

PREMIUM ON SAFETY

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A MESSAGE FROM USAIG

Greetings! How are those New Year's resolutions holding up? Were there any safety angles among those traditional fitness, fiscal, and cerebral improvements you vowed to strive for in 2016? If not, it's never a bad time to become a more vigilant and active agent for safety. Few workplaces are without hazards, and few procedures are truly optimized and bulletproof.

An investigation after a major airline had an alarming close call due to maintenance being done on the wrong aircraft revealed that "airplane swap" errors were a recurring issue, but because they were usually noticed and resolved by technicians who did not report them, work practices that actually aided the confusion never got scrutinized. Opportunity lost! Now's a great time to really consider things you're seeing and doing that could hurt you or your operation, to make a report or spark the right conversation, and drive changes before they do. Fly smart and fly safe!

Paul Ratté
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Loss of Separation

Are You on a Collision Course? BY CINDY YOUNGBLOOD

An aircraft was in the final phase of flight preparing to land at a busy commercial airport. It had been a long day for the pilots dealing with weather and delays. Vectored onto a base leg for Runway 17L, the pilots were completing the before-landing checklist when ATC advised them to expect the ILS 17L. Shortly after, the localizer needle for 17L came alive and swung across the pilot's primary flight display. They had not been cleared for the approach, so the co-pilot immediately attempted to contact ATC on the last frequency, but there was no answer. Instead of capturing the localizer and proceeding inbound, as advised to expect, the pilots continued on their last assigned heading.

Often it's not one but rather a combination of hazards that results in a LOS. For example, pilot fatigue, an inoperative glideslope, and an ambiguous clearance may combine to produce controlled flight into terrain.

They flew across the approach paths of Runways 17C and 17R, then began a climbing right turn heading straight into traffic. ATC had no way to keep aircraft separated as the pilots flew an unpublished procedure, resulting in a loss of separation that could have ended in disaster.

Loss of Separation (LOS)—a complex problem with as many pieces and possibilities as there are pilots and planes in the sky. A LOS event occurs when two or more aircraft experience a loss of

minimum separation. But what are separation minimums? Rules are different everywhere—depending on the category of airspace, ATC technology, an aircraft's equipment, and pilot capabilities—and they're constantly changing. Loss of separation can take place anywhere, at any time, from chocks to chocks. It can occur between aircraft, aircraft and terrain/obstacles, or aircraft and ground equipment. The FAA even has a category for loss of separation between aircraft and a pedestrian. In the non-aviation world, I'm pretty sure that's called "distracted walking" and addresses the hazards created by those obsessed with their cell phones.

Contributing factors affecting LOS are extensive. They include pilot-controller communications, airspace systems, pilot training, aircraft type, evasive action, blind spots, inoperable equipment, weather systems, fatigue, even operations into cold weather, all of which can result in altimetry errors leading to a loss of separation. The biggest opportunity for LOS is human error in the terminal environment.

However, it can also occur in remote en route areas, low altitude, high altitude, VFR, IFR, and everything in between. New pilots, seasoned pilots, professional crews, and even the military are not immune. Often it's not one but rather a combination of hazards that results in a LOS. For example, pilot fatigue, an inoperative glideslope, and an ambiguous clearance may combine to produce controlled flight into terrain. The subject of LOS is so complex, it's impossible to address

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Separation... (continued from page 1)



...the best method of minimizing LOS is to emphasize and promote situational awareness (SA). This includes having a clear mental picture of where you are at any given time and the factors to safety that also exist within that space, such as proximity to terrain, obstructions, weather systems, other aircraft, airspace systems, ATC communications, etc.

with a simple solution—or is it?

All separation minima are set for risk mitigation and designed to create a volume of airspace around each aircraft—space which should not be infringed upon by another aircraft, obstacle, or terrain. *When measures are taken by all participants to protect the safe zone around each aircraft, risk is said to be mitigated.* While it is the job of air traffic controllers to direct traffic and apply separation rules to keep aircraft at a safe distance from each other, pilots—when able—have the responsibility to see and avoid.

