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Combat Edge

ACC's Full-Spectrum Safety Magazine

CAF Flight Safety

The Next Level (Part III)

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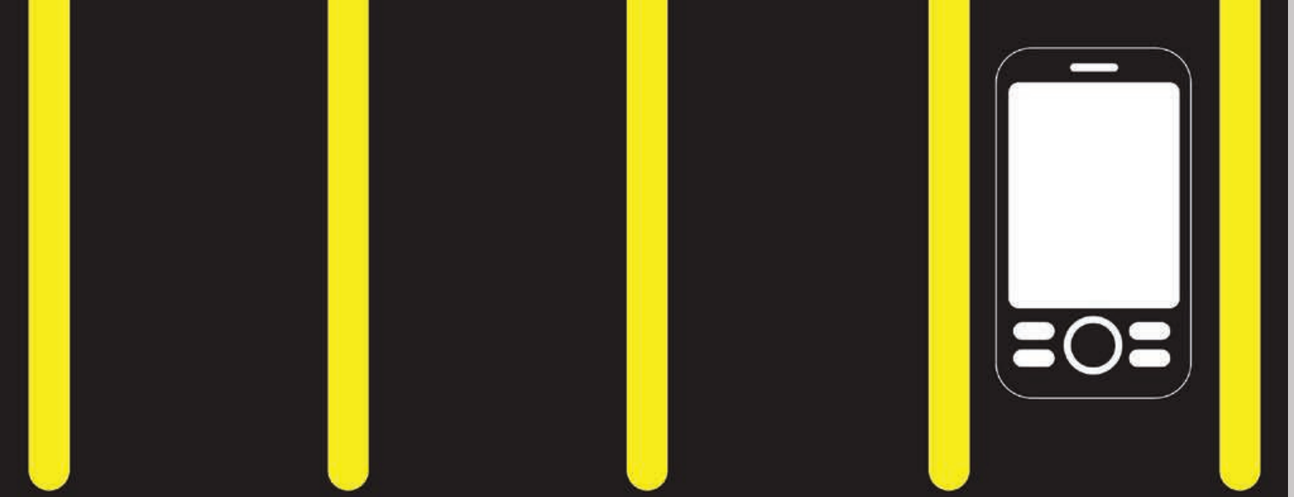

Combat Edge

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COVER PHOTO BY: MASTER SGT. JOHN HUGHEL

ACCent

The Bell Curve

Col. Robert B. Trsek
Outgoing Director of Safety

The top of my test said "55" in **bold red ink**. Somehow red ink makes everything worse. Following that 55 was a "C+" however, and I was thrilled. Calculus, no problem, thermal dynamics, particles in motion, sure. Rotational dynamics? I didn't really care how much Nancy accelerated when she lowered her arms, and I wasn't sure why she was spinning on a huge turntable to begin with. I was just happy for bell curves, and their use to normalize a distribution.

They said there'd be no math, but they lied. Life is economy and statistics and you use (and are subject to) both whether you like it or not. The shortest distance between home and work, the lowest price per ounce of peanut butter, the car insurance costs for a single male under 25 compared to a married woman over 40 in the exact same car. Insurance companies base their rates on historical fact and predictive models, whether car or life insurance, and they understand bell curves really well, because they must to make money. You are, as they say, an "n" of one, and you are part of a distribution in everything that you do, whether safely in the middle of that curve, low risk at one end due to great genetics, or high risk at the other end for skydiving or reckless driving. Maybe you have great genetics but also like to light carcinogens on fire and inhale. Repeatedly.

In the safety business we spend a lot of time looking at "the numbers" just like an insurance company. We look at raw numbers, rates over time, trends, and outliers. Where is our Air Force having the most head injuries? Are our fighters experiencing an increase in rapid decompressions? We have a lot of RPA mishaps but is that normalized by the sheer volume of flight hours? These are questions that we have to answer if we are to apply our scarce resources properly, but this approach isn't just for the MAJCOM staff. It's for you.

Bivariate is not a Bavarian pastry, and Chi-square is not a fancy herbal tea, but you don't need a degree in statistics to understand bell curve distributions. My point is that there is a reason for everything happening, and that reason is usually physics, so *understanding* as a starting point for making choices isn't as much of a mystery as you'd think. As a Caucasian male in the U.S. I know I can expect to live to be about 82, and I have a roughly 50% chance of dying from either cancer or heart disease. I'm an "n" of one, and while I like to think I'm unique, I'm not – millions of deaths over time support this fact. Dynamic hydroplaning is a complex phenomenon, but I also know a rough rule of thumb for 9 times the square root of my tire pressure, and I avoid going that fast in heavy rain or standing water. The math won't change if I have two hands on the wheel or I'm taking a selfie at 54mph. I know where I am on the life expectancy bell curve. I know where I am below hydroplaning speed on the highway. You have to *understand* where you are on any given curve if you are going to do anything about it, with open recognition that understanding may not change behavior in the face of peer pressure, alcohol or other influences.

Safety and statistics are wedded terms – maximizing variable X (fun, gas mileage, sorties, etc.) while minimizing risk Y is a mathematical ratio. There is a direct correlation between the decrease in the number of pirates and the increase in global warming, but correlation may not be good enough – do your best to understand the facts, and make conscious decisions about your choices. Nobody wants to be a statistic yet we all are, every day – but you do get a vote where your number goes.

CAF Flight Safety
The Next Level (Part III)

BY COL. STEVEN G. OWEN

Is that Technique or Procedure? How many times have you either asked this question or heard one of your peers, subordinates or supervisors ask it of someone else? Have you ever run into a situation where established procedures became overshadowed by personal techniques? During my first couple of flying tours, we had a word for it … "Technedure". Most of you reading this article have most likely heard this term at one time or another during your career. If you haven't, here's my personal definition:

> ***Technedure:*** a specific technique for accomplishing a particular task (which may or may not comply with tech-order or AFI guidance) that is utilized or taught by a highly skilled airman over an extended period of time, that eventually becomes accepted within the organization as procedure.

On the surface, this doesn't seem so bad, right? After all, our Air Force has been engaged in operational warfare for the last 26 years, we are constantly encouraged by our leadership to innovate and adapt in order to accomplish our mission, and we have increasingly had to adapt to a fiscally constrained environment that requires us to "do more with less". The problem with "technedures" is that some of them (not all of them) are nothing more than shortcuts. Recent mishaps in ACC have shown that allowing techniques to take precedence over established procedures can result in a unit culture that accepts procedural deviations as "normal". If this normalization of deviations is allowed to continue over time, it can have catastrophic consequences.

Photo by: Staff Sgt. Ryan Callaghan

Photo by: Amn Nathan H. Barbour

In the spring 2017 edition of Combat Edge, we started a three part series titled "The Next Level". The first part of this series introduced multiple environmental factors described in the 2015 ACC Strategy, "Securing the High Ground" that must be considered in preparing for the future operating environment. Many of our potential adversaries are developing or acquiring technologies that require the Air Force to operate in Contested, Degraded and Operationally-Limited (CDO) environments. In order to meet the threats posed by this future environment, our aircraft have become increasingly complex. We have slowly moved from substantial quantity with superior technology towards lower aircraft numbers with exquisite technology. On the domestic front, "the US national debt and associated fiscal repercussions, combined with two decades of sustained combat operations have imposed tremendous stress on our Airmen and equipment." If you combine these fiscal realities with reduced inventory and the limited ability to replace a single aircraft, it becomes readily apparent that each airframe within our inventory is truly a national asset. As such, the mission impact of losing a single aircraft outside of a combat environment requires all of us to elevate our aviation mishap prevention to the next level.

