 operations. For on-demand Part 135 operations, the FAA uses the General Aviation and Air Taxi Activity and Avionics Survey (GAATAA Survey) to estimate flight hours. The 2006 estimates of flight hours and fleet size for on-demand Part 135 airplanes and helicopters are shown in table 20. In 2006, airplanes accounted for 76% of the fleet and 68% of the flight hour activity. Helicopters accounted for about 22% of the fleet and 31% of the flight hour activity. For scheduled Part 135 operations, the flight hours accumulated by these operators are reported to the FAA on a quarterly basis.

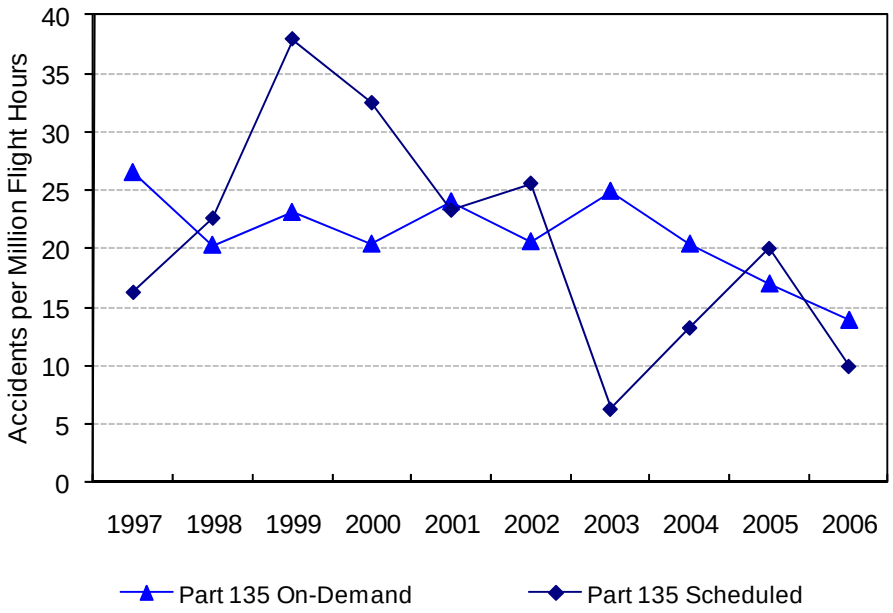
Table 20: 2006 On-Demand Part 135 Flight Hours and Fleet Size

	On-Demand Active Fleet Size	GAATAA Survey Flight Hour Estimates
Airplane	6,927	2,544,250
Helicopter	2,036	1,175,342
Overall[a]	9,083	3,742,230

[a] In addition to airplanes and helicopters, the *GAATAA Survey* estimate of the On-Demand Part 135 fleet includes 44 lighter-than-air and 75 experimental aircraft.

The accident rates for both types of Part 135 operations have demonstrated considerable variability from 1997 through 2006 (figure 10). The on-demand Part 135 accident rate fluctuated from 20 to 25 accidents per 1,000,000 flight hours between 1998 and 2004. Beginning in 2005 and in 2006, the on-demand Part 135 accident rate declined. Both years fell below the 20 accidents per million flight hour mark, and 2006 recorded the lowest accident rate during the 10-year period at 13.9 accidents per million flight hours. The small number of scheduled Part 135 accidents and operations resulted in a large variation in the accident rates during the same period, rising above the on-demand rate after the Part 121/Part135 reclassification in 1997, peaking in 1999, and then falling to a near record low in 2003.[15]

Figure 10: Part 135 Accident Rates, 1997-2006



On-Demand Part 135 Accidents

On-demand Part 135 accident rates for airplanes and helicopters in 2006, based on the FAA estimate of flight hours, are shown in table 21. Helicopters accounted for a third of the on-demand Part 135 accidents, producing an accident rate slightly higher than for airplanes and a fatal accident rate slightly lower than for airplanes. The proportion of on-demand Part 135 accidents involving helicopters steadily increased after 1997 to a high of 36% in 2003 (table 22).

[15] 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.

Table 21: On-Demand Part 135 Accidents, Fatal Accidents, and Accident Rates for 2006

	Accidents	Fatal Accidents	Flight Hours	Accidents per Million Flight Hours	Fatal Accidents per Million Flight Hours
Airplane	35	7	2,544,250	13.8	2.8
Helicopter	17	3	1,175,342	14.5	2.6
Overall	52	10	3,742,230	13.9	2.7

Table 22: On-Demand Part 135 Accidents, Airplanes and Helicopters, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Airplane	72	66	58	63	54	43	47	46	48	35
Helicopter	10	11	16	17	18	17	26	20	17	17
% Helicopter	12%	14%	22%	21%	25%	28%	36%	30%	26%	33%

On-Demand Part 135 Accident Severity and Injuries

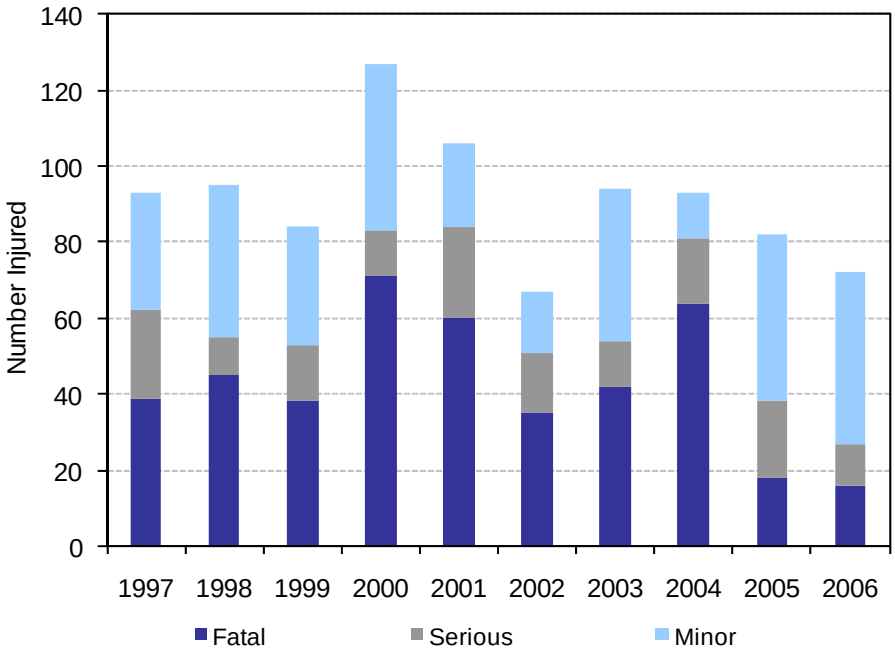
Data for 2006 demonstrate that the potential for injury in on-demand Part 135 accidents is much greater than in Part 121 accidents. Half of the Part 135 accidents in 2006 resulted in injuries and 20% of the accidents were fatal (table 18). Although 2% of the people on Part 121 accident aircraft suffered any injury, 40% of the people on board on-demand Part 135 accident aircraft were injured (41% of the crew and 39% of the passengers), and 22% of the injuries were fatal (table 23). The smallest percentage of fatalities over the 10-year period occurred in 2006, while the largest percentage was in 2000, as shown in figure 11. Although a few accidents can substantially increase the number of injuries in any one 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.[16]

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

Table 23: On-Demand Part 135 Accident Injuries by Role for 2006

	Fatal	Serious	Minor	None	Total
Flight crew	11	4	11	38	64
Cabin crew	0	0	0	0	0
Other crew	0	2	3	7	12
Passengers	5	5	31	65	106
Total aboard	**16**	**11**	**45**	**110**	**182**
On ground	0	0	0	0	0
Other aircraft	0	0	0	0	0
Total	**16**	**11**	**45**	**110**	**182**
Accidents	10	6	10	26	52

Figure 11: On-Demand Part 135 Accidents
Number Injured by Level of Injury, 1997-2006



As might be expected, the potential for fatal or serious injury increases with the level of aircraft damage. In 2006, 7 of the 10 fatal on-demand Part 135 accidents involved aircraft that were destroyed (table 24), and 6 of the serious-injury accidents were associated with aircraft that were either destroyed or substantially damaged (table 25). This pattern was consistent from 1997

through 2006: 80% of the fatal accidents were associated with aircraft that were destroyed, and 91% of the serious-injury accidents involved aircraft that were substantially damaged or destroyed. However, the survivability of on-demand Part 135 accidents can be quite good: all of the minor-injury accidents and all but 5 of the 361 no-injury accidents from 1997–2006[17] involved aircraft that were substantially damaged or destroyed.

Table 24: On-Demand Part 135 Fatal Accidents for Each Level of Damage, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Destroyed	14	15	11	19	15	13	11	20	7	7
Substantial	1	2	1	3	2	5	5	3	4	3
Minor							2			
None					1					

Table 25: On-Demand Part 135 Serious-Injury Accidents for Each Level of Damage, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Destroyed	3		2	2	1	2	2	2	3	1
Substantial	9	3	6	3	7	3	1	4	4	5
Minor			1						1	
None	2		1		1					

Table 26: On-Demand Part 135 Minor-Injury Accidents for Each Level of Damage, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Destroyed	5	4		2	1		5	1	2	
Substantial	9	12	11	12	6	5	12	4	10	10
Minor										
None										

Table 27: On-Demand Part 135 No-Injury Accidents for Each Level of Damage, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Destroyed	1				2	3		2		
Substantial	38	41	41	38	36	29	35	30	34	26
Minor	1		1	1		2				
None										

[17] Four of the five minor damage accidents shown in table 27 were the result of collisions that substantially damaged other aircraft.

