AOPA AIR SAFETY FOUNDATION ACCIDENT TRENDS AND FACTORS FOR 2001

2002 NALL REPORT

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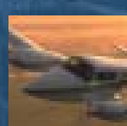

DEDICATION

The Joseph T. Nall Report is the AOPA Air Safety Foundation's annual review of general aviation aircraft accidents that occurred during the previous year. The report is dedicated to the memory of Joe Nall, an NTSB Board member who died as a passenger in an airplane accident in Caracas, Venezuela, in 1989.

PREFACE

Final vs. preliminary statistics

This report is based on NTSB reports of accidents involving fixed-wing general aviation (GA) aircraft weighing less than 12,500 pounds. To provide the pilot community with the most current safety information, ASF gathered NTSB data on 2001 accidents for the first nine months of 2002. By October 2002, 80.7 percent of the year 2001 reports had been finalized. The remaining 19.3 percent contained preliminary data. Prior year comparisons suggest that this mix of preliminary and final data will not significantly change the conclusions presented here when all final reports are analyzed.

As a supplement to the information contained in this report, ASF now offers its accident database online. You may search the database by selecting specific criteria. To view the database, visit www.aopa.org/asf/ntsb/index.html.

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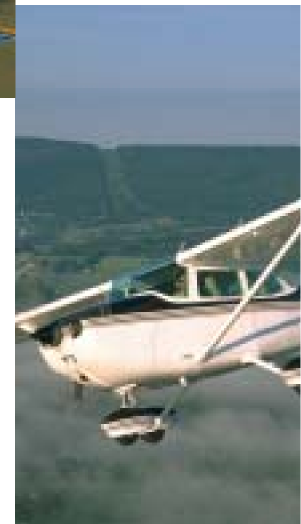
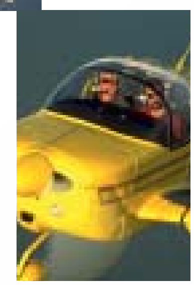




EXECUTIVE OVERVIEW

Bruce Landsberg
Executive Director,
AOPA Air Safety Foundation

Last year the national focus was understandably on terrorists and the aftermath. While there is still concern about security, pilots need to stay focused on the more prevalent risks in aviation. AOPA's Airport Watch program is an excellent approach to addressing GA's security issues, but only pilots can directly handle the risks that will confront any of us during a particular flight.

Low-level maneuvering was the leading fatal phase of flight again this year as it has been for the last five, holding steady at about 20 percent. In the vast majority of cases, the accelerated stall, impact with wires, a building, or an object, should not be considered a surprise. One interesting trend is that fatal accidents during takeoff now rank as the second leading phase of flight. It is something that every pilot must deal with on every flight.

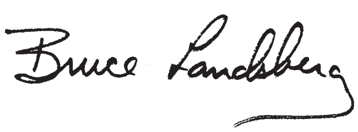
The majority of weather-related aircraft accidents involved VFR pilots tackling weather for which they either weren't rated or prepared. Weather involvement has remained nearly level with approximately 13 percent of fatal accidents over the preceding five years.

A trend in final NTSB reports from 1997 through 2000 shows a 25 percent increase in total accidents due to maintenance-related causes. That could be due to any number of factors. Pilots still account for the lion's share but this does reinforce the need to take care of the hardware as well. As an aside, the Oklahoma State University basketball team accident in Colorado two years ago was recently finalized by NTSB. The probable cause was spatial disorientation following a major electrical failure. You can read more on page 15.

Continuing education is essential. Seminars, online courses and quizzes, and a wealth of publications are readily available from the foundation. Periodic refresher training and thinking through the consequences of certain actions will improve the record.

Address the basics: Carry enough fuel, don't stall or fly close to the ground, remain VFR when not on an IFR flight plan, and polish takeoff and landing skills. Remember these basics and the GA accident numbers will continue to drop—significantly.

Safe flights for the coming year!



Safe Pilots. Safe Skies.

OVERVIEW

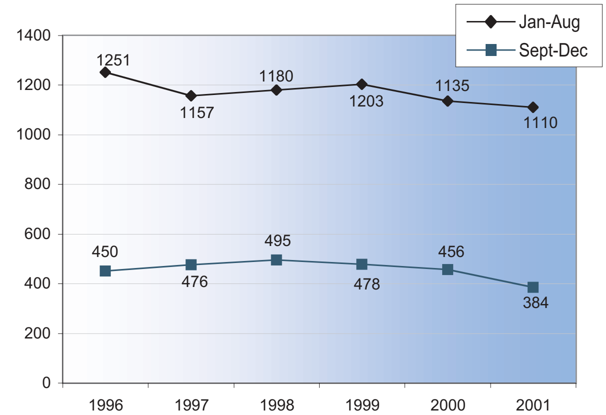
2001 Statistics

GA accident statistics derived from NTSB accident reports are presented below, with flight hour estimates provided by FAA.

ACCIDENT STATISTICS

	1997	1998	1999	2000	2001
Total Fixed-Wing GA Accidents	1,633	1,675	1,681	1,591	1,494
Fatal Fixed-Wing GA Accidents	325	343	306	299	298
Total Fixed-Wing GA Fatalities	613	622	556	521	535
Estimated GA Flight Hours	25.6M	25.5M	29.7M	29.1M	26.2M

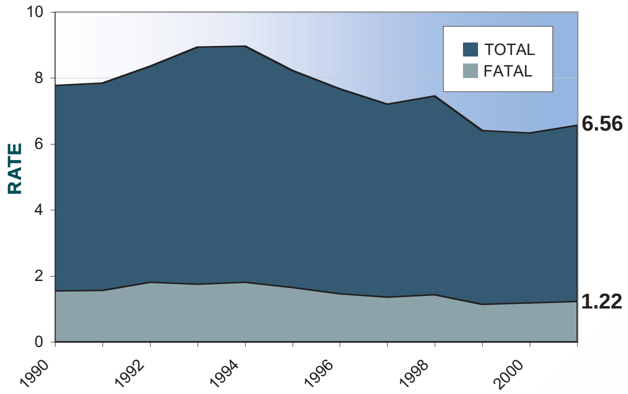
MONTHLY TREND ANALYSIS



The chart below shows the overall GA accident rate per 100,000 flying hours. While there were fewer accidents in 2001 than in 2000, there were also fewer flight hours flown. The FAA estimates the number of flight hours decreased from 29.1 million in 2000 to 26.2 million in 2001. Therefore, for the first time since 1994, this year showed an increase in both the total and fatal accident rates.

U.S. GENERAL AVIATION ACCIDENTS

PER 100,000 HOURS 1990-2001



During the weeks following September 11, 2001, all aircraft in the U.S. were grounded. General aviation was the last segment of aviation to be released, and some airports are still not back to normal pre-September 11 operations. The numbers in this report reflect a unique time in aviation history. The increased accident rate may be the result of decreased proficiency after prolonged government-mandated grounding.

The chart above, right, shows that during the first eight months of 2001, the number of total accidents was slightly lower than previous years. After September 11, the decrease was more pronounced.

There were no surprises regarding the leading accident factors for GA accidents in 2001. The most common accident causes continue to be pilot-related. In every form of human activity involving machinery such as automobiles, boats, and aircraft, the hardware is invariably more reliable than the human operator. Humans cannot be re-engineered to improve piloting or decision-making skills, while machinery is improved to make it more reliable. *This does not mean that accidents are inevitable, nor does it mean that just by trying harder, or by adding multiple layers of regulation, the safety record will improve significantly.*

GA Safety vs. Airlines

GA accident rates have always been higher than airline accident rates because of the marked differences in the type of flying. Following are some of the important distinctions of GA:

- **Less regulation** — GA pilots conduct a wider range of operations.
- **Wide variances in pilot certificate levels** — GA is the training ground for the industry. Certificates range from ATP level to student pilot.
- **Fewer cockpit resources** — Air carrier operations require at least two pilots; GA operations are predominantly single pilot. GA aircraft owners and pilots are individually responsible for the safety of flight. Air carriers and the military have dispatchers, mechanics, and loadmasters to help share a variety of duties.
- **More facilities** — GA flies to more than 15,000 landing facilities; the airlines serve only about 700. Many GA airports lack precision approaches, long runways, approach lighting systems, and the advanced services of airline-served airports.

- **Special mission-related tasks,** such as aerial application, external load, and banner towing.

- **More takeoffs and landings** — the highest risk phases of any flight. On a per hour basis, GA conducts many more takeoffs and landings than either air carriers or the military.