Part I of this series introduced Military Flight Operations Quality Assurance (MFOQA) as one of three interrelated programs designed to drive mishap rates even lower than they are today. MFOQA focuses specifically on raw data and tells us ***"what"*** our aircrews are doing in the air. It utilizes data from aircraft flight data recording systems to track trends in aircraft and aircrew performance. It also provides you, the tactical operator, with the ability to tailor and track specific performance factors or safety trends that matter the most to your MDS. The primary limitation of MFOQA as a stand-alone tool for trend analysis is that it does not provide relative context for the data that it collects. That is where the other two interrelated proactive safety programs come into play.

Part II of this series introduced the Airman Safety Action Program (ASAP). ASAP provides an additional method for proactively identifying hazards before a mishap occurs by enabling Airmen to submit lessons learned to the entire Air Force community through a web-based application (https://www.usaf-mfoqa.com/). From a tactical aviator's perspective, we discussed ASAP as a "virtual bar napkin" that allows Airmen to capture lessons learned across multiple MDS and MAJCOMs. ASAP provides contextual insight into human and environmental factors that help to explain ***"why"*** a particular event occurred. Combining raw data from MFOQA with associated context from ASAP submissions provides a powerful tool that enables further root cause analysis to identify actionable trend information for a particular MDS or unit.

Part III focuses on the third and final aspect of proactive safety; the Line Operations Safety Audit (LOSA). AFI 91-225 describes LOSA as "an observation program developed to gather safety-related data on environmental conditions, operational complexity, and human factors issues during every day flying operations." LOSA utilizes trained observers at the squadron level to identify threats that personnel face, the common errors they commit, and the best practices they utilize to mitigate those threats or errors. Because a LOSA is an operational audit, it encompasses all operations areas which impact the aircrew, including Ops, MX, AMOPS and other key personnel. It is important to note that a LOSA is not a "check-ride". Instead, a LOSA provides a snapshot of operational performance across a specific community or MDS which is then used to make proactive safety changes to prevent future mishaps. The LOSA provides an additional level of contextual insight into human, environmental and squadron cultural factors that MFOQA and ASAP alone would be unable to provide. In other words, it helps to identify those cultural "technedures" that would otherwise remain hidden from view.

Photo by: Airman 1st Class Christian Clausen

Photo by: Airman 1st Class Michael Shoemaker

The LOSA program was originally developed to provide trend analysis and support to the civil aviation industry and has become an integral part of Air Mobility Command's safety program. As such, LOSA has been primarily focused on crew aircraft and many of the LOSA observers have been able to ride "shotgun" with the aircrew members that they have been observing. The application of the LOSA model to crew aircraft and RPA squadrons within ACC will be similar to the model used by AMC. ACC recently completed our first-ever LOSA, providing observers to conduct 88 observations for four MQ-9 wings. Future application to single-seat fighter squadrons within ACC will require some adaptation and innovation in order to maximize the benefits that LOSA provides. As always, we'll be looking for your feedback … this is your program, tell us your thoughts!

As long as we continue to employ combat air power, we will never be able to eliminate every risk or prevent every mishap. We can, however, leverage the benefits of proactive safety programs to elevate our CAF mishap prevention to "The Next Level" in order to preserve combat power and provide air dominance to our Joint warfighters. By combining all three proactive safety programs, we can utilize MFOQA to identify raw performance trends, ASAP to provide human factors and environmental context for daily lessons learned, and LOSA to provide further insight into organizational and culture factors that contribute to an effective flight safety program.

Until next time … Fly Safe!

~Grit

ADI Failure in IMC

Lessons Learned

BY 1LT WILLIAM "BUFF" MCCARTHY

On 5 May 2017, I was RTB in a T-38A from exercise Northern Lightning at Volk Field, Wisconsin with 3 other jets. The weather at KVOK was clear and a million, but the two-hop home to Langley was going to be tricky with low clouds and rain everywhere in between. The plan was to stop at Rickenbacker (KLCK) for some gas, and then complete the trip to Langley. The weather there was 007 OVC, but there was a good alternate nearby at Wright-Patterson AFB with ceilings >010 and unlimited visibility underneath. Our first 2 pilots stepped and launched with that plan and made it there and home without issue. I held up to launch with the last jet for mutual support as they were just getting back from lunch. When they returned, I grabbed my gear and was about to head out the door, anxious to get home. The next decision probably saved me from having to eject, and more than likely saved my life.

The two other pilots returned from lunch ready to go, but insisted that we go through the plan again, and re-check all of the weather for the first leg of the trip. I begrudgingly obliged as I knew they hadn't checked the weather in a while, and it was obvious that I needed to extinguish a bit of my get-home-itis that was building. That's when we realized that the weather at Wright-Patterson had gotten worse, and now the nearest alternate field was an extra 100 miles away at Pittsburgh International; not an ideal stop. After a half hour of watching live weather radar and reading seemingly endless amounts of METARs/TAFs, we chose Tyson airport in Knoxville TN as the new destination. The ceilings were forecast higher at about 020 and layered above, but it came with reduced visibility/wet runways due to rain and mist. Not perfect, but it didn't require an alternate and that sounded good.

I launched first as a singleton with the second jet about 5 minutes behind. The majority of the flight was clear, smooth, and without incident. On my descent, I began to notice that my attitude director indicator (ADI) was starting to 'roll back'. Basically, each time that I leveled off after a step-down altitude, it was still showing that I was nose low, even though I was level. No worries, there's a knob to adjust that and so I did… quite a few times, until it was adjusted as far as it could go. I didn't see it roll back any farther, called it good, and pressed on. I now know by speaking with very experienced T-38A pilots that this action is a sign of impending ADI failure. About this time I also passed through a cloud layer and picked up some light rime icing. Icing and T-38s don't mix well as it can damage the engines, and their small/thin wings don't fly well with any icing buildup. I immediately asked for an altitude below the forecast icing layer and was cleared down lower. I was fortunate that most of the way down was in clear air and the little icing I had picked up disappeared. I gave my icing report to center, which allowed the jet behind me to pick an alternate route and avoid it all together.

I was back in the weather at 120 and was relaxed, confident that the ILS would be a breeze, and I had plenty of gas for multiple approaches if it turned out otherwise. I got down to 060 on a long radar downwind for the ILS 23L, and was given a right turn to base. Here is where my instrument cross-check broke down. Usually while in instrument conditions, your ADI is your main point of reference, and then you continually cross check your altitude, airspeed, heading, etc. I became fixated on my ADI, and was only cross-checking my horizontal situation indicator (HSI) in order to stop at my assigned heading. My ADI showed a 30 degree bank turn, the HSI was turning as desired and everything felt right. That's exactly why flying in IMC can be so dangerous.

In my peripheral vision I noticed a needle fall pretty drastically, and it grabbed my attention. It was my vertical velocity indicator (VVI) swinging quickly downward, displaying that I was in a dive. I looked above it and saw my altimeter winding back as well. The VVI swung as low as -4,000 ft/min, and with the ground 1,000 ft above sea level, I had just over a minute before I would have re-united with earth (or less if I found one of the many towers in the area). At that moment my pilot training kicked in: Recognize – Confirm – Recover. I'm in an unusual attitude in the weather, and I'm close to the ground so I need to figure this out ASAP. I recognized that my altimeter/VVI showed me in a dive, and my ADI still says I'm in a level turn. That didn't confirm it, so I looked farther left to my standby ADI which is about ¼ the size and typically much less accurate. It showed me in about a 60 degree bank turn and 10-15 degrees nose low. That confirmed the other readings, so I knew my main ADI had failed and I would now be flying off of the standby.

