A look back at 10 years of accidents and statistics

by Gordon Gilbert

Over the last 10 years business aviation safety has improved immensely. During the same period, the entire aviation industry has been subject to a number of equipment, avionics and procedural requirements designed to reduce accidents.

The question is, has safety improved because of these requirements or have they been a financial, maintenance and procedural drain not justified by the elimination or reduction of the accidents they were intended to prevent? As for most complex things in life, the answers are not always clear and depend in many cases on the specifics of the situation.

One thing is clear: over the last decade, nearly all segments of business aviation flying have become safer *(see chart on page 29)*. Corporate aviation (defined by safety analyst Robert E. Breiling Associates as all aircraft types flown for business by salaried crews) had its safest year in 2003 in terms of accident rates (accidents per 100,000 flight hours) and its safety record was better than the scheduled airlines' in every year during the last decade.

However, as the chart on page 29 also shows, the rate of accidents involving turboprops has improved little during the same period, with accidents involving specifically the Cessna Caravan and the Mitsubishi MU-2 having a major effect on the statistics. As you will read later in this article, both models are now getting special attention from safety investigators and the FAA in an effort to stem their accident involvement.

Throughout the article are charts intended to provide additional background statistics to assist the reader in evaluating the justification for and the usefulness of equipment and procedures that have been mandated over the last 10 years.

In fact, that is the purpose of this article–to relate the accidents of some specific aircraft models, accidents in general and types of accidents to equipment and procedural requirements enacted to help prevent future accidents.

Simultaneously, this article will also show how accidents over the last 10 years have led to systems and procedures designed to provide more data for investigators to better determine the probable cause of accidents, as well as finding accident locations and possible survivors more quickly. A case in point is the recent adoption of emergency locator transmitter requirements.

ELT Equipment

The 2004 mandate for emergency locator transmitters (ELTs) on transport aircraft resulted from an act of Congress in response to a single fatal crash of a Learjet 35 in 1996 in IMC on approach to Lebanon Municipal Airport in New Hampshire. Searchers gave up trying to locate the wreckage, which was accidentally found two years after the crash.

Starting July 1, 2008, all airplanes operating internationally will need to carry at least one emergency locator transmitter, according to a proposed standard from the International Civil Aviation Organization (ICAO). The proposal, if enacted, also states that beginning July 1, 2008, "automatic" (406-MHz) ELTs must be carried on all international operations of both commercial aircraft authorized to seat 19 passengers or fewer and private aircraft with any number of passenger seats that obtain their certificate of airworthiness *after* that date.

International operations of commercial airplanes authorized to carry more than 19 passengers and that obtain their certificates of airworthiness after July 1, 2008, would have to be equipped with at least two ELTs, one of which must be a 406-MHz unit.

Current ICAO standards call for ELTs only on airplanes operated on extended overwater flights and on flights over designated land areas where search-and-rescue operations are a particular challenge.

Congress (pushed by the lobbying efforts of then avionics maker Sundstrand) was also responsible for the 1974 mandate for airlines to equip with ground proximity warning systems (GPWS). But controlled flight into terrain (CFIT) accidents continued until the advent of enhanced GPWS in 1996.

The technological upgrade in ground proximity warning devices came after an American Airlines 757 crashed in Cali, Colombia, in 1995. It hit a mountaintop on its approach to the airport, killing 160 of the 164 on board. Investigators believed that a more sophisticated warning device would have given the pilots an earlier alert, adding a few seconds for them to take actions to avoid the crash.

There have been no CFIT crashes by airplanes equipped with enhanced systems–either the enhanced GPWS from Honeywell, or terrain awareness and warning systems (TAWS) from several other manufacturers.

That statistic, combined with a barrage of recommendations over the years from the NTSB, prompted the FAA in 2001 to extend the requirement for TAWS beyond Part 121 airline transports to all FAR Part 91 and 135 turbine aircraft configured for six or more passenger seats.

The mandate became effective for new airplanes manufactured after March 29, 2002, and on March 29, 2005, for airplanes built before March 29, 2002. Those compliance dates proved ironic for the crew of a 1980 Learjet 35 that crashed into a mountain on Oct. 24, 2004. According to NTSB investigators, the air-ambulance flight crashed into Otay Mountain at 12:30 a.m., about two minutes after taking off from Brown Field near San Diego. The crew took off under VFR intending to pick up their IFR clearance in the air. The two pilots and three aeromedical staff were killed. Said the Safety Board in its May 23 final report: "The airplane was scheduled to have a terrain awareness and warning system (TAWS) installed in January 2005"–about three months before the March 29 compliance deadline.