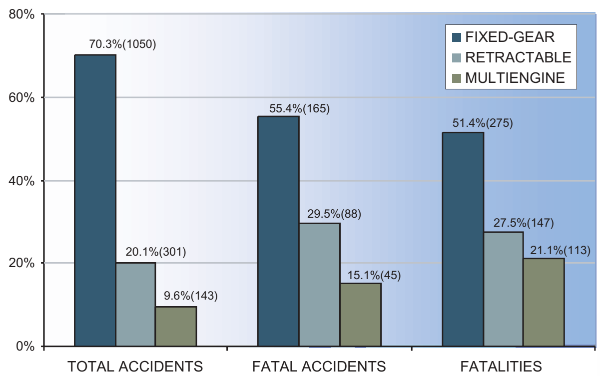
- **Less weather-tolerant aircraft,** which generally must fly through the weather instead of over it or which may not have systems to avoid/cope with adverse conditions.

Although GA operations are different from air carrier, pilots who actively manage risk can significantly improve safety.

AIRCRAFT CLASS

The number of pilot-related accidents in each class of aircraft reflects the number of hours and types of operations flown. Individual differences in overall accident rates are more likely to be caused by differences in exposure to risk than by characteristics of the airplanes themselves. For example, training aircraft are more likely to be involved in takeoff and landing accidents since they spend much of their time in pattern operations with inexperienced pilots.

ACCIDENT AND FATALITY RATES BY CLASS



Increased complexity changes the risk equation. Higher airspeeds and more complex systems result in increased demand on the pilot's flight management skills. This includes components such as retractable landing gear, constant-speed propellers, sophisticated navigation, and autopilot systems.

Single-engine fixed-gear aircraft have more accidents than complex aircraft because they are much more common and are flown more hours.

IFR weather-related and IFR approach accidents are more common in single-engine retractable-gear and multiengine airplanes because these aircraft operate more frequently in instrument weather conditions.

ASF studies have shown that low pilot time in type is often a significant contributing factor in accidents. Transitioning to a new aircraft, even one that is less complex, can cause problems for experienced pilots as well as novices.

Takeoffs and maneuvering flight—dangerous phases

Maneuvering flight and takeoff/climb accidents accounted for the largest number of fatal accidents in both single-engine and multiengine aircraft.

As aircraft increase in size and weight, minimum flight speeds also increase and that increases the probability of fatalities. In single-engine fixed-gear airplanes, 16.8 percent (32 of 191) of all takeoff/climb accidents were fatal. Thirty percent (12 of 40) were fatal in single-engine retractable-gear airplanes and 38.9 percent (7 of 18) were fatal in multiengine airplanes. Takeoff accidents accounted for 22.8 percent of all accidents in 2001.

Maneuvering flight, the dominant fatal accident phase of flight in single-engine airplanes, also resulted in high total and fatal accident rates, although accounting for a much lower number of total accidents in all classes of airplanes. Maneuvering flight problems in single-engine fixed-gear airplanes resulted in fatalities in 49.5 percent (48 of 97) of these accidents. In single-engine retractable-gear airplanes, 75 percent (12 of 16) were fatal. There were nine maneuvering accidents in multiengine airplanes, and six (66.7 percent) of them were fatal. Maneuvering flight accidents accounted for 11.2 percent of all accidents in 2001.

During the past five years, maneuvering flight accidents averaged 7.7 percent of all accidents. However, fatal maneuvering accidents increased from 19.7 percent in 2000 to 22.1 percent in 2001.

Weather-related accidents equal high fatality rate

Weather-related accidents continue to have the highest probability of fatalities. In single-engine fixed-gear airplanes, 56.5 percent (13 of 23) of weather-

related accidents were fatal. In single-engine retractable-gear airplanes, 89.5 percent (17 of 19) of weather-related accidents were fatal and 100 percent (three of three) of weather-related accidents in multiengine airplanes resulted in fatal injuries. Weather-related accidents accounted for 4.1 percent of all accidents in 2001.

Over the last five years, weather-related accidents accounted for only three percent of total mishaps, on average, but resulted in 12 percent of the fatal accidents. While the numbers do not show a consistent trend, the percentage of fatal weather-related accidents decreased from 18.9 percent in 2000 to 15.2 percent in 2001.

Landings—big numbers, low fatalities

Landings continued to account for the highest number of total accidents, but some of the lowest numbers of fatal accidents. In 2001, there were 385 total landing accidents, but only four (1 percent) resulted in fatalities. The low incidence of fatalities in landing accidents reflects the lower speeds at the time of collision and the fact that the mishap occurred on or close to a runway, with few obstacles. Landings accounted for 35.3 percent of all accidents in 2001.

The following paragraphs outline the key areas of concern and related statistics in each class of airplane. In each class, the fatal percentages indicate the proportion of accidents in each phase that resulted in at least one death on board the aircraft.

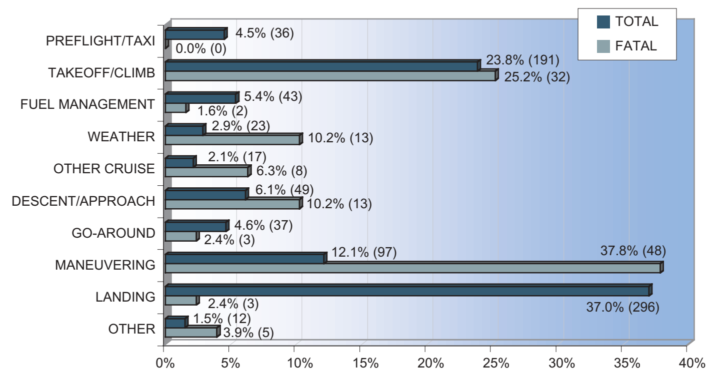
Single-Engine Fixed-Gear Aircraft

801 Total/127 Fatal

The top four areas for fatal accidents in single-engine fixed-gear aircraft in 2001, listed below, are similar to previous years. Together, these areas account for 83.4 percent of all fatal pilot-related accidents in these airplanes.

- **Maneuvering:** 37.8 percent (48)
- **Takeoff/Climb:** 25.2 percent (32)
- **Weather:** 10.2 percent (13)
- **Descent/Approach:** 10.2 percent (10 VMC, 3 IMC)

ACCIDENT CAUSES
SINGLE-ENGINE FIXED-GEAR



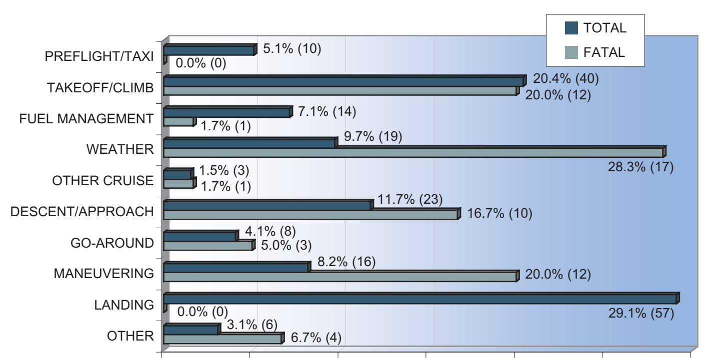
Single-Engine Retractable-Gear Aircraft

196 Total/60 Fatal

The following top four areas for fatal accidents in single-engine retractable-gear aircraft in 2001 account for 85.0 percent of all fatal pilot-related accidents in these airplanes.

- **Weather:** 28.3 percent (17)
- **Maneuvering:** 20.0 percent (12)
- **Takeoff/Climb:** 20.0 percent (12)
- **Descent/Approach:** 16.7 percent (6 VMC, 4 IMC)

ACCIDENT CAUSES
SINGLE-ENGINE RETRACTABLE-GEAR



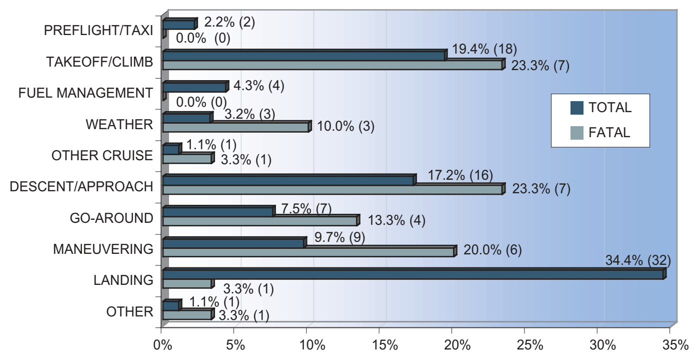
Multiengine Aircraft

93 Total/30 Fatal

The list below identifies the top four areas for fatal accidents in multiengine aircraft in 2001. Together, these areas accounted for 79.9 percent of all fatal pilot-related accidents in these airplanes in 2001.

