

# PREMIUM ON SAFETY

ISSUE 45 SUMMER 2022

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### A MESSAGE FROM USAIG

## How's Your CRM Rep?

We needed a grand summer blockbuster and—for once a bonus—it came with an aviation theme! The Top Gun saga roared back to life after a 36-year break and took me right back to the heady fun of seeing the original in Pensacola's 'Cradle of Naval Aviation' while attending flight training there. Airlines were busy starting crew resource management (CRM) programs in the years leading up to the movie and believers were extolling CRM's benefits as the 'next big safety thing' to an interested-but-skeptical aviation community. Do you suppose Maverick's famous eight-word assault on the concept helped or hurt?

"Sorry Goose, it's time to buzz the tower."

Translation: With you as my hostage, I'm ignoring your objection, violating regs, and risking both of our lives and careers without good reason. I know—killjoy for picking that apart—forgive me. You don't hear too much about crew coordination these days. Surely our collective CRM practice has advanced as impressively as Hollywood's aerial cinematography in the intervening years. Didn't the CRM vaccine wipe out intra-crew hostage-taking and stifling of safety dialogue years ago? Perhaps CRM is tucked in among the annual training modules you complete, somewhat ironically considering the topic, individually. Is it valid to presume that since CRM's been an aspect of pilot training for decades, it's just 'in us' now? I have a hunch you can think of a current flier who's a bit of a wild card and flies by the seat of their pants in terms of crew coordination. Any chance your name just popped into someone else's head who's reading this? What's your CRM reputation?

Effective crew coordination seems like what would naturally occur save for the things we do, consciously or not, to interrupt it. It's certainly more important to apply good CRM practice on today's trip than to be known for doing so on prior ones. But your reputation sets the stage, so history's important too. Like winds aloft, it forms a context poised to either help things along or put up challenges to push against. It's worth your time to become (and stay) self-aware of your CRM persona. Want to be a better pilot? Consider dedicating more personal introspection, reading, and skill-building effort in this area than the minimum required.

If you're looking for a start, try focusing on being an active listener in crew settings. That tends to help you validate your teammates' motivations so you better-value their insights or illuminate differences you can address sensibly. Either way, it's a perspective you only get by listening.

I recall a situation where, as an instructor, I was pushing to complete a flight check while eyeing some building weather. A crewman who I'd just met at the preflight briefing piped up unsolicited with, "I think we should pack this in and get on the ground." I demurred; confident we had the 15 minutes more needed to finish. The crewman's response was a matter-of-fact, "We need to get on the ground now." We'd barely made it from the parked aircraft into the hangar when the impressive thunderstorm engulfed the airport. I praised the crewman for telling a visiting instructor what he thought. He explained he'd grown up in the area as an outdoorsman, was 'pretty familiar' with local weather, and could 'just tell' we were about to get slammed. He said there were lots of pilots with whom he would not have spoken up but offered, "I didn't know you and really didn't feel like getting struck by lightning, so I gave it a shot." Your CRM reputation—or even the absence of one—matters. The people you fly with have all sorts of good reasons to steer you away from poor decisions and collectively help achieve best outcomes. But they've got to be willing to share them with you, and you've got to be listening.

Stay well, fly smart, and fly safe.

**Paul Ratté**  
Director of Aviation Safety Programs, USAIG

**CAIG USAIG**





## Procedural Non-Compliance

BY KRISTINE HARTZELL

From day one of flight training, pilots are taught the importance of using a checklist. It is drilled into us over and over again that we need to approach every flight with consistency and use checklists to verify that all the critical items of preflight, takeoff, climb, cruise, descent, approach, landing and after-landing are completed fully and accurately. Why are checklists so important? It may seem obvious to us now after decades of proven effectiveness but maybe it's worth stating: Checklists save lives.

Checklists are an important extension of aircraft and organizational standard operating procedures (SOP). Where checklists give you a list of tasks to complete, the SOP gives you all the details. These procedures spell out what to do, how to do it, who should do it, and when and where it needs to be done. SOPs are critical in aviation safety. As Bruce Landsberg, NTSB Vice-Chairman, so accurately states, "SOPs have been written in bent aluminum and blood." So clearly, it should be the top priority for flight crews to know and follow SOPs and checklists. We all want to learn from those that went ahead of us. Why then was procedural non-compliance by flight crews determined to be a factor in 29 of 37 accidents (78 percent) of an NTSB survey of accidents from 1978 to 1990? Why does it continue to be a

contributing factor in so many aircraft accidents today?

When James Reason published his, now famous, "Swiss cheese" model of human error in 1990, the aviation community began to examine human error in a systematic way and human error became broken down into two categories: errors and violations. You might instead call these categories: errors and intentional non-compliance. Errors are often referred to as "honest mistakes" where procedures were followed but were inadequate or poorly executed, or the crew was working with imperfect or incomplete information that led to an error. Non-compliance, on the other hand, is an intentional deviation from SOP. It could be as simple as non-adherence to sterile cockpit procedures or extending past crew duty limits or as egregious as illegally descending below minimums on an approach or allowing an unqualified crew member to fly an aircraft or approach that they aren't trained or qualified to fly.