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The nonfatal results of a Hawker 800XP midair with a sailplane in August: a case where safety equipment–in this instance a transponder in the glider–was not switched on, thus preventing the jet's TCAS from doing its job.

Helicopter Safety Record

TAWS has not provided the same benefits for the rotorcraft sector. Currently, there are no requirements for TAWS on turbine helicopters, but that could change before the end of the decade. In June, the FAA asked the RTCA to develop specifications for a helicopter TAWS.

An RTCA review of helicopter accident data from 1994 thru 2004 "indicates that controlled flight into terrain (CFIT) is a major contributor to these accidents," said the organization. "Development of helicopter TAWS performance standards to reduce the accidents resulting from CFIT is necessary." To accomplish this, RTCA Special Committee (SC) 212 is tasked with developing by next March helicopter TAWS protection scenarios for VFR and IFR helicopters and, by March 2008, minimum operational performance standards for helicopter TAWS.

The first FAA/industry public meeting on SC 212 was held late last month.

TCAS and Mode-S

While TAWS addresses the issue of airplanes flying into terrain, traffic alert and collision avoidance systems (TCAS) are intended to help prevent airplanes from hitting each other–both on the ground and in the air. Since Jan. 1, 1996, TCAS has been required on Part 135 turbine airplanes configured for 10 or more passenger seats. Part 135 operators also have the option of equipping with the more sophisticated TCAS II (required in larger aircraft).

Unlike TAWS, TCAS is not required in most Part 91 turbine aircraft. But, starting Jan. 1, 2005, turbine airplanes with an mtow exceeding 12,500 pounds or having between 19 and 30 passenger seats must have TCAS II or ACAS (TCAS II with Change 7). Since March 31, 2005, upgraded mode-S elementary surveillance transponders have been required for operations in European Civil Aviation Conference airspace.

Meanwhile, the FAA has withdrawn its decade-old proposal to rescind its requirement for mode-S transponders and adopted a new rule that will end the hundreds of mode-S installation exemptions currently in effect.

As a consequence of the proposal's being withdrawn, beginning next March 1, Part 121 and 135 operators will no longer be exempted to fly without a mode-S transponder. No new exemptions will be granted after that date, though mode-A or -C transponders can continue to be used until they can no longer be repaired, after which they would have to be replaced with a permanent mode-S unit.

When the FAA in 1996 proposed to rescind the mandate to install mode-S transponders (except on aircraft equipped with TCAS II), the agency was inundated with requests for exemptions, as operators anticipated the mode-S requirement would be withdrawn.

Some safety experts believe that the potential for midair collisions is raised in VMC (conditions when most midairs occur) because there is no requirement for transponders on aircraft operating VFR outside Class A, B or C airspace. To date, the NTSB and FAA have not addressed this. Maybe they will after they complete their investigation into last month's (nonfatal) midair between a VFR glider and an IFR Hawker 800XP. At press time, though, there was no official word that absence of a transponder was a factor in the accident.

One of the next major upgrades in the ATC system that promises to improve safety, as well as increase operational efficiency, is ADS-B. Although it will be several years before its use is widespread across the National Airspace System, some limited use so far appears to be proving its

value. In these limited evaluations, aircraft equipped with ADS-B have had a lower accident rate than non-equipped aircraft, according to the FAA.

From 2000 through 2005, the rate of accidents for ADS-B-equipped aircraft dropped 49 percent, the agency said. These statistics come mostly from the experience of operators in Alaska, the only region in which ADS-B is used in the U.S. Soon, however, the technology will be approved for use in the Gulf of Mexico, primarily by offshore helicopter operators.

More Regs Do Not Always Mean More Safety

It might be assumed that the stiffer the operational requirements, the safer the operations. There is some evidence that does support that assumption. For example, accident statistics indicate that Part 121 air carriers have the lowest accident rate of all segments, but that is not the case when accidents for business jets flown under the more restrictive Part 135 are compared with accidents befalling business jets flown by salaried pilots under Part 91 (*see chart on this page*).