I snapped the wings back to level, began a 2-3G pull and pushed the throttles up to Mil power stopping my descent. I began climbing back up and recognized that at the lowest point I had lost almost 1,000 ft. Here's where I encountered even more of what got me into trouble in the first place: spatial disorientation. I got into a bit of what's called a pilot induced oscillation (PIO). A PIO occurs when a pilot is trying to gain control of their airspeed and altitude, but are instead making the situation worse by over-controlling the aircraft. I solidified myself in a climb and froze the stick, allowing everything to equalize and become steady.

As a Monday morning quarterback, here is where I should have declared an emergency. My jet is broken, I'm on my standbys in the weather at an unfamiliar airport, and I just had a serious unusual attitude situation. So why didn't I? Mainly, it was task saturation. I just experienced the most difficult 71 seconds in a jet I'd ever had, and was too busy simply keeping the jet flying correctly to worry about declaring. The other reason was that I was getting exactly what I was asking for. Once I had the jet under control, I let Knoxville approach know my main attitude indicator had failed and I needed to get to visual conditions (VMC) immediately. They got me down to 3,800 ft where I found I was in mostly VMC between cloud layers. Since I wasn't having any issues getting prioritized with what I needed, I decided not to declare. The right call would be to declare just in case, and it's what I plan on doing in the future should I find myself in this situation again.

I had one last layer of clouds to get through, so I caged the standby ADI to make sure it was truly level. I made a small attempt to right the main ADI but it seemed not worth the effort, and I wanted to concentrate on getting the jet down safely. I reached the final approach course and descended quickly to get VMC again, and complete the rest of the approach visually. Once visual with the field and on a good wire to land, I started checking out how my instruments were doing. Now the ADI showed a large bank in one direction and the standby showed a small bank in the other. I had never been so happy to be in visual conditions and headed toward a runway.

After landing and catching my breath, it dawned on me that had I been stubborn and pressed to Rickenbacker, I may not have had the same ability to get into visual conditions and it may have led to an ejection. We never know when a part is going to go bad, but we do have the power to mitigate the risk as best we can and plan for success. I'm glad we did that day.

My Lessons Learned

- Declare an emergency when one exists, and when time allows.
- Aviate, navigate, communicate; I believe that I worked these three steps in order, but the lesson was tested and it worked.
- There were red flags of an ADI failure while high in VMC. Don't scoff them, and use the time and altitude to troubleshoot when it's safer and more convenient.
- Get-home-itis can be dangerous. Weather is easier to plan for at 0 AGL/0 AS than with a weather puck.

Fire! Fire! Fire!

BY CAPT. CHAD VANDERHORST

"Fire! Fire! Fire! Fire in the Galley!"

That was the call that rang out over the aircraft communication systems as a six-foot inferno erupted from the highly-pressurized, liquid oxygen system during takeoff, engulfing the entire tail section of the aircraft in smoke and flame. The day was 30 April 2015, and I was the Aircraft Commander (AC) of SNOOP 71, an RC-135V RIVET JOINT, or "RJ", departing from Offutt AFB with 27 aircrew to support a CONUS exercise. Fourteen seconds after brake release and at approximately 50 knots, the crew members closest to the fire called out the emergency, and I immediately aborted the takeoff. Once the jet was completely stopped, I directed the aircrew to egress. While the copilot and I completed the checklists to secure the aircraft, the Navigator installed the crew entry chute ladder, allowing all 27 aircrew to egress without injury. Less than three minutes after stopping the aircraft, the entire crew of SNOOP 71 had egressed to safety and formed up for accountability. While I prioritized those personnel potentially needing medical attention, the fire burned through the aircraft skin and a 15-foot flame shot out of the aircraft tail like a flame-thrower. We watched in awe as three airfield firetrucks, who had arrived on scene an eye-watering 69 seconds after being notified, drenched the inferno for five minutes but were unable to stifle the flames. Eventually the fire exhausted itself once the entire liquid oxygen system was depleted but not before causing over $63 million in damages resulting in a Class-A Mishap.

Two years later, the mishap continues to offer lessons not only for the RJ community but for all crewed aircraft. The Accident Investigation Board (AIB) praised the crew's actions that day. Still, the safety report and mishap crew debrief highlighted areas for improvement both in training and practice, and the area most identified: Crew Resource Management (CRM). While individual crew members followed emergency procedures to the letter that day (which, in my opinion, saved the crew), the simultaneous emergency call-outs and ensuing interphone coordination became muddled as a highly excited aircrew in the aft of the fuselage attempted to communicate the severity of the situation while the flight deck sought to understand what was happening. As a result, the cockpit was unable to decipher the initial call-outs.

Another CRM critique from the crew debrief and the AIB: the lack of communication amongst the crew after the initial emergency call-outs. This failure of CRM meant that the flight deck did not know how the EP was progressing, highlighting the importance of constant, deliberate communication throughout an emergency, not just in the beginning. In general, the farther you were away from the fire, the less you understood about the situation. While I was in the cockpit, all that I knew about the fire was that it existed and where it was located, and I had determined the fire was serious based on the tone and inflection of the initial callouts. I made the decision to secure the aircraft and initiated the egress based solely on the initial callouts and the stress in my crew's voices. On one hand, the Tactical Coordinator (Electronic Warfare Officer charged with the EP updates in such a scenario) recognized that the copilot and myself were busy securing the aircraft, but on the other hand, I had no idea the current status or spread of the fire. Making matters worse, the majority of the crew unplugged their headsets to egress as directed, which quickly eroded CRM even further. If I had to do it over again, I would have queried the TC about the status of the fire before and after the removal of aircraft power by any means necessary, especially while I was waiting for the remaining aircrew to egress. With a crew as large as 36 airmen, CRM is especially vital to safe, sound decision-making, and communication between crewmembers needs to remain clear, concise, and timely.

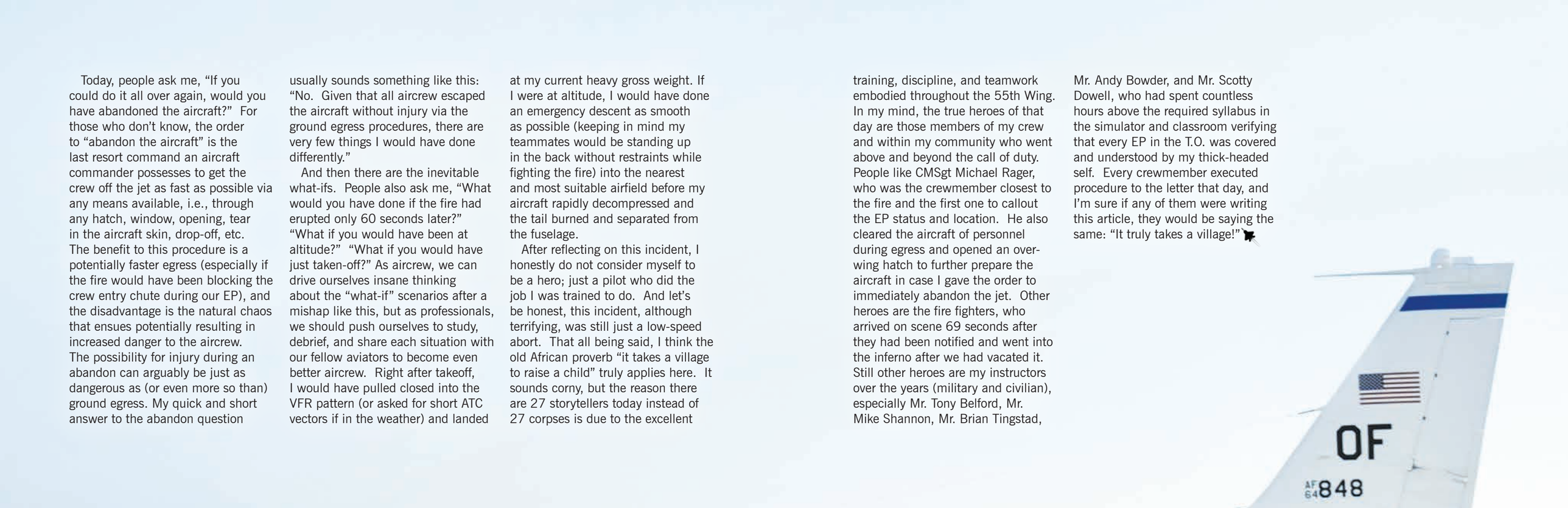
Now that we've discussed the general narrative and some lessons learned, let me tell my personal account of this mishap. Sitting in the left seat as the AC that day, I flew the takeoff, and it began like any other. Once cleared, I stood up the throttles, scanned the engines instruments to verify no abnormal indications, and released the brakes to begin the departure … my first as a newly qualified AC. A few seconds later, I heard what sounded like very loud voices and chatter over GUARD frequencies. As a result, I immediately disregarded that "noise" to focus on the takeoff. Another second passed by before I recognized that these voices were callouts from my own crew shouting "FIRE!" The indicated airspeed read 50 knots, so I immediately made the decision to abort the takeoff.

