2005: The Year in Review
Return of the Killers

BY JIM BURIN

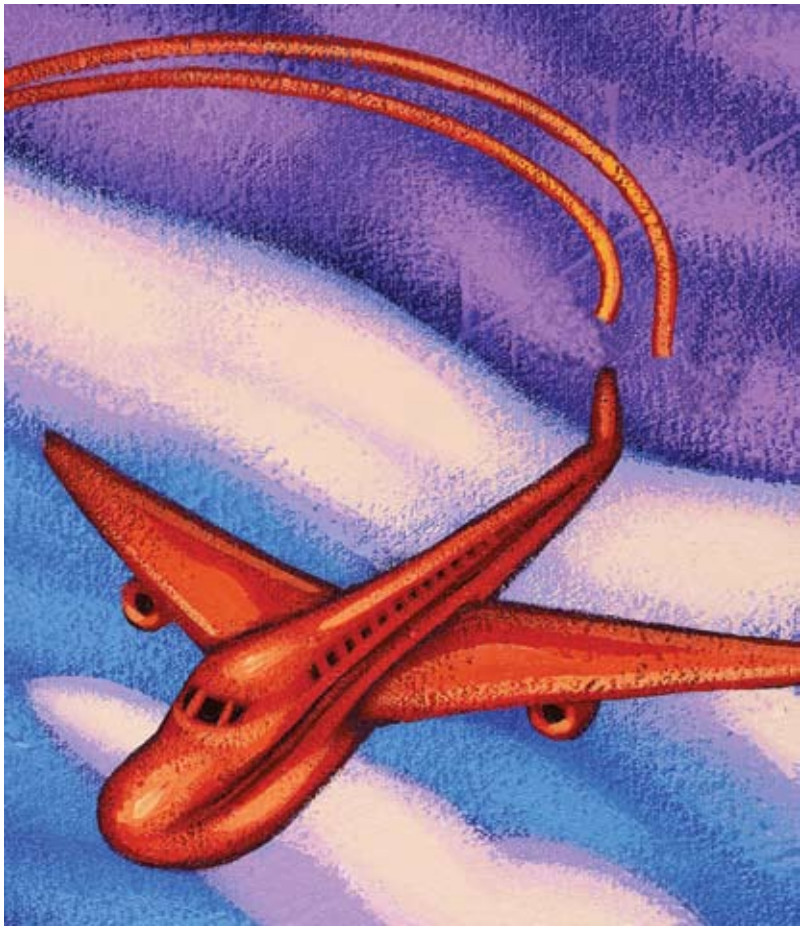
Aviation's historic killers made an unwelcome comeback in 2005. Controlled flight into terrain (CFIT) and loss of control (LOC) accidents returned after a brief hiatus, and the consequences were predictable. The 778 commercial jet fatalities last year were slightly more than average but seem especially bad compared to the record low 196 deaths in 2004.

In 2004, there was only one LOC accident and, for the first time, not a single commercial jet CFIT accident. In 2005, however, commercial jets were involved in five CFIT accidents and three LOC accidents that produced more than 70 percent of the year's fatalities (Figure 1, page 18). Significantly, all five CFIT accident aircraft came from that 8 percent of the world fleet not equipped with a terrain awareness and warning system (TAWS), repeating once again the pattern of the past; every CFIT accident to date has involved an aircraft lacking this vital piece of equipment.

Overall, the safety record of all levels of professionally flown jet and turboprop aircraft — commercial, cargo and corporate — was only slightly below average despite the big jump from 2004. As has been the case for the last 20 years, approach and landing accidents (ALAs), CFIT and LOC claimed the majority of aircraft and accounted for the majority of fatalities, with ALAs continuing to cause more than half of the hull loss accidents for all categories of aircraft. Figure 2 (page 18) shows that from 1995–2004, CFIT and LOC caused 62 percent of the fatalities during the 10-year period.

The number of aircraft in the active air carrier and corporate/business jet fleet grew during the year, the jet transport fleet growing 1.9 percent to 22,517, and the business jet numbers increasing 1.2 percent to 13,535, while the turboprop numbers remained essentially flat, up 0.2 percent to 12,931.

One statistic stands out in 2005: While 29 percent of the turboprop fleet is Eastern-built, they accounted for 52 percent of the turboprop hull loss accidents. This is in contrast to the



record of Eastern-built turbojet aircraft, comprising 14 percent of the turbojet fleet and accounting for 16 percent of the turbojet hull losses.