Why is that? In many respects the rates of exposure at the most dangerous times–takeoff and landing–are more frequent for Part 135 operators than for Part 91 operators. However, the landing and takeoff frequency for air taxis is similar to that for fractionals, yet the latter have fewer incidents and accidents.

For example, although the safety record of fractional operators between 1996 and 2005 (and so far this year) is exemplary, the FAA saw fit to require fractional operations to fly under essentially the same safety requirements as Part 135 or meet an entirely new set of FARs–Part 91, Subpart K.

Has the accident rate changed significantly since Subpart K went into effect in 2003? Not really. To date, there still has been no fatal accident involving a fractional, and the sector's accident rate (incidents per 100,000 hours) last year was the best of all segments of turbine-powered business aviation (*see chart on this page*).

Subpart K has served generally to equalize operational requirements for fractionals with the limits of Part 135–such as runway distance, look-see approaches, duty time and weather-reporting requirements. Previously, fractional operators had been permitted to operate under the less stringent requirements of Part 91.

In addition to making fractional operators answer to a higher authority–which might or might not reduce accidents in this segment–the rule change did accomplish one thing Part 135 operators had been craving that had little to do with safety. Traditional charter operators believe Subpart K leveled the economic playing field. Before Subpart K, air-taxi operators groused about alleged unfair competition for customers because fractional operators had less stringent operational restrictions.

Even the toughest rules can sometimes be difficult to enforce when rulemakers are often relying on aircraft owners and operators to follow the honor system. For example, investigations into several high-profile air-taxi accidents in the last few years have revealed confusion for safety investigators and regulatory officials trying to pinpoint who exactly was the entity in command and control of the flight, as well as discovering FAR and DOT violations by non-certified businesses ostensibly holding themselves out to be operators.

As a result of alleged regulatory violations, the FAA early this year launched a series of so-called "operational control workshops" on its proposed guidance policy on air carrier operational control, wet leasing of charter aircraft, charter broker relationships and the use of "fictitious" business names, known as DBAs (doing business as).

FAA lawyers and flight standards specialists have met with charter companies to discuss these issues, as well as the agency's planned new charter Operations Specifications A008, which will replace Notice 8400.83, published last June. These issues surfaced after the Darby Aviation/Platinum Jet Challenger 600 accident at Teterboro, N.J., in February last year and following other FAA enforcement actions against companies flying allegedly illegal charters.

Addressing Icing Accidents

NTSB recommendations and FAA rulemaking often result from accident and incident investigations that indicate a trend or commonality–either by the circumstances of the accident, operational certificate or type of aircraft. General aviation turbine airplanes over the last decade presented some highly visible examples, such as the number of accidents involving Cessna Caravans and Mitsubishi MU-2s, particularly in icing conditions.

In the case of the MU-2, there have been two major FAA events in the past decade–a special safety review that got under way last year to address all aspects of flying the twin turboprop and a 2003 operational AD to address specifically MU-2 icing accidents.

More stringent training requirements for MU-2 pilots will result from the review of the turboprop twin. For Part 135 operators, the additional requirements will become part of their FAA-approved training syllabus. For Part 91 operators, which cover the vast majority of MU-2s, a special FAR will be promulgated through the usual rulemaking process. The safety review is still under way so its results cannot be evaluated yet, but the 2003 operational AD is a different story.

That directive (AD 2003-22-07) was unusual because instead of requiring an aircraft repair or modification, it is used to mandate pilot training–specifically, MU-2 pilots must receive icing training regularly. Since that AD came out, there hasn't been a single MU-2 icing accident. However, non-icing MU-2 accidents continue to occur and perhaps the safety review, once put into action, will help stem these mishaps.

The FAA might take a slightly different tack to reduce icing accidents in the Caravan turboprop single. Pilot training is expected to become a part of the FAA-approved airplane flight manual (as it is for the MU-2), but at press time an AD was not in the works. Caravan charter operator Linear Air in late August told **AIN** that its industry contacts mentioned not only a mandatory Cessna icing training program but also that Cessna has conducted Caravan icing tests and will release new performance charts and procedures before year-end.

Icing accidents in the U.S. and abroad in recent years involving the Challenger also led to an AD. Although the accidents were attributed to the flight crew's failure to ensure that the jet's wings were completely free of ice or frost before takeoff, the NTSB concluded that "for many years we have been dealing with the fact" that aircraft such as the Challenger with so-called "hard wings [that is, those without leading-edge devices] have been found to be more susceptible to the effects of icing."