In 2006, a person in an airplane was less likely to be injured in an accident than a person in a helicopter: 37% of the people in airplanes suffered some form of injury in an accident compared with 43% of the people in helicopters (table 28). However, a higher proportion of the injuries in airplanes were fatalities (28%) than in helicopters (15%).

Table 28: On-Demand Part 135 Accident Injuries by Type of Aircraft in 2006

	Airplane	Helicopter	Total
Fatal	11	5	16
Serious	6	5	11
Minor	22	23	45
Total Injuries	**39**	**33**	**72**
Total Onboard	**106**	**76**	**182**

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. See appendix C for a more detailed discussion.

Table 29: On-Demand Part 135 Airplanes, First Occurrences by Phase of Flight for 2006

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Maneuver	Standing or Taxiing	Total
In-flight Encounter with Weather	1	2	3	1		7
In-flight Collision with Terrain/Water	2	1	3			6
In-flight Collision with Object	1	1	2			4
Loss of Control - In-flight	1	1	1			3
Loss of Control - On Ground/Water	2		1			3
On Ground Collision with Object					3	3
Airframe, Component, System Failure			2			2
Loss of Engine Power		2				2
Hard Landing			1			1
Main Gear Collapsed			1			1
Overrun	1					1
Total	8	7	14	1	3	33

Table 29 shows first occurrence data by phase of flight for on-demand Part 135 airplanes involved in accidents in 2006: 42% of these accidents and 36% of the fatal and serious accidents occurred during approach or landing. Cruise or descent accounted for 43% of the fatal accidents, a pattern consistent with Part 121 accidents with one notable exception: although most of the injury-producing accidents in Part 121 operations occurred in flight and were typically associated with turbulence, turbulence was rarely cited as a cause or factor in on-demand Part 135 accidents. Instead, encounters with weather and in-flight collisions with terrain or water were the most frequent initiating events in on-demand Part 135 airplane accidents in 2006.

Table 30: 2006 On-Demand Part 135 Airplane Accidents by Severity and Phase of Flight

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Maneuver	Taxiing Standing	Total
Fatal		3	3	1		7
Serious	1	2	1			4
Minor	1		2			3
None	6	2	8		3	19
Total	8	7	14	1	3	33

Table 31: On-Demand Part 135 Helicopters, First Occurrences by Phase of Flight for 2006

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Maneuver or Hover	Total
Loss of Control - In-flight	2		2		4
In-flight Collision with Object			1	1	2
In-flight Encounter with Weather				2	2
Loss of Engine Power (Total) - Mechanical		2			2
Cargo Shift		1			1
In-flight Collision with Terrain or Water	1				1
Loss of Engine Power		1			1
Loss of Engine Power (Partial) - Mechanical	1				1
Miscellaneous/Other			1		1
Rotor Failure/Malfunction				1	1
Total	4	4	4	4	16

Loss of control was the most frequent initiating event for on-demand Part 135 helicopter accidents in 2006; all other initiating events were more evenly distributed (table 31). The helicopter accidents were also evenly distributed among all phases of flight. Only 3 of the 16 helicopter accidents were fatal, and 69% resulted in minor injuries or no injuries (table 32).

Table 32: 2006 On-Demand Part 135 Helicopter Accidents by Severity and Phase of Flight

	Takeoff or Climb	Cruise or Descent	Approach or Landing	Maneuver Hover	Total
Fatal	1	1	1		3
Serious		1		1	2
Minor	3		2	1	6
None		2	1	2	5
Total	4	4	4	4	16

Pilots of on-demand Part 135 accident aircraft were the most frequently cited cause or factor (table 33), followed by the environment. Aircraft-related causes or factors were cited in fewer airplane than helicopter accidents, with powerplants accounting for more causes or factors in helicopter accidents than in airplane accidents. Because multiple factors in an accident are coded only once at the level of personnel, aircraft, or environment, the sum of the individual percentages may be greater than the broad cause/factor percentage.

Table 33: On-Demand Part 135 Accidents, Top Causes/Factors in 2006

	Percent Airplane Accidents	Percent Helicopter Accidents
Personnel	90.9%	87.5%
Pilot	75.8%	75.0%
Others (aboard)		
Others (not aboard)	15.2%	25.0%
Aircraft	18.2%	37.5%
Powerplant/propulsion	6.1%	31.3%
Flight control systems	3.0%	6.3%
Aircraft structure		
Landing gear	6.1%	
Systems and equipment	6.1%	12.5%
Environment	72.7%	43.8%
Weather condition	51.5%	31.3%
Terrain condition	24.2%	25.0%
Light condition	21.2%	12.5%
Object	18.2%	
Airport/airways facilities, aids		

The pattern of causes and factors for on-demand Part 135 accidents in 2006 was similar to that from 2001 through 2005, as shown in tables 34 (airplanes) and 35 (helicopters), although the proportions varied considerably from year to year. Pilots were the most frequently cited cause/factor for on-demand Part 135 accidents, followed by the environment. For both airplanes and helicopters, weather and terrain led the environmental category. In 2006, powerplants were the most frequently cited aircraft-related cause or factor for helicopters, but not for airplanes. Powerplants, landing gear, and systems were equally likely to be cited in airplane accidents. Note that airport facilities and navigation aids were not cited as a cause or factor in either airplane or helicopter accidents in 2006. 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 (see figure 9).

Table 34: On-Demand Part 135 Airplane Accidents, Top Causes/Factors, 2002 - 2006

	2002	2003	2004	2005	2006
Personnel					
Pilot	80.5%	80.4%	93.2%	74.5%	75.8%
Others (aboard)					
Others (not aboard)	24.4%	15.2%	11.4%	25.5%	15.2%
Aircraft					
Powerplant/propulsion	4.9%	6.5%	2.3%	12.8%	6.1%
Flight control systems		2.2%		2.1%	3.0%
Aircraft structure		4.3%	11.4%	6.4%	
Landing gear	7.3%	8.7%	6.8%	4.3%	6.1%
Systems and equipment	2.4%	4.3%	4.5%	6.4%	6.1%
Environment					
Weather condition	31.7%	28.3%	25.0%	21.3%	51.5%
Terrain condition	19.5%	28.3%	11.4%	23.4%	24.2%
Light condition	14.6%	15.2%	9.1%	8.5%	21.2%
Object	4.9%	6.5%	9.1%	10.6%	18.2%
Airport/airways facilities, aids	4.9%		2.3%	10.6%	

Table 35: On-Demand Part 135 Helicopter Accidents, Top Causes/Factors, 2002 - 2006

	2002	2003	2004	2005	2006
Personnel					
Pilot	100.0%	84.6%	90.0%	68.8%	75.0%
Others (aboard)		3.8%			
Others (not aboard)	17.6%	7.7%	20.0%	12.5%	25.0%
Aircraft					
Powerplant/propulsion	11.8%	23.1%	5.0%	31.3%	31.3%
Flight control systems					6.3%
Aircraft structure		3.8%	5.0%	6.3%	
Landing gear					
Systems and equipment	11.8%	11.5%	10.0%	6.3%	12.5%
Environment					
Weather condition	23.5%	30.8%	40.0%	12.5%	31.3%
Terrain condition	23.5%	15.4%	15.0%	12.5%	25.0%
Light condition	17.6%	3.8%	30.0%	6.3%	12.5%
Object	11.8%	7.7%	15.0%	6.3%	
Airport/airways facilities, aids			5.0%		

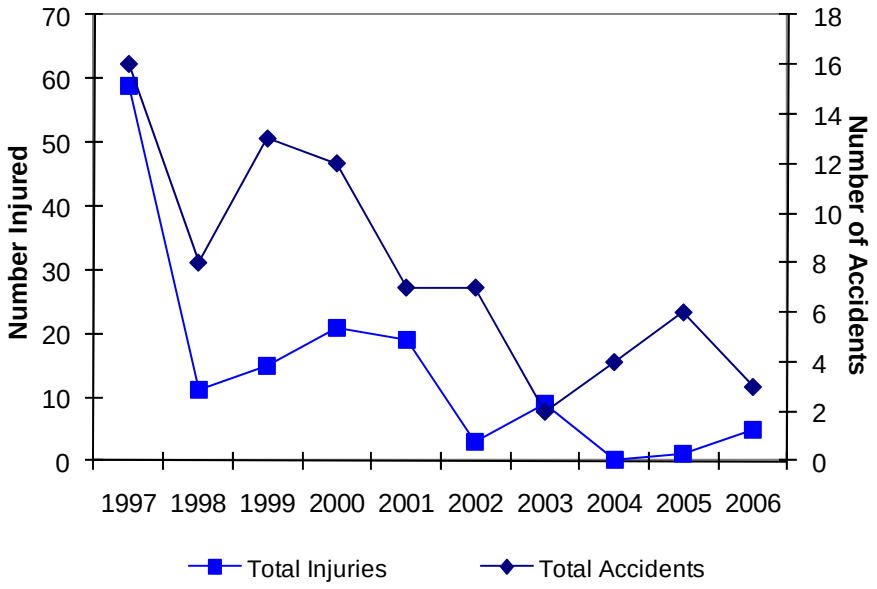
Scheduled Part 135 Accidents

Scheduled Part 135 operations represent a small segment of commercial air carrier operations, accounting for less than 1.5% of total air carrier flight hours in 2006. Three scheduled Part 135 accidents occurred in 2006. One accident resulted in fatalities.