Today's operating environment makes collision avoidance both easier and more challenging at the same time. Each situation must be evaluated individually as it is impossible to provide collision avoidance guidance that is universally applicable. Therefore, the best method of minimizing LOS is to emphasize and promote situational awareness (SA). This includes having a clear mental picture of where you are at any given time and the factors to safety that also exist within that space, such as proximity to terrain, obstructions, weather systems, other aircraft, airspace systems, ATC communications, etc. Also, have a planned course of action if an intruder is suspected, whether a Piper Cub at 87mph, a Citation X at Mach 0.92—or a texting pedestrian.

For example, a fighter pilot must be aware of the threats and intentions of enemy forces, as well as the status of his/her own aircraft.

For instructor pilots in the training area, SA requires conducting frequent clearing turns and keeping an eye out for converging traffic, while remaining alert to the actions of students. For ATC, SA includes being attentive to the positions and clearances of multiple aircraft and being able to anticipate future changes and developments.

Simply put, situational awareness is being vigilant to the informational, personal, environmental, and organizational influences inherent to operating within complex environments. Within such space, each operator has the obligation to be knowledgeable about and alert to potential dangers, and operate in a manner that promotes safety to the best of their ability. Rules are not the same for everyone; however, everyone can and must work to maintain situational awareness.

Changing airspace makes for changing dynamics. In January 2005, the FAA implemented reduced vertical separation minimums (RVSM) in domestic airspace. Under RVSM, vertical separation between approved aircraft and operators reduced from the previous 2,000-ft minimum to 1,000 ft between Flight Levels 290 and 410. This rule change resulted in more aircraft occupying the same airspace. "RVSM doubled our airspace capacity immediately," stated former air traffic controller Mitch Berry. While shrinking separation minimums improves airspace efficiency, it increases the

opportunity for a LOS event. Airspace rules are complicated and they allow different separation distances—both vertically and horizontally—depending on the aircraft, airspace, location, and distance from radar. In special cases, controllers can also reduce separation if, for example, a pilot acknowledges they see another aircraft and they can maintain visual separation.

While demands on our airspace system continue to increase—resulting in the need for frequent rule changes—aircraft and equipment technologies keep evolving in an effort to mitigate the risks of loss of separation as well. Equipment like the latest traffic alert and collision avoidance system (TCAS II Version 7.1) has greatly affected the ability of pilots to see and avoid. Where a collision risk exists, an airborne collision avoidance system (ACAS) provides the most effective means of collision avoidance. However, for some, the high cost of certifying and updating systems can be a significant barrier to improved operations. It's only a matter of time before compliance is mandatory.

What would you do? The pilots on approach to Runway 17L were last cleared to fly a specific heading and told to expect the ILS 17L. Most pilots wait until cleared for the approach to activate the approach mode and turn to intercept the localizer. However, instructions to expect the ILS 17L means you're expected to intercept the localizer and fly the approach as published. Odds are, a combination of factors—fatigue, radio out, and confusion—led to the pilots forgetting their "expect clearance" and flying through the localizer, creating a loss of separation with landing traffic.

Radio-out conditions are very rare in today's flying environment. However, it can happen, so it's important to review the basics and know what to do if things don't go as planned. Even with today's high tech advancements, the tower can still give permission to land or go around using light signals when there's a loss of communication. It's always good practice to review the basics (including light signals) and talk about "what ifs."

Losses in situational awareness may occur during:

- Periods of high workload
- Periods of multi-tasking
- Preoccupation with other tasks
- Inadequate feedback from crewmembers

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Separation... (continued from page 2)

- Periods of stress
- Interactions with automated systems

Fortunately, the majority of events created by a loss of separation are innocuous. In fact, in 2015, the aviation industry recorded its best year ever in terms of safety, with a global fatal accident rate of just one in five million flights. However, the rapid increase of airplanes in the sky continues to put greater demands on airspace, making it a top priority for the Next Generation Air Transportation System

(NextGen). NextGen is a new National Airspace System currently under implementation across the United States. It will transform America's air traffic control system from a radar-based system to a satellite-based one. While NextGen will improve operational efficiencies, the changes will also result in even more aircraft in the system.