The directive (AD 2005-04-07) requires that operators of all U.S.-registered Challenger 600s, 601s and 604s and Canadair Regional Jets incorporate flight manual revisions to ensure that before takeoff the "wing leading edge and upper wing surface are completely free of ice, frost, snow or slush." In addition to a visual inspection, the ADs require a "tactile means" to identify potential contamination. The FAA directive followed an identical AD from Transport Canada.

As a result of its investigation of the Nov. 28, 2004, fatal takeoff accident involving a Challenger 601 in Montrose, Colo., the NTSB in December 2004 issued a special alert advising pilots of all aircraft about the detection and effects of ice accumulation on the wing.

In the aftermath of four dual flameouts involving P&WC JT15D-powered Beechjets, the NTSB late last month issued an urgent recommendation to help prevent further incidents on Beechjets and a broader recommendation calling on the FAA to work with engine and airplane OEMs to develop an ice detector for new engines, as well as for retrofit.

Overruns Abundant

Turbine business aircraft accidents involving icing, loss of control and botched instrument approaches in IMC have caused the most loss of life over the past 10 years, according to data provided by safety analyst Robert E. Breiling of Boca Raton, Fla.

But one of the most numerous mishaps for private and commercial aircraft is the landing or aborted-takeoff overrun. There were 44 runway overruns last year involving transport aircraft, according to the International Federation of Air Line Pilots' Associations. The data served to underscore the group's crusade to get runway-end safety areas or arrester beds on runways at all major airports worldwide.

Although there are many overruns that are not investigated by the NTSB because they lack substantial damage or serious injury, there have been some spectacular ones that have caused fatalities and resulted in new requirements for operators of both aircraft and airports.

Failure of ground spoilers to deploy caused at least six nonfatal overruns

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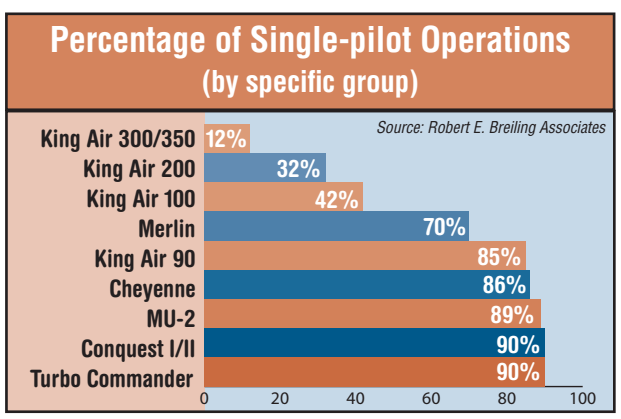
Accident Rate Comparisons (U.S. Fleet)
Accidents per 100,000 hours

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Corporate aviation[1]	0.14	0.23	0.09	0.23	0.13	0.11	0.12	0.03	0.09	0.08
Fractional jets	0	0	0	0.66	0.26	0	0.52	0.14	0.53	0.14
Scheduled airlines	0.25	0.29	0.27	0.29	0.29	0.22	0.21	0.29	0.12	0.17
FAR 91 business jets[2]	0.23	0.33	0.32	0.37	0.31	0.24	0.34	0	0.34	0.32
FAR 135 business jets	0.55	0.81	0.79	0.56	0.31	0.89	0.54	0.77	0.77	0.47
Business aviation[3]	1.7	1.4	1.2	1.4	1.28	1.1	1.08	0.95	0.91	0.73
Non-scheduled airlines	0.78	0.77	1.01	1.28	0.85	0.76	1.05	0.52	1.22	0.94
FAR 91 & 135 business turboprops	1.27	1.76	1.24	0.98	1.48	1.49	1.79	2.23	1.59	1.61
All air taxis	4.4	2.7	2.1	2.3	2.1	2.4	2.1	2.6	2.1	2.0
Regional airlines[4]	0.41	1.63	2.26	3.79	3.25	2.33	2.56	0.63	1.52	2.01
General aviation	7.7	7.2	7.4	6.5	6.6	6.8	6.7	6.7	6.4	6.8

1. All aircraft types flown by salaried crews for business purposes.
2. Business jets professionally and non-professionally flown.
3. All aircraft types, owner flown.
4. Regional airlines were re-classified in 1997 by the FAA causing rate increase.