Because both the number of scheduled Part 135 accidents and the number of people involved in those accidents is small each year, accident and injury data vary considerably from year to year (figure 12). This relatively small number each year makes stable patterns in the data difficult to discern, but it is clear that the number of scheduled Part 135 accidents and injuries declined overall from 1997 through 2006.

Flying in weather or at night contributed to two of the accidents, with the night flight resulting in a loss of control and producing the two fatalities. The third accident was attributed to the pilot's misjudgment of the airplane's height above water during a water landing. In all three accidents, pilots were cited as a cause or factor.

Figure 12: Scheduled Part 135 Accidents and Number People Injured, 1997 - 2006



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Appendix A: 2006 Air Carrier Accident Data

Part 121 Operations											
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 16, 2006	N32626	Passenger	El Paso, TX	Continental Airlines	Boeing 737-524	Minor	Fatal	Serious	1	Propeller Blast or Jet Exhaust/Suction	Standing -Engine(s) Operating
Probable Cause: The mechanic's failure to maintain proper clearance with the engine intake during a jet engine run, and the failure of contract maintenance personnel to follow written procedures and directives contained in the airline's general maintenance manual. Factors contributing to the accident were the insufficient training provided to the contract mechanics by the airline, and the failure of the airport to disseminate a policy prohibiting ground engine runs above idle power in the terminal area.											
February 7, 2006	N748UP	Cargo	Philadelphia, PA	United Parcel Service	Douglas DC-8	Destroyed	Minor	Major	0	Fire	Descent
Probable Cause: An in-flight cargo fire that initiated from an unknown source, which was most likely located within cargo container 12, 13, or 14. Contributing to the loss of the aircraft were the inadequate certification test requirements for smoke and fire detection systems and the lack of an on-board fire suppression system.											
February 25, 2006	N697DL	Passenger	Boston, MA	Delta Air Lines Inc.	Boeing 757-232	Substantial	None	Damage	0	On Ground/Water Collision with Object	Standing - Engine(s) Not Operating
Probable Cause: The deice vehicle driver's failure to maintain clearance from a standing airplane, which resulted in a collision between the deice vehicle and left elevator of the airplane.											
March 13, 2006	N421XJ	Passenger	Alpena, MI	Mesaba Aviation Inc., DBA Northwest Airlink	Saab-Scania AB (Saab) 340B	Substantial	None	Damage	0	Miscellaneous/Other	Standing - Engine(s) Operating
Probable Cause: The station agent's inability to maintain control of the stroller when he lost his balance exiting the airplane's cargo compartment, allowing it to be blown into the operating right propeller. A factor was the high, gusty winds.											
March 15, 2006	N518UA	Passenger	Omaha, NE	United Air Lines Inc.	Boeing 757-222	None	Serious	Injury	0	In-flight Encounter with Weather	Cruise
Probable Cause: An inadvertent encounter with unforecast mountain wave turbulence during cruise flight. A contributing factor was the mountain wave (terrain induced) turbulence.											
April 4, 2006	`N386FE	Cargo	Memphis, TN	Federal Express Corp.	Boeing MD-10-10	Substantial	None	Damage	0		
Probable Cause: Not available											
April 15, 2006	N934EV	Passenger	Front Royal, VA	Atlantic Southeast Airlines	Bombardier, Inc. CL600-2B19	None	Serious	Injury	0	In-flight Encounter with Weather	Desecent - Normal
Probable Cause: An inadvertent encounter with clear air turbulence.											
April 19, 2006	N216UA	Passenger	Shanghai, China	United Airlines	Boeing 777	None	Serious	Injury	0		
Probable Cause: Not available											
April 25, 2006	N789AN	Passenger	DFW Int'l Apt, TX	American Airlines	Boeing 777-233ER	None	Serious	Injury	0	In-flight Encounter with Weather	Descent - Normal
Probable Cause: The in-flight encounter with turbulence in clouds resulting in a flight attendant being injured.											

Part 121 Operations											
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 30, 2006	N909FJ	Passenger	Las Vegas, NV	Mesa Airlines, Inc.	Bombardier, Inc. CL-600-2D24	Substantial	None	Damage	0	On Ground/Water Collision with Object	Taxi - To Takeoff
Probable Cause: The failure of ground service personnel to properly set the parking brake on the lead baggage cart.											
May 12, 2006	N275SK	Passenger	Boston, MA	Chautauqua Airlines Inc., DBA US Airways Express	Embraer EMB-145-LR	Substantial	Minor	Damage	0	On Ground/Water Collision with Object	Standing - Engine(s) Not Operating
Probable Cause: The tug driver's inadequate visual lookout, which resulted in a collision with a parked airplane. A factor was the fog.											
May 13, 2006	N653AE	Passenger	Winchester, VA	American Eagle Airlines, Inc.	Embraer 145LR	None	Serious	Injury	0	Miscellaneous/Other	Maneuvering
Probable Cause: The passenger's failure to heed the flight attendant warning and the seat belt sign. A factor was the turbulence.											
May 30, 2006	N651RW	Passenger	Dulles, VA	Shuttle America Airlines, DBA United Express	Embraer EMB-170	Substantial	Serious	Serious	0	Airframe/Component/System Failure/Malfunction	Takeoff - Initial Climb
Probable Cause: Improper servicing of the nose landing gear strut and the operator's inadequate maintenance procedure. A factor was the inadequate checklist provided to the flight crew by the operator.											
June 4, 2006	N68047	Cargo	Managua, Nicaragua	Arrow Air Inc.	McDonnell Douglas DC-10-10F	Substantial	None	Damage	0		
Probable Cause: Not available											
June 7, 2006	N922FT	Cargo	Rio Negro, Colombia	Tradewinds Airlines, Inc.	Boeing 747-200	Substantial	None	Damage	0		
Probable Cause: Not available											
June 8, 2006	N403TZ	Passenger	New York, NY	American Trans Air, Inc.	Boeing 737-300	Substantial	None	Damage	0	On Ground/Water Collision with Object	Taxi - To Takeoff
Probable Cause: The foreign object damage to the horizontal stabilizer during taxi as a result of improper airport maintenance by contract maintenance personnel. The aluminum plate was a factor.											
June 17, 2006	N653UA	Passenger	Dulles, VA	United Airlines	Boeing 767-300	Substantial	None	Damage	0	Miscellaneous/Other	Standing - Engine(s) Not Operating
Probable Cause: The driver's failure to follow company standard operating procedures. A factor was the driver's diverted attention to an on-time departure.											
June 20, 2006	N961TW	Passenger	Chicago, IL	American Airlines	McDonnell Douglas DC-9-83	Substantial	None	Damage	0	Airframe/Component/System Failure/Malfunction	Approach
Probable Cause: The jammed nose landing gear due to a failure of the nose landing gear spray deflector for undetermined reasons.											
July 7, 2006	N839UA	Passenger	Masonville, CO	United Airlines	Airbus A319-131	None	Serious	Injury	0	In-flight Encounter with Weather	Descent - Normal

