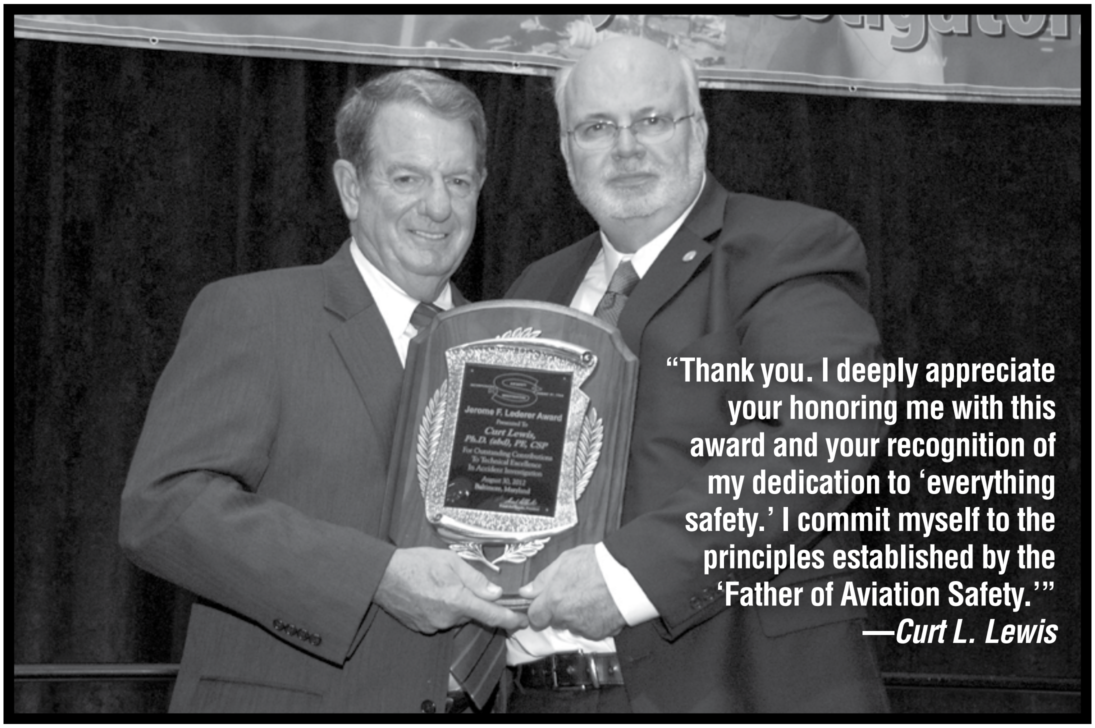
ISASI FORUM

"Air Safety Through Investigation"

OCTOBER–DECEMBER 2012



CONTENTS

FEATURES

DEPARTMENTS

ABOUT THE COVER

ISASI's coveted Jerome F. Lederer Award is displayed by Curt L. Lewis, right, following its presentation by ISASI President Frank Del Gandio. More than 300 persons attended the awards presentation dinner held on the last evening of the Society's 43rd annual conference on air accident investigation. (Photo: Esperison Martinez)

ISASI FORUM
"Air Safety Through Investigation"

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AIR SAFETY INVESTIGATORS
INCORPORATED AUGUST 31, 1964

Bringing Change to Our Industry Means Safer Flight

By Frank Del Gandio, ISASI President

(Excerpted from opening remarks presented to the delegates of ISASI 2012 in Baltimore, Maryland, USA, on Aug. 28, 2012.—Editor)

Welcome to Baltimore and ISASI's 43rd annual international seminar on air accident investigation. Our theme this year is "The Evolution of Aviation Safety, from Reactive to Predictive." The theme is an appropriate one for our time. As most air safety professionals recognize, our field has changed profoundly over the past 10 to 12 years.

Perhaps the most obvious and biggest change is that we simply have far fewer major accidents than we have had in the past. Aviation has become safer and safer, year after year, for a century. However, just 15 years ago, much of the aviation community believed we had finally reached a point where the historical pattern of accident rates was changing in a fundamental way, and not for the better.

The historical pattern had been one of steady incremental changes, followed by a sharp breakthrough in the rate, followed by more steady improvement, then another sharp breakthrough, and so on. However, by the late 1990s, a consensus was developing that the accident rate was flattening out and that major breakthroughs were a thing of the past. We could expect only incremental improvements in safety, while the rate of growth in the system would exceed the incremental pace of improvement. In short, we likely would have more and more major accidents, even if the rate continued to improve slowly.

Obviously, that consensus was wrong. In fact, just as that consensus was developing, we already had entered the next revolution and breakthrough in aviation safety. Not only did the accident rate improve sharply yet again, but the rate of improvement accelerated. Compared to just 15 years ago, the fatality rate on airliners has fallen by more than 95 percent in most of the world, and the raw number of major accidents has collapsed.

Unlike the consensus of the late 1990s, I will not tell you that the century-old historical pattern is about to end and that we somehow will no longer see great improvements. We will continue to see improvements. Nevertheless, the system, in fact, has become so safe that the general public in much of the world now demands essentially an accident rate of zero. One accident today really is one too many.

To a degree, we have been cursed by our own success. We reached a point some years ago where we could no longer depend primarily on accident investigation to continue eliminating remaining risk and to move us ever closer to a long-term rate of near zero.

We needed a new approach, and we have developed a new approach. We have moved from a reactive system to a predictive system. The effectiveness of that change and the pace at which the change took place have been yet another revolution in aviation, and we remain in the midst of that revolution today.

This revolution began with sudden and sharp increases in digital memory and data processing—and with equally sudden changes in the way we intellectually approached notions of aviation risk. Essentially, we applied the knowledge learned from decades of accident investigation to understand exactly what

The field has changed. New tools and techniques enable us to monitor risk much more closely. This greatly expands our intellectual toolkit, but it does not mean we are throwing anything away.

types of problems contributed to different types of accidents and what problems increased the risk of certain types of accidents.

The frequency and severity of those problems are now monitored closely from routine daily flights that land safely. Most people in this room now can call out a litany of parameters that are analyzed to determine trends in the risk of a CFIT accident, or an undershoot, or a runway excursion, or what have you. The strength of this approach has been improved even more by integrating voluntary reporting systems in which pilots, mechanics, flight attendants, air traffic controllers, and others describe incidents in which they were involved, or try to describe safety risks that they have identified.

This ongoing revolution is the prime topic of our seminar this year. Just five to seven years ago, most papers on this topic would have been a bit like missionary work, trying to convert the slackers to adopt the new way. That missionary part is now behind us. Now you will hear presentations that focus on exactly what some organizations are doing with contemporary analytical tools, what types of parameters they are tracking, etc. You also will hear some suggestions that these analytical tools are beginning to penetrate general aviation in a meaningful way.

But the theme "reactive to predictive" does not suggest that one intellectual approach has replaced another. It simply means that the field has changed. New tools and techniques enable us to monitor risk much more closely. This greatly expands our intellectual toolkit, but it does not mean we are throwing anything away.

This room is full of expertise, and I encourage delegates to share their knowledge with each other. That is very much the purpose of a seminar like this.

Thank you, and enjoy. ◆

Aviation Safety Has No Borders

By Deborah A.P. Hersman, Chair, U.S. National Transportation Safety Board

(Excerpted from opening remarks presented by Chair Hersman in her keynote address to the delegates of ISASI 2012 on Aug. 28, 2012, in Baltimore, Maryland, USA.—Editor)

Thank you, Frank [Del Gandio]. You know, Frank and I have met before. Each time he introduces me, he is more and more gracious…. At my first ISASI seminar in Orlando, Florida, it was Bob MacIntosh [newly elected ISASI treasurer] who introduced me to many of you. Last night during the [seminar welcome] reception, I felt as if I were with good friends. Thank you—all—for welcoming me to the ISASI family. I see Bob and would like to salute him for his years of service to the international aviation community. Thank you, Bob, for your excellent counsel.

As Frank mentioned, one of my priorities is strengthening international relationships. We have stepped up our involvement with organizations like ICAO and the International Transportation Safety Association.

PHOTOS: E. MARTINEZ

Our greater involvement with this year's ISASI seminar stems from last year's NTSB meeting where we outlined the many benefits of international cooperation. I'm honored to share keynote assignments with Wendy Tadros [the TSB, Canada] and Jean-Paul Troadec [the BEA, France]. With delegates from more than 35 countries and accident investigation board heads from five continents, this year's seminar clearly reinforces the international nature of accident investigation.

Today, there is no such thing as a domestic accident. That concept is as outdated as a foil recorder. And we can no longer rely on 20th century techniques to investigate 21st century accidents. We must use all the tools available—retaining the tinkicking, but also enhancing laboratory equipment and taking advantage of tools that mine data to map trends and hot spots—so that we can move "From Reactive to Predictive," as this year's theme states.

Our History Affects Our Future

By Wendy Tadros, Chair, Transportation Safety Board of Canada

(Excerpted from remarks presented by Chair Tadros in her keynote address to the delegates of the ISASI 2012 on Aug. 29, 2012, in Baltimore, Maryland, USA.—Editor)

Yesterday, Debbie Hersman spoke about the importance of building strong relationships as we do more and more international investigations. Today, I want to look at the domestic scene and draw on some good old Canadian experience. I want to examine the historical record, look at the positive news, and see what that means for our future.

So let's begin: The good news is that, over the last 10 years, the number of fatalities in aircraft accidents has declined, especially for large aircraft. In fact, when it comes to large aircraft, the Canadian news is very good indeed: Up until last summer's 737 crash in the Canadian Arctic, the previous decade saw *zero* fatalities for large Canadian operators on Canadian soil.

There's more good news. This decline in fatalities isn't just in Canada. Here in the United States, that number has also come down *significantly*.

But why? Why are the number of deaths going down? For a variety of reasons, really—no small part of which is the excellent work of investigators like you. You do your job well, identifying safety deficiencies and making recommendations to improve the system for everyone. Regulators and industry have listened, too. And we are doing a better job of learning from one another.… So together we have saved lives.

But here's a question: With the numbers in decline, where does that leave us—where does that leave *you*, as investigators? Will the numbers ever reach and *stay* at zero? Will we have to close up shop and go home?

I tell people in the transportation industries all the time that I want them to put *me* out of a job! And I do! But I know very well this is a pipe dream. The reality is, in this complex world, that there will always be a need for accident investigators. Many of you will be investigating large aircraft accidents in the developing world as accredited representatives. And conversely, at home

How many of you were in Paris 18 years ago? That year your seminar theme was "Detecting and Eliminating the Hazard." Later that year, an undetected hazard led to the crash of USAir Flight 427 near Pittsburgh, Pa.

I know there are many attendees here who worked on that investigation. Flight 427 provides an excellent example of just how much has changed in accident investigation between the end of the 20th century and today.

Tom Haueter, the IIC for the investigation, said his immediate challenge was setting up telephones at the command center. Today, I suspect it's not a lack of telephones, but rather their proliferation, that is the challenge for IICs.

At four-and-one-half-years, Flight 427 was the NTSB's longest investigation. Investigators developed, pursued, and eliminated one theory after another. The NTSB worked with Boeing to develop complex flight simulations to derive flight control positions from the limited FDR data. Investigators created simulations for malfunctions of the rudder system, flaps, slats, engines, spoilers, thrust reversers, and more.

The major breakthrough was serendipitous.

While conducting tests to look for a dual-jam, the Systems Group found that a reversal could occur and cause an uncommanded rudder hardover. Fifty-four months of investigation...10 safety recommendations...a flawed rudder design corrected in thousands of Boeing 737s.

In short, increased safety for countless air travelers.

What if a Flight 427 crash happened today? How long would the investigation take?

Look at the data and tools now available. Flight 427's airplane only required five FDR parameters. Today's minimum requirement is 88 parameters. And manufacturers deliver aircraft with hundreds to thousands of parameters, including crucial flight control data.

In 1994, there were zero U.S. Flight Operational Quality Assurance, or FOQA, programs. Today, dozens produce mountains of data. Eighteen years ago, there were no Aviation Safety Action Programs. Now, they number more than 200... and represent pilots, mechanics, dispatchers, and flight attendants. In 1994, ASIAS [Aviation Safety Information Analysis and Sharing] wasn't even an acronym. Today, the program includes data from 43 airlines and a number of other sources. With today's data and tools, solving a puzzle like Flight 427 would be quicker—perhaps narrowing in on the upset's cause in weeks or months. Not years.

But what about your theme: From Reactive to Predictive? Could today's data and tools help predict an accident like 427?

That is the question.

We know that hindsight is 20/20. It's easy, looking back, to know what you should have looked for...and the questions you could have asked. Looking ahead is harder. All the data points in

we will be seeing fewer and fewer investigations that were once commonplace: the ValuJets, the TWAs, the Swissairs.

So the question remains: What *kinds* of domestic accidents will we be investigating? More to the point, what kinds of accidents *should* we be investigating? Here's what I think. We have to take a hard look at where the risk lies, where we have the most to learn, and where we should put the most effort to influence the greatest change. Which means our jobs are changing—or, if they haven't already, they're about to.

How? Well, let's turn our focus to the kinds of accidents that now claim the most lives. In Canada, it's the smaller aircraft. They are involved in more than 90 percent of accidents, and they're responsible for more than 90 percent of fatalities. These aircraft travel daily to smaller communities, servicing more remote airports where there is often less infrastructure. Often they're small turboprop or piston airplanes, and they may be equipped with less-sophisticated navigation and warning systems. These are the aircraft used for aerial work: medevacs, forestry work, and surveys. They're also used to transport workers or commuters or...as air taxis.

Let me give you an example of the kind of risks we see out there. It's a brief summary of a report that the TSB released a few months ago: In December 2009, a King Air, operated by Exact Air, was approaching the Chicoutimi/St-Honoré Airport in the province of Quebec. This air taxi was IFR, flying a nonprecision approach at night, in adverse weather: clouds, blowing snow, and wind gusts to 31 knots. The plane descended below the minimum descent altitude and struck trees just three miles short of the runway. The aircraft was destroyed on impact, both pilots were killed, and the two passengers were seriously injured. Officially, it is recorded in our database as a CFIT: controlled flight into terrain. But for those involved, their families and loved ones, it is something else: a tragedy.

As investigators, you know that every accident is unique, a singular combination of causes and contributing factors—be they human, environmental, organizational, or mechanical. That being said, what happened with this accident is, in a sense, also very typical. *Sadly,* very typical.

Let me give you some more statistics to show you what I mean: I said earlier that, prior to last summer's Arctic crash of a 737 in Resolute Bay, there had been no fatalities in the previous 10 years for Canada's large scheduled airliners. Going back further gives us an even bigger sample size to really show the differences between operations. And those differences are stark. In the two decades from 1992 to 2012, there were a total of seven fatal accidents involving Canadian scheduled airliners. For commuter airplanes, there were twice that; for planes involved in aerial work, 24. But for air taxis, there were *152*.

So whether we are investigating an air ambulance service coming into Sandy Bay, Saskatchewan, or a float plane taking off from the Gulf Islands on Canada's West Coast.… Whether it's a Beechcraft headed from Québec City to Sept-Îles, a PA-31 crashing on approach in North Spirit Lake, Ontario, or a Sikorsky S-92 helicopter en route to the oil fields of the Atlantic…. In *all* of these recent accidents—and there are many, many more—what we're seeing is a *pattern*.

Sadly, Exact Air fits that pattern all too well. Because what the world won't necessarily connect the dots. Yet, in almost every accident we see "precursors," data that could have been used to understand breakdowns in safety margins and help predict accidents. But, in real time, with thousands of flights, figuring out what the data can tell you, and how the data might combine with other factors in the operating environment...well, it can be as much art as science. Connecting the dots without knowing what you are looking for...is like knowing on the first day of art class which paints on your palette will produce a *Mona Lisa.*

It takes skill and artistry.

And it takes a proverbial village—a village like the time-tested party system where the AIB gets everyone to the table to gather the facts, and works to obtain alternate viewpoints and feedback. And a larger community, too, where AIBs also collaborate on standards and best practices through organizations like ISASI and ICAO.