At the time of this decision, I did not know the degree or size of the fire (that information was never communicated to me), but I did know the situation was serious due to the tone and inflection of my aircrew's callouts. Airmen were yelling, adrenaline was pumping and training took over. After I stopped the jet, I immediately called for the ground evacuation checklist knowing that if I needed to escalate that command by ordering the crew to abandon the aircraft, I could always do so. As I have been trained, an order to egress through the crew entry chute can always be escalated to an order of abandoning the aircraft via any means, but the abandon order can never be retracted once given. After the copilot and I had completed our emergency checklists, we waited for what seemed like hours (actually less than 2 minutes in real time) while the remaining crew members egressed via the crew entry chute. As the last few crew members came forward, I noticed they had trouble seeing, their eyes were bloodshot, and they were coughing from smoke and fume exposure. I observed no other injuries. I wanted to hurry them along, but thought twice once I saw their symptoms. I quickly re-evaluated the situation and EP status, and I determined my previous decision-making to be sound; we would press on with the egress, painfully wait for our turn down the chute, and not give the order to abandon the aircraft. We safely completed the egress with four crewmembers requiring medical attention for smoke and fume inhalation.

Today, people ask me, "If you could do it all over again, would you have abandoned the aircraft?" For those who don't know, the order to "abandon the aircraft" is the last resort command an aircraft commander possesses to get the crew off the jet as fast as possible via any means available, i.e., through any hatch, window, opening, tear in the aircraft skin, drop-off, etc. The benefit to this procedure is a potentially faster egress (especially if the fire would have been blocking the crew entry chute during our EP), and the disadvantage is the natural chaos that ensues potentially resulting in increased danger to the aircrew. The possibility for injury during an abandon can arguably be just as dangerous as (or even more so than) ground egress. My quick and short answer to the abandon question usually sounds something like this: "No. Given that all aircrew escaped the aircraft without injury via the ground egress procedures, there are very few things I would have done differently."

And then there are the inevitable what-ifs. People also ask me, "What would you have done if the fire had erupted only 60 seconds later?" "What if you would have been at altitude?" "What if you would have just taken-off?" As aircrew, we can drive ourselves insane thinking about the "what-if" scenarios after a mishap like this, but as professionals, we should push ourselves to study, debrief, and share each situation with our fellow aviators to become even better aircrew. Right after takeoff, I would have pulled closed into the VFR pattern (or asked for short ATC vectors if in the weather) and landed at my current heavy gross weight. If I were at altitude, I would have done an emergency descent as smooth as possible (keeping in mind my teammates would be standing up in the back without restraints while fighting the fire) into the nearest and most suitable airfield before my aircraft rapidly decompressed and the tail burned and separated from the fuselage.

After reflecting on this incident, I honestly do not consider myself to be a hero; just a pilot who did the job I was trained to do. And let's be honest, this incident, although terrifying, was still just a low-speed abort. That all being said, I think the old African proverb "it takes a village to raise a child" truly applies here. It sounds corny, but the reason there are 27 storytellers today instead of 27 corpses is due to the excellent training, discipline, and teamwork embodied throughout the 55th Wing. In my mind, the true heroes of that day are those members of my crew and within my community who went above and beyond the call of duty. People like CMSgt Michael Rager, who was the crewmember closest to the fire and the first one to callout the EP status and location. He also cleared the aircraft of personnel during egress and opened an over-wing hatch to further prepare the aircraft in case I gave the order to immediately abandon the jet. Other heroes are the fire fighters, who arrived on scene 69 seconds after they had been notified and went into the inferno after we had vacated it. Still other heroes are my instructors over the years (military and civilian), especially Mr. Tony Belford, Mr. Mike Shannon, Mr. Brian Tingstad, Mr. Andy Bowder, and Mr. Scotty Dowell, who had spent countless hours above the required syllabus in the simulator and classroom verifying that every EP in the T.O. was covered and understood by my thick-headed self. Every crewmember executed procedure to the letter that day, and I'm sure if any of them were writing this article, they would be saying the same: "It truly takes a village!"



File an ASAP Today!

Taken from an actual ASAP submission.
This event did not result in a mishap, but provides valuable information worthy of sharing.

ASAP: 128: F-15E - Level 4 Over-G (11.9G) recovering from a night strafe pass with a live gun.

Description: First sortie as a certified 2-ship flight lead (cert ride previous night); first night strafe event for 1A; CAS upgrade ride for 1B; 2A instructor of record; Operating night CAS in [RANGE] with [UNIT] JTACs.

Background: Events leading to incident: T/O, Admin to range uneventful. First 9-line uneventful with inert GBU-12 attacks. Received a 9-line for strafe. Went to complete AAR, but returned to range for CAS. Confirmed executing same 9-line. NVGs donned prior to attack (Hi-Illum). Confirmed friendly location and target PID. BDROCA completed for HAS 1000' recovery. Run-in restriction was 111 +- 10 degrees. Poor base parameters at run-in, so 1 spun to reset base. On second setup, 1 rolled in on a shallow wire 2 degrees outside of restriction. 1A attempted to fix both error simultaneously and ends up steep (28D pod depression angle). Speed recognized passed approximately 420C and 1A pulled the power to idle and deployed the speedbrake. Airspeed increased and wire steepened. Due to "light-in-the-seat" feeling and out of parameters (500C, 31 DEG NL), 1B called "Fast, Abort!" Due to similar feelings of ground rush and wind rush, as well as the urgency in 1B's voice, 1A pulled aggressively with a symmetric max performance pull to the horizon. 11.9Gs pulled. Recovery was initiated at 3600' and completed by 2900'. Both aircrew sensed they were much lower after reviewing the event page. Switches safed up, BD check completed, IFE declared, and straight in flown.

Debrief: Lack of experience in night strafe, crew fatigue/stress (debriefed until 2am previous night, multiple upgrade rides, switched from days to nights mid-week), poor parameters (both at base and down the shoot), and perceived spatial orientation with regard to altitude were the main factors for over-G event.

Reaction: Declared Emergency with ATC.

Submitter Suggestions: To combat the lack of experience in night strafe: Add it to the B-Course syllabus as a demo-pro event (MQ syllabus as minimum). First time accomplishing event should not be after 2FLUG.

Resolution: Thank you for your ASAP submission. This will be closed and tracked for trend analysis.

