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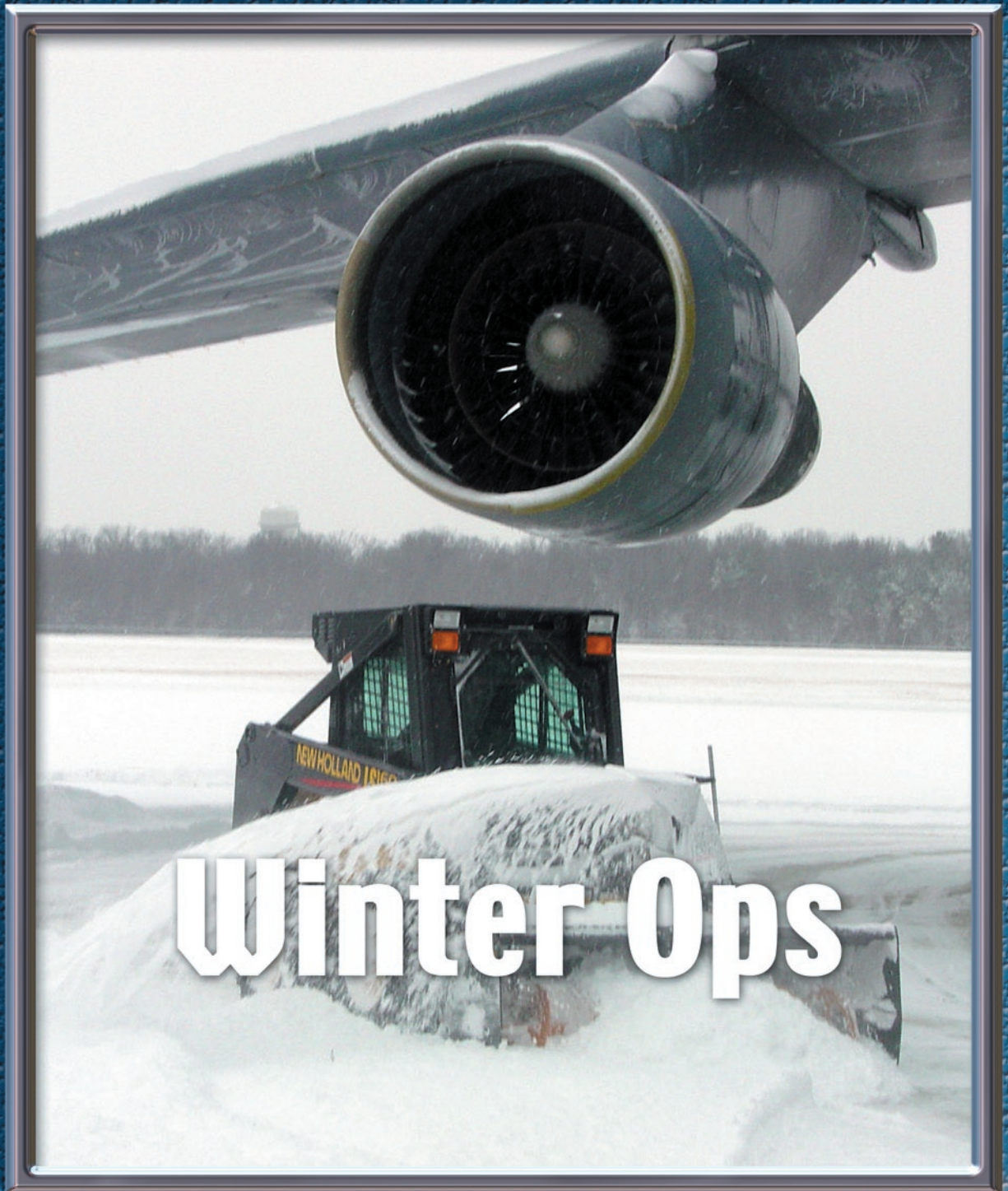

Winter Ops

FSM
FLYING SAFETY MAGAZINE

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U.S. AIR FORCE

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SAFETY SAGE

BERM STEER

Courtesy ASRS *Callback* #256, December 00
NASA's Aviation Safety Reporting System

Darkness and blowing snow obscured taxiway markings and reduced forward visibility as a B-737 left the gate. The flight crew attempted to follow the proper taxi route to the runway by taxiing parallel to a snow berm left by plows that had cleared the ramp earlier. The Captain describes what happened next:

At night, with a snow-covered ramp, we left the gate area and paralleled the ramp... Based on the airfield diagram, we believed there was a taxiway in front of us. There was a berm of snow from snow plow operations to our left. Parked DC-10 aircraft (in storage) were to our right. The snow plowed area abruptly got narrower. I attempted to correct to the left to correct (toward) the berm, however, we had left the ramp surface. What we believed was a taxiway, turned out to be a service road. [Airport] operations personnel advised that "numerous" other crews have made the same mistake, but because the ramp was not snow covered, they were able to see their error and make a U-turn back to the taxiway.

Contributing causes: (1) snow-covered ramp, darkness; (2) taxiways and service roads look the same on the airfield diagram; (3) there were no taxiway lights at the edge of the ramp; and (4) crew was accomplishing a checklist and was not devoting 100 percent attention to taxiing.

The Captain added that the aircraft was finally freed by a company recovery team that used two snow plows and large cables around the main gear struts. He acknowledged that the crew should have stopped the aircraft when they could not see the taxi lines and requested a guide vehicle.

DEPARTMENT OF THE AIR FORCE — THE CHIEF OF SAFETY, USAF

PURPOSE — ***Flying Safety*** is published monthly to promote aircraft mishap prevention. Facts, testimony, and conclusions of aircraft mishaps printed herein may not be construed as incriminating under Article 31 of the Uniform Code of Military Justice. The contents of this magazine are not directive and should not be construed as instructions, technical orders, or directives unless so stated. SUBSCRIPTIONS — For sale by the Superintendent of Documents, PO Box 371954, Pittsburgh PA 15250-7954. REPRINTS — Air Force organizations may reprint articles from *Flying Safety* without further authorization. Non-Air Force organizations must advise the Managing Editor of the intended use of the material prior to reprinting. Such action will ensure complete accuracy of material amended in light of most recent developments.

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Extreme Icing

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Peterson AFB CO

USAF Photo
Photo Illustration by Dan Harman

Crew: "Hey, we got ice buildup on the engine spinner."
Engineer: "It's designed so that is impossible with the engine running. Why were you taxiing without the engine on?"
Crew: "The engine was on, and we got the ice anyway."
Engineer: "But that's impossible! It can't happen."
Crew: "You're not listening. It just did!"

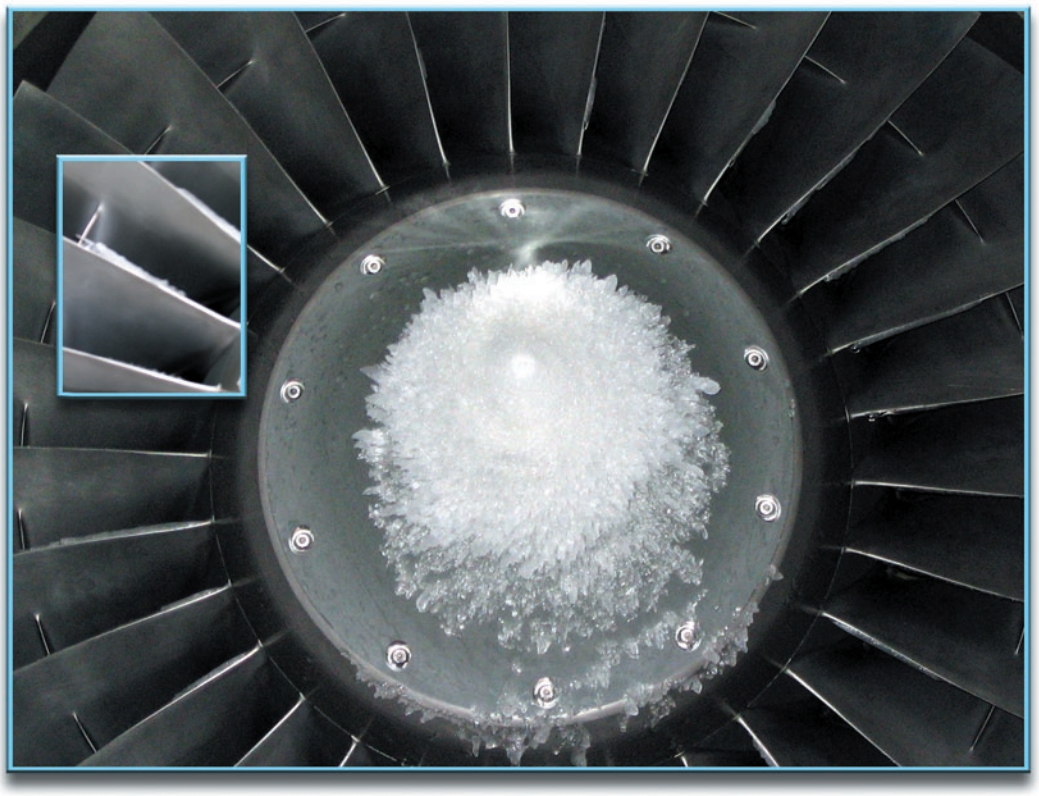
This telephone "conversation" went on, but you get the idea of how effectual it was. What kind of conditions would lead up to such extreme icing? Must have been pretty heavy freezing rain, right?

It was a typically cold Colorado morning, but instead of snow there was freezing fog that covered Peterson. It put a layer of ice down on everything, making taxi/takeoff questionable. In addition to this, RVR fluctuated between 1200 and 1800; we need 1600 here for takeoff, due to single RVR restrictions. There were two aircraft launching that morning. Both planned on pressing as long as the RVR held up, because the crews figured the worst case would be that they would taxi out and wait for it to raise enough for them to go.

About the time the second jet was ready to be towed out to start engines, the first aircraft taxied back in. They received a radio call from one of the more experienced pilots in the 200 AS (ANG C-21s) who said the last time they saw these conditions they didn't go because they had terrible induction icing on their spinners and back of their turbine blades. After inspection, the crew of the first aircraft found this to be the case and taxied back. Although it was completely legal to go, and they were following procedure, this crew still had at least an inch-thick buildup on their spinners and about half-an-inch behind each turbine blade.

For fear that an engine would shell out from ice coming off during takeoff run, the first crew aborted the mission. The second crew did the same after seeing the ice on their engines. Everything else said we were good to go, but this was a safety of flight decision they had to make, and they did so correctly.

The conditions were listed as "freezing fog." Our regs say freezing rain is severe icing and freezing drizzle is moderate icing, but it doesn't give any guidance about freezing fog. So, freezing fog must just be light icing, right? That's what we all thought, too. The only reason that plane didn't launch that day was the RVR limitation and the timely heads-up from the ANG guys.