*Procedural deviation usually starts as something much more benign. Call it "procedural drift" or "bending the rules."*





As a pilot, why would you deviate from SOPs? Procedural deviation usually starts as something much more benign. Call it “procedural drift” or “bending the rules.” A relatable example is driving a car consistently 5 to 10 mph faster than allowed by law. Though speeding is against the law, police typically don’t enforce the law until you are more than 10 mph over the limit, so essentially the violation has no consequence. The driver has gotten away with it over and over again so the actual speed limit that they self impose has drifted away from the true limit as stated by law.

*I challenge you to read through NTSB accident reports and find an accident that couldn’t be stopped by a layer of the “SOP Swiss cheese.”*

When we become lax in one area, it’s easy for that complacency to bleed over to other areas. Non-essential conversation in the sterile cockpit environment may limit the time for a thorough and necessary approach briefing. Maybe that briefing becomes abbreviated and critical information is left out. Maybe the checklist wasn’t completed and a crucial item was skipped. Any one of these seemingly innocuous deviations could be the critical layer of Swiss cheese that stops an accident from happening. Each SOP is a slice of the cheese. When we deviate from SOPs, we’re eliminating one layer of safety whether we realize it or not in the moment. As Vice-Chairman Landsberg put it, “If you disrupt any one aspect of the accident chain, the accident doesn’t happen.”

I challenge you to read through NTSB accident reports and find an accident that couldn’t be stopped by a layer of the “SOP Swiss cheese.” Yes, when we read accident reports, we’re working with a lot of 20/20 hindsight and can’t possibly know the full reason why SOPs were ignored or eliminated. But by reading through some of the reports, we may be able to imagine ourselves in a similar situation, recognize how we might have started down a similar path, and identify SOPs that could help us avoid a similar fate.

Maybe a checklist is outdated or redundant to the point that items are blown over. Maybe there isn’t a good procedure that fits the situation. Maybe there’s a better way to complete a task than what’s currently in the SOP. If we develop and foster habits in ourselves to ensure that we’re following checklists, making callouts, conducting thorough briefings and honoring stabilized approach criteria, we will not only be consistently safer pilots, but also able to identify areas for improvement in our own SOPs. If what we are doing isn’t working or efficient, we should bring it to the attention of our organization or the aircraft manufacturer, always striving for improvement in ourselves and the system.

So what do we do if we find ourselves in a situation where we feel like we may go down a path of procedural non-compliance? The NBAA’s Safety Committee Professionalism Working Group came up with several steps that we can take to mitigate that risk. They are:

- Slow down. It has often been said in aviation that the fastest thing that must occur in the cockpit is putting an oxygen mask on. The rest of the issues can all be priorities. Numerous line check airmen at a global Part 121 airline have stated that once an EICAS/ECAM message occurs, they press the stopwatch, and wait five to seven seconds in order to evaluate the situation accordingly.
- Review the situation in question.
- Reassess the situation by using proper threat and error management (TEM) and aeronautical decision making (ADM). If threats are addressed, safe operations can resume. If errors are detected, they are immediately repaired and safe operations can resume.
- Come to an action consensus as a crew.
- Implement the solution and change the variables to enhance ADM and crew coordination in the future. Review what procedures do and don’t work. Perhaps a verbiage change is required.

What we practice becomes habit. Make sure it’s a habit worth keeping.

—Kristine Hartzell flies as Captain for a Fortune 500 company.



## What Exactly Is Special Use Airspace? ANSWERS ON PAGE 9

### And can I use it?

BY AMY LABODA, MANAGING EDITOR,  
USAIG PREMIUM ON SAFETY

Special use airspace falls into a myriad of categories in the U.S., and it is a safety imperative for pilots to understand them.

**1** \_\_\_\_\_ airspace is established where activities conducted within that airspace must be conducted due to their nature.

- A) Special Use
- B) Prohibited Area
- C) Military Operations Area (MOA)
- D) Restricted Area
- E) Warning Area

**2** ATC can never issue a clearance into:

- A) Warning Areas
- B) Restricted Areas
- C) Special Use Airspace
- D) MOA's
- E) Prohibited Areas

**3** The purpose of \_\_\_\_\_ is to denote the presence of hazardous activity to nonparticipating aircraft in international airspace.

- A) Special Use Airspace
- B) Warning Areas
- C) MOAs
- D) Prohibited Areas
- E) Restricted Areas