Source: Robert E. Breiling Associates

Historically, the major scheduled airlines have had the fewest number of serious accidents and the lowest rate (the number of accidents per 100,000 flight hours), but in recent years corporate aviation has frequently surpassed the airlines. For example, the statistics here show that last year corporate aviation had the lowest accident rate, followed by its fractional segment, with the major airlines in third place. Air-taxi operations of both turbine and piston airplanes were ninth on the list, followed by regional airlines. Also in keeping with the trend, general aviation as a single group had the highest accident rate when compared with the other 10 segments shown here.



Except for the King Air 100, 200 and 300, the majority of operations of other Part 23 turboprop twins are flown single pilot, and they have more accidents than those flown by two pilots. A similar analysis is not available for operations of single-pilot jets versus two-pilot jets.

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involving early models of the Raytheon Premier I in the period between 2002 and 2004. These accidents led to an AD requiring Premier I operators to temporarily replace existing landing-distance and landing-weight charts in the AFM with charts that reflect the increased landing distance without the lift-dump spoilers deployed. Since Raytheon Aircraft incorporated a fix, there have been no reported overruns involving Premiers.

The February 2005 crash of a Challenger 600 after it overran a runway at Teterboro Airport in New Jersey got the ball rolling on the government's investigation into improper charter operations. And the overrun last December of a Southwest 737 at Chicago Midway Airport led to a controversial new requirement for commercial and Part 91K operators when computing landing distance; the so-called 15-percent rule, which was scheduled to go into effect before year-end.

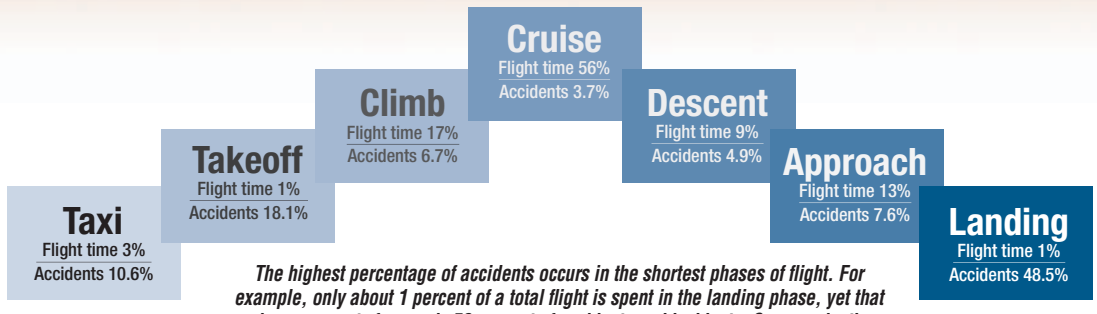
However, compliance with the 15-percent requirement has been delayed since some business aviation trade groups challenged the notice as being ill-conceived and illegal because it didn't go through the notice of proposed rulemaking process, complete with a public comment period.

Overruns are included in the few accidents involving fractional operators, such as the May 2, 2002, overrun of a NetJets Citation in Leakey, Texas. The airplane touched down about 2,100 feet beyond the landing threshold, leaving just 1,875 feet in which to stop. The two crew and four passengers escaped injury, but the jet was destroyed in the post-crash fire, the only accident to date in which a fractional aircraft was completely destroyed.

The NTSB in June released the probable cause, saying the "pilots failed to land the aircraft at the proper touchdown point to allow adequate stopping distance."

This and other overruns have led the FAA to take action to help prevent damage and injuries from overruns. Part 139 (certified) airports are now mandated to construct 1,000-foot safety areas or barriers at the ends of their main runways, where possible. Some airports have had to shorten the length of runways to accommodate safety areas. There is no requirement for safety overruns or barriers at most general aviation airports.

Engineered Materials Arresting Systems (EMAS)–designed for runways that do not have enough space for 1,000-foot-long safety areas–are being installed at several airline and non-airline airports. To date, EMAS has been credited with preventing injury and aircraft damage in four incidents, including a Falcon 900 overrun on July 17 at Greenville Downtown Airport, S.C.



The highest percentage of accidents occurs in the shortest phases of flight. For example, only about 1 percent of a total flight is spent in the landing phase, yet that phase accounts for nearly 50 percent of accidents and incidents. Conversely, the lowest number of accidents and incidents (less than 4 percent) happen during cruise, the longest phase of a flight.