- **Takeoff/Climb:** 23.3 percent (7)
- **Descent/Approach:** 23.3 percent (1 VMC, 6 IMC)
- **Maneuvering:** 20.0 percent (6)
- **Go-around:** 13.3 percent (4)

ACCIDENT CAUSES MULTIENGINE



LEADING ACCIDENT CAUSES AND FACTORS

Phase of Flight

Most pilot-related accident sequences occurred during phases of flight that take up relatively little flight time but contain the highest number of critical tasks and the highest task complexity, specifically during takeoff and landing. As shown above, right, fatal accidents occurred mostly during maneuvering flight and takeoff/climb.

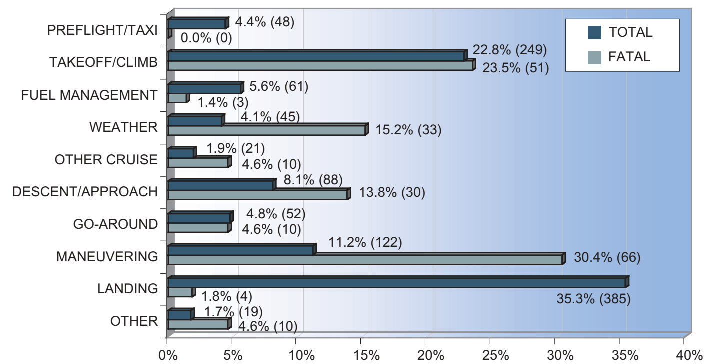
GA operations involve many more takeoffs and landings per flight hour than airlines. Instructors and their students sometimes spend entire flight lessons in the traffic pattern. Nevertheless, the critical relationships between phases of flight remain basically the same. For both GA and commercial flights, takeoffs and landings, although the most complex phases of flight, constitute a relatively small portion of the total flight time.

Cruise is one phase in which GA accident proportions consistently differ from commercial flying. Weather is usually the culprit in cruise accidents, and was the cause in 15.2 percent of all pilot-related fatal accidents in 2001. Weather is especially a factor when GA pilots attempt VFR flight into IMC. About 49 percent of the pilot population is instrument qualified. While IFR flying presents new risk areas that pilots must manage, earning an instrument rating can equip the pilot with vital life-saving skills.

Pilot-Related Causes

1,090 Total/217 Fatal

ACCIDENT CAUSES PILOT-RELATED



GENERAL AVIATION ACCIDENTS

MAJOR CAUSE	ALL ACCIDENTS	FATAL ACCIDENTS
Pilot	73.0%	72.8%
Mechanical/Maintenance	15.5%	10.4%
Other	9.6%	9.1%
Unknown	2.0%	7.7%

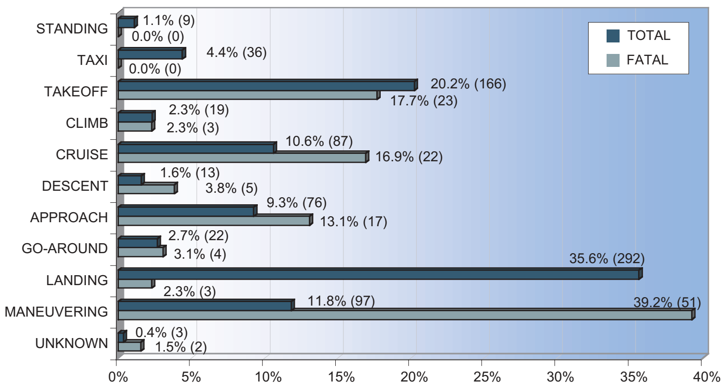
MAJOR CAUSE	ALL ACCIDENTS	FATAL ACCIDENTS
Pilot	1,090	217
Mechanical/Maintenance	231	31
Other	143	27
Unknown	30	23
TOTAL	1,494	298

As shown above, pilot-related problems accounted for 73.0 percent of all accidents and 72.8 percent of the fatal accidents in the accident records reviewed for this report. After all reports are finalized this typically climbs to 75 percent. Many of the mechanical/maintenance accidents are also attributable to human-related problems.

The first chart on page 5 identifies the phase of flight in which pilot-related accidents began. There is some overlap in the terms used to describe the phase in which the emergency occurred and the accident cause, but the two are not always the same.

For example, fuel exhaustion resulting in an accident may have occurred during cruising flight or during a landing approach. The accident cause will be attributed to fuel management, and the phase of flight may be listed as approach or cruise. Conversely, problems associated with approach operations, such as descending below the minimum descent altitude, will show approach as both the phase of flight and the cause.

EMERGENCY PHASE OF FLIGHT



aviation accidents, with 74.2 percent of them fatal. Pilots with fewer than 500 hours of total time were involved in 34.9 percent of all accidents in 2001. *Note: These are raw numbers and have not been correlated for exposure.*

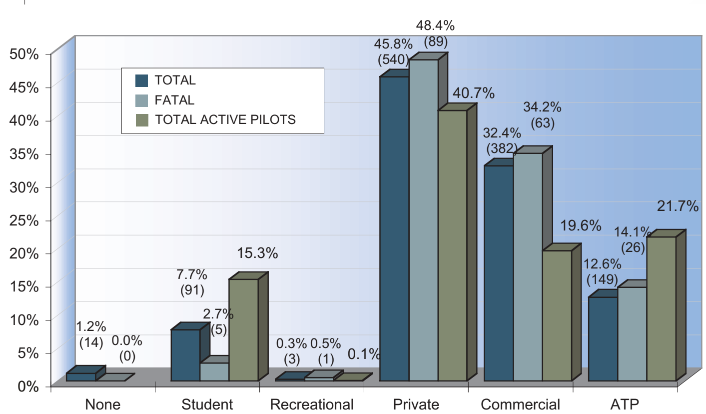
Specific Operations

The purpose of a flight is referred to as type of operation. The following paragraphs focus on three of the most common GA operations: personal flying, business flying, and flight instruction. The chart below shows how those categories compare to other types of operations.

Pilot Experience

Accidents involve pilots of all certificate and experience levels. The graph below shows that the accident rates for student and airline transport pilots were below their proportion in the pilot population, with students holding 15.3 percent of active certificates but only accounting for 7.7 percent of the accidents. However, private and commercial pilots were

HIGHEST CERTIFICATE ON BOARD



involved in more than their share of accidents, with private pilots having the highest fatality rate, 48.4 percent. Pilots with fewer than 500 hours of time in type were involved in 76.2 percent of general

TYPE OF OPERATION

TYPE OF OPERATION	Percent of Flying (2000)	Percent of Total Accidents (2001)	Percent of Fatal Accidents (2001)
Personal	48.1%	67.7%	70.8%
Instructional	22.0%	14.5%	7.0%
Aerial Application	5.0%	4.4%	4.4%
Business	13.7%	3.6%	4.4%
Positioning	*	2.4%	2.3%
Ferry	*	0.7%	1.3%
Other Work Use	1.5%	1.6%	1.7%
Aerial Observation	4.1%	0.4%	0.3%
Exec./Corporate	4.0%	0.3%	1.0%
Other/Unknown	1.6%	4.4%	16.7%

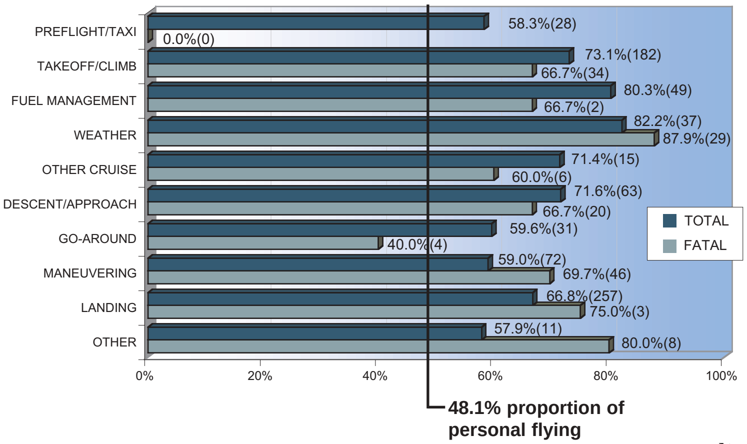
*Included in Other/Unknown

Personal Flying

745 Total/152 Fatal

In a typical year, personal flying comprises approximately 45 percent of all GA flights—by far the largest single type of operation. It also accounts for a disproportional number of accidents. For 2001, 68.3 percent of all accidents and 70.0 percent of fatal accidents occurred during personal flights. This is a continuing trend from year to year.