Do you have a lesson learned to share?
http://safety-masap.com

ASAP—Aviation Safety Action Program ...
It's confidential and quick

FUNDAMENTALS FOCUS

GET REAL

What's the most important part of realistic training? It is always the match between the mission and the aircrew. While RM will help incorporate assessments and mitigations for the many elements that can impact the flight, matching the mission to the aircrew capability is the first step and requires thoughtful planning and alertness to tailor the mission in real-time if needed to our real performance.

First, as instructors, flight leads or aircraft commanders, we love developing challenging tactical scenarios for training missions. We want to push the envelope and do something interesting. However, do we always cross-check that the scenario is the right complexity and right mission for the crewmembers involved? When flying the mission, do we listen and observe feedback that everyone is able to keep up with the mission and tactical tasks. If the mission is too complex, aviators can get behind the jet, become frustrated or confused and lose the training opportunity. At that point, we are just wasting flight hours and fuel or, even worse, letting dangerous situations develop. A magnificent tactical scenario does not hone skills if it is not tailored to the right complexity to challenge, but not over speed, the flight.

Even veteran and experienced crewmembers need to consider if the game plan is right for them on any given day. If your mission includes rehacking an overdue currency, take the potential lack of proficiency seriously with extra briefing topics or warm-up tasks before going full throttle. For example, night low level flying requires precise control and a quick cross check. Immediately executing an aggressive gun jink could get the nose buried too low. Add a little rising terrain to the mix and the situation can get dangerous quickly. Give yourself a chance to warm up and build your SA before expecting yourself to be ready with your A-game.

Even when qualified and proficient, be realistic and observant about your performance. Getting back in the jet after being gone for a few days, whether bouncing back from being sick or re-acclimating post an amazing vacation, be watchful for differences in G-tolerance, fatigue or focus and tailor the mission to align with what you are able to do.

So, instructors, flight leads and all aircrew, put your focus on making sure the mission matches your skill, proficiency and performance and get real about what you ask your flight--and you!--to do.

Photo by: Tech. Sgt. Jorge Intriago

MAINTENANCE MINUTE

BY MASTER SGT. JEFFREY STULL

As maintainers, we are required to adhere to our technical guidance to complete maintenance tasks. Our technical guidance will detail all the tools, hardware, and consumable items required to do the task. It is crucial that members conducting maintenance actions are properly trained and technical guidance is strictly adhered to for proper execution of the maintenance tasks. If not, a scenario may arise that results in an aircraft mishap. For example, a maintenance crew was repairing a fighter aircraft that exhibited an oil leak during operational checks. The faulty component identified was an APU lubrication pump. During the removal of the lube pump, they noted that the pump was unusually difficult to remove from the APU. One of the maintainers grabbed a screwdriver and attempted to pry the component loose. Another member of the maintenance crew verbally corrected the member trying to dislodge the lube pump. He told him that using a screwdriver is not a preferred maintenance technique to remove the lube pump. The flight line expeditor checked on the team and decided to assist by using a mallet and ½ inch extension to aggressively remove the lube pump, which resulted in one of the lube pump lugs being broken. Further inspection revealed that the litany of non-standard removal techniques resulted in damage to both the faulty lube pump and the APU it was attached to. During this same timeframe, another maintenance crew was attempting to cannibalize a replacement lube pump from another non-mission capable aircraft to repair the previously describe aircraft. Unfortunately, that second team utilized the same removal techniques and caused identical damage to the second aircraft's APU, resulting in damages valued over $380K. Leveraging tools not identified in the technical guidance and using non-preferred maintenance technique to remove aircraft parts resulted in a Class C mishap and damage to two aircraft.

In another example, a pair of maintainers were working on the exhaust of another fighter aircraft. They were installing exhaust nozzle liners onto the engine on the aircraft. The maintainers were using an approved slide hammer to install retaining pins into the exhaust liners. Care must be taken when using a slide hammer, as the force it exerts on aircraft hardware can cause damage to the aircraft. Once the pin holes were aligned, one of the maintainers utilized the slide hammer to install two outer retaining pins into the exhaust liner. Unbeknownst to the maintainers, the outer retaining pins were installed too far during installation. When the center retaining pin failed to go in all of the way, the team removed all of the pins and liner to determine what was obstructing the center retaining pin. This is when they discovered damage that occurred by using their tools to install the outer pins into the liner farther than the technical guidance allows. Damage to the aircraft was assessed at $76K. While the tool was approved for use, care was not taken when using the slide hammer to install the pins and they were installed further than TO specifications. This resulted in a Class C mishap. Both of these mishaps were preventable provided the technical guidance was followed when utilizing the tools required for the tasks.

Tools facilitate maintenance on Air Force aircraft. They can make maintenance tasks very easy, however in some instances tools can cause mishaps when improperly used. It all boils down to using the proper tools required by the technical guidance and using them in the proper way. Ensuring maintainers utilize the required tools (G), execute a proper maintenance plan (P) per the technical guidance, while leveraging proper training (S) is a recipe for success. That recipe being Check 3 GPS (Gear, Plan, Skills). Sticking to this recipe will help prevent mishaps and keep aircraft available for the Air Force to Fly, Fight, and Win!

WEAPONS WORDS

THE WILD UXO

BY MR. RALPH "CHRIS" SANTOS

We love our outdoor recreation, especially when it's warm, with many activities to choose from like hunting, fishing, hiking, biking, off-roading, diving, snorkeling, treasure hunting, and more. Most of these activities take place on public lands or waters with significant wildlife and natural beauty, but some areas have a hidden hazard from the past ... the wild UXO.

The United States Department of Defense has used land for munitions testing and training throughout the country and its territories for over 200 years. When these lands were no longer needed they were returned to public or private uses, and many are known or suspected to be contaminated with unexploded ordnance (UXO); munitions that did not function when they were supposed to. The Dolly Sods Wilderness Area in West Virginia, Mosquito Lagoon in Florida, and Maunawili Valley in Hawaii are examples of public recreational areas that contain UXO.

Outdoor recreation may be allowed on or near these areas and they are often marked with warning signs that advise of the potential UXO hazards. If you use these areas, follow any provided instructions for your safety (e.g., remain on established trails). Stay out of restricted areas and do not touch a suspected UXO or any manmade object you do not recognize. If you do find a UXO, follow the 3Rs of Explosives Safety from the US Army Corps of Engineers: Recognize, Retreat, Report. Visit their 3R website for additional information at http://www.usace.army.mil/Missions/Environmental/Formerly-Used-Defense-Sites/. Another good source for UXO information is at DENIX, http://www.denix.osd.mil/uxo/.

Lastly, the domesticated UXO is just as dangerous as its wild cousin and should not be kept as a souvenir or keepsake. If you or a loved one have a UXO, it may pose an explosive hazard until properly verified and certified safe in writing. Call 911 and tell the police what you have and do not handle it, regardless if it has been handled in the past.