Despite the Eastern-built turboprop fleet's disproportionately high proportion of accidents, many of those accidents had little to do with where the aircraft was built and a lot to do with the dangers of operating in relatively high-risk areas.

Nineteen Hull Losses

Altogether in 2005, there were 19 hull loss accidents of commercial jet airplanes over 60,000 pounds/27,000 kilograms maximum takeoff weight (MTOW), including all cargo and passenger operations for Western-built and Eastern-built aircraft (Table 1, page 19); 16 were Western-built aircraft. The 19 hull loss accidents included 13 ALAs, five CFIT accidents and three LOC accidents. Eight of the 19 hull losses had zero fatalities.

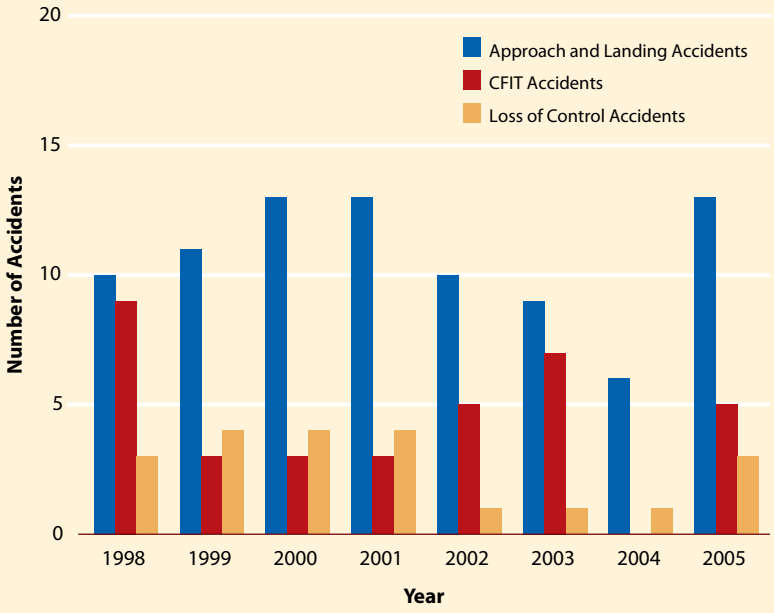
Going down in size, there were 15 hull loss accidents involving turbojet aircraft less than 60,000 pounds MTOW in commercial or corporate/business service (Table 2, page 20), well above the historic average of seven or eight per year for that class of aircraft. Of those 15 hull losses, eight were ALAs, one was a CFIT accident, and three were LOC accidents.

There were more than twice as many turboprop hull losses, 39 (Table 3, page 21), as there were commercial jet hull losses, 19. In this category are all Western-built and Eastern-built turboprop aircraft with more than 14 seats. Of the 39 turboprop hull losses, 19 were ALAs and nine were CFIT accidents.

Of the 13 commercial jet ALAs in the year, seven had zero fatalities. Also, eight of the 15 hull losses for turbojets less than 60,000 pounds MTOW were ALAs, as were 49 percent of the turboprop hull losses.

The hull loss ALAs' history for all aircraft clearly shows that the aviation industry must continue to focus on this high-risk area. Most, if not all, of the causes of these accidents are well documented and addressed in the Flight Safety Foundation *ALAR Tool Kit*.

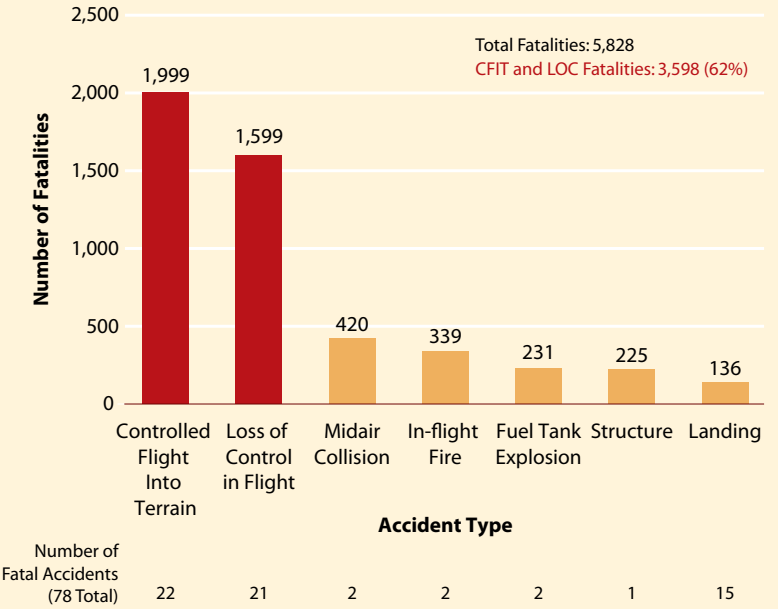
Hull-loss Accidents, Worldwide Commercial Jet Airplanes (> 60,000 lb), 1998–2005