Today, we are increasingly seeing regulators, manufacturers, operators, and labor coming together and joining forces through the Commercial Aviation Safety Team or through organizations like the Flight Safety Foundation. There's been great success through collaboration, a strong move from reactive to predictive.

Yes, we are in an era of unprecedented voluntary cooperation. And U.S. aviation is in an unprecedented safe period. Some even suggest that with today's sophisticated data and tools, accident investigations may become a thing of the past.

However, the reality is that forensic investigation is the foundational tool not only to be reactive, but to be more predictive. There are four major tools in aviation safety's 21st century toolkit: continued emphasis on forensics, data collection and analysis, new and emerging technologies and, to be sure, international cooperation.

First, the time-honored tool: forensics. We are not just talking about learning from major accidents, but investigating incidents. This provides the opportunity to be reactive, but also to use available data sources to evaluate the incident against the experience of the fleet to be predictive. Take the overruns in December 2010 at Jackson Hole, Wyoming, USA, and April 2011 at Chicago Midway, USA. These were both landing incidents that involved delayed thrust reverser and speed brake deployment. While there were similarities and differences in the factors and causes at play, neither was predicted. But they happened. And, yes, no one died; no one was injured. But they could have been. That's why we issued safety recommendations.

The second tool in our 21st century toolkit—data—is growing larger every day. Eighteen years ago, could anyone have imagined the dramatic change—from such a deficit of data, a handful of parameters on the FDR and 30 minutes on a CVR—to today's wealth of data? Yet, that very wealth can make us information rich and knowledge poor.

We need to effectively use data. We need to know the right

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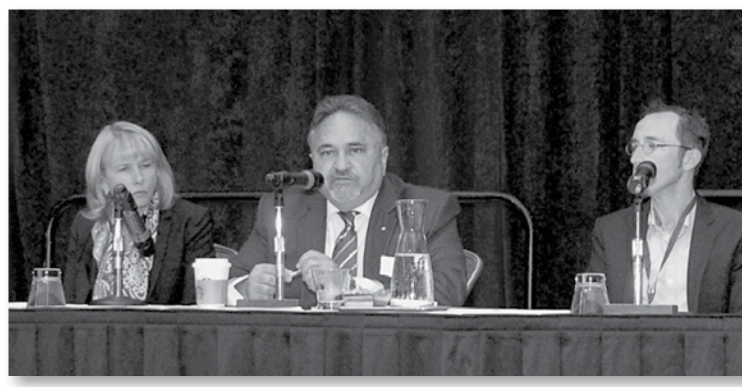
happened was a *typical* example of an approach and landing accident (ALA). And where do ALAs take place most often? At airports where only nonprecision approaches are available (such as Chicoutimi/St-Honoré)—airports that are served most often by these smaller planes.

So let's say all of that is the background. Now let me pose two questions: First, what will we do? And by "we," I mean independent accident investigation *bodies*. And second, what will *you* do as investigators?

I think the answer to the first part, "what will we do," is two-pronged. We've already started on it, too. In Canada, the TSB is pushing for wider implementation of Safety Management Systems (SMS). It's not a panacea, and I won't say that extending SMS to smaller operators is guaranteed to cut accident rates by a specific percentage…but…there is a reason why ICAO has led the charge and why Transport Canada has required it for the large carriers. And the reason is because SMS helps companies find trouble, before trouble finds them.

It is also the reason why we at the TSB have put SMS on our "Watchlist"—our list of issues that pose the greatest risk to Canada's transportation system. Because we want *all* companies, large *and* small, to have SMS. In Canada, the regulator (Transport Canada)—to its credit—agrees that SMS is part of the solution. Implementing it, though, will depend on changing safety cultures, and that takes unrelenting commitment, time, resources, and perseverance. But, again, with smaller aircraft involved in 90 percent of all accidents, we need to do something, and we think SMS will definitely help.



Shown, from left: Chair Tadros; Capt. Mohammed Aziz, Middle East Airlines; and Stuart Godley, ATSB, Australia.

What else are we doing? Several things, and here I want to take a moment and talk about technology. It was back in 1995 that the TSB made its first recommendation for the installation of ground proximity warning systems. Concerned about the number of CFIT accidents, we saw this technology as a way to help crews who had lost situational awareness, and an obvious way to save lives. Here in the United States, the FAA was ahead of the curve with requirements for terrain awareness warning systems (TAWS). In Canada, the regulator has only recently caught up, announcing new regulations requiring TAWS in all private turbine-powered and commercial airplanes with six or more passenger seat. From 1995 until now—*17* years. Some discussions go on longer than others.… But it's

Chair Hersman, center, chats with Frank Del Gandio, president, ISASI; Wendy Tadros, chair, TSB, Canada; and Jean-Paul Troadec, director, BEA, France.

questions to ask. And just as important, how do we know what we don't know?

Take, for example, the September 2008 accident in Columbia, South Carolina, USA. A Learjet 60 overran the runway during a rejected takeoff attempt. After experiencing tire failures, the pilot commanded reverse thrust to stop the airplane. However, failure of the air ground signal, due to wheel well damage, resulted in forward—not reverse—thrust. The airplane overran the runway at high speed, through a perimeter fence, and into an embankment across a road. The captain, first officer, and two passengers were killed.

Although a design analysis of the relevant systems had been performed during the airplane's original certification in 1993 and again in 2001, following an accident, this design vulnerability went unaddressed until the subsequent 2008 accident. It goes back to all those data points and connecting the dots. Not being able to predict, much less prevent, accidents can be the inability to consider what could happen, rather than what should happen. We must continuously engage in the processes of identifying hazards, assessing risk, making adjustments, and evaluating performance.

But we all know that it's not just a matter of being objective analysts. There are many complicated realities, such as who gets to decide which questions to ask. If the industry and/or the regulator are the gatekeepers and some issues are uncomfortable, do they avoid the hard questions? Can a single veto keep the group from moving forward?

Here's another issue: How do we most effectively navigate the massive amounts of data while addressing the landmines of legal implications and personal privacy that are so important?

The Safety Information Protection Task Force, through ICAO, has been looking at the various sources of safety information,

done. And it will help. And that is *nothing* but good news.

On another technology note.… As an investigation body, we want as much information as possible. All of us do. Not just flight plans and wreckage, or even interviews with survivors or witnesses. We want hard data—objective facts that tell us what was going on in those final seconds, and when possible, even earlier. That is why we have called for, and will soon have, two-hour recorders on large aircraft. We want to know about the relationship between the crew, and between the crew and ATC: what they said, what they saw, what they did.

Not having the information we need makes it tougher to find out what happened; it may even preclude the identification and communication of safety deficiencies that can advance transportation safety. And even when we *think* we know what happened, not having the *evidence* to prove it… well, it gives us less ammunition when we're pushing for change.

Our large investigations have long demonstrated the value recorders bring to accident investigation. And the number of smaller investigations where the cause is undetermined, or we have barely been able to skim the surface in our findings, argues for wider use of recorders…because having this information will let us dig deeper and find out why so many of our small carriers—the commuter operators, the air taxis—are having so many accidents.

We know, however, that the minute we bring this up, cost will be factored into the equation. Fair enough. Now though, technology is taking leaps forward. There are smaller, lighter, *lower-cost* options—recorders that can capture cockpit image, audio, and other data for use in investigations. In other words, the time may now be approaching where we consider—where we ***re***consider—their feasibility. And I can tell you that debate is taking place right now at the Transportation Safety Board of Canada. So that's what we're doing at an organizational level: we're talking to the change agents and making the case for SMS across the board—*and* we have started the debate on recorders for smaller aircraft.

And that brings me to the second question I asked: "What will *you* do?" The answer to that involves something I said earlier: "taking a good hard look at where the risk lies, where we have the most to learn, and where we should put the most effort to influence the greatest change." Determining *that* involves taking a very broad look, a very high-level look, at the work we do.

It's true that we can sometimes be guilty of tunnel vision, focusing only on our own investigations…finishing one and then getting on to the next. But accidents have *many* causes and contributing factors, some of them less obvious than others. What can start off as a "weak signal" in one occurrence, or in *several* occurrences, may be a symptom—a sign of greater trouble—down the road. This speaks to us being strategic about where to put our efforts. And once we've decided, we need to look deeper at all of the underlying factors to see if we can find some patterns—and from there perhaps some solutions.

Let me give you an example: CRM. Today, more or less everyone recognizes the importance of crew resource management. But that wasn't always the case. It started out as an issue that popped up in maybe a single incident. Then two. Then it started the diverse requirements of member states regarding public transparency and personal privacy, and the different civil and criminal justice systems. The goal: Develop a policy to enhance safety, which all ICAO members can agree with. Aviation safety's technological and analytical hurdles can seem small compared with the policy challenges. We recognize the task has not been as easy one, and we look forward to the final report.

Turning to the third tool: technology. We must continue to exploit new sources of information, such as nonvolatile memory, and use new tools, like Geographic Information Systems, which the NTSB will discuss in a conference this December. Just like in your AIB, our labs have been steadily developing new capabilities.

For example, our scanning electron microscope can examine parts in greater detail than ever before. It has an ion-beam feature that allows engineers to cut specimens to show the condition of the material below the surface. This microscope was extremely helpful in the recent Boeing 737 fuselage rupture where it was used at 300,000 times magnification. At that magnification, a human hair would appear to be the size of the Washington Monument.

And we must be open to new ways of doing things. Can we learn from other transportation modes or industries? For example, the International Maritime Organization adopted Safety Management System requirements years ahead of aviation. Just as no accident is domestic anymore, no industry has all the answers when it comes to safety.

Yes, we must use all the tools available—forensics, data, and technology. But the last tool is perhaps one of the most effective: our counterparts and colleagues. We must continue to help each other and share what we know. Our professional relationships lead to improved collaboration, better understanding, and more effective recommendations. This May, I asked Chairman Tadros and the TSB to lead the investigation into a mid-air collision involving airplanes operated by an NTSB employee and an FAA employee. The TSB graciously agreed. The strong relationship Wendy and I enjoy extends across our organizations and investigators.

And I am sure everyone is anxious to hear from Jean-Paul Troadec on Thursday about Air France Flight 447. He and the BEA team just completed one of the most difficult investigations in recent history, and their ground-breaking efforts will inform investigative work for years to come.

We are together here in Baltimore—and in so many places around the globe—because we value the contributions that each individual and organization makes. We are professionals who recognize that none of us can do it alone. Sometimes we may have differences; but at the end of the day, we know that, whether it is on scene at an accident, in the lab, or reviewing accident data, aviation safety has no borders.◆

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popping up elsewhere. It was getting *recognized*. Investigators started actively tracking it, recording those occurrences where CRM was a factor. Research began to happen. Its incidence was no longer anecdotal. People began gathering facts. In time, they had enough ammunition to make their case. And a compelling case, too—*so* compelling that in Canada the regulator has made CRM mandatory for all large operators.

But it hasn't stopped there. As the evidence continues to mount, as the case has grown even stronger, the push for mandatory CRM has expanded, and it is now coming to air taxis and commuters, too. And we are looking not just at CRM but to raise the bar to *modern* CRM and threat and error management.

Will that help? You bet. And *that's* what I'm talking about. *That's* what investigators can do: *You're* at the leading edge. *You're* in the field, gathering information, sifting through wreckage. *You* are the ones who see, again and again, firsthand, what the issues are. And sure, sometimes those issues start off as anecdotal, but as you look for them and find they occur over and over, and as they are recorded and measured, they become statistics. And statistics have weight; they have strength. They can be used to make arguments. And arguments bring change.

Let me be clear: I am not talking about trying to predict the future; rather I am talking about studying the details, recognizing those underlying factors, the ones that maybe haven't become full-fledged causes yet, but that are nonetheless important. And whether those issues are discovered by mathematical trend analysis or by talking to other investigators and finding out what issues they're facing in their investigations,… however it happens, it's vital. Because finding these issues, identifying them, and the risk they pose, can help us push for change—the right change, which can save lives.

I'd like to think that, if this had been five years ago, CRM would have been one of the issues we would have flagged on our Watchlist. Because that's the idea behind the Watchlist: bringing attention to the issues that need it the most—the issues that have been identified as posing the biggest risk—and then building momentum to address them. The identification of emerging issues doesn't happen on its own, though. It takes someone to recognize a potential issue and then wade through the data to confirm if this is a real concern. And then once the issue is recognized, it takes more people to champion that issue until it becomes *widely* recognized. Accident investigation has a long list of issues like this, issues that are well-recognized *now* but that weren't so well-recognized not that long ago.

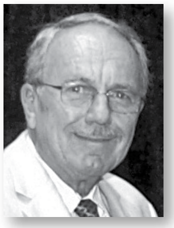
Today, as we move forward, with the accident rate for the big scheduled airliners at an all-time low, I want to point out that there is still a lot of valuable work to be done. Today is not the end of the future. In fact, when I look at the statistics, the trend is clear—because 90 percent is a hard number to ignore. It's the smaller aircraft—the ones used to transport commuters or for aerial work or as air taxis—that have *far* more fatal accidents than other types of operations.

And so, over the next few years, *here* is where we have a chance to make the biggest difference, where we have a chance to save the most lives.

That's an opportunity we can't afford to miss. Thank you. ◆

Vice President Pledges Unwavering Committment to Members

By Ron Schleede, Vice President



I am sincerely honored and humbled that ISASI members have voted to reelect me as their vice president. To you who voted for me, to you who did not vote for me, and to you who did not vote at all, I want all to know that I am fully committed to sustaining the trust that has been placed in me. I will strive energetically to improve the benefits and rewards of ISASI membership for all members.

To help set that course, I think of the rewards and benefits that came from my membership in ISASI over the past nearly 40 years and I ask myself, "How can I possibly ensure similar experiences for the current membership?" I recall the wonderful networking that occurred during almost monthly ISASI Mid-Atlantic Regional Chapter (MARC) meetings in Washington, D.C., in the 1970s. Many members of MARC were the original founders of SASI. As a young fledgling investigator with the NTSB, I found mentors who counseled me and provided me considerable support as my career progressed. I was also fortunate to be able to attend several international seminars where the networking and mentoring continued.

Following that thought, I recently received an e-mail from student member David Hamblin, who attended the recent seminar in Baltimore. David has been "mentored" by long-standing ISASI member John Purvis since they met at an American Institute of Aeronautics and Astronautics (AIAA) meeting about a year ago. John could not attend the seminar, so he asked Kevin Darcy and me to seek out David and speak to him, which we did. In his e-mail, David thanked us for meeting with him and sharing experiences, adding, "I feel as though the connections I made were just priceless…. I think it's a little weird that I learn so much [more] from you guys (free of charge) than I do from school (thousands and thousands of dollars)…. I'm really starting to see how much networking and making connections really form the foundation of a great career…."

That is what ISASI is all about—education and fostering the art of investigation to prevent aircraft accidents. As vice president, I hope to promote these aspects by expanding all ISASI members' experiences to be similar to those experienced by student member David Hamblin and myself.

I believe that one of the means to improve members' experiences is for them to be more aware of the ongoing activities of ISASI around the world. The *ISASI Forum* and the annual seminar both excel in their roles but don't necessarily provide timely communications. The use of social media, such as Facebook, Twitter, etc., is an option. However, for a variety of reasons, many members may not be willing or able to use these networking sites. Our website is much improved and now includes a Twitter link; however, the website's use for timely communications could be costly to our limited budget. One simple, but effective, means of communication is e-mail. I plan to work closely with our president, Frank Del Gandio, to post updates and other information directly to members so they may feel more connected with the Society and other members. I encourage use of social networks; however, I believe e-mail provides a direct means to network with other members on important topics related to aviation safety. Just see how successful the Curt Lewis [ISASI's recent Jerome Lederer Award winner] aviation-safety-related news digest (FSINFO) has been in disseminating aviation safety information worldwide.

One simple, but effective, means of communication is e-mail. I plan to work closely with our president, Frank Del Gandio, to post updates and other information directly to members so they may feel more connected with the Society and other members. I encourage use of social networks; however, I believe e-mail provides a direct means to network with other members on important topics related to aviation safety.