We have a dynamic and complex system to be sure, thus the need for crews to implement best practices to minimize threats.

Furthermore, we haven't even approached the subject of unmanned aircraft and the challenges they add to the mix...but that's for another day. For now, be proactive about improving situational awareness and watch out for texting pedestrians.

Cindy Youngblood is an ATP and type rated in the BE400, CE500 and CE560XL. She has a background in corporate and Part 135 operations.

BEST PRACTICES

Business Aviation Food Security

Arming Against Intentional Contamination BY JEAN DIBLE

Business aviation employees and crew members must not only deal with food safety issues—the unintentional contamination of food (see “SMS Corner: Aviation Food Safety and Security,” Issue 17 Year 2015 *Premium on Safety*)—but they must also deal with the threat of deliberate contamination of aircraft meals.

The majority of aviation food handlers have

from numerous catering companies it is a buy, store, and resale food activity not unlike a retail food store. How do they know their food is either safe from pathogens or secure from an intentional threat? They don't!

Who would deliberately contaminate food?

- **Competitors** in corporate business—as well as catering company competitors—most likely are the **riskiest** threat to food security. If catering delivery employees are allowed to put food directly into an FBO cooler, it only takes a few seconds to commit a sinister act involving a competitor's catering order.
- **Disgruntled catering employees** are motivated by their emotions and self-interests. Unhappy employees may be the most difficult group to stop because they usually have legitimate access to the food products.

- **Criminals** are generally sophisticated and have the means to gain access to catered food. There is usually no emotion involved in deliberately contaminating a flight department's provided food, but money will be involved in the high-value target.
- **Subversives and terrorists** are usually politically motivated and work in small well-organized groups. Their objectives include death, destruction, theft, and publicity.

Aside from national networking catering groups—which could be considered secure—there are a few U.S. catering companies with international locations. These usually employ

local natives, and some could have an axe to grind with U.S. citizens. Realistically, there is no 100-percent security! Food can certainly be compromised in the U.S., but during international flights food security needs to be front and center stage and cannot be minimized.

There are simple ways to reduce food tampering in a finished catered product. In the flow of food, from farm to fork, there are as many as forty hands that may handle the food before it is served to a passenger. Just as in accidental food mishaps, there are many places along the food chain where deliberate food contamination can occur.

Need-to-know prevention. The less employee involvement in a domestic or international catering order for an aircraft, the lower the security risk for a flight department. Regardless of where a crew member or scheduler purchases food for a flight, strangers will be preparing, handling, and delivering the food. It is essential to give an international catering company the least amount of information to get the order delivered.

- Passenger names are not needed to process a catering order. Use a number or pseudo name for each passenger for specialty or allergen meals. The employee who orders the food, or crew members who handle it, should change the numbers or names routinely.
- Catering orders should be written on a generic order form using a number or letter instead of the aircraft registration number. This system is essential if the flight department has several flights from the same FBO or will be purchasing catering

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never visited their catering suppliers in the United States nor do they have any idea of how secure their suppliers' facilities are. Crew members or FBO customer service employees may occasionally meet the food delivery person, but that doesn't mean the food facility is safe or secure.

Schedulers order a lot of aircraft meals for crew members by phone or computer. Not only do these “untrained” schedulers not see the actual food they have ordered, but in the majority of cases they have also never met a delivery person or visited a catering facility. When crew members or FBO customer service personnel order food by phone or computer

A safe and effective food security system should be in place and verified by flight department management for all local food suppliers, which includes employee security, facility security, and tampering prevention.

Food... *(continued from page 3)*

in a foreign country.