These photos were taken long after the aircraft was parked in the hangar. The inset photo shows greater accumulation on the tubine blades before melting.

Photos Courtesy of Author

According to the textbook definition, the difference between freezing rain, drizzle, and fog is the size of the water molecules. The National Oceanographic and Atmospheric Administration and the American Meteorological Society use definitions like these:

Fog is a visible aggregate of tiny water droplets suspended in the atmosphere near the earth's surface that affects visibility. Fog differs from cloud only in that the base of fog is at the earth's surface while clouds are above the surface.

Drizzle is very small precipitation drops (diameters less than 0.5 mm) that appear to float with air currents while falling in an irregular path. Unlike fog droplets, drizzle falls to the ground.

Rain is precipitation in the form of liquid water drops more than 0.5 mm in diameter, falling in relatively straight, but not necessarily vertical, paths.

As you can see, like anything to do with weather, it all comes down to the best guess and experience of the weather voodoo magic makers as they walk out of the shop to make the observation. Some go from what they feel on their face; the more meticulous observers will use a flat piece of metal like a car hood or something similar. Even if they could measure to 0.5 mm, it shows just how little of a difference there is between the different levels of icing. On top of all this, they are just observing the weather at Base Ops; they can't measure the droplets in the clouds.

So, how do we know that what we're about to fly through will be as advertised? After talking to a few people in different weather shops, it seems that it's more important to look at the depth of the cloud cover than the reported precipitation. For instance, if freezing fog is being reported but the cloud deck is very thick, you may have more of a problem than you'd think. On the other hand, if there is freezing drizzle but a thin cloud deck, you're less likely to run into major problems.

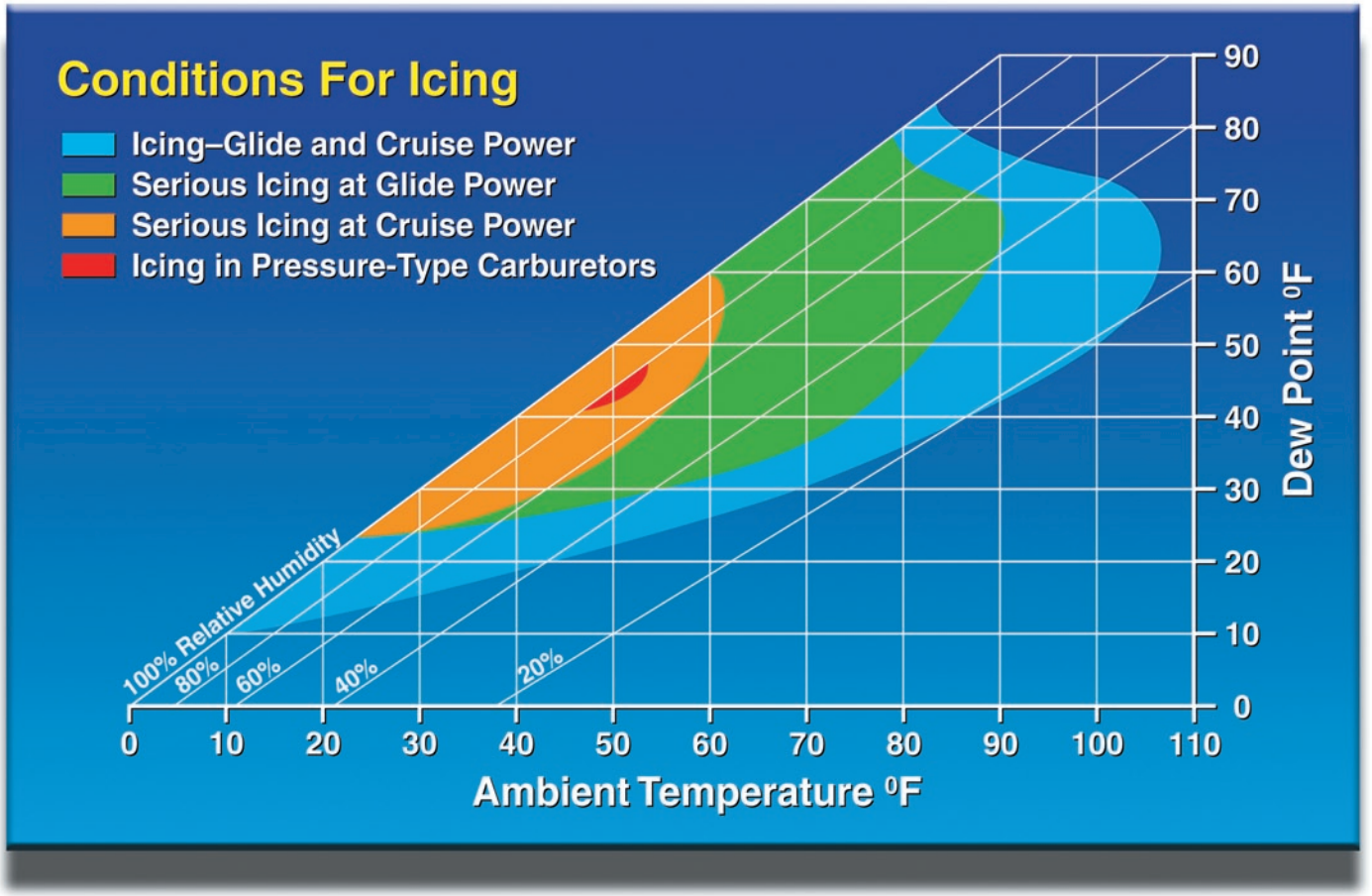
Of course, you can always try to use radar to keep you out of the worst stuff, but radar isn't perfect, even if you're talking to the Metro. I once held about 20 miles away from home, in the clear, literally watching the commercial traffic being cleared and flying into a cloud deck and landing uneventfully. Why did I do this? No, not to pad my logbook or to take in a beautiful sunset over the Rockies. It was because there was a SIGMET for severe icing over our landing airport. No problem, right? Just call Metro and get them to call the SIGMET invalid. After a few minutes of talking, we were still holding, still watching planes make the approach and reporting they weren't encountering any icing. The weather guy was using all the tools he had, but he just didn't want to give us the go-ahead. We finally got down and I went to talk to the weather guy who had helped us down. "What was the big deal? Why were you so worried?" He then showed us how buildups were

growing around the airport. He said he pretty much held his breath until he heard we landed.

I have to admit, at first I blew off his worry over the icing. About one week later, a small executive jet went down in Pueblo, about three miles short of the field. As of this writing, the accident report hasn't yet come out, but the weather was just like we had when the icing accumulated on the spinner. A look at the Terminal Area Forecast showed freezing fog at the time of the crash. Was icing a factor? I don't know, but I do know that I now take a lot more thought before stepping into any type of freezing precipitation.

We're still trying to convince the engineers that the icing happened. Maybe they'll be able to come up with a solution. But until then, what can we do to avoid this? The best way, of course, is to avoid the area altogether, but we all know that's not always possible. Before takeoff, we do the engine run-up as specified. However, it is sometimes difficult, if not impossible, to do an engine run-up while taxiing on a taxiway with an RCR of poor, or even nil. The dilemma is that the time we most need to do ice shedding procedures is the exact time we are least able to do it. Ice shedding requires engine run-ups, but skating down a taxiway doesn't sound like a whole lot of fun. There's the option of deplaning a crewmember to check the plane for icing. It's an option; I didn't say it was a practical one. It's always a good idea to have the plane de-iced, but many of the places we go don't have that available. As always, talking with weather service is important; they usually have more information available to them. They also usually have more experience in the local weather idiosyncrasies—icing in Colorado can be a whole lot different than icing in Maryland.

As everyone knows, there is no way of knowing exactly what weather we are going to experience on any sortie. We've all seen forecast severe clear become a severe thunderstorm by the time we get there. The best we can do is make sure we get all the information available and always have one (or two) backup plans for when we find ourselves in holding, watching the sunset over the Rockies, and trying to find a safe way to get back on the ground.



ORM
A WINTER SITUATION

Anonymous

USAF Photos
Photo Illustration by Dan Harman

Operational Risk Management (ORM): Is it lip service or an effective tool being utilized by today's Air Force aviators and leadership? As we briefly explore ORM and its principles, we will form an understanding of how it should play into both the leadership and aircrew decision-making process. We will then evaluate these understandings against a scenario, forming a conclusion of whether or not the crew and leadership applied proper ORM principles while executing the mission. To answer these questions, one must first have an understanding of what ORM was designed to do and the levels it was designed to work at.

Understanding ORM is more than knowing the six steps, which we will cover later in discussion; it is knowing the principles that govern all the actions associated with the decision-making process in the risk management business. There are four principles that control decision making:

(1) Accept no unnecessary risks. This tells us that, yes, there is risk in every mission we fly; however, there are different levels to those risks and the determination of acceptability of those risks need to occur for each situation.

(2) Make risk decisions at the appropriate level. Making decisions is directly related to account-

ability. If you cannot be held accountable for the success or failure of a mission, then you probably do not have the stakes to give input.

(3) Accept risk when benefits outweigh the costs. This is simple economics. If the real or perceived benefits outweigh the real or perceived costs, then the mission has a significant impact and should be executed.

(4) Integrate ORM into Air Force doctrine and planning at all levels. These levels should include the Commander, Deputy Commander and, most importantly, the aircrew. This is where the rubber meets the road and the ability to see fluid risks will always be most apparent. Now that we have a brief description of the four principles of the ORM process, let's explore the six steps that we should apply during the ORM matrix.

Operation Risk Management is comprised of six steps, which all count upon the previous steps being followed to completion. These steps are defined as follows by the pocket guide to United States Air Force (USAF) Operational Risk Management:

(1) Identify the hazards. The purpose of this step is to identify all hazards, real or perceived, that may cause mission degradation.

(2) Assess the risks, or assess the exposure, probability and severity of a loss to the above hazards.

(3) Analyze risk control measures. Investigate specific tools and strategies that can reduce, mitigate, eliminate, avoid, delay, or transfer the risks, etc.

(4) Make control decisions. After controls have been chosen to eliminate the hazards or reduce the risks, determine the leftover risk for the mission tasking. If they are acceptable, continue. If not, reevaluate or pass the decision process to a higher level.

(5) Implement risk controls. To do this, assets need to be made available for the mission, and the people in the system, (aircrew) should be informed of the risk management process and the subsequent decisions.

(6) Supervise and review is the step in which monitoring the operation occurs to ensure that the control measures remain in place and are being effective. If they are not, reevaluation would be necessary. It is also the part at which we should review after our assets are expended to control risks to answer whether the mission was really balanced against the four driving principles.