Source: Robert E. Breiling Associates

What's Old Is New Again

Since its inception in 1967, the NTSB has investigated more than 124,000 aviation accidents and issued more than 5,000 aviation recommendations (mostly to the FAA). Since 1990 the Safety Board has highlighted its most urgent issues on its "Most Wanted" list of safety improvements.

Keep in mind that the Safety Board has no regulatory authority and the FAA does not have to adopt its recommendations. Nevertheless, the agency has acted favorably on more than 84 percent of them. Still, some in Congress don't believe that's a high enough percentage and have introduced an amendment to the NTSB reauthorization bill "to make the FAA explain why the Safety Board's Most Wanted recommendations have not been implemented."

Of the remaining 16 percent of recommendations not enacted, many were initially published 10 or more years ago and the NTSB has reiterated several of them as new accident investigations raise old issues that have not been resolved to the Safety Board's satisfaction.

There are currently two recommendations that have been on the Most Wanted list since its inception nearly 17 years ago: stopping runway/taxiway incursions and reducing dangers to aircraft from airframe icing. Both of these items have been restated several times over the years because of continuing accidents or incidents involving these factors.

According to an NTSB statement late last year, "Although the FAA completed action on a number of objectives to make ground operation of aircraft safer, these incidents continue to occur with alarming frequency."

Said the NTSB recently, "The FAA's anti-incursion system provides warnings to air traffic controllers but not to flight crews, a fact that reduces the amount of time that pilots have to react to an impending incursion."

The NTSB's recommendations and statements not withstanding, the number of incursions has been declining steadily, according to FAA figures. Agency statistics show that there were 383 incursions in 2001 and 324 last year.

However, the NTSB believes these figures are incorrect because it claims not all incidents are being reported, and some are being reported by ATC as "operational errors."

In 1997, as a direct result of the crash of TWA Flight 800 a year earlier, the NTSB added to its Most Wanted list preventing explosive mixtures in transport aircraft fuel tanks. The Safety Board currently describes the FAA's action as "acceptable, progressing slowly."

Most Wanted recommendations that the FAA responded to in a manner acceptable to the NTSB in the last 10 years include reducing accidents from wake vortex turbulence (added in 1995, removed in 1998), improving commuter airline safety (added in 1995, removed in 1996) and pilot background checks (added in 1996, removed in 1998).

CVRs Not Good Enough?

Flight data recorders (FDRs) have gotten better–both in the quality of their structure and the quantity of their data–as the result of accident investigations in the period from 1996 to 2005 and the constant prodding by the NTSB. The Safety Board is also disappointed that cockpit voice recorders (CVRs) are not required in all turbine airplanes and is unsatisfied with the quality of those that are installed.

In several business aviation accidents the Safety Board expressed its frustration about the fact that a CVR was either not required or, if it was installed, failed to operate properly. For example, during its investigation into a May 9, 2005, Sabreliner accident in which a birdstrike was implicated, the Safety Board said the CVR recording "was of such poor quality it was useless for accident investigation purposes."

The NTSB decried the lack of recorders on a Learjet that was involved in a fatal crash on Dec. 23, 2003. The airplane was not equipped with a CVR or FDR and federal regulations did not require them. "This is another example of where a recording device–whether a voice recorder, data recorder or a video recorder–would have greatly helped investigators determine what happened," the Safety Board said. "An opportunity to improve aviation safety was lost here."

The NTSB specifically refers to lack of possibly important data because the CVRs weren't working in the investigations of the Oct. 9, 1999, incident in which an Amway Falcon 900B experienced a series of serious pitch oscillations and the May 21, 2000, fatal accident of an Executive Airlines BAe Jetstream 31 that apparently suffered fuel starvation.

The NTSB also believes that current requirements for retaining information recorded on a CVR do not go far enough in ensuring that pertinent data is available after reportable accidents or incidents. Because of this longstanding concern, the Safety Board in 2002 asked the FAA to require operators to deactivate the CVR immediately after an incident or accident and to require a functional check of the device before each flight of the day.