For ISASI to be effective with an e-mail effort, we need to have an up-to-date database of e-mail addresses. More than two years ago, I tried to send "all-hands" e-mails to members and found a significant percentage, about 15 percent, of outdated or wrong addresses. Since then, I've worked with society and chapter presidents and our office manager to update the list. Outdated e-mail addresses will be a continuing problem, unless members ensure that their contact information is up-to-date.

I urge you to check your information on the members-only section of our website. If it is incorrect, notify our office manager at isasi@erols.com of any changes.

By the time you read this, you will have received e-mails from Frank Del Gandio and me implementing this communications policy. We would like to receive feedback about how to improve this program. We hope we will be able to jointly create a networking system for all ISASI members to exchange ideas and promote aviation safety learning, much like David Hamblin experienced.

Lastly, I would like to hear from all of you about your ideas to improve the experience of ISASI membership. I plan to communicate with you and trust that you will relay your ideas to me. My e-mail address is ronschleede@aol.com. ◆

ISASI 2012: Evolution of Aviation Safe

Byte-by-Byte, Validated Data Wear Prediction's C

Speaker after speaker at ISASI's 43rd annual accident investigators seminar extolled the benefits that validated systems data have brought to aviation safety, and lauded the worth of data's future to reduce accident/incident events through prediction.

By Esperison Martinez, Editor

"Today, there is no such thing as a domestic accident. That concept is as outdated as a foil recorder. And we can no longer rely on 20th century techniques to investigate 21st century accidents. We must use all the tools available—retaining the tinkicking, but also enhancing laboratory equipment and taking advantage of tools that mine data to map trends and hot spots—so we can move "from reactive to predictive," as this year's theme states." These words spoken by NTSB Chair Deborah A.P. Hersman, in her keynote address opening ISASI's 2012 international conference on air accident investigation, exemplify the core of the seminar's essence.

Held in Baltimore, Maryland, USA, August 27–31, the annual conference is the only event designed solely for aviation professionals to discuss the latest innovative trends and practices in accident investigation and prevention. This year, 363 persons attended seminar activities. Of these, only 24 were companions. The remaining 339 represented 37 countries, attesting to ISASI internationalism, which was another feature highlighted in many of the presentations.

Photos of ISASI 2012 seminar activities can be viewed online at www.isasi.org.

In addition to the traditional program of technical papers and the full-day tutorial program, ISASI 2012 and planners of the U.S. National Transportation Board's International Investigations Conference agreed to integrate the two events. They believed the joint meeting would maximize the number of attendees for both groups in addition to offering more opportunities for networking, sharing lessons learned during the breaks, and meeting the closely allied objective of both groups.

The NTSB conference 1) shared experiences of the challenges involved in conducting Annex 13 aviation accident and incident investigations; 2) discussed solutions, lessons learned, and best practices in dealing with the above-noted challenges; and 3) discussed process improvement opportunities for future efficiencies in Annex 13 investigations.

ISASI's conference 1) showed the historical evolution of air safety from reactive to predictive; 2) discussed the interaction between accident or incident investigation and accident prevention or analysis; 3) demonstrated the analytical processes that identify, monitor, or assess emerging risks; and 4) discussed the practical application of those processes to minimize the risk of accidents.

Tutorials

The venue of the Baltimore Marriott Waterfront Hotel, overlooking Baltimore City's harbor, with its spacious conference auditorium and meeting rooms, proved excellent for the 363-plus ISASI folks who filled its space. All indoor program and social activities took place within the hotel. Many hotel rooms offered stunning views of the harbor and of the lighted city during the evening.

The conference week began with two one-half-day tutorial programs that also kept to the theme of the seminar "Evolution of Aviation Safety—From Reactive to Predictive." Anna Cushman, of the FAA Flight Data Lab, and Michiel Schuurman, of the Dutch Safety Board, presented "When an Animation Doesn't Tell the Real Story: Flight Data for Accident Investigation and Beyond." With 75 attendees, the tutorial's morning program focused on data (the facts you have to work with) and information (facts with context and perspective). Using examples, they discussed the differences between data and information. The tutorial subsequently focused on the validation of recorded data, a time-consuming process that is often overlooked. Using various simplified, but authentic, examples, participants were asked if the data were valid or invalid. An example where the recorded data showed an aircraft flying backward seemed to be untrue at first. However, if the headwind is greater than the stall speed of the aircraft, it is possible to fly backward. Thus, given the right context, the data may seem to be invalid, but are in fact valid.


PHOTOS: E. MARTINEZ

The examples showed that data must be properly identified and validated in order to be analyzed further. Other topics discussed were sources of flight data on board an aircraft, FDR decoding—document control quality issues and data limitations—the effect of sampling and other issues, and how flight data regulations affect an investigator, operator, and regulatory inspector.

Andy McMinn, air safety investigator/instructor at the Department of Transportation's Transportation Safety Institute, presented the afternoon session titled "Basic Failure Analyses: Failure Mode Identification at the Accident Site." His instruction style is "hands-on" with lots of interaction with the attendees. Using props, he demonstrated his points that "basic failure analysis/failure mode identification of fractured aircraft components at the

ety—From Reactive to Predictive
Crown

accident site is a skill needed by all air safety investigators [yet] is considered by many to be 'black magic' when it needn't be. The black magic of failure mode identification," he said, "is based on scientific principles that are easily learned when condensed down to basic structure and metallurgy, i.e., what the component was made of, how it was made, how it was treated, and what its normal service conditions are. All these factors determine how a component fails whether in flight due to abnormal service conditions or in an accident due to impact forces with the ground/water."

The NTSB arranged for a day-long tutorial, with 68 attendees, titled "Manufacturer Assistance to Accident Investigation." It gave insight into some of the tools and techniques aircraft manufacturers have available to support major investigations. Discussed were their capabilities and the benefits and limitations of utilizing certain data systems. The presentations and presenters were

- John Harrison, product manager for airplane health management, the Boeing Company, USA, who delivered "Airplane Health Monitoring (AHM) and Aircraft Communications Addressing and Reporting System (ACARS) in an Airplane Accident Investigation."
- Albert Urdiroz, director of flight safety/accident investigations, Airbus, who spoke about his company's perspective regarding developing tools and techniques to support major investigations.
- Jim Allen, Jay Eller, and Jim Mulkins from Honeywell, who addressed nonvolatile memory in Honeywell products and its benefit to accident investigations.

Technical program

The hotel's conference hall afforded ISASI's 339 delegates unobstructed views of an elevated speakers' platform bookended by two massive reflective screens to view PowerPoint presentations. Particular attention was paid to the audio so that the speakers' voices would clearly resonate throughout the space.

Owing to the dual-conference arrangement, the event offered as keynote speakers the chairs of the U.S., Canadian, and French national safety boards. NTSB Chair Hersman spoke about why "Aviation Safety Has No Borders (see page 4); TSB Canada Chair Wendy Tadros addressed how "Our History Affects Our Future" (see page 4), and BEA France Director Jean-Paul Troadec recounted the "History of the Flight AF447 Accident Investigation" (see the upcoming January-March 2013 issue of *ISASI Forum*).

ISASI President Frank Del Gandio's welcoming address stressed that presentations that address investigative techniques and review major accidents "will always have a home at ISASI because…investigation remains the primary vehicle for learning what actually goes wrong in rare major accidents…so the theme "reactive to predictive" is not meant to suggest that one intellectual approach has replaced another. It simply means that the field has changed. New tools and techniques enable us to monitor risk much more closely. This greatly expands our intellectual tool kit, but it does not mean we are throwing anything away."

This sampling of 20 technical paper titles presented and noted panel titles indicates how well the joint conference objectives were filled: "Proactively Monitoring Emerging Risks Through the Analysis of Occurrence and Investigation Data," "From Daedalus to Smartphones and NextGen: The Evolution of Accident Investigation Tools and Techniques," and "Challenges in Transferring a Predictive Safety Tool from Flight Operations to Aircraft Maintenance."

From left: W. Tadros, M. Aziz, S. Godley, and M. Langor.

ABOVE: From left: D. Hersman, C. Hanford, N. Johnson, T. Logan, and J. Burin. BELOW: From left: S. Godley, T. Fazio, J. Burin, and J. Delisi.

From left: S. Dionne, M. Guan, C. Menz, S. Zayko, and J. Kolly.

From left: M. Cunningham, A. Cybanski, and F. Camago.

Similarly, NTSB objectives were partially addressed through four panel discussions in which civil aviation authority representatives from 23 countries and other aviation safety representatives participated. The panels were moderated by Board members the Honorable Earl F. Weener, "Laboratory Support of Accident Investigation, Challenges, and Opportunities"; the Honorable Christopher A. Hart, "Challenges Associated with Parallel Investigations"; the Honorable Robert Sumwalt, "Covering the Gap from the On-scene Phase to the Final Report"; and the Honorable Mark Rosekind, "Developing and Fostering Safety Awareness."

Award of Excellence

The truth of the old adage that "the best is always saved for last" surfaced on the last day of the seminar when Capt. Harry Nelson, Airbus's executive operational advisor for product safety, made his "Learning from Past Experiences" presentation. It was awarded ISASI's "Award of Excellence" as the best delivered paper of the seminar.

He took the audience on a journey of learning over the past 100 years and peeked into the future as well. His message was that "industry teaching focuses on what we have to do with problems we know about, but some situations can't be trained for in advance." As a consequence, "we need to be teaching young crews how to 'think' about problems, how to 'approach' them, how to 'prioritize' and then how to 'progress' them safely."

He gave three examples of Black Swan exceptional group events, events that cannot be trained for in advance. "These are events that start as a 'routine' event but suddenly deteriorate into something much more serious. They require the crew to adapt very quickly and to release previous mindset data—not easy, especially when fatigued."

Capt. Harry Nelson makes his Award of Excellence presentation.

In these three examples "Everyone got home."

1. Missile hit. No hydraulics, fire, fuel leak, no flight controls, wing surface damaged. The A300 was struck by a missile on Nov. 22, 2003, as it departed Baghdad. All hydraulics were lost, but the engines were running. The crew, he stressed, "had to learn to fly and land an aerodynamically asymmetric aircraft by thrust only. The PIC (pilot in command) was in the dark in terms of stability control but found a way to fly the aircraft.

2. Focus on landing. Multiple strikes by Canadian geese, no engines, low altitude over major city. This was the US Airways Flight 1549 bird strike and ultimate ditching in the Hudson River in New York on Jan. 15, 2009. Through a flight simulation of the aircraft from takeoff to ditching, Nelson discussed the maneuvers within the three minutes and 31 seconds from birdstrike to ditching. He stressed that the lack of time drove the priorities. All 155 persons were safely evacuated.

From left: F. Camargo, Y. Yanagisawa, H. Yetterberg, and J. Vincent.

From left: P. Sleight, M. Usman, J. Friedman, P. Judge, and D. Straker.

From left: M. Sawyer, M. Graves, J. Graser, J. Stoop, and L. Groff.

3. Crew management. Uncontained engine disk burst, 600 plus wires cut, fuel leaks, multiple system failures with numerous alerts and warnings plus serious structural damage. The A380-842 departing Singapore on Nov. 4, 2010, lost engine No. 2 at 7,000 feet to an uncontained failure of the intermediate pressure turbine disk that pierced the left wing leading edge and front spar and the belly fairing. The flight had a flight crew of five, a cabin crew of 24, and 440 passengers.

In the cited examples, Nelson said all of the flight crew stayed calm, focused on flying the aircraft, and managed the workload through an application of leadership, decisiveness, and teamwork. They exhibited sound basic skills and knowledge, prepared a plan of action while staying open to changes, and used the procedures where appropriate—but did not do so blindly. He concluded with this advice: "fly, navigate, communicate," or more precisely, "fly, assess, adapt, act."

Assembly activity

It takes a very interesting program to retain the attention of 300 plus persons throughout three 9-hour days of sitting elbow-to-elbow listening, watching, and taking notes. But interest was high, and attendees

The audience of 300 plus gives its full attention for three days.

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remained attentive, active, jovial, and—during each morning and afternoon Q-&-A period—questioning.

Seminar planners are well aware that subject matter alone is not enough to "keep spirits bright." Accordingly, the program day was peppered with door prizes and giveaways provided by the 21 corporate sponsors (see sidebar) and related interested parties. Door prizes included articles of clothing, books, airplane models, pocket gifts, airline travel tickets, and reward points for travel. Regardless of the size or value of the prize, the ticket calling and response always provided a break from the instructive time that preceded it.

But the most anticipated break time was the 30 minutes between session when all emptied the conference room for coffee, tea, and refreshments. The objective was the chance to chat with someone about a presentation or another subject that was sure to invite a response. Unlike the structured program, networking opportunities are unrestricted. They are enlightening, generally pleasant, and always fulfilling. Indeed, the opportunity to make contact with safety professionals from all walks of the international aviation community has always proven to be one of the major benefits of ISASI seminars.

Coupled with the program breaks were the two social events of the seminar: the President's Welcome Reception and, this year, the evening cruise aboard the Spirit of Baltimore along the Patapsco River, made possible by the sponsorship of Qatar Airways. Both these events were well appreciated and used for reconnecting with old friends, making new friends, and, in the case of the boat trip, relaxing to the motion of the vessel in the breeze of the night—a needed break after two days of sitting in hard chairs, taking in new ideas, and digesting their meaning.

Questions from the floor following morning and afternoon sessions.

Keynote speaker Hersman opens ISASI 2012.

Two persons on opposite ends of the experience spectrum expressed their seminar experience as follows: Capt. Carol L. Stone, of the US Airline Pilots Association, said, "We had such a productive and enjoyable time in Baltimore. We were able to develop cooperative relationships with the officials of 14 of the countries to which US Airways flies. There is no better venue for those of us involved in the betterment of aviation safety than at the ISASI convention. Congratulations on another superb seminar. Please pass USAPA's thanks to all of the people who worked so hard."

And from David Hamblin, a university student: "I just wanted to sit down and say thanks for everything at the ISASI conference. I am a senior in mechanical engineering at the University of Tennessee, and I think I learned so much more from the conference than I ever have in engineering school! I am a member of several engineering societies, and not one of them reaches out to its student members like yours. I know now, more than ever, that networking and relationship building are really the key foundational elements to a great career. To say that the ISASI conference provided me with some of those key elements would be a huge understatement! Thanks again for a great conference and for all the work you do at ISASI."

Companion events

For ISASI delegates, the week is filled with work activities. But for companions who take advantage of the planned companions' program, the week is filled with buses, walking, sightseeing, and tasting various cuisines. The 24 enrolled companions enjoyed two full days of activities.

The city of Baltimore, celebrating the 100th anniversary victory of the War of 1812, was immersed in activities and displays commemorating the event. On the first day of the tour, the out-of-country companions got a firsthand look at American history from the American Revolution to post World War II. The group travelled to Towson, Maryland, to the Hampton National Historic Site. There, park rangers described the ma-

ISASI's 43rd Annual International Seminar On Air Accident Investigation

Companions visit the Sunshine Grill at Boordy Vineyards, above. Part of the tour of Annapolis is a visit to a crab house, left. Some enjoy the first-time experience of eating the renowned Maryland Blue crab, others not so much.

jor phases of American social, cultural, and economic history across three centuries.

From there, the group visited Ladew Topiary Gardens, with its more than 100 larger-than-life topiary forms that serve as centerpieces to designated garden rooms. Next was lunch at the Sunshine Grill of Boordy Vineyards. True to its name, sunshine filled the picnic area, where under shade umbrellas a tasty box lunch was served, followed by a private vineyard tour and an exclusive wine tasting.

The second day's event was a narrated city bus tour en route to a walking tour of Mt. Vernon. There the group viewed the local residences and visited the area's historical edifices, cultural museums, and quaint specialty stores. Lunch was served at the Marie Louise Bistro, where diners made a selection from the local eatery's extensive menu.

Tour day

Early Friday morning, after the festivities of Award Night (see right), the 31 attendees who opted for the optional tour day made the 20-mile bus trip to the city of Annapolis, capital of Maryland. The day was bright and hot, but walking shoes were necessary to fully appreciate the charming colonial heritage of the well-preserved city historical center.