Part 121 Operations											
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
Probable Cause: The flight's encounter with unexpected turbulence, which resulted in a passenger sustaining a fractured ankle.											
July 24, 2006	N703MR	Passenger	Newark, NJ	American Eagle Airlines Inc.	Embraer EMB-135LR	Substantial	None	Damage	0	Miscellaneous/Other	Taxi - Pushback/Tow
Probable Cause: The captain's failure to follow company procedures, which resulted in pushback with the parking brake set. A factor was the larger than preferred tug.											
July 27, 2006	N529AU	Passenger	Pittsburgh, PA	US Airways	Boeing 737-300	Substantial	Minor	Damage	0	Airframe/Component/System Failure/Malfunction	Taxi - Pushback/Tow
Probable Cause: The airplane tug driver's inadvertent movement of the tug gear shift lever from forward to reverse, which resulted in the nose landing gear collapse. Contributing to the accident was the defective gear shift lever.											
July 28, 2006	N391FE	Cargo	Memphis, TN	Federal Express Corp.	BOEING MD-10-10F	Substantial	None	Damage	0	Gear Collapsed	Landing - Roll
Probable Cause: The failure of the left main landing gear due to fatigue cracking in the air filler valve hole on the aft side of the landing gear. The fatigue cracking occurred due to the presence of stray nickel plating in the air filler valve hole. Contributing to this was the inadequate maintenance procedures to prevent nickel plating from entering the air filler valve hole during overhaul.											
August 27, 2006	N431CA	Passenger	Lexington, KY	Comair, Inc.	Bombardier, Inc. CRJ-100	Destroyed	Fatal	Major	49	Miscellaneous/Other	Taxi
Probable Cause: The flight crewmembers's failure to use available cues and aids to identify the airplane's location on the airport surface during taxi and their failure to cross-check and verify that the airplane was on the correct runway before takeoff. Contributing to the accident were the flight crew's nonpertinent conversation during taxi, which resulted in a loss of positional awareness, and the Federal Aviation Administration's failure to require that all runway crossings be authorized only by specific air traffic control clearances.											
September 5, 2006	N622DL	Passenger	San Juan, PR	Delta Airlines, Inc.	Boeing B757-232	Substantial	None	Damage	0	Dragged Wing,Rotor,Pod,Float or Tail/Skid	Landing - Flare/Touchdown
Probable Cause: The first officer's inadvertent application of full nose-up trim during a prolonged flare, resulting in an excessive pitch angle during landing and subsequent tailstrike. Contributing to the accident was the flight crew's failure to correct the airplane'											
September 8, 2006	N864RW	Passenger	New York, NY	Shuttle America	Embraer EMB-170	Substantial	None	Damage	0	Collision Between Aircraft (Other Than Midair)	Taxi
Probable Cause: The Airbus first officer's misjudged clearance from the EMB-170. Also causal was the ground controller's decision to issue a taxi clearance for the Airbus to pass behind the EMB-170. A factor to the accident was the light condition.											
September 14, 2006	N623FE	Cargo	Subic Bay, Philippines	Federal Express Corp.	McDonnell Douglas MD-11	Substantial	None	Damage	0		
Probable Cause: Not available											
September 16, 2006	N793SA	Passenger	Hastings, NE	Southwest Airlines	Boeing 737-700	None	Serious	Injury	0	In-flight Encounter with Weather	Cruise
Probable Cause: The airplane's in flight encounter with thunderstorm related turbulence.											
October 11, 2006	N906DA	Passenger	Denver, CO	Delta Airlines, Inc.	McDonnell Douglas MD-90-30	Substantial	None	Damage	0	Airframe/Component/System Failure/Malfunction	Approach - VFR Pattern - Final Approach
Probable Cause: A fractured nose gear assembly spray deflector that blocked the nose gear from extending during landing, and resulted in an intentional nose gear up landing.											
November 7, 2006	N328UA	Passenger	Chicago, IL	United Airlines	Boeing 737-300	Substantial	None	Damage	0	On Ground/Water Collision with Object	Standing - Engine(s) Operating

Part 121 Operations											
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
Probable Cause: The pilot-in-command of the other airplane failed to maintain clearance with the parked airplane during taxi for takeoff.											
November 7, 2006	N428UA	Passenger	Chicago, IL	United Airlines	Airbus A-320-200	Minor	None	Damage	0	On Ground/Water Collision with Object	Taxi - To Takeoff
Probable Cause: The pilot-in-command failed to maintain clearance with the parked airplane during taxi for takeoff.											
November 7, 2006	N904ME	Passenger	Milwaukee, WI	Midwest Airlines, Inc.	Boeing 717-200	Minor	None	Damage	0	On Ground/Water Collision with Object	Taxi - To Takeoff
Probable Cause: Ground personnel failed to verify the clearance between the airplanes prior to signaling the crew that they were cleared to taxi. A factor associated with the accident was the parked airplane which was contacted.											
November 7, 2006	N923ME	Passenger	Milwaukee, WI	Midwest Airlines, Inc.	Boeing 717-200	Substantial	None	Damage	0	On Ground/Water Collision with Object	Standing - Engine(s) Not Operating
Probable Cause: The failure of ground personnel to verify the clearance between the airplanes prior to signaling the crew tha the crew of the other airplane that they were cleared to taxi.											
November 10, 2006	N956AT	Passenger	Memphis, TN	AirTran Airways, Inc.	Boeing 717-200	Substantial	None	Damage	0	On Ground/Water Encounter with Terrain/Water	Taxi - From Landing
Probable Cause: The captain's inadequate visual look out during taxi.											
December 23, 2006	N752SA	Cargo	Anchorage, AK	Southern Air	Boeing 747-228F	Substantial	None	Damage	0	On Ground/Water Colllision with Object	Standing - Engine(s) Not Operating
Probable Cause: The failure of the deicing truck crew to maintain sufficient distance from the parked airplane during deicing, which resulted in a collision and substantial damage to the airplane.											
December 26, 2006	N207WN	Passenger	San Diego, CA	Southwest Airlines, Co.	Boeing 737-7H4	Minor	None	Damage	0	Collision between Aircraft (Other than Midair)	Taxi - To Takeoff
Probable Cause: Failure of the captain, during taxi, to maintain adequate clearance from an occupied airplane stopped on the ramp.											
December 26, 2006	N673AA	Passenger	San Diego, CA	Southwest Airlines, Co.	Boeing 737-3A4	Substantial	None	Damage	0	Collision Between Aircraft (Other Than Midair)	Taxi - Pushback/Tow
Probable Cause: Failure of the captain of the other taxiing airplane to maintain clearance from an occupied airplane stopped on the ramp.											

Scheduled Part 135 Operations										
Date	Registration Number	Type of Operation	Location	Operator of Aircraft	Aircraft Type	Damage to Aircraft	Highest Injury	Total Fatalities	First Occurrence	Phase of Flight
March 27, 2006	N223PB	Passenger	Dorado, PR	Hyannis Air Service, Inc, DBA Cape Air	Cessna 402C	None	Serious	0	In-flight Encounter with Weather	Cruise - Normal
Probable Cause: The failure of the pilot to use on-board weather radar equipment for weather avoidance and the pilot's continued operation into known adverse weather conditions, resulting in injury to passengers.										
June 1, 2006	N606KA	Passenger	Port Townsend, WA	Kenmore Air Harbor, Inc.,	de Havilland DHC-3T	Substantial	None	0	In-flight Encounter with Weather	Maneuvering - Turn to Reverse Direction
Probable Cause: The pilot's misjudgment of the airplane's height above the water during a precautionary landing which resulted in a hard landing. Contributing factors were glassy water conditions, fog, and the pilot's inadvertent VFR flight into IMC.										
December 14, 2006	N8361Q	Passenger	Port Heiden, AK	Peninsula Airways	Piper PA-32-301	Destroyed	Fatal	2	Loss of Control - In-flight	Cruise
Probable Cause: The pilot's failure to maintain control of the airplane during cruise flight, which resulted in an uncontrolled descent, and an in-flight collision with snow-covered terrain. Contributing to the accident were the pilot's spatial disorientation, and dark night conditions.										

On-Demand Part 135 Operations											
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 5, 2006	N391QS	Passenger	Woodruff, WI	NetJets Sales, Inc., DBA Executive Jet Aviation Inc.	Airplane	Cessna 560	Substantial	None	0	Loss of Control - In-flight	Landing
Probable Cause: The Captain's failure to maintain adequate airspeed during the landing which resulted in a stall/mush. Factors were the gusty conditions, the snowbank in the safety area next to the runway, and the runway light that the airplane struck.											
January 5, 2006	N11QD	Passenger	Lahaina, HI	Helicoopter Consultants of Maui, DBA Bluse Hawaiian Helicopters	Helicopter	Eurocopter EC130B4	Substantial	None	0	Airframe/Component/System Failure/Malfunction	Cruise - Normal
Probable Cause: An intermittent electrical continuity failure and short of the DECU-XPC wiring harness, which resulted in an uncommanded and an initially undetected engine deceleration and a resulting loss of main rotor rpm. Also causal was the manufacturer's inadequate installation of the wiring harness at the time of manufacture. Contributing to the accident was the manufacture's inadequate design and certification of the primary airframe and engine control interface system.											
January 6, 2006	N36107	Cargo	Burlington, WA	Airpac Airlines, Inc.	Airplane	Piper PA-34-200T	Destroyed	Fatal	1	In-flight Collision with Object	Approach
Probable Cause: The pilot's failure to maintain the published minimum descent altitude and not adhering to the published missed approach procedures, which resulted in an in-flight collision with trees and terrain. Factors contributing to the accident were low ceilings and trees.											
January 9, 2006	N310CK	Cargo	St. Charles, MO	St. Charles Flying Service/Klondike Air LLC	Airplane	Cessna 310R	Substantial	None	0	In-flight Collision with Object	Cruise
Probable Cause: The in-flight collision with a duck during cruise flight resulting in a ruptured fuel tank and the strobe/light assembly electrical short resulting in a fire to the right wing tip tank. Contributing factors were the dusk light conditions.											
January 10, 2006	N3607P	Passenger	Hana, HI	Sunshine Helicopters, Inc.	Helicopter	Eurocopter AS350BA	Destroyed	Serious	0	Loss of Engine Power (total) - Mech Failure/Malfunction	Cruise
Probable Cause: The total loss of engine power due to a fatigue failure of a turbine blade. A factor in the accident was the lack of a suitable forced landing site.											
January 12, 2006	N495LF	Passenger	Ponce, PR	MSE Air Group, Inc., DBA Aviane Air Ambulance	Helicopter	MBB BO-105S	Substantial	Minor	0	Loss of Engine Power(partial) - Mech Failure/Malfunction	Takeoff - Initial Climb
Probable Cause: A loose B-nut on the PC line connecting the power turbine governor (PTGOV) to the fuel control unit (FCU) that created a leak and caused the engine to roll back to an idle condition, causing a low hydraulic system pressure and subsequent control lock. A contributing factor was the unsuitable terrain (construction area) on which to make a forced landing.											
January 15, 2006	N460M	Passenger	Anchorage, AK	Security Aviation, Inc.	Airplane	Cessna S-550	Substantial	None	0	On Ground/Water Collision with Object	Taxi - From Landing
Probable Cause: A failure of the driver of a snowplow vehicle to maintain adequate visual lookout while maneuvering on an airport hangar ramp, which resulted in a collision with the accident airplane as it was being marshaled into parking.											