**AOPA Ask An Ambassador -  
Special Use Airspace**

**4** ATC cannot issue a clearance into an active restricted area.

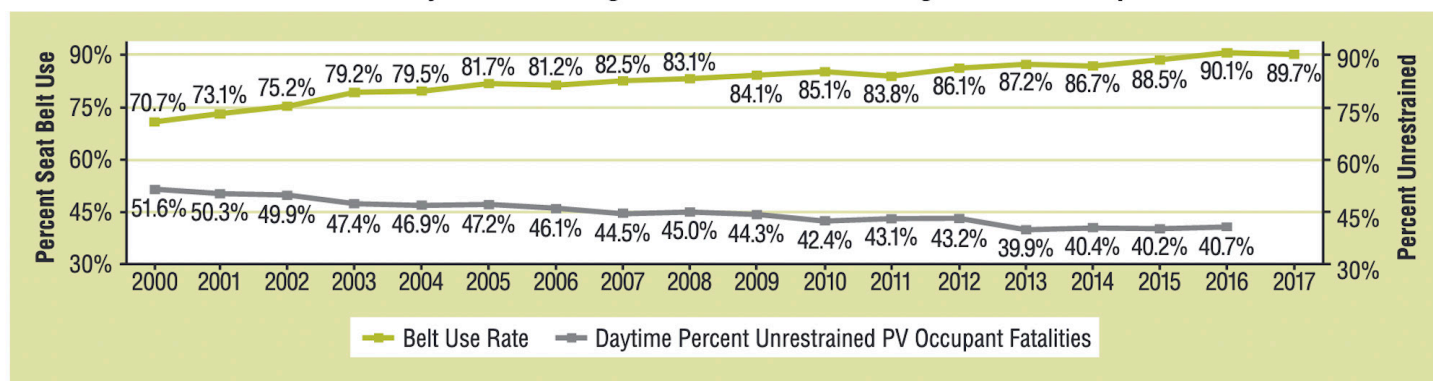
- A) True
- B) False

**5** \_\_\_\_\_ is/are established for the purpose of separating military training activities from air traffic

- A) Special Use Airspace
- B) Warning Areas
- C) MOAs
- D) Prohibited Areas
- E) Restricted Areas

Figure 1

## National Seat Belt Use Rate and Daytime Percentage of Unrestrained Passenger Vehicle Occupant Fatalities



Source: NOPUS and FARS

## Proper Restraints Are Essential for Passenger Safety

BY DAVID ST. GEORGE

Since we are all pilots, or people passionately involved in aviation, there is a tendency to view the aviation mission as flying an airplane to a particular destination on a schedule. The real focus should be the passengers and the cargo. These are the valued items—not the plane—though extra points are awarded for delivering the airplane also. Our primary job is transporting precious human cargo. This spans the gamut from single-engine GA flying to the more luxurious corporate carriage. Once we comprehend this larger mission, proper briefing, restraints, and cohabitation with potentially dangerous cargo becomes the primary concern. Even in the case of a crash, survivability is the focus, and that is the focus of this article.

Flying safely requires an appreciation for the challenges and occasional surprises involved in this miracle of flight. The respected industry tome, “Commercial Aviation Safety” from

Aviation Week has 400 pages of safety information, but absolutely no mention of restraining systems for passengers or cargo. Hidden risks and failures in this area are often really the silent killers.

If you were alive before the internet, you might remember childhood trips in the family car, jumping around in the backseat of your parents’ car unrestrained. New York State enacted the first seat belt use law in 1984 and most other states soon followed (this is not Federally mandated for automobiles). It wasn’t until 1996, that every state, with the exception of New Hampshire, enacted mandatory seat belt use laws covering drivers and front-seat occupants.

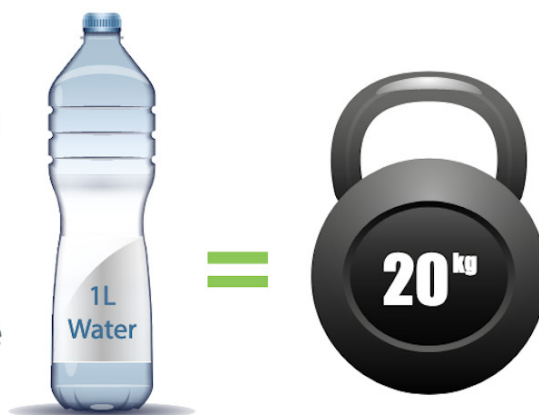
*Continued on Next Page*

## THE RISK OF OBJECTS INSIDE THE VEHICLE BECOMING PROJECTILES

### QUICK FACTS

#### What are the dangers of loose objects in vehicles?

- When a car crashes at high speed one of the **greatest dangers comes from loose items** thrown around the cabin.
- When a car stops suddenly in a crash, objects inside keep moving and can **impact at up to 20 times the force of gravity**. A 1 litre water bottle carries the force of a 20kg object.

Source: [https://www.mynrma.com.au/media/IN\\_CAR\\_SAFETY\\_1.pdf](https://www.mynrma.com.au/media/IN_CAR_SAFETY_1.pdf)



Incremental improvement in automobile restraint systems (airbags and crushable structures) followed. **The fatality rate in automobiles** went from 5.06 per million miles to a current rate of 1.33. **This is a four-fold decrease in 30 years.** From 1975 through 2017, seat belts in automobiles have saved an **estimated 374,276 lives**. If you buckle up in the front seat of a passenger car, you can reduce your risk of fatal injury by 45 percent (Kahane, 2015) and reduce “moderate to critical injury” by 50 percent.

Airplane safety restraints and improvements have not kept pace with automobiles despite the higher speeds in aviation and an arguably more hazardous environment. Seat belts in airplanes conform to the same standards set forth by the Society of Automotive Engineers, Inc. (SAE) but are only federally mandated for takeoff and landing. In aviation, convenience and comfort are often valued more highly than safety. The increasingly posh interiors of many corporate aircraft are designed to make it hard to even believe you are flying. But it is important to remember that the crash forces experienced by occupants are an exponential (square root) force, not linear. Twice the speed in flight delivers four times the crash force in a sudden stoppage.

So with the limited resources available in aviation, typically lap and shoulder belts, it is incumbent upon all pilots and crews to assure respect for the risks we face and insist on proper restraint usage. This requires comprehensive briefings, careful maintenance

of the web belts, and proper securing of any onboard cargo. No one wants to be a buzzkill about having fun during travel, but an unexpected wake turbulence encounter in an aircraft could put everyone in the back into the hospital if they are unrestrained. The FAA has reported that inflight turbulence is the leading cause of nonfatal injuries on commercial airlines.