The first stop was the Maryland State House, the location that once served as the capital of the newborn nation. Legislative meeting rooms of those early days proved well-preserved and stirring to view. Next came a walk of several blocks to the U.S. Naval Academy, which has been part of the Annapolis scene for more than 100 years. The Academy chapel is an imposing sight, as is the magnificent marble and bronze sarcophagus of American Revolutionary War naval hero John Paul Jones, whose body rests in the chapel.

Aside from the visual delights, the tour provided, for some, their first experience of eating the renowned Maryland blue crab. Steamed until bright orange-red, the crustaceans were served hot, stacked on a large tray, and finger lifted by diners onto a paper-covered table. Claws and legs were twisted off, the body halved, and the tender white meat picked from between shell membrane. Needless to say, experience in eating crabs paid large dividends. Those inexperienced found their emotions ranging from an outright "ugh!" to "not too bad."

Award Night

Award Night, the evening of peer recognition, closed the three-day technical program. For the 107 for whom this was a first attendance, it was an evening of unknown events; for those repeat attendees, it was an evening of anticipation, knowing that pure enjoyment would occur. The 300 persons who filled the elegantly linen-covered, crystal-adorned round tables of 10 were not disappointed.

Mary Ann Jung, right, portrays "Amelia," dressed in the aviatrix's garb of the era. A few members of the audience portray significant people in her "journey."

Following a bit of table hopping and mingling, and an exquisitely prepared dinner of tenderloin steak and crab cakes accompanied by selected beverages, attendees were entertained by "Amelia Earhart."

Mary Ann Jung, a local entertainer who has a national reputation, specializes in "making history fun." And she did. She portrayed the icon who is imprinted on the minds of all in the aviation world. Dressed in the aviatrix's garb of the era, Amelia carried the audience through her life, from being enthralled by flight, to fulfillment, to commitment, to adventure, to her ultimate attempt. Along her "journey," she "invited" a few members of the audience to act out the roles of U.S. president (Frank Del Gandio) and Mrs. Roosevelt (Raila Frostell) and navigator Fred Noonan (Marcus Costa). The "story" ended with a loud applause of appreciation for the exactness of the recreation and the enthusiasm of the participants.

President Del Gandio then turned to recognizing those who march the Society forward. He introduced all of the Society's international and local elected officials in attendance, noting that new elections returned Ron Schleede as vice president and that Robert MacIntosh, an ISASI Life Member, assumed the treasurer's office. Further, he gave special attention to corporate members and industry booth participants that helped finance

Awards scholars from left: R. Geske, H. Moats, and F. Mohrmann, with F. Del Gandio, second from right.

ISASI 2012 through their sponsorship.

Not forgotten were those persons who played such a large role in the planning and execution of the annual seminar. These included Barbara Dunn, Robert Matthews, Ron Schleede, and Candy Del Gandio. Special recognition plaques were designed for those persons who voluntarily gave of their time to so admirably deliver the tutorial programs. Also recognized were the all-important new corporate members: Air Accident Investigation Bureau of Mongolia, Papua New Guinea Accident Investigation Commission, the Air Group, Gulfstream Aerospace Corporation, and Aero-Republica.

Tom McCarthy, right, ISASI's long-term treasurer, receives kudos for his outstanding service from President Del Gandio.

Individual recognition was made to newly inducted ISASI Fellow Member Dr. William G. Welch. Also called to the front platform were the four students who were awarded ISASI-sponsored Rudy Kapustin Memorial Scholarships for the 2012 school year (see *ISASI Forum* July-September, page 10).

Two individuals received special attention: Tom McCarthy and Curt Lewis.

Tom, the 2007 Lederer Award recipient, was recognized for his 16 years of work as the Society treasurer, a post he decided to relinquish now that he has it "all in order." An ISASI member since 1981, Tom has been a Society operations stalwart. He has done multiple duties as Membership and Nominating Committee chair along with "keeping the books" and creating the annual budget. President Del Gandio characterized him as an "indispensable member of this organization who has been totally dedicated over the decades." In reality, owing to the proximity of his residence to the ISASI home office, Tom has also been the maintenance mainstay and real estate czar of the property. In his 59 years of aviation work, Tom has collected an abundance of recognition plaques; hence Del Gandio broke the mold and presented him with the ubiquitous iPad to "push" him into the 21st century.

Curt Lewis, right, is honored as the 2012 recipient of the coveted Jerome F. Lederer Award (see page 16).

The second and ultimate recognition was to Curt Lewis who was selected as the 2012 recipient of the coveted Jerome F. Lederer Award (see page 16). Del Gandio lauded Curt's longtime service to the Society and to his principles and contributions to aviation safety. He is an ISASI Fellow and has served as past president of the Dallas-Fort Worth Regional Chapter and as past president of the United States Society of Air Safety Investigators.

Curt emulates Jerry Lederer's penchant for wide distribution of safety information through his free Internet aviation-safety-related news digest (FSINFO) that reaches 40,000 readers. In making the presentation, Del Gandio said, "[His] safety contributions to the aviation industry, his commitment to advancing aviation safety as an educator, and his many years of tireless service to ISASI make him an outstanding recipient of our Lederer Award."

The award winner's quiet demeanor was evident in his words to the audience that thundered his approach to the lectern: "Thank you. I deeply appreciate your honoring me with this award and your recognition of my dedication to 'everything safety.' I commit myself to the principles established by the 'Father of Aviation Safety.'"

In closing ceremonies, Del Gandio called upon Barbara Dunn to receive the traditional passing of the "gong," the chime used to summon seminar attendees back in session after breaks. The Canadian Society, of which Barbara is president, will host ISASI 2013 to be held in Vancouver, British Columbia, Canada. ◆

Tutorial plaques are given to A. McMinn, left, and M. Schuurman, above.

In closing ceremonies, Del Gandio calls upon Barbara Dunn to receive the traditional passing of the "gong," the chime used to summon seminar attendees back in session after breaks.

Curt L. Lewis: ISASI's 2012 Lederer Award Recipient

The Jerome F. Lederer Award is presented for "outstanding contributions to technical excellence in accident investigation…."

By Esperison Martinez, Editor

E. MARTINEZ

Curt Lewis, right, accepts and displays the coveted Jerome F. Lederer Award from ISASI President Frank Del Gandio.

The annual presentation of the Society's highest honor, the Jerome F. Lederer Award, to ISASI Fellow Curt L. Lewis marked the end of the Society's three-day-long air accident investigation seminar that shared lessons learned, personal experiences, and investigative innovations in conducting aircraft accident investigations. Following a rigorous vetting process, the Jerome F. Lederer Award was presented to a person with a career of making outstanding lifetime contributions to technical excellence in furthering aviation accident investigation and achieving ISASI objectives.

Introducing the award winner to the banquet guests, President Frank Del Gandio said, "Curt is a life-long contributor to aviation safety and aircraft accident investigation. He is a consummate representative of the principles and contributions to aviation safety for which ISASI stands. He is an ISASI Fellow with a long history of service to our Society as a member, as past president of the Dallas-Fort Worth Regional Chapter, and as past president of the United States Society of Air Safety Investigators. He has contributed mightily to the active Dallas-Fort Worth Chapter, which hosted one of the most highly attended ISASI annual seminars.

"Jerry Lederer's overarching fervor was to achieve wide dissemination of safety information. Curt's latest air safety involvement embraces this fervor. He has created and continues to publish the free Internet aviation-safety-related news digest (FSINFO) that reaches 40,000 readers. This accomplishment is just the upper tip of the iceberg when it comes to his contributions to our industry.

"Currently, he is an assistant professor with Embry-Riddle Aeronautical University–Worldwide [discipline chair for aviation safety]. Additionally, he is president/owner of Curt Lewis & Associates, LLC. The consulting firm's major specialties are aviation/airline safety, accident investigation and reconstruction, Safety Management Systems, and litigation support.

"Prior to retirement from American Airlines, he served as its corporate manager of flight safety and flight operational quality assurance and later as director of system safety. Additionally, Curt held safety management positions with LTV-Vought Aerospace and Texas Instruments, and was a flight training instructor for Boeing and a corporate pilot.

"In all, Curt has in excess of 35 years of safety experience as a professional pilot, safety engineer/director, and air safety investigator. He holds an airline transport pilot license, and is a certified flight instructor with more than 10,000 hours of flight experience. Curt is also a certified safety professional (CSP), professional engineer (PE), and an ISO-9001:2000 certified quality auditor (PA), as well as a Fellow of the UK Royal Aeronautical Society (FRAeS).

"Curt Lewis's safety contributions to the aviation industry, his commitment to advancing aviation safety as an educator, and his many years of tireless service to ISASI make him an outstanding candidate for our Lederer Award."

The 300 persons seated at banquet dinner tables gave thundering applause as President Del Gandio presented the coveted award plaque. Lewis, who had been standing by as all his past accomplishments were recited to the large crowd, felt similar emotions to all those who have stood where he was—a touch of embarrassment, a sense of pride, and a strong feeling of kinship.

One would imagine that a man who captures the attention of 40,000 readers, delivers classroom safety lectures, and has directed multiple safety programs would be a bit overly expressive. Yet those in the audience who knew the award winner were not surprised when he stepped to the lectern, gazed out to the audience, and in a soft voice said, "Thank you. I deeply appreciate your honoring me with this award and your recognition of my dedication to 'everything safety.' I commit myself to the principles established by the 'Father of Aviation Safety.'"

The Iconic Man Behind the Award…

Jerome F. Lederer: 'Father Of Aviation Safety'

(Material excerpted from ISASI Forum, *April–June 2004, page 4,* Jerome F. Lederer: 'Father of Aviation Safety.'*—Editor)*

Jerry Lederer's aviation lore stretches back to the time of wooden wings and iron men when he joined the U.S. Air Mail Service in 1926 at Maywood, Ill., as an aeronautical engineer. His aviation safety prowess would become renowned. Along his route to becoming a legend, he became, in 1965, a member of the Society of Air Safety Investigators, forerunner to ISASI, and in 1969 he became the second president of our organization. In time, and in his honor, the Society established the Jerome F. Lederer Award. Jerry "flew west" at age 101 on Feb. 6, 2004.

Known as the "Father of Aviation Safety" throughout the industry even before the U.S. Congress recognized him as such in 1997, Jerry himself never believed that to be true: "It's nice to be known as that, but I don't really think I am." He believed the Wright Brothers really deserved that honor…. They originated design concepts like positioning the engine beside the pilot to lessen danger…and the first flight data recorder.

That exchange personified Jerome F. Lederer's quiet, unassuming nature. Yet those who knew him, worked with him, talked with him recognized the depth of knowledge and selflessness that lay within the man whose small frame, cherubic features, and twinkling blue eyes belied his towering public stature.

Born on Sept. 26, 1902, the year before the Wright Brothers launched the world into powered flight, Jerry's flight safety career spans the entire aerospace safety spectrum and other areas of public interest as well. During his remarkable aviation career of more than seven decades, he became, as one author wrote in 1970, "a veritable walking encyclopedia of aviation lore and safety facts and figures and a man of vision to challenge the seers of all times."

He lived with the growth of aviation safety from the time the U.S. Post Office operated the nation's accident-plagued transcontinental air mail service and with the nation's early ill experiences of space flight safety to the present era, when aviation is considered the safest form of public transportation.

U.S. Air Mail Service

Holding bachelor's and master's engineering degrees, Jerry, in 1926, joined the U.S. Air Mail Service (1918–1927), at Maywood, Ill., and became aeronautical engineer of the world's first system of scheduled air transportation, in which one of every six airline pilots died in crashes each year. It was here that his predilection for flight safety took hold. Bad-weather flying, coupled with technical problems, predominated as the cause of aircraft accidents that were taking the lives of so many pilots. The usual cause of death was a fire following a crash. He devised an experiment that showed when the airplane crashed, the fuel spilling out of the tanks—which were carried up front in the fuselage—would go onto the hot exhaust manifold and start the fire. He drew specification for new parts and developed test methods for new ways of operating the plane.

Designer, fabricator, communicator

In June 1927, Jerry left the Air Mail Service and began a consulting career by forming his own company, Aerotech, in Davenport, Iowa. His involvement in aircraft accident prevention began in earnest when he joined Aero Insurance Underwriters of New York in 1929. He became chief engineer in charge of loss prevention for one of the world's largest insurance companies. His FSF [Flight Safety Foundation] recorded interview says, "I was in charge of accident risk analysis. I would go over the losses, and I learned a lot about what was happening in aviation that should not happen. I started writing a newsletter to keep our insured operators out of trouble. We reduced accidents. The newsletters made such a big hit that we used to send them by the thousands to airlines [worldwide]." In his lifetime he would write one book [*Safety in the Operation of Air Transport,* Norwich University, 1938] and hundreds of papers and articles that are now archived in the FSF Jerry Lederer Aviation Safety Library.

Jerry believed that "risk management" was a more useful term than "safety." He often stated, "Risk management is a more-realistic term than safety; it implies that hazards are ever present, must be identified, analyzed, evaluated, and controlled or rationally accepted. Accepting the premise that no system is ever absolutely risk free or conversely that there are certain risks inherent in every system, it becomes an absolute necessity that management should know and understand the risks that it is assuming."

Aviation's first safety chief

By 1940 Jerry had attained a full-fledged reputation in the flight safety arena and was selected to become the first director of the Safety Bureau of the Civil Aviation Board, serving until 1942. As director, he was responsible for the promulgation and violation investigation of all civil aviation safety regulations and for directing all civil aviation accident investigations. During his tenure, Jerry laid the foundation and led the development of accident investigation procedures and regulatory standards. The principles and procedures he developed are essentially followed to this day by the United States National Transportation Safety Board (NTSB) and countless other government and military safety investigation groups. Indeed, the provisions eventually became a part of the U.S. contribution to standards, recommended practices, and guidance material in Annexes 1, 6, 8, and 13 of the ICAO accident investigation and prevention manuals as well as other documentation.


E. MARTINEZ

Jerry Lederer (1902–2004)

During his years at CAB, Jerry was involved with many safety advances. Two in particular involve the evolution of anti-collision lights and flight data recorders. Jerry received a report from the Air Line Pilots Association (ALPA) of a developing nighttime hazard involving DC-3s and the faster military aircraft being developed. The report said that military pilots could not distinguish the stationary lights of the DC-3 from city lights when the DC-3 was being overtaken in flight.

Jerry recorded this recollection, "Because ALPA believed we should do something about it, I started a project to test flashing lights. Some people in the Civil Aeronautics Administration did not think much of the idea and were fighting me…. We went ahead anyway. American Airlines loaned us a DC-3. We had several different kinds of flashing lights made and put on the airplane, on the tail, and also on the navigation lights. The way we judged the best intervals of the light/no light was to stand on the roofs of our houses at night and make notes while the airplane circled…. That's was how anti-collision lights evolved."

In 1942, he was tapped by the U.S. Air Transport Command to serve as director of training within the Airline War Training Institute. In this position he had oversight responsibility for the training of more than 10,000 pilots and navigators and 35,000 aircraft technicians. Under his guidance, the command produced 15 textbooks in 15 weeks, including one on survival in the event of a crash in a jungle, in the ocean, or elsewhere.