Now that we have completed an overview of both the four driving principles of ORM and the six steps in the execution of the ORM process, let's examine a scenario and evaluate how the crew and leadership measured up in applying the ORM process.

In this scenario, the mission was to fly a C-21A from Randolph AFB, TX to Scott AFB, IL to pick up a wing commander who had been selected to be on a Chief's promotion board at Air Force Personnel Center, Randolph AFB. Crew complement was a new aircraft commander with less than 500 hours in the C-21A, and a new copilot with less than 100 hours in the C-21A. It was mid-December and the crew showed on a Sunday at 0700 for a 1000 local takeoff for an out-and-back; no passenger mission line. At about one hour into the planning phase of the sortie, the flight commander showed at the office and told the crew they would need to go to Scott AFB to pick up the wing commander because all the international airports had shut down due to a severe winter storm that had covered the St. Louis area. All flights in and out of the region had been cancelled.

So, you are probably asking the same question as the crew: Why can't the squadron located at Scott AFB do the mission? After all, they are there and have more experience dealing with icy conditions. Well, the answer was they had already notified their crews and cancelled all their flights for the day due to the winter conditions, leaving only the Randolph crew available for the mission. Since there was no other option and the operations group commander insisted the mission be done, the crew and the commander began crunching away at the planning phase of this new mission. The conditions were overcast at 500 feet AGL with severe icing and heavy snow over the field at Scott AFB. The Runway Condition Rating (RCR) was being reported as four, and the taxiways braking action less than poor. All these conditions were outside of the performance and limits of the C-21A. The weather at Randolph was skies clear and a temperature of more than 50 degrees, and weather for the route of flight was not a factor.

The crew completed all mission planning tasks and briefed the commander on their intended actions. They had talked to Scott AFB Base Ops and coordinated with them to start plowing the runway and all taxiways required to reach the de-icing area and aux passenger terminal on the civilian side of the field. The crew took off with enough gas to hold for an extended period of time to catch a break in the weather at Scott AFB. The weather shop reported that they expected a 30-minute window where the icing would go from severe to moderate. The plan was to hit this window, land, quick-turn acquiring minimum gas, mission-plan for departure, load passengers and luggage, de-ice, taxi and take off, all in a 30-minute window. All this would be done with no concurrent servicing allowed in the C-21A. If it sounds like a goat-rope, it was.

The flight commander called the Operations Group Commander one last time and advised him of the conditions and risks involved. His guidance was to continue with the mission. The wing commander needed to be at Randolph AFB for a promotion board that started Monday morning. With

this guidance, the flight commander instructed the crew to continue with the mission. The crew stepped to the aircraft, did all preflight inspections and departed for Scott AFB. At cruise, the crew contacted Little Rock AFB Weather and requested an update on Scott AFB conditions. The weather was reported as overcast at 300 feet AGL and one-half mile visibility with mixed snow and sleet and severe icing. The aircrew asked them to contact Base Ops and get runway condition. The report was of an RCR of four and braking action less than poor on taxiways. The crew elected to continue overhead Scott AFB and enter holding as planned to see if the break in weather would occur.

After five minutes of holding and monitoring the Automatic Terminal Information Service (ATIS), the crew contacted the weather shop to confirm the severe icing conditions and RCR that ATIS was reporting. They then contacted Base Ops at Scott and asked for an update on the runway conditions because ATIS and weather was reporting severe conditions. Base Ops reported an RCR of six, which is the minimum for the C-21A, and icing was moderate, also falling within operating range. With the conflicting information, the crew decided they should contact the weather shop one last time. The weather shop continued to report an RCR of four and severe icing. The crew then queried Base Ops again. Base Ops told the crew to stand by. After a prolonged pause, Base Ops came back on frequency and told the crew to contact Weather. The crew switched frequency and contacted Weather. This time, the RCR was being reported as six, and the icing was now moderate.

With all the conditions within limits, the crew turned all the anti-ice systems on and prepared for the descent through the weather. The approach and landing was executed without incident with the crew breaking out of the weather at minimums and an uneventful landing on a runway with a braking action of poor, and crosswinds within one knot of wind limits. The crew followed the plow truck as a follow-me, as it plowed the way to the loading and de-icing area. On the post-flight walkaround, the aircrew noticed icing on the trailing edge of the wing and on the conical spinner of the engine, which was not supposed to be able to accumulate ice.

The wing commander arrived as the crew was rushing through the post/preflight checks, and proceeded to drive the staff car behind the jet, where it slid into a snowbank and became stuck in the critical exhaust area. In order to be able to start engines, the aircraft commander instructed the copilot to dig the car out of the snowbank with a shovel from the de-icing truck while the aircraft commander finished the mission planning. The copilot was able to get the car moved and the wing commander loaded into the jet, as the aircraft commander started engines and called for the de-icing truck. All this went as planned, and the crew was ready to depart. It had been 49 minutes since they landed. The crew checked the weather one last time and continued to depart. The takeoff was uneventful with the aircraft performing normally. On climbout at about 1500 feet and two miles from the field tower called, "Scott AFB icing severe, contact departure." The crew contacted departure and continued to Randolph AFB uneventfully to a full-stop mission complete.

Though this mission was a success in being completed with no loss of assets or life, was it a success in the realm of ORM? To answer this, let's compare the sequence of events to what we learned earlier about the ORM process and principles. In conclusion, let's review the four driving principles of the ORM process and see if we can find errors in this scenario.

1. Accept no unnecessary risk: Is the risk of a C-21A at the cost of 3.3 million dollars, two crewmembers, and the wing commander of an AMC wing, worth the risk of transporting personnel to a Chiefs promotion board?

2. Make risk decisions at the appropriate level: All members who had a stake in the failure or success of this mission were accounted for.

3. Accept risks when benefits outweigh the costs: The benefit of this mission is the wing commander arrives on time to the board, instead of showing a half-day late on Monday, at the possible loss or damage to aircraft and personnel.

4. Integrate ORM into Air Force doctrine and planning at all levels: This action was partially met; all individuals were involved and both the crew and commanders integrated most of the ORM principles.

However, knowing what we know about these principles, it is clear that one or two of these is not the driving force; it is all four that need to be evaluated and met. In this scenario, the four principles were not addressed completely and correctly. It seems apparent that the individuals involved let these driving principles fall out of their crosscheck, or were influenced by other motives. Though the six steps of ORM were applied and properly used, the driving principles were not met. "Accept no unnecessary risks" comes to my mind. The crew was at the point of the mission, in the fluid motion where all the hazards are most visible. Just because ORM was met before departure does not relieve the crew of their duty to make sure the principles are being applied through the entire mission.

If it comes to a point where you feel the risk is not worth the benefit, ask yourself, "Is the risk I am about to take worth the price of the aircraft, the lives of the passengers, or the wings on my chest?" Do not let the perceived pressure of getting the mission done be a factor that makes you part of a mishap.

USAF Photo by MSgt Shaun Withers
Photo Illustration by Dan Harman

CAPT S. JAMES "FLASH" FRICKEL
51 FW
Osan AB ROK

It was a snowy March day and I was on my first 4vX Mission Qualification Training (MQT) sortie. I was flying as Weasel 2 in a four-ship of F-16s. Weasel 1 had been thorough in his coordination brief, including deconfliction block altitudes with an emphasis on air-to-air training rules. After completing the coordination brief, he gave an in-depth instructional brief on the air-to-air gameplan execution. Due to my inexperience, he finished by reemphasizing the importance of deconfliction and safety.

Our mission went as planned. We conducted two successful engagements, and the adversaries died as all adversaries should. Our third engagement was a well-briefed scenario. The adversaries attacked in two separate groups, and Weasel 1 executed his gameplan. He split the formation into two-ship elements in preparation for the attack. Weasel 3 and 4 quickly engaged and destroyed the first group of adversaries, successfully "killing" Bandit 1 and 2 while Weasel 1 and I maneuvered to visually identify the second adversary group. We quickly approached the only surviving bandit element and ensured that we had sufficient situational awareness to come out of our deconfliction blocks. We knew Weasel 3 and 4 had just killed the first group of adversaries and we knew the position of the remaining group, so we felt safe to execute our attack.

The attack ended as planned. Weasel 1 identified the group as "Hostile" and we each killed our opposing Bandit fighter. The final engagement was over in a matter of seconds, and our Base Exchange was safe for another day.

During our recovery, a large snowstorm shut down the home field and our flight diverted to our alternate. When we finally got back to base a few days later, the flight debriefing began like any other and the first two-thirds unfolded uneventfully. But as we began reviewing the third engagement a large dark object flashed across the screen, and my instructor's surge of emotion transported us both back into the fight.

"What the hell was that?" he practically screamed. He leaned forward and squinted, as if by straining he might see the image that was no longer displayed on the monitor.

"I don't know!" I jerked my head back unconsciously and blinked in confusion. I searched everything I knew to make sense of the dark image that had just crossed my HUD tape.

The IP hit the rewind button and replayed the last

couple of seconds. In those frames I was 40° nose-high in a low-to-high vertical conversion in trail of Weasel 1 a couple of miles in front of me. For a millisecond, the clouds and sky disappeared as a dark form blacked out the camera's field of view. For a moment, both of us looked at the screen silently. The image we'd just witnessed looked like nothing I'd ever seen before. According to the tape, something had passed by the nose of my jet—something large and very, very close.

"Dude! Was that *me*?" My instructor accused, yelling directly at me.

"No! It wasn't you! I don't know *what* it was, but I'm positive it wasn't you," I replied in shock. "I was more than a mile in trail—I never got anywhere near you." I was confused and I struggled with my thoughts. I'd flown that ride. It was my windscreen that had practically blacked out. But no matter how hard I thought about it, I knew I'd seen nothing unusual, let alone something so lethally close to me.

"Then what the hell was it?" he asked again.

"I don't know," I said slowly with growing resolve as my thoughts began to gel. "I didn't see anything. That's the first time I've seen it."

Both of us gathered our thoughts and worked through the adrenaline coursing through our bodies. We calmed down as our subconscious defenses relaxed, bringing us back to the safety of the debrief and away from the fight that had apparently included a near-fatal collision. We reviewed the entire engagement over again, but didn't find any further clues to the ID of the phantom. All of our comm before and after that moment made it clear that I had not seen anything irregular during the flight. The sortie had continued and ended without incident or comment. Realizing the tape itself was not going to give up its secret, we called some "supervision" into the room. Over the next few hours, they called all of the pilots from that mission to our debrief to account for where they had been at that point in the fight…answers had to be found.

Everyone had an answer that cleared them—everyone, that was, except Bandit 2. Minutes before the flash on my tape, he had been killed and was supposed to be flowing safely back to his "regeneration" point. The fight continued without him, and as he moseyed back, I was beginning my engagement with the last adversary group. While he was taking his time and looking for *his* flight lead, he should have flowed to the regen point in accordance with the brief—90° away from the fight for 30 seconds and *then* on course—avoiding any subsequent fights. Unfortunately, that is not the path he chose and he unwittingly stumbled right back in the fight, with no one the wiser.