In FAR Part 121 (airline) and FAR Part 135 (charter) operations, regular crew training is FAA-mandated on the proper briefing of passengers in the proper use of their seats, seatbelts, and emergency exits. This is part of every operating manual and annual checkride. At the FAR Part 91 level, passenger briefings can unfortunately get more perfunctory, despite the same level of risk. The latest safety trend on all aircraft is “encouraging” the use of seatbelts whenever seated, a small inconvenience considering the huge safety benefit.

The FAA is **very specific on the requirements** for proper safety equipment, training and maintenance. Cabins require fireproof materials and specifically designed seat belts. But if they are improperly worn or ignored, they are of no use to the occupants. A good safety program of training and recurrency goes a long way to ensuring compliance from the crew and passengers.

*In the case of a crash, survivability is the focus.*

From my perspective flying jets in the flight levels, building awareness among the passengers is the key to safe transportation of high-value passengers and cargo. Despite opulent interiors and increasingly distracting entertainment, we are still in a pressurized tube high above the earth transiting sometimes uncertain weather patterns at very high speeds. As much as dispatch and the pilots try to assure a smooth ride, airplanes bounce and jolt and occasionally encounter **unforecast turbulence**. The accompanying pictures are from the back of our jet after encountering wake turbulence headed into Chicago (still high up, descending out of the flight levels). Fortunately, this was a “dead-head leg”—with pilots strapped into 5-point harnesses—or the passengers in the back could have easily been severely injured.



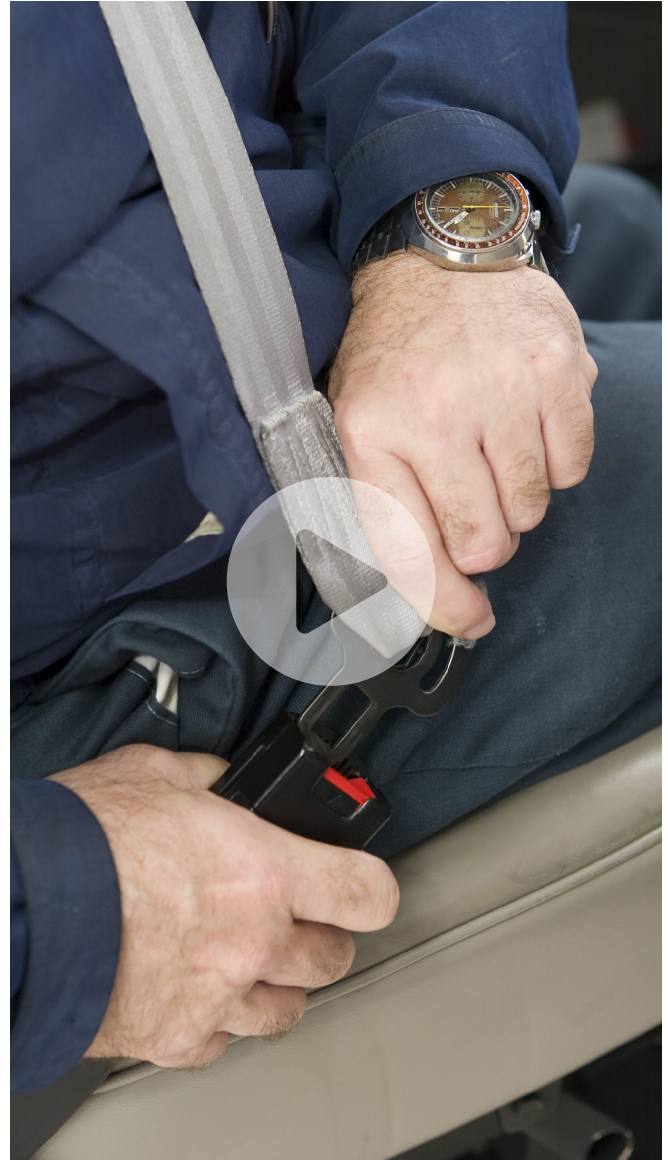
Airborne cargo aboard passenger flights is an additional risk during turbulence or crashes and can run the gambit from unrestrained pets and luggage in the cabin to last-minute purchases in shopping bags. All of this can become airborne during flight if not properly secured under belts or a cargo net.

*From 1975 through 2017, seat belts in automobiles saved an estimated 374,276 lives. If you buckle up in the front seat of a passenger car you reduce your risk of fatal injury by 45 percent (Kahane, 2015) and reduce “moderate to critical injury” by 50 percent.*

Seemingly benign, unrestrained objects can be an even bigger issue in turbulence or a crash (even water bottles). Since the physics of kinetic acceleration is a square root function, small objects in a plane can become projectiles if not properly secured. “At 55 miles per hour, a 20-pound object hits with 1,000 pounds of force—so powerful that a suitcase can literally sever the arm of a crash test dummy.” Unrestrained objects in cars (better statistics are available) cause an estimated 13,000 injuries every year! Unrestrained baggage in aisles and rear cargo areas should be regarded as potential missiles and properly secured by approved cargo nets. Water bottles become kettle bells when accelerated by turbulence or crash forces.