PROPORTION OF ACCIDENTS ATTRIBUTED TO PERSONAL FLYING

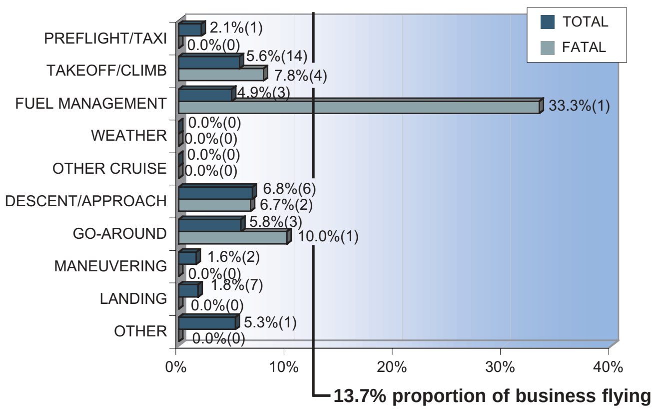


The graph above shows the proportion of total and fatal accidents due to a particular cause that occurred during personal flights. Only four fatal landing accidents were recorded in 2001 during all types of flying combined, but three of these occurred during personal flights.

Business Flying

37 Total/8 Fatal

PROPORTION OF ACCIDENTS ATTRIBUTED TO BUSINESS FLYING



Flying gives many business travelers a flexible, economical way to travel on their own schedules. It also allows them to reach destinations that are difficult or impossible to reach via airlines or other modes of transportation. Business flights accounted for only 3.4 percent of the total pilot-related accidents and 3.7 percent of the fatal accidents in 2001 while accounting for 13.7 percent of all GA flight hours. *Note: The primary distinction between business and corporate flying is that corporate pilots are hired only to fly while, for business pilots, flying is secondary to their primary business function. Many corporations operate turbojet aircraft that weigh more than 12,500 pounds and are not considered in this report. However, smaller propeller and light jet airplanes operated by individuals or corporations are included.*

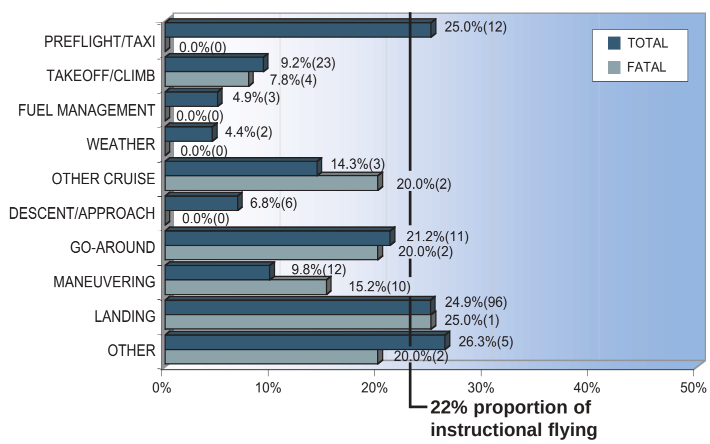
The causes of business travel accidents, as well as the fatality rate for each cause, are shown below, left. As in most recent years, business accidents in 2001 were lower than the proportion of business flying hours in all causal areas. Overall, business flying continues to have a very good safety record.

Instructional Flying

173 Total/21 Fatal

Flight training, which includes dual instruction and solo flight for instructional purposes, accounted for 15.9 percent of all pilot-related accidents in 2001.

PROPORTION OF ACCIDENTS ATTRIBUTED TO FLIGHT INSTRUCTION



The amount of fatal pilot-related instructional accidents rose from 6.9 percent in 2000 to 9.7 percent in 2001. The proportion of total accidents attributed to instructional flying increased slightly, from 13.1 percent in 2000 to 14.5 percent in 2001, but is still well below the 22.0 percent of total flight time attributable to instructional flight. Following are some noteworthy facts about instructional flying:

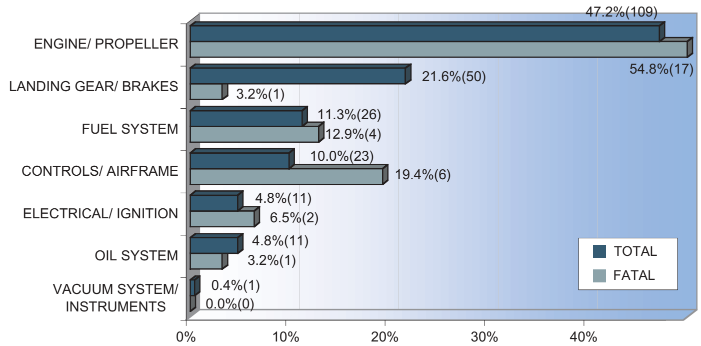
- The total number of accidents attributable to instructional flying increased by 7.5 percent in 2001 compared to the previous year's figures (173 vs. 161).
- Landing accidents in instructional flights increased by 18.5 percent in 2001 (96 vs. 81).
- Accidents in takeoff and initial climb decreased 23.3 percent from 30 in 2000 to 23 in 2001.

- Instructional accidents due to weather decreased from 7 in 2000 to 2 in 2001, with no fatalities.

Mechanical/Maintenance

231 Total/31 Fatal

MECHANICAL/MAINTENANCE ACCIDENTS



Mechanical/maintenance factors accounted for 15.5 percent of all accidents and 10.4 percent of fatal accidents in 2001. Total accidents in this category are down slightly from 2000, when 16.9 percent of all accidents were attributed to mechanical/maintenance issues. Fatal mechanical/maintenance accidents increased slightly in 2001. By far, the largest percentage of mechanical and maintenance accidents were the result of powerplant or propeller problems (47.2 percent of all mechanical/maintenance accidents and 54.8 percent of fatal mechanical/maintenance accidents). Another 67 accidents were classified as "power malfunction/loss for unknown reasons." For example, carburetor icing could cause engine stoppage but by the time investigators arrive, the evidence may have melted.

Several of the mechanical failure accidents could have been prevented by a thorough preflight. Other accidents resulted when pilots incorrectly performed procedures after system failures occurred. The number and percentage of mechanical-related accidents typically increases slightly once all final reports are in, but the average is 15.4 percent. On all aircraft, but particularly older aircraft, attention to regular maintenance is essential.

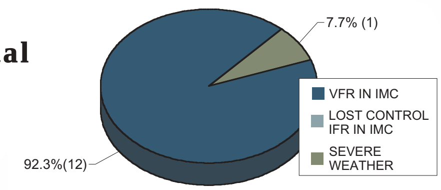
The number of mechanical/maintenance accidents decreased this year for the first time since 1997. The percentage of total accidents attributed to mechanical/maintenance issues decreased from 17.0 percent in 2000 to 15.5 percent in 2001. A thorough pre-flight will prevent some, but not all, of these accidents.

WEATHER

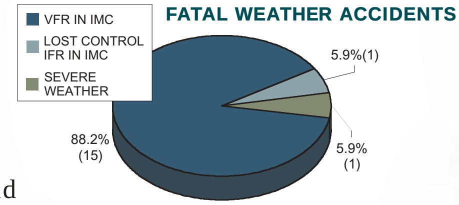
45 Total/33 Fatal

Attempted VFR flight into IMC continues to be the most deadly weather-related accident cause. While it resulted in only 2.2 percent of all accidents in 2001, 84.0 percent of those were fatal. VFR pilots who find themselves in marginal weather must exit immediately. Instrument-rated pilots are trained for this condition, but still fall victim to this deadly scenario especially when not on an IFR flight plan. Before flight, get a weather briefing and ask for pilot reports (pireps) along your route. While en route, give pireps to confirm or contradict the forecast, and help other pilots.

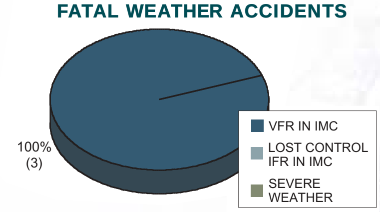
SINGLE-ENGINE FIXED-GEAR FATAL WEATHER ACCIDENTS



SINGLE-ENGINE RETRACTABLE-GEAR FATAL WEATHER ACCIDENTS



MULTIENGINE FATAL WEATHER ACCIDENTS



Note: To learn more about pireps, visit www.aopa.org/asf/skyspotter/ to participate in ASF's online SkySpotter® program.

The pie charts on the previous page show fatal weather-related accident causes, categorized by class of aircraft. While many of these accidents involved inexperienced VFR pilots, high-time commercial and airline transport pilots were also included. The AOPA Air Safety Foundation's *Safety Review: General Aviation Weather Accidents* offers details and analyses of weather accidents.

Most weather-related accidents involved aircraft striking objects or terrain at high airspeeds or crashing out of control, sometimes after pilot-induced structural failure.