Breaking new ground

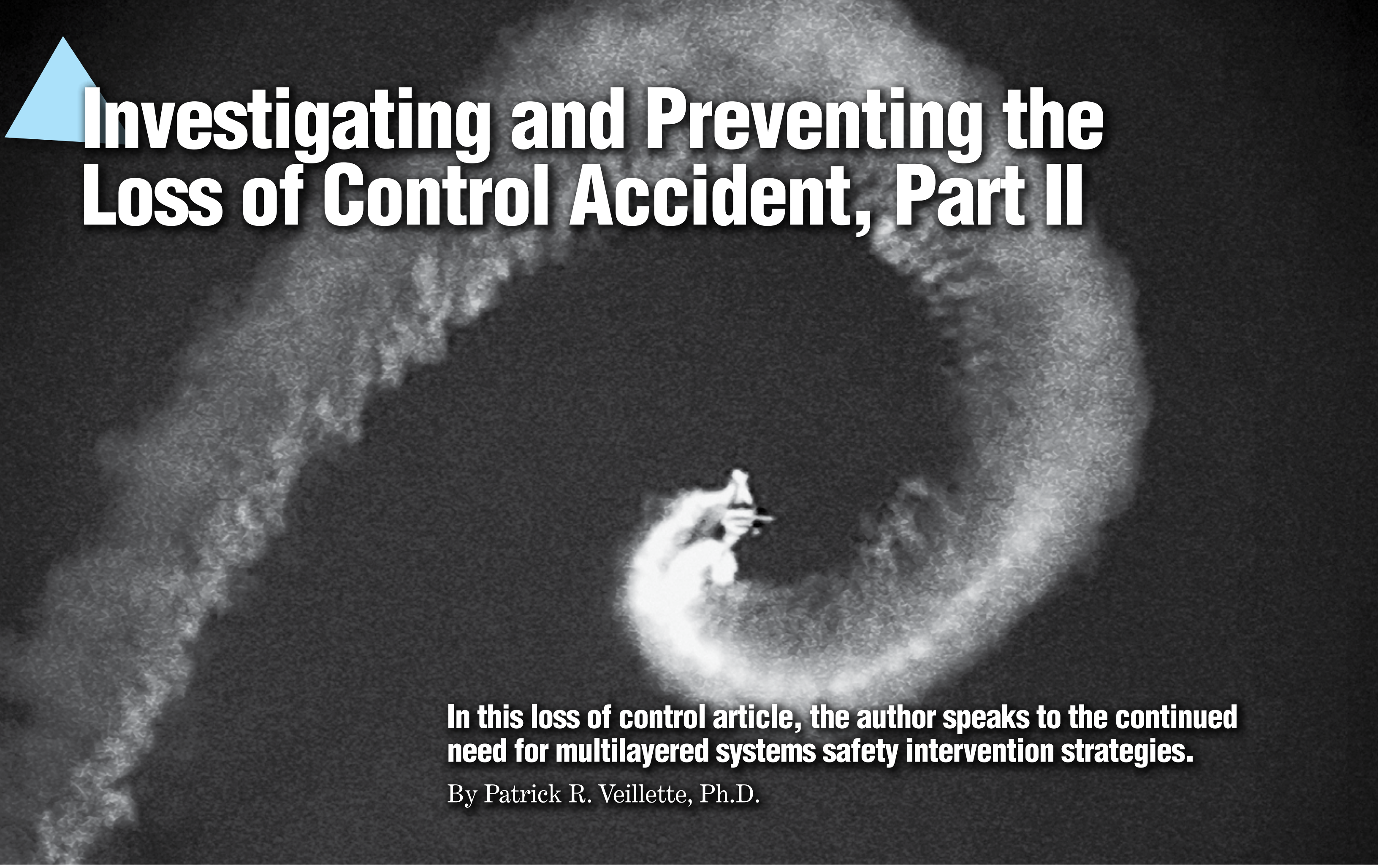
Following the war, Jerry found a way to achieve his passion for sharing safety information; he established Aircraft Engineering for Safety (AES). It disseminated safety information across commercial and national boundaries. The event leading to the formation of AES in 1947 was the crash of a TWA Lockheed Constellation resulting from an inflight fire that killed all occupants except one pilot. As a result of the investigation and public hearings into the crash, several flight safety experts recognized the usefulness of the Aero Insurance Underwriters safety bulletins, which Jerry had published. It was suggested that similar efforts would also be valuable to the entire aviation industry. "When word got around that I was starting up, some people said that I should not get into this stuff, that I would be sitting on a keg of dynamite, that it would ruin my career, and that safety was not a saleable object—shows you how safety was a hard sell in those days. You mentioned safety and you scared people away. That is the big thing that I had to overcome—by diplomacy, mostly, and by not putting out things that would scare people," said Jerry.

AES merged with a group that was studying cockpit layouts from a human factors point of view. The merged group took the name Flight Safety Foundation (FSF). The first seminar drew only eight people, but the number grew to 50 at the second seminar and kept growing. The present-day FSF is rooted in the recognition that sharing safety information is vital to the health of the industry. While at the foundation in 1948, he organized the first U.S. aircraft accident investigation course by a private organization, using former CAB colleagues as instructors.

National roles

From 1950 to 1967, he was director of the Cornell University-Guggenheim Aviation Safety Center. The center frequently highlighted significant areas for further research. In 1956, he was appointed to U.S. President Dwight D. Eisenhower's seven-person Aviation Facilities Investigation Group, which paved the way for the organization of the FAA and modernized the air traffic control system. And in 1965, Jerry represented the United States in supporting the ICAO Jet Transport Implementation

(continued on page 30)



Investigating and Preventing the Loss of Control Accident, Part II

In this loss of control article, the author speaks to the continued need for multilayered systems safety intervention strategies.

By Patrick R. Veillette, Ph.D.

(This is Part II of the author's adapted article that appeared in the July–September issue of Forum*. The article was adapted with permission, from the author's paper entitled* Loss of Control: Investigating and Preventing the Loss of Control Accident—The Continued Need for Multilayered Systems Safety Intervention Strategies *presented at the ISASI 2011 seminar held in Salt Lake City, Utah, Sept.13–15, 2011, that carried the theme "Investigation—A Shared Process." The full presentation, including cited references to support the points made, can be found on the ISASI website at www.isasi.org under the tag ISASI 2011 Technical Papers.—Editor)*

Automation mismanagement

Mismanagement of cockpit automation was the second leading cause of loss of control (LOC) accidents. This study found seven accidents and 38 ASRS reports in which autopilot mismanagement caused temporary LOC. An example of this happened on Sept. 14, 1999. The Dassault Falcon 900B was descending over Romania when the pilot-flying moved the control wheel to level off at FL150 with the autopilot engaged. The pilot-flying felt a progressive increase in effort on the control column, at which point the elevator servomotor torque reached the maximum value, and the autopilot disengaged. Over the next 24 seconds, the aircraft entered 10 pilot-induced pitch-oscillations with a peak vertical acceleration of +4.7 g and -3.26 g. (The Falcon 900B load factor limits are +2.6 g and -1.0 g.) The cabin was destroyed during the upset. Seven passengers were killed.

The Romanian report said one of the possible explanations for the pilot-flying's attempt to manually override the autopilot was that the pilot was using a technique appropriate for the B-737-400, in which both pilots had received a proficiency check just months prior. Neither pilot had received a proficiency check in the Falcon.

The Romanian report recommended the JAA and FAA require "safe and transient-free disengagement of automatic flight control and guidance systems to prevent hazardous crew automation interactions." It is significant to note that sudden disengagement of automation led to very abrupt aircraft pitching and/or rolling in the seven accidents, all of which jeopardized the safety of aircraft occupants. The FAA's Airplane Upset Recovery Training Aid reminds pilots that "Airplane upsets have occurred when the pilot has made incorrect adjustments…. If the pilot's control inputs are reactionary, unplanned, and excessive, the airplane reaction may be a complete surprise. A continued divergence from what is expected due to excessive control inputs can lead to upset…." Unfortunately, in the seven accidents, pilot control inputs caused

***Dr. Patrick Veillette** is currently a nonroutine flight operations captain for a major fractional air carrier and has authored more than 200 reports on aviation safety. He is a former designated pilot examiner and accident investigator. Dr. Veillette is a graduate of the U.S. Air Force Academy, where he earned a BS degree with distinction in aeronautical engineering and MS and Ph.D. degrees in engineering from the University of Utah. His work has received numerous awards from the Royal Aeronautical Society, TRB, AIAA, and NBAA.*

One of the most common problems in this category involves binding of the flight control due to freezing. For example, on May 9, 2007, a Dassault Falcon 20 was descending toward London (Stansted) after a flight from Gander, Newfoundland, Canada, when a lateral flight control restriction became apparent.

further unwanted oscillations, commonly referred to as pilot-induced oscillations (PIO).

The ASRS reports indicated significant temporary spatial disorientation caused by somatogravic illusion and adverse kinesthetic feedback from the flight controls, both of which significantly compound the ability of the pilot to promptly and accurately detect and make measured and deliberate control inputs. The insight from these ASRS reports helps to explain how highly experienced pilots in many other LOC events have been unable to quickly detect and react to abrupt, undesired aircraft motions.

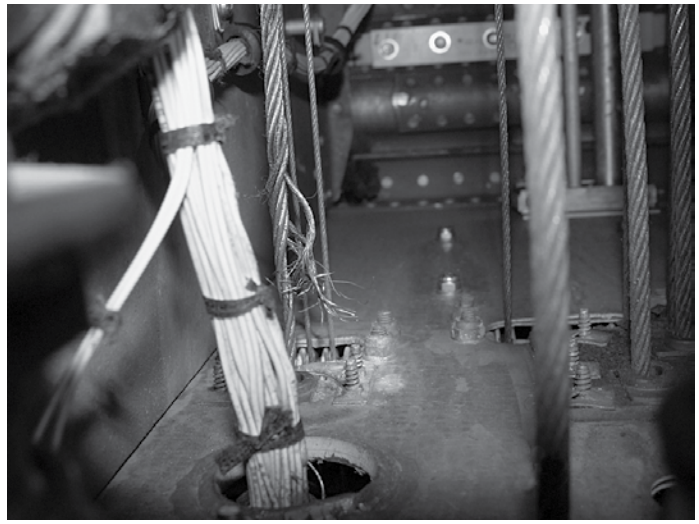
Autopilot mismanagement has also contributed to several other "undesired aircraft states," further highlighting concern regarding the lack of adequate procedures and training to ensure adequate flight crew competency with automation. A BCA study of altitude deviations published in the September 2007 edition found that autopilot mismanagement was a factor in 39 percent of the altitude deviations and 43 percent of route deviations. One astute ASRS reporter wrote, "I am used to an FMS that reverts to 'heading' and displays a message 'couple data invalid.' On the other FMS, it just keeps on truckin' on the last coupled course. Bad situational awareness coupled with minimal FMS knowledge brews trouble."

The Romanian report also recommended "the JAA and FAA make sure that training programs and documentation of all operating airplanes provide sufficient information and illustrative examples of aircraft-pilot coupling and of possible unsafe crew automation interactions." Despite this recommendation, a survey of line pilot results indicated 32 percent performed initial and/or recurrent training in simulators equipped with different FMSs than contained in their aircraft. It should be noted that several of these Part 135 training programs are officially "FAA approved."

The proper policies, procedures, and training should be given to flight crews to avoid adverse auto flight management inputs specific to that aircraft's automation, as well as optimal use of the cockpit automation to lower workload, provide more precise aircraft maneuvering, and enhanced cross-checking and monitoring. It is important that the ground and simulator training discuss and practice the best modes to use, as well as the pitfalls of other modes. It is apparent that frequently the initial, transition, and recurrent training does not provide adequate practice to master the FMS, nor does the simulator training explore some of the more common scenarios in which automation mismanagement has proven problematic.

Flight control malfunction

A flight control malfunction was the third most common cause of LOC accident, resulting in six accidents. Flight control malfunction was also present in 18 incidents in the FAA's records and 11 in the ASRS sample. One of the most common problems in this category involved binding of the flight control due to freezing. For example, on May 9, 2007, a Dassault Falcon 20 was descending toward London (Stansted) after a flight from Gander, Newfoundland, Canada, when a lateral flight control restriction became apparent. During descent the later flight control problem had



become worse. While in a left turn, the bank angle continued to increase. When it reached 45 degrees, the captain disconnected the autopilot with the intention of flying manually. He found that roll control was very stiff when rolling to the right. He used rudder to bring the aircraft to a wing-level attitude. Full force by the pilots was applied to both control wheels in an attempt to recover lateral control, but no movement was possible. The captain was only able to make turns through the gentle use of rudder. He accordingly restricted the bank angle to a maximum of 10 degrees. The flight crew notified ATC that they had a jammed flight control and were unable to do turns to the right and were only able to make shallow left turns. Due to some apparently extraordinary airmanship, the aircraft was landed safely at Stansted and all seven aircraft occupants exited without injury.

During the investigation, a significant volume of water (at least 20 liters) was discovered below the floor panels in the forward fuselage; the water had frozen in flight and caused a restriction to the movement of the aileron trim actuator.

The UK AAIB Bulletin 2/2008 said the water in aircraft bilges could have come from a variety of sources, including leaking plumbing, condensation, and leaking seals. Forensic analysis of the water sample concluded that it was most probably rainwater, which would imply the aircraft had a leaking door seal on the ground. The manufacturer believed a more likely source of the water in question was minor leaks in the area of the icebox drain over an extended period of time.

Additionally, several of the ASRS narratives of flight control failures were also traced back to liquid contamination in the bottom of the fuselage, which subsequently froze in the cold air of higher altitudes during longer flights. The problem isn't as obvious when the aircraft flies shorter legs, but becomes more likely when the aircraft gets "cold soaked" while at altitude for several hours during which the flight controls are barely moved.

Quite recently, the NTSB was made aware of numerous incidents in which flight crews experienced rudder binding in flight in the Citation 560XL. Post flight examination of the tail cone revealed ice around the rudder control cables and pulleys. Given these incidents, it is important to determine whether the specific design of the aircraft makes the flight control system more susceptible to binding or freezing, especially if some form of liquid is allowed to leak into those locations on the aircraft and freeze in flight. It is important for maintenance officials to

Low-level windshear caused six of the accidents and 10 incidents. All events occurred on landing with the aircraft in the final landing configuration (full flaps, landing gear extended).

be cognizant of this potential and inspect aircraft regularly for this potential, and for pilots who are preflighting aircraft to be aware of the potential for leaking fluids.

One of the questions in the LOC problem is whether the flight control malfunction is an issue specific to a particular aircraft make and model, or whether the cause of the upset could happen to any business jet. Of the 11 ASRS events, nine involved incidents associated with aircraft-specific flight control malfunctions. Five of these were the failure of the stabilizer on the Citation XL to reposition itself with retraction of the flaps, as were four of the 13 FAA incident reports. Four other incident reports involved an uncommanded movement of a leading edge flap or slat that caused a sudden temporary LOC. All of the incident and ASRS reports indicated the flight crews regained control of the aircraft after the initial startle, performed the appropriate abnormal checklist, and landed without further incident. Training should expose the flight crew to type-specific control malfunctions, but are the proper recovery procedures adequately flight-tested and documented in crew training manuals?

Alternate control techniques were successfully utilized in three accidents, namely using the rudder to cause minor bank changes in the aircraft. (Alternate control techniques would not have worked in the other three accidents due to catastrophic disabling of the primary flight controls.) Pilots employed alternate control techniques that placed the incident aircraft into a worsening aerodynamic and/or structural state in six incidents. Alternate control techniques were not needed in the 12 other incidents nor 11 ASRS events involving flight control failure. Those aircraft were recovered without further deterioration of the aircraft's flight path and/or structural safety.

Low-level windshear

Low-level windshear caused six of the accidents and 10 incidents. All events occurred on landing with the aircraft in the final landing configuration (full flaps, landing gear extended). All of the accidents occurred within 200 feet of the ground, where the flight crew is intensely concentrating on the dynamics of making a safe landing and is visually fixated on the runway environment using visual stimuli to maintain an appropriate glide path and aim point.

Five of the six accidents occurred when the aircraft was in the landing flare with the throttles in a low thrust condition. This is very significant to the discussion of an attempted recovery because the "spool up" time required to produce full power can be significant—on the order of 7.5 seconds for one of the common powerplants used among jets in this sector. The lack of sufficient thrust for acceleration for such an extent of time, in the fully configured landing configuration, and so close to the ground, produces a situation in which recovery is unlikely. One aircraft did attempt a go-around, but due to the windshear, lack of altitude as a margin, and lack of thrust to accelerate quickly, the aircraft was unable to recover and all persons died in the nonsurvivable accident.

Were proactive windshear warnings available in these cases?

Wake turbulence is the most common cause of deteriorated aircraft control in the ASRS database. This is not surprising since business jets often operate in close proximity to large transport aircraft in both terminal and high-altitude airspace.

All of these accidents occurred at uncontrolled airports with no control tower and no warning from air traffic controllers. It was noted that the GPWS gave a windshear warning in five of the accidents, but unfortunately the warning occurred when the aircraft was already in the landing flare with the throttles at idle. Severe ground impact occurred very shortly thereafter.