Given all these facts, it is incumbent upon every safety-minded operator to focus more assiduously on the proper use of restraints both for passengers and cargo. An awareness program building better compliance is really low-hanging fruit in the safety game; buckle up. So pass along the word on the importance of passenger restraints and securing cargo because this is an under-appreciated flight risk. Fly safely (and often)!

—**David St. George** is a Master Flight Instructor/FAA DPE/ATP (ME-SE) and Part 135 pilot.



Seat belt restraints, be they three-, four- or even five-point, work. The proof is in the data. When a passenger is unrestrained during an accident, as in this video, tragedy is sure to follow.

## For more information go to:

- National Highway Traffic Safety Administration: “Seat Belts”
- DOT: “Traffic Safety Facts” Occupant Protection in Passenger Vehicles
- CDC “Transportation Safety” (statistics)
- Aviation Crash Stats
- Cellphone “Thermal Runaway”
- Summer Safety: Safety on Summer Road Trips
- Australian Fleet Management Association: “How loose items can become projectiles in a crash”
- National Road Safety Fact Sheet





## Learning Works If We Change Our Behavior

BY RICHARD MCSPADDEN

In the title lyric of his recent ballad, John Mayer croons, “It shouldn’t matter, but it does.” The line resonated as I began the unpleasant task of another fatal accident review.

Analyzing accidents requires an objective mind. Look hard at the facts; have the honesty to go where they lead and the discipline to ignore emotions. Emotions shouldn’t matter. They corrupt conclusions and lead to elisions that conceal lessons we must glean from these tragedies, or we’re more likely to repeat them. The emotions felt by family and friends from what these accident analyses reveal are difficult to put aside.

When families hear pilot error as the cause of an accident that took their beloved pilot and others, they often respond with disbelief, then denial and anger: The NTSB is wrong. The pilot the family knew and who flew them safely was exceptional. A great, knowledgeable pilot. If only we had flown with them, we’d understand something else had to cause the accident. A problem with the airplane; some unexplained weather phenomenon or a controller mistake, anything but pilot error. Not their pilot.

The shock and grief of surviving loved ones is the price we pay for publicizing lessons from our tragedies. I hate it for the families. I know their emotional reaction shouldn’t taint our drive for a full and accurate understanding of the accident. It shouldn’t matter, but it does. The only justification is that I’m certain a public analysis saves lives and prevents others from similar emotional wreckage.

The incredulity of family and friends faced with the fallibility of their pilot exposes the trust our loved ones place in us. A recondite trust. They cannot comprehend the risk calculations we make on their behalf, nor the knowledge required to make those calculations. Every passenger we fly offers us their life, all they’ve worked for, and the emotional health and well-being of those who love them. The latter impact on our own families—when our flying skills lie naked, fissures exposed through a harsh public critique—seems especially camouflaged to us.

Poor decision-making is often the catalyst for general aviation accidents and the ensuing heartache. Looking back is easy. We spend hours gathering near-perfect awareness of a situation a pilot experienced clouded in mental duress. Sometimes, the pilot makes a premeditated bad decision. Other times, the error comes with only minutes or seconds to take action. In both cases, the error is so clear. The right path is so obvious in hindsight. We scratch our heads and ask, “What were they thinking?” If the pilot were sitting beside us, comfortably, at zero knots and 1 G, with no pressure and all the information we have, they’d nod their head and agree: “What were they thinking?” That rhetorical question is better reframed, “Why were they thinking that?”

Asking “why” prevents us from dismissing a poor decision by thinking I’d never do that. I read about accidents with an assumption the pilot was skilled, knowledgeable, and bringing their best to the situation, but something derailed them. Something corrupted the decision-making that has served them so well in their lives up to that point. My paradigm comes from experience. In my lifetime of flying I’ve known skilled, professional pilots who made a costly bad decision. Something clouded their head-work so that what is so logical in hindsight eluded them in the moment. If it could happen to them, it can happen to me. So, I study their mistakes, and I learn.

An experienced pilot takes off in zero-zero conditions with the people they admire most. A VFR-only pilot takes their child into instrument conditions. A friend takes off over-loaded on a hot day for a joyride. A pilot anxious to keep a holiday promise launches in a winter storm. These flights ended tragically, under control of an experienced pilot who had flown safely for decades and earned a reputation with family and friends as an excellent pilot, a safe pilot. The point is not to dispute the convictions of those family and friends, rather to appreciate the innocent faith non pilots place in us.

In his ballad Mayer laments: “Shoulda done more. Shoulda learned a lesson from the year before.” Let’s heed his regrets. Lessons are only learned when we change behavior. Unless we change behavior, it’s simply a lesson observed. We owe it to the pilots who’ve perished and their families who endure the painful analysis to learn as much as we can from these tragedies and change our behavior in response.

Let’s learn these lessons and fly like the pilots our family and friends believe us to be.

Fly safe!