On-Demand Part 135 Operations											
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 18, 2006	N5371U	Passenger	Cordova, AK	Copper River Air Taxi	Airplane	Cessna TU206G	Substantial	None	0	Overrun	Takeoff - Aborted
Probable Cause: The pilot's selection of unsuitable terrain for takeoff, and his delay in aborting the takeoff, which resulted an overrun and subsequent collision with an embankment. A factor contributing to the accident was the snow-covered airstrip.											
January 29, 2006	N90Q	Passenger	Kahului, HI	Alika Aviation, Inc., DBA Alex Air	Helicopter	Eurocopter AS350D	Substantial	None	0	Loss of Engine Power(total) - Mech Failure/Malfunction	Cruise - Normal
Probable Cause: A total loss of engine power due to the internal effects on the bearings of a prior oil starvation event. A contributing factor was the leasing agent's and the operator's failure to ensure the airworthiness of the leased engine prior to installation in the helicopter.											
February 8, 2006	N629EK	Cargo	Paris, TN	Tri-Coastal Airlines, Inc.	Airplane	Swearingen SA-226-TC	Destroyed	Fatal	1	Loss of Control - In-flight	Descent
Probable Cause: The pilot's inflight loss of control following a reported fuel asymmetry condition for undetermined reasons.											
February 22, 2006	N888SR	Cargo	Goldendale, WA	Wings of Wenatchee, Inc.	Airplane	Cessna 182P	Destroyed	Fatal	2	In-flight Collision with Terrain/Water	Descent
Probable Cause: The pilot's failure to maintain terrain clearance during descent. Factors contributing to the accident were the high mountains, mountain obscuration, the dark night condition, and the pilot's improper in-flight planning/decision making.											
March 1, 2006	N777YA	Cargo	Beluga, AK	Transnorthern Aviation	Airplane	Douglas DC-3	Substantial	None	0	In-flight Collision with Object	Approach - VFR Pattern - Final Approach
Probable Cause: The pilot's failure to maintain altitude/clearance from trees on final approach, which resulted in an in-flight collision with trees.											
March 12, 2006	N7528Z	Passenger	Ilimana, AK	Pollux Aviation LTD	Helicopter	Robinson R44	Substantial	None	0	In-flight Encounter with Weather	Maneuvering
Probable Cause: The pilot's continued flight into adverse weather conditions, and his spatial disorientation and loss of control during a subsequent landing attempt. Factors associated with the accident are flat light and whiteout conditions, fog, and snow-covered terrain.											
March 14, 2006	N370RL	Passenger	Patterson, LA	Rotorcraft Leasing Company LLC	Helicopter	Bell 206L-1	Destroyed	Fatal	2	Loss of Engine Power	Cruise
Probable Cause: The improper installation of an engine fuel line fitting by other maintenance personnel, which resulted in a loose fitting and a loss of engine power during cruise flight. Factors associated with the accident are a tailwind, and the lack of a suitable site for a forced landing.											
March 18, 2006	N54RP	Cargo	Butte, MT	Ameriflight, Inc.	Airplane	Beech C99	Substantial	Fatal	2	In-flight Encounter with Weather	Approach - IAF to FAF/Outer Maker (IFR)
Probable Cause: The second pilot's failure to follow the published instrument approach procedure and the captain/PIC's inadequate supervision. Snow and mountain obscuration were factors.											

On-Demand Part 135 Operations											
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
March 20, 2006	N331FC	Cargo	Emporia, KS	Safewing Aviation Company, Inc.	Airplane	Piper PA-23-250	Substantial	Serious	0	In-flight Encounter with Weather	Cruise
Probable Cause: The pilot's attempted flight into adverse weather conditions and improper in-flight planning which resulted in loss of control and subsequent impact with trees. Contributing factors were the pilot's delayed remedial action, the icing and dark night conditions.											
March 20, 2006	N662MW	Cargo	Shreveport, LA	Central Air Southwest, Inc.	Airplane	Aero Commander AC50	Substantial	None	0	In-flight Encounter with Weather	Approach
Probable Cause: The pilot's failure to execute a missed approach after losing visual contact with the runway, which resulted in a collision with approach lights. Factors were the dark night conditions and the fog.											
March 22, 2006	N58EM	Cargo	Philadelphia, PA	Bankair, Inc.	Airplane	Gates Learjet 35	Substantial	None	0	Loss of Control - On Ground/Water	Takeoff - Roll/Run
Probable Cause: The operator's inadequate maintenance of the fuel computer harness which resulted in engine surging and a subsequent loss of control by the flight crew during the takeoff roll.											
April 6, 2006	N209CH	Passenger	Haines, AK	Coastal Helicopters, Inc.	Helicopter	Aerospatiale AS-350BA	Substantial	None	0	In-flight Collision with Object	Landing
Probable Cause: The pilot's failure to maintain adequate clearance from an object while landing a helicopter at a remote site, which resulted in the main rotor blades striking a tree.											
April 19, 2006	N8063R	Passenger	Houston, TX	Houston Helicopters, Inc.	Helicopter	Sikorsky S-76A	Substantial	None	0	Rotor Failure/Malfunction	Hover - In Ground Effect
Probable Cause: The failure by maintenance personnel to secure the tail rotor driveshaft cowling after performing maintenance which resulted in a loss of tail rotor control. A contributing factor was the pilot's improper preflight inspection of the tail rotor driveshaft area.											
April 19, 2006	N954EA	Cargo	Billings, MT	Exec Air Montana, Inc.	Airplane	Cessna 310R	Substantial	None	0	Main Gear Collapsed	Landing - Roll
Probable Cause: Collapse of the right main landing gear during the landing roll for an undetermined reason.											
April 25, 2006	N1453V	Passenger	Tuluksak, AK	Inland Aviation Services, Inc.	Airplane	Cessna 172	Substantial	Minor	0	Loss of Control - In-flight	Takeoff - Initial Climb
Probable Cause: The pilot's inadvertent stall/mush during takeoff-initial climb, which resulted in an in-flight collision with trees and terrain. Factors associated with the accident were the pilot's excessive loading of the airplane, his inadequate preflight planning, and slush covered runway.											
May 5, 2006	N514AL	Passenger	Intracoastal, LA	Air Logistics LLC	Helicopter	Eurocopter EC120B	Substantial	Minor	0	Loss of Control - In-flight	Climb
Probable Cause: The pilot's loss of control for undetermined reasons.											
May 14, 2006	N91099	Passenger	AKIACHAK, AK	Inland Aviation Services, Inc.	Airplane	Cessna 207	Substantial	None	0	On Ground/Water Collision with Object	Standing - Engine(s) not Operating
Probable Cause: The failure of the driver of an all terrain vehicle to maintain adequate visual lookout while maneuvering on the ramp, which resulted in a collision with the parked accident airplane's elevator.											