Source: Boeing, Airclaims

Figure 1

Worldwide Airline Fatalities, By Accident Type, 1995–2004



Source: Boeing

Figure 2

Preliminary data on commercial jet LOC accidents in 2005 indicate that two of the three were caused by improper takeoff configuration. The history of LOC accidents over the past 13 years does not show a consistent pattern, although the number of LOC hull losses had decreased during the three years running up to 2005. The revised version of the *Airplane Upset Recovery Training Aid*, issued last year, hopefully will continue the pre-2005 trend.

CFIT Persists

The 2005 burst of CFIT accidents after their absence in 2004 has not significantly altered the slow but measurable decrease in the five-year rolling average in the number of CFIT accidents since 1998. However, the shallow slope of the five-year average trend lines is testimony to the fact that despite increased awareness, increased training and some exciting new technologies, CFIT remains a major challenge, especially when the nine commercial turboprop CFIT accidents in 2005 are added to the turbojet totals. It is significant and worth repeating that every one of those 15 CFIT accidents in 2005 — and indeed every CFIT accident in history — happened to aircraft not equipped with TAWS.

Last August was especially challenging, with five hull loss accidents in one month, more than a quarter of such accidents for the entire year. However, with the worldwide average at fewer than 0.8 hull losses per million departures, an accident has become almost a statistically random event, and five accidents in a month is no more unusual than zero accidents in three or four months — but they obviously get a lot more media coverage.

A great example of that randomness is this: The "worst" year for aviation safety was 1983, with a rate of 2.41 hull loss accidents per million departures; the "best" year was 1984, with a rate of 0.67. Thus, the best and worst happened in consecutive years and more than 20 years ago.

Still Safe

Yet, despite the spike in CFIT and LOC accidents last year, aviation remains

Hull-loss Accidents, Worldwide Commercial Jets (> 60,000 lb)
January 1, 2005–December 31, 2005

Date	Operator	Aircraft	Location	Phase	Fatal	
Jan. 8, 2005	AeroRepública	MD-80	Cali, Colombia	Landing	0	
Jan. 24, 2005	Atlas Air	747-200	Dusseldorf, Germany	Landing	0	
Feb. 3, 2005	Air West Cargo	Il-76	Khartoum, Sudan	Approach	7	C
Feb. 3, 2005	Kam Air	737-200	Kabul, Afghanistan	Approach	104	C
March 19, 2005	Race Cargo Airline	707-300	Entebbe, Uganda	Approach	0	C
March 23, 2005	Airline Transport	Il-76	Mwanza, Tanzania	Takeoff	8	L
April 7, 2005	ICARO Air	F-28	Coca, Ecuador	Landing	0	
April 20, 2005	Saha Air	707-300	Tehran, Iran	Landing	3	
June 19, 2005	Mahfooz Aviation	707	Addis Ababa, Ethiopia	Landing	0	
July 1, 2005	Biman Bangladesh	DC-10	Chittagong, Bangladesh	Landing	0	
Aug. 2, 2005	Air France	A340	Toronto, Canada	Landing	0	
Aug. 14, 2005	Helios Airways	737-300	Grammatikos, Greece	Enroute	121	
Aug. 16, 2005	West Caribbean	MD-82	Machiques, Venezuela	Enroute	160	L
Aug. 23, 2005	TANS Peru Airlines	737-200	Pucallpa, Peru	Approach	45	C
Sept. 5, 2005	Mandala Airlines	737-200	Medan-Polonia, Indonesia	Takeoff	104	L
Oct. 22, 2005	Bellview Airlines	737-200	Lissa, Nigeria	Climb	117	
Oct. 31, 2005	MIBA Aviation	727	Kindu, DR Congo	Landing	0	
Nov. 11, 2005	Royal Airlines Cargo	Il-76	Khak-e Shahidan, Afghanistan	Approach	8	C
Dec. 10, 2005	Sosoliso Airlines	DC-9	Port Harcourt, Nigeria	Approach	109	C