Localized wind conditions that significantly differed from the reported winds were responsible for five of the six accidents. AWOS or ASOS sensors were located at "midfield" locations and did not provide an accurate indication of the wind at the threshold location. This is particularly of issue when the runway is set among significant topographical features that can cause very abrupt changes in wind direction and/or speed.

Furthermore, a pilot listening to an AWOS or ASOS signal is likely to get just a short "snapshot" of the wind indication. The wind velocity reported by automated equipment is a two-minute average updated once every five seconds. It is reported once every minute in the one-minute observation and the computer-generated voice message. Thus, instant real-time wind conditions are not reported, and it is possible that winds that are rapidly shifting in direction or magnitude may not be reported as windshear as conventional systems do not provide windshear warnings.

Windshear training is a common component of simulator training syllabi; scenarios are nearly always at a sufficient altitude above the ground, usually during an ILS, and re-create the scenarios of some of the well-known previous windshear and/or microburst accidents. None of the reviewing training involves aircraft close to the runway and with the throttles reduced for landing.

Intentional maneuvers: NRFO and flight training

"Intentional maneuver" was the fifth most-common category causing LOC accidents. Two of these were ostentatious displays,

Wake turbulence was the most common cause of deteriorated aircraft control in the ASRS database.

attempting to do a loop or roll in a business jet. Both maneuvers were entirely outside of normal maneuvers and exceeded the parameters normally experienced in line operations or training. An extensive review of ASRS data submitted by business jet flight crews (more than 6,300 reports) did not reveal other ostentatious displays, thus the extent of lack of airman discipline appears to be very isolated.

More problematic in this category are intentional maneuvers that have inadvertently placed the aircraft outside of the aircraft envelope. All of these occurred during post-maintenance test flights or flight training.

Non-Routine Flight Operations (NRFO) conducted after maintenance will sometimes test aircraft handling closer to the edges of the aircraft envelope than normally experienced in line operations. Sometimes post-maintenance flights test flight control systems that have undergone maintenance. For example, a "stall check" is required in the Hawker series when the TKS panels are removed for any maintenance. The stall check is conducted to ensure the TKS panels are precisely reinstalled on the leading edge of the wing.

An extensive review of accident, incident, and NASA ASRS records found a significant number of additional "threats" that definitely raise the risk levels for post-maintenance functional flight checks. The threats for a NRFO flight are different than a normal flight. Of the 128 reports reviewed for that study, all indicated extra workload in flight induced by the abnormal procedures to test the component. Eighty-two percent indicated a distraction in flight with the abnormal crew coordination procedures required to rest the component. The most common errors found were handling errors, which occurred in 74 percent of the reports. These included lateral and vertical deviations of the aircraft from the desired direction, speed deviations, abrupt aircraft control, and configuration deviations. Recently the NTSB and the FAA have highlighted the need for special training of flight crews who conduct NRFO flights, and for operators to develop adequate operational procedures and training programs.

Simulator training has replaced nearly all forms of inflight training within the scheduled airline industry to mitigate the cost and potential dangers involved with performing maneuvers in a transport aircraft. However, inflight training is still widely used within the business aviation industry.

Five of the LOC accidents in this study occurred during inflight instruction in aircraft. The BCA study of altitude deviations found 18 percent occurred during inflight training during which the attention of flight crews was diverted from the primary tasks of aircraft control. The maneuvers at the time of the loss of control included emergency descent, V-1 cut, touch and go, and deliberate stall maneuvers. All of these place an aircraft close to the edges of the aircraft envelope, and with small safety margins. The NTSB noted in four of the five accidents that while the PIC did hold a CFI certificate, it doubted the adequate qualifications of the PIC to instruct in the aircraft and noted improper type-specific procedures being taught.

Handling margins are thin in reduced vertical separation minima or minimum (RVSM) altitudes.

In the aftermath of a Beech 1900 loss-of-control accident off Block Island, Rhode Island, the NTSB strongly encouraged the maximum use of flight simulators rather than aircraft for flight training. This advice remains equally applicable today.

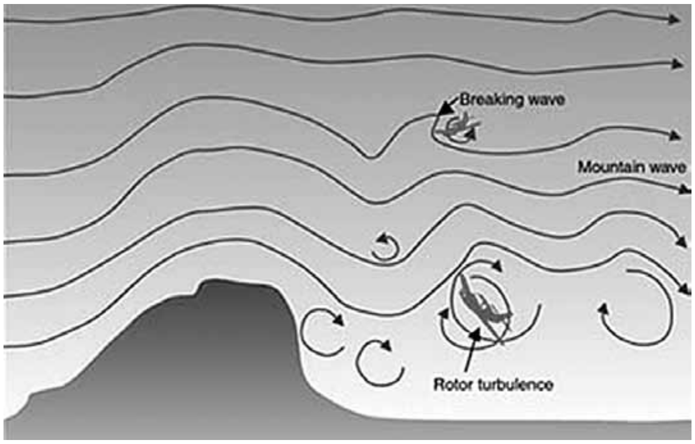
Wake turbulence

Wake turbulence was the most common cause of deteriorated aircraft control in the ASRS database. This is not surprising since business jets often operate in close proximity to large transport aircraft in both terminal and high altitude airspace.

Several distinct trends are apparent in this ASRS data. First, 40 percent of the encounters occurred during approach and landing, and most of these occurred below 1,000 feet AGL. In all of these, the aircraft was in its final approach configuration and presumably near its final approach speed. Sixty-eight percent described an abrupt rolling motion in one direction followed just as suddenly by an abrupt roll in the opposite direction. Bank angles up to 45 degrees were experienced in 87 percent of the encounters. Significant airspeed and altitude losses occurred in 21 percent, caused by a penetration of the downdraft zone that is in between the two counter-rotating vortices.

Two fatal accidents in business jets that perilously penetrated a 757's wake at less than three miles of separation were among a string of accidents and incidents that brought attention to the inordinate strength of the 757's vortices in the early 1990s. NOAA flight testing had previously found the speed of the airflow around the core of the 757's vortices to be an eye-opening 357 ft/sec. Fortunately both the accident data and ASRS data indicate a significant decrease in wake turbulence events with the 757 as a wake-generating aircraft ever since the adoption of increased separation criteria.

Some of the latest wake turbulence research has discovered a distinct tendency for vortices to rebound after the vortex reaches ground proximity. The practical effect is that some vortices may



Low-altitude rotor; updrafts/downdrafts, tropopause/high-altitude handling.

be present in locations where pilots may not have anticipated this hazard, particularly pilots who had thought they flew a high enough glide path behind another aircraft. The variability in wake vortex behavior is actually quite prominent and still stymies the best of the fluid dynamics research community. The scientific data clearly show that wake vortices sometimes don't react in the simplistic manner taught in pilot ground schools.

The other half of the ASRS reports occurred at altitudes where reduced vertical separation minima or minimum (RVSM) operations are now mandatory. Similar to the low-altitude encounters, the onset of the wake encounter was very abrupt, usually starting with an abrupt rolling motion in one direction followed just as suddenly with a roll in the opposite direction. Aircraft encountered more than a 200-foot altitude excursion during the abrupt encounter in 57 percent of the reports. Pilots expressed concern about the safety of their unseated and/or unbelted passengers in 43 percent; and in one particular ASRS report, the neck of the CEOs wife was broken in the back of the Gulfstream when it encountered a 757's wake. Of particular concern with the high altitude encounters is the relatively small "maneuvering margin" during high-altitude operations.

Airbus recently conducted an immense inflight data collection program to investigate the effect of wake turbulence on a large commercial transport. From May 2005 through December 2007, Airbus conducted 77 flights that accumulated 308 flight hours, during which they encountered 1,041 wake turbulence events. Analysis of the data concluded that most of the time the autopilot will control the encounter and will keep the aircraft adequately and safely within the aircraft's flight and maneuvering envelope.

Should these recommendations apply to business jets? The typical airline transport aircraft has considerably more inertia in the rolling axis due to the large amounts of fuel in the wings and the under-wing engines. Thus, it will resist rolling motions much more than will the average business jet design. The typical business jet is rather "fuselage loaded," meaning that most of the mass of the typical business jet is concentrated along the fuselage, which includes the aft-mounted engines. The wing span of the typical business jet are also just a fraction of the wing span of the typical airline transport, meaning that a wake encounter might affect only a portion of the wing span in a transport while affecting a very large portion of a business jet's wing span. Whether the Airbus conclusions and recommendations are directly applicable to the business jet community given these significant performance and handling differences should be properly investigated in a scientific forum.

High altitude

Seven accidents exhibited inadequate crew knowledge of the handling and performance limitations of the flight controls for high-altitude flight. High-altitude handling and performance characteristics were at issue in 34 ASRS reports. An additional 19 ASRS reports categorized under "mountain wave" also included high-altitude aerodynamic handling and performance issues. It is important to note that the operating altitude of most business jets is considerably higher than large commercial transports (several are certified to FL510).

The ASRS reports indicated concerns of high-speed and/or low-speed aerodynamic buffet, significant deviations from assigned altitude, swept-wing aerodynamic issues, knowledge of clear air turbulence/jet stream core or boundary encounters, adequate preflight weather analysis, pilot knowledge to determine the suitability of lower or higher altitude cruise capability and its effect on fuel burn, and noteworthy flight crew reactions to prevent further loss of positive aircraft control. A review of dispatch packages found inadequate preflight weather information regarding locations of high-altitude turbulence potential.

The NTSB identified a number of deficiencies in "high-altitude" training in previous accidents. It has asked the FAA to do work with members of the aviation industry to enhance the training syllabi for pilots conducting high-altitude operations. The syllabi should include methods to ensure that pilots possess a thorough understanding of the airplanes' performance capabilities, limitations, and high-altitude aerodynamics. The NTSB also recommended providing pilots with opportunities to practice high-altitude stall recovery techniques in simulators, during which time the pilots demonstrate their ability to identify and execute the appropriate recovery technique. Queries of pilots throughout the industry indicate such topics have not been rigorously implemented into current training programs.

Several early models of popular business jets were particularly prone to "mach tuck," which led to unrecoverable fatal accidents. Aircraft manufacturers subsequently designed later models with enhanced features to prevent adverse high-altitude handling characteristics such as mach tuck. It is worth noting the absence of mach tuck events in the databases searched in this study. One can infer the effectiveness of those design elements in preventing a notable adverse handling condition.

Mountain wave

Three prominent threats to aircraft control caused by mountain waves were found in these databases, namely the low-altitude rotor, the high-altitude turbulence predominantly at the upper layers of the wave where it interacts with the tropopause, and the updrafts-downdrafts.

Atmospheric rotors are intense low-level horizontal vortices that form along an axis parallel to and downstream of a mountain ridge crest and pose a great hazard to aviation due to the potential for very strong lower tropospheric turbulence and shear. The FAA's Airplane Upset Recovery Training Aid states, "Moderate

Six of the 18 were attempting to over-fly a thunderstorm cell or band and were ensnared by the outflow in the upper regions of the storm.

turbulence will be experienced 150–300 miles downwind on the leeward side when the wind component of 25–50 knots is at ridge level. Severe turbulence can be expected in mountainous areas where wind components exceeding 50 knots are perpendicular to and near ridge level."

Undesired aircraft states caused by the rotors included severe or extreme turbulence in all of the reports, temporary losses of control or upset, and concerns about passenger injury. ASRS reports contained quotes such as "severe turbulence...unable to keep bank within +/- 45 degrees of bank despite full control deflection."

Atmospheric flight test results and training material contain the same warning to avoid rotor turbulence whenever possible. Despite the clear significance of rotor prediction and avoidance, the dynamics and structure of rotors are poorly understood and forecasted, in part because of infrequent and insufficient observational measurements and inadequate sophistication and fidelity of numerical weather prediction models.

The updrafts and downdrafts within a mountain wave can also produce loss of control. According to the FAA's Airplane Upset Recovery Training Aid, an aircraft attempting to maintain a level altitude on autopilot in the updrafts and downdrafts of a wave will experience significant changes in pitch and airspeed. In the downdraft sections of the wave, the aircraft will pitch up to maintain altitude. This has a serious potential consequence. A significant downdraft can extract significant airspeed from the aircraft, enough to approach the onset of low-speed buffet.

On the updraft side of the wave, just the opposite will happen, with the nose of the aircraft pitching down to maintain altitude. It should be noted that nearly all of these events occurred at significant altitudes (in excess of FL300) where high-altitude aerodynamic handling and performance factors require special attention.

High-speed, high-altitude flight produces considerable changes on an aircraft's stability, handling qualities, and buffet boundaries. These can be a significant concern, especially during an encounter with a mountain wave at high altitude. As air density decreases at higher altitudes, an aircraft's aerodynamic damping decreases, thus the airplane becomes more responsive to control inputs. Higher mach numbers may also adversely affect the stability of the airplane. As mach number increases, airflow over parts of the airplane begins to exceed the speed of sound. Shock waves can interfere with the normally smooth flow over the lifting surfaces, causing local flow separation. As this separation grows in magnitude with increasing mach number, the aircraft's longitudinal stability can be adversely affected. Beyond that speed, the aerodynamic center of pressure begins to shift rearward, inducing a nose-down pitching moment in some swept-winged aircraft.

Research has found that strong mountain waves can propagate their energy vertically and produce steep mountain waves that can cause severe or extreme turbulence at high altitudes. During research flights in the stratosphere over the Sierra Nevada Mountains, research aircraft encountered several cases of severe turbulence that occurred in regions immediately downstream of wave troughs, in areas of slower wind speeds associated with the prevailing upwind tilt of the waves. Research has also found that severe turbulence within 5,000 feet of the tropopause is likely up to 150 miles downwind from a mountain range when a mountain wave exists with winds in excess of 50 knots at ridge top.

Review of the ASRS reports indicated that the flight crews encountered significant high-speed, high-altitude handling difficulties such as "coffin corner," buffet boundaries, airspeed excursions, exceeding airframe airspeed limits, changes in aerodynamic handling and stability, or induced engine problems. Twenty-eight percent of the ASRS sampled reports indicated exceeding the Mmo/Vmo limits for the aircraft and required airframe overspeed inspections in compliance with the maintenance and inspection guidelines upon arrival at the destination. Queries of pilots throughout the industry indicate such topics have not been implemented in-depth into current training programs.

Thunderstorms, microbursts

For years the industry has known that the turbulence within a thunderstorm can be extreme, and that the only safe method for dealing with thunderstorms is "avoid, avoid, avoid." So were the 18 ASRS reports of thunderstorm-induced LOC events due to pilots who ignored this sage advice? No. Six of the 18 were attempting to over-fly a thunderstorm cell or band and were ensnared by the outflow in the upper regions of the storm. It's probably a safe assertion that these six weren't the only ones to fall into this situation. These flight crews were attempting to maintain separation from the visible portions of the cell. Unfortunately, the outflow does proceed for a significant distance above and beyond the visible top of a thunderstorm.

Twelve of the 18 were in IMC conditions when they encountered the thunderstorm, and all of these flight crews were caught by surprise. All of them stated that their radar returns were showing no returns at the time of encounter. This leads to the inevitable discussion of whether flight crews have been properly using the gain and tilt function, or whether this was simply due to the limitations of the rather small radar dishes on most business jets, or both.

The relatively low number of thunderstorm-involved events in this study reveals the relative success of the "avoid" philosophy, as well as the advances in radar technology and coordination within ATC.

It is remarkable to note that microbursts incidents are thankfully absent in the 20-year period covered by this study. Clearly, the training emphasis on "avoid, avoid, avoid," combined with better weather detection and warning technology, has worked. It is important to point out that the "team" effort to prevent microburst accidents included atmospheric research scientists, aeronautical engineers, electrical engineers, etc., in the effort to better understand the conditions that create microbursts, how

(continued on page 31)

ISASI Names New Slate of Executive Officers

The Ballot Certification chairman and Nominating Committee chairman report that 192 votes were certified in the election of the 2012 Executive officers and U.S. Society/international councilor election. Those elected for a two-year term (2012–2014) are as follows: president, Frank Del Gandio; vice president, Ron Schleede; secretary, Chris Baum; treasurer, Robert (Bob) MacIntosh; U.S. councilor, Eugene (Toby) Carroll, Jr.; and international councilor, Caj Frostell. All, except for Schleede and MacIntosh, were incumbents and returned to their positions.