Minimizing food security risk. Common ways to secure food for delivery:

- The food can be transported in an **Atlas** metal or plastic container, with a lock that can be sealed with a **security plastic serial number and pull seal**. The number on the pull seal will be given to the flight crew so they can check the number upon receiving the food.
- **Tamper-proof security tape** is another way to increase the security of catered food before it leaves the kitchen. Tamper-proof tape makes it evident if a box has been opened and resealed. When the tape is removed, it leaves an unmistakable blue message: "Void-Opened." The flight department needs to plan ahead and ship tamper-proof security tape to the catering company that will be servicing the aircraft. Alternatively, the security tape could be provided to a catering company by drop-shipping the order to the catering company from an internet source.
- **Transparent** containers, or containers wrapped with a plastic cling wrap, should never be used to transport food from a catering kitchen to an aircraft. It

is very easy to insert a needle syringe containing poison into food through a transparent plastic wrap. Breakfast items, like fresh fruit or muffins, are easy to inject through a plastic wrap.

- Never accept any **catering packaged in a bag**. Catering packaged in a bag is probably the worst security breach listed.
- Know **suppliers** and make site visits at the flight department's home-based caterer. Ask questions and inspect all incoming food from:
 - Caterers
 - Third party food suppliers (e.g., sushi vendors)
 - FBOs
 - Delis
 - Restaurants
- **Assure security:**
 - Verify origin of catering
 - Know delivery person
 - Question food substitutions

Food safety and security audits. Flight departments should request that home-based catering companies provide internal audits for all kitchen staff and delivery personnel. A ten-year background check should be performed on each of the employees, and the flight department should be provided cop-

ies for each employee. Flight departments may have to pay for some of the costs of the audits, but it is peace of mind if a flight department is serious about food security.

A safe and effective food security system should be in place and verified by flight department management for all local food suppliers, which includes employee security, facility security, and tampering prevention. The purpose is to ensure that all food supplies are purchased from a secure and approved supplier and that all business aviation employees are constantly on guard concerning food security.

There is never a guarantee that deliberate food contamination cannot happen, but a proactive effort should be made by flight departments to address food security issues.

Jean Dible, president of GA Food Safety Professionals, has 40 years of experience in food education and food safety training. Jean's online food safety training courses (aviationfoodsafetytraining.com) for flight attendants and for pilot and flight technicians will be offered through USAIG's Performance Safety Vector Program. She can be reached at jean@aviationfoodsafetytraining.com or 770-634-7070.

SMS CORNER

After the Audit Sustaining a Culture of Continual Improvement BY KRISTIN HUSKA

Since safety management systems (SMS) were first introduced to business aviation,

assigning a safety officer, writing an operations manual, purchasing SMS software, conducting

ing the systems that have been put into place.

The period of time after an audit is a critical juncture in an operator's SMS journey—however, most teams are not aware of its importance.

hundreds of operators have made the decision to develop and implement the concept into their operation. The path to SMS certification usually follows a pattern of similar activities;

SMS training, and receiving validation through a third party SMS audit. After the audit event, it is common for operators to breathe a sigh of relief. The focus then usually turns to maintain-

The period of time after an audit is a critical juncture in an operator's SMS journey—however, most teams are not aware of its importance. The focus on "maintaining what we have" after an audit often means missing out on the necessary process of adjusting systems and procedures so that the SMS continues to evolve with the operation.

A good analogy is to compare the SMS pro-
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Audit... (continued from page 4)



cess to that of designing and building a home. You go through the steps of developing a blueprint that will meet your family's requirements. You select a location, materials and vendors, build the house, conduct an inspection, and finally move into your new home. Homeowners

Managers and accountable executives need to be active contributors to emphasize that participation in SMS activities is important, valued, and expected of all employees—including themselves.

will probably relate to the fact that things are never perfect, especially with the passage of time. Things break and need to be fixed, home features and appliances may become dated, and you may decide to renovate with new styles, colors, and materials. You may find that you need more space as your family grows, or you may find that you have too much space as children get older and move out.