C CFIT accident L Loss of control accident

Source: Boeing, Airclaims

Table 1

Every one of those 15 CFIT accidents in 2005 — and indeed every CFIT accident in history — happened to aircraft not equipped with TAWS.

Commercial aviation has never had a year with zero accidents, and there has never been (and never will be) a flight with zero risk.

Hull-loss Accidents, Worldwide Commercial/Corporate Jets (< 60,000 lbs)
January 1, 2005–December 31, 2005

Date	Operator	Aircraft	Location	Phase	Fatal	
Jan. 1, 2005	Jet Services	Citation II	Ainsworth, NE, USA	Approach	0	C
Jan. 28, 2005	Million Air	Learjet 35	Kansas City, MO, USA	Landing	0	
Feb. 2, 2005	Platinum Jet	Challenger 600	Teterboro, NJ, USA	Takeoff	0	
Feb. 21, 2005	Scott Aviation	HS 125	Bromont, Canada	Approach	0	
Feb. 16, 2005	Circuit City Stores	Citation V	Pueblo, CO, USA	Approach	8	
Feb. 24, 2005	Colima State Gov.	Westwind	Morelia, Mexico	Enroute	7	
March 8, 2005	Air Global	Citation I	Caracas, Venezeula	Approach	2	
May 9, 2005	Compas Acquisitions	Sabreliner	Brownwood, TX, USA	Takeoff	0	
May 15, 2005	Weibel Scientific	Citation I	Atlantic City, NJ, USA	Landing	0	
May 20, 2005	Jet 2000	Falcon 20	Moscow, Russia	Descent	0	
July 15, 2005	Aspen Aviation	Learjet 35	Vail, CO, USA	Landing	0	
Sept. 1, 2005	USA Jet	Falcon 20	Elyria, OH, USA	Takeoff	0	
Sept. 16, 2005	Viação Cometa	Citation 525	Rio de Janeiro, Brazil	Climb	2	
Nov. 5, 2005	Houston Cardiac Assoc.	Citation I	Houston, TX, USA	Takeoff	2	
Dec. 28, 2005	Skyward Aviation	Learjet 35	Truckee, CA, USA	Landing	2	

C CFIT accident

Source: Aircraft

Table 2

remarkably safe. In 1947, commercial aviation had about 600 fatalities while flying approximately 9 million passengers. Over the past three years, commercial aviation has averaged about 500 fatalities a year while flying approximately 2.4 billion passengers a year — fewer fatalities with almost 300 times more passengers.

Over the last four-plus decades since the introduction of the jet airliner, the hull loss accident rate has steadily declined. In fact, the rate has decreased by an average of 32 percent per decade, an impressive accomplishment for an already safe system.

The goal of Flight Safety Foundation is to make aviation safer by reducing the risk of an accident. But some ask what personal lessons can be learned from such data. With less than one hull loss accident per million departures in the world for commercial aviation, and with corporate and general aviation accident rates improving, the odds are against any particular aircraft operator having an accident in 2005, or in any year. However, it cannot be forgotten that every flight presents the opportunity for an accident. Commercial aviation has never had a year with zero accidents, and there has never been (and never will be) a flight with zero risk. So, there is still work to do and challenges to address to make the world's safest mass transportation system even safer.

Maintaining declining hull loss rates while the number of departures continues to climb (Figure 3, page 22) has been achieved for several reasons.

First, the aircraft are better. Each new generation of aircraft has been safer, and the accident rates show that. The hull loss accident rates of the newer aircraft have started low and stayed there. For example, until the recent Airbus A340 accident in Toronto, there had not been an accident involving the newest generation of aircraft — the Boeing 777 and 717, and the A340 and A330 — in over 14 years of commercial operation.

Training is another area of great progress. With the advent of programs like the advanced qualification program (AQP), line-oriented flight training (LOFT) and others, training has been a great asset in reducing risk. And technology has made simulators much more effective training devices.