In February last year, partly in response to the NTSB's urgings, the FAA published a notice of proposed rulemaking to improve both the quality and quantity of information from CVRs and FDRs. The rule, still in the proposed

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Accident Exposure–Single Pilot vs Dual Pilot
U.S. business turboprop aircraft–all operations
10-year period (1996-2005)

	Single pilot	Dual pilot	Total
Fleet size	32,333	19,306	51,639
Number of accidents	281	108	389
Percent of accidents	70.5%	29.5%	100%
Percent of fleets involved in accidents	0.87%	0.56%	0.75%
Percent of fleet vs crew size	63%	37%	100%
Ratio of exposure	1.55	1	–

Source: Robert E. Breiling Associates

According to Breiling's accident statistics for multi-engine business turboprops between 1996 and 2005, an aircraft crewed by one pilot had 1.6 times the probability of being involved in an accident as an aircraft flown by a two-pilot crew. Last year, 80 percent of turboprop-twin accidents involved single-pilot operations, but only 63 percent of the turboprop fleet was flown single pilot.

Business Jet Accidents
Crew-and-passengers vs crew-only

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total	Percent
Total No. of Accidents	10	16	16	24	17	22	21	16	22	20	184	100
Accidents w/pax on board	7	8	12	18	10	11	8	9	14	16	113	61.4
Accidents w/crew only	3	8	4	6	7	11	13	7	8	4	71	38.6

Source: Robert E. Breiling Associates

Comparing crew-only business jet flights (such as deadheading and positioning) with passenger-carrying business jet flights over the 10-year period 1996 through 2005, Breiling's research shows that passenger-carrying flights were involved in about 61 percent of the accidents, while around 10 percent crew-only flights were involved in approximately 39 percent of the accidents. This means, according to Breiling, crew-only flights have some 5.5 times the potential of being involved in an accident as passenger-carrying flights.

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stage, has been criticized by NBAA and the National Air Transportation Association.

The associations claim the agency failed to conduct even a cursory review of the feasibility and economic impact of the rule for aircraft operated under Parts 135 and 91. "This oversight has resulted in substantial flaws in the FAA estimates of time to complete CVR retrofits, the overall costs of the upgrades and the number of small businesses impacted."

Six years ago, the Board recommended that the FAA require CVRs, in lieu of flight data recorders, in smaller turbine-powered aircraft frequently employed in Part 135 operations. And about three years ago, the NTSB added to its Most Wanted list a requirement for cockpit video recorders on all transport aircraft. To date those recommendations carry an "unacceptable response."

Under Part 135, CVRs are required on turbine-powered airplanes or helicopters with a passenger configuration of six or more and for which two pilots are required. Under Part 91, CVRs are mandatory on all transport-category airplanes regardless of their number of seats. That leaves a new category of airplanes off the hook–very light jets operated under Part 91 or Part 135.

While this article has shown that some recent rules, procedures and systems have helped to prevent accidents, the NTSB for many years has determined that the flight crew is at fault in more than 75 percent of all accidents. This figure seems to indicate that pilots always have the ability to ignore, overcome or bypass systems, rules and procedures designed to prevent accidents. As long as pilots make the final decision in the cockpit, it is unlikely that there will ever be a system, rule or procedure that is 100-percent foolproof. ❑

FINDING ACCIDENT STATISTICS ONLINE

Here are Web links to several sources of accident statistics that are typically updated daily. In the U.S., the only official source for probable cause-data for serious accidents and incidents is the NTSB. However, many less serious general aviation accidents and incidents in the U.S. are investigated by the FAA.

Air Accidents Investigation Branch–UK equivalent of the NTSB and Canada's Transportation Safety Board: www.aaib.dft.gov.uk/home/index.cfm.

Aircraft Crashes Record Office–A record of accidents in all segments of aviation, as well as links to accident statistics, including accident history by aircraft model: www.baaa-acro.com/.

AviationSafety Network–Accident and hull-loss history for most corporate jet models and an accident database starting in 1943 covers more than 12,200 airplane accidents:http://aviationsafety.net/index.php.

FAA–Preliminary accident data for the most recent 10-day period: www.faa.gov/data_statistics/accident_incident/preliminary_data/.

NTSB–Preliminary, factual and final reports for all serious aviation accidents and incidents from 1962 to the present: www.ntsb.gov/ntsb/month.asp.

PlaneCrashInfo.com–A record of accidents in all segments of aviation and links to accident databases. http://planecrashinfo.com/index.html.

Robert E. Breiling Associates–Considered the premier source of business aviation accident and incident data and analyses, including custom reports: www.breilinginc.com/specific.htm.

Transportation Safety Board of Canada–Similar to the U.S. NTSB:http://tsb.gc.ca/en/index.asp. *–G.G.*