MONTHLY AWARDS

Aircrew Safety Awards of Distinction

Lt Col Adam Court and Maj Russell Reynolds – 333 FS, 4 FW, Seymour Johnson AFB NC *(May 2017)*
1st Lt Carter S. Adams and Amn Owen T. Smith – 42 ATKS, 432 WG, Creech AFB NV *(June 2017)*

Crew Chief Safety Awards of Distinction

SrA Bryan J. Castelow – 9 AMXS, 9 RW, Beale AFB CA *(May 2017)*
TSgt Richard C. Eady – 923 AMXS, 23 WG, Moody AFB GA *(June 2017)*

Flight Line Safety Awards of Distinction

TSgt Justin M. Rubio – 380 EAMXS, 380 AEW, Al Dhafra AB, UAE *(May 2017)*
A1C Colleen J. Clay – 552 AMXS, 552 ACW, Davis-Monthan AFB, AZ *(June 2017)*

Occupational Safety Awards of Distinction

SrA Jesse N. Gass – 380 EAMXS, 380 AEW, Al Dhafra AB, UAE *(May 2017)*
SSgt Micah P. Davis – 355 AMXS, 355 FW, Davis-Monthan AFB, AZ *(June 2017)*

Pilot Safety Awards of Distinction

Capt Michael R. Shaw – 79 EFS, 455 AEW, Bagram AB, Afghanistan *(May 2017)*
Capt Chad R. Rudolph – 357 FW, 355 FW, Davis-Monthan AFB AZ *(June 2017)*

Unit Safety Awards of Distinction

62nd Expeditionary Attack Squadron – 455 AEW, Kandahar AF, Afghanistan *(May 2017)*
None Submitted *(June 2017)*

Weapons Safety Awards of Distinction

TSgt John D. Edwards – 386 ELRS, 386 AEW, Ali Al Salem AB, Kuwait *(May 2017)*
TSgt Joshua L. Couffer – 355 FW, Davis-Monthan AFB AZ *(June 2017)*

QUARTERLY AWARDS

Flight Safety

Maj Kimberly A. Hoffman, 4 FW, Seymour Johnson AFB NC. Maj Hoffman advocated for use of the Air Force Airmen Safety Action Program (ASAP) throughout the 4 OG. Her actions resulted in a 300% increase is ASAP submissions which resulted in increased aircrew awareness on flight safety issues in the 4 FW. She coordinated an aircraft down scenario with the North Carolina National Guard's Operation VIGILANT CATAMOUNT exercise. This two week exercise is comprised of 40 agencies and over 500 civilian/military personnel who will train together in a multi-faceted scenario. During this exercise, approximately 20 participants will be able to practice the wing's Mishap Response Plan in the event a 4 FW aircraft crashes during a local training sortie. She investigated three airborne lasing incidents at the 4 FW; worked diligently with the aircrew affected, local FAA FSDO and implemented a checklist and Safety Read File for aircrew to reference during a lasing incident. Maj Hoffman revamped the in-flight emergency reporting procedures and data managing process. Her actions reduced the process from a 6-step procedure to only 3-steps saving both aircrew and the wing safety office several man-hours per incident and increased the number of on-time reports. These efforts will lead to an on line incident worksheet program for aircrew to complete immediately post-flight.

Occupational Safety

SSgt Allison M. Mott, 9 PSS, 9 RW, Beale AFB CA. Over the course of three months, she overhauled over 100 Air Force Form 55's, established a compliant HAZCOM program that was dormant for over three years, and rectified two MAJCOM discrepancies. She also created a comprehensive JSTO, combining 10 work sections into one document which was approved and validated by the Installation IG. Due to SSgt Mott's meticulous attention to detail, she identified 14 discrepancies during 16 spot inspections and removed 24 overdue fire extinguishers ensuring a safer working area for 93 individuals. She oversaw Supervisor Safety Training, in which she identified and corrected the delinquent documentation of 49 individuals and ensured 15 more received training. This action increased the program's status by an astounding 86%. SSgt Mott set up training for one advanced rider and she was responsible for keeping nine riders' records up to date and current. She also restored the LOTO program for two duty sections. SSgt Mott set up a wing spot inspection and evaluation that ensured compliance and helped established a 24/7 on-call response plan. Her focus on the High Risk Activity program cleared up 30 delinquencies which brought the program's status to over 90% compliant. SSgt Mott's review of 50 MICT checklist items and updating 13 new practices helped the Squadron prepare for the upcoming UEI.

Weapons Safety

TSgt Robert Cash II, 355 FW, Davis-Monthan AFB AZ. TSgt Cash, deployed in support of Operation INHERENT RESOLVE, developed a design to construct an ammunition holding area for the USA's High Mobility Artillery Rocket System. The explosive site plan proposal he produced boosted the installation's NEW storage capacity to 8K, increasing the JFLCC's combat capability. He assisted the AEG Weapons Safety Manager in drafting a contingency risk assessment to increase the NEW by another 75K. His contributions identified over 15 quantity distance violations that required AFCENT/CD exemption approval. Upon return, TSgt Cash transitioned back into his role as the 355 FW WSM and conducted three annual inspections and 15 spot inspections. His keen eye for detail recognized a Security Forces clearing barrel that was not properly secured. Taking immediate action, he instructed the ADWSR on how to correct the discrepancy which was rectified within 24 hours of identification. He responded to an A-1OC in-flight emergency involving the aircraft's 30mm cannon. Upon reaching the flight line, he discovered a jammed round in the aircraft gun system which had not been properly de-armed after landing. The unsafed gun posed a significant hazard to 28 A-1OCs and the 250 personnel operating on the main aircraft parking ramp. TSgt Cash's leadership and recognition of a highly dangerous weapons threat guided the response of trained technicians to remove the hazard.

Photo by: Tech. Sgt. Larry E. Reid Jr.

Mishap Statistics Scoreboard

FY17 Flight

As of 30 Jun 2017

	Fatal	Aircraft Destroyed	Class A Aircraft Damage
1 AF			
9 AF			1
12 AF		(MQ-1/9) X3	
25 AF		2	
USAFWC		1	
ANG (ACC-gained)		1	1
AFRC (ACC-gained)			

FY17 Occupational

As of 30 Jun 2017

	Class A Fatal	Class A Non-Fatal	Class B
AFCENT	0	0	2
12 AF	1	1	0
USAFWC	0	0	2
25 AF	2	0	1
9 AF	3	0	3

FY17 Weapons

As of 30 Jun 2017

	Class A	Class B
9 AF	0	0
12 AF	0	1
USAFWC	0	0

Flight Notes

The third quarter FY17 was a challenging quarter for aviation safety. ACC suffered the complete loss of five combat assets; two F-16s, two MQ-9s, and one RQ-4. We also sustained Class A damage to two combat assets; one F-22 and one F-16. Additionally, a weather event at Offutt AFB resulted in combined Class A damage to ACC and AFGSC assets. Furthermore, ACC suffered a single Class B mishap this quarter that sidelined a combat asset and costing millions in repairs. Fortunately, ACC experienced no aircrew fatalities during this period. With continued vigilance and focus on fundamentals, we can reverse this negative trend. Know your limits, keep your wingman in your crosscheck, and stay engaged. Focusing on a sound plan, flying safe, and applying ORM will help us round out the fourth quarter on a positive note.

Occupational Notes

As we close out FY17 we're holding steady at 6 fatalities, same number as last year. However, our Class A, Permanent Total injuries and our Class B, Permanent Partial injuries are way higher than last year. The last fatality mishap in 2016 happened over the Labor Day weekend during a hiking event when an Airman lost his footing and fell 60 feet to his death. As you prepare to finish out your last event for the summer/year, please remind members to plan out their activities and stick to the plan. Since we never know where the next mishap is going to strike, we must apply Check 3, GPS in all activities.

Our Leader-Wingman focus is simple. Leaders don't take Wingmen beyond their capabilities and good Wingmen always operate within their skills and training and ensure others around them do the same.

Weapons Notes

This quarter we experienced two classed mishaps … one Class B and one Class D. Conversely, we've had a few minor incidents that very well could have led to a mishap/event. The Class B investigation is currently ongoing, while the Class D was due to lack of technical order clarity. A procedural recommendation was submitted to improve verbiage in the current technical order. Continue paying attention to detail and stay vigilant while conducting explosive operations, as we know there is an inherent risk associated with our profession. ACC Safety appreciates all that you do; your efforts have a direct impact on the success of our mission.