Technology has also been helpful in other areas. For example, the traffic-alert and collision avoidance system (TCAS) continues to reduce the risk of midair collisions, and the midair collision safety record reflects its great success. Head-up displays (HUDs) are entering the world fleets, and operators using them are quite impressed with their capabilities and their risk reduction potential. Electronic flight bags (EFBs), like HUDs, are just

Hull-loss Accidents, Worldwide Commercial Turboprops (> 14 Seats)
January 1, 2005–December 31, 2005

Date	Operator	Aircraft	Location	Phase	Fatal	
Jan. 8, 2005	Service Air	Antonov 12	Uganda	Approach	6	
Jan. 13, 2005	AirNow	Embraer 110	USA	Landing	1	
Jan. 22, 2005	ANAF	Antonov 8	D.R. Congo	Approach	0	C
Jan. 27, 2005	Farnair Hungary	Let 410	Romania	Approach	2	C
Feb. 16, 2005	Trident Aviation	DHC-5 Buffalo	Sudan	Approach	0	C
Feb. 22, 2005	Missionary Aviation	DHC-6 Twin Otter	New Guinea	Approach	2	C
Feb. 22, 2005	TAM	Convair CV-580	Bolivia	Takeoff	0	
March 16, 2005	Regional Airlines	Antonov 24	Russia	Approach	28	C
March 26, 2005	W. Caribbean Airways	Let 410	Colombia	Climb	8	
March 28, 2005	Aerocaribbean	Ilyushin 18	Venezuela	Takeoff	0	
March 31, 2005	RPS Air Freight	Antonov 12	Yemen	Takeoff	0	
April 12, 2005	GT Air	DHC-6 Twin Otter	Indonesia	Enroute	17	C
May 1, 2005	Wideroe	DHC-8	Norway	Landing	0	
May 3, 2005	Airwork NZ	Metro	New Zealand	Enroute	2	
May 4, 2005	Kisangani Airlift	Antonov 26	D.R. Congo	Enroute	11	
May 7, 2005	Aero-Tropics	Metro	Australia	Approach	15	C
May 25, 2005	Victoria Air	Antonov 12	D.R. Congo	Enroute	26	
June 2, 2005	Marsland Aviation	Antonov 24	Sudan	Takeoff	7	
June 2, 2005	TAG	Let 410	Guatemala	Climb	0	
June 4, 2005	AerOhio	DHC-6 Twin Otter	USA	Landing	0	
June 8, 2005	Shuttle America	Saab 340	USA	Landing	0	
June 10, 2005	748 Air Services	HS 748	Kenya	Landing	0	
June 29, 2005	Mango Airlines	Antonov 26	Congo	Landing	0	
June 30, 2005	Gorkha Airlines	Dornier 228	Nepal	Approach	0	C
July 16, 2005	Equatair	Antonov 24	Guinea	Enroute	61	
July 27, 2005	Wilson International	Let 410	Sudan	Landing	0	
July 27, 2005	Business Aviation	Let 410	Sudan	Landing	0	
Aug. 6, 2005	Tuninter	ATR 72	Sicily	Enroute	16	
Sept. 5, 2005	Kavatahi Airlines	Antonov 26	D.R. Congo	Approach	11	C
Sept. 8, 2005	TMK Air	DHC-6 Twin Otter	D.R. Congo	Climb	0	
Sept. 9, 2005	Air Kasai	Antonov 26	Congo	Enroute	13	
Sept. 19, 2005	Dynamic Air	Metro	Netherlands	Takeoff	0	
Oct. 4, 2005	Wimbi Dira Airways	Antonov 12	D.R. Congo	Landing	2	
Oct. 30, 2005	Trade Air	Let 410	Bergamo, Italy	Takeoff	3	
Nov. 8, 2005	Air Now	Embraer 110	USA	Climb	0	
Dec. 9, 2005	Air Now	Embraer 110	USA	Enroute	0	
Dec. 16, 2005	NatureAir	DHC-6 Twin Otter	Costa Rica	Approach	0	
Dec. 19, 2005	Chalk's Ocean Airways	Grumman G-73T	USA	Climb	20	
Dec. 23, 2005	AZAL	Antonov 140	Baku, Azerbaijan	Climb	23	

C CFIT accidents

Source: Airclaims

Table 3

... Success in reducing the risk of an accident [grew out of] the safety community's decision to be guided by data.

coming into widespread use, but they bring significant improvements to information available in the cockpit. And the success of TAWS is well known and indisputable, one piece of equipment that may have saved more lives than any other single piece of aviation equipment.