According to our deconfliction plan, our jets should never have crossed paths, but according to the tapes they clearly had. The briefed safety measures had been ignored, and both of us had nearly lost our lives because of it. Through basic mil sizing we figured out that the collision had been averted by less than 100 feet. But another mystery still had to be unraveled. Why had neither of us known that we had passed each other so closely? Further scrutiny revealed that we were both looking in opposite directions at the exact moment when we crossed paths. When we passed right to right, I was padlocked on No. 1 out the top of my canopy, so I never saw the fleeting image my camera captured. Amazingly, at the same instant, Bandit 2 was searching for Bandit 1 to his left and didn't see the close pass either. In an unlikely event that almost couldn't be recreated, we passed right to right at less than 100 feet and more than 1000 knots closure, without knowing it.

Realistically, what could we have done differently to prevent this near midair collision? Did we do everything we could have done? The answers lie in the basics.

1. What was our biggest hazard? In this scenario we were our own biggest threat—eight jets flying around in the same relatively tight piece of airspace. My IP was concerned about the risk and emphasized it throughout the briefing and the flight. He set a good deconfliction plan, briefed the Air-to-Air Training Rules in depth, and closely monitored it throughout the scenario.

2. Did we accurately assess our hazards in frequency, severity, and likelihood? While an Air-to-Air midair collision was one of the highest risks, I don't think we completely assessed the most likely source of the threat. Because it was my initial upgrade, I was the obvious focus for the instruction, but I wasn't the *only* inexperienced pilot in the mission. Bandit 2 was also a relatively new wingman, but he was not ID'd as a probable liability.

3. Did we plan appropriate actions to limit our risks? As previously mentioned, Weasel 1 did a good job ensuring that I was under adequate con-

continued on page 30

USAF Photo by SrA Joshua Strang

Managing The Risks Of Mother Nature In Winter

MAJ DARREN DE ROOS
962 AACS
Elmendorf AFB AK

When someone mentions Alaska, the first thing that comes to most of our minds is cold, snowy winters. If you have ever wanted a white Halloween or a frightfully cold April Fool's Day, Alaska is the place to be. What I mean is that for six months of the year, flight operations in Alaska are especially challenging. The hazards of ice, snow, low visibility, high winds, and intense cold are present (often all at the same time), and they challenge the readiness and training of the flying units stationed there. This article will examine how the professional warriors of the 3rd Wing, and specifically the 962nd Airborne Air Control Squadron (AACS), manage the risks of flying at Elmendorf AFB AK in the winter. How we apply Operational Resource Management (ORM) in this environment may even give our warm-blooded neighbors to the south some ideas to apply at their bases…even if it's for just a couple of months a year!

In all seriousness, winters in Alaska aren't all bad. The most breathtaking scenery Mother Nature has to offer is right here, along with great opportunities to participate in fun outdoor activities. On the flying side, the cold makes even airplanes like the Fat Kid (the affectionate nickname of the E-3 AWACS) perform the way a jet should. Flying there simply has some added challenges.

Ice and Snow as Hazards and Risks

Applying the principles of ORM to our winter operations is where Elmendorf makes its money, so to speak. AFI 90-901, *Operational Risk Management*, states that the first step of ORM is to identify the hazards. This is fairly easy; I did that in the first paragraph (remember ice, snow, low visibility, etc.). The next step is to analyze the risks, also pretty simple. At first, this sounds like the first step, but a risk is better defined as a hazard with a probability of happening associated. For example, an icy runway is a hazard. If it's really icy, the risk of a plane sliding off the runway is high, and that would be bad! The best way to explain how the 3rd Wing applies the rest of the steps of ORM is to provide examples.

Controlling the Icy Runway Risk

Elmendorf AFB is home to no fewer than five different airframes: F-15Cs, F-15Es, C-130s, E-3s, and C-12s. The various planes have different capabilities for taxiing, taking off, and landing on wet or icy runways. This gives airfield management folks a key role in controlling this risk.

One outstanding tool they use is coordination with Base Ops to publish a real-time website that shows the conditions of the runways and all taxiways. Operations supervisors are able to see conditions before they send crews to their aircraft. If necessary, they can call Base Ops to request the snow removal crews to improve the conditions of required taxiways for their specific type of aircraft.

Another control method is using the Supervisor of Flying (SOF) to actually drive on the taxiways and runway to make assessments. Airfield management personnel are doing the same thing, but the size of the airfield precludes them from being everywhere at once. The SOF is able to call Base Ops and again relay the request for snow removal equipment at desired places instead of the entire airfield.

The key theme here is communication. Elmendorf's airfield management, Base Ops, and SOFs work well together to reduce the risk of damaging an airplane. They do an excellent job. From a pilot's perspective, there is no better feeling in the world than to see the ice rink in front of our 325,000-pound airplane removed right before we try to taxi there. (Though seeing a Fat Kid pirouetting on a 75-foot taxiway might be cool, I'd rather not be at the controls at the time!)

Bush Ops—Information, Just a Call Away

One of the other charming things that can happen while flying in Alaska is that the weather could be excellent for takeoff, and while we're out flying our eight-hour sortie, it can change drastically. Having the ability to reach homestation via radio anywhere we fly is a tremendous advantage. We routinely call our Operations Desk, Bush Ops, for updated information on airfield status.

Most pilots are able to phone-patch the base weather shop for forecasts, and that information is important to us as well. However, Bush Ops is able to provide more detailed information on the status of the airfield. They are also able to relay our arrival time to the SOF, who then calls Base Ops. Base Ops is then able to roll snow removal equipment for the runway and taxiways.

Maintenance—Heroes of Risk Management

A huge amount of credit for the success of employing the E-3 at Elmendorf, and minimizing the risks of winter, belongs to the maintenance squadron. They are out there every morning, noon, and night making their airplanes safe for us to use. The aging E-3 doesn't respond well to being left out in the cold, so maintenance puts the jet in the hangar when able. This helps minimize wear on cold engines and electrical generators and manages the risk of parts failures and mishaps.

They also stand out in the cold at every launch to monitor safety and to provide assistance to the crew before takeoff. Their professionalism and dedication make them an invaluable player in managing the risks of winter flight operations. They truly are the best!

Open Forums—Closing the ORM Loop

The ORM cycle can't be complete unless the risk control measures are reviewed and continually improved. Again, communication is the key. Once a month, Base Ops, the Control Tower and flight deck crewmembers have an open forum to discuss current issues with the airfield and traffic patterns. This open exchange allows all involved to provide input on our procedures and make suggestions for further minimizing risks.

Conclusion

Winter in Alaska is a beautiful time, but a daunting challenge for flight operations. The key to making sure winter risks are minimized involves the whole team: crewmembers, SOFs, operations supervisors, Base Ops, Airfield Management, and maintenance. Communication is vital in applying all of the principles of ORM. Elmendorf AFB, the 3rd Wing, and the 962nd AACS are excellent examples of how to effectively manage the risks of winter in Alaska, while at the same time accomplishing its mission of providing trained warfighters and aircraft able to employ anywhere in the world.

The World's Most Expensive Snowblower

CAPT NATHAN RODRIGUEZ
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The best thing about this job is that it takes me to new and interesting places. The worst thing about this job is that it takes me to new and interesting places. Any pilot will tell you that when you fly to unfamiliar airfields, especially in other countries, your personal level of preparation and awareness goes up, or should go up. We usually prepare by looking at the weather, flight plan routing, and the available approaches before we even take off. Publications like the GP, the AP series, and the IFR Supplement also give good information to help make entry easier. However, there are local procedures and/or policies, what we refer to as "localisms," that do not usually appear in these publications, and these are usu-

Photo Courtesy of Author
Photo Illustration by Dan Harman

ally the things that cause us the most headache and can lead to mishaps. This is why increasing your personal awareness in these situations is so critical. A recent Class E event at one of the KC-135's many deployed locations is an excellent example of this.

Last winter, a crew was returning from a flight after a rather large snowstorm. The snow had been plowed, of course, leaving huge piles of snow on either side of the taxiways. The crew landed uneventfully, taxied clear of the runway, and continued via normal routing to the ramp behind the "FOLLOW ME" truck. The crew turned left into the parking area, which had a huge bank of plowed snow on the left and two parked KC-135s to the right on the way to their assigned spot. The crew had wing-walkers on both sides of the airplane to assist them with wingtip clearance, one underneath the tail of the plane on the left and one up ahead of the aircraft next to the snowbank on the right.

As the crew began the left turn, they realized that the turn was a bit wider than anticipated. This focused both pilots' attention on the right side of the aircraft. They continued taxiing while focused on the wing-walker to their right. After ensuring that they were clear of the planes on the right, they looked back to the wing-walker on the left, who was giving them the "STOP" signal. The pilot stopped the aircraft immediately and looked out to the left wing to see why. The No. 1 engine had plowed about 20 feet or so through a snowbank (see photo). The crew shut down. The engine was inspected and borescoped by maintenance to check for damage. Surprisingly, no damage had occurred.

All it took was a few seconds of unfocused attention, or more properly channelized attention (to borrow a human factors term). Obviously, the outcome of this event could have been much worse, and the crew was very fortunate. Given the vast amount of rocks and debris on this particular ramp, there was a real possibility of serious damage to the engine. This event is a great example of the "localisms" mentioned above.

The week or two prior to this event, the crew was forward-deployed to another location within the AOR. During that time, the airfield recorded a record amount of snowfall, and this was the crew's first flight back. Speaking from experience, when it snows hard at this airfield it is next to impossible for Civil Engineering (CE) and the local airport staff to keep up. There was no mention in the NOTAMs of the limited taxi clearance. The only mention made was in the Ops Notes in the Tanker Operations building. The nose wheel never left the painted centerline while taxiing, and under normal conditions, though this airfield was obviously not originally built for the KC-135, that usually guaranteed that you would have the proper clearance. The deployed Safety Office had talked to CE about pushing the snow outside the clearance zone for taxiing. Obviously, it did not get pushed back far enough. (The snow was completely removed after this incident.)

This event was just one example of the "localisms" at this field. There are many others, such as which taxiways to use at night or while under IFR conditions, which taxiways are not permissible for our use at all, the non-standard approach procedures needed to get into the field due to rather large mountains in the vicinity, and how to fly the approach while talking to approach and a translator on two different radios. Even something as simple as filing a flight plan is an interesting experience. (You have to request a translator in advance and have the translator meet you at the base of the airport control tower, where you go in and file.) None of these things is mentioned in any of the pubs or IFR supplement. It is not even mentioned in the local NOTAMs. It is part of the common knowledge that develops once you fly into this airfield a few times and become familiar with it. Obviously, when you get there the Ops staff will give you a very thorough briefing so you are not left to figure all this stuff out for yourself.