Legend

Class A - Fatality; Permanent Total Disability; Property Damage $2,000,000 or more
Class B - Permanent Partial Disability; Property Damage between $500,000 and $2,000,000
Class C - Lost Workday; Property Damage between $50,000 and $500,000
(Class Description Effective October 1, 2009)

* Fatality ** Non-rate Producing *** Performing SOUTHCOM Mission

= Fatal = Fatal due to misconduct

Symbols for Mishap Aircraft

OVER the Edge
MAGAZINE

Resiliency Hikes

PAGE 6

BUCKLE UP.

58% of Passenger Vehicle Occupants
Aged 18 to 34 Killed In Crashes In 2015

WERE UNRESTRAINED.

SOURCE: NHTSA.GOV

OVER the Edge MAGAZINE

Don't Be A Crash Dummy

Safety Soup

BY MRS. BARBARA TAYLOR

Method: Combine equal parts of Prevention, Precaution, and Training in a large pot and bring to a boil over high heat. Mix in thoroughly the correct Tools & Procedures, Discipline, and Attention to Detail and continue to boil. Sauté Caring, Leadership, and Teamwork and add to the boiling mixture. Season with Hindsight/Lessons Learned and Tact and Diplomacy. Mix well and serve generous portions daily.

Although this recipe takes a look at safety from a lighter side, the message is still clear. This "soup" is made up of several important ingredients. Without any one of them, it would not be authentic or as effective. Unlike a watery broth, this soup provides the balanced nourishment each of us needs in our daily mission accomplishment. Amazingly, this recipe serves individuals, squadrons, and wings alike. Quantities may be adjusted to suit your needs, situations, or environments, but all of the ingredients must be present.

Safety must be an ingrained part of the way we do our jobs. It must be stressed in everything we do until safety considerations become "second nature." When taken for granted or neglected, the results are all too predictable—a serious mishap with injuries and/or death.

Safety Soup Ingredients

4 pounds	Leadership	2 pounds	Teamwork
4 quarts	Prevention	2 pints	Attention to Detail
4 quarts	Precaution	3 pints	Correct Tools & Procedures
4 quarts	Training	4 ounces	Hindsight/Lessons Learned
3 pounds	Caring	3 dashes	Tact and Diplomacy
3 pints	Discipline		

This is a reprint from an earlier edition of TCE, and while the terms may have changed, the safety message has remained constant over the years; there is an increased emphasis on safe mission accomplishment and leadership involvement across the Air Force. Heather Wilson, the recently appointed Secretary of the Air Force, reinforced this in her first message to Airmen with the statement, "Because our adversaries do not rest, we will cost-effectively modernize the force and drive innovation to bring new capabilities to the service of liberty. Underpinning it all will be a commitment to our people—to the development of leaders to command the finest combat force in the world." With that tenant in mind and the guidance of senior safety leaders, we've modified the recipe to increase the serving size of leadership. In light of our current Safety Management System construct, safety culture is prominent, if not paramount, and the lead advocates for cultural change are commanders. This ties to the CSAF's current focus on revitalizing the heart of our Air Force -- Squadrons – with appropriate delegated responsibility and authority. We can't have safe organizations or processes without involved leadership, especially given increased tasking, decreased manning, and decreased budgets. All of these things call for prioritization and a balanced approach, and only commanders can accept risk for extant hazards. Overall, only minor changes to a proven recipe to highlight the importance of leadership were needed to bring the recipe for "Safety Soup" back in balance. ~ Ed.

Resiliency Hikes

BY CHAPLAIN (CAPT.) GERALD STOUT
and MSGT JESSICA GRAMLICK

Comprehensive Airman Fitness, as a program, is designed to equip Airmen with the tools necessary to stay resilient in today's fight. However, some of our Airmen long for a more personal style of mentoring and coaching. This is what the 23rd Maintenance Group (MXG) Religious Support Team (RST) learned while providing squadron focused warrior care in the largest maintenance group in the Air Force, the 23 MXG at Moody Air Force Base (AFB), Ga.

In an effort to eliminate the potential for Airmen to slip through the cracks, the 23 MXG RST, Chaplain Gerald Stout and MSgt Jessica Gramlick, are delivering a new initiative to support commanders (CCs) and their Airmen. The RST has been leading Airmen on Resiliency Hikes, full of physical challenges paired with resiliency discussions ranging from deployment expectations to spirituality, relationship issues, and stress in the workplace. However, it's not just the event that has Airmen excited: it's the time. Seeing the value and need as pre- and post- deployment care, commanders are giving their Airmen time in the duty day to hit the trail with their RST.

It started in the run up to GREEN FLAG Exercise January 2017. Ch Stout and MSgt Gramlick met with each commander in the MXG early in FY17 and performed their annual leadership needs assessment interviews. The unexpected transpired: numerous squadron CCs, including the MXG/CC, offered to provide funds for their RST to go Temporary Duty (TDY) with their Airmen.

In response to those meetings, chapel leadership reallocated time and resources to accommodate the new opportunities and resources coming from commanders. In both January and April 2017, Ch Stout and MSgt Gramlick went TDY to Nellis AFB and Davis-Monthan AFB to do morale checks at Geographically Separated Units (GSUs) attached to the 23rd MXG during two joint task force exercises. During the January TDY they inaugurated their first resiliency hike. The MXG RST has led four hikes to date, with three more planned. Two hikes were at Red Rock Canyon near Las Vegas and two in Georgia and Florida; all during the duty week.

Lt Col Bobby Buckner, 23rd Aircraft Maintenance Squadron Commander values his RST, saying, "During deployments, units can expect several major life events. Whether it's a family member dealing with an accident, surgery or experiencing medical problems, it's beneficial that they have their leadership and the base chaplains to help overcome these obstacles. The chapel team helps us provide comfort for the group and individual needs. It also helps that they are building bonds by being in the fight as they talk to our maintainers while servicing our aircraft."

SrA Felicia Anderson, 74th Aircraft Maintenance Unit crew chief who went on one of the hikes, said, "What I took from the experience looking back was having the chapel team turn stressful days of maintenance around by taking a second to step back and breathe," said SrA Anderson. "The chapel team helped make us all laugh and brought in food when workers on shift couldn't leave to eat. The last weekend there, they took us out hiking and we spoke about how even the people that can achieve the most still need to, at times, get away to get your head back on track; and that's exactly what we all did."

ACC Command Chaplain, Col Tim Butler, applauded this effort. "We need to find new and creative ways to care for our Airmen. PowerPoint presentations and boring talks about the issues we assume matter to our Airmen are not helpful. I applaud Chaplain Stout and MSgt Gramlick for their leadership. Encouraging Airmen to form small groups, based on hobbies or interests, and facilitating open conversations about the challenges they face, will pay dividends for our Airmen and their family members, contributing directly toward mission success. I also applaud their commanders for carving time out of the busy duty day to help build resilient Airmen. We do it for Physical Training. Allowing duty time for resiliency makes clear it is very important."

Since the Resiliency Hikes were inaugurated, positive feedback has rippled out. Wing leadership and other commanders at Moody AFB have asked their squadron RSTs, "Can we get our Airmen in on one of those hikes?"

Test Drive NOT REQUIRED

BY COL. ROBERT B. TRSEK

In 2009 I did two things I'd never done before, I bought a brand new car off the dealer's lot, and I did it without so much as taking it for a test drive. As a young man my parents always advised me to get a car that was about two to two and a half years old, with the logic that most of the depreciation had already been absorbed by the original owner, and any systemic problems with the car would already have manifested by the two-year point and a service record would show it. Economically and in terms of getting a mechanically sound vehicle, this is a decent strategy, and one that most young people probably still employ. Saving money, wasn't my goal however - although I was in no hurry to waste money either. In 2004 I had my first child and in 2008 a second – I was at a point in my career that I could afford a new car and in buying one I had a singular purpose, to get the safest mid-size car on the road for my family. In 2009 there were six such mid-size cars with top safety marks, from Honda, Volkswagon (2), Subaru, Audi, and Ford. At the time Hondas and Toyotas dominated the US market for their reliability, and it didn't take many clicks of the mouse before I had settled on the Honda Accord. That afternoon I drove to the nearest Honda dealership and proclaimed my intent to drive off in a shiny new Honda Accord. Naturally, the salesman was eager to show off the vehicle (and earn a commission I suspect), but I declined the drive. I knew everything I needed to know, and it was after all a car.