**Richard G. McSpadden, Jr.**  
Senior Vice President, AOPA Air  
Safety Institute

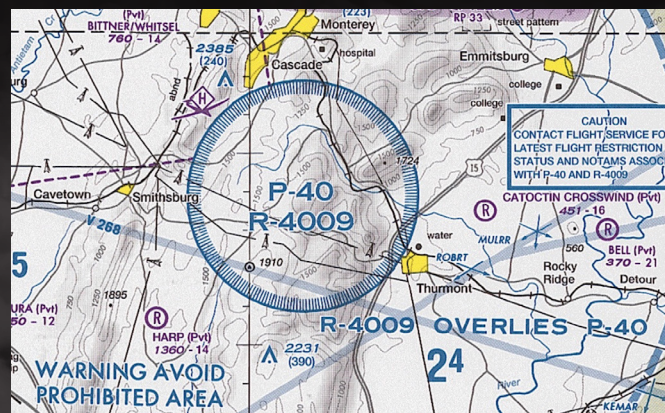
**Accident Case Study:  
Faulty Assumptions**





## QUIZ ANSWERS QUIZ ON PAGE 4

1. **A. Special Use airspace is established where activities conducted within that airspace must be conducted due to their nature.** It might be paratroopers practicing high altitude jumps, air-to-air refueling, or low-level high speed practice bombing runs; but anywhere you see special use airspace it behooves you, the pilot, to pay attention and know the rules of operation. Always check NOTAMS!
2. **E. Prohibited areas are simply off-limits to general aviation.** Don't bother asking if you can fly over the White House or Camp David; or any other airspace protected with the word Prohibited.
3. **B. Warning areas are there to let you know that hazards (typically military aircraft practicing for warfare) exist inside or outside of U.S. territorial airspace.** Sometimes spacecraft return to splashdown in warning areas, as well, in which case temporary flight restrictions (TFRs) may overlay the published airspace.
4. **False.** ATC can, on occasion, issue a clearance to participating aircraft to transit an active restricted area.
5. **C. MOAs exist to warn you that military operations are in progress in the designated airspace.** Since MOA's are not typically used continuously, a pilot can request its status (hot or cold) from the air traffic controlling facility for the area. MOAs, even when hot, are legal for both VFR and IFR general aviation traffic to transit, however, caution should be maintained, as military pilots are focused on their tasks, not necessarily on stray aircraft.



## For Lack of a Pin

**For lack of a nail, the shoe was lost ...**

**BY DAVID J. KENNY**

It's hardly news that details matter, and more so in aviation than most other pursuits. Approaching a short airstrip even five knots fast courts a landing overrun. Engine failures have been traced to fractured cylinder studs due to over torqued hold-down nuts and fuel lines that separated because the B-nuts securing them were left hand-tight. Slowing a helicopter to a hover in a quartering tailwind risks a loss of tail rotor effectiveness; at low altitude, the resulting spin is most likely unrecoverable. Even underinflated tires have caused catastrophic losses of control by bursting during the takeoff or landing roll.

Shortly before 8:00 p.m. in the evening of October 7, 2019, a Hawker 800XP took off from the Naples, Florida Municipal Airport (KAPF) on a Part 135 charter flight to Kerrville, Texas (KERV). Two ATP-rated pilots and two passengers were on board. The takeoff roll and lift-off seemed normal, but when the co-pilot tried to retract the landing gear, the nose gear transit light remained illuminated. Shortly after, both pilots heard "a thud from the nose gear as if it had fallen down" and felt a vibration that the pilot described as suggesting "the nose gear doors didn't shut." The main landing gear lights extinguished

and the gauge indicated normal hydraulic pressure, so the crew tried to cycle the gear. The mains extended as expected, but the nose gear's transit light remained illuminated. The crew declared an emergency and requested a hold to assess the situation.

The hold eventually lasted almost three hours. The procedures detailed in the landing gear section of the abnormal condition checklist produced no change in the position indications. The crew reviewed the checklist to confirm that all steps had been completed, then requested a continued hold to burn off fuel while contacting company maintenance. The company's suggestions likewise failed to retract or extend the nose gear, so the crew continued to hold while consuming more fuel, briefing the passengers, and reviewing emergency procedures for a gear-up landing and subsequent evacuation.

Company dispatch suggested landing at Fort Lauderdale, but storms were passing through and its runways were wet. Instead, the crew decided to divert to the Southwest Florida International Airport (RSW) in Fort Myers, already in sight from their holding

## LESSONS LEARNED

*Continued on Next Page*



position to its east and offering a dry 12,000-foot runway. After burning sufficient fuel, they moved the passengers to the forward rear-facing seats and briefed them on the evacuation procedures. Hydraulic pressure was confirmed to be normal with brake pressure available. The pilots made a normal ILS approach to Runway 6, touching down with 45 degrees of flaps at the lowest controllable ground speed and holding the nose up as long as possible. The jet came to rest on the runway, about 4,500 feet past the approach end, with the nose gear still in its well. The passengers and crew evacuated without injury through the main cabin door. As the captain noted in his statement to the NTSB, “No additional or different actions of flight crew could have prevented failure, or resulted in a more favorable outcome.”

*The missing pin that allowed the push rod linkage to wrench out of the nose gear actuator was just one of the thousands of pieces that must be in place and correctly secured for all the systems of any aircraft to operate as designed.*

Photographs taken by the responding FAA inspector documented that the push rod linkage for the nose gear actuator was disconnected from its attachment point. The castle nut, washer, and split pin that should have secured the linkage were not found in the wreckage, and the corresponding threads of the linkage were deformed inwards. The matching bushing in the hydraulic actuator was partially twisted from its seat, suggesting repeated unbalanced pressures during the 124 cycles since the nose gear had been

removed, overhauled, and reinstalled the previous January. No other inspections of the nose gear had been performed since.