At airports all across our country and all over the world, there are little things, common knowledge to those familiar with the local area, that could create big problems for the uninitiated pilot. With today's "global reach" Air Force, we are being sent to new places every week. Each country, each city, each airport has its own local rules and ways of doing things. Violating these rules, even unknowingly, can cause problems, from a simple reprimand to a full-blown Class A mishap. So, the next time you are tasked to fly to an airfield you have never previously been to, you can plan, prepare, and brief it until someone on your crew shoves a pencil in their eye to get you to shut up, but you had better still be on the lookout for that one small thing that might turn your airplane into a very expensive snowblower.

They come by air and sea and land,

Risking their lives to take a stand,

Once again over differences in man,

No, they didn't start this all,

Yet they rose to their Nation's call,

Precious is the day they're coming home.

Dan Harman

US Army Photo by SPC Jory C. Randall
Photo Illustration by Dan Harman

USAF Photo

The Easy Thing

CAPT NATHAN RAGAN
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Sometimes, doing the right thing isn't exactly the easiest thing. That's the biggest lesson I learned on my first trip as an aircraft commander. I had just finished the last of my mission qualification training, my overseas "over-the-shoulder," and was awaiting the certification board that would make me a full-fledged aircraft commander. As I was finishing the last of my paperwork with our training office, I got the word that I would be leaving at the end of the week on a two-ship coronet to drag an F-16 unit from Alaska to Nellis AFB. In the KC-135 community, as with most other airframes, we've been stretched pretty thin since September 11th. So, while it's not standard practice for us to send a brand new AC on a coronet for their first unsupervised flight, with my unit's manning levels at the time, it also wasn't too surprising.

I walked down to our scheduling shop to find out who would make up the rest of my crew. This time, I was surprised. My crew would be myself, a brand-new copilot (also on his first mission), a new navigator (with a whole month under his belt), plus my Chief Boom and another Instructor Boom Operator (IB). I was a little nervous about the lack of experience in the pilot/navigator positions, but was glad the "powers that be" chose to send me out on the road with the squadron's two most experienced booms. Little did I know how glad I'd be later in the mission.

With a couple of days left until we had to leave, I did what any brand-new AC who'd never been to Alaska before would do… I ran around with my hair on fire trying to find out everything I could about the mission. I talked to everyone I could find who'd been there and read every document I could get my hands on. After some very, very thorough mission planning, an even more thorough mission briefing, and my certification board, my crew and I were all set to go.

The flight to Alaska was pretty uneventful, with only one minor maintenance issue (a broken radio; no problem, we've got three), so I won't bore you with the details and pick up my story from my first attempt to leave Eielson for Nevada. The two KC-135 crews from my base were joined by another tanker from another base, and the three of us were going to refuel five F-16s apiece along a reserved route. The only hitch in the plan was that there was not enough deicing equipment available to properly deice all the tankers at once, and a minor snowstorm had swept through the area the night before. Did I mention that this trip was in February?

We pressed through all the preflight briefings, including a very thorough weather brief for our fighters' divert bases, and headed out to the aircraft. To make a very long and frustrating story short, I was the last tanker to get any deicing equipment and didn't have the heat carts long enough to fully thaw out my engine nacelles. We did everything by the book, but one of my bleed-air valves got stuck in the open position (a no-go item for us). Because the fighters couldn't land at Nellis at night, we ran out of time and ended up having to slip my flight to the next day.

With only a third of the aircraft around for round two, we sped through all of the preflight planning and procedures. Again, we got an outstanding weather briefing which was much more inclusive than tanker guys normally get, but which ended up playing a major factor that day. Because we'd slipped by 24 hours, the weather systems that had been off

the coast the day before had moved over western Canada and the northwestern United States. Most of my fighters' divert bases were marginal at best. No problem, I thought. I've never had a fighter have to divert on a coronet before. If one of the guys has a problem, we can just tank them to whatever base they need to go. Based on everything I'd heard and done before, it wasn't really a bad assumption.

We got out of Eielson with no problems the second time around, climbed to our cruise altitude, and settled in for a long and routine flight. The F-16s came in for a top-off and fuel check, and everything looked great. An hour later, however, things weren't going so well. One of the Vipers couldn't make a good contact. My young instructor boom operator tried both modes of his system (automatic and manual) multiple times, to no avail. It appeared that the F-16 had a mechanical malfunction with his refueling system and couldn't get his toggles to engage, thereby preventing a contact. No contact, no gas. This wasn't something I had planned for.

We took a collective deep breath and assessed the situation. I had the IB cycle the rest of the 16s through the refueling process, and called my Chief Boom up to the cockpit along with the F-16 mission commander (who just happened to be on my plane). While the F-16 mission commander talked with his pilots, I had the Chief Boom and my IB work through our books to double-check that the problem wasn't on our end. It wasn't, and that meant big problems for my Viper buddy.

Given our preflight weather brief, and the fact that we were currently over a vast expanse of Canadian wilderness, we decided it would be best to try to get a weather update for the F-16s' divert bases. Thank goodness I had a navigator onboard, I thought. "Nav," I said, "get in touch with the nearest flight service station and figure out if these guys can get into any of their divert bases." To which he replied, "What's a flight service station, and how do I find it?" Not exactly the words you want to hear in a crowded cockpit with a developing emergency on your hands.

So there I was, in the middle of nowhere with an F-16 on my wing nearing Bingo fuel, his boss waiting on answers, a navigator who didn't know how to get the information I needed, a copilot who, while extremely sharp, just didn't have the experience to provide good input, down a radio, and quickly running out of options. All of a sudden, a quiet voice from the back of the plane, my IB, asked "What about pressure air refueling?" Duh, why didn't I think about that? It was a fairly straightforward emergency procedure that allowed us to transfer gas by creating a seal between aircraft without the toggles latching. Pressure AR was just what I needed to buy me the time I needed to get a hold of the situation. The downside was that it could potentially damage the boom.

I quickly weighed my options and decided to have all of the other F-16s top off on gas as quickly as they could, then proceed with the pressure AR. While that was going on, I had my copilot show my Nav where to find flight service stations on the chart and get permission from the center controller to go off frequency for a few minutes. The Nav, now that he knew who to talk to, did an excellent job of getting all the info we needed. The way my day was going, it didn't surprise me that all of the bases in Canada were at or below minimums. On the bright side, the Viper drivers calculated that with the extra gas they'd just gotten, the malfunctioning jet and a wingman could make it into McChord, which had better weather. Sweet! McChord wasn't far off our flightpath, so we had plenty of time to coordinate the divert.

A little while later, it was time for the inevitable moment of truth. I'm not sure which of the F-16 drivers first brought it up, but the question went something like: "You know, if you can Pressure AR this guy one more time we won't have to divert." Their reasons were pretty sound. We were already a day late getting them into Nellis, and I'm sure the prospect of losing even more training time wasn't sitting well with them. It wouldn't be too hard to cycle all of the "good" F-16s through the boom, and save the emergency procedure for last. We'd all get in to Nellis, but at what price? I queried my crew on what they thought about the situation. Pretty much everyone thought that since it was an emergency procedure, with possible resultant boom damage, we shouldn't push our luck. I think my IB summed up the situation perfectly when he stated, "Sir, the boom's already retracting slowly, and I'm not really comfortable with doing another pressure AR…but it's your call."

Needless to say, if my IB wasn't comfortable about a refueling, neither was I. We broke the news to the F-16s, coordinated their divert, and pressed on uneventfully to Nellis. Sure, we could have done the easy thing and made everyone happy. But in the end, doing the right thing, even if it ruffled a few feathers, was still the right thing. It just goes to show that these ORM and CRM things we harp about so much on the ground really can and do come into play while we're on a mission. Did I at any time during the flight actually bring either of those topics up? Not at all. But it's all of the small decisions we make as aircrew members that make all the difference. If my crewmembers didn't feel like they could speak their minds about an issue, and if we didn't weigh all of the possibilities, who knows what might have happened? Yeah, we probably would have made it back to the home drome with no major damage, but who wants to answer their commanders' questions about a mishap that could have easily been avoided? Would you?

A TOUGH WEATHER CALL

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USAF Photos
Photo Illustration by Dan Harman

At my UPT graduation, our guest speaker gave us young pilots some advice which has stuck with me to this day. He explained that as we begin our flying career, we are equipped with a full luck bucket and an empty skill bucket. Faced with an airborne challenge, we could look in either our luck bucket or our skill bucket for the answer. We couldn't always rely on our luck bucket because it was no ordinary bucket. It had a small hole in the bottom and over time would empty. Pilot training had started filling our skill bucket, but for the most part, it was still empty. Studying our books, learning from other's mistakes and taking a conservative approach were all good techniques in filling our skill bucket. The key to success was to fill your skill bucket before your luck bucket runs out. Here's one for your skill bucket.

While stationed at Dyess AFB, flying C-130s, we deployed to Germany in support of the Bosnian effort. The plan was to depart homestation for a gas-and-go at Brunswick NAS, then continue on to Iceland and remain overnight. The last leg of the trip was planned directly to Ramstein. Our crew was made up of a young AC, a senior navigator, a senior engineer from our sister squadron, two younger loadmasters and me, a senior copilot.

We were the second of six Herks flying follow-the-leader across the ocean. Neither the aircraft commander nor I had flown across the pond previously. It proved to be a valuable learning experience for both of us.

The first hop to Brunswick was uneventful because our advance team had coordinated fuel, ground transportation, and the like. We spent our time grabbing a bite to eat, rechecking the NOTAMs and getting an update on the weather. The forecast at Kevlavik, Iceland was typical for late fall. A low pressure system was parked just south of the island. It was predicted to pass over the base about an hour prior to our scheduled arrival, bringing along low ceilings and rain. The forecast temperature was 34 degrees Fahrenheit, along with expected winds of 330/30G45. The forecaster explained that the storm could either pass left or right of the base, resulting in a slight temperature change. In other words, we could expect rain or freezing precipitation at our arrival time, depending upon which side it passed. The crosswind limit for the C-130 under icy conditions is only 10 knots, while the wet crosswind limit is 25. Regardless of which runway we chose, the crosswind component would still exceed our limit if the temperature dipped below freezing.

Our planned alternate, Reykjavik, was only 15 NM from our destination and would be subject to the same weather conditions. Due to Reykjavik's runway layout, the crosswind limits would also be exceeded. In short, Reykjavik wouldn't be a suitable alternative.