Your SMS is a “way of doing business,” and similar to the previous analogy your best-laid plans will ultimately change over time. As technology advances, team members rotate, mission profiles change, and the economic and regulatory landscapes evolve—so will your SMS. By focusing efforts on continual improvement your team will be poised for a much higher level of SMS performance.

Establishing a process of continuous improvement will involve different efforts for each operator depending on available resources, mission requirements, team culture, and several other factors. However, in order to sustain a habit of continual improvement there are some practices that should be reinforced for every operation.

Accountable executives and management participation vs. support. We have heard

about the importance of supporting an SMS “from the top down.” It is important to define what this actually means. It is more than allocating a portion of the budget toward SMS activity, agreeing to writing an operations manual, or accepting the concept of a non-punitive reporting system.

While all of those activities are important, many managers and accountable executives miss the most critical aspect of “top down support”—*participating in the system*. Team members take cues from management and they will approach their roles in ways that focus on what is important to their leadership. If managers and accountable executives never discuss SMS, login into software systems, or contribute by submitting a safety

report, it sends a strong message. Team members will pick up on the unspoken directive that SMS is something we *have*, but not something we *do*. Managers and accountable executives need to be active contributors to emphasize that participation in SMS activities is important, valued, and expected of all employees—including themselves.

Establishing metrics and key safety performance indicators (KSPIs). Establishing performance metrics is a critical component of measuring activity levels, engagement, and effectiveness of the SMS. Ideally, this will occur before or right after the first SMS audit in order to establish a baseline measurement for comparisons over time. Most operators miss the opportunity to begin collecting metrics and KSPIs early in the process because they simply do not know where to start.

Although some SMS software systems can provide metrics, these are usually only very basic snapshots, which rely on participation in the system. Most operators struggle with participation and engagement. It can be tempting to assume that the colorful auto-generated charts, graphs, and data reports are accurate and valid depictions of activity. Unless your team is fully engaged, those features are only

providing a partial glimpse into the reality of your SMS.

It's akin to distributing a survey to 100 people but only having 50 people respond. You will be able to produce data reports from the 50 respondents, but that data is not comprehensive. The first step is taking an honest look at where your team stands with their interest, participation, and engagement with your SMS. Once you have an accurate depiction of activity levels, you can begin structuring improvement initiatives so that systems can produce meaningful data and metrics. As mentioned already, managers and accountable executives are critical to getting and *keeping* teams engaged.

Evolving SMS components and elements. After your team has consistent support and participation from management, accountable executives, and all team members, you will find that metrics and data begin to manifest within the system. At this point, it is critical to continually monitor and analyze what the data actually mean.

Even the best software systems will still require a human to provide context to data. Remember that data is just that—simply data. Your safety officer, management, and team will need to provide insights into what the data mean for your operation and what changes, if any, need to be made in order to reduce risks, make improvements, etc.

Your SMS should be continually evolving, and changes to your system should be primarily driven by your team. Do not fall into a passive approach of only updating your SMS to match a vendor's timetable or only when standards and regulations are updated. Continuous improvement will look different for every operator; however, some standard focus areas are as follows:

- **Make continual updates to SMS forms and tools.** Consistent SMS activity will prompt your team to periodically make revisions to forms, tools, and process flows. Your forms and tools should be continually honed to ensure you are capturing data that is relevant to your operation. Forms that are designed to suit your operation's unique requirements will encourage a higher level of participation and your team will feel a sense of “ownership” knowing that their suggestions are valued and incorporated into the system.

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When Honest Mistakes Become Mishaps

BY GEORGE PERRY



Overcoming denial can be difficult, especially when pride, reputation, and other external pressures come into play. A vivid example of this occurred after a Challenger 601 with only a pilot and copilot on board landed at a rural Maryland airport. This

airport has a control tower, but it was closed at the time of arrival.