Though the heavy maintenance contractor’s job cards had been checked and signed off by a quality assurance inspector, the NTSB concluded that “it is likely that the split pin was not installed during the installation of the nose landing gear following the overhaul, and over the course of the 124 cycles...the nut and washer backed out.” The accident’s probable cause was therefore found to be:

Maintenance personnel’s improper installation of the nose landing gear assembly, which resulted in separation of the actuator arm and the failure of a [sic] nose landing gear to lock into place.

After the airplane was removed from the runway, the nose gear locked into place normally when the operator’s maintenance staff extended it by hand.

Details matter. A bad situation could have been made much worse had two experienced pilots not put first priority on flying their airplane, then systematically assessed their situation, identified the most favorable landing site, and taken care to touch down under control at the slowest safe speed and lowest safe weight. And the missing pin that eventually allowed the push rod linkage to wrench out of the nose gear actuator was just one of the thousands of pieces that must be in place and correctly secured for all the systems of even a small corporate jet to operate as designed. There’s no knowing how it came to be overlooked, but while no kingdom was lost for the lack of a horseshoe nail, the absence of one small, inexpensive part that could have been installed in seconds led to an in-flight emergency and vastly disproportionate damage.

—**David Jack Kenny** is a freelance aviation writer and statistician.



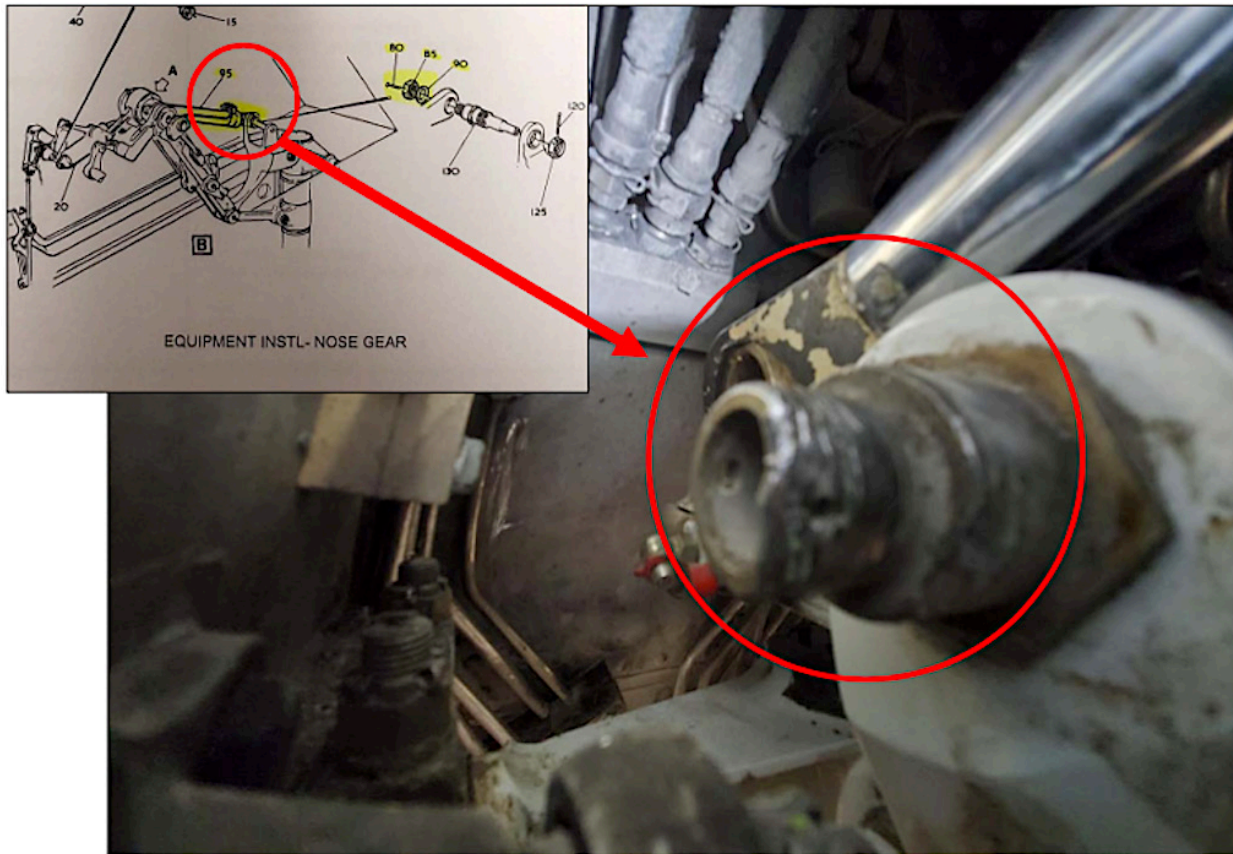
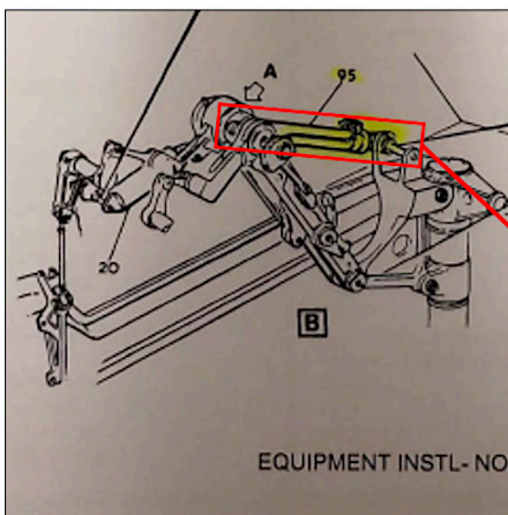


Photo 1 - View of the nose landing gear actuator (Photography Courtesy of FAA)

Raytheon Hawker 800/850XP illustrated parts catalog, Item 95, Part Number AIR4504. Photographs courtesy of Delta Private Jets.