How different could it possibly drive from the many other mid-size cars I'd driven in my life?

"35,092 people died in motor vehicle crashes in 2015" - IIHS

Where did those "ratings" come from? Nestled in the beautiful and somewhat remote landscape of Ruckersville Virginia is the Insurance Institute for Highway Safety (IIHS), an independent, nonprofit scientific and educational organization dedicated to reducing the losses — deaths, injuries and property damage — from motor vehicle crashes. In May of 2017 I had the pleasure of visiting IIHS with the senior-most safety officers in the Air Force, and I can tell you, what we saw was nothing short of amazing. The state-of-the-art facility hosts a team of engineers and safety discipline professionals with processes praiseworthy for their objective approach to preventing losses - and it's cleaner than some of the best airplane hangars you've ever seen. On May 10th, 2017 they were testing a new 2017 Ford model, the report for which hasn't been released as of this writing, but we were able to watch the crash test in action. Within 5 minutes of the test, the crash had been made safe, the download of instrumented data was already in progress, and observers were able to come down for a personal inspection. It was clear that this was a process they do often, and they do it efficiently.

"Rollovers are rare but deadly. Vehicles rollover in 2 percent of all crashes, but these crashes account for more than a third of passenger vehicle occupant deaths." - IIHS

Looks can be deceiving. A lot of cars look alike within their class – you won't see what you need to know while standing on the showroom floor, or even looking at two similar vehicles side-by-side. Some of the starkest contrasts we saw at IIHS were cars that looked almost identical but performed at polar ends of the spectrum upon testing. Two minivans stand out in my memory, one that buckled and crumpled like a paper bag and another that properly distributed energy throughout its body, protecting the occupants. In IIHS's roof strength area they have two bright blue crossover vehicles that you'd swear are the same car. The same story was true here – in a rollover test one crumples, one doesn't. Which one is yours? Your parent's?

"Electric vehicles, hybrids, more efficient internal combustion engines and other technological advances can raise fuel efficiency without affecting occupant protection." - IIHS

Smart can be dumb. IIHS has several "smart" cars on display. You've seen them, the cute little cars with 12 inch wheels boasting outlandish gas mileage and unbeatable parallel parking ability. When tested in a crash against one another, two smart cars didn't fair too badly. However, when testing a smart car against a typical mid-size vehicle, the smart car faired much worse, earning a "poor" rating overall. In the end, vehicle safety is the result of many factors not one single thing. Mass or construction can be used as a guide, but we do know that it's virtually impossible to overcome certain disadvantages. A smart car, when compared to a typical vehicle, simply has less mass to distribute crash energy, and that is bad news for protecting survivable space in the passenger compartment. Consumers should be wary of buying small or light vehicles, both of which mean better gas mileage. Instead, keep an eye out for more efficient engines, not necessarily less vehicle mass.

"... automakers don't build cars like they used to. They build them better." - IIHS

"They" are right, they don't build them like they used to, and we should be thankful for that. Modern engineering and advances in metallurgy have provided stronger materials and better construction to distribute energy during a crash. In September 2009 IIHS conducted a crash test with a 1959 Chevrolet Bel Air and a 2009 Chevrolet Malibu in a 40 percent head-on overlap test. The results showed the fallacy of the old-school quality assertion, where the Bel Air was pummeled by its younger, better designed counterpart. This is one you need to see, it's a story that says a lot about collapsing steering wheels, metallurgy and airbags!

"A lighter vehicle will always be at a disadvantage in a collision with a heavier vehicle." - IIHS

So is bigger better? In the past, Sport Utility Vehicles (SUV) were criticized for being top-heavy and prone to rollover with resultant injuries or death. Their mass and height were great for common crashes, but rollover protection and performance were poor. This tendency has been addressed by manufacturers through engineering and electronic stability control, and today IIHS states the benefits of SUVs in general now outweigh the detractors "pound for pound". In addition to having additional mass, SUVs (and pickup trucks) also have the added benefits of greater height, which is a significant factor in side-collisions and rear-collisions with tractor trailers (what the industry refers to as "underride" collisions).

Being low and being dead. Teenagers, corvette owners, (insert demographic here) all love to have low-to-the-ground cars. It's cool. It makes it impossible to see traffic ahead of the car in front of you, but hey, it's cool. It's also asking for decapitation in an underride collision, or asking for your B-pillar to be severed in a side-impact. An underride collision with a semi is an eye-opening experience, and the lower your car is, the less likely you are to have the front of your car act as a crush zone to absorb crash energy. You become very likely to have ¼ inch of glass stand between that semi and your melon, only one of which isn't likely to be deformed beyond repair. In a side collision, the "B-pillar" is the beam that sits between your front and rear passenger doors. This beam can be the only thing between you and the hood of the car that T-bones you, and if it buckles you're going to have a bad day. The lower your car is, the less likely a side-impact will hit the lower frame of your car, and the more likely the B-pillar will be left alone to defend you and your passengers. Help the B-pillar, get more mass involved, and get a taller vehicle.

Recalls. If you don't have your vehicle registered with the manufacturer, or you aren't periodically checking online for recalls on your vehicle, you could be missing out on critical life-saving information. The National Highway Traffic Safety Administration maintains an up-to-date listing of vehicle recalls, and you can even search by your own unique Vehicle Identification Number (VIN) to take the guess-work out of particular models, features and options you may or may not have. In just the last year I was notified of recalls on two of my 2009 vehicles, both involving the airbag, so don't assume that just because your car is older that all the bugs were worked out years ago – many components are more likely to fail over time without periodic inspection & maintenance.

Toys and gadgetry. A host of technological wizardry is making its way into production cars today and their myriad capabilities are promising. Short, mid and long-range radar, ultrasonic sensors, near-range cameras, lane-sensing cameras, stereoscopic cameras, infrared and laser sensors, and adaptive headlights are all making our cars safer by sensing what is around us and helping to prevent collisions. While at IIHS we had a chance to test some of these technologies including cars that parallel park themselves and those with anti-collision features, automatically engaging your ABS brakes to stop just short of a collision. If you are in the market for a new car, or even a couple years old, be on the lookout for these features, but above all, take the time to do your research online before heading to the dealership. Find the right car, the safe car, in the comfort of your home where you can see what you really need to know, and not just what your eyes can see. Oh, and then take it for a test drive. Or not.

To see how your car stacks up or to see what safety features are making new cars even better, visit http://www.iihs.org/iihs/ratings or the National Highway Traffic Safety Administration at https://www.nhtsa.gov/ratings. For a deeper look at crash statistics including trends, age and gender, seatbelt use, and speeding, see http://www.iihs.org/iihs/topics/t/general-statistics/fatalityfacts/overview-of-fatality-facts. If you want to see live video of how your car measures up, educational videos on the physics of car crashes, or some of the new technologies making it into production vehicles, see https://www.youtube.com/user/iihs. For underride testing, see https://www.youtube.com/watch?v=XFTy0bCE66A, and for the revealing 1959 Chevrolet Bel Air vs 2009 Malibu video, see https://www.youtube.com/watch?v=C_r5UJrxcck.