The Challenger somehow ended up on an unlit secondary taxiway that transitions from pavement to gravel—scarcely wide enough for both main gears to fit on. At this point, apart from a slightly embarrassing mistake, there was no real harm done and the pilot was a “tug” away from a quick fix. However the situation didn’t end there. No one except the pilot knows why, rather than shutting down and accepting his fate, he chose to continue looking for a way out. In doing so the aircraft departed the taxiway and plowed through the grass for nearly 100 feet in a futile attempt to get the jet back on solid asphalt. Once in the grass, all three landing gear quickly submerged into the sod. Most pilots would have given up at this point, but now in full denial, this pilot repeatedly applied full power followed by full reverse thrust in a vain attempt to “rock” the plane out of the mire. But the jet’s weight drove the landing gear deeper into the grassy muck. Both pilot and copilot were uninjured, at least physically, but the aircraft was not so fortunate.

Why did this happen? The answer is simpler than we might think. Denial and a failure to recognize “situational futility” can sometimes be hard for our minds to come to grips with. Sometimes people find themselves in situations beyond their “mental” point-of-no-return. Denial, anger, and vanity can be powerful physiological forces. As pilots we should recognize this and continually evaluate our resources and available options, especially when things don’t go as planned. If this pilot had just stopped, talked with his copilot, or decided they’d pushed the situation far enough, the outcome could have been much different...Safe Flights!



George Perry, Senior Vice President
AOPA Air Safety Institute

Audit... *(continued from page 5)*

- **Focus on self-driven revisions to SOPs and manuals.** The majority of changes to your SOPs and operations manuals should be driven by your team. While SMS manual vendors can provide suggestions for content and wording, it is critical that your team drives the changes to your documentation. Otherwise, your SMS will begin to resemble a template-based product instead of depicting the way you operate. This is also a good way to reinforce the value of your team’s suggested inputs. It is rewarding to see a suggestion or observation result in a documented change within SOPs, ops manuals, etc.
- **Ensure your SMS software is evolving.** It is important to continually monitor how well your SMS software is meeting your requirements. Ensure you have a system that can grow with you instead of purchasing something that is cost prohibitive to configure over time. Periodically evaluate what features are being used (and are rarely used). The nature of a highly productive SMS means that your team’s requirements will constantly be changing. Ensure your software can keep up with your needs and the ever-evolving technology landscape. This will keep your team interested and willing to use software instead of becoming frustrated with dated or complex systems.
- **Modify roles and responsibilities within the organization.** As your SMS evolves, so will the requirements of roles and responsibilities within your team. In particular, the role of safety officer will shift from directing the development and implementation of the SMS to becoming more actively involved with analyzing data and driving continuous improvement. A team that is truly connected to their SMS will naturally begin to redefine roles that reflect a higher level of engagement.

Remember that continual improvement is a commitment and a journey that never ends, even after a successful audit. There is no template, checklist, manual, software system, or consultant that can drive the success of your SMS. An engaged team that remains self aware of their strengths, weaknesses, and SMS performance is the best indicator of a culture that is well poised for sustained continual improvement.

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HELICOPTER OPS

2016 Will See First Safety Audits

HAI-APS Opens for Business BY DENNIS PRATTE

Editor’s note: This article appeared in the fall 2015 issue of ROTOR magazine and is reprinted with permission of the publisher. © 2015 Helicopter Association International.

Built on the principles of a just culture, quality assurance, and continuous safety improvement, the HAI Accreditation Program of Safety (HAI-APS) helps participating member operators “fly to a higher standard” of safety and professionalism. HAI Regular Operator Members can participate in HAI-APS as a way to improve their safety culture and reduce accident and incident rates.

Standards Set For Safe Helicopter Operations. The HAI-APS incorporates two sets of aviation standards: the International Standard for Business Aircraft Operations (IS-BAO) and the Helicopter Mission-Specific Standards (HMSS). The two programs are complementary; operators who wish to become accredited under

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HAI-APS must maintain an IS-BAO registration as well. They must also be HAI Regular Operator Members.