Interaction of Night and Weather

Total and fatal accidents in various light and weather conditions are shown below. Night increases the probability of fatalities; nearly 20 percent of all accidents resulted in fatalities, but 30.4 percent of night accidents were fatal. IMC, however, nearly doubles the probability of a fatality—58.5 percent of IMC accidents resulted in fatalities. The combination of night and IMC slightly increased the fatality rate to 60.0 percent.

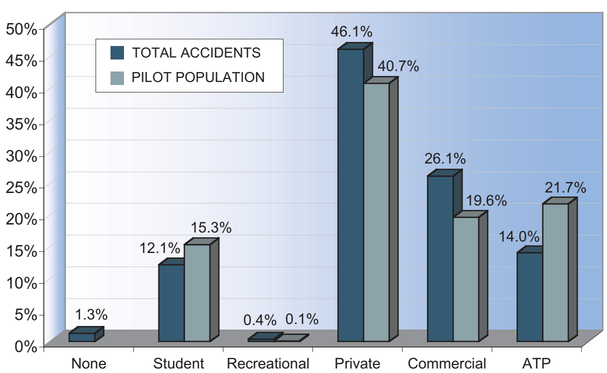
CONDITIONS	Total Accidents	Fatal Accidents	Percent Fatal	Accident Rate/ 100,000 hours
Day	1,071	146	13.6%	5.24
Night	115	35	30.4%	3.12
VMC	1,388	236	17.0%	6.61
IMC	94	55	58.5%	4.13
All Conditions	1,494	298	19.9%	6.42
Day VMC	1,032	128	12.4%	5.53
Night VMC	88	18	20.5%	3.76
Day IMC	39	18	46.2%	2.19
Night IMC	25	15	60.0%	5.04

SPECIAL EMPHASIS TOPIC

Takeoffs and Landings

More than 58 percent of all pilot-related accidents occurred during takeoff and landing. This includes the entire spectrum of pilots—from student to ATP.

TAKEOFF AND LANDING ACCIDENT CERTIFICATE LEVELS



Takeoffs and landings (TOL) are performed during each flight, yet they continue to be the leading cause of accidents in general aviation. In 2001 there were 634 TOL accidents, which equates to nearly two accidents per day. The fatality rate in pilot-related takeoff accidents was 20.5 percent, compared to only one percent in landing accidents. The "basic" act of taking an aircraft into the air and returning it to the ground should not be taken for granted.

ASF recently studied TOL accidents that occurred between 1991 and 2000. The leading factor in both phases of flight was loss of control, accounting for 30.2 percent of takeoff accidents and 32.8 percent of landing accidents. Various factors can cause loss of control, such as failure to establish a positive rate of climb, inability to maintain climb speed, stalling, premature rotation, or spatial disorientation. Other categories of TOL accidents include wind conditions, power loss, surface conditions, aircraft configuration, and landing gear malfunction.

Improper aircraft configuration was the cause of 13.5 percent of takeoff accidents. The *Pilot's Operating Handbook* (POH) is the guide to the proper configuration and operation during takeoff. A disciplined use of checklists is a guaranteed way to verify that the aircraft is in the correct configuration for the planned takeoff.

On July 17, 2001, during an instructional flight, the private pilot retracted the landing gear of the Beech 95-B55 while on the ground during a touch and go.

The aircraft skidded to a halt and caught fire. During the rollout, the pilot was instructed to raise the flaps and initiate the takeoff. Instead of advancing the throttle, the pilot mistakenly raised the landing gear control switch. Both pilots evacuated the aircraft without harm. The need to change the aircraft's configuration for the ensuing takeoff ultimately led to substantial aircraft damage and the possibility of serious injury.

Wind also plays a key role in many landing accidents. Wind conditions caused 17.2 percent of all landing accidents, the second leading cause in that category. When the topic of wind comes up, the discussion inevitably leads to talk of crosswind landings. The art and science of landing in a stiff crosswind is mastered only through practice.

The failure to operate within set limitations can prove disastrous. A private pilot, accompanied by a passenger, took off from a small private strip in a Cessna 150G. The aircraft departed runway 09, which was 2,200 feet long. Immediately after liftoff the aircraft began to lose airspeed, descended, and collided with trees 1,000 feet from the departure end of the runway. A review of the weather data showed the takeoff was attempted with an 11-knot tailwind. Both occupants escaped with only minor injuries, but the aircraft was destroyed. The NTSB determined the probable cause of this accident was the pilot's selection of a runway that resulted in a tailwind takeoff.

TOL accidents are usually a result of skill deficiency (excluding the rare mechanical malfunction)—most often caused by lack of practice. The foundation for all safe takeoffs and landings lies in the pilot's ability to operate during normal conditions. When pilots encounter complex operations, such as crosswinds, short fields or high-density altitudes, competent instruction is highly recommended.

FATAL ACCIDENT FACTORS

Based on the probability of fatalities, most fatal accidents in 2001, for all classes of aircraft, occurred under the following conditions:

- **Maneuvering**
- **Takeoff/Climb**
- **Weather**
- **Descent/Approach**

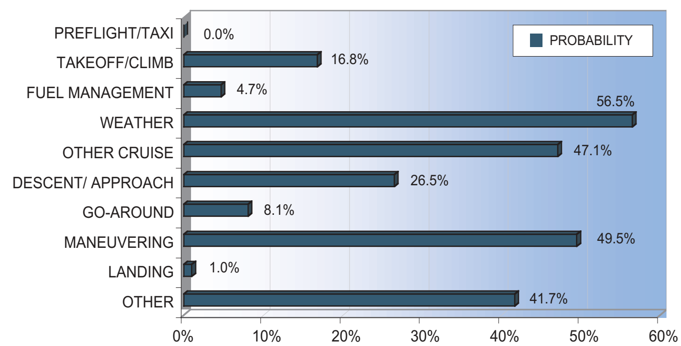
As in the past, the causes of fatal accidents were closely linked to the flight profile, including the length of the trip, the time of day, the purpose of the trip, and whether the flight was IFR or VFR.

Probability of Fatalities

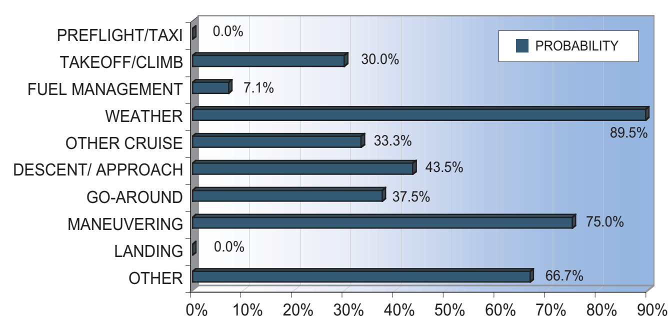
The likelihood that a given accident will result in fatalities can be estimated by comparing the number of total accidents to the number of fatal accidents under the same set of circumstances. Regardless of the cause, accidents in single-engine retractable-gear aircraft were more likely to be fatal than those in fixed-gear aircraft. The fatality rate for multiengine airplanes was even higher. This was likely the result of higher speeds at impact and the fact that many accidents in twins are inherently more likely to result in fatalities (e.g., loss of control or collision with terrain in weather).

The three graphs below show the probability that an accident in a certain phase of flight or category of aircraft will result in a fatality.

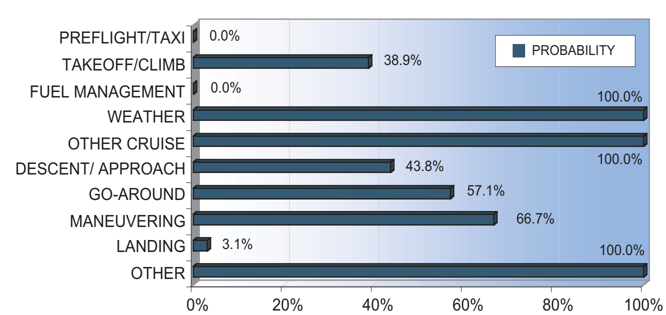
SINGLE-ENGINE FIXED-GEAR



SINGLE-ENGINE RETRACTABLE-GEAR



MULTIENGINE



Weather accidents have the greatest chance of being fatal. In all categories, the probability is 73.3 percent. However, that increases in single-engine retractable-gear and multiengine aircraft, with 89.5 percent and 100 percent, respectively. Maneuvering flight is another phase of flight with a high probability of fatalities.

While go-arounds are not usually high on the fatal accident factor list, in 2001 they were fatal 57.1 percent of the time in multiengine aircraft. A go-around in a single-engine fixed-gear aircraft is less likely to be fatal (8.1 percent), perhaps due to the lower airspeeds involved.

