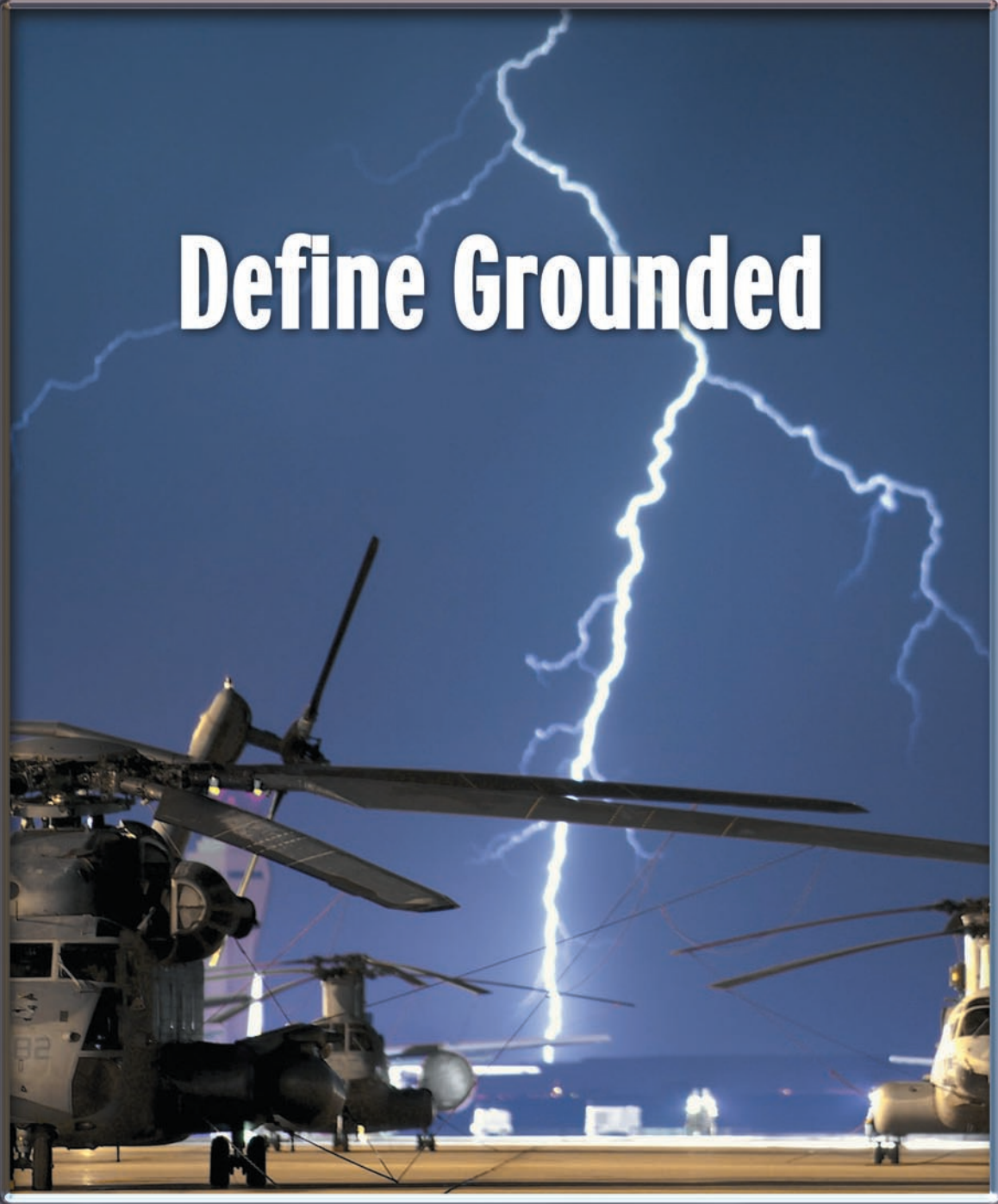
UNITED STATES AIR FORCE
FSM
MAY 2005
FLYING SAFETY MAGAZINE

# Define Grounded



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SAFETY SAGE

## SEVERE WEATHER AND MISHAPS

This month's lead article, "Techniques to Avoid Thunderstorms," by Lt Col Scott Blum of the Advanced Instrument School at Randolph AFB, introduces some "There I Was" stories about encounters with severe weather. You'll find fog, lightning, rain, even typhoons in these pages.

These experiences with weather may be isolated, but they can also be very expensive. As this issue was being prepared, a lightning strike to the radome of a B-52H caused an electronics fire that pushed the damage costs into the Class A range (over $1 million).

So, what can we say? "Hey—let's be careful out there."





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

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# Techniques To Avoid Thunderstorms

**LT COL SCOTT BLUM**
**12 OG/AIS**
**Randolph AFB TX**

USAF Photo by Edward Aspera Jr.

In June 1999, an MD-82 en route from Dallas to Little Rock flew through a thunderstