ISASI FORUM

OCTOBER–DECEMBER 2003

"AIR SAFETY THROUGH INVESTIGATION"

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***First Fatal Accident***—*On Sept. 17, 1908, at 5:14 p.m., the Wright Flyer, with Orville Wright and First Lieutenant Thomas E. Selfridge of the Army's Signal Corps First Field Artillery, took off from the parade ground at Fort Myer, Va., and circled the field four and a half times. Suddenly, a piece of one of the propeller blades broke off and the airplane plummeted to the ground from an altitude of about 75 feet (continued on page 27). (Photo: ISASI 2003)*


ISASI FORUM

"Air Safety Through Investigation"

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# 100 Years of Powered Flight

By Frank Del Gandio, President

*(President Del Gandio's opening remarks to the delegates of ISASI 2003 have been abbreviated.—Editor)*

In a few months we will celebrate 100 years of powered flight. Orville and Wilbur Wright spent many years experimenting before they achieved their goal of powered flight. The preponderance of their work was with gliders and wind tunnels, where they constantly improved the wings and structure. Finally, on Dec. 17, 1903, after numerous failures, they achieved their dream. The first flight lasted 12 seconds and traveled 121 feet over the sand dunes. Before the day was over, they accomplished four flights, and the last flight was 59 seconds and traveled 852 feet.

But as we celebrate 100 years of powered flight on December 17, we also celebrate 100 years of accident investigation. The fourth flight crashed on landing, which resulted in an investigation by the Wright brothers as to why the aircraft crashed.

In reality, the first aircraft accident happened on Dec. 14, 1903, 3 days before the historic first flight. On December 14, Wilbur tried to coax the Flyer into the air. He almost made it but was surprised by the sensitivity of the aircraft's elevator. The aircraft nosed up, stalled, and dove into the dunes. Wilbur's reaction—"There is no question of final success." It took 3 days to repair the Flyer in preparation for the historic first flight.

Aviation has progressed and expanded faster than any other industry. Normally a statement such as "this has not happened by accident" would be appropriate. However, I believe I can make the statement that our industry has "grown by accident" or, more appropriately, by "accident investigation."

The phenomenal improvement in safety, I believe, has been the direct result of two things. The first is people with ideas or dreams like the Wright brothers and the many who followed, like Jerry Lederer, who is here with us today. They are the stars and the legends of our profession. The second is a result of accident investigation and our constant quest to improve the man, the machine, and the environment to prevent further reoccurrence.

The people with ideas and dreams usually receive the accolades because their goal is to attain a new altitude, a new speed, to carry more passengers, or something to surpass a previous goal. These folks have been very important and influential in fostering and improving our industry.

A sub group would be the military and space pioneers who have improved our airspace system and greatly improved aviation safety and reliability because of their accomplishments in the military use of air power and space explorations.


E. MARTINEZ, EDITOR

The group that we are most concerned about is the unsung heroes of accident investigation. When an air disaster occurs, it brings darkness to our industry, but the stars of accident investigation shine bright as we accomplish our task of determining what caused the accident and initiate change to prevent reoccurrence. Because of the work of investigators, thousands of changes have been developed and incorporated following air disasters and non-disastrous accidents and incidents.

We, as accident investigators, are an integral part of the aviation community. We are a part of the main group because we participate in the airspace system by flying, maintaining, training, dispatching, etc. When a disaster happens, it affects everyone in the industry, and we, as investigators, are eager to help solve the mystery.

Traditionally, we don't get much notoriety or accolades. But we don't need it. We get our satisfaction from accomplishments that enhance the safety and efficiency of our industry.

Our profession is a classic example of intrinsic rewards. We, as aircraft accident investigators, are ordinary people accomplishing extraordinary things. As we meet here over the next 3 days, we will do what we, as investigators, do best. We will learn from one another.

The real hope is that, at the 150th anniversary of the first flight, people will speak of the enormous gains made since the centennial celebration. I hope that safety continues to improve at such a pace that today's safety levels will seem outlandish in 50 years, or sooner. A related hope and real possibility is that a few folks sitting right here today will be recognized in 50 years as having driven those next great leaps in safety because of your ideas, your dreams, or your investigative skills. ◆

*(Happy Holidays to all ISASI members and friends worldwide. —Frank)*

# Conflict Hinders International Accident Investigations

**Conflict can occur during any major airline accident investigation…. Unfortunately, if not managed effectively, conflict has a good chance of hampering the development of accident/incident prevention measures.**

By Ronald L. Schleede (MO0736), International Aviation Safety Consultant

*(This article was adapted, with permission, from the author's technical paper entitled* Managing Conflict During Major International Accident Investigations *presented at the ISASI 2002 Seminar in Taipei, Taiwan, October 2002. The full paper is available on the ISASI website at www.isasi.org.—Editor)*

Despite the continued efforts of air safety investigators to focus their investigative efforts on accident prevention, conflict often develops between key organizations involved in major international aircraft accident investigations. Conflict diminishes the effectiveness of many investigations by wasting the limited resources of investigative personnel and their organizations. More importantly, the primary goal of developing accident prevention measures is not always reached because of conflict.

***Ronald L. Schleede** is an independent consultant specializing in international aviation safety and investigation management since retiring in July 2000 from the NTSB after 28 years of service. He has about 35 years' experience in aviation safety, including 5 years in the U.S. Air Force as a fighter pilot and air safety investigator, and 6 months as Director of Investigations for Air at the TSB of Canada, just before retiring. He is a consulting instructor and member of the Advisory Board for the Southern California Safety Institute, a member of the Flight Safety Foundation International Advisory Committee, an associate consultant for Safety Services International, International Affairs Advisor for Flightscape, Inc., and Vice-President of ISASI of which he has been a member for more than 25 years.*

The Convention on International Civil Aviation (Chicago Convention) was developed in 1944, in part to promote cooperation between States and to foster a safe international aviation system. Annex 13 to the Chicago Convention contains the specific standards and recommended practices (SARPs) that deal with cooperation amongst States during the investigation of serious incidents and accidents. In order to facilitate cooperation, Annex 13 specifically directs that the sole objective of the investigation is to prevent future accidents and incidents and is not intended to apportion liability or blame. In general practice, the intended cooperation is achieved. However, there are several examples in which the intent is not achieved and serious conflict occurs because of counterproductive actions on the part of individuals and organizations.

The Chicago Convention governs States and is implemented primarily by States' government organizations, such as the civil aviation authorities. However, private sector organizations, such as airlines, manufacturers, and insurers, have an enormous stake in the results of aircraft accident investigations. Consequently, the private sector plays a large role in the ability of States to meet the intent of Annex 13. There also are political influences within and between States that can adversely affect government organizations and diminish the effectiveness of investigations. When the spirit of cooperation that is intended by the Chicago Convention and Annex 13 is violated, there are no reasonable means to correct the situation, since ICAO does not "enforce" the provisions of the Convention or its Annexes.

### Conflict—past and present

It is well known in the aviation community that, during the course of the investigation of the American Eagle ATR 72 accident at Roselawn, Ill., on Oct. 31, 1994, considerable conflict occurred between the National Transportation Safety Board (NTSB) team and the French team, led by the Bureau Enquetes-Accidents (BEA). Conflict also occurred between the NTSB and the Federal Aviation Administration (FAA). The conflict in this case was aired at two previous ISASI seminars.

The conflict continued during the course of the investigation and became more obvious following the adoption of the NTSB's final report, which contained a probable cause statement that cited failures on the part of the manufacturer and the safety oversight agencies that certified the airplane. The probable cause statement was considered to be a "blame" statement by key organizations.

Why did this conflict occur? How could it have been avoided or reduced? Did the conflict have an adverse effect on aviation safety? When considering these questions, one has to recall that there have been additional accidents involving other model turbo propeller airplanes subsequent to the Roselawn case that involved similar safety issues (airframe icing) that were not resolved as the result of the Roselawn investigation and final report.

Are there other examples of severe conflict during major investigations that may have hindered the development of accident prevention measures? Here are some selected media statements illustrating conflict:

• "JAL Captain Indicted in Fatal Pitchup…. The captain of a Japan Airlines MD-11 that experienced severe air turbulence (June 8, 1997)…has been in-

dicted on a charge of *professional negligence resulting in death*…. The prosecutor's action contradicts a report from Japan's Aircraft Accident Investigation Committee (AAIC) of the Ministry of Transport."
• "The investigation has yielded no evidence to explain the cause of the accident (SilkAir Boeing 737, Dec. 19, 1997)…. Harsh U.S. Criticism of Indonesia's Findings…. (NTSB Chairman) Hall said the crash can be explained by intentional pilot action…. Such harsh criticism of a foreign crash report was unprecedented…. There is simply no other means, other than deliberate manual input, for the aircraft to go from 35,000 feet to the bottom of the Musi River in the time frame, said an Australian expert who took part in the investigation."
• "Looking for someone to blame…. Government sources close to the investigation are leaking like rusty buckets." "The National Transportation Safety Board today determined that the probable cause of the crash of EgyptAir Flight 990 (Oct. 31, 1999) was the airplane's departure from normal cruise flight and subsequent impact with the Atlantic Ocean as a result of the relief first officer's control inputs." "The Egyptian Civil Aviation Authority called the NTSB report *flawed* and demanded reconsideration of its findings…. The Americans still have to prove the suicide theory. It was very clear from the beginning that all the Americans cared for was to protect their interests, such as Boeing's interests." "The investigation has been contentious, with U.S. groups suggesting that deliberate pilot action crashed the Boeing 767, while Egypt says mechanical failure was responsible."
• "Singapore defends own SQ006 report…. It is regrettable that Singapore had to put out its own report, because if this became a trend, it would be dangerous, the entire international order would become messy…. The Ministry of Transport (of Singapore) yesterday said it has the right to carry its own probe of the Singapore Airlines Flight 006 crash (Oct. 31, 2000) in Taipei a year and a half ago…."
• "Prosecutors said Friday they will ask a judge to charge 11 people, most of them air traffic controllers, with manslaughter and other crimes in the runway collision of two airplanes that killed 118 people (SAS and business jet ground collision at Linate Airport, Milan, Italy, Oct. 8, 2001)…. Investigators said the crash was caused by human error compounded by poor visibility because of morning fog."
• "Midair Collision Sparks Angry Finger Pointing…. Bickering could undermine public confidence in the investigation of ATC and pilot interaction." "Initially, Swiss air traffic said it gave the Russian plane about two minutes warning and that the pilot responded after a third request. But, the Swiss revised their account after German officials began describing the tighter time scenario…. EU (European Union): Rules Not to Blame for Crash (July 8, 2002)…. There is no link here…spokesman for the EU executive commission…. *The problem is that the plane wasn't where it was supposed to be*."

Public conflict sells newspapers and television coverage, especially when it involves an airline accident. Although Annex 13 specifies that only the authority in charge of the investigation shall report on the findings and progress of the investigation, there continue to be violations of this standard, as illustrated by the above few examples. Unfortunately, the violations impact severely on the limited resources and energy of the investigators and organizations involved in the investigation, thereby deflecting those precious resources and energy away from the primary objective of prevention.

Public conflict also can confuse and mislead the traveling public by eroding confidence in the aviation system.

The standards in Annex 13 were developed with a purpose that is not being met when individuals and organizations continue to violate those standards by leaking information and speaking to the media irresponsibly.

**Following the difficulties encountered during the Roselawn ATR 72 investigation, the BEA and NTSB staff and senior managers strived to build better relationships by holding meetings and discussing cooperation in the case of a future major accident.**

### Improvement suggestions

Building relationships and trust between organizations at various management levels within the organizations is important *before* an accident occurs. After an accident, it is too late to build relationships and trust.

For example, periodic meetings between the investigation authorities and regulators and industry organizations to discuss each other's goals, objectives, needs, operating methods, etc., are important to building relationships and trust, so that when an accident occurs there are less surprises and subsequently less conflict. There will always be enormous stress on the organizations and individuals involved in major catastrophic accident investigations. However, preplanning, exercises, and cooperative discussions, before accidents occur, can reduce or eliminate conflict and its adverse consequences.

Following the difficulties encountered during the Roselawn ATR 72 investigation, the BEA and NTSB staff and senior managers strived to build better relationships by holding meetings and discussing cooperation in the case of a future major accident. As the result of those meetings, a memorandum of understanding was signed between the BEA and the NTSB about operating practices should there be a catastrophic French-manufactured aircraft accident in the United States. More importantly, the BEA and Airbus conducted exercises simulating a major Airbus accident in the United States. Real and potential conflicts were discussed and remedies were developed. It would appear that this effort was quite successful in view of the lack of apparent conflict between the BEA (Airbus) and the NTSB during the

**ISASI has begun an important program with its "Reachout" seminars, which are intended to bring accident investigation and prevention training to States and regions that have limited experience and resources to gain the necessary knowledge and skills elsewhere.**

investigation of the American Airlines Flight 587 A300-600 accident in New York City. It is likely that the efforts to build good relationships and trust before the American Airlines Flight 587 accident reduced major conflict between the key organizations.

Certainly, it is not necessarily practical for all of the investigation agencies in the world and all of the airlines and other organizations to build close relationships and trust between each other before an accident occurs. However, there are mechanisms for accomplishing this goal, at least in part, through the programs of ISASI and ICAO.

Unfortunately, the world's accident investigation authorities and industry officials only meet occasionally at ICAO Divisional Meetings (AIG 1974, 1979, 1992, and 1999) to debate changes to Annex 13 and other accident investigation and prevention issues. Certainly, these meetings help build relationships and trust, but they are too infrequent to be effective. At the past two meetings (1992 and 1999), the delegates recommended that ICAO promote more seminars around the world at which accident investigation and prevention are discussed. Among the goals of such seminars are to illustrate lessons learned by others and to build relationships and trust between government and industry safety officials. Several seminars have been held in many regions of the world, but the actual numbers are small when compared to the problems that need to be resolved.

Similarly, ISASI has begun an important program with its "Reachout" seminars, which are intended to bring accident investigation and prevention training to States and regions that have limited experience and resources to gain the necessary knowledge and skills elsewhere. The Reachout seminars are possible only because of the financial sponsorship of ISASI corporate members and volunteer ISASI members who donate their time to teach.

Can we do better? How could we do better? One possible solution is to elevate the status of the investigation authorities and their air safety investigators to a level comparable to the regulatory/safety oversight authorities (CAAs) of ICAO Contracting States. What do I mean by this?

It has been my experience that ICAO programs and initiatives are dominated by the CAAs (the FAA in the United States). When ICAO deals with a State, the organization it deals with is virtually always the CAA of the State, not the investigation authority. Of course, when the Chicago Convention was first developed, there were virtually no independent investigation authorities. Similarly, the triennial Assembly Meetings, where the ICAO work program and goals and objectives for the future are discussed and agreed to, are typically attended by the Directors General of Civil Aviation (DGAC) of the various States, who present the views of their particular State. The independent investigation agencies present in some States are not substantively involved in the Assembly Meeting programs.

Whenever there is a crisis in civil aviation, the DGACs meet at special sessions of ICAO to resolve problems. There are also regional DGAC meetings. Other than the European Civil Aviation Conference (ECAC) Group of Experts on Accident Investigation and Prevention, which meets annually to discuss European cooperative issues, investigation authorities around the world do not have a direct role in setting the work program and goals and objectives of ICAO.

Nor do the investigation authorities have a mechanism to meet more often and resolve current issues in a timely manner. I don't believe that the periodic AIG meetings every 7 or more years serve the purpose of permitting the building of relationships and trust that is necessary to reduce conflict during major international aircraft accidents. Therefore, the AIG Divisional Meetings need to be held more often, and investigation agencies of all States need to be more organized and involved in the work of ICAO, particularly Assembly Meetings.

Perhaps the new initiatives at ICAO to include auditing of compliance with Annex 13 by States beginning in 2004, as part of the ICAO Safety Oversight Program, will elevate the status of investigation authorities. Hopefully, the new audit program will also promote efforts for better adherence to the principles and spirit of cooperation envisioned by Annex 13.

## Cause=blame=conflict

What else causes conflict during major international aviation accident investigations? How about the guidance in Annex 13 and the ICAO manual for investigation that urges that the "causes" of accidents be determined and specified in the final report. Doesn't a requirement to determine causes directly conflict with the stated purpose of the investigation not to apportion blame or liability?

Following the issuance of the Taiwan Aviation Safety Council (ASC) final report of the Singapore Airlines Flight SQ006 Boeing 747 accident that occurred near Taipei, Taiwan, on Oct. 31, 2000, and as the result of some negative media coverage about the findings of the report, Dr. Kay Yong, Managing Director of the ASC, questioned the need for citing the causes, because it is in direct opposition to the primary goal of developing accident prevention measures. I agree with Dr. Yong.

Obviously, the subject of including, or removing, causes in final accident reports has been debated for many years. During my career at the NTSB, I supported the NTSB practice of determining "probable causes" because it was a requirement in the NTSB legislation. When I led U.S. delegations to the 1992 and 1999 AIG meetings, I defended that NTSB position because it was U.S. law. I now realize that I should have worked behind the scenes to urge the develop-

ment of a consensus among other States to amend that part of Annex 13 and the ICAO investigation manual.

The identification and validation of safety deficiencies during investigations, with the view toward promoting safety actions, should be the primary objective, not determining causes (who is to blame).

The investigation and final report of the SQ006 accident issued by the ASC identified numerous safety deficiencies and urged safety actions on a wide spectrum of safety issues that have worldwide implications. However, the conflict that arose during the investigation and following the issuance of the final report, including the unprecedented and ill-advised publication of a separate report by Singapore, could easily overshadow the importance of the safety messages contained in the official report.

If the ASC had not followed the guidance provided by Annex 13 and merely listed the investigation findings about safety deficiencies that increased the risk of the accident, or of any future accident, the debate and conflict that arose may have been reduced significantly. More importantly, the significant accident prevention potential of that report would more likely be realized.

Similarly, if the NTSB had merely cited as findings the safety deficiencies uncovered during the Roselawn ATR 72 investigation, instead of a probable cause that was considered blameworthy, perhaps the safety deficiencies might have been addressed more directly and subsequent icing accidents might have been prevented.

Should we revise Annex 13 and the manual guidance on determination of causes? I say yes, and I hope my thoughts and those of Dr. Kay Yong will prompt actions to do so. If we truly believe that the sole purpose of the investigation is the prevention of accidents and is not to apportion blame or liability, we need to take the determination of causes out of the final report.

### Cause=crime=blame=conflict

Lastly, I would also like to mention the publicly reported conflict between the NTSB and the Indonesian investigation authority that surrounded the final report of the SilkAir crash. In general, the NTSB stated that the airplane crashed because of intentional actions by the captain. Similarly, during the investigation of the EgyptAir crash, it was widely reported that the NTSB had concluded that the accident was caused by intentional actions by the relief first officer. The Egyptians strongly disagreed with the NTSB and continually urged further examination of wreckage that had not been recovered from the sea.

**Conflict can occur during any major airline accident investigation because of the tremendous stakes involved. Unfortunately, if not managed effectively, conflict has a good chance of hampering the development of accident/incident prevention measures.**

What caused this conflict and how could it have been avoided? Did the conflict and public debates prevent the development of accident prevention measures?

First of all, I personally don't believe that accident investigation agencies should be determining whether a crime was the cause of an aircraft accident. A determination that murder/suicide led to the destruction of an aircraft is essentially a determination of a criminal act, which is the responsibility of judicial authorities, whose task is to determine if a crime was committed and to punish the criminal. I don't believe that the judicial authorities involved in the SilkAir and EgyptAir cases concluded that murder/suicide was involved. Regardless of what the safety investigation authorities believed caused those accidents, their efforts should have been directed toward preventing similar future accidents, not toward blame.

I am not aware of any significant safety actions promulgated as the result of the SilkAir accident. Also, to my knowledge the only safety actions that resulted from the EgyptAir accident investigation involved safety deficiencies with the design of the horizontal stabilizer of the Boeing 767, which were identified and pursued by the Egyptian team.

These were not the only airline accidents in the past in which pilot suicide was suspected or confirmed. Nonetheless, no safety recommendations or other actions by government or industry resulted from the SilkAir or EgyptAir investigations to develop measures to prevent similar cases in the future. If such actions are under way, they have not been made public.

Did the conflict that arose in these two investigations prevent the development of viable safety actions? Is it too late to organize an international group of experts, perhaps under ICAO oversight, to evaluate the need for pilot screening and monitoring policies and procedures to identify potential self-destructive behavior by airline pilots? If the considerable rhetoric and conflict about suicide being involved in these two accidents were directed toward development of prevention measures, perhaps a future accident could be prevented.

### Summary

Conflict can occur during any major airline accident investigation because of the tremendous stakes involved. Unfortunately, if not managed effectively, conflict has a good chance of hampering the development of accident/incident prevention measures. Building of relationships and trust among organizations involved in major aircraft accident investigations by means of preplanning, exercises, bilateral cooperative agreements, and multilateral programs sponsored by ICAO and ISASI could reduce or eliminate counterproductive conflict. If conflict could be reduced or eliminated, the efforts of air safety investigators could more appropriately be focused on prevention of future accidents, not on dealing with blame and conflict, which should be clearly excluded from an Annex 13 investigation. ◆

# TINKICKERS

# 100 YEARS PLUS

## ISASI 2003 unfolded the origins of "investigation," tracking its development from humble deduction to today's sophisticated analyses using information technology.

ISASI 2003

By Esperison Martinez, Editor

Air safety accident investigators who attended ISASI 2003, the 34th annual International Society of Air Safety Investigators aviation safety seminar, fashioned, produced, and directed solely for the "tinkickers" of the industry left the weeklong event, held in the shadow of Washington D.C., with entrenched knowledge of "from whence" they came and the value of their profession to the transportation industry.

The theme for the seminar, "From the Wright Brothers to the Right Solutions—100 Years Identifying Safety Deficiencies and Solutions," invited technical sessions filled with repetitive demonstrations of insightful and penetrating PowerPoint imagery, which unfolded the origins of "investigation" by tracking its development from humble deduction to today's sophisticated analyses using information technology. Indeed, those pioneers who first sought to soar, to their successors who unlocked secrets of flight, and those who now comfortably and routinely travel through the air, owe a very great deal to the tinkickers from the days of yore through those of today.

The 3-day technical program, attended by 339 delegates representing 31 countries, took place from August 26-August 28. However, included in the overall seminar time schedule of 5 days was 1 day of intense "tutorial" programming, and 1 day of touring some of the famous Washington, D.C., sites. Registration statistics show attendance by the most numbers of international investigators and investigation managers from investigative agencies, regulatory agencies, military, airlines, and manufactures than ever before. The countries represented at the seminar included Brazil, France, Singapore, South Korea, Argentina, the United States, Norway, Ireland, the U.K., Czech Republic, Israel, Canada, Denmark, Chili, Australia, Angola, the Netherlands, Germany, Switzerland, Peru, New Zealand, Italy, Japan, United Arab Emirates, Finland, South Africa, Russia, Mexico, and Taiwan, R.O.C. Attendance by representatives of so many nations truly marks ISASI as an international organization with a strong reputation of effectiveness.

The venue for the event was the Crystal Gateway Marriott Hotel, situated in Arlington, Va., on the opposite bank of the Potomac River on which sits the nation's capital city. The hotel accommodations proved highly satisfactory for the events of the seminar, offering tons of air-conditioned air to counter the sweltering August heat of the area.

Routinely, registration begins 2 days prior to the start of the technical session and 1 day before the tutorials. Non-routinely, this registration required each attendee to wear a photo ID badge for security purposes. Joe Reynolds managed the task of taking the photos and incorporating them into name badges expeditiously, and without the confusion the organizing committee believed might occur. Although a small line did form, the 164 tutorial registrants were all ready to meet the buses that left the hotel at 7:30 the next morning. They became the first organized group to receive instruc-


PHOTOS: E. MARTINEZ, EDITOR

***Paul-Louis Arsinian, BEA, France, makes his keynote address on the coexistence of justice and safety concerns in society as the panel of R. Schleede, J. Purvis, K.F. Chow, D. Lee, V. Young, and S. Dyne looks on.***

tion at the new National Transportation Safety Board Academy at the George Washington University Virginia Campus in Ashburn, Va (see page 22).

## Tutorials

The two daylong separate tutorials were conducted simultaneously. James Cash and Erin Gormley, both of the NTSB, presented Recorded Data, and Dave Blake of the FAA's Technical Center in Atlantic City, N.J., presented Fire Investigation. Attendance was unusually high, with 74 attending Recorded Data and 90 attending Fire Investigation.

NTSB Academy Director Juliana Beal said in welcoming the group, "It is fitting that we start here today with you, a worldwide group of investigators, for that is what we are all about, making flying safer by improving accident investigator skills." And indeed, the NTSB Academy proved an ideal "learning" location. Being new, the facilities were excellently provisioned: every student location was wired for electronic interface, seats were comfortable, desktop area was large, temperature was controlled, and acoustics were excellent.

***Recorded Data:*** Both Cash and Gormley relied heavily upon PowerPoint presentations to make their points. But, they also provided "hands on" opportunity with a table full of salvaged CVR and FDR equipment and parts that were passed around the audience as the duo made their points about how to capture data from goods that look damaged beyond use. Attendees were talked through salvaging data from damaged FDR and CVR cases, circuit boards, and extracting undamaged memory from damaged crash cases.

History, too, played a large role in the tutorial, with lessons about the first regulations calling for FDRs in the early 1940s, but how the recorder didn't become commercially ready until 1953 and the industry compliance date didn't happen until 1958. But that was only the start—Cash presented just about all one could want to know about the development, growth, and use of both the CVR and FDR right through the digital process and expanded parameters that allow the application of animation to the investigation process. He concluded with a look at future recordings efforts, such as image recording, speaking both of its advantages and limitations.

*Dave Blake, left, and James Cash, above, address their separate tutorial audience. The group gained the "first students" title at the new NTSB Academy.*

He related that recorded data come from many sources but warned of source limitations, noting that data accuracy, resolution, and sampling are sensor limited, bit limited, and capacity limited. Nevertheless, he said, "Traditional [recovered] recorders will survive and ancillary recorders may survive and may contain data, but some of that data will be calibrated and some will not."

It fell to Gormley to deal with the "data" aspect of the tutorial subject. Her outline included radar data, data limitations, timing correlation, and data presentation types. She talked of primary and secondary radar returns, of long-range and short-range radars. She explained how radar data are used for airspace violations and for runway incursion events, cautioning, "internationally, the collection methods and types of data collected are not standardized."

From radar data she moved to data acquired by the FDR and CVR. She relaxed the crowd with her opening comment about recorders: "You just plug it in and data come out!" On a more serious note, she stressed that an investigator must understand where the data are coming from. What the data mean. What is normal? That it cannot be individually analyzed and that all evidence available must be correlated. Before the tutorial session ended, attendees received a thorough grounding on how to achieve the needed understanding, as she explained each of the processes in detail.

In closing her session, she noted, "recorded data are a valuable resource that can positively contribute to flight safety." But she cautioned that the increasing number of recorded data sources are dynamically changing with advancing technology; and as a result, investigators need to remain "aware of data limitations and use them accordingly."

***Fire Investigation:*** The four tiered levels of the Academy's main lecture hall were filled to capacity for the Fire Investigation tutorial presented by Dave Blake, which required a full day. The promotion for this tutorial said the session would focus on "inflight fire prevention and post-crash fire survivability." It noted that attendees could expect a review of several major accidents in which fire was a major factor. Still, it is doubtful if the attendees were at all prepared for the impact of seeing, through videos, the explosive behavior of fire in full-scale

testing conducted during high-profile accident investigations.

For example, the video of the ValuJet accident test showed the devastating effects of the activation of chemical oxygen generators. The test of the 1985 British Air Tours 737 accident in Manchester, England, recreated the fuselage burnthrough and cabin fire/smoke that spread through the aircraft. The remaining video showed the ignition and violent burning of a titanium hot bleed air duct in the 1985 Royal Jordanian Airlines L-1011 inflight fire near Singapore. It was clear from the narrative provided by Blake, concerning the tests, that in each case it is only through gaining an understanding of the behavior of fire that one creates the knowledge to blunt its effect. Other related topics included wiring arc tracking, insulation flammability, and the use of hand-held extinguishers on inflight fires.

The tutorial also included discussions on the current flammability test methods for aircraft materials and an update on current projects that included Halon replacement testing, insulation flammability and flame penetration resistance, and cargo compartment fire detection improvements and fuel tank inerting.

## Main program

The main program began on August 26 and like the 2 days to follow, its schedule was tightly packed with technical speakers every 30 minutes. Yet, sufficient break time for attendees to interact while enjoying hot or cold refreshments was plentiful.

ISASI President Frank Del Gandio welcomed the assembled investigators to ISASI 2003. His remarks delivered a theme upon which many succeeding speakers would elaborate, namely that, but for investigation there probably would never be a 100th anniversary of powered flight.

After reciting the Wright brothers achievements of Dec. 17, 1903, and telling of the fourth flight's crash on landing, which the Wrights investigated to determine why the aircraft crashed, he told the audience that in reality, the first aircraft accident happened on Dec. 14, 1903, 3 days before the historic first flight. On that flight, the Flyer nosed up, stalled, and dove into the dunes. After the brothers determined the cause, it took 3 days to repair the Flyer in preparation for the historic first flight (see "President's View," page 3).

He next announced and introduced the winners of the first ISASI Rudy Kapustin Memorial Scholarship Fund. The Fund honors the memory of "tinkicker extraordinaire" Rudy Kapustin who served for years as the ISASI Mid-Atlantic Regional Chapter president. Winners of the $1,500 awards were Noel Brunelle, Embry-Riddle Aeronautical University, and Michiel Schuurman, Delft University of Technology, the Netherlands (see page 18). In making the announcement, Del Gandio said: "After reading their submitted essays, I surmise that maybe, just maybe, these young investigator hopefuls will be the 'legends' of the 150th celebration of flight; congratulations to both of you."

Lastly, he announced the winner of the 2003 Jerome E. Lederer Award: Caj Frostell (MO3596), ISASI International Councillor and ICAO's Chief of Accident Investigation and Prevention Section (AIG) (see page 16). In making the announcement, he also introduced the award's namesake, who was in attendance and alert as ever. In recognizing the "Father of Aviation Safety," Del Gandio said, "While we celebrate 100 years of aviation, Jerry celebrates 101 years of life," at which the audience erupted with a thunderous applause.

## Keynote speakers

Among the six keynote speakers, one for each of the conducted sessions, were five governmental representatives and one union president. **Ellen G. Engleman,** Chairman, National Transportation Safety Board, opened the first session. She, too, carried her audience back, citing progress from the Wrights first flight of 12 seconds and 120 feet to "the development of an international airline industry which had over 3 trillion miles of passenger flight in the year 2000. "The Wrights' meticulous experiments and adherence to the best scientific principles led them to analysis of their own glider experiments and the questioning of some of the commonly accepted scientific data," she said.

"The qualities that made the Wright brothers a success are still enormously important in aviation today. International sharing of information, the use of scientific testing to support hypotheses, ques-

## Special FAA Award

In concluding her presentation to the 350 delegates of ISASI 2003, FAA Administrator Marion Blakey made a surprise and special presentation. She told the assembly, "As you think about how you can become even more prepared, here's a role model for you … Jerry Lederer … a man who has spent three-quarters of a century finding the right solutions to make aviation safer. In 1948, he organized the Flight Safety Foundation's first accident investigation course. And I think it's fair to say that if there is one person who can be credited for outstanding safety record in the first century of flight, it is Jerry Lederer.