IS-BAO promotes high-quality operating practices for business aircraft operations around the world. As noted on the IS-BAO website, ibac.org, the standard provides baseline requirements for structuring flight departments and for planning and conducting flight operations. It also challenges flight departments to review current systems, programs, and procedures for their conformance to safety management system principles.

HAI developed the HMSS to address safety in helicopter aviation. These standards encourage rotorcraft operators to implement industry best practices and to develop controls to mitigate risk.

The HMSS have a general section that

applies to all helicopter operations, as well as sections that cover the following missions:

- Aerial application
- Airborne law enforcement
- Air tour
- Corporate and VIP transportation
- Electronic news gathering
- Aerial film and photography
- External loads and heavy lift
- Flight training
- Helicopter air ambulance
- Heli-skiing
- Offshore
- Personal use
- Pipeline and power line
- Wildlife management and mustering.

Operators can receive a general accreditation, or they can become accredited under one or several of the 14 specific missions; their accreditation certificate will list the specific HMSS under which they are accredited. If an operator conducts missions outside the scope of the current HMSS, HAI will work with that operator to research and develop best practices for those missions.

The Audit Process. Audits are an essential step in obtaining either an IS-BAO registration or the combined IS-BAO registration and HAI-APS accreditation. An independent third-party HAI-APS-authorized auditor will visit an operation to validate that the operator not only meets the mandated minimum safety standards but has adopted processes and procedures that provide a higher level of safety.

HAI-APS auditors will be able to conduct both IS-BAO and HAI-APS audits. Rotorcraft operators can save time and money by undergoing both audits at the same time.

To make the HAI-APS program easy to adopt and maintain, the HMSS can be accessed on a cloud-based system that can be downloaded by registered member operators on any desktop, laptop, or Apple and Android tablets and smartphones. This easy-to-use software contains the standards and checklists that enable operators to easily track and document their progress toward HAI-APS compliance.

Coming Soon: Auditor Training, Website Launch, First Audits. The first training for HAI auditors was December 1, 2015, at HAI headquarters in Alexandria, Virginia. HAI is looking for auditors in each country. Candidates interested in becoming an authorized HAI-APS auditor should review the requirements and submit their requests to participate at <http://hai-aps.rotor.org>. HAI is also looking for operators interested in becoming the first operation to be accredited in each mission specialty. Operators interested in participating in the HAI-APS accreditation program should visit <http://hai-aps.rotor.org>. HAI-APS audits began January 2016 and operators from around the globe are participating. Please visit <http://hai-aps.rotor.org> where you can learn more about the accreditation program and see a list of HAI-APS-accredited operators.

Dennis Pratte is the Helicopter Association International's director of safety.

LESSONS LEARNED

Underequipped and Overwhelmed BY DAVID JACK KENNY

In 2015, the NTSB placed "strengthening procedural compliance" on its Most Wanted List. The fact that this wasn't repeated in 2016 hardly means that the problem has gone away. Very high-profile accidents continue to be precipitated by operators (or pilots) who mistake the relative flexibility offered by FAR Part 91 for license to do as they please.

Case in point: A 1975 model Cessna 500 Citation took off from Wichita Mid-Continent Airport shortly after 10:00 a.m. on October 18, 2013. Only two people were on board, the airplane's owner and his company pilot. Their

destination was New Braunfels, Texas. Eight minutes after takeoff, the pilot checked in with Kansas City Center to report that the aircraft was leveling at 15,000 feet; he received a clearance to climb to Flight Level 230 and go directly to the Millsap Vortac.