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Your feedback is vital to our safety programs, as it helps us hone in on what's most important to you, the operator. USAIG's website ([USAIG.com](http://USAIG.com)) offers a convenient way for us to collect your thoughts or suggestions. A visit there will provide a great look at all our services, including the "Safety" tab that outlines our safety programs. All of the "Safety" pages—including the one where you can go to download all past issues of this newsletter—contain an "Ask a Safety Expert" feature you can use to communicate directly with USAIG's Director of Aviation Safety Programs. We look forward to your comments on the newsletter or our other safety programs, and advancing **Premium on Safety** in step with your needs and suggestions. Fly smart and fly safe!

# The Aviation Maintenance "Never Events" Program Comes of Age

BY DR. TONY KERN, CEO, CONVERGENT PERFORMANCE

Ten years ago, then-USAIG President and CEO David McKay reached out to me asking if our team had any ideas to reduce maintenance technician-induced damage, which was costing the industry nearly \$40 billion per year. The global epidemic of technician-induced damage and the costs of unnecessary rework are draining dollars from everyone's bottom line and reducing the operational readiness of valuable aircraft. Even in healthy economic times, this is bad business. Today it is simply unacceptable.

Convergent Performance solves human factors problems. For aviation we developed a new approach centered on the personal accountability and self-awareness of line technicians. We have trained and certified more than 35,000 technicians in Aviation Maintenance Never Events®, a technician-centered method proven to reduce the costliest events in maintenance operations.

Research into industry reports and insurance data identified just seven key events that result in most of the damage. They are aptly named, as the Never Events are all 100 percent preventable. Technicians learn to eliminate these Never Events using competence, compliance, awareness, and teamwork, while tying the whole thing together on a foundation of solid documentation.

**Wrong Person** – Demanding schedules often lead to under-qualified employees being assigned tasks for which they are not prepared—or authorized—to perform. This results in delays, rework, repairs, and all too frequently, a non-airworthy aircraft being released to fly. We show how the "right person" can become the wrong person through fatigue, distraction, or lack of proficiency.

**Wrong Part** – Using parts that are sub-par or over-timed and reusing single-use parts causes serious problems. Wrong Part training includes how to avoid improper installation errors. Technicians are taught to embrace and improve upon parts inspection and control programs to ensure that the right parts are always installed—and installed correctly—on every aircraft, every time.

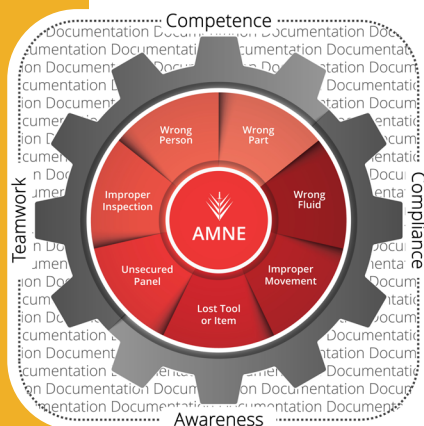
**Wrong Fluid** – Fluid errors and improper lubrication often result in major cost incidents from complete system contamination. It has also resulted in the tragic loss of aircraft. Additionally, technicians learn how to take care when working on high-pressure, electrical, and other systems that are dangerous in less obvious ways.

**Improper Movement** – Ramp rash incidents make up 25 percent of damage costs annually (\$10 billion). Heightened awareness of the environment, surface control movement, equipment movement, communications, and new communication protocols raise employee awareness and defenses during these risky events.

**Lost Tool or Item** – Lost tools or other misplaced common-use items are a key contributor to the estimated \$4 billion lost annually from FOD damage. This program leverages 360-degree situational awareness and tool, part, and fastener control measures so that techs never leave an item behind.

**Unsecured Panels** – Improperly secured panels, doors, cowlings, and caps are one of the most embarrassing—and most preventable—errors. The Never Events approach teaches awareness, memory, and briefing techniques for task handoffs and shift changes to eliminate this problem.

**Improper or Incomplete Inspection** – Inspections are the cornerstone of airworthiness and the last chance to ensure it. When steps are skipped or glossed-over airworthiness is compromised. The Never Events approach counters this by improving inspector awareness of situations and circumstances that lead to weak inspections and reestablishes the sacred trust we place in them.



This program was developed by aviation maintainers, for aviation maintainers, and includes five generations of refinements. We work in a risky business, but it becomes less so every time a proven safety solution is adopted by the industry. For more information on this contact me at [tony@convergentperformance.com](mailto:tony@convergentperformance.com)

The next USAIG-sponsored round of the 4-session AMNE Webinar Series begins September 7, 2022. Performance Vector-eligible policies that have not yet used their current policy's benefit can use that to enroll their maintenance staff. Group enrollments can also be self-purchased at USAIG member rates. View an informational flyer on the Fall series [here](#). Email us at [safety@usaig.com](mailto:safety@usaig.com) with questions.