Fuel management is an accident factor that consistently results in fatalities each year. While the probabilities are low (4.7 percent in single-engine fixed-gear and 7.1 percent in single-engine retractable-gear), this type of accident is easily preventable by increased diligence on the part of the pilot.

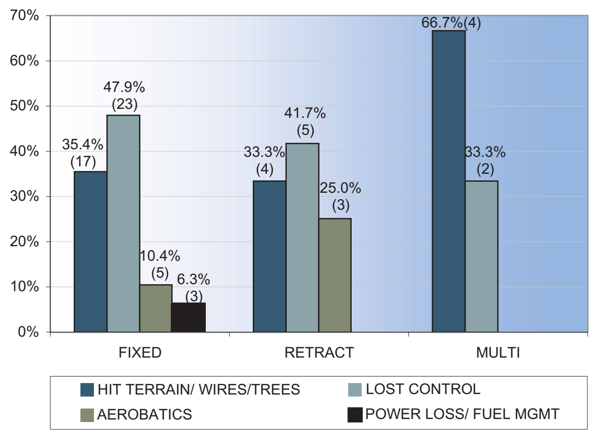
Maneuvering Flight

122 Total/66 Fatal

More than half (54.1 percent) of all accidents involving maneuvering flight (66 of 122 accidents) involved fatalities. Like weather-related accidents, maneuvering accidents frequently involved aircraft crashing out of control or colliding with terrain, wires, or other structures.

Maneuvering flight continues to be the largest producer of fatal accidents. It is also one of the most preventable. Twenty-five of 66, or 37.9 percent, of fatal maneuvering accidents were the result of "hit terrain, wires, trees, etc." Thirty of the 66 (45.5 percent) fatal maneuvering accidents were attributed to

FATAL MANEUVERING ACCIDENTS



"loss of control." Two of the six (33.3 percent) fatal maneuvering accidents in multiengine airplanes were due to this cause.

Some of these accidents occurred during legitimate activities such as aerial applications, banner towing, and law enforcement. These operations require low, slow flight and considerable mission-related division of attention. In operations where there is a mission beyond just operating the aircraft, the task demands of the mission and the task demands of flying can reach extremes simultaneously, severely taxing the pilot's capability. These operations carry some inherent risk and demand skill and vigilance from the pilot.

The majority of maneuvering accidents occurred during personal (56.4 percent), not mission-related, flights.

A few of these accidents were the result of inadvertent loss of control by pilots performing common operations. Some, however, occurred during buzzing or low-level aerobatics. Many involved a degree of recklessness that makes it difficult to term them "accidents" in a true sense. No increase in proficiency can prevent such accidents—only an increase in judgment.

Descent/Approach

88 Total/30 Fatal 70 VMC/18 IMC

Approximately a third (34.1 percent) of all approach accidents (30 of 88) produced fatalities. Aside from steep turn/stall mishaps, "improper IFR approach" was one of the largest single problems in this area, adding another dimension to the weather-related accident count.

Accidents resulting from mishandled approaches, although relatively low in number, were fatal 34.1 percent of the time. Most problems in this category were the result of stall/mush or failure to follow instrument approach procedures. All classes of aircraft were represented in both of these problem areas.

Fatal instrument approach accidents involved one multiengine and three retractable single-engine aircraft. Training and currency are essential but pilots must also consider fatigue. Instrument-rated pilots must perform complex tasks, often after flying for long periods in bad weather.

Airline studies conducted by NASA and FAA have shown that the most demanding tasks, landing and approach, must be performed at a time when the pilot's ability to accomplish complex tasks may be significantly diminished.

HOMEBUILT AIRCRAFT

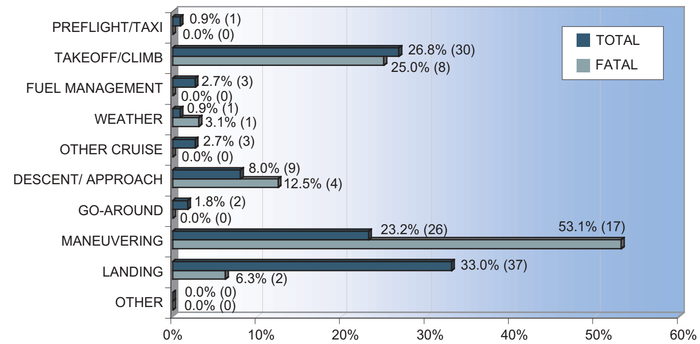
184 Total /51 Fatal

Accident Causes: Pilot-Related

112 Total/32 Fatal

The graph above, right, identifies accident causes for homebuilt airplanes. Some of these accidents were the result of pilots being unprepared for the peculiarities of their aircraft. Being prepared is particularly important for initial flight testing, since lack of preparation often shows up in approach accidents. Many of these accidents also involved poor judgment on the part of the pilots involved, rather than any unique features of their aircraft.

HOMEBUILT ACCIDENT CAUSES PILOT-RELATED



Comparison with Factory Aircraft

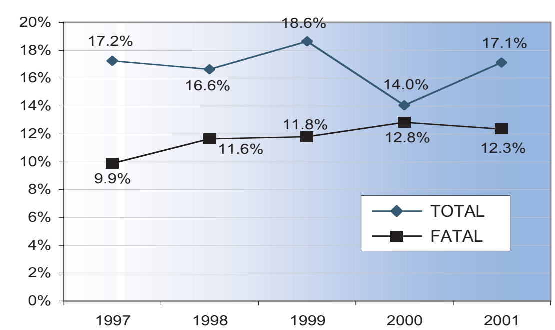
In 2001, homebuilt airplanes were involved in 184 accidents. Of these, 51 fatal accidents resulted in 68 fatalities. Factory-built airplanes in 2001 were involved in 1,310 accidents, of which 247 were fatal with 467 fatalities. Nearly 30 (27.7) percent of homebuilt aircraft accidents resulted in fatalities, and 18.9 percent of the accidents in factory-built airplanes were fatal. As in prior years, it appears that there is a significantly higher risk of a fatality in the event of an accident in a homebuilt aircraft compared to a factory-built machine. The fatality rate for homebuilt aircraft increased seven percent in 2001.

HOMEBUILT ACCIDENT CAUSES

MAJOR CAUSE	ALL ACCIDENTS	FATAL ACCIDENTS
Pilot	60.9%	62.7%
Mechanical/Maintenance	24.5%	15.7%
Other	13.0%	15.7%
Unknown	1.6%	5.9%

Although fatal homebuilt aircraft accidents decreased dramatically in 2000, they increased to 17.1 percent in 2001. Historically, homebuilt aircraft are involved in approximately 16 percent of all fatal accidents.

HOMEBUILT ACCIDENTS '97 - '01



OTHER ACCIDENT FACTORS

Midair Collisions

5 Total/3 Fatal

During 2001, there were five midair collisions involving a total of 10 GA aircraft. Three of these accidents were fatal, resulting in eight deaths. This number is down considerably from the 19 collisions and 32 fatalities in 2000. Midair collisions usually occur on good VFR days, at low altitude, close to airports. In 2001, all of the midair collisions occurred in VMC and during the hours of daylight. ASF has made a major effort in the last two years to remind pilots to see and avoid with special emphasis programs in Florida, Illinois, and California. In these high-density traffic areas the potential for collisions is increased.

A recent Air Safety Foundation study of midair collisions revealed that 82 percent resulted from a faster aircraft overtaking and hitting a slower moving aircraft. Only five percent were from a head-on angle. Eighty percent of the midair collisions that occurred during "normal" flight activities happened within 10 miles of an airport, and 78 percent of the midair collisions that occurred around the traffic pattern happened at nontowered airports. Important strategies for avoiding these mishaps can be found in two of the Foundation's Safety Advisors, *Operations at Nontowered Airports*, online at www.aopa.org/asf/publications/sa08.pdf, and *Collision Avoidance: Strategies and Tactics*, online at www.aopa.org/asf/publications/sa15.pdf.

Fuel Mismanagement

114 Total/7 Fatal

More than twice a week last year, pilots mismanaged the fuel flow to the engine. Fuel-related accidents dropped, however, from 138 in 2000 to 114 in 2001. Fuel exhaustion causes engine stoppage due to the depletion of all available fuel on board the airplane. Fuel starvation results in engine stoppage due to an interruption of the fuel supply to the engine, even though fuel remains available in one or more of the fuel tanks. In 2001, there were 75 accidents caused by fuel exhaustion, of which four were fatal, resulting in seven deaths. Another 30 accidents occurred because of fuel starvation, of which one was fatal, resulting in two fatalities. Another nine accidents were attributed to fuel contamination. The Air Safety Foundation recommends a minimum fuel reserve of at least one hour for both VFR and IFR operations. As with many accident causes, fuel mismanagement is not the sole domain of the inexperienced pilot.