Back in the plane, the crew discussed our options. We could continue the mission, as nothing in the books prevented us from going. The forecast called for above-freezing temperatures, ceilings above minimums and winds within our crosswind limits for a wet runway. Because forecasts typically predict the worst case, we shouldn't have a problem. On the other hand, if the forecast was a few degrees too optimistic, we'd be shooting a rather sporty approach and landing. We'd face excess crosswinds and blowing snow, at an unfamiliar field, at night, in a foreign country, etc.—you get the picture.

We discussed the option of proceeding to our equal time point (ETP, the point at which you must continue because there is insufficient fuel to go back), getting a WX update and making our decision at that time. The ETP was approximately three hours into the mission and the forecast would be that much more accurate. However, the front wasn't scheduled to pass Kevlavik for another few hours. Delaying the decision would decrease the risk of an incorrect forecast; however, if the forecast still proved wrong, we'd be in for our "sporty landing."

We discussed making the decision as late as possible, our point of no return. This point was four hours into the mission and would allow a diversion to Goose Bay. Beyond this point we would be committed to Kevlavik. However, this point was still prior to the frontal passage and held the same risks, should the forecast be wrong.

Additionally, if we chose to continue and subsequently diverted, we would run out of crew duty and be forced to RON wherever we landed—without an advance team at our disposal. Any such diversion would in turn delay our arrival at Ramstein and our relief of the unit currently deployed.

The AC felt responsible for making the mission happen. Leadership was pushing for a successful "organic" deployment in order to demonstrate our squadron's capabilities. An organic deployment is one which doesn't require supplemental airlift. We were bringing all of our equipment ourselves. Deploying as a self-sufficient package was quite a challenge, and leadership had been working on this for quite some time. The AC had been entrusted with a plane, the crew and the duty to carry out this mission.

Adding to the pressure, the first plane took off as scheduled.

If ever in my career I'd seen the responsibility of command, this was it. The AC faced a dilemma without a clear-cut solution. He could legally decide to continue and risk diversion, delay or worse. If he decided otherwise, he would be going against the precedent set by the first aircraft, have to face leadership and explain why he was stopping the train. As a young aircraft commander, he didn't have the benefit of credibility on his side. He had yet to prove himself.

But prove himself he did.

He went back to the terminal and called the DO. He was planning on having his backside handed to him because the organic idea was the DO's brainchild. Our plan was to RON at Brunswick and then continue on to Ramstein the next day. The weather was forecast to improve at Iceland; we'd arrive during daylight and much earlier in our crewday. Our new arrival time at Ramstein would be within a few hours of our original schedule. Our plan contained substantially less risk and yet allowed a prompt switchover of the Alpha Squadron at Ramstein.

To the aircraft commander's surprise, the DO supported his decision. But the reason wasn't because of our great plan. Rather, the DO recognized that this AC had made the tough call and he supported him. The DO was more concerned with the AC's thought process rather than minimal mission impact of a short delay.

As it turned out, none of the other aircraft following us departed that night. The lead aircraft landed at Iceland with snow blowing horizontally. They learned a different lesson that day. I guess their luck bucket wasn't empty yet.

Sometimes It

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There comes a time in all of our careers as Air Force pilots when we will be the experienced or "senior" crewmember on the crew. It's inevitable. In the Air Force, the nature of our business is, in most cases, to move along every three years. I can remember one particular instance where I looked around the cockpit and I was the crusty, old captain (with a year-and-a-half as a captain) and the Instructor Pilot. I was surrounded by a crew of lieutenants and a master sergeant on his first flying assignment. This was a good crew, and these guys were very sharp, but in the course of this flight I would be calling upon all of my experience and skills in the name of getting the mission done.

Our mission was to deploy with a jet "over the pond" to a wonderful location in the Saudi desert that we had come to know as our home away from home. The best part of the mission was ferrying a jet to and from the sandbox, because this required a stop in jolly old England for crew rest. As things go, this was one of the better missions to have in our world of orbiting for mind-numbing hours at 30,000 feet only to return to the airfield from which we had taken off. This mission was going to be the straight-line flying that we rarely get to do, and there was always something to look forward to in the U.K.

The crew did an excellent job with the mission planning, and they performed well during the crew certification. The wing commander had received the certification briefing, as he had just taken command, and this allowed him some insight into his people and the global mission. My role was as Aircraft Commander, but also as the instructor to ensure that the crew learned the lessons of the dynamic mission of deploying overseas with a jet. This was going to be great.

The first leg was from Tinker AFB to Mildenhall AB, UK, with air refueling over Boston. The weather looked great for takeoff and arrival, but there was a mean system pushing up the East Coast with forecast light to moderate turbulence at all altitudes. Standard. As forecasted, the flight was smooth until we entered the weather system, and then we experienced continuous light chop until the Air Refueling Initial Point (ARIP). Mr. Murphy was flying with us, and he decided it was time for the moderate turbulence. Did I mention it was at night? We were completely in the soup, with visibility of about 3/4 of a mile.

The rendezvous with the KC-135 looked perfect on the radar, and we were one mile in trail, 1000 feet low. The problem was that we could not get a

Is You

USAF Photo by MSgt Val Gempis

visual with the tanker, and the occasional moderate bumps were just adding to the fun. We needed 35,000 pounds of gas from the tanker to make our destination, or else we needed to land short to get fuel. We remained in trail for 20 minutes and talked to the tanker, who was talking with Center to see if there was any VMC to be found in the area. We started working on plans B and C, as we rode the turbulence in one mile radar trail of our JP-8. The weather system affected our missed A/R alternates, and all had weather at or below minimums for an approach. This makes for a fun turn for the Flight Engineer slogging around in the ice and snow. Potential for problems departing always exist as well. How about Plan A?

The tanker took us to the end of the track, and said he had to turn back towards home if we still needed to take the full 35,000 pounds, or else he was facing the same weather issues we had for our alternates. We decided to turn and follow the tanker, and he found some better flight conditions—that is, we finally could see him at one mile. Murphy was still bumping us around, but we had the vis to go get the gas. Game On.

My crew of crusty lieutenants was looking at me like they weren't sure what we were going to do. The answer was obvious to me: Get the gas, go to Mildenhall. Questions? Yes, the weather sucked; yes, it was bumpy, but it was within the limits by the regulations, so let's do our job. This took a few precious minutes of limited visibility to talk this through, and make sure they were all with me. CRM. They had never seen conditions like this, and they did not understand that Plan A was still an option. We had plenty of gas to divert if we couldn't get the gas, but we wouldn't make the crew duty day to reach the destination if we had to stop and get gas, etc., etc.

Adding to the drama, we were told there were some crewdogs puking in the back. They were earning that leather jacket. After a quick ORM rundown, the flight crew was behind me 95%. I told them I was confident that we were safe to give the AR a few tries, and to make sure that I did not do anything that they thought was *dumb, dangerous, or different.* It's funny how this stuff comes back, even years after your first T-37 solo.

The turbulence continued and I told the tanker my plan to try a few contacts, and that we would knock it off if the ride got to be too wild. The tanker said, "Roger, hurry up. We need to get home ASAP."

The refueling took multiple contacts, and all of my skills acquired in five years of air refueling, but we got it. The crew was unusually quiet during the AR, and tensions in the cockpit were high. But through strong CRM we got the mission done. The crewdog from the mission crew who was sitting in the observer's seat behind me will probably never ask to sit up front during AR again, but I feel he got to see us at our best.

Sometimes it is you who will have the skill or experience to make the mission a success. The lesson is to rely on your training and use the tools that you have learned from experience or from the people you have flown with. Hangar flying serves as another valuable tool for seasoning aircrews, as you can learn a lot from how your buddy either screwed up or saved the day. We knew we were dealt a tough hand, and it was more than my crew had experienced. Luckily, my experience allowed us to complete the mission, and through CRM I was able to ensure that they were there to back me up. This is not a story of an IP leaving his crew behind, but rather it is a case of CRM training working and enabling the mission.

The lieutenants should have the same story I have told here, and I am sure that they were with me, based on the conversation later the next day at the pub. I reinforced to them that if they had doubted me, or my plan, then they should have spoken up and worked toward another solution.

The lesson is not only to trust experience, but more importantly, don't let some crusty IP kill you just because he has more experience.

LOW-LEVEL WIND SHEAR

CAPT WILLIAM HART
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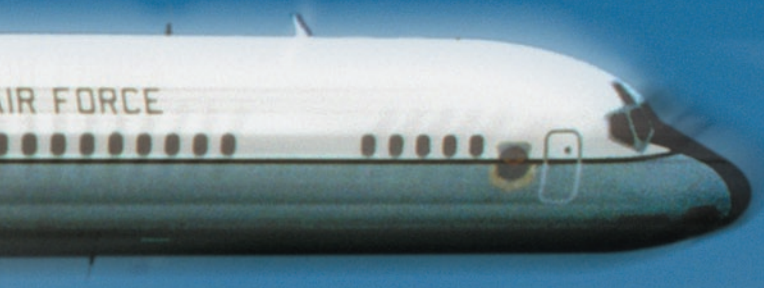
It was just another routine European medical mission in the C-9. My copilot and I were on our last day of a two-day mission from Rota NAS, Spain to Sigonella NAS, Italy. We were carrying about 22 patients, one on a litter, and eight crewmembers. This medical mission was one of our squadron's weekly runs moving patients to and from Italy. Flying to Sigonella was almost a daily flight in the C-9. This "Sig" run was just another routine flight…boring.

After flying across the Med uneventfully for two hours, we picked up the ATIS for Sigonella calling for clear skies, slight gusty crosswinds and a temperature of 43 Celsius. Winds didn't seem that unusual for this location, and temperature was a little warmer than normal, but nothing to be concerned about. It was "clear and a million." I was flying left seat and planned to fly the TACAN to 10R.

As we started descending through FL100, I noticed we were experiencing light, if not moderate, turbulence. The hilly terrain of Sicily and the hot temperature were creating thermals, thus the turbulence. Descending from altitude to IAF, we completed all the necessary checklists. We took vectors to final, and ATC cleared us for the approach about 15 miles out. Passing 1000 feet and starting on the non-precision approach, the turbulence increased slightly, but was still in the moderate range. We picked up the airfield and continued on the TACAN for 10R. Everything looked good. This non-precision approach was proceeding quite normally, just a bit bumpy for all on board. I'm sure the person on the litter in the back was having a good ride. As we passed 500 feet, the turbulence really started to pick up. The airplane was still fully controllable, but was taking increased effort. I asked the copilot to get a wind check, and tower called 10 gust 20 knots with a slight crosswind, the same as ATIS. For every foot we descended, the turbulence increased precipitously. Passing 500 feet, we were being tossed around like dice on a craps table. The runway was clearly in view, and we were just under a two-mile final at this point. The turbulence was a little disconcerting, but not a reason to discontinue the approach by any means.



USAF Photo
Photo Illustration by Dan Harman

We've all flown approaches in bumpy air; plus, there was no weather, not a cloud in sight.