"It is with great honor, on behalf of the men and women of the FAA, on behalf of millions of air travelers, on behalf of everyone who takes a calculated risk to defy gravity and returns to Earth safely, that I present this special award to Jerry Lederer—Mr. Aviation. Thank you, Jerry." ◆

***Marion Blakey gives Jerry Lederer a little bit extra to accompany his special FAA award.***

tioning commonly held beliefs, and a desire to cut costs are all principles that we adhere to today when we conduct accident investigations," she told the assembly.

Noting that the first official investigation of an aviation accident occurred 5 years after the Wright brothers' historic flight and was due to the death of First Lieutenant Thomas Selfridge at Fort Meyer, Va., in 1908, she said, "We may not label the Wright brothers and other early pioneers as accident investigators, but clearly their approach to aviation is no different than our modern approach to accident investigation. The early pioneers had many more mishaps and accidents to learn from than we do today, but all of their improvements were a result of meticulous investigation into the problems of flight and a willingness to question commonly accepted theories and practices…."

In the remainder of her presentation, Chairman Engleman spoke of the relationship between safety and security in a post 9/11 world: "We must find a way to accomplish both tasks without jeopardizing or negatively impacting the other." She also spoke of the NTSB role and responsibilities of appropriately participating in foreign investigations and maintaining the health of the U.S.-manufactured fleet. About the agency's independence she said, …[It] must remain so in order to accomplish our mission of determining the probable cause irrespective of fault. Once that probable cause is determined we issue our recommendations…. Open recommendations mean that the safety loop is not closed, open recommendations mean that our job is not done.... The risks that have been identified still remain—and action is yet to be completed. So a key aspect of my tenure at the Board will be to clean up the record of outstanding recommendations...."

**Marion C. Blakey,** Federal Aviation Administrator, opened the second day's session by telling the audience: "I bring greetings on behalf of President Bush, Secretary Mineta, and all of us at the Federal Aviation Administration (FAA). ISASI really is a remarkable forum that brings people together from all over the world. And, it's great to see so many people from so many countries. Aviation safety has no borders … as demonstrated by the presence here today of so many senior officials from the investigation authorities representing four continents.

***A speaker makes his point during the very active Q&A sessions that followed each panel presentation.***

"Thank you all for everything you do in taking on one of the toughest jobs in the world. Bill Adair, who wrote a book on the USAir Flight 427 crash investigation, admired air safety investigators before he started his work. But, after six years of up-close-and-personal, he says he is 'constantly amazed at your ability to find the answer from little bits of metal.'

"And for the first century of flight, accident investigation has been the bedrock of aviation safety. As our honored guest—founder of the Flight Safety Foundation—Jerry Lederer has said, it was the challenge of safety in part that got the Wright brothers interested in aviation. The 1895 death of German aviation pioneer Otto Lilienthal in a glider accident … fired their desire to find the solution to safe flight. One could call Wilbur and Orville Wright the first air safety investigators. On December 14th, three days before the breakthrough, Wilbur first tried to coax the Flyer into the air. He almost made it. But he was surprised by the sensitivity of the plane's elevator. He nosed up, stalled, and dived into the dunes. The brothers identified the problem … fixed it … and flew into history three days later."

She went on recounting how pilot deaths fell from one in six flights in the airmail pilot era to about one in every 16 million flights today, thanks to early insights by men like Jerry Lederer and "what we have learned 'kicking tin.'"

Noting that today's aircraft are highly complex pieces of machinery with hundreds of complicated systems and thus much more than just thousands of parts flying in formation, she said, "…the cause of the next major accident is just as likely to be an error in a line of computer code as it is the failure of pilots to set their flaps during takeoff." Acknowledging past successes and future challenges she said, "We have gotten so good at solving—and preventing—the single-cause accidents. It's the high-tech and system failures that we have to tackle now."

With a sagacious smile, she said, "Our goal at the DOT and FAA is to put accident investigators out of business…. We want aviation to be so safe that investigators can spend more time teaching, training, maybe even spending some time not living out of a suitcase, home with your families. And to reach that point …we must get in front of accidents, anticipate them and use hard data to detect problems and disturbing trends. And that is exactly what the FAA is committed to doing with a system safety approach."

The Administrator lauded CAST—or the Commercial Aviation Safety Team—as "a perfect example of teamwork and getting in front of accidents." She said similar efforts are under way in Asia, Europe, and Central and South America, and also recognized the Pan American Aviation Safety Team for translating Flight Safety Foundation training materials into Spanish and Portuguese. FAA support for the FOQA and ASAP programs also received laudatory mention.

In closing she laid a challenge before the ISASI member assembly: "I applaud ISASI for its international seminars. I challenge you to build and grow and make these available to even more investigators. As the international society you are ideally positioned to take the lead … to look at where aviation and technology is going … and lead the development of more training to ensure that your members—especially your airline members who may not have the same

*The Challenger wing display, which served as part of the presentation made by Steve Wallace, director of the Office of Accident Investigation, FAA, captures the attention of many delegates.*

level of training available to them—are prepared with tools and training. This would be an enormous contribution to the profession of air safety investigator."

**John Carr,** the National Air Traffic Controllers Association (NATCA) President, introduced the audience to the history of his labor organization and to the growth of the ATC system from the days when Archie League stood at the end of a grass strip with two wands and a wheelbarrow, and when airplanes navigated via radio beacons, radio ranges, and bon fires, almost 80 years ago. The airlines established the first Airway Traffic Control Center in Newark, N.J., in December 1935, then came a center in Chicago and Cleveland. On July 6, 1936, the government assumed the operation of the three centers and established five more. The Civil Aeronautics Act of 1938 established new regulatory codes and air traffic rules, and the Civil Airways System was established with controlled airports, airway traffic control areas, and radio fixes as required reporting points.

His union was founded in 1987 and today represents more than 15,000 air traffic controllers and 2,500 other bargaining unit members who include engineers, architects, and other aviation safety professionals. NATCA's motto, *Safety Above All*, is, he emphasized, "the litmus test against which all our decisions are based." He added, "First and foremost NATCA is committed to promoting aviation safety and is committed to aircraft accident investigation through its own Air Safety Investigators Program. This Program maintains a cadre of specially trained air traffic controllers who provide expert real-time knowledge to aid in aircraft incident and accident investigation.

Of the issues facing the ATC system, he said, "The most urgent issue facing air traffic controllers in the United States today is preventing the privatization of the air traffic workforce. In our view, air traffic control is an inherently governmental function, which directly and significantly affects the lives of everyone. Air traffic control is intrinsically linked with the public interest so much so as to mandate its performance by government employees…. Privatization of our industry stands to put profits over safety and that is unacceptable."

Along with job protection concerns, NATCA sees potential for erosion of independent accident investigative processes: "It is essential that investigations of air traffic incidents remain independent of external influence and blame and focus on accident prevention. But when you deal with privatized air traffic control systems, there are problems that muddy the waters," he said. Noting Canada's privatization effort he said, "In Canada, in spite of the wishes by the Canadian Safety Board, management officials rather than front-line controllers participate in the investigative process….There have been instances where controllers were denied party status to investigations of incidents involving contract towers."

In closing, he told of the outstandingly exceptional performance of the nation's ATC professionals in the aftermath of Sept. 11, 2001. "When Transportation Secretary Norman Mineta issued the order to shutdown the National Airspace System at 9:45 that morning, air traffic controllers all over the United States landed over 700 airplanes within four minutes. Air traffic personnel directed every aircraft to land at the nearest airport immediately, effectively rerouting one aircraft every second. Over the next four hours, controllers safely guided another 4,000 airplanes with no errors."

**Col. Marcus Antonio Araújo da Costa,**

Chief of CENIPA (Aeronautical Accident Prevention and Investigation Center) in Brazil, spoke about accident investigation in his country. Geographically speaking, he noted the country is full of contrasts: the largest rain forest in the world and a city of more than 20

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million people, making São Paulo one of the top-most populated cities. Aviation wise, São Paulo's Guarulhos International Airport is the largest in Latin America. Countrywide, 75 million passengers passed through Brazilian airports in 2002. And Brazil has the second largest corporate aviation fleet, ranking second only to the United States. He said the size of Brazil, 3,286,170 sq. mi. (8,511,180 sq. km), a little larger than the Continental United States, "poses a challenge for safety investigators to carry out their task, not to mention economic constraints imposed by a developing nation reality."

In describing his nation's aviation safety system, he said, "SIPAER (Aeronautical Accident Prevention and Investigation System) is responsible for all safety matters in Brazil and was designed to help safety investigators cope with local characteristics. SIPAER's central office is the Aeronautical Accident Prevention and Investigation Center, CENIPA." He plotted out the organizational structure showing the safety "links" spread throughout the country.

"All airlines, commercial, regional, or commuter, and aircraft manufacturers, flying schools, Air Force bases, and so on, are required to have a safety office in their organization structure," he said. He added that those offices report to CENIPA, making it the top supervisor for every single aircraft accident and incident investigation performed in Brazil, regardless of whether it involves domestic or international flights, civil or military planes.

The investigation process for civil aviation involves seven main Regional Safety Offices (RSOs) and one main supervisor at the Civil Aviation Department (DAC). RSOs investigate any accident in their respective areas, except those involving aircraft operating under RBHA 121 (equivalent to FAR 121), which are investigated by the DAC. Should any agency in the accident investigation chain be unsatisfied with the investigation, the report can be returned to the investigation board for further analysis, he said

Concluding his presentation, he said, "Having just one hybrid safety system, Brazil has made significant progress in the accident prevention and investigation arena, despite its challenging economic reality. Civil and military aviation have benefited the most from such a unique system. While the Air Force halved its accident rate in the past decade, major airlines sustained a singular fatality to passengers in the last seven years. The SIPAER has proven to be an effective and efficient system, especially for States with limited resources."

**Robbie Graham,** Director for Safety Investigation at the Australian Transport Safety Bureau, spoke about "Managing Organizations in a Demanding Society—Times They Are a Changin'." Citing the well-worn descriptions of change—accelerating and increasing specialization—he said: "Our challenge is to understand change in the context of aviation and manage our business to take advantage of it."

He believes that "understanding our environment and managing our relationships is an important part of maintaining investigative excellence." He illustrated this belief by noting that historically, advances in marine (since 1847) and aviation safety have come from accidents that often have multiple fatalities. Lessons learned at a cost, he said, were fed back into the industry.

"Now," he added, "incidents are investigated as a proxy to prevent future accidents and research is used to provide indicators of potential weaknesses that can be addressed before they cause accidents."

The major issues facing the accident investigation process, he noted, are not generally technical, but rather more political and socioeconomic. One of the major issues involves the changing legal climate that now is challenging the traditional purpose of collecting and analyzing evidence to improve safety rather than *to apportion blame.* He cited examples of lawyers' demands that point to use of collected data for adversarial litigation: access to cockpit voice recorders; access to confidential interviews in which questions that might be self-incriminating have to be answered. There are also demands that processes of investigation be put in place that could be used in criminal or civil cases, among others.

A second major issue facing the process, he noted, is independence vs. accountability. He stressed the need to investigate to achieve a "safety outcome," for the professional investigation agencies to be able to choose what to investigate and what to use only for statistical analysis, having reports released without censorship by outside interests, and publishing reports without fear or favor. But he cautioned, "We all live and work in a social context." Partnering is therefore necessary as investigations are not undertaken in a sociopolitical vacuum; and if we are to keep the confidence of our stakeholders, the values of independence and integrity need to be maintained.

***Part of the ISASI group that toured the Smithsonian National Air and Space Museum inspects the original Wright Flyer in the Milestones of Flight gallery.***

Still another major issue is "what to investigate?" Noting that in Australia nearly 6,000 reports are issued in a year, he said that everything couldn't be investigated, due to limited resources. He discussed the value of incident investigation, how to decide when investigations should be closed, the depths of investigations, and identifying safety issues.

In Australia, the Transport Safety Investigation Act now provides an overarching legislative basis for investigations and will be pivotal to the nature of accident investigation in future years.

He concluded by remarking that changes being experienced are both evolutionary and revolutionary, reminding investigators of the need to aim for continual improvement in the quality of safety reports and finally that when resources are tight the focus must be on better management and cooperation without loss of independence.

## Technical sessions

In all, 26 topics were delivered from the raised dais; all were PowerPoint presen-

tations (see adjacent list of speakers and subjects). And while speakers were grouped into six sessions, only one group was designated a "panel." That panel delved into a seldom-discussed aspect of accident investigation: How autopsy information and injury patterns of victims can aid in the investigation process. The five speakers on this topic captivated the audience. A keynote speaker opened each session.

The hotel's main meeting room was amply equipped to handle twin-screen PowerPoint presentations that every speaker used. In keeping with the historical theme of the seminar, almost every presentation provided a look backward and forward into the history of the topic, whether it was accident investigation techniques, system analysis, development of occupant protection, use of forensic evidence, the role of preventative medicine, or investigative rules development.

At the end of each session, speakers formed a panel to take questions from the floor. "Walking" microphones were available to the audience, so every question asked was audible to the entire assembly. Under such conditions, questions seemed to encourage others, and this seminar's Q-&-A session proved no different.

The final presentation of the seminar, placed last because it was provisional, was a report dealing with the investigation of the space shuttle Columbia accident. Steve Wallace, Director of the Office of Accident Investigation, FAA, made the presentation. He was heavily involved in the Columbia accident investigation. The official accident report had been released to the U.S. Congress and to the public 2 days prior. The mockups of the struck wing and the foam that did the damage created a great deal of attention following Wallace's full presentation to the highly interested audience.

Closing functions of the seminar included an ISASI membership meeting and meetings by societies, chapters, and working group representatives. President Frank Del Gandio reported on the financial health of the organization, mentioning the value the Society has garnered from purchasing an office condominium versus renting space. He encouraged volunteer participation in the working groups to ensure the stability of the professional side of the organization and said that there is no dues increase on the horizon.

*Victoria Anderson, left and Nora Marshal, seminar co-chairs, display the recognition plaques presented to them by ISASI President Del Gandio.*

## Social activities

Attendees' long hours of concentration to speakers, PowerPoint screens, and panel discussions are relieved by nightly social activity. These gathering are designed to encourage delegate exchange of views, ideas, concerns, solutions, and just plain networking, so should happenstance bring them together at an accident scene, the investigation will begin more efficiently.

The first such event is the Welcoming Reception held on the evening before the start of the general session. It is a casual business dress affair at which the attendees get the chance to shake out any accumulated travel stress, relax after a heavy day of "tutorial" hours, and greet old friends and begin new acquaintances. Roving through the clusters of conversations that took place along the lines leading to laden buffet tables and between the tables scattered about were a contingent of former stewardesses dressed in the early uniforms of their era, and "Wilbur and Orville Wright," a duo of very knowledgeable entertainers who sprinkled their discussion with events of their experiments in learning to fly and in finally unveiling the mystery of powered flight.

The prime casual social time was dubbed Fun Night, and it was celebrated aboard the 240-foot-long, glass-enclosed cruise boat Odyssey III through the generosity of Platinum sponsor jetBlue Airways. It was a dinner cruise that almost didn't happen, because of a fierce thunderstorm that blew through the area as the partygoers were boarding the busses. But the ISASI folk were not to be denied, and the storm ended quickly. Once aboard the cruise vessel, especially designed to travel beneath the historic bridges spanning the Potomac River, the crowds shunned the chairs and mixed among themselves and roamed the two decks. After lavish food platters and ample refreshments, the two dance floors were crowded with swinging bodies, as onlookers whooped and hollered from the side tables. By nightfall, many couples stood at the rails, enjoying the lighted landscape of Washington, D.C., and its monuments, as the boat slowly moved down the River. Often, the sounds and lights of commercial passenger jets turned heads upwards as the planes flew low following the river approach to Reagan National Airport.

The Companions' Program, always a central part of the ISASI seminar, featured special tours of American historical locations filled with the sights and sounds of Washington, D.C, including some of its museums and gardens. Tour day lunches were, according to reports, delicate and refined.

Similarly, the final day expedition designed solely for relaxation, since the technical sessions had ended, was a morning guided tour of the Smithsonian Air and Space Museum, in which is exhibited, not only the original Wright Flyer, but the "original" of many aviation and aerospace record setters of world-renowned events. The day of the tour was hot, even by Washington standards, so the luncheon location inside the cavernous former train station, since refurbished into an elegant shopping and restaurant center, was much appreciated. After lunch, the group moved by bus to guided tours of the halls and hollows of the Capitol building, where specially made arrangements allowed access to heavily secured areas, not generally open to the public since 9/11.

## Awards banquet

The jeweled night of the seminar is always the Awards Banquet, at which the coveted Jerome F. Lederer Award is presented, along with accolades for those persons who contributed so greatly to the success of ISASI 2003, both financially and organizationally. The sponsor of the event was Emirates Airline. The occasion is also used to recognize those who provide value to the Society throughout the year.

But all this occurs after time for crowd mixing, entertainment, and a sumptuous dinner. This year was no exception. The giant banquet room seated 350 people at round tables set for 10 persons each. The dinner settings of china and crystal atop snow-white linens were adorned with bouquets of long-stemmed delicate and small-blossomed orchids specifically flown in to honor the occasion. The comic entertainer kept the crowd in laughter and suspense (who's next?) by involving members of the audience in the skits he played out on the stage. The humor in the entertainment set the stage for the final comedy act, which involved creating a ballet dancer out of Larry Doherty, who at 6-feet plus of muscle and strength must have felt a "little" conspicuous in a "tutu." But the crowd loved it, and he took it all in good humor, promising "paybacks" at ISASI 2004, being hosted by his Australian Society.

Later, President Del Gandio formally introduced the winner of the 2003 Jerome F. Lederer Award: Caj Frostell (MO3596), and asked Jerry Lederer to make the presentation (see "Award" article page 16). Del Gandio also introduced Noel Brunelle and Michiel Schuurman, winners of the first ISASI Rudy Kapustin Memorial Scholarship Fund award. Del Gandio said: "When Rudy passed away a year ago, his family donated some money for a scholarship in his name, which the Council established and to which members have contributed. Now, we are most proud to announce the awarding of the scholarship. These two students, who won their award through a written competition, have been able to attend this seminar through the scholarship, which paid their registration fee and the majority of their expenses. The scholarship is a magnificent endeavor, and we need more money to sustain it. Contributions are tax deductible, and the funds are not used for anything else. I'm happy to say we've had quite a few donations, and I encourage your continued support by sending cash contributions to the ISASI office, in the name of the scholarship (see "Scholarship" article page 18).

Special recognition was given to members of the seminar committee; all members of the hosting ISASI Mid-Atlantic Regional Chapter: Seminar Chairs Nora Marshall and Victoria Anderson; Sponsorship Committee Ron Schleede; Technical Program Tom McCarthy; Evening Activities Cynthia Keegan; Companion Program Kathy Schleede, Candy Del Gandio, and Louise Rawson; Registration Ann Schull; and Security Joe Reynolds. MARC members supported the committee.

In recognizing ISASI's new corporate members, he said of such members, "It's their sponsorship that makes events of this nature possible, and when coupled with your membership dues, we are able to do what we do and to keep the dues reasonable. But remember, we have members in 53 countries in the world and a lot of people believe that the dues they pay to be a member of ISASI is a great deal of money." New corporate members include Flight Safety Foundation, Cavok International, Inc., Mexican Pilots Association, Flight Safety Foundation of Taiwan, Embraer, Air Accident Investigation Bureau of Singapore Ministry of Transport, and jetBlue. Phoenix International, Inc., was a first-time attendee and applied for corporate membership; 11 individuals applied for individual membership.

Special recognition was given to John Purvis for attainment of ISASI Fellowship membership. "This is the highest class of membership we have and your enrollment brings our Fellows to 12. Congratulations," Del Gandio said. To attain this class of membership, one has to have been involved with 10 accidents—minimum—among other stringent deeds. Purvis has done them, as evidenced by being awarded the Lederer Award in 2001.

The closing ceremony of ISASI 2003 was the traditional passing of the "Call to Order Bell" to ring the opening of ISASI 2004 to be held in the Gold Coast of Australia, Aug. 30-Sept. 2, 2004. ◆

***Seminar Committee members and supporters are, front row, left to right, R. and A. Schull, L. Rawson, K. Schleede, C. Keegan, T. McCarthy, and N. Marshall. Rear row, left to right, F. Del Gandio, E. Gromley, J. Rawson, C. Del Gandio, J. Reynolds, and R. Schleede. Missing is V. Anderson.***

# CAJ FROSTELL:
# 2003 Lederer Award Winner

By Esperison Martinez, Editor

ISASI 2003

The Jerome F. Lederer Award is conferred for outstanding lifetime contributions in the field of aircraft accident investigation and prevention. The award was created by ISASI to honor Jerry Lederer, a leader in the world of aviation safety since its infancy. A lifelong friend of Charles Lindbergh, Lederer was the first director of the Bureau of Air Safety in the Civil Aeronautics Board, established the Flight Safety Foundation, and organized the first flight safety office for NASA. At 101 years old, he was on hand to present the award to Caj Frostell (MO3596), recipient of the 2003 Award.

Awarded annually by the International Society of Air Safety Investigators (ISASI), the award recognizes achievement of the Society's objectives and technical excellence of the recipient. The presentation is the highlight of the ISASI 2003 seminar awards. In introducing the winner to the audience, ISASI President Frank Del Gandio said, "The Jerry Lederer Award is the most prestigious award you can get in accident investigation, the highest award you can get from ISASI. Caj stands out as a beacon of dedication, objectivity, professionalism, and leadership among the world's experts in aircraft accident investigation. Further, he can be justly called the creator of the aviation accident investigation system in his native Finland." He began his civil aviation career at the Finnish Civil Aviation Authority (CAA) as an airworthiness inspector. Gradually he participated in more accident investigations and began acting as chief of the accident investigation section in 1972. During the 70s, he investigated some 300 aviation accidents.

In his current position with ICAO as chief, Accident Investigation and Prevention Section (AIG), Caj plays a major role in the international efforts to promote aviation safety. On the job he is responsible for Annex 13, the bible of the world's investigators, as well as other major issues and publications. He worked on AIG 92 and was responsible for the success of the recent AIG 99 meeting, both of which resulted in major revisions to Annex 13. He is currently deeply involved in the overhaul and rewriting of the ICAO accident investigation manual.

E. MARTINEZ, EDITOR

*Jerry Lederer, center, makes a few comments after presenting the coveted Jerome Lederer Award to Caj Frostell, right. Looking on is ISASI President Frank Del Gandio.*

"All who work with him consider Caj a superb asset to the organization and to the world of aviation safety. Because of the international role he plays, he must remain independent, yet he displays a talent for fairness that continues to reflect his commitment to aircraft accident investigation and prevention. His assignments require every ounce of diplomacy he can muster to bring about successful conclusions, often under extremely tense situations," Del Gandio told the audience.

He added, "In his position in ICAO he is good friend and supporter of ISASI where he serves as its International Councillor. He is able to travel the world and spread the word of aviation safety, especially in those remote areas that truly need it. He has been a major contributor to ISASI's Reachout seminars, participating in at least five (Prague, Beirut, New Delhi, Dar-es-Salaam, and San Jose). Further, he is a welcome source for ISASI members giving papers, readily providing needed background information and materials on various ICAO subjects. ISASI is indeed blessed to have such an outstanding individual in its ranks. We are lucky to have the support of a person of such dedication, energy, and talent. Caj Frostell is uniquely qualified to receive the honor of being named the 2003 Jerry Lederer Award winner."

After the acceptance ceremony, Caj

addressed the audience. He said, "I am overwhelmed. This is a great surprise and a great honor. Thank you very much, Jerry."

In a switch of roles, he praised the award's namesake: "In 1999, Jerry Lederer received ICAO's highest award, the Edward Warner Award. The president of the ICAO Council, Dr. Assad Kotaite, was delighted to personally bestow the Edward Warner Award on Jerry, whose acceptance speech was profound, significant, and embedded with excellent humor. It was the best acceptance speech that I have heard in my 23 years with ICAO.

"Behind the scene, in the ICAO selection process for the award, I had the opportunity to read numerous articles and publications written by Jerry, much of these works were from the 1930s. My task was to prepare a 1.5 page justification summary. It was fascinating reading. At this seminar we have talked about the need for change and reform. But Jerry's articles have transcended time; they are as valid and relevant today as they were in the 1930s. They are true proof of an aviation safety prophet."

He then turned to the present: "I wish to thank Frank Del Gandio for the excellent way he is leading ISASI. I appreciated very much his opening of this seminar and the introduction of numerous accident investigation agencies as an indication of the international forum that ISASI represents.

"The ISASI Reachout seminars are close to my heart. I wish to thank Jim Stewart, the chairman of the Reachout Committee, for his excellent work, and I wish to thank Ladi Mika from the Czech Republic as the host of the first ISASI Reachout seminar. Jim and Ladi could well be called the fathers of 'Reachout.' I also wish to thank the corporate sponsors whose financial support is essential for us to be able to carry out the Reachout program.

## Past Lederer Award winners

1977—Samuel M. Phillips
1978—Allen R. McMahan
1979—Gerard M. Bruggink
1980—John Gilbert Boulding
1981—Dr. S. Harry Robertson
1982—C.H. Prater Houge
1983—C.O. Miller
1984—George B. Parker
1985—Dr. John Kenyon Mason
1986—Geoffrey C. Wilkinson
1987—Dr. Carol A. Roberts
1988—H. Vincent LaChapelle
1989—Aage A. Roed
1990—Olof Fritsch
1991—Eddie J. Trimble
1992—Paul R. Powers
1993—Capt. Victor Hewes
1994—U.K. Aircraft Accidents Investigation Branch
1995—Dr. John K. Lauber
1996—Burt Chesterfield
1997—Gus Economy
1998—A. Frank Taylor
1999—Capt. James McIntyre
2000—Nora Marshal
2001—John Purvis and The Transportation Safety Board of Canada
2002—Ronald L. Schleede ◆

"This is not only an honor for me, it is also an honor for my country Finland, a small country with five million people. We had two other participants from Finland at this seminar. I wish to acknowledge Capt. Pekka Kärmeniemi, safety manager with Finnair, and Lieutenant Colonel Jaakko Saatsi, the chief investigator in the Finnish Air Force. I am grateful to the Finnish Air Force for my first exposure to aviation, officer school, and flight training some 38 years ago. And I admit that flight safety and accident investigation was not in my thought process at that time. Simply stated, I was fascinated by the opportunity to fly an airplane.

"I also wish to thank Mr. Olof Fritsch, who hired me to ICAO 23 years ago. Many of you remember Olof as a former president of ISASI some 10-12 years ago. I also wish to acknowledge Ron Chippindale, whom I worked with for 2-3 months in 1986-1987 on the Samora Machel accident, a TU-134 accident just inside South Africa in which the president of Mozambique was fatally injured. Ron and I were assisting the accredited representative of Mozambique. The 3 months with Ron in Mozambique set the stage for a life-long friendship.

"The aviation safety and accident investigation training institutes are also close to my heart, and I have been involved with several of them. Many of these training institutes are also ISASI corporate members. I wish to acknowledge and thank the University of Southern California and Mike Barr. May I ask Mr. Chan Wing Keong, the director of the AAIB in Singapore, to convey my thanks to the Singapore Aviation Academy for involving me in their accident investigation courses. And last but not least, I wish to thank the Southern California Safety Institute, Marlene Foulk, Gary Morphew, John Purvis, and Ron Schleede for involving me in their programs in the USA and the new courses in Prague, the Czech Republic.

"I apologize that time does not permit me to mention all numerous friends in the audience. I wish to thank you very much. May God bless you all, and may God bless Jerry Lederer, in particular. Thank you." ◆

# 'Kapustin' Scholars Selected

## Students from Embry-Riddle Aeronautical University, Florida, USA, and Delft University of Technology, the Netherlands, become the first recipients of the Rudy Kapustin Memorial Scholarship Fund.

By Esperison Martinez, Editor

Noelle Brunelle, Embry-Riddle Aeronautical University, Florida, USA, and Michiel Schuurman, Delft University of Technology, the Netherlands, have been selected by the ISASI International Council as the first recipients of the Rudy Kapustin Memorial Scholarship Fund. The Fund was established in memory of all ISASI members who have died, and was named the ISASI Rudy Kapustin Memorial Scholarship Fund in honor of the former ISASI Mid-Atlantic Regional Chapter president and long-term ISASI member who developed a reputation as "tinkicker extraordinaire" among his peers.

The scholarship is intended to encourage and assist college-level students interested in the field of aviation safety and aircraft occurrence investigation, according to Richard Stone, ISASI executive advisor and one of the two fund administrators. Contributions have and will continue to supplement the Kapustin's family initial endowment. The memorial will provide an annual allocation of funds for the scholarship. All members of ISASI enrolled as a full-time student in a recognized and accredited education program with a concentration on aviation safety and/or aircraft occurrence investigation are eligible for the scholarship. A student who has once received the annual scholarship will not be eligible to apply for it in another year.

The ISASI executive advisor and ISASI vice-president, offices presently filled by Stone and Ron Schleede, serve as executors and administrators of the fund. They will ensure that the education program is being completed at a recognized school and applicable to the aims of the Society and assess the applications and determine the most suitable candidate. The scholarship, which consists of an annual $1,500 award, requires a student to submit a 1,000 (+/- 10%) word essay in English addressing "The Challenges for Air Safety Investigators."

### About the scholars

Noelle Brunelle is in her second year of a masters of science, human factors and systems program at Embry-Riddle Aeronautical University, in Daytona Beach, Fla., USA. Noelle, a native of California, took her first flying lesson in 1988, and has been hooked on all things aviation ever since. Her experience includes not only flying but also training in air traffic control and work in airfield operations, command and control, corporate flight attending, and as the safety officer at the Osan AB Flying Club. These experiences have allowed her to participate in battle staff operations, rescue and recovery operations, and alerting and assembling parties to investigations and related activities. Her goal for any work she does in the safety field is to save one life and to inspire one person to become an investigator.

Noelle's husband, a flight engineer on USAF combat rescue helicopters, was killed during a mid-air collision in 1998. She recalls that the "accident board did an excellent job. It was a human factors accident and many recommendations came from the investigation. But once the report was written and released, no actions flowed from the recommendations." This inaction, she says, was the motivation for her move into the investigative arena.

After her husband's accident, many

E. MARTINEZ, EDITOR

*Kapustin scholars Schuurman and Brunelle (center) are flanked by Scholarship Committee members Ron Schleede, left, and Richard Stone, right.*

friends dissuaded her from working in the accident investigative field because they felt it would be too emotionally demanding. For a while she believed them; but as time passed, she realized there could be no better memorial to Kevin than working in the safety field. In 2001, she returned to school at ERAU and began attending the ISASI student group meetings. "I just loved the material we got there. It was often the high point of school," she said. Her experiences, as outlined above, and the dynamics that came with all those tasks, further moved her into the human factors field of study.

She says about the winding road that led her to air accident investigation: "Maybe I followed this path for a reason. I have been exposed to ATC, airfield operations, rescue and recovery operations, flight attending, and commercial cockpit operations. These experiences have given me the ability to look at an accident from many different perspectives."

ISASI 2003 was her first exposure to tinkickers en masse and their "literature."

What did she think of the experience? "I have found my tribe! This is where I am supposed to be!" she exclaims exuberantly.

Michiel Schuurman, age 24, is in the fourth year of a 5-year aeronautical engineering program at Delft University of Technology, the Netherlands. His interest in aviation started with a discovery. Doing what young boys do, searching for family "treasures in the attic," he discovered a book dealing with general aviation and it piqued his interest to the point that he, later, acquired the series of books that make its collection. His ultimate goal is to become an accident investigator. Why? "The 1992 Bijlmermeer accident left indelible images with me. Trying to prevent future accidents like that is my main reason for wanting to become an accident investigator," he explained.

He hopes to gain entry into the aviation industry, but believes it will have to be outside of the Netherlands. He is prepared to relocate to achieve his goals. In Europe he is eyeing Airbus or one of its many affiliates. He recognizes that he will not be able to enter directly into active investigations, and first will be looking at doing engineering analysts tasks before getting into the field. He has already arranged to serve a 12-week internship with the Dutch Transportation Safety Board (Raad voor de Transportveiligheid (RvTV)). In this way, he says, "I will get practical work at the Board and technical learning at the university."

In his essay that helped gain him the ISASI scholarship, he speaks of "The Challenge for Air Safety Investigators." But he sees a different type of challenge for persons like himself: "One of the biggest challenges for us new people is to learn from the older heads; we have to start with pen and paper before we can apply information technology to the process. We can't be effective by beginning with the computer and all it implies; we need to begin at the bottom and work ourselves up, learn the basics of investigation, so to speak."

ISASI 2003 was his second attendance at a "tinkickers" seminar. His first was ISASI 2002 held in Taiwan. He contrasted the two as one being heavy "technical with hands-on examples," and the other with being more "information filled." And it was that diversity of approach in the seminars that reinforced his thinking of the AI profession: "You have to be adaptive, have an open mind, learn a lot, including the history of accidents, because one of the charges to the profession is to prevent a repetition of history." About attending the seminar, he added with a happy grin: "I'm at the right place for networking. I met the RvTV head accident investigator last year in Taiwan, now I'm doing my internship there."

The papers submitted by the two recipients follow.

## Challenges Facing Air Safety Investigators Today

*—By Noelle Brunelle*

A challenge can be one of many things. It can be a contest or a fight, a request for identification or explanation; it can be an objection, stimulation, or even the barking of a dog. It shares Latin roots with trickery and deception, but also is recognized as the full use of one's abilities, energies, and resources. Since man first slipped the surly bonds of Earth, he has encountered a new challenge, the challenge to understand why winged craft fail. Air safety investigations, be they of hazards, deviations, incidents, or accidents are labors of love performed out of the desire to increase this understanding. It is through this study of errors and failures that we increase the reliability of aviation systems and in turn save lives. Challenge, in all its forms, uniquely describes the many facets of air safety investigations.

Some challenges investigators face are obvious. Becoming an investigator is a daunting task requiring not only expertise in engineering, operations, or systems, but also additional training in investigative methods. Wreckage may be located in a remote or inhospitable location, contain biologic or chemical hazards, and be damaged by impact and fire. A flight data recorder may not be present; available information may not provide a clear picture of the flight. The increasing complexity of aircraft systems requires greater analysis of debris; the human factors discipline may not adequately explain human behaviors. Investigations can require extensive data collection, research, and analysis and may take years to complete.

Other challenges investigators face are

less obvious. Repeatedly approaching the carnage of an accident scene requires steel will. Increased media presence requires special skills and procedures to minimize speculation. Sometimes, despite dogged determination and months of work, a specific probable cause cannot be determined or effective recommendations cannot be made. Perhaps what is most difficult for an investigator is watching as recommendations continue to go unheeded.

### Contest and explain

It is our nature to contest and explain the events and circumstances surrounding aircraft mishaps. The goal of these efforts is to ultimately effect change. Accident scenes are carefully documented, the sequence of events carefully reconstructed, probable causes and recommendations carefully made, all performed seeking to satisfy this goal. In the first decades of aviation, meeting this challenge was a simple task—mechanical failures were identified and improvements in design, engineering, and materials were implemented. As aircraft structures became more reliable, greater attention was focused on human components. Despite the best efforts of investigators, the pace of change resulting from accident findings has slowed.

This lagging influence was both a call to attention and a call for explanation, and encouraged investigators to recognize strengths and weaknesses of the system. Analog flight recorders collected only limited data; cockpit voice recorders often produced poor quality recordings. Cockpit devices and displays were installed without a full understanding of their effects. Human behavior is difficult to explain; the hierarchical structure of flight departments resisted changes thrust upon them. Safety departments and investigative agencies were required to report to the very entities they were tasked to evaluate.

### Challenge

The challenge to identify and to overcome the effects of these factors has led to great advances. Digital flight data recorders can monitor up to 64 parameters. Innovative minds have married these recorders with the datalink abilities of new flight management systems to allow real-time download of inflight data. Trend analysis of this data has led to reductions in runway incursions and overspeed approaches. Video technology offers the promise of enhanced data collection. Advances in psychobiology have provided great insight into how stimuli are sensed and interpreted.

This new knowledge has led to greater understanding of the interactions among aircrew, automation, and the physical cockpit environment. Improvements in simulation have generated experimental trials with greater validity. Aviation psychology has begun applying economic, management, social, and motivation theories to aircrew processes. Results of these efforts include a mathematical model predicting cognitive performance using sleep histories and a greater understanding of team dynamics and decision-making under stress.

Line-oriented flight training has led to the development of line-oriented safety audits and the opportunity to gain a greater understanding of aircrew threat and error management. Safety departments and investigative agencies have been made independent entities reporting to the same offices of those they investigate. Though many components needed to effect change are now in place, other challenges still remain. Frequently the bridge between research and operations, investigators must spend increasing amounts of time remaining abreast of current technology and human factors advances.

Though independent, investigators do not work in an environment free of the influence and politics of interested third parties. In addition, modern society frequently demands quick and simple answers; effective recommendations are often time consuming and expensive and are often met with resistance.

The work of air safety investigators honors those who have been lost to flight. Recent changes to the aviation environment are creating new opportunities for investigators to both advocate and effect change. Advances in human factors research allow us to quantify a greater number of human responses and behaviors. Game theory allows us to predict the costs and benefits of proposed actions. Recent economic losses by the airline and insurance industries have focused attention on cost-effective strategies. These and other events have generated an opportunity for air safety investigators to quantify and justify the value of their services. Seizing available and creating new opportunities requires that we accept the challenges before us, challenges to identify and contest our current role, to sound call to and explain the benefits of our work. This challenge is the greatest air safety investigators face today.

## The Challenges for Air Safety Investigators: The Development of The Aircraft—*By Michiel Schuurman*

In the early years, the "flying contraptions" either didn't fly at all or they broke due to a lack of strength. By "trial and error" the weakest link was found and replaced. After a lot of tears and broken bone, the Wright Flyer flew during a flight test. With this breakthrough in aviation, the probability of an accident was still there. In 1908 the first fatal accident happened when Lt. Thomas Selfridge was killed in the Wright Flyer III piloted by Orville Wright. The cause of the accident was determined to be an inflight propeller separation of one of

the two propellers. This separation resulted in the slashing of the wires of the rudder and made the plane uncontrollable. By replacing the propeller and the wire, the plane flew again, the trial-and-error strategy continued.

## Common practice

Later, even during World War I, the common practice for aircraft engines was durability testing whereby the engine would be run until some part of it failed. The part was then replaced and the engine would be run until the next part failed. At that time this method resulted in an acceptable safety level.

As years past, the engines became lighter and more powerful and higher speeds could be reached. A stronger material was, however, needed to fulfill this possibility. To accomplish this, metals were an attractive alternative. At first, planes were made with metal tubes covered by linen; later all metal planes were created. Notably, at that time engineers were very capable of estimating the strength and weaknesses of wood. A new method was invented of controlling the wood rot by impregnation, which would eradicate the main problem of wooden structures. The technological push was, however, too great—a small period of the "trial-and-error" accidents resulted with new metal planes. Failures of joints and strength problems with connections were again causes of accidents.

During World War II, the development of a new (jet) engine was under way. This would mean a breakthrough in engine technology making flying at high altitude possible. The first jet passenger plane was developed, the de Havilland Comet. After several crashes a new phenomena in the aircraft industry would be discovered called "metal fatigue." A combination of loading and unloading with a stress concentration would have a disastrous result. By incorporating this knowledge, engineers made the next generation of planes safer.

At the same time, laws and regulations were written down, wherein the minimum standards were described. Procedures for flight tests and minimum levels of safety were set and written down. This would become the basis to which the manufactures must adhere to in order to get a certificate of airworthiness.

The introduction of computer technology made the development of aircraft structure behavior possible, which led to greater accuracy in strength and life expectancy. Through the use of wind tunnels, an optimal wing design could be found, making the aircraft stable and easy to fly. At the end of the 80s, concurrent engineering helped to achieve a balanced design, whereby all the fields of aeronautical knowledge came together to produce a cost-effective plane that could be built and had better handling qualities. All and more of these measurements contributed to reduced accidents and making traveling by air safer.

## Accident rate

Accidents still occur, even after all these efforts. Are we doing something wrong? The accident rate is beginning to flatten; predictions of increase in air travel and planes flying will result mathematically in more accidents and loss of life. This grim prediction is not what a safety investigator wants to hear, but it is the reality. The challenge is now to achieve the decline in the accident rate. The past hundred years of flight have resulted in a wide range of accidents. But what have we really learned? Looking at the past and into the future, is it possible to predict accidents and construct an aircraft to anticipate that?

Closing the loop—at present we are (still) discovering the fault out in the field. After an accident, a governmental agency tries to find the cause(s) of the accident. When the cause is found, a recommendation is made to redesign a specific part or procedure, thus reducing the probability of a similar accident. This is done for every accident separately, so in effect we may still make the same errors in the design process resulting in the same kind of accidents over and over again. Currently we have archives full of "things not to do," yet this knowledge isn't passed on.

## Human-centered design

Is design the key? We are designing aircraft with a safe-life and fail-safe strategy. Not long ago, crashworthiness for the increase in the survival rate was introduced; human-centered design is getting more acceptance in the industry for the human-error component. However, will these measures result in a steady decline of the accident rate? Or do we need a different approach? Instead of designing a high-end product, why don't we design an aircraft system that is immune to unfavorable actions leading to accidents?

I am not saying that every engineer has to buy a crystal ball so that he is able to predict what is going to happen in the future. However, in future design of aircraft we may rely more on data collected in the past that gives an insight of common accident types. This vital data written down in accident reports is lying in archives and needs to be filtered and correlated for commonalities. Keeping in mind that the environment and the user who is using the aircraft for certain operations sets the boundaries, these aspects in combination or apart constitute the system that can and has in the past resulted in aircraft accident proneness. By studying accidents of the past, the system can be described so that a better boundary can be set for future aircraft. These boundaries need to be found and made known to the manufactures. Closing the loop in the design of an aircraft system is the challenge for the air safety investigator. ◆

# NTSB Academy Greets First 'Students'


JAY KIVOWITZ, NTSB

**ISASI members attending the Society's annual seminar "open" the doors of the new NTSB Academy.**

By Esperison Martinez, Editor

At the turn of the century, year 2000, when NTSB officials selected George Washington University (GWU) as the new home of the NTSB Academy, they knew that they wanted the safety institution to provide comprehensive education and training to the men and women who improve safety by conducting independent transportation accident investigations. They couldn't know that the first "students" to use the facility would be an international cadre of aviation accident investigators—a 164-strong contingent of ISASI members who traveled from far and near to be the first to "open" the doors of the Academy. NTSB Academy Director Julie Beal put it best when she welcomed the group, "It is fitting that we start here today with you, a worldwide group of investigators, for that is what we are all about, making flying safer by improving accident investigator skills."

The NTSB Academy is a major Safety Board initiative to improve the training and skills of its own employees and to make its safety expertise more widely available to the diverse transportation community. Its mission is to provide comprehensive education and training to the men and women who improve safety by conducting independent transportation accident investigations; to foster an environment that encourages transportation safety initiatives and technical research; and to promote uniform programs that ensure compassion, understanding, and assistance for those affected by transportation tragedies. It is located on the university's campus in Ashburn, Va., near Washington Dulles International Airport.

The ISASI contingent arrived in two busses as workmen were finishing work on the structure and its landscape. Inside, however, the structure was complete and due to architectural design, little resembled a drab, stark-looking government building. Bright colors, high ceilings, spacious surroundings, and excellently equipped study halls make it world class.

During a tour of the Academy, the group discovered that the impetus for creation of the Academy was the wreckage of TWA 800. What has been recognized as the most significant airplane accident investigation effort ever produced a reconstructed fuselage that is a virtual "learning laboratory." And as such, the NTSB wished to preserve it for the benefits that could be passed on in "teaching" situations. The agency determined that the annual cost to maintain the reassembled fuselage in rented hangar space could be halved by the establishment of a self-directed facility that would also greatly expand the agency's training capability and allow its safety expertise and know-how to be more widely available to the transportation community. The result, with congressional approval, is a 20-year lease agreement with GWU, which owns the building, to house the Academy whose curriculum promotes independent, objective, and technically advanced accident investigations aimed at enhancing the safety of all modes of transportation.

The group learned that what was once five acres of red clay and scrub pine trees has become a state-of-the-art, 72,000-square-foot, two-level facility with five classrooms, a football-sized, steel superstructure laboratory (hangar) equipped with a 15-ton crane to house the three-dimensional, 93-foot reconstruction of the forward portion of the TWA Flight 800's fuselage, ample laboratory space, an outside simulations court, meeting rooms, student and teacher work areas, and offices.

During the daylong tutorial program that the ISASI group attended, two class spaces were used. Both reflected the attention designers gave to the needs of the students. There was no crowding as the seating affords ample elbow room and wide writing surfaces that are uncluttered and wired for laptop computers and other electronic instruments. Temperature was maintained at a very comfortable setting, and lighting was carefully monitored to match the needs of the instruction being offered. Outside the lecture room was a very large lounge in which a buffet luncheon was served; the four-person table arrangements allowed easy conversation and mingling by the individuals.

Indeed, at the end of the day, when asked his opinion on the practicality of the Academy, one "student" seemed to say it all with the simple words: "It looks and feels like a winner." ◆

# Pilot Fatigue Countermeasures

**In any accident investigation that raises questions about "pilot performance" being an issue in the chain of events leading to an accident, the Human Factors Group should attempt to document the quality of the crew rest experienced by the pilots.**

By Steven R. Lund

Following a congressional request in 1980, the NASA Ames Research Center created an on-going program to examine whether "there is a safety problem of uncertain magnitude, due to transmeridian flying, and a potential problem due to fatigue in association with various factors found in air transport operations," such as flying across numerous time zones.

Reporting in a hearing on pilot fatigue, before the Aviation Subcommittee of the U.S. House of Representatives' Committee on Transportation and Infrastructure in the summer of 1999, NASA's Deputy Associate Administrator, Office of Aerospace Technology, said, "The NASA Ames Fatigue/Jet Lag Program (now the Fatigue Countermeasures Program)… was created to collect systematic, scientific information on fatigue, sleep, performance in flight operations, and circadian rhythms—the biological "time clock" that regulates the body's daily sleep-wake patterns."

NASA established three program goals, which continue to guide research efforts to (a) determine the extent of fatigue, sleep loss, and circadian disruption in flight operations, (b) determine the impact of these factors on flight crew performance, and (c) develop and evaluate countermeasures to mitigate the adverse effects of these factors and maximize flight crew performance and alertness.

The NASA program gathered data regarding the existence and extent of fatigue in aviation from several realistic sources, including actual flying, laboratory studies, high-fidelity simulations, and surveys. These data have been consistent in showing that fatigue is an issue with complex, diverse causes and potentially critical consequences. Field studies specific to different aviation environments and using a range of measures (e.g., performance, physiology, and behavior) have revealed a number of factors related to fatigue. For example, in long-haul operations, the non-24-hour duty/rest cycles, the circadian desynchronization associated with transmeridian flights, and the sleep loss accompanying night-time flying are all associated with fatigue.

This research program has made evident that pilot fatigue is a significant safety issue in aviation. Rather than simply being a mental state that can be willed away or overcome through motivation or discipline, fatigue is rooted in physiological mechanisms related to sleep, sleep loss, and circadian rhythms. These mechanisms are at work in flight crews no less than in others who need to remain vigilant despite long duty days, transmeridien travel, and working at night when the body is programmed for sleep.

A dramatic example of fatigue in aviation operations showed up when NASA researchers collaborated with U.S. National Transportation Safety Board (NTSB) investigators in assessing whether fatigue was present in the 1993 crash of a U.S. DC-8 freighter in Guantanamo Bay, Cuba. The DC-8 crashed into level terrain during a circling approach to the landing runway in clear weather, resulting in the aircraft being damaged beyond repair but in no fatalities to the three crew members, the only persons aboard. The NTSB implicated fatigue in its report: "Probable causes—The impaired judgment, decision-making, and flying abilities of the captain and flight crew due to the effects of fatigue." This was the first time fatigue had been so identified in an aviation accident. Three core physiological factors related to fatigue were identified (cumulative sleep loss, continuous hours of wakefulness, and circadian time of day). All three crewmembers were found to be heavily influenced by these fatigue factors.

NASA concluded that fatigue is a problem with diverse causes, requiring a multifaceted and comprehensive, yet integrated, approach. Based on current research, such an approach should have at least the following components: (a) education and training, (b) hours of service, (c) sound scheduling practices, (d) effective countermeasures, (e) incorporation of appropriate design and technologies, and (f) research.

While serving as chairman of the NTSB, Marion Blakey has said that operator fatigue remains a primary cause of serious transportation accidents throughout the United States. "Many times and throughout all modes of transportation, our investigations have found that lost sleep equals lost lives"

A NASA/FAA countermeasure study empirically demonstrated the effectiveness of a planned cockpit rest period in improving performance and alertness in long-haul flight operations. Flight crews who were provided a planned 40-minute nap opportunity (resulting in an average of 26 minutes of sleep) subsequently exhibited improved physiological alertness and performance compared to flight crews not receiving the nap opportunity. The crewmembers napped one at a time in a three-person cockpit with minimal disruption to normal flight op-

***Steven R. Lund*** *retired after a 32-year career at Douglas Aircraft Company (now Boeing) that was devoted to flight test, flight safety, and commercial jet transport incident and accident investigation. He has been involved in the investigation/analysis of more than 130 jet transport airline accidents worldwide and more than 5,000 incidents. He participated in the RAND Institute for Civil Justice Study on the U.S. National Transportation Aircraft Accident Investigation Process: "Safety in the Skies—Personnel and Parties in NTSB Aviation Accident Investigations." Among other affiliations, he was a member of the U.S. National Research Council Committee on Aircraft Certification Safety Management, a Strategy for the FAA's Aircraft Certification Service.*

erations and with no one reporting or identifying concerns regarding safety. The benefits of the nap were observed throughout the critical descent, approach, and landing phases of flight. The planned nap appeared to provide effective and acute relief from significant sleepiness experienced by crews in three-person flight operations. While several airlines have adopted the preplanned "NASA nap" for international flight operations, the FAA has not yet sanctioned it for use by U.S. carriers.

Technology continues to evolve rapidly, but humans have not changed their need for sleep, their rate of adjustment after circadian desynchronization, or the relationship between fatigue and performance. Good system design incorporates information about human physiology, its limitations and strengths, early in the process. Technological approaches that use this information can take many forms, including flight crew scheduling algorithms (i.e., the methodology of choosing flight crews) and alertness monitoring/management systems.

Fatigue program work in this area includes a project examining onboard crew rest facilities to determine the quantity and quality of sleep obtained and the factors that promote or reduce good sleep in the bunk. Onboard bunks are used in operations with extra (augmented) flightcrew members onboard so that crews can rotate through flightdeck positions and non-flying crews can obtain sleep during long flights.

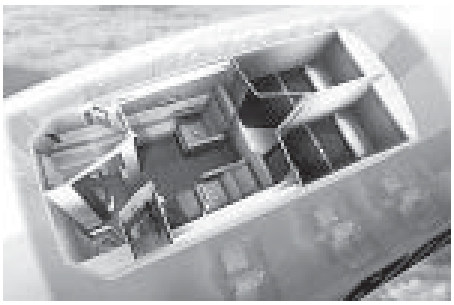
A recent NASA study is examining the feasibility of a video-based, automated, online system for drowsiness detection on the flight deck. Because we tend to underestimate our own degree of sleepiness, these systems have the potential to play a valuable role in detecting dangerous levels of fatigue and alerting crewmembers to their presence.

However, once crews are alerted to the presence of fatigue, the next problem is what can be done to ameliorate it: Does the industry mandate that a fatigued pilot immediately enter into a regiment of "power naps"—designed to provide restful sleep, without negative post-nap effects, such as grogginess, disorientation, or headaches—which also avoid subsequent sleep loss that might otherwise compromise regular sleep patterns? Or, should airlines be required to constantly provide backup crewmembers to replace ones with detected levels of fatigue? Both remedies would be needed if modern flight decks were fitted with drowsiness-detection devices.

The remedies are clearly not an incentive for the industry to mandate such devices. The question that could be posed is, "Why measure a condition for which there is no established mitigating

PHOTOS: BOEING

***ABOVE: Overhead crew rest—Putting the crew rest area in the crown of the airplane frees up space for more revenue-generating seats. BELOW: The Boeing 777 has the spacious cross-section required to incorporate roomy berths and business-class-comfort seats into overhead rest quarters.***



procedure if the pilot's 'drowsiness high' light comes ON at the top of descent?" The most viable solution would be that the industry require pilots to be adequately rested before the flight operations they are scheduled to work, giving due consideration to the quality of rest obtained, including the pilots' rate of adjustment after circadian desynchronization in addition to the current federal aviation regulations (FARs) concerning crew block time.

Considerable progress has been made during the last half of the 20th century regarding knowledge about sleep, sleep need, the effects of sleep loss on performance, and related issues. Even more recently, major advances have occurred in human circadian rhythms research, leading to an improved understanding of these daily rhythms and their control by the human circadian pacemaker in the brain. However, the NASA studies concluded that more research is needed to fully understand the capabilities and limitations of the human sleep and circadian systems. An additional challenge is the appropriate application of this research to operational environments such as aviation.

Given the recent development of technologies claiming to be able to detect fatigue, focused research is needed to ascertain the sensitivity, reliability, and validity of these devices. According to NASA, research also needs to continue to address regulatory, scheduling, and countermeasure questions. The area of fatigue is plagued by misconceptions about its causes and characteristics. There is no substitute for valid empirical data to guide decision-making and policy.

## Accident investigation strategies

If there is any question about "pilot performance" being an issue in the chain of events leading to an accident, the Human Factors Group should attempt to document the *quality of the crew rest* experienced by the pilots in addition to determining adherence to the appropriate flight- and duty-time regulations.

For instance, did the pilot experience any sleep disorders, such as insomnia or sleep apnea [caused by relaxation of the muscles of the tongue and the soft palate at the base of the throat, which allows the breathing passage to collapse in individuals with a narrow airway. Although chest movements may continue, no air flows into the lungs and oxygen levels in the blood decrease. When blood oxygen levels fall too low, the person briefly wakes to take a breath. This cycle of sleeping, then, the repeating cycle of airway collapsing, waking, and sleeping, often occurs hundreds of times in a night. Individuals with this common sleep apnea might not remember these brief awakenings and believe they slept through the night. However, the interrupted sleep leaves the individual exhausted in the morning and sleepy throughout the day]. Even something as innocuous as trying to rest in a noisy hotel room replete with interruptions to the normal sleep cycle should be documented. [Also, staying up late the night before a trip, unrelated flying duties such as USAF reserve flying, commuting habits, etc]. ◆

# ISASI 2004 Makes Ready

For the Australian Society of Air Safety Investigators, which is hosting ISASI 2004, 4-plus years of planning are nearing completion. The 35th annual seminar will take place Aug. 30-Sept. 2, 2004, and carry the theme "Investigate, Communicate, Educate." It will be held in the ANA Hotel Gold Coast, Queensland, Australia.

ISASI 2004 will follow what has become the established ISASI format: A weeklong program that includes a day of two tutorial workshops, a 3-day technical program, and an optional day for relaxation on a specifically planned social program. The planned tutorial subjects are "interviewing" and "effective communication and education." Subjects for the technical program are as yet unknown, but the "Call for Papers" has been issued (see page 27).

Planners have said that the "seminar will be a broad based informative and educative event, with particular reference to the importance of learning from the outcomes of a range of investigations. It will address broad contemporary safety and investigation issues. We plan to include recent practical examples of air safety occurrences and safety investigations. The program will be attractive to a wide range of the aviation safety community. As usual, it will be an ideal opportunity to meet and discuss safety issues with a wide cross-section of aviation specialists."

Final registration costs for the seminar are yet to be determined, as the cost will depend largely on the amount of sponsorship the organizing committee is able to secure. At press time, however, the committee did say that the "costs are estimated to be no more than A$700. At the current monetary exchange rates, that is about US$460. Also, because of the potential for fluctuations in exchange rates, registration will be payable in Australian dollars only.

E. MARTINEZ, EDITOR

***Larry Doherty accepts the "Call to Order Bell" with which ISASI 2004 will be opened.***

The ANA Hotel is handy to both Brisbane International Airport and Coolangatta (Gold Coast) Airport, which are served by Australian domestic carriers. The hotel is a five-star property and is located in a very popular international and domestic tourist holiday area. Hotel rates will be A$154 including tax, or about US$100 per night. The very favorable rate remains available for those persons who may wish to arrive early, or remain after the seminar. ◆

## Annual ANZSASI Seminar Gets 'Positive' Rating

The annual Australasian Regional Air Safety Seminar for 2003 was held at the Novotel Twin Waters Resort, Mudjimba Beach, Queensland, Australia, over the weekend of May 31-June 1. On Friday, May 30, the seminar was preceded by a meeting of the Asia Pacific Cabin Safety Working Group, at which Gerry Gibb of Safetywise Solutions ran a workshop on investigation techniques for cabin safety personnel.

Rob Graham, the ATSB director of investigations, was the seminar keynote speaker and he outlined new ATSB legislation. His address led into papers from ATSB investigators; and the first day continued with emphasis on civil aviation, with developments in technology and recent investigations in Australia and New Zealand. The second day had more of a military flavor, as well as including a panel discussion, with the panel comprising key personnel from Australasian investigation agencies. (Copies of papers and more details can be accessed on the ASASI website.)

The social program featured a welcome reception on the Friday evening and a gala dinner on Saturday night. Feedback on the technical program, the social activities, and the location of the seminar was totally positive. Because ASASI will be hosting next year's ISASI annual international seminar, there will be no ANZSASI seminar staged in 2004, but New Zealand will host the next such event in 2005. ◆

## Lederer, Burin Receive Awards

Jerome (Jerry) Lederer (LC0035) and James Burin (MO4448) were recent recipients of separate awards recognizing their many contributions to the industry. Lederer was one of two recipients of the Henderson Award given annually to "a living individual or group whose vision, leadership, or skill has made a significant and lasting contribution to the promotion and advancement of aviation or space

*Continued . . .*

## Technical Papers Presented at ISASI 2003

The following is a list of the technical papers presented at ISASI 2003 in Washington, D.C.

- Jean-Pierre Dagon, AirTran Airways—*The Practical Use of Root Cause Analysis System (RCA) Using REASON: A Building Block for Accident/Incident Investigations*
- Jeff Guzzetti, NTSB, and Brian Nicklas, NASM—*From the Wright Flyer to the Space Shuttle: A Historical Perspective of Aircraft Accident Investigation*
- Barbara Burian, NASA Ames Research Center—*The Emergency and Abnormal Situations Project*
- John Purvis, 2001 Lederer Award Winner —*Aircraft Reconstruction-The Decision Process*
- David Lee, Taiwan ASC—*CI 611 & GE 791 Wreckage Recovery Operations Comparisons and Lessons Learned—15:00-15:30*
- Victor Liang, Taiwan ASC—*Application of 3-D Software Wreckage Reconstruction Technology in Aircraft Accident Investigation*
- Stuart Dyne, University of Southampton, U.K.—*CVR Recordings of Explosions and Structural Failure Decompressions*
- Stéphane Corcos and Gérald Gaubert, BEA—*Investigating Techniques used for DHC-6 Twin Otter Accident, March 2001*
- Jay Graser, Galaxy Scientific—*Investigation Enhancement Through Information Technology*
- Candace Kolander, AFA—*Historical Review of the Flight Attendant Participation in Accident Investigation*
- Mike Poole, Flightscape—*Accident Investigation Without the Accident*
- Caj Frostell, ICAO—*Update of ICAO Activities*
- Jim Burin, Flight Safety Foundation—*The CFIT and ALAR Challenge-Attacking the Killers in Aviation*
- Pippa Moore, CAA U.K., and Mike Horne, AD Aerospace—*Flight Deck Image Recording on Commercial Aircraft*
- Mike Huhn, ALPA—*An Analysis of the Relationship of Finding-Cause-Recommendation from Selected Recent NTSB Aircraft Accident Reports*
- Robert Matthews, FAA—*Ramp Accidents and Incidents Involving U.S. Air Carriers*
- Timothy Logan, Southwest Airlines—*Airline Safety Data: Where Are We, and Where Are We Going?*
- Scott Warren, NTSB—*Use of Computed Tomography Imaging in Accident Investigation*
- Tom Farrier, ATA—*Investigating Survival Factors in Aircraft Accidents: Revisiting the Past to Look to the Future*
- Ray Cherry—*The Accident Database*
- Steve Wallace, Director, Office of Accident Investigation, FAA—*Investigating the Space Shuttle Columbia Accident*
- Panel: "Occupant Protection Measures—History, Development, and Future Directions"
- Adrianne Noe, NMHM/AFIP—*The 1908 Wright/Selfridge Mishap*
- William Waldock, ERAU—*Crashworthiness Investigation: Enhanced Occupant Protection Through Crashworthiness Evaluation and Advances in Design*
- William Gormley, Office of the Medical Examiner, Commonwealth of Virginia—*Enhanced Occupant Protection Through Injury Pattern Analysis*
- Mary Cimrmancic, Marquette University—*Forensic Aspects of Occupant Protection: Casualty Identification*
- Dr. Allen Parmet—*Aircraft Accident Investigation: The Role of Aerospace and Preventive Medicine*

activity." This is the third occasion that the National Aeronautical Society has recognized Lederer. In 1965 he was honored with the Wright Brothers Memorial Trophy, and in 1974 he was named one of NAA's Elder Statesmen of Aviation.