Knowledge of aircraft performance and systems, realistic preflight planning, and diligent monitoring of fuel consumption are essential. For more information see the Foundation's Safety Advisor, *Fuel Awareness*, online at www.aopa.org/asf/publications/sa16.pdf.

Ground Injuries: Off-Airport

10 Total/3 Fatal

3 Fatalities/2 Serious/21 Minor Injuries

There is much concern from the nonflying public about aircraft falling from the sky. The statistics have consistently shown that this is a very low probability event. In 2001, there were three fatalities, two serious injuries, and 21 minor injuries to off-airport bystanders. Twelve of those occurred as a result of a single accident, when the pilot of a PA-34 landed on a highway after losing left-engine power. The number of off-airport injuries in 2001 is up from 2000, when 5 people suffered minor injuries, with no serious or fatal injuries to bystanders.

Seasonal Trends

Higher accident numbers during the spring and summer months are the result of greater flight activity. Certain types of accidents tend to be season-specific due to changes in weather patterns, shorter days during winter months, and increases in certain types of flying such as recreational flying, aerobatic flying, and vacation trips during the spring, summer, and early fall.

In 2001, the highest number of accidents occurred during the summer months of June, July, and August. The total accident counts for those months were 177, 213, and 177, respectively. The lowest number of accidents occurred during December (74).

Alcohol and Drugs

12 Total/10 Fatal

In 2001, 12 accidents showed evidence of the possible involvement of alcohol, illicit drugs, or unapproved prescription or over-the-counter medications. Other factors were also involved in several of these accidents. It is also probable that a number of accidents still under investigation will implicate drugs or alcohol as well as the factors already known. Drug and alcohol misuse as an accident factor continues to be relatively low.

In the midst of negative publicity for airline pilots flying under the influence of alcohol, general aviation continues a downward trend in this category that has been consistent during the past five years. The number of alcohol and drug related accidents was 12 in 2001. This may increase as final reports reach 100 percent. Over the past five years, the average alcohol/drug accident count was 17 per year.

Pilot Incapacitation

4 Total/4 Fatal

Four accidents in 2001 were the result of the pilot becoming incapacitated. This number is up from 2000 when only one accident resulted from pilot incapacitation. This is another area of concern for passengers that is a statistically insignificant number—the odds of a pilot becoming incapacitated on any one flight are one in several million. However, ASF's Pinch-Hitter® course is recommended for all nonflying companions. It is offered live and on video and provides information to enhance enjoyment and understanding as well as emergency pilot information. Visit our Web site, www.aopa.org/asf/schedules/pinch.html.

Propeller Strike Injuries

2 Total/0 Fatal

A line technician and a passenger were struck by turning propellers during 2001. Such accidents are usually either the result of attempts to hand propstart airplanes (other than those designed without starters), or people in the ramp area inadvertently coming into contact with moving propellers. A small number of serious injuries and fatalities from propeller strikes occur annually. Pilots, flight schools, and fixed-base operators must ensure that propeller safety is included in their training and safety programs. View the ASF's Safety Advisor, *Propeller Safety*, online at www.aopa.org/asf/publications/sa06.html.

The number of propeller strike injuries fluctuates each year. During the past five years, 1998 had the most propeller strike accidents, with seven total and four fatal, but the average is two per year.

SUMMARY

There were significant drops in the total accident count and the number of flight hours in 2001, but slight increases in fatal accidents and fatalities. At the same time, trends in the causes of accidents showed little change from previous years. The majority of accidents—73.0 percent of all accidents and 72.8 percent of fatal accidents—were the result of pilot-related causes. This will likely increase a few percentage points as the last reports of 2001 are finalized. Typically, the final numbers attribute about 75 percent of all accidents to pilot-related causes.

The following are some of the most significant factors that influenced GA accidents in 2001:

- **Takeoff and landings accounted for less than five percent of a typical cross-country flight, but they constituted 55.8 percent of accidents for which the emergency phase of flight is known.**

  ASF's latest seminar, "The Ups and Downs of Takeoffs and Landings," and the accompanying safety advisor focus on the primary causes of these accidents. Though most takeoff and landing accidents are not fatal, they make up a disproportionate number of the total accidents when compared to flight time. For more information, view the safety advisor online, www.aopa.org/asf/publications/sa18.pdf, and see the Special Emphasis Topic on page 8.

- **Weather was the most deadly accident cause.** In 2001, it resulted in a fatality rate of 56.5 percent for single-engine fixed gear aircraft, 89.5 percent of retractable-gear aircraft, and 100 percent of multiengine aircraft.

  While complex aircraft fly longer distances and encounter more weather, single-engine fixed-gear aircraft continue to be involved in weather accidents. One factor is continued VFR flight into IMC. Accidents that result from this type of flight have a fatality rate of 90 percent. For more information on spatial disorientation, view ASF's safety advisor, *Spatial Disorientation: Confusion That Kills*, online at www.aopa.org/asf/publications/sa17.pdf.

- **IMC flight at night was one of the most deadly accident environments.** While 30.4 percent of all night accidents were fatal, adding flight in IMC at night doubled the chances of a fatality (60.0 percent). IMC alone had a fatality rate of 58.5 percent. This doesn't mean that pilots should avoid IMC night flight. It means they should be aware of, and compensate for, the additional risk.

- **Maneuvering flight accidents accounted for 30.4 percent of all fatal pilot-related accidents.** Many of these accidents involved buzzing or other low-level flight. While additional training may reduce the number of accidents that result from other factors, many maneuvering accidents are caused by a lack of good judgment.

- **Personal flight comprises 48.1 percent of GA activity, but these flights accounted for 68.3 percent of all pilot-related accidents and 70.0 percent of all fatal accidents.**

APPENDIX

What is General Aviation?

Although GA is typically characterized by recreational flying, this important segment of aviation includes much more. Besides providing personal, business, and freight transportation, GA supports diverse activities such as law enforcement, forest fire fighting, air ambulance, logging, fish and wildlife spotting, and other vital services. For a breakdown of GA activities and their accident statistics, see "Specific Operations" on page 5.

What Does General Aviation Fly?

General aviation aircraft are as varied as their pilots and the types of operations flown. The number of GA aircraft, sorted by category and class, registered in 1999 (the most recent year available from the FAA) to air taxi operators and GA is shown below:

WHAT DOES GENERAL AVIATION FLY?

	Air Taxi	General Aviation
Piston single-engine	652	150,081
Piston multiengine	1,607	19,469
Turboprop single-engine	75	943
Turboprop multiengine	860	3,802
Turbojet	496	6,625
Helicopter	746	6,701
Experimental	30	20,493
Total	4,466	208,114

The following aircraft categories and classes are included in this report:

- Piston single-engine
- Piston multiengine
- Turboprop single-engine
- Turboprop multiengine
- Experimental
- Homebuilt

The following aircraft categories and classes are not included in this report:*

- Turbojets
- Part 121 airline operations
- Part 135 charter operations
- Military operations
- Aircraft weighing more than 12,500 pounds
- Helicopters
- Gliders
- Balloons

**Note: Midair collisions involving a general aviation fixed-wing aircraft and another aircraft category or commercial/military operation will be included.*

Interpreting Aviation Accident Statistics

What is the accident rate?

Meaningful comparisons are based on equal exposure to risk. However, this alone does not determine total risk. Experience, proficiency, equipment, and flight conditions all have a safety impact. To compare different airplanes, pilots, types of operations, etc., we must first "level the playing field" in terms of

exposure to risk. The most common way to do this is to compare accidents per 100,000 flight hours. GA flight hours are estimated using data from an annual activity survey conducted by the FAA. Whether this accurately reports the total hours has been debated for years but even though the rate may not be accurate, *the relationships between accident categories will probably not change significantly with more accurate exposure data*. Landing accidents will still account for the lion's share of minor injury mishaps while weather and maneuvering flight will still claim the most lives.

Accident investigators and safety researchers determine the probability that a given accident was the result of a particular cause or sequence of events. This report shows the percentage of accidents attributed to particular causes and the percentage of accident sequences that began in a particular phase of flight. Thus we can identify and concentrate on accidents that carry the greatest risk.

Sequence of Events and Accident Causality

The Boeing Commercial Airplane Company, studying accidents of transport-category aircraft, found that most result from a sequence of events rather than a single catastrophic event. Their research identified as many as 20 events in a single flight that directly influenced the accident. The NTSB uses a similar method to break down each accident into "occurrences."

Our objective is to prevent future accidents by learning from the past. This report identifies the phase of flight in which the sequence of events began, often referred to as the "first occurrence." Compensating for hazards associated with the "first occurrence" or breaking a subsequent link in the chain of events should prevent the accident.