"Runway in sight, gear, flaps, cleared to land." All was looking good as we passed 400 feet. I was actually starting to dismiss all the turbulence and began thinking about the landing. I figured it wasn't going to be one of my prettiest landings with so much turbulence, but I was certainly going to try my best. As I was picking up the aim point, all of a sudden the boring "Sig" run became interesting. Just passing around 200 feet, the airplane did an uncommanded roll to the left, the airspeed increased 30 knots, and we ballooned 150 feet. We had just flown through a low-level wind shear! All the classic conditions of an increasing performance wind shear and at 200 feet...not good. What had been a normal TACAN, to a familiar field, in clear skies was now going to be a go-around for wind shear.

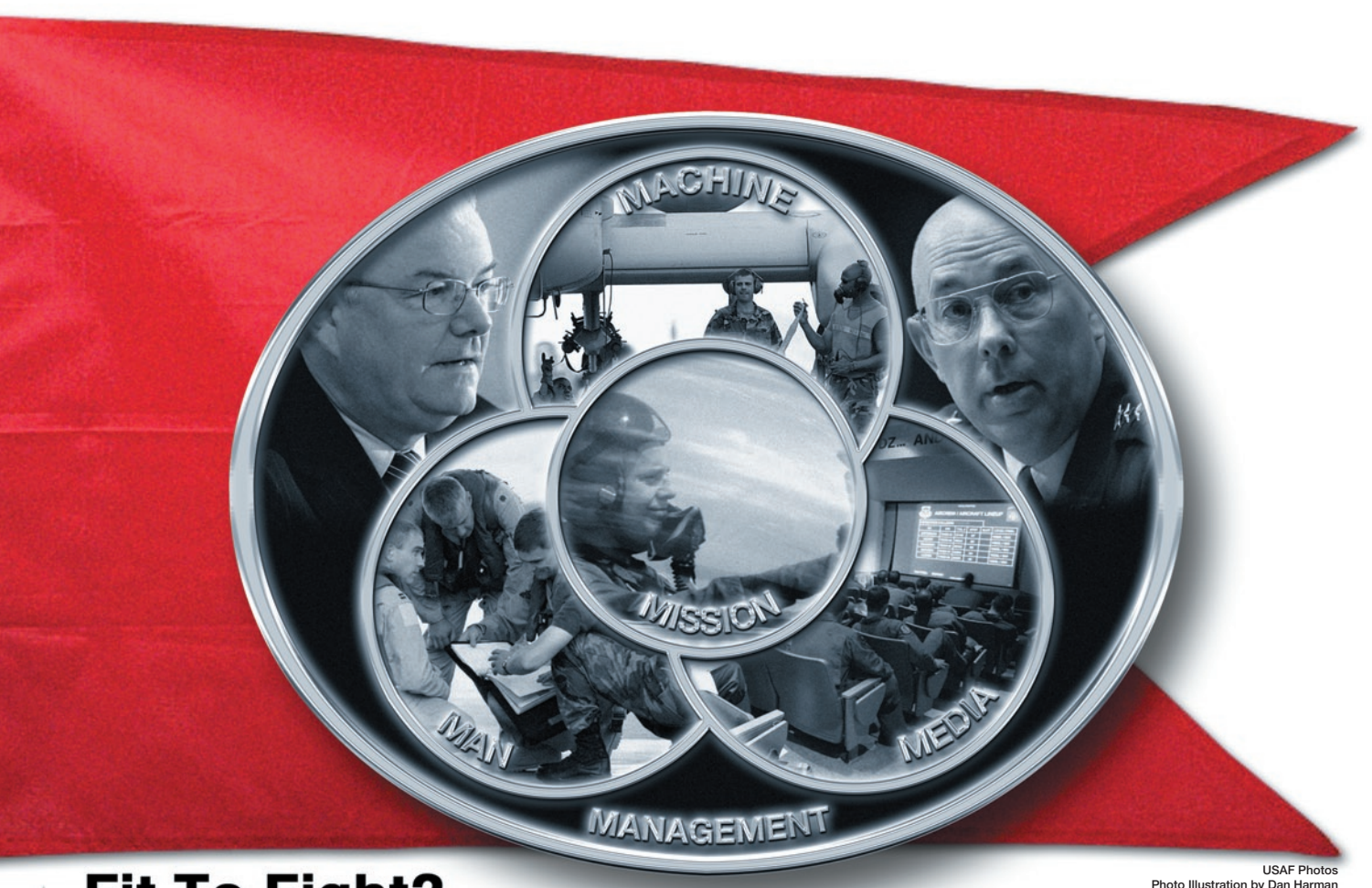
I initiated the C-9 go-around and we broke through the dangerous condition, climbing back up to 2000 feet. The copilot informed tower of the wind shear event we had just experienced on short final. We took vectors out to the IAF. The climbout was extremely turbulent. As we were on downwind to the field, even our EGPWS started yelling, "Wind shear, wind shear!" We just looked at each other. We were now at a safe altitude, so it was not a factor. The EGPWS never picked up the wind shear condition on final. We decided to go out for long vectors to final and try the approach again, giving it some time for the wind shear to dissipate or move away.

After waiting a while and discussing what had just happened, we decided to commence another approach to 10R, keeping possible wind shear conditions in mind, of course. The approach was bumpy again, but not like the first time. We experienced slight airspeed deviations, but just a few knots. The aircraft didn't have any uncommanded wing rolls or rapid altitude gains or losses; it was just bumpy. I had the copilot carefully and constantly scanning the instruments for any sign of trouble. We never saw the same conditions on short final again, so I was able to make a safe landing.

As we were taxiing in, the copilot informed ground control of our little episode so they could inform future pilots of the dangerous condition. As we neared parking, we heard a C-130 make their gear down call, then about 30 seconds later we heard, "Going around for wind shear." I heard tower inform the crew of possible wind shear activity on final, but the severity of it might not have been emphasized. When I went into base ops I personally gave a detailed description, with location and severity of the low-level wind shear.

Wow, my first real severe wind shear experience that could probably be classified as a micro-burst! Looking back at the entire situation from hearing ATIS to going around, I realized there were definite clues to the impending situation. First, the unusual hot temperature for Sigonella was a factor. Extremely hot conditions usually create thermals at low levels, causing small areas of wind shear. Second, the increasing turbulence as we got lower was a definite indication. There was a direct correlation between altitude and degree of turbulence. We should have known to expect dangerous wind shear conditions as we proceeded down the final approach course. We could also see small dust storms around the airfield as we approached. As I look back now, I can see how all of these conditions made it ripe for wind shear.

We are all trained to be ready to go around at any time on final approach. But when the weather is absolutely clear and sunny, we'd rather think about making a sweet landing instead of going around. Anything can change that perfect approach into a go-around. And I remember an old sim instructor from my previous MDS saying at one time, "If you don't think you can get a wind shear in clear skies…you're wrong!"



USAF Photos
Photo Illustration by Dan Harman

Fit To Fight? Using ORM To Evaluate Red Flag Readiness

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During the first night of RED FLAG 04-2, a two-ship of NATO F-16s and an EA-6B Prowler entered Nellis recovery airspace without clearance from approach control. Nellis Control, saturated with other recovering aircraft, directed the F-16s to turn north into the path of the southbound Prowler, who was not yet radar identified. The lead F-16 passed less than 200 feet above the EA-6B. Two years earlier, the lead of a two-ship of F-16s passed within 400 feet of a civilian Cessna 320 after the flight lead misapplied local procedures and violated Las Vegas Class B airspace.

These events are a sample of several near mid-air collisions involving RED FLAG participants within the past two years. What is most troubling about these incidents is that they take place during the administrative portion of the mission. Heavy emphasis is placed on safety during the tactical portion of the sortie, but the majority of the safety events occur during recovery. The Hazardous Air Traffic Reports (HATRs) filed in the above examples noted lack of crew knowledge of local procedures and exercise special instructions (SPINS) as the root cause. In truth, the root causes lie deeper and can be traced to the crew preparation in the months leading up to their Nellis deployment.

The RED FLAG exercise environment represents the world's most realistic large force employment scenario. The training gained from participation is unrivaled, but is not without risk. In order to mitigate the risk, apply Operational Risk Management (ORM) well before the exercise begins to maximize safety and mission success. The Flight Safety Officer (FSO) is a critical asset to the commander in analyzing the readiness of the squadron during the months leading up to FAM DAY. How can an FSO use ORM to determine if their squadron is fully fit to fight? There are a variety of tools available to aid in risk control (AFPAM 90-902). The 5M Model (Fig 1) analyzes the **Management of Media, Machine and Man** to maximize **Mission** accomplishment without unnecessary risk.

Management is the key to success of any squadron safety program and employs the cooperative efforts of the commander, weapons officer, and FSO. The commander makes the ultimate deci-

sion on squadron readiness. The efforts of the FSO make this decision an easy one. Critically analyze the Media, Machine, and Man portion of the model in order to identify risks and formulate steps to mitigate them.

Media reflects the expected operating environment. A detailed analysis of RED FLAG Media ensures that everyone in the squadron has the big picture of what to expect and how to prepare. The FSOs and weapons officers must develop a training plan. This plan incorporates a comprehensive review of exercise SPINS and local area procedures in the months leading up to the deployment. Squadron standards, in-flight guides, and local area maps should all be published for everyone to review well before arrival at Nellis. Comprehensive academics and testing are the two best ways to ground the squadron in the basics. The commander and operations officer also allocate time for a flight spin-up for the squadron. This spin-up includes an update of required training currencies and employment of the attacks and tactics expected. A review of exercise participants will identify potential hazards associated with integrating diverse assets and working with NATO partners.

The look of RED FLAG changes every period and squadrons need to adapt to this changing environment. New elements and scenarios are tailored to the requests of participants and the deployed forces commander. Combat Search and Rescue and Time Sensitive Targeting are just two examples of diverse missions being integrated into the RED FLAG scenario. In addition to analyzing the Media, the FSO is also an excellent conduit between maintenance and the operators in identifying risks associated with the Machine.

The **Machine** portion of the 5M model drives focus on aircraft preparation. Talk with maintenance about expected configurations, ordnance and exercise vulnerability periods. Tailor deployment configuration to reduce reconfiguration time once aircraft land at Nellis. Adjust sortie generation and manning if maintenance cannot support the current tactical plan. Once RED FLAG starts, the FSO helps the commander better sense demands placed on the maintenance personnel. This leads to the analysis of the final portion of the model, Man.

Man includes the experience and proficiency level of all squadron personnel. Evaluate these elements to establish overall squadron fitness. It is important that everyone understands current exercise objectives and that both operators and maintainers prepare to handle them. A sound training plan accomplishes required upgrades and ensures that people are well prepared for the task at hand. RED FLAG is not the time to accomplish upgrades! The exercise affords an awesome training environment and upgrades tend to overflow an already full plate. The FSO provides a good perspective when these issues come up and helps prevent doing too much with too little experience.