Ron Schleede has been a member and strong supporter of ISASI for more than 35 years. In April 2009, Ron was designated an ISASI Fellow. In 2002, Ron was named that year's Lederer Award recipient. He was also elected president of the U.S. Mid-Atlantic Chapter, a position he still holds. He was first elected vice president of ISASI in 2002, a position he held for eight years. A fighter pilot in the U.S Air Force, he later served with the U.S. National Transportation Safety Board (NTSB) for 29 years. He held a variety of positions, including the position of chief of major aviation investigations from 1985 until 1995, and was deputy director of the Office of Aviation Safety, when he retired in 2000. In December 1999, Ron was designated director of investigations—air at the Transportation Safety Board of Canada as part of an exchange program, where he worked until he retired.

Bob MacIntosh has been active in ISASI for more than 30 years, including participating as a seminar session chair, author, and speaker. He served with the U.S. NTSB as the chief advisor of international safety affairs from 2001 until his retirement in 2011. He was responsible for providing management expertise for U.S. government and industry technical participation in accident investigations on foreign soil, overseeing travel budget allocation, representing the U.S. at relevant ICAO meetings, and managing Safety Board activities included in the U.S. Interagency Group on International Aviation. From 1988 to 2001, Bob was an investigator-in-charge and accident report writer with the NTSB Major Investigations Division. In that position, he led many high-profile domestic air safety investigations (Aloha, Sioux City, Los Angeles collision) and represented the U.S. NTSB in numerous international cases (Lauda, AirInter, LAPA, Concorde) as the U.S. accredited representative. ◆

Bob MacIntosh, left, and Ron Schleede.

ISASI Int'l Council Completes Extensive Agenda

The ISASI International Council, in session on August 26, completed an extensive list of actions, including establishment of a new society, acceptance of two seminar applicants, and adoption of the 2013 budget.

By a unanimous "yes" vote, the Council approved SASI Pakistan to be officially affiliated with ISASI. The new society will be known as the Pakistan Society of Air Safety Investigators (PSASI). The new society is composed of two corporate members, Pakistan International Airlines (PIA) and Pakistan Airlines Pilot Association (PALPA), and 13 individual members. Wing Commander (Ret.) Syed Naseem Ahmed serves as the Society's elected president. PIA serves as secretary, represented by Capt. Adnan Haris. PALPA serves as vice president, represented by Capt. Matin Bhurgri. President Naseem said the affiliation "will be a landmark for Pakistan aviation."

In accepting affiliation, PSASI and ISASI mutually agree to

- at all times adhere to the bylaws of the International Society of Air Safety Investigators and to uphold the honor and dignity of its members.
- cooperate with each other in advancing their common interest.
- respect each other's national and regional jurisdictional policies and to use their endeavors to be represented as a single international society.
- mutually exchange pertinent air safety investigation information.
- respect the constitutional procedures for settling any differences as they may arise between member societies and to abide by the decisions reached.
- refrain from abusing or taking advantage of the confidences reposed in them by the Council of ISASI or any member societies thereof.
- to prevent all consideration of politics, race, color, creed or national origin from influencing the free and fair determination of questions that may come before them.
- faithfully observe the provisions of the ISASI bylaws as now adopted and as hereinafter amended.
- abstain from conduct deleterious to the interests of the air safety investigators profession or that falls below the standards established by the Code of Ethics and Conduct of ISASI.

Annual seminars

The Council discussed the annual seminar program at length, including past practices and present and future practices to ensure the events maintain their ability to draw quality presentations and offer the lowest possible cost to attendees and the widest venues possible.

Continued . . .

LEFT: President Del Gandio, left, and Syed Naseem Ahmed display the affiliation agreement. ABOVE: Treasurer McCarthy makes his final financial report.

The latter item drew particular attention because of the lack of applicants for future seminars. Going into the meeting, no bid existed to host the 2013 seminar. Barbara Dunn, national Seminar Committee chair, noted that while interest for 2013 had been expressed by various countries, no bids had been placed. She said the Canadian Society has been preparing in the event it was needed. She, as president of the Canadian Society, therefore submitted a bid to host ISASI 2013 in Vancouver, B.C., Canada. The seminar will be held at the Westin Bayshore on Aug. 19–22, 2013, with the theme "Preparing the Next Generation of Investigators." By unanimous vote, the Council accepted the bid. Watch for a call for papers at www.isasi.org.

The Council also unanimously accepted the seminar bid for 2014 put forward by Lindsay Naylor, president of the Australian Society. His society plans to host the event in Adelaide, Australia, Oct. 13–16, 2014. Lindsay reported that Adelaide has an international airport to facilitate travel. Travel from North America would connect through Brisbane, Sydney, or Melbourne. The present planned location is the Stamford Grad Hotel, which is a beachfront property in Glenelg, Adelaide. The hotel has 220 rooms, and overflow arrangements are being sought at hotels in close proximity. ASASI has selected the theme "ISASI and Safety Management Systems." A traditional program is planned: one day of tutorials and three days of technical presentations with networking events as usual.

Financial report

Tom McCarthy, ISASI's long-serving treasurer, elected not to run for office in the recent elections; hence this was his last ISASI national financial/budget proposal to be put before the Council. But with the thoughtfulness, care, and detail to attention he always has provided, Tom invited Bob MacIntosh, the newly elected treasurer, to join him in the budget's preparation to ensure that continuity in the budget process was maintained.

Tom reported that the Audit Committee has completed its fiscal review of 2011 records and found all acceptable. In reviewing, he also noted the history of gaining tax relief from Loudoun County and the state of Virginia and the considerable tax savings ISASI has achieved. He further reviewed bank balances and cash on hand. Proceeds from the Salt Lake City seminar went directly into the ISASI reserve account, which is approximately at 75 percent of the US$100,000 goal.

Turning to the 2013 budget, Tom said it will produce a positive cash flow of $6,109.02. He called it a "solid document, based on past accounting data, as well as known and projected expenses and income." After reviewing the line items, Tom recommended adopting the budget as presented and recommended a review of its status in the spring 2013. The motion to accept the budget was passed unanimously. In addition, the Council gave him a very sincere expression of appreciation for his many years of "keeping the books." ◆

New Zealand Elects New Officers; Sets ANZSASI Annual Seminar

The New Zealand Society has elected new officers: president, Alister Buckingham, and vice president, Al Daley. Retained in office are secretary/treasurer Russell Kennedy and international councilor, Pete Williams.

In addition, the Society announced that the annual Trans-Tasman seminar will be held jointly with the Australian Society in Christchurch, New Zealand, on June 8 and 9, 2013, at the Chateau on the Park Hotel. The seminar will follow the normal format of a cocktail reception on Friday night, working days on Saturday and Sunday, and the seminar dinner on Saturday night.

While the Call for Papers has not yet been issued, anyone from outside the region wishing to present a paper at the seminar should contact Alister by e-mail at alister.buckingham@caa.govt.nz. Further details will be posted on the ISASI website later in the year.

Alister (or AB as he is more commonly known) is currently a safety promotion adviser with the CAA of New Zealand. Previously he served as an inspector of air (and later rail) accidents with the Transport Accident Investigation Commission under the tutelage of the late Ron Chippindale. He continued this line of work with the CAA, completing 14 years in safety investigation. This experience was followed by three years in the CAA's ICAO liaison role plus almost five years in his current position. His aviation background includes both civil and military flying, and he describes himself as a "mixed-wing" aviator, holding Australian and New Zealand helicopter and airplane ATPLs, as well as a

Alister Buckingham, left, and Alan Daley.

Speakers and Technical Papers Presented at ISASI 2012—Baltimore, Maryland, USA

Tuesday, August 28
Seminar Opening—*Frank Del Gandio, President of ISASI and Seminar Chair*
Keynote Address—*Honorable Deborah A.P. Hersman, Chair, U.S. NTSB*
Making Safety Predictive in a Reactive World—*Jim Burin, Flight Safety Foundation*
The Role of Voluntary Safety Programs in SMS—*Tim Logan, Southwest Airlines*
Facing the Change: From Organizational Responsibility to Personal Accountability—*Carmen Hanford, Royal Australian Navy*
Safety Boards and the Evolution of Predictive Safety Management—*Mike Cunningham, TSB Canada*
The A320 Overrun in Sao Paulo, in July, 2007—*Fernando Camargo, CENIPA, Brazil*
Ultra Low Cost FDR for GA and Legacy Aircraft—*Major Adam Cybanksi, Royal Canadian Air Force*

Wednesday, August 29
Keynote Address—*Honorable Wendy Tadros, Chair, TSB Canada*
Monitoring Emerging Risks Through the Analysis of Data: Techniques Used by Australian Investigators—*Stuart Godley, ATSB, Australia*
Maintenance Safety Survey: Transferring Predictive Safety Tools from Flight Ops to Maintenance—*Marie Langer, Cranfield University, UK*
Managing a Major Accident Investigation in a Small Country; Ethiopian #409, Off the Coast of Beirut—*Capt. Mohammed Aziz, MEA/Air Liban*
The Benefits of a Safety Studies Program to Proactively Promote Aviation Safety—*Joseph Kolly and Loren Groff, U.S. NTSB*
Design of an Innovative Stall Recovery Device—*Kindunos Gorinchem and John Stoop, Delft University of Technology, the Netherlands*
From Daedalus to Smartphones and NextGen: The Evolution of Accident Investigation Tools and Techniques—*Jay Graser, Gemitek*
Revisiting Trajectory Analysis: Evolving the Cranfield Model—*Matthew Greaves, Cranfield University, UK*
The Use of Odd's Ratios to Quantify the Relationship Between Causal Factors and Errors—*Michael Sawyer and Katie Berry, Fort Hill Group*

Thursday, August 30
Reactive and Proactive Flight Data Usage—*AIB Nigeria and Mike Poole, Flightscape*
Issues in the Investigation of UAS Accidents—*Tom Farrier, Former USAF, ISASI UAS Working Group*
A Holistic Approach to Aircraft Accident Incident Investigation—*Phillip Sleight, AAIB, United Kingdom*
Learning from Experience—*Capt. Harry Nelson, Airbus (No text available)*
Keynote Address—*Jean-Paul Troadec, Director, BEA*
Flight Recorders: AF447—*Léopold Sartorius, BEA*
Human Factor Issues: AF447—*Sébastien David, BEA*
Media and Victims' Families Issues: AF447—*Martine Del Bono, BEA*

steam locomotive driver's certificate.

J. Alan Daley began his flying career in 1971 at the Auckland Aero Club, Ardmore, New Zealand. Working his way through general aviation, he progressed to airline transport pilot license (airplane) in both Australia and New Zealand. He holds a Category A flight instructor rating (airplane) and is a flight examiner. Flight operations have included Papua New Guinea, Australia, and New Zealand

He completed a bachelor of aviation (aviation management) degree at Massey University in 2004. Since joining the CAA of New Zealand in 1999, he has investigated 198 accidents, including more than 20 fatal accidents, and has been involved with investigator training with the CAA Safety Investigation Unit. He is currently an aviation examiner with the CAA and is looking forward to his role as vice president of NZSASI. ◆

ISASI SoCal Chapter Hosts 21 Attendees

The recently reactivated Southern California ISASI Regional Chapter held a "very successful" chapter meeting on October 6 at the USC Aircraft Accident Investigation lab in Los Angeles, California. Twenty-One attendees listened to feature speaker Michael Huhn, an

Mike Huhn, right, uses aircraft wreckage to amplify points of his presentation.

NTSB investigator, give a presentation on the accident of N17803, a BE-36. The aircraft wreckage is contained in the accident lab and exemplifies the points of Huhn's presentation.

In addition to the NTSB presentation, Jean-Claude Demerjian made an excellent presentation on the Concorde trial in France, which he has personally monitored. Michael Barr presented a summary of the ISASI 2012 Baltimore, Maryland, USA, conference, and Keith McGuire summarized the ICAO documents that provide guidance for small states in the conduct of aircraft accident investigations. Rounding out the meeting was a description of human factors in ATC by Peter Trono and a summary of RTCA initiatives to integrate UASs into the NAS.

Daniel Scalese, the 2011 winner of the ISASI Rudolf Kapustin scholarship, assisted in organizing the meeting and provided a great deal of help, according to President Thomas Anthony. ◆

Reachout Program Weighs Use of New Technology

The ISASI Reachout program is a nonprofit program that supports free accident investigation and safety management workshops around the world. Started in 2000, it has held 41 workshops in 25 countries, teaching 2,127 aviation safety-minded persons.

Reachout is directed by John Guselli, who reports that "the program has always been prepared to deliver the services of expert volunteers to diverse areas of our aviation world. We now have recently received an opportunity to make a quantum leap through available technology. We recently fielded an enquiry from Hungary from which a potential host organization suggested that ISASI might consider an electronic form of Reachout by webinar.

"This concept would significantly alter our Reachout paradigm. The upside here is that it may no longer require a physical presence of volunteers at a remote location to deliver the Reachout product.

The down side, as always, means that the output will not receive the 'personal touch' or the physical interaction with involved people available on site."

John adds that the Reachout Committee welcomes this new initiative and would be pleased to accept any suggestions from any specialists within the ISASI membership on how Reachout might utilize these new forms of social media to meet its objectives.

The traditional process has been reliant on any intending "host" organizations specifying the particular areas of expertise that were sought for their location. This enabled the Reachout Committee to match necessary skills with available volunteers and then, to physically send volunteers there.

"Through these contemporary means, the Reachout program may well be able to extend the program to even more remote international regions and with a minimum of cost. I would appreciate receiving your constructive thoughts. Please send to jguselli@bigpond.net.au." ◆

GASIG Working Group Reviews Terms of Reference

Marcus Costa reviews ICAO data with the CASIG Group.

Marcus Costa, chairman of ISASI's Government Air Safety Investigators Group (GASIG), held a group meeting at ISASI 2012 in Baltimore, Maryland, USA. Twenty investigators representing agencies of 13 countries discussed ICAO aircraft-accident-related material. Frank Hilldrup from the NTSB provided a brief overview of an informal manufacturing states meeting that was held earlier in the day. The meeting discussed training investigators, the importance of going through the appropriate state contact for information requests, and protecting investigative data, including voluntary reporting information.

In addition, the Group's Terms of Reference were reviewed. Item 9 of the Reference received special attention, and members were urged to provide thoughts and input to Marcus, including anything deemed to be lacking in ICAO documentation related to AIG.

Marcus also noted that ICAO has received several safety recommendations to develop provisions on airborne image recording systems. However, he said, the pilot community has expressed concerns about proper protection of such information. The ICAO Safety Information Protection Task Force is presently discussing the overall protection of safety information, and should complete its work in early 2013.

The Working Groups Terms of Reference, which sets out the objectives for GASIG are

1. Promote the exchange of air safety investigation information.
2. Facilitate and/or share resources as appropriate for the investigation of related accidents in countries in need of such resources.
3. Promote collaboration to avoid the independent parallel efforts toward the same end.
4. Provide mutual assistance in accident investigation.
5. Provide and encourage the proactive approach to air safety investigation through the exchange of information on research, research techniques, and special studies.
6. Provide mutual assistance in the training of accident investigators in both general and specific areas.
7. Promote liaison between safety investigators and other professionals within the aviation industry.
8. Promote the investigation by government air safety organizations of accidents and incidents for accident prevention purposes only.
9. Provide advice to ICAO in respect to development of international standards and recommended practices, as well as associated guidance material, for application in the field of aircraft accident and incident investigation and prevention.
10. Create opportunities where government investigation agencies can meet to discuss and share safety-related information.