His readback of "Millsap direct, Zero Echo Delta" was the last transmission received from the flight. It disappeared from radar less than two minutes later. Witnesses on the ground saw the jet descending vertically at very high speed, trailing smoke and possibly fire. Several also reported seeing detached pieces flutter down

afterwards. Sure enough, a nine-foot section of the left wing was found some 3,100 feet west of the 15-foot-deep impact crater; the left aileron was discovered in between. Analysis of 23 different fracture surfaces showed that the wing had failed in overload. In its description of the main wreckage, the NTSB's factual report uses the word "obliterated" no fewer than 13 times.

The type certificate of the model 500—the original Citation I—requires a two-person crew. However, an FAA exemption allowing single-pilot operation is available. The pilot had obtained one 11 months before the accident, and all of

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Underequipped... (continued from page 7)

the 206 hours he'd logged in the airplane since were listed as single-pilot flights.

To qualify for the exemption, a pilot must complete an approved single-pilot training course. It also imposes more stringent equipment requirements on those flights—in particular, that the autopilot, flight director, and attitude instruments be fully functional. That was not, however, the

Canada's field service representative. In fact, only the faulty right-seat attitude indicator had been resolved by the time of departure. A repair station on the field swapped it out for an overhauled unit.

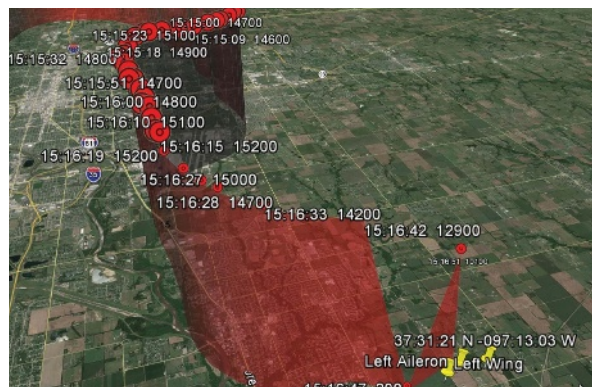
Radar track data showed that during the minute after the pilot's final readback, the Citation turned right and then left, its altitude varying between 15,200 and 14,600 feet. In the 32 seconds

between the last two radar returns, it descended some 5,100 feet, a rate of more than 9,500 feet per minute. The jet was almost certainly in the clouds throughout, as bases were below 6,000 msl and satellite imagery suggested tops in the vicinity of 23,000. The freezing level was 7,200 feet, and dual-polarization weather radar suggested that those clouds were nearly saturated with a mixture of different types of moisture ranging from ice crystals and dry snow to supercooled large droplets; the intensity of the echoes around the site increased from 15 to 35 dB in the five minutes before the accident. The National Weather Service's Current Icing Potential also predicted a 75 to 90 percent probability of moderate to severe icing between 13,000 and 15,000 feet. There is no record of the pilot having received any weather briefing.

The Citation is certified for flight into known icing, but any de-icing system can be overwhelmed by sufficiently rapid accumulation. The NTSB concluded that the pilot—already overburdened

trying to hand-fly partial-panel in IMC—encountered severe icing while coping with the additional workload of altitude and heading changes. The respective roles of structural icing and spatial disorientation in the resulting loss of control can't be completely untangled—but the ultimate cause of this crash was the pilot's decision to fly the airplane despite discrepancies that he knew made it unworthy. He accepted that risk, and lost.

David Jack Kenny is the Air Safety Institute's statistician. He is a fixed-wing ATP with commercial pilot privileges for helicopters and the owner of a Piper Arrow.



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case. After landing in Wichita the day before, the pilot had phoned an A&P mechanic in Texas to report that the autopilot had disconnected repeatedly, forcing him to "hand-fly the entire flight," the pilot's attitude indicator and horizontal situation indicator were flagged, and the co-pilot's attitude indicator "was sideways." He'd also seen unexplained fluctuations in N1, N2, and turbine inlet temperature on one engine, with the result that the power level "would not stay where he set it," on one occasion exceeding 100 percent. Although the mechanic warned him not to fly the airplane until the engine control problems were sorted out, the pilot didn't follow up with Pratt and Whitney

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