On-Demand Part 135 Operations											
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
May 22, 2006	N1543	Passenger	Kodiak, AK	Andrew Airways, Inc.	Airplane	de Havilland DHC-2	Substantial	Serious	0	In-flight Collision with Terrain/Water	Takeoff - Initial Climb
Probable Cause: The pilot's inadequate evaluation of the weather conditions, and his selection of unsuitable terrain (rough water) for takeoff, which resulted in a collision with ocean swells during takeoff initial climb, and a hard emergency landing and a roll over. Factors contributing to the accident were a windshear, rough water, and buckling of the float assemblies when the airplane struck the waves.											
May 24, 2006	N475AT	Passenger	Georgetown, Bahamas	Air Trek, Inc	Airplane	Israel Aircraft Industries 1124	Substantial	Minor	0		
Probable Cause: Not available											
May 29, 2006	N688JK	Passenger	Skwentna, AK	Ace Flyers, DBA JayHawk Air	Helicopter	Robinson R44	Substantial	None	0	Cargo Shift	Cruise
Probable Cause: The pilot's improper rigging of the external sling load, which allowed the suspended load/cargo cable to entangle and disable the tail rotor control, resulting in a loss of control during cruise and an in-flight collision with terrain.											
May 30, 2006	N601FH	Passenger	Washington, DC	MedStar	Helicopter	Eurocopter EC-135P1	Destroyed	Fatal	1	Miscellaneous/Other	Approach - VFR Pattern - Final Approach
Probable Cause: The operator's inadequate training program and the pilot's failure to maintain control of the helicopter following his inadvertent disabling of the No. 1 and then the No. 2 engine full authority digital engine control system.											
May 31, 2006	N45RP	Passenger	Juneau, AK	Coastal Helicopters, Inc.	Helicopter	Bell 206L-1	Substantial	Minor	0	In-flight Encounter with Weather	Maneuvering
Probable Cause: The pilot's failure to maintain adequate altitude/clearance from terrain while maneuvering in adverse weather conditions. Factors associated with the accident are the pilot's decision to continue flight into adverse weather, fog, whiteout and flat light conditions.											
June 2, 2006	N182K	Passenger	Groton, CT	International Jet Charter, Inc.	Airplane	Gates Learjet 35A	Destroyed	Fatal	2	In-flight Collision with Terrain/Water	Approach - FAF/Outer Marker to Threshold (IFR)
Probable Cause: The crew's failure to properly monitor the airplane's altitude, which resulted in the captain's inadvertent descent of the airplane into water. Contributing to the accident were the foggy weather conditions, and the captain's decision to descend below the decision height without sufficient visual cues.											
June 8, 2006	N5136X	Passenger	Mullan, ID	Majestic Alliance	Airplane	Cessna TU206G	Substantial	Fatal	2	In-flight Encounter with Weather	Maneuvering
Probable Cause: The pilot's VFR flight into IMC and his subsequent failure to maintain terrain clearance. The pilot's inadequate inflight planning/decision, mountain obscuration, trees and high terrain were factors.											
June 15, 2006	N265SH	Passenger	Vernal, UT	Silver State Helicopters	Helicopter	Bell 206L	Substantial	Minor	0	Loss of Control - In-flight	Landing

On-Demand Part 135 Operations											
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
Probable Cause: The loss of tail rotor effectiveness during an attempted precationary landing after a takeoff over uneven, sloping, brush-covered terrain. Factors include the pilot using the wrong performance chart while completing his preflight performance calculations, the uneven, sloping, brush-covered terrain, and a high density altitude.											
July 10, 2006	N40ST	Cargo	Easton, WA	Airpac Airlines	Airplane	Piper PA-31-350	Destroyed	Fatal	1	Loss of Engine Power	Cruise
Probable Cause: The loss of power in both engines for undetermined reasons while in cruise flight, leading to an attempted forced landing. Factors include unfavorable winds at the site of the forced landing, and trees off the approach end of the grass runway the pilot was attempting to land on.											
July 11, 2006	N40978	Cargo	Indianapolis, IN	AirNet Systems	Airplane	Piper PA-31-350	Substantial	None	0	On Ground/Water Collision with Object	Taxi
Probable Cause: The failure of the tug driver to maintain clearance from the airplane taxiing on an active taxiway. A factor was the night conditions.											
July 11, 2006	N8440Q	Passenger	Fairbanks, AK	Louis Gold, DBA Marina Air Inc.	Airplane	Cessna 206F	Substantial	None	0	In-flight Encounter with Weather	Takeoff - Initial Climb
Probable Cause: The pilot's inadequate weather evaluation, which resulted in the airplane encountering a severe downdraft during takeoff initial climb, and an in-flight collision with terrain. Factors associated with the accident were a thunderstorm and a downdraft.											
July 12, 2006	N44NM	Passenger	Taos, NM	Aerowest Management Services, Inc.	Helicopter	Bell 206L-3	Substantial	Minor	0	Loss of Control - In-flight	Landing
Probable Cause: The loss of tail rotor effectiveness during landing, and the pilot's delayed remedial action to counteract a right yaw, which resulted in a loss of directional control and collision with terrain. A contributing factor was the pilot's failure to perform preflight performance calculations.											
July 15, 2006	N55CL	Passenger	Van Nuys, CA	Clay Lacy Aviation	Airplane	Learjet 55	Substantial	None	0	Fire	Approach - VFR Pattern - Final Approach
Probable Cause: An in-flight fire of undetermined origins.											
July 27, 2006	N301TH	Passenger	Skagway, AK	Temsco Helicopters, Inc.	Helicopter	Eurocopter AS 350B2	Substantial	Serious	0	In-flight Collision with Object	Hover
Probable Cause: The pilot's failure to maintain adequate clearance from trees while hovering, which resulted in a main rotor strike with trees, an uncontrolled descent, and a collision with terrain.											
July 31, 2006	N93356	Passenger	Juneau, AK	Ward Air, Inc.	Airplane	de Havilland DHC-3	Substantial	Serious	0	In-flight Collision with Terrain/Water	Approach - VFR Pattern - Base Leg/Base to Final
Probable Cause: The pilot's failure to maintain altitude/clearance during approach, which resulted in the airplane impacting the surface of the water. Factors associated with the accident were the flat-light and glassy water conditions, which affected the pilot's ability to see the surface of the water.											

On-Demand Part 135 Operations											
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 1, 2006	N4040W	Passenger	Anaktuvuk Pass, AK	Brooks Range Aviation	Airplane	de Havilland DHC-2 MK.1	Substantial	None	0	In-flight Collision with Terrain/Water	Takeoff - Initial Climb
Probable Cause: The pilot's failure to abort the takeoff at his predetermined reference point, which resulted in a collision with the shore during takeoff-initial climb, and structural damage to the airplane.											
August 16, 2006	N8597D	Passenger	Tok, AK	Forty Mile Air Ltd.,	Airplane	Piper PA-18	Substantial	None	0	Loss of Control - On Ground/Water	Takeoff - Roll/Run
Probable Cause: The pilot's failure to compensate for the wind conditions during the takeoff roll, which resulted in a collision with a tree. A factor contributing to the accident was a crosswind.											
August 19, 2006	N4975U	Passenger	Whittier, AK	Jim Air, Inc.	Airplane	Cessna U206G	Substantial	Serious	0	In-flight Encounter with Weather	Cruise
Probable Cause: The pilot's continued VFR flight into instrument meteorological conditions, which resulted in a collision with terrain while maneuvering to reverse direction in a pass. A factor contributing to the accident was clouds in the pass.											
September 2, 2006	N3125N	Cargo	Wainwright, AK	Alaska Air Taxi, LLC	Airplane	de Havilland DHC-3	Substantial	None	0	Loss of Control - On Ground/Water	Landing - Roll
Probable Cause: The pilot's failure to adequately compensate for wind conditions during the landing roll, which resulted in a loss of control, and subsequent collision with a ditch when the airplane departed the runway. A factor contributing to the accident was a crosswind.											
October 2, 2006	N142MK	Passenger	Hilo, HI	K and S Helicopters, Inc.	Helicopter	McDonnell Douglas 369E	Substantial	Minor	0	Loss of Control - In-flight	Takeoff
Probable Cause: Inadvertent application of the lateral cyclic friction, which resulted in a loss of control and subsequent hard landing.											
October 13, 2006	N7336U	Cargo	Tuntutuliak, AK	Flight Alaska, Inc., Yute Air Alaska	Airplane	Cessna 207	Substantial	Minor	0	In-flight Encounter with Weather	Approach - VFR Pattern - Final Approach
Probable Cause: The pilot's misjudgment of distance/altitude during the landing approach, which resulted in an undershoot and in-flight collision with a river embankment. Factors contributing to the accident were reduced visibility due to rain and mist.											
October 26, 2006	N1096W	Mail	Houston, TX	GTA Air, Inc.	Airplane	Beech F33	Substantial	None	0	Loss of Engine Power	Cruise
Probable Cause: The loss of engine power due to fuel starvation as a result of the pilot's improper fuel management.											
December 8, 2006	N779BC	Cargo	Gillette, WY	Key Lime Air, Inc.	Airplane	Fairchild SA227BC	Substantial	None	0	Hard Landing	Landing - Flare/Touchdown
Probable Cause: Wind shear.											

On-Demand Part 135 Operations											
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
December 10, 2006	N523FX	Passenger	Waukegan, IL	Jet Solutions LLC	Airplane	Bombardier, Inc. BD-100-1A10	Substantial	None	0	In-flight Collision with Object	Takeoff - Initial Climb
Probable Cause: The bird strike during initial climb after takeoff from the departure airport.											
December 14, 2006	N407JJ	Passenger	Dagsboro, DE	HeloAir, Inc.	Helicopter	Bell 407	Substantial	Fatal	2	In-flight Collision with Terrain/Water	Takeoff
Probable Cause: The pilot's improper decision to depart under visual flight rules into night instrument meteorological conditions. Contributing to the accident was the fog and the dark night conditions.											
December 17, 2006	N49NS	Passenger	North Canton, OH	Mid-Ohio Aviaiton, Inc.	Airplane	Cessna 560	Substantial	None	0	Airframe/Component/System Failure/Malfunction	Approach
Probable Cause: The rupture of the hydraulic pressure hose assembly, which was caused by internal wear between the hose's fire sleeve and stainless steel braid, and the failure of the emergency landing gear assembly to deploy the right main landing gear during approach. Contributing to the accident were inadequate hydraulic hose assembly maintenance inspection procedures, the lack of a hydraulic hose life limit by the airplane manufacturer, and the inadequate landing gear rigging procedures.											
December 26, 2006	N136WE	Passenger	Nashville, TN	Secure Air Charter LLC	Airplane	Gates Learjet 35A	Substantial	None	0	Airframe/Component/System Failure/Malfunction	Approach - FAF/Outer Marker to Threshold (IFR)
Probable Cause: The pilot's inadequate compensation for gusty crosswind conditions during landing, which resulted in a loss of control and collision with the runway. Factors contributing to the accident were the failure of the aileron augmentation (spoiler) flight control system, diminished directional (roll) control, and crosswind gusts.											
December 29, 2006	N99TH	Cargo	Rapid City, SD	Alpine Aviation, Inc.	Airplane	Beech B-99	Substantial	Minor	0	In-flight Collision with Terrain/Water	Approach
Probable Cause: The pilot's failure to follow the published instrument approach procedure which contributed to his failure to maintain altitude and clearance from terrain during the instrument approach. A factor was the night light condition.											