Persons attending the GASIG meeting included Prita Widjaja (NTSC–Indonesia), Frank Hilldrup (NTSB–USA), Luke Schiada (NTSB–USA), Edith Irgens (AIBN–Norway), David Lim (AAIB–Singapore), Caj Frostell (ISASI), Birger Bull (AIBN–Norway), Darren Straker

ISASI 2013—44TH ANNUAL SEMINAR

"Preparing the Next Generation of Investigators"
Aug. 19–22, 2013
The Westin Bayshore, Vancouver, BC, Canada

Watch for a call for papers at www.isasi.org

(GCAA–UAE), Mark Clitsome (TSB–Canada), Don Enns (TSB–Canada), Yuji Yanagisawa (JTSB–Japan), Koji Fukuda (JTSB–Japan), Jens Friedemann (BFU–Germany), Paddy Judge (AAIU–Ireland), Kevin Humphreys (IAA–Ireland), Fernando Camargo (CENIPA–Brazil), Rob Smith (ATSB–Australia), Michael Guan (ASC–Taiwan), Joseph Li (ASC–Taiwan), and Ann Shih (NASA– USA). ◆

Awards Committee Seeks Jerome F. Lederer Award Nominations

Gale Braden, Awards Committee chairman, announces that the ISASI Awards Committee is seeking nominations for the 2013 Jerome F. Lederer Award. He notes that this award is one of the most significant honors an accident investigator can receive; therefore, the Awards Committee exercises considerable care in determining the recipient.

"I ask each ISASI member to thoughtfully review his or her association with air safety investigators and submit a nomination letter when they identify someone they consider qualified for this outstanding award. The deadline for nomination letter consideration is May 31, 2013."

The purpose of the Jerome F. Lederer Award is to recognize outstanding contributions to excellence in air safety accident investigation. The award is presented each year during ISASI's annual seminar to a recipient who is recognized for positive advancements in the art and science of air safety investigation.

The nomination process is quite simple. Any member of ISASI may submit a nomination. The nominee may be an individual, a group of individuals, or an organization. The nominee is not required to be an ISASI member. The nomination may be for a single event, a series of events, or a lifetime of achievement. The ISASI Awards Committee considers such traits as duration and persistence, standing among peers, manner and techniques of operating, and of course achievements. Once nominated, a nominee is under consideration for three years and if not selected in that period is then dropped. After an intervening year, the candidate may be re-nominated again for another three-year period. The nomination letter for the Jerome F. Lederer Award should be limited to a single page.

Nominations should be mailed or e-mailed to the ISASI office or directly to the Gale Braden, 13805 Edmond Gardens Drive, Edmond, OK 73013-7064 USA. Or send by e-mail to galebraden@cox.net. For private phone discussions, call (home) 405-242-4815 or (cell) 405-517-5665. ◆

UAS Working Group Meeting Sets Action Plan

A dozen ISASI members participated in the ISASI Unmanned Aircraft Systems (UAS) Working Group (WG) face-to-face meeting held in conjunction with the ISASI annual seminar in Baltimore, Maryland, USA, on Aug. 29, 2012. According to Tom Farrier, working group chairman, "Our breakout session was extremely productive and resulted in a sharp focus for what we will be doing in the coming year."

Following a lengthy discussion of the best way forward on the many tasks that lay before the group, the UAS WG agreed to concentrate on building a description of what unmanned aircraft systems are—and are not—before trying to attack safety data or Annex 13 issues. Some interest remained in taking on a line-by-line review of Annex 13, just to get a general sense of what content might need to be added to it to ensure the inclusion of UAS-specific material where appropriate. Anyone who is interested in taking on this project should

Tom Farrier, center, and the UAS Group set agenda.

contact John Darbo (john.darbo@argus.aero) to discuss a coordinated approach to this activity.

The UAS group also will be working to support a UAS-specific chapter in the forthcoming ICAO Document 9756, Manual of Aircraft Accident and Incident Investigation, Part III–Investigation that would describe UAS for investigative purposes. This aligns well with self-imposed "description" task and will allow the group to zero in on what will make investigating UAS accidents different from other aircraft accidents. It will be extremely difficult to get into many of the specific parameters within which UAS operate, at least in the first edition of this product. However, some subjects that are likely to be included are

- different data streams that interact between unmanned aircraft and their ground control stations.
- different ways in which downlinked data are used in different systems.
- how flight-critical data (especially GPS location) are handled from system to system.
- spectrum (i.e., radio frequencies) reserved for UAS operations.

Tom said, "Darren Gaines will serve as the UAS WG liaison to the ISASI Air Traffic Services WG. If any member of the Government Air Safety Investigators Group would like to volunteer to facilitate interactions between your WG and ours, please let me know so that I can add you to our mailing list. For the rest of the ISASI membership at large, if our work sounds interesting to you, join the party!" ◆

U.S. ISASI Society Plans Active Year

The U.S. Society held its annual meeting during the ISASI 2012 international seminar in Baltimore, Maryland, USA. The meeting was attended by approximately 60 members. After introductions and reports on activities from the eleven regional chapters, the U.S. Society President/Councilor Toby Carroll briefed on the Society's activities since the last international seminar.

Two inactive regional chapters, the former San Francisco now renamed the Northern California Regional Chapter (President Kevin Darcy) and the Los Angeles now renamed Southern California Regional Chapter (President Tom Anthony) have been reactivated and have been holding regular meetings. The Northeastern Regional Chapter (President Luke Schiada) has planned a reactivation meeting for Nov. 3, 2012.

Toby Carroll, left, speaks to the U.S. Society group.

Focus action items for this next year will be the reactivation of the remaining inactive regional and student chapters, development of a U.S. Society newsletter, and holding annual seminars beginning in 2013. The other officers in the U.S. Society helping to make this all happen are Troy Jackson, vice president communications, and Anthony Brickhouse, vice president student chapters/mentor program. ◆

The Iconic Man Behind the Award…Jerome F. Lederer: 'Father of Aviation Safety'

(continued from page 18)

Panel formed to evaluate the acceptance of the introduction of jet transport aircraft in international civil aviation.

Two years later, in 1967, following the tragic space capsule fire at Cape Kennedy in which three astronauts lost their lives, Jerry was invited to organize and become director of the new Office of Manned Space Flight Safety for NASA. At that time, he was 65 and had just retired from FSF, having already earned the unofficial title "Mr. Aviation Safety" among his peers.

In 1970, having been awarded the NASA Exceptional Service Medal for his work in the Apollo program, he became director of safety for all NASA activities, responsible for the concept and execution of safety programs throughout the entire organization. He knew the daunting task of managing the risk associated with the complex NASA technology. His background of analyzing risk in the aircraft insurance field influenced his thinking and the terms he used to communicate his ideas about safety. He further believed that defining the task as risk management would help attract the caliber of personnel he wanted at NASA, because "it served as more of a challenge to mental resources than safety, because it stresses the uncertainties."

Jerry dedicated much of his free time to investigations of unique and challenging safety problems, such as drug abuse, subtle cognitive incapacitation of pilots, cockpit boredom, and interpersonal communications. He also served as chairman of the Crew Fitness Panel, SAE [the Society of Automotive Engineers] Committee on the Technology of Human Behavior. He is listed in *Who's Who in America, Who's Who in Engineering, Who's Who in Aviation, American Men of Science, and the Architects of the Age of Flight.* He was elected into the OX-5 Aviation Hall of Fame, the Safety and Health Hall of Fame, and the International Space Hall of Fame.

Following his retirement from NASA, Jerry turned to academia to spread his safety beliefs. He served as adjunct professor and lecturer at the Institute of Safety and Systems Management at the University of Southern California. He actively lectured at various civil aviation safety seminars as well as the United States Air Force Safety Center at Norton Air Force Base. He organized and conducted numerous meetings on aviation safety for the FSF, the International Society of Air Safety Investigators, the System Safety Society, the National Fire Protection Association, the Institute of Navigation, the Society of Automotive Engineers, and the American Institute of Astronautics and Aeronautics; and he served as president emeritus of the International Society of Air Safety Investigators.

Honors

In his lifetime, Jerry received more than 100 honors. In 1965, he was awarded the prestigious Wright Brothers Memorial Award. The citation read, in part: "Aviation's extraordinary safety record to a significant degree is a result of the tireless and devoted efforts of Mr. Lederer. For 35 years, he has worked unceasingly to improve all elements of the flight safety spectrum and concentrated on making compatible the primary elements of flight—the man, the machine, and the ground environment—to ensure maximum safety. In accomplishing this objective, he has taken the leadership in correlating, coordinating, and improving the flight safety activities of the many varied organizations and agencies comprising world aviation."

Other recognitions include the ICAO 1999 Edward Warner Award, the 2003 Cliff Henderson Award for Achievement from the National Aeronautic Association (November 2003), one of the Laurel Legends for 2002 by *Aviation Week & Space Technology,* an honorary doctorate in safety science from Embry-Riddle Aeronautical University (2002), the NASA Exceptional Services Medal, the FAA Distinguished Service Medal, the Daniel Guggenheim Medal, the Amelia Earhart Medal, the Von Baumhauer Medal of the Royal Dutch Aeronautical Society, the Airline Medical Directors Award, and the Aerospace Life Achievement

Award of the American Institute of Aeronautics and Astronautics.

In May 1997, the U.S. Congress recognized the then 95-year old aviation safety innovator by bestowing upon Jerry the title "Father of Aviation Safety" and presenting him "special congressional recognition" for his numerous achievements and outstanding service toward the improvement of aviation safety for all Americans.

But if the Father of Aviation Safety, with all he accomplished, didn't believe that title described him, what did he think did? He once said that the following words from an FSF Distinguished Service Award, which he received in 1967, best defined his career: "For pioneering the flight safety discipline at a time when it was all but unknown, and for pursuing the objective of safer flight with a singular dedication, wisdom, and courage. His belief in and application of the sharing of flight safety information and experience formed the cornerstone of the effort." ◆

Investigating and Preventing The Loss of Control Accident, Part II

(continued from page 24)

to better detect microbursts, and finally, what to do if trapped in a microburst. Such collaborative efforts are needed on the other LOC scenarios.

Conclusions and recommendations

It is possible to opine that the minimal amount of thunderstorm and microburst numbers in this study reflects the effectiveness of a multilayered "avoidance" philosophy. Notably, research from the atmospheric sciences community was used to design better ground- and aircraft-based detection equipment and to provide better atmospheric physical models that were more capable of intermediate and near-term forecasting and detection, and "operationally oriented" materials were drafted into pilot training modules to help pilots better understand and avoid the weather conditions that create these adverse environmental hazards.

The thunderstorm and microburst examples also demonstrated the effectiveness of advance ATC intervention; proper preflight planning to avoid, when possible; and the transmission of understandable, easier-to-interpret information to pilots. That approach serves as a useful model to help with several other atmospheric and environmental threats found in this study, including icing, mountain wave, and high-altitude and wake turbulence.

The reduction in ASRS wake turbulence encounters during approach, especially after revising the separation criteria trailing a 757, is another positive example of a multilayered systems safety approach. The absence of mach tuck accidents can in part be attributed to deliberate aircraft design safety features. Many of the other LOC situations would clearly benefit from a multilevel strategy in which greater emphasis is placed on early recognition and avoidance, in addition to using a "systems safety" methodology of risk reduction, safety designs, warning devices, and training.

It is very important to consider that the vast majority of the LOC accidents occurred during terminal phases of flight (takeoff, initial climb, approach and landing). Flight crew workloads are very high when associated with frequent changes in aircraft heading, altitude, and airspeeds; large aircraft configuration changes; checklist accomplishment; frequently amended ATC clearances; near mid-air collision avoidance; and the necessities involved with all-weather operations, including necessary attention to deice and anti-ice operations. The safety margins during these phases of flight are thin, workloads are very high, and the time available for error detection, decision-making, and reaction is measured in micro-seconds. Adding further to this equation are the highly dynamic changes to an aircraft's motion with changes in thrust and flap settings.

The "abrupt-automation-disconnect" events revealed significant temporary spatial disorientation caused by somatogravic illusion and adverse kinesthetic feedback from the flight controls, both of which significantly compound the ability of the pilot to promptly and accurately detect and make measured and deliberate control inputs. These reactions are not constrained to just the cockpit automation events but apply to any event in which the aircraft begins to react in an abrupt, unplanned, or unexpected manner.

Negative habit transfer from techniques learned in other aircraft, particularly from former backgrounds in large airline transports or tactical military aircraft, were significant findings in this study. The FAA's Airplane Upset Recovery Training Aid points out, "Aerodynamic principles do not change, but airplane design creates different flight characteristics. Therefore, training and experience gained in one model or type of airplane may or may not be transferable to another."

Each aircraft model has unique momentum, handling, flight control, system operating procedures, performance characteristics, operating limitations, and structural limitations. Assuming that a certain procedure or practice that applies in every other aircraft has led to catastrophic consequences. The information and techniques taught in advanced maneuvers programs should be very rigorously reviewed for their appropriateness in a specific make/model/type, properly documented in the aircraft's AFM, and then properly trained.

This study frequently found that the same underlying threats such as improper CG loading, inadequate cross-checking and monitoring, lack of adequate FMS training, lack of rigorously defined training procedures for mountain bowl approaches, etc., often led to other very serious accidents such as high-speed RTO, approach and landing, and CFIT. Hence, preventive actions aimed at addressing the underlying threats may have the added benefit of preventing other adverse and undesired aircraft states.

Despite the fact that investigatory agencies have called for refinements to automation and high-altitude training, the lack of progress creating and implementing updated training programs throughout the industry must be questioned. Such impediments need to be resolved so that proper training materials and programs can be implemented in a timelier manner.

During the research for this study, it was noted that highly experienced and qualified pilots have been victims of LOC accidents. Countermeasures to surface features of past accidents will not prevent future accidents. Any comprehensive and multilayered preventive strategy must take into account human performance limitations. An in-depth report detailing the human factors findings found during this study is currently under draft and will be presented in an appropriate scientific forum in the future. ◆

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Who's Who

Qatar Airways—Safety First

(Who's Who is a brief profile prepared by the represented ISASI corporate member organization to provide a more thorough understanding of the organization's role and function.—Editor)

Qatar Airways is a full-service, award-winning five-star global airline offering extensive routes to and from its centrally located hub in Doha, the capital of the state of Qatar.

The company was re-launched in 1997 with a mission to be the best airline in the world, offering exceptional service and quality to passengers globally. The airline has received numerous outstanding service awards and was named "Airline of the Year" by leading industry audit company Skytrax in 2011, an accolade the airline retained in 2012.

Qatar Airways' dedicated workforce steadfastly remains focused on safety while achieving business targets and meeting the needs of its customers. The company's pilots and engineers work and operate with the highest ethical and professional standards; they receive ongoing safety communications and training programs.

As part of its corporate values, Qatar Airways places safety as one of its highest priorities. It believes in providing all customers and employees with a safe and healthy working and travel environment. Qatar Airways operates in compliance with industry regulations at all times. The oversight and governance of the airline's Safety Management System (SMS) program is managed by the Group Safety and Security Division, which comprises the following departments: Group Safety and Operations Quality, Group Security, Contingency Planning, Emergency Response Planning, and Business Continuity Planning.

Group Safety provides the framework for an organized approach to managing safety, including the necessary organizational structures, accountabilities, policies, and procedures. The SMS program proactively identifies hazards and manages risks throughout the business.

Group Security conducts constant assessments of threats and risks, formalizes security policies to counter those threats and risks, implements appropriate countermeasures, and continually monitors the implementation of those measures. The Operations Quality Department, through its annual audits of all operational areas within Qatar Airways, is responsible for ensuring that the airline operates in a safe environment and is fully compliant with regulatory requirements.

The Contingency Planning Department ensures that Qatar Airways' Emergency Response Planning complies with requirements and guidelines set out by the Qatar Civil Aviation Authority, the International Civil Aviation Organization (ICAO), the International Air Transportation Association (IATA), the Montreal Convention, and national governments that determine specific legislations regarding pre- and post-accident response.

As part of its continuous safety enhancements, Qatar Airways equips its fleet with the latest technological innovations, such as required navigation performance with authorization required (RNP-AR) capability, brake to vacate, runway awareness systems, and airport moving map displays and provides its flight crews with modern tools, including head-up displays (HUD), electronic flight bags (EFB), and electronic flight folders (EFF) to ensure that safety is enhanced constantly and operational efficiency is maximized. ◆