Jim Burin, long-time ISASI member and director of technical programs for Flight Safety Foundation, received the General Spruance Award, presented by the SAFE Association for outstanding contributions to safety through education. He was recognized for his "tireless commitment to safety education while serving as director of the U.S. Navy School of Aviation Safety in Monterey, Calif., and his service to FSF. The award is named for U.S. Air Force Brig. Gen. William W. Spruance (Ret.), who has given presentations on aircraft survival to more than 150,000 people. ◆

## FLRC Continues Investigation Workshops

The ISASI Florida Regional Chapter is continuing with its program to conduct annual accident investigation education in Lakeland, Fla., at the FAA Aviation Safety Center and Production Studios, according to Chapter President and FAA Inspector Ben Coleman. "We started four years ago due to an overwhelming industry request to educate first responders to aircraft

## NEW MEMBERS

**Corporate**

- Exponent, Inc. (CP0217)
  Cyrille Dennis Moore
  Lemoine V. Dickinson
- Air Accident Investigation Bureau of Singapore (CP0218)
  Wing Keong Chan
  See Hai Ho
- Phoenix International Inc. (CP0219)
  Steven D. Saint-Amour
  Mike Kutzleb

**Individual**

Baird, Ricky, W., MO4961, Vernon Hills, IL, USA
Bruce, James, S., ST4963, Pleasant, SC, USA
Buchanan, Michael, D., AO4933, Sugar Land, TX, USA
Bulgin, George, A., ST4957, Prescott Valley, AZ, USA
Busch, Robert, M., MO4943, Duluth, MN, USA
Correa Echandia, Maria Isabel, ST4934, San Jose, Costa Rica
Davies, Richard, V., AO4966, Holt, ACT, Australia
Diggins, Daniel, P., MO4949, Gaithersburg, MD, USA
DiLollo, Michael, R., MO4952, Mirabel, PQ, Canada
Duncan, Clemons, S., MO4947, Lusby, MD, USA
Florio, Andrea, AO4939, Rome, Italy
Gupte, Sanjeev (Sam), V., MO4960, Louisville, KY, USA
Hogwood, Norman, W., AO4942, Auckland, New Zealand
Holt, Timothy, B., ST4937, Warminster, PA, USA
Horn, Susan, E., ST4938, Anchorage, AK, USA
Hufnagle, Joseph, W., ST4965, Dayton Beach, FL, USA
Kemp, Richard, N., FO4956, Fairbanks, AK, USA
King, Brian, T., ST4962, Summerville, SC, USA
Klepper, Robert, B., AO4951, Huntsville, TX, USA
Knickerbocker, Shawn, F., MO4958, Orange Park, FL, USA
Kurt, Steven, T., AO4940, Greeley, CO, USA
Lascelles, David, N., AO4953, Fulham Gardens, SA, Australia
Lawrence, Jason, B., MO4935, Georgetown, ON, Canada
Lockley, Wayne, T., MO4948, California, MD, USA
Lynch, David, J., AO4936, Pointe Claire, PQ, Canada
Macmillan, Peter, C., AO4954, Kilcoy, Qld, Australia
Means, Quentin, L., ST4964, Salina, KS, USA
Meyer, II, Kenneth, AO4950, Forest Hill, MD, USA
Orsena, Joanne, M., FO4955, Vienna, VA, USA
Parson, Susan, K., FO4932, Falls Church, VA, USA
Pearce, Douglas, L., MO4946, Huntingtontown, MD, USA
Roberts, Thomas, E., MO4945, Leonardtown, MD, USA
Robertson, David, L., MO4941, Ray, MI, USA
Rucci, Gregory, MO4944, Charlotte Hall, MD, USA
Setti, Garry, H., AO4959, Remington, VA, USA
Sharp, Julie, A., ST4968, Lakeland, FL, USA
Teague, Kelly, L., MO4967, Mustang, OK, USA
Thompson, Melissa, K., ST4969, Greenville, TX, USA

# CALL FOR PAPERS

# ISASI 2004

## The Australian Society of Air Safety Investigators Presents A Professional International Society of Air Safety Investigators Seminar, August 30-Sept. 2, 2004, ANA Hotel, Gold Coast, Queensland, Australia

If you wish to offer a presentation in line with the theme for the seminar, please provide a brief abstract (approximately 200 words) plus personal details by March 1, 2004. *Offers after this date will only be considered subject to program availability.*

If accepted, the author agrees to provide a full written paper no later than June 1, 2004. *PowerPoint presentations are not acceptable for publication in seminar proceedings or CDs.*

Upon acceptance, the presentation will be produced on a CD-ROM approximately 2 weeks before the seminar commences. Please note, although a presenter may need to withdraw at short notice from a scheduled presentation, the written material will remain part of the CD-ROM if already produced.

**Send Abstracts to:** Brent Hayward, Dedale Asia Pacific Pty Ltd, P.O. Box 217, Albert Park, Victoria 3206, Australia. Fax: +61 3 9645 5472; e-mail: bhayward@dedale.net. Alternatively, please send to: ASASI, P.O. Box 588, Civic Square, ACT 2608, Australia

accident sites with protocol and tools to aid, not hamper, an investigation," he said.

The 6-hour program is a joint effort by the NTSB, the FAA, local law enforcement aviation units, and the Florida Aviation Safety Foundation. The upcoming course will be held on May 14, 2004, and will be satellite uplinked to the FAA's Aviation Training Network in Oklahoma City for downlink broadcast at more than 60 sites nationwide.

See www.faaproductionstudios.com for the details of how to attend Accident Investigation 105. Coleman emphasized, "Sometimes thorough investigations are impeded by the lack of proper first response. We are teaching as many professionals as possible how important their role can be to prevent accidents through investigations."

For more information on this dynamic course, contact ben.coleman@faa.gov. ◆

## ABOUT THE COVER

*(continued from page 2)*

*Lt. Selfridge suffered a severe head injury in the accident and died about 3 hours later; this was the first official aircraft accident fatality. Selfridge, age 26, was buried with full military honors in nearby Arlington National Cemetery. Orville Wright somehow survived with serious injuries and was hospitalized for 6 weeks; he fractured his left thigh, broke several ribs, and received severe head wounds and back injuries in the crash. The ensuing substantive accident investigation report by the Aeronautical Board of the Signal Corps concluded that the cause of the accident was "the accidental breaking of a propeller blade and a consequent unavoidable loss of control, which resulted in the machine falling to the ground…." The report explained that prior to the trials, Orville Wright replaced the 8-foot 8-inch propellers with ones that were 9 feet long for the purpose of "tuning up the speed of his machine preparatory of making his official speed trial." Due to the vibration of the machine, the longer propeller caught a guy wire on the aircraft and broke the propeller. The guy wire pulled the rear rudder to its side, and the airplane lost control.*

## LARSASI Reports Life Member Retirement

ISASI's Latin American Society reports that ISASI Life Member Carlos Jose Bondio (LM2120) has retired from the Investigaciones de Accidentes de Aviacion Civil of Argentina. Bondio is credited with being a "starter and impeller of ISSI in our country. Most of us are in debt to him for all his transfer of knowledge, experience, passion, and dedication in accident investigation," said Horacio Larrosa (MO4131).

Bondio was born in Cordoba, Argentina, in 1922 and developed "a brilliant career in the Argentine Air Force, Civil Aviation Authority, private industry, and in the aircraft accident investigation profession," concluded Larrosa. ◆

*Continued . . .*

## ATSWG Meets During ISASI 2003

The Air Traffic Services Working Group met on August 27 during the annual ISASI seminar, held this year in Washington D.C., USA. Working Group Vice-Chairman Ladislav Mika conducted the meeting in the absence of Chairman John Guselli. The Working Group actively reviewed the ATS "top ten" safety target initiatives.

The ATS top ten targets had previously been nominated by the growing working group membership as those items that were the most likely to deliver the maximum safety benefit from a collective effort. Primary consideration was given to the motivation of a diverse membership toward achieving effectiveness. ◆

## Readers Respond to Photo Query

This photo was on the cover of the July-September 2003 *ISASI Forum*. Very little information was available. Readers were asked for help in identifying the incident and its circumstances. Many thanks to those who responded—from Australia, John Griffiths, Philip Smith, David Adkins (MO4479), Andrew Simmonds (A04893); also Jack L. Parnell (LM2680) USA, and Norman Hogwood, New Zealand.

But it was reader Alan Rohl, U.K., who wrote, in part, "It really happened at Parafield, the light aircraft airport for Adelaide, South Australia. A 'tabloid' report follows—details may be embellished somewhat!!"

### VH-KBZ—The Sliced Plane

By Colin McDonald

A doctor surgeon from Whyalla found his battery dead in his Piper Saratoga (a powerful single-engine aircraft) at Parafield Airport, South Australia, on the night of Aug. 26, 2001. He then proceeded to hand start the engine by turning the prop. While this is actually not illegal, it should be approached with the utmost of caution and is really only used in remote areas where there is no help or decent pub within a long walk.

The pilot, by himself, did not chock

## ISASI Annual Report 2002

*(A change in the office of the ISASI Vice-President and the contingencies of publication deadlines necessitates a change in the format of the ISASI Annual Report. This report focuses on the financial condition of the Society as of the close of 2002.—Editor)*

| | Jan.-Dec. 2002 | Budget | $ Over Budget | % of Budget |
|---|---|---|---|---|
| **Ordinary Income/Expense** | | | | |
| **Income** | | | | |
| **601 Dues-New Individual Member** | 8,535.00 | 10,000.00 | -1,465.00 | 85.4% |
| **603 Dues-New Corporate Member** | 4,600.00 | 4,800.00 | -200.00 | 95.8% |
| **611 Dues-Renewal Individual Member** | 78,117.50 | 60,000.00 | 18,117.50 | 130.2% |
| **613 Dues-Renewal Corporate Member** | 63,863.00 | 50,000.00 | 13,863.00 | 127.7% |
| **614 Dues-Late Fees** | 495.00 | 1,000.00 | -505.00 | 49.5% |
| **615 Dues-Upgrade Fees** | 220.00 | 350.00 | -130.00 | 62.9% |
| **616 Dues-Reinstatement Fees** | 0.00 | 0.00 | 0.00 | 0.0% |
| **621 Contrib-Unres Membership** | 2,477.00 | 1,500.00 | 977.00 | 165.1% |
| **625 Contribution-Other** | 311.10 | 0.00 | 0.00 | 0.0% |
| **631 Publication Subscriptions** | 480.00 | 625.00 | -145.00 | 76.8% |
| **632 Publication Income** | 704.00 | 700.00 | 4.00 | 100.6% |
| **634 Library Services** | 153.78 | 100.00 | 53.78 | 153.8% |
| **636 Publications Advertising** | 0.00 | 0.00 | 0.00 | 0.0% |
| **642 Membership Services** | 546.34 | 300.00 | 246.34 | 182.1% |
| **643 Membership Regalia Sales** | 335.00 | 500.00 | -165.00 | 67.0% |
| **650 Seminar-Proceedings** | 4,400.00 | 5,000.00 | -600.00 | 88.0% |
| **651 Seminar-Net Proceeds** | 11,800.52 | 10,000.00 | 1,800.52 | 118.0% |
| **652 Seminar-Reimbursed Advance** | 3,000.00 | 3,000.00 | 0.00 | 100.0% |
| **684 Reachout-Sponsorship** | 20,000.00 | 1,000.00 | 19,000.00 | 2,000.0% |
| **Total Income** | 200,038.24 | 148,875.00 | 51,163.24 | 134.4% |
| **Expense** | | | | |
| **6560 Payroll Expenses** | 498.22 | | | |
| **700 Condo Fees** | 2,861.30 | 2,650.00 | 211.30 | 108.0% |
| **705 Mortgage Interest** | 6,315.80 | 9,552.00 | -3,236.20 | 66.1% |
| **711 Repairs and Maintenance** | 48.54 | 1,000.00 | -951.46 | 4.9% |
| **712 Storage Rental** | 1,620.00 | 800.00 | 820.00 | 202.5% |
| **801 P/R Exp-Office Mgr Salary** | 35,864.38 | 35,200.00 | 664.38 | 101.9% |
| **802 P/R Exp-Health Insurance** | 6,690.00 | 6,000.00 | 690.00 | 111.5% |
| **803 P/R Exp-SEPP** | 3,557.21 | 1,760.00 | 1,797.21 | 202.1% |
| **804 P/R Exp-Trng Misc and Benefits** | 0.00 | 500.00 | -500.00 | 0.0% |
| **805 P/R Expense Employers FICA** | 724.63 | 2,500.00 | -1,825.37 | 28.4% |
| **806 P/R Expense-FUTA Tax** | 0.00 | 0.00 | 0.00 | 0.0% |
| **807 P/R Expense-VA UIC Tax** | 0.00 | 0.00 | 0.00 | 0.0% |
| **808 P/R Expense-Bonus** | 0.00 | 800.00 | -800.00 | 0.0% |
| **811 Accounting-Payroll** | 836.82 | 920.00 | -83.18 | 91.0% |
| **812 Accounting-Tax Prep** | 387.00 | 400.00 | -13.00 | 96.8% |
| **814 Insurance** | 2,818.00 | 1,400.00 | 1,418.00 | 201.3% |
| **817 Licenses and Permits** | 140.00 | 300.00 | -160.00 | 46.7% |
| **822 OPS-Telephone & Telex** | 2,268.93 | 3,200.00 | -931.07 | 70.9% |
| **824 OPS-Equip Maint & Repair** | 1,799.90 | 1,800.00 | -0.10 | 100.0% |
| **825 OPS-Other Utilities** | 3,154.34 | 2,000.00 | 1,154.34 | 157.7% |
| **826 OPS-Postage and Shipping** | 7,036.27 | 6,000.00 | 1,036.27 | 117.3% |
| **827 OPS-Printing and Reproduction** | 1,517.53 | 2,500.00 | -982.47 | 60.7% |
| **828 OPS-Office Supplies** | 3,096.35 | 3,000.00 | 96.35 | 103.2% |

| | Jan.-Dec. 2002 | Budget | $ Over Budget | % of Budget |
|---|---|---|---|---|
| **830 OPS-Computer Tech Support** | 0.00 | -1,000.00 | -1,000.00 | 0.0% |
| **831 Equipment Purchase** | 2,734.46 | | | |
| **832 OPS- Equipment Lease** | 4,089.62 | 3,000.00 | 1,089.62 | 136.3% |
| **833 OPS-Petty Cash** | 200.00 | | | |
| **835 OPS Parking/Tolls** | 14.20 | | | |
| **840 OPS-Temp Help** | 185.00 | 500.00 | -315.00 | 37.0% |
| **844 Publications-Forum Expense** | 33,634.50 | 38,000.00 | -4,365.50 | 88.5% |
| **845 Publications Proceedings** | 6,500.00 | 5,000.00 | 1,500.00 | 130.0% |
| **848 Publications-Handbook Expense** | 150.00 | 2,500.00 | -2,350.00 | 6.0% |
| **856 Membership-Regalia Items** | 0.00 | 1,000.00 | -1,000.00 | 0.0% |
| **861 Membership-Service Expense** | 1,210.53 | 2,000.00 | -789.47 | 60.5% |
| **871 Library Expenses** | 417.76 | 400.00 | 17.76 | 104.4% |
| **881 Management Council-Travel** | 16,276.29 | 15,000.00 | 1,276.29 | 108.5% |
| **882 Management Council-Admin Exp** | 1,262.12 | 1,500.00 | -237.88 | 84.1% |
| **883 Management Council-Other** | 3,344.58 | 2,000.00 | 1,344.58 | 167.2% |
| **886 Management Council-Rep Travel** | 0.00 | 500.00 | -500.00 | 0.0% |
| **887 Management Council-Rep Admin** | 0.00 | 100.00 | -100.00 | 0.0% |
| **891 Rebate-Natl/Reg/Corp** | 200.00 | 3,000.00 | -2,800.00 | 6.7% |
| **892 Nat-Reg/Reimb Exp** | 0.00 | 0.00 | 0.00 | 0.0% |
| **893 Nat-Reg/Adv (non-seminar)** | 0.00 | 0.00 | 0.00 | 0.0% |
| **901 Seminar-Advances** | 0.00 | 3,000.00 | -3,000.00 | 0.0% |
| **902 Seminar-Reimbursable Cur Exp** | 13,460.19 | 0.00 | 0.00 | 0.0% |
| **903 Seminar-Lederer Award** | 168.51 | 250.00 | -81.49 | 67.4% |
| **905 Seminar/Reachout** | 8,132.74 | 1,000.00 | 7,132.74 | 813.3% |
| **911 Bank Fees** | 358.69 | 300.00 | 58.69 | 119.6% |
| **912 Credit Card Charges** | 2,420.02 | 2,000.00 | 420.02 | 121.0% |
| **Total Expense** | 175,994.43 | 164,382.00 | 11,612.43 | 107.1% |
| | | | | |
| **Net Ordinary Income** | 24,043.81 | -15,507.00 | 39,550.81 | -155.1% |
| | | | | |
| **Other Income/Expense** | | | | |
| **Other Income** | | | | |
| **661 Rent-Tenant Rental Income** | 8,220.00 | 7,620.00 | 600.00 | 107.9% |
| **662 Rent-Tenant Shared Expenses** | 0.00 | 0.00 | 0.00 | 0.0% |
| **671 Interest-Checking Acct** | 277.42 | 1,500.00 | -1,222.58 | 18.5% |
| **683 Other Income-Reimbursements** | 14,992.75 | 0.00 | 14,992.75 | 100.0% |
| **Memorial Scholarship Fund** | 3,365.00 | | | |
| **Total Other Income** | 26,855.17 | 9,120.00 | 17, 735.17 | 294.5% |
| | | | | |
| **Other Expense** | | | | |
| **922 Misc-Other Reimb Exp** | 2,473.03 | | | |
| **924 Misc-Death/Illness Exp** | 100.00 | | | |
| **925 Misc Refunds** | 150.00 | | | |
| **Total Other Expense** | 2,723.03 | | | |
| | | | | |
| **Net Other Income** | 24,132.14 | 9,120.00 | 15,012.14 | 264.6% |
| **Net Income** | **48,175.95** | **-6,387.00** | **54, 562.95** | **-754.3%** |

the wheels or check that the handbrake was engaged ….