Another source of success in reducing the risk of an accident is the safety community's decision to be guided by data. Data are used first to identify the high-risk areas and then to monitor the success of the safety interventions devised to manage that risk. Being data-driven also means that industry efforts are not dissipated in an attempt to equally address every potential safety issue but are focused on the high-risk areas in order to achieve the greatest reduction in risk for our efforts.

That does not mean that hazards such as bird strikes are not important, but it does mean their priority is lower than that of the proven killers: CFIT, ALAs and LOC.

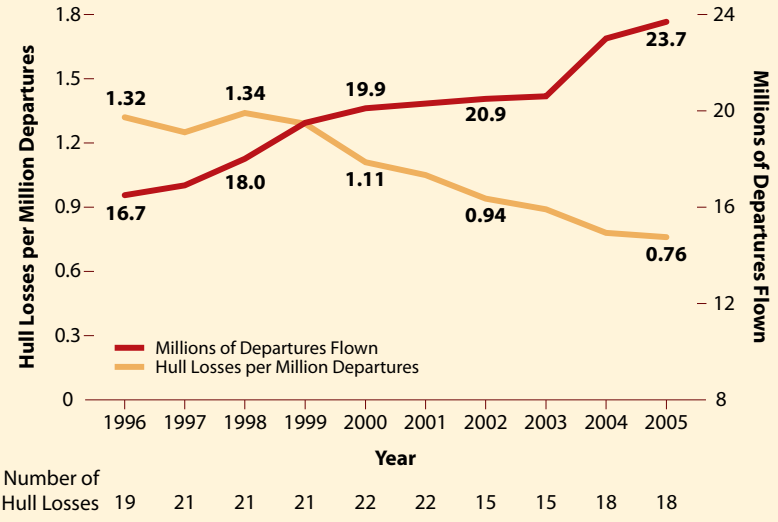
New Data Sources

The effort to get the data needed to prioritize our efforts has moved beyond simply studying accidents; there are so few accidents, it is hard to get enough data from accidents alone. This need has brought about the use of new sources of data, proactive and preventative sources like incident data and data from programs like flight operational quality assurance (FOQA), aviation safety action programs (ASAP) and line operations safety audit (LOSA). This new use of data has shifted the emphasis of safety efforts from historic to diagnostic, and soon to predictive.

In addition, new programs are emerging that use shared data, making the data ever more powerful. Examples are the U.S. Federal Aviation Administration's voluntary aviation safety information-sharing program (VASIP) and the International Air Transport Association's safety trend evaluation analysis data exchange system (STEADES).

The only cautionary note about this strategy is that organizations should not get so overloaded with data that they spend most of their resources on gathering and organizing the data and not enough effort analyzing it.

Western-built Jet Air-transport Traffic and Hull-loss Rates, 1995–2005



Source: IATA

Figure 3

Today's focused safety efforts are more cooperative, both within regions and between government and industry. The U.S. Commercial Aviation Safety Team (CAST) is a great example of industry and government working together on a common safety agenda. The Pan American Aviation Safety Team (PAAST) is an example of a regional safety effort that has made impressive progress in reducing the risk of accidents in Latin America. The International Civil Aviation Organization (ICAO) cooperative development of operational safety and continuing airworthiness programs (COSCAP) are attempting to do the same thing in regions of the world that have never before benefited from this type of effort. ICAO has also become much more active in international safety issues such as English language proficiency, CFIT prevention and the recently passed change to Annex 13 that protects safety information from inappropriate use in judicial proceedings.

Public Expects Better

The public benefits every day from our success in reducing the accident rate. However, despite the impressive record and great success, they expect better. That was evident after the five tragic hull loss accidents in August prompted the public to question the safety of air travel.

In an industry where the risk will never be zero, we face a constant challenge in meeting the public's expectation of perfection as the minimum acceptable standard. However, the aviation industry continues to successfully address that challenge and is continually working to make aviation safer by reducing the risk of an accident. ●

— Jim Burin is director of technical programs for Flight Safety Foundation.