Breaking News

Shortly before this report went to print, the NTSB released the final accident report about the King Air that crashed in Colorado in 2001, carrying members of the Oklahoma State University (OSU) basketball team. All ten people aboard the aircraft were killed.

While in IMC, the King Air suffered an AC electrical power failure. The probable cause of the accident was the pilot's spatial disorientation, which resulted from failure to maintain aircraft control with the remaining flight instruments. Available instruments included the airspeed indicator, turn and slip indicators on both sides of the aircraft, and additionally an altimeter and attitude indicator on the co-pilot's side.

Using CRM (cockpit resource management) when trouble-shooting a problem in flight is invaluable. It's also essential for all pilots, especially those that are instrument-rated, to practice partial panel flying so they are prepared to cope with instrument failure if it should occur in IMC.

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See page:

NTSB DEFINITIONS

Accident/Incident (NTSB part 830)

The following definitions of terms used in this report have been extracted from NTSB Part 830 of the Federal Aviation Regulations. It is included in most commercially available FAR/AIM digests and should be referenced for detailed information.

Aircraft Accident

Aircraft accident—An occurrence incidental to flight in which, "as a result of the operation of an aircraft, any person (occupant or non-occupant) receives fatal or serious injury or any aircraft receives substantial damage."

- **A fatal injury is one that results in death within 30 days of the accident.**

- **A serious injury is one that:**

(1) Requires hospitalization for more than 48 hours, commencing within seven 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) Involves lacerations that cause severe hemorrhages, nerve, muscle, or tendon damage;

(4) Involves injury to any internal organ; or

(5) Involves second- or third-degree burns, or any burns affecting more than five percent of body surface.

- **A minor injury is one that does not qualify as fatal or serious.**

- **Destroyed means that an aircraft was demolished beyond economical repair, i.e., substantially damaged to the extent that it would be impracticable to rebuild it and return it to an airworthy condition.** (This may not coincide with the definition of "total loss" for insurance purposes. Because of the variability of insurance limits carried and such additional factors as time on engines and propellers, and aircraft condition before an accident, an aircraft may be "totaled" even though it is not considered "destroyed" for NTSB accident-reporting purposes.)

- **Substantial damage:**
  (As with "destroyed" above, the definition of "substantial" for accident-reporting purposes does not necessarily correlate with "substantial" in terms of financial loss. Contrary to popular misconception, there is no dollar value that defines "substantial damage." Because of the high cost of many repairs, large sums may be spent to repair damage resulting from incidents that do not meet the NTSB definition of "substantial damage.")

(1) Except as provided below, substantial damage means damage or structural failure that adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected part.

(2) Engine failure, damage limited to an engine,

bent fairings or cowling, dented skin, small puncture holes in the skin or fabric, ground damage to rotor or propeller blades, damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wing tips are not considered "substantial damage."

- **Minor damage is any damage that does not qualify as substantial, such as that in item (2) under substantial damage.**

Kind of Flying

The purpose for which an aircraft is being operated at the time of an accident:

On-Demand Air Taxi — Revenue flights, conducted by commercial air carriers operating under 14 CFR 135, that are not operated in regular scheduled service, such as charter flights, and all non-revenue flights incident to such flights.

Personal — Flying by individuals in their own or rented aircraft for pleasure or personal transportation not in furtherance of their occupation or company business. This category includes practice flying (for the purpose of increasing or maintaining proficiency) not performed under supervision of an accredited instructor and not part of an approved flight training program.

Business — The use of aircraft by pilots (not receiving direct salary or compensation for piloting) in connection with their occupation or in the furtherance of a private business.

Instruction — Flying accomplished in supervised training under the direction of an accredited instructor.

Executive/Corporate — The use of aircraft owned or leased, and operated by a corporate or business firm for the transportation of personnel or cargo in furtherance of the corporation's or firm's business, and which are flown by professional pilots receiving a direct salary or compensation for piloting.

Aerial Application — The operation of aircraft for the purpose of dispensing any substance for plant nourishment, soil treatment, propagation of plant life, pest control, or fire control, including flying to and from the application site.

Aerial Observation — The operation of an aircraft for the purpose of pipeline/power line patrol, land and animal surveys, etc. This does not include traffic observation (electronic newsgathering) or sightseeing.

Other Work Use — The operation of an aircraft for the purpose of aerial photography, banner/glider towing, parachuting, demonstration or test flying, racing, aerobatics, etc.

Public Use — Any operation of an aircraft by any federal, state, or local entity.

Ferry — A non-revenue flight for the purpose of (1) returning an aircraft to base, (2) delivering an aircraft from one location to another, or (3) moving an aircraft to and from a maintenance base. Ferry flights, under certain terms, may be conducted under terms of a special flight permit.

Positioning — Positioning of the aircraft without the purpose of revenue.

Other — Any flight that does not meet the criteria of any of the above.

Unknown — A flight whose purpose is not known.

Phase of Operation

The phase of the flight or operation is the particular phase of flight in which the first occurrence or circumstance occurred:

Standing — From the time the first person boards the aircraft for the purpose of flight until the aircraft taxies under its own power. Also, from the time the aircraft comes to its final deplaning location until all persons deplane. Includes preflight, starting engine, parked-engine operating, parked-engine not operating, and idling rotors.

Taxi — From the time the aircraft first taxies under its own power until power is applied for takeoff. Also, when the aircraft completes its landing ground run until it parks at the spot of engine shutoff. Includes rotorcraft aerial taxi. Includes taxi to takeoff and taxi from landing.

Takeoff — From the time the power is applied for takeoff up to and including the first airborne power reduction, or until reaching VFR traffic pattern altitude, whichever occurs first. Includes ground run, initial climb, and rejected takeoff.

Climb — From the time of initial power reduction (or reaching VFR traffic pattern altitude) until the aircraft levels off at its cruise altitude. Also includes en route climbs.

Cruise — From the time of level off at cruise altitude to the beginning of the descent.

Descent — From the beginning of the descent from cruise altitude to the IAF, FAF, outer marker, or VFR pattern entry, whichever occurs first. Also includes en route descents, emergency descent, auto-rotation descent, and uncontrolled descent.

Approach — From the time the descent ends (either IAF, FAF, outer marker, or VFR pattern entry) until the aircraft reaches the MAP (IMC) or the runway threshold (VMC). Includes missed approach (IMC) and go-around (VMC).

Landing — From either the MAP (IMC) or the runway threshold (VMC) through touchdown or after touchdown off an airport, until the aircraft completes its ground run. Includes rotorcraft run-on, power-on, and auto-rotation landings. Also includes aborted landing where touchdown has occurred and landing is rejected.

Maneuvering — Includes the following: Aerobatics, low pass, buzzing, pull-up, aerial application maneuver, turn to reverse direction (box-canyon-type maneuver), or engine failure after takeoff and pilot tries to return to runway.

Other — Any phase that does not meet the criteria of any of the above. Examples are practice single-engine airwork, basic airwork, external load operations, etc.

Unknown — The phase of flight could not be determined.

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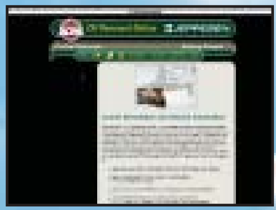
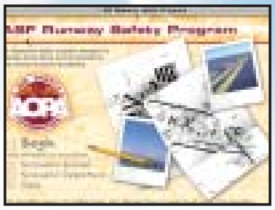


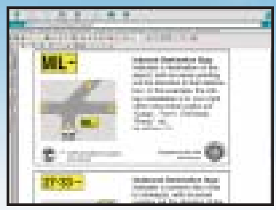
Runway Safety

Learn how to avoid runway incursions.



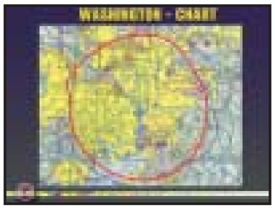
Flash Cards

Quiz yourself or your students about airport signs and markings.



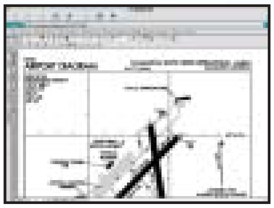
Operation Airspace

View this presentation before you fly to learn about special airspace, TFR's, and interception procedures.



Airport Taxi Diagrams

Become familiar with the airport layout before you fly there.

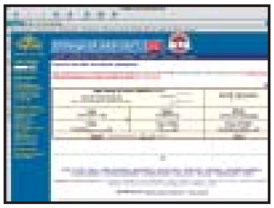


IFR Adventure

Learn about IFR regulations with this interactive program.

ASF Accident Database

Search this database of general aviation accidents.



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