The use of the 5M model is an example of how FSOs can maximize the success of their squadron at RED FLAG. Commanders must ensure that their squadrons are ready. Each participant must be grounded in the basics before the Sunday in-briefs. If not, they are taking unnecessary risks before the war even starts. This is a reason the FSO works directly for the commander. It is important to realize what a critical role risk management plays in mission success. The precedent set by someone arriving at Nellis who is not fit to fight jeopardizes the valuable training that RED FLAG affords.

RED FLAG ORM CHECKLIST

This is not an all-inclusive checklist, but gives FSOs a starting point to evaluate squadron readiness.

—MANAGEMENT

- Establish exercise objectives
- Evaluate squadron readiness
- Appoint an experienced project officer

—MEDIA

- Establish a solid training plan
- Dedicate scheduled aircraft solely for RED FLAG spin-up
- Culminate in a base LFE prior to deployment
- Print copies of Nellis IFG and local area maps for everyone (NLT one month prior)
- Highlight common visual references on maps
- Conduct squadron academics on Nellis procedures and SPINS
- Type and number of aircraft participating
- Missions to expect
- Nations involved
- Vulnerability periods and mission commander responsibilities
- Test squadron aircrew knowledge of Nellis procedures and SPINS
- Foot stomp mishaps associated with RED FLAG (HATRs on recovery)

—MACHINE

- Inform maintenance of planned deployment configuration
- Determine the best exercise configuration
- Determine sortie generation schedule and number of aircraft to deploy
- Planned ordnance (live drops involved relocating aircraft)

—MAN

- Establish upgrade priorities
- Mission commanders need comprehensive academics
- Training currencies (Night, LOWAT, AAR)

Ready Or Not

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USAF Photo
Photo Illustration by Dan Harman

Looking back, our crew probably shouldn't have been surprised when, among other serious malfunctions, the No. 4 engine on our KC-135A caught fire in flight. After all, our crew bus had overheated on the way from our hotel to our TDY base in Alaska that morning. Then, in a particularly fitting end to our day, a forklift downloading our jet after our arrival at Plattsburgh AFB actually caught fire! Unless one is a particularly superstitious person, though (which I am not), the engine fire was simply one in a series of incredible events on quite a memorable day.

Our crew was returning home after spending the night at Eilson AFB. We had about 35 duty and space-available passengers on board—among them our squadron commander and his family. Immediately after engine start, we noted a slight vibration in the No. 4 throttle which was not excessive, so we pressed on. Taxi and takeoff were uneventful and we leveled off and settled back for the cruise home. We completed our engine data sheet, a standard requirement in which we logged such in-flight parameters as engine instrument readings so that maintenance at Plattsburgh could track the health of the engines by computer. During completion of the data sheet, we were also required to assign a number value to the vibration in each throttle. We paid particular attention to No. 4 and, again, it was nothing out of the ordinary.

Later during the flight, we noticed that we were

rapidly losing hydraulic fluid from our right system. The KC-135 has left and right hydraulic systems which are isolated from one another but can be connected through the use of a crossover valve, allowing the crew to recover the use of certain critical aircraft systems on the malfunctioning side. This is an action a crew would take only if they knew for certain where a leak was located and that they would be able to stop the leak, for example by de-powering a certain aircraft system.

In our case, we didn't know the source of the leak. Had the vibration in throttle four been an indication of impending failure of that engine-driven hydraulic pump? We thought so, but it was still only a guess. Crossing over, therefore, would most likely have allowed the fluid in the left system to simply flow from the leak source on the right side, leaving us with no hydraulics at all. We had to settle with what systems we were (and were not) left with, and the one we'd probably miss the most would be the rudder boost.

We ran the appropriate checklists and started lining up our ducks for arrival at Plattsburgh. Darkness had settled in over the great northeast as we set up an orbit near the base. We were in the middle of completing our to-do list for landing when the No. 4 engine fire light illuminated. We shut the engine down as soon as we picked our jaws up off the floor and prepared for a three-engine, rudder power-off night approach. Most likely, the cause of the fire was that the No. 4 engine-driven hydraulic pump had finally eaten itself up, regardless of the fact that we had operated it as per the loss of hydraulics checklist. Of course, good old Murphy had made sure that we'd lost an outboard engine—the least desirable configuration for a no-rudder boost approach.

We decided to dump fuel so as not to make our remaining three ancient, water burning J-57s work any harder than required. When we came to the appropriate step in the dump checklist I dutifully flipped the dump switch, but all I got for my trouble was a huge thump heard and felt throughout the entire jet. Our stares of, "Now what the heck was *that*?!" were replaced with "You *gotta* be joking!" when the boom operator promptly reported that the boom had telescoped out completely but that we weren't pumping out any gas. Apparently the poppet valve had failed to open due to the loss of right system pressure. The fuel pressure against the valve had consequently caused the boom to telescope to its limit, and that, to no surprise, was where it was going to stay since we had no pressure to retract it.

So there we were, as the saying goes, preparing to fly a night three-engine (outboard engine out) rudder power-off approach with 18 feet of boom extended full of fuel. It would have been nice at that point to be able to push the "motion off" button and step out. As unbelievable as it all seemed, though, all this was really happening. Besides, my aircraft commander flew a beautiful approach to a great landing and, well, you've already heard the part about the forklift.

What important lessons learned, then, do I feel I can pass along as a result of my mishap? To be honest…none, really. Put it in the context of what lessons I feel I can help to be *re*-learned, though, and it's a different story. One thing I learned having recently attended the Flight Safety Officer (FSO) Course is that, over the years, we really haven't devised new and different ways to crash airplanes. Aviators unfortunately are a group that is all too often condemned to repeat history because they haven't learned from it.

Always be aware of the fact that multiple systems emergencies can occur, whether as a predictable result of one another or not. Your airmanship and systems knowledge then comes into play as to how you integrate the appropriate checklists—some of which may seem to be in conflict with others.

Simulators—use them! I'm first to admit that I'm less than enthusiastic about the 0600 sim period or the box time that ends at midnight. However, with today's obvious technological advantages, there is almost nothing that a crew can't practice in a simulator before seeing it in the jet. I recently had to shut down an engine in flight in the KC-10, and since we practice engine failures from start to finish in the sim all the time, my actual IFE was practically a non-issue.

Though no one on our crew had yet heard of the CRM concept, excellent CRM was exactly what we used that night. The leadership of our aircraft commander, combined with the individual personalities of each crewmember, made information flow and decision-making processes much easier than they could have been. Lip service to and implementation of CRM are two different things entirely. Some of the anti-CRM "dinosaurs" who are still manning our aircraft today are simply accidents waiting to happen—especially if they were to experience multiple emergencies.

Be enthusiastic in your willingness to relay to other squadron members IFE experiences you have had along with the lessons you learned. The information you pass along could someday be a key factor in the safe recovery of a damaged airplane.

In the end, there were obviously more pluses than minuses that came out of our adventure. Besides, my crew got to attend the 8th Air Force annual reunion the next year, where we received an award. Over that weekend, I had the honor of talking to many men who'd sweated out a trip back home after losing multiple engines and various other important parts of their airplanes at a target over occupied Europe. We've all seen pictures of such damage. Now, that's what I call *real* IFEs.

continued from page 11

USAF Photo by MSgt Shaun Withers

trol; however, Bandit 2 was left to his own devices and wisdom. He clearly needed focused time spent with him establishing his responsibilities and working through "what if" types of situations.

4. Did we implement our safety measures? No; Bandit 2 blew them off. They only work if everyone plays by the rules.

5. Did we adequately debrief to find our problems? Our assessments were a strong point in the mission. Due to our delayed debrief, this could have easily been missed, had lead been lazy about it. Instead, he methodically analyzed the mission piece by piece and drew appropriate lessons from each stage, as if the ride had just ended. When the situation became aggravated, he stopped and brought additional expertise to make sure the correct actions were taken. This expertise ranged from our Weapons Officer to the Ops Officer and eventually, even the Commander. They all made valuable and additional contributions to our analysis of the situation.

6. Finally, what would we do differently next time? Now that we had survived this situation, this is probably the most important step that we had to take. There were many lessons drawn from this situation, and many more you can draw on your own. These were three of the major lessons we took out of the situation.

Lesson 1: Squadron supervision took it upon itself to closely monitor the situations it put inexperienced wingmen in.

Lesson 2: It was also a sobering lesson for many of the instructors, flight leads, and wingmen to never get complacent with what they were doing, even when they were "only" Red Air. It emphasized the fact that even "non-mission" sorties, such as Red Air, need to be thoroughly briefed.

Lesson 3: Finally, when it comes down to the bottom line, *when all else fails, clear your own flight path.* It's your life (and/or maybe your buddy's) on the line.

If any of us had been clearing our flight path more aggressively, versus making assumptions about adversary positions, then this story wouldn't exist. Check Six!

FY06 Flight Mishaps
(Oct - Dec 05)

5 Class A Mishap
0 Fatalities
0 Aircraft Destroyed

FY05 Flight Mishaps
(Oct - Dec 04)

7 Class A Mishaps
1 Fatality
1 Aircraft Destroyed

09 Oct		An F-16C departed the runway on landing rollout; pilot egressed safely.
20 Oct	✶	An F-22A ingested an NLG safing pin into the #2 engine; no intent for flight.
21 Oct	✶	An MQ-9L landed short of runway; gear collapsed.
24 Oct	✶	An Aerostat was destroyed during a hurricane.
28 Oct		An F-16C departed the runway on landing rollout; pilot egressed safely.
02 Nov		A C-5A had a #2 MLG bogie fire after landing.
28 Nov		An F-16C departed the runway on landing rollout; pilot egressed safely.
06 Dec		An A-10A had a landing gear collapse on takeoff.

- A Class A mishap is defined as one where there is loss of life, injury resulting in permanent total disability, destruction of an AF aircraft, and/or property damage/loss exceeding $1 million.
- These Class A mishap descriptions have been sanitized to protect privilege.
- Unless otherwise stated, all crewmembers successfully ejected/egressed from their aircraft.
- Reflects only USAF military fatalities.
- "✈" Denotes a destroyed aircraft.
- "✶" Denotes a Class A mishap that is of the "non-rate producer" variety. Per AFI 91-204 criteria, only those mishaps categorized as "Flight Mishaps" are used in determining overall Flight Mishap Rates. Non-rate producers include the Class A "Flight-Related," "Flight-Unmanned Vehicle," and "Ground" mishaps that are shown here for information purposes.
- Flight and ground safety statistics are updated frequently and may be viewed at the following web address: http://afsafety.af.mil/AFSC/RDBMS/Flight/stats/statspage.html.
- **Current as of 13 Dec 05**.

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