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Appendix B: Definitions of Terms

Air Carrier Operations

Air carriers are generally defined as operators that fly aircraft in revenue service. The *Review of 2006 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 does not discuss general aviation aircraft,[2] foreign-operated aircraft, ultralight vehicles, experimental aircraft, and commercial space launches.

Part 121 Operations

Part 121 operations refer to commercial, passenger-carrying operations that are limited to controlled, towered airports and airspace that provide radar, navigation, weather, ground, and maintenance support. These operations generally involve large jet and turboprop airplanes engaged in commercial, passenger-carrying operations. Operations can be both scheduled and nonscheduled, but scheduled operations must specify, in advance, a 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 requirements that are similar to those of Part 121 (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).

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.

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

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

[3] Title 14 *Code of Federal Regulations* (CFR) Part 119.3.

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. On-demand Part 135 air carriers are typically characterized as offering one of three types of services: air taxi or charter; air tour; or air medical. Historically, on-demand Part 135 operations represent about half 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.[4] 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[5] 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.

NTSB Severity Classification of Part 121 Accidents

Since 1997, the NTSB has used a classification system for Part 121 and other air carrier accidents based on accident severity. Developed in response to a congressional requirement,[6] the system uses classifications that characterize both injury and damage. Definitions for level of injury and

[4] 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.

[5] As previously mentioned, Congress is considering legislation that would make medical flights comply with Part 135 regulations even when no patient is on board.

[6] 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).

level of damage in Part 121 accidents are the same as those used to classify Part 135 accidents. The definitions of NTSB Severity Classifications for Part 121 accidents are provided below:

Major An accident in which at least one of the 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 the 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.

NTSB 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.

Definitions for Level of Injury

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

Serious Any injury that:

(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% 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 (NTSB) 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.

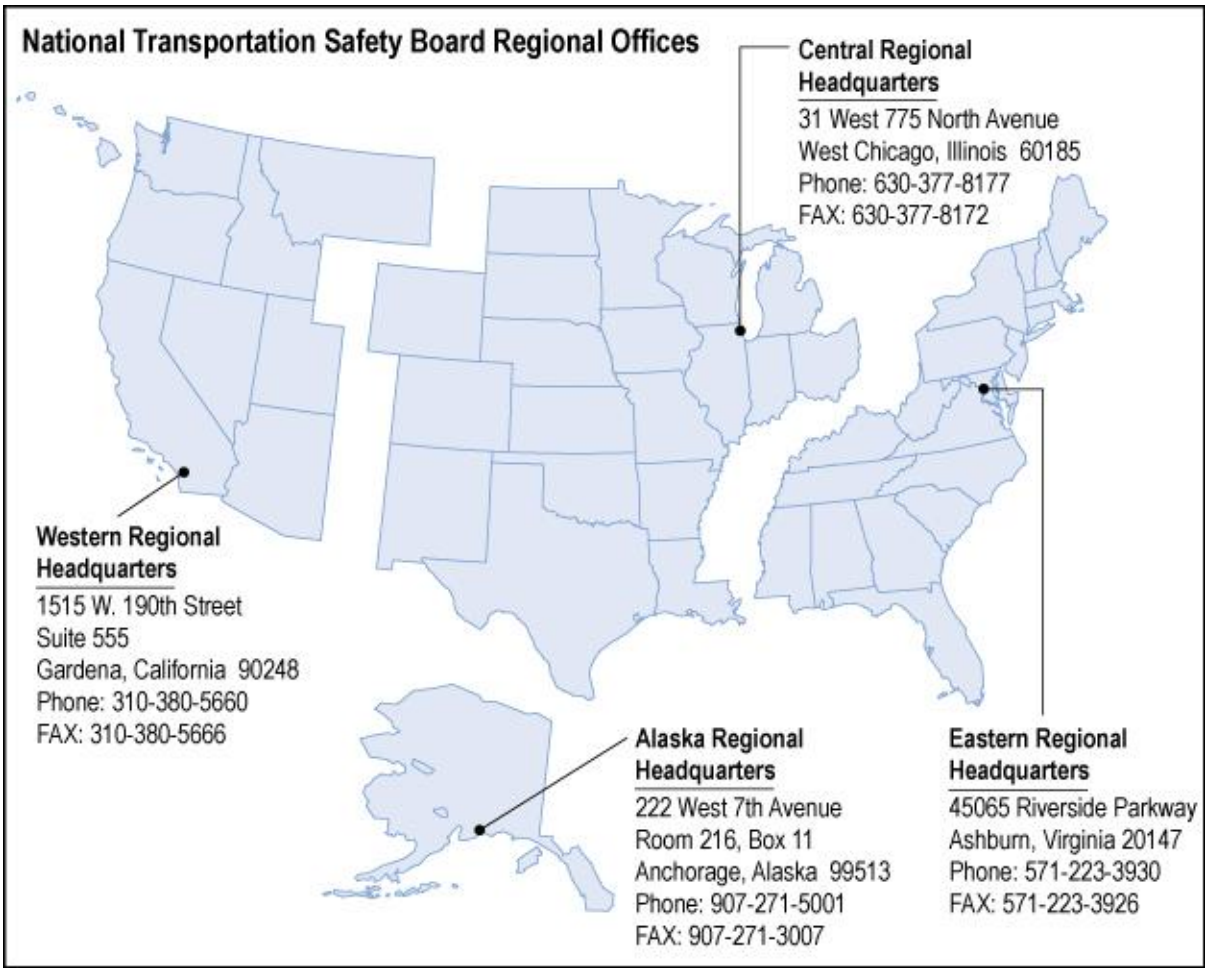
Accident Data: The NTSB Investigative Process

The NTSB investigates every civil aviation accident that occurs in the United States. It also provides investigators to serve as U.S. Accredited Representatives, as specified in international treaties 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 NTSB Headquarters staff based in Washington, D.C., or by staff based in one of the regional offices.

Although the NTSB investigates all civil aviation accidents that occur on U.S. soil (including those involving domestic and foreign operators), the *Review of 2006 Aircraft Accident Data: U.S. Air Carrier Operations* describes accidents that occur among U.S.-operated aircraft in all parts of the world.

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

National Transportation Safety Board Regional Offices



The NTSB Aviation Accident/Incident Database

The NTSB maintains the Accident/Incident Database, the U.S. government's official repository of aviation accident data and causal factors for civil aviation accidents. The database was established in 1962 by the NTSB's predecessor agency, the Civil Aeronautics Board, and approximately 1,900 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 <http://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.

The NTSB'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.[2]

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, NTSB 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, which contains five types of data:

- 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 into 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 NTSB'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[3] 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.

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 takes place in the chronology of flight. These 50 distinct codes are classified into six major

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

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

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 NTSB 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 NTSB considers all facts, conditions, and circumstances associated with the accident. Within each accident occurrence, any information that helps explain why that event happened is designated as either a "cause" or "factor." The term "factor" is used to describe situations or circumstances that contribute to the accident cause. In addition are findings that provide additional information of interest to the investigation. 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 help explain 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 and analysis components of an accident 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.

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 NTSB 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 NTSB Members 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[4] data to the Department of Transportation,[5] 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 GAATAA Survey, which is compiled annually by the FAA. The GAATAA 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.

Once GAATAA Survey data are compiled, the FAA estimates flight hours, which the NTSB includes in its annual reviews. Prior to 2002, the FAA estimated flight hours based strictly on GAATAA Survey data. In 2002, the FAA changed its estimating method and revised its flight-hour estimates for on-demand Part 135 operations for 1992–2000. The revised activity estimate uses calculations that are based on the number of aircraft assumed to operate on-demand operations[6] and the average number of flight hours reported on the GAATAA Survey. FAA's flight-hour estimates as revised for on-demand Part 135 flight operations are substantially higher than they would have been 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 1992–2005. The change is so dramatic that the NTSB maintains on its website[7] 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.

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

[5] 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.

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

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

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, this 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, this 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.[8] Any comparisons with NTSB data published before the 1998 review should take this change into account.

[8] The data on flight hours and departures for 2006 were obtained from BTS, National Transportation Statistics, 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 grew slightly between 1997 and 2006, ranging from 13 in 1997 to 21 in 2006 (table D1[1]). However, the number of other carriers (including national, large regional, and medium regional) decreased after 1997 from a peak of 83.