Anyway, the engine fires up at about 2,000 rpm and the aircraft starts taxiing to the runway on its own. The only problem with that was there were four piper warriors and a twin-engine Seminole (the sliced plane in picture) in its way. The pilot somehow managed to avoid certain death, although this may have been the better option considering what was about to unfold.

At a steady rate of forward movement similar to a fairly upset hippo during breeding season, the Saratoga proceeds to destroy anything in its path. With approx. 350 liters of avgas spewing out of the damaged aircraft, the pilot must surely realize that an appropriate timely death is about to occur….The result is he lived, and the University of Adelaide lost one plane and the use of the other four for some time to come, all because of a flat battery and a really bad decision. The cost—$1.5 million and absolute embarrassment for the rest of the pilot's life.

You can just imagine the pilot, after being run over by his own plane, hanging on to the tail of his aircraft trying to stop it going any further and watching in horror as it bit by bit shreds the tail of the most expensive aircraft in the vicinity and thinking any minute the engine will stop. Just when he thinks the nightmare is going to come to an end, his aircraft then makes a sharp right-hand turn and without conscience heads to the second-most expensive aircraft in its way. Following the laws of Karma, this guy must have done some serious [stuff] somewhere along the line. (To see the full article: http://users.senet.com.au/~colton/Interesting_Stories.html.)

*Editor's note: The end of the story? The crash was found to be a "simple and reasonable mistake," as reported by the* Adelaide Advertiser: *"Dr Luis Isabel, 50, of Wattle Park, discovered his single-engine Piper Saratoga had a flat battery on Aug. 26, 2001. Satisfied the handbrake was on, he climbed on to a wing to hand start the propeller but a 'huge surge of power' as the engine started caused the plane to hit five other planes.*

*"Magistrate Richard Brown dismissed charges saying it could not be proven it was not a mistake."* ◆

## Transportation Fatalities Increase in 2002

Transportation fatalities in the United States increased slightly in 2002, according to preliminary figures released by the National Transportation Safety Board. Deaths from

*Continued . . .*

## TRAINING COURSE CALENDAR 2003/2004

**UNIVERSITY OF SOUTHERN CALIFORNIA**
- Aviation Safety Program Management
Jan. 5-16, Mar. 22-Apr. 2, Jun. 21-Jul. 2, Sept. 20, Oct. 1, Dec. 6-17
- Human Factors in Aviation Safety
Mar. 1-5, May 17-21, Sept. 13-17, Nov. 8-12
- Safety Management for Aviation Maintenance
May 10-14, Nov. 1-5
- Software Safety
Apr. 26-29, Nov. 15-18
- Gas Turbine Accident Investigation
May 3-7, Nov. 15-19
- Accident/Incident Response Preparedness
Feb. 23-35, Oct. 18-20
- Photography in Accident Investigations
Feb. 26-27, Oct. 21-22
- Helicopter Accident Investigation
Apr. 5-9, Oct. 25-29
- Aircraft Accident Investigation
Dec. 8-19 (03), Mar. 8-19, Jun. 7-18, Oct. 4-15
- Incident Investigation/Analysis
Jan. 26-29, Aug. 30-Sept. 2

*For further information contact:*
University of Southern California/Aviation Safety Programs
Tele: 310-342-1345
Website: www.usc.edu/dept/engineering/AV.html

**TRANSPORTATION SAFETY INSTITUTE & FAA**
- Aircraft Accident Investigation
Jan. 27-Feb. 4, Mar. 9-17, May 3-11, Jun. 8-16, Jul. 13-21, Jul. 27-Aug. 4, 2004, Aug.18-26
- Accident Investigation Recurrent Tng.
Jan. 13-15, Jan. 13-15, Mar. 2-4, Apr. 20-22, Aug. 10-12, Sept. 14-16
Human Factors in Accident Investigation
Dec. 2-4 (03), Feb. 10-12, Apr. 13-15, Jun. 29-Jul. 1, Aug. 31-Sept. 2
- Rotorcraft Accident Investigation
Dec. 2-11(03), Jan. 21-30, Feb. 18-27, Mar. 23-Apr. 1, Apr. 20-29, May 18-27
- Aircraft Cabin Safety Investigation
May 4-5, Aug. 19-20
- Aviation Safety Officer
Dec. 9-11 (03), May 18-20
- Amateur Build Aircraft Accident Investigation
Jan. 27-29, Jun. 8-10, Jul. 27-29
- Turbine Engine Accident Investigation
Dec. 9-11 (03), May 18-20

*For further information contact:*
Pat Brown, Transport Safety Institute
Tele: 405-954-7206
Website: www.tsi.dot.gov

**SOUTHERN CALIFORNIA SAFETY INSTITUTE**
A=Albuquerque, NM
T=Torrance, CA
O=Ottawa, Canada
V=Vancouver, British Columbia
PR=Prague, the Czech Republic

- Aircraft Accident Investigation (A)
Feb. 23-Mar. 5, May 30-Jun. 11, Oct. 11-22
- Human Factors for Accident Investigators (A)
Mar. 8-12, Jun. 14-18, Oct. 25-29
- Investigation Management (A)
Mar. 15-19, Jun. 21-25, Nov. 1-5
- Gas Turbine Accident Investigation (A)
Mar. 22-26, Nov. 8-12
- Advanced Aircraft Accident Investigation (T)
Dec. 1-5 (03)
- Aircraft Performance and Structures Investigation (A)
Nov. 17-21 (03)
- Operational Risk Management (T)
Mar. 1-5
- Ramp and Maintenance Safety (T)
TBD
- Fire and Explosives Investigation (A)
TBD
- Helicopter Accident Investigation (A)
Mar. 29-Apr. 2
- Safety Management Systems (T)
Feb. 2-13 (03), Sept. 13-24
- Human Factors in Safety Management Systems (T)
Feb.16-20, Sept. 27-Oct. 1
- International Aircraft Cabin Safety Symposium (V)
Feb. 2-5
- European Edition of the Cabin Safety Symposium (PR)
Mar. 23-25
- Basic Accident Prevention and Investigation (PR)
Apr. 19-30
- Accident and Incident Investigation for Aviation Managers (T)
Feb. 23-27

*For further information contact:*
Eduardo Treto, Registrar
SCSI, 3521 Lomita Blvd, Ste. 103
Torrance, CA 90505-5016, USA
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E-mail: registrar@scsi-inccom
Website: wwwscsi-inccom

transportation accidents in the United States in 2002 totaled 45,098, up from the 44,969 fatalities in 2001.

Highway fatalities, accounting for more than 94 percent of the transportation deaths in 2002, increased from 42,196 in 2001 to 42,815 in 2002. The number of fatalities increased in most highway vehicle categories; however, a decrease in deaths occurred in the category of medium and heavy trucks, which recorded 24 fewer fatalities in 2002 than in 2001.

The number of persons killed in all aviation accidents dropped from 1,171 in 2001 to 618 in 2002. It should be noted that airline fatalities in 2001 accounted for a total of 531 deaths. The 2001 deaths included the September 11 terrorist attacks and the American Airlines Flight 587 crash in November. There were no fatalities on scheduled passenger carriers in 2002. The number of general aviation fatalities increased slightly from 562 in 2001 to 576 in 2002, according to the NTSB. ◆

## ERAU Seeks Historical Input from Early Students

Embry-Riddle Aeronautical University is seeking historical information from accident investigators who may have attended the university during the pre-university decades of the 1920s through the 1960s.

The project under way is collecting and archiving the history of aviation at the institution as seen through the eyes of its graduates and instructors. Tagged the "Heritage Project," it allows prior students to "help pass the legacy and story of this world-class training facility to future generations."

Interested persons should contact Dean Robert Rockwett at 386-226-6026 or by e-mail at Robert Rockett@erau.edu. ◆

# Benefits of Individual ISASI Membership

### About You

You are an air safety professional. You may work for an airline, a manufacturer, a government, the military, an operator, or on your own. But you are a person who is dedicated to improvement of aviation safety and you joined ISASI with the expectation of enhancing the achievement of that goal.

### About ISASI

ISASI is the only organization specifically for the air safety investigator. Our motto is "Air Safety Through Investigation." We are a growing, dynamic organization with a full range of membership.

### Why Join? Lots of reasons—activities, education, services, and networking

- The yearly ISASI seminar has become a focal point for aviation safety professionals throughout the world. Attendance has steadily grown and the presentations are state of the art and meaningful. The 2002 seminar was held in Taipei, Taiwan, and the 2003 seminar was held in Washington, D.C., celebrating the 100th anniversary of flight.

- The new *Reachout seminar program* was instituted to provide low-cost, subject-oriented seminars in regions of the world with higher accident rates. Since the first *Reachout* held in Prague, Czech Republic, in May 2001, there have been six Reachout seminars in Lebanon, Chile, India, Sri Lanka, Tanzania, and Costa Rica. All have been an unqualified success in attendance and content. These mini-seminars provide our corporate members an opportunity to directly affect safety in those areas where it will have the greatest return.

- The ISASI publication, *FORUM,* is a first-class magazine, published in color four times a year. Its editorial content emphasizes accident investigations findings, investigative techniques and experiences, regulatory issues, industry accident prevention developments, and member involvement and information. Each issue also features one of our corporate members in a full back-page "Who's Who" article.

- The annual seminar-published *Proceedings* are provided to individual members at no cost on line.

- Individual members have access to past ISASI publications, our library, and accident database.

- ISASI now has an easily accessible website, www.isasi.org, with an extensive "Members Only" information section and a limited general public area.

- Our corporate and individual members are a large and diverse group working in all facets of the industry worldwide. This presents a unique opportunity for personal and on-line networking.

**ISASI is the place for those dedicated to improving aircraft accident investigation and aviation safety.**

## PREAPPLICATION FOR INDIVIDUAL MEMBERSHIP

(Cut and mail to the address below or otherwise contact ISASI to receive a full membership application.)

PLEASE PRINT

Name (last, first) _____

Date of birth _____

Home address _____

City _____

State, district, or province _____

Country _____

Postal zip/zone _____

Home telephone _____

Citizen of (country) _____

E-mail address (optional) _____

**I AM INTERESTED IN APPLYING FOR SOCIETY MEMBERSHIP IN THE MARKED MEMBERSHIP CLASSIFICATION. PLEASE FORWARD TO ME A FULL MEMBERSHIP APPLICATION.**

❑ **Member**—A professional membership class requiring at least 5 years' active experience as an air safety investigator.
❑ **Associate Member**—A professional membership class for air safety investigators who do not yet fulfill the requirements for member.
❑ **Affiliate Member**—A public, non-professional membership class for persons who support ISASI's goals and objectives.
❑ **Student Member**—A membership class for students who support ISASI's goals and objectives. (If student, list name of institution where enrolled_____.)

Present employer _____

Employer's name _____

Address and telephone _____

Did your position involve aircraft accident investigation? ❑ Yes ❑ No

Your title or position: _____

Dates: from:_____ to _____

**INTERNATIONAL SOCIETY OF AIR SAFETY INVESTIGATORS**
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Fax:703-430-4970
E-mail: isasi@erols.com

# Allied Pilots Association, National

With more than 12,000 members, the Allied Pilots Association (APA) is the largest independent pilots' union in the world. The APA represents all American Airline pilots as their certified collective bargaining agent.

Founded by five American Airline pilots, and granted official certification on Nov. 13, 1963, the Association has been guided by a basic principle of government originally established by its framers: democratic vote by the membership. Approximately 99 percent of all American Airline pilots are members of the APA.

The APA National Safety Committee consists of pilot volunteers who are committed to attaining the highest levels of safety possible in commercial aviation. With this underpinning directive, and with the support of domicile safety committees, American Airlines pilot safety consultant members, the Association's Safety Department, and Committee members focus on industry technical operations, current operations, and airline-specific items.

Safety Committee activities are either proactive or investigative with respect to accidents and incidents. Proactively, APA safety professionals represent Association member interests in systems safety industry conferences, such as the Commercial Aviation Safety Team (CAST), to maintain a strong presence at the national level.

APA safety representatives also play an active role in airline-specific programs designed to identify injurious operations, like the Aviation Safety Action Program (ASAP). In order to enhance the environment in which pilots perform and to benefit the operational integrity of American Airlines, APA safety members are presently working toward an agreement with the airline on the implementation of a Flight Operations Quality Assurance (FOQA) program.

A recent major accomplishment of Association safety representatives was the introduction of risk-management techniques into the FAA's desktop modeling assessment on land and hold short operations (LAHSO). The APA interpolated risk-analysis methodology into studies of the LAHSO procedure. This had a significant impact on the industry, ultimately resulting in nullifying the expansion of this departure and landing technique in the United States.

The APA maintains an experienced team of pilot accident investigators for various NTSB groups in accidents in which the APA is a party. Referred to as the "GO" Team, there are up to 31 highly qualified individuals who are ready to fly to an accident site at a moment's notice. Additionally, the APA is an active partner in the FlightAssist Program that the APA has helped to develop. The Association offers the services of more than 80 pilots who are trained in critical incident stress management (CISM).This program aids pilots in the normal recovery process after abnormal events.

The events of 9/11, and the loss of American Airlines Flights No. 11 and No. 77, particularly affected the APA. Following 9/11, members of the APA Safety Committee became designees to the DOT's Rapid Response Task Force (RRTF). Aware of the voluminous issues that were highlighted in RRTF meetings, APA members identified strategic procedural points necessary to the maintenance of both safety and security. These eight recommendations were adopted by Congress—and incorporated into aviation security legislation that today constitutes safety and security protocol for commercial airlines, establishing procedure for all U.S. airlines.

Commitment to safety is an inherent cornerstone of the Association and its Safety Committee. To learn more about the Allied Pilots Association, visit www.alliedpilots.org ◆

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