Table D1: Number of Air Carriers, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Major Air Carriers	13	13	13	15	15	15	14	14	17	21
Other Air Carriers	83	83	81	76	72	68	66	69	65	77
Total	**96**	**96**	**94**	**91**	**87**	**83**	**80**	**83**	**82**	**98**

The number of air carrier aircraft in the fleet increased 14% from 1997 to a peak of 8,497 in 2001 (table D2[2]). All of the increase was in turbojets, which increased 30% in that period, while the number of turboprop airplanes, piston airplanes, and helicopters declined.

Table D2: Air Carrier Aircraft Characteristics, 1997-2006

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Fixed Wing	7,482	7,994	8,106	8,016	8,370	8,161	8,144	8,150	8,182	8,046
Turbojet	5,108	5,411	5,630	5,956	6,296	6,383	6,523	6,691	6,839	6,784
Turboprop	1,646	1,832	1,788	1,475	1,494	1,250	1,123	989	889	807
Piston	728	751	688	585	580	528	498	470	454	455
Helicopter	134	117	122	39	127	33	32	36	43	47

[1] U.S. Bureau of Transportation Statistics (BTS), National Transportation Statistics, table 1-2 (December 2008). 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.

[2] BTS, National Transportation Statistics, table 1-13 (December 2007).

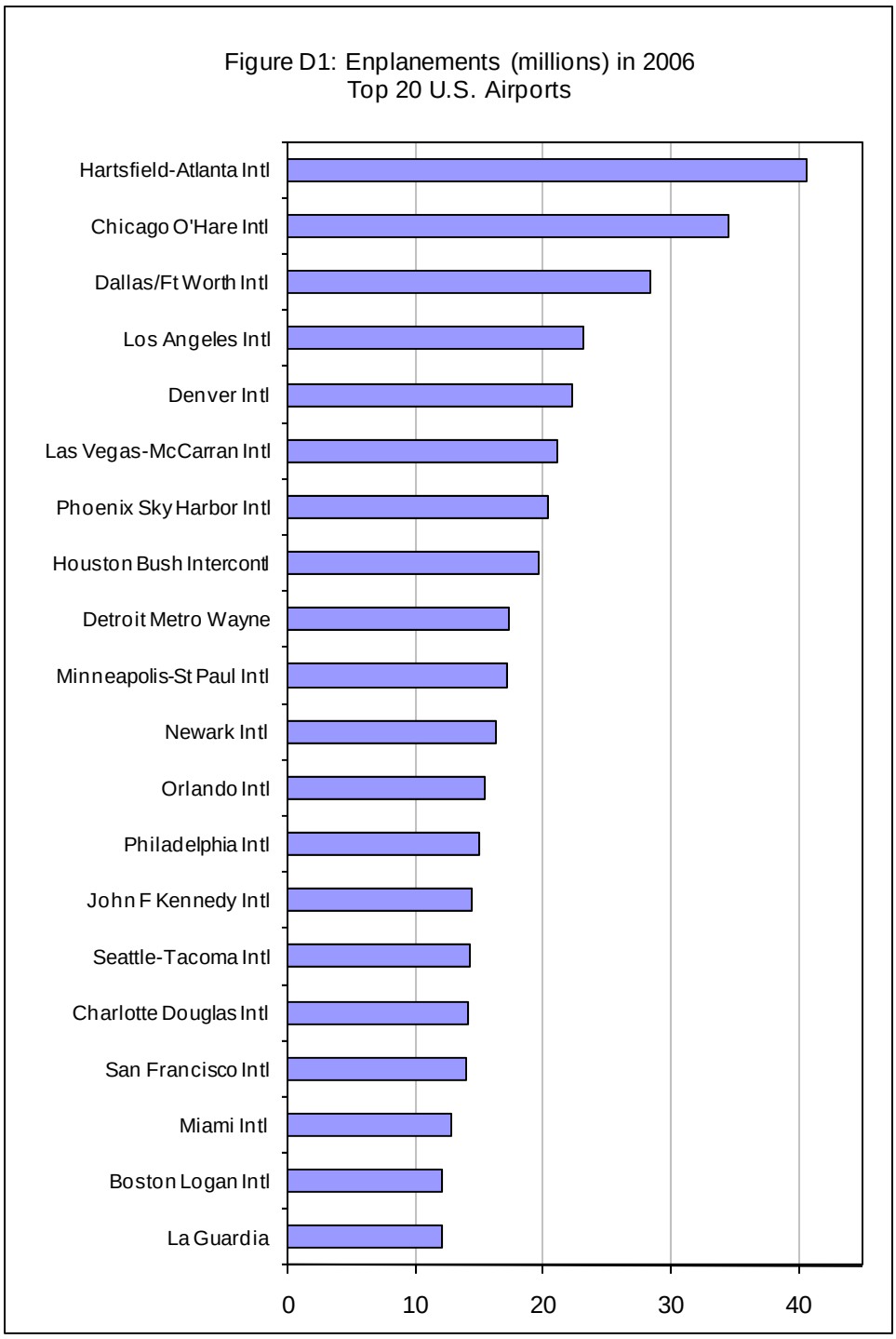
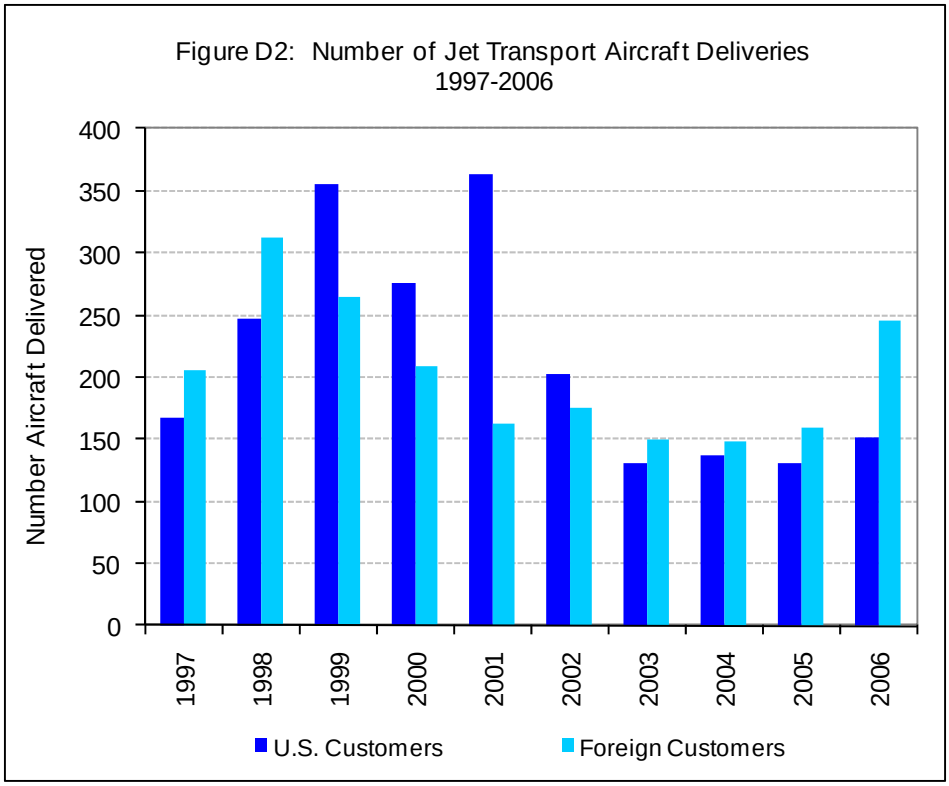


Figure D1: Enplanements (millions) in 2006
Top 20 U.S. Airports
Hartsfield-Atlanta Intl
Chicago O'Hare Intl
Dallas/Ft Worth Intl
Los Angeles Intl
Denver Intl
Las Vegas-McCarran Intl
Phoenix Sky Harbor Intl
Houston Bush Intercontl
Detroit Metro Wayne
Minneapolis-St Paul Intl
Newark Intl
Orlando Intl
Philadelphia Intl
John F Kennedy Intl
Seattle-Tacoma Intl
Charlotte Douglas Intl
San Francisco Intl
Miami Intl
Boston Logan Intl
La Guardia
0
10
20
30
40

The number of enplanements is another indicator of the aviation environment. In 2006, 691 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 2006.[3] As in previous years, Hartsfield Atlanta International Airport had the highest traffic volume with 40.6 million enplanements.



The latest figures for the number of U.S.-manufactured jet transport aircraft shipments show a cyclical pattern from 1997 through 2006 (figure D2); total deliveries to U.S. and foreign customers peaked in 1999.[4] Shipments to U.S. customers peaked in 2001, with shipments in 2002 down 44% from the previous year. An average of 50% of all shipments went to U.S. customers from 1997 through 2006, with a low of 38% in 2006 and a high of 69% in 2001. The least number of aircraft were shipped in 2003 (281 to all customers), and the most were shipped in 1999.

[3] BTS, National Transportation Statistics, table 1-41 (April 2008).

[4] 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 website: <http://www.aia-aerospace.org/assets/stat21.pdf>. Data are from Series 21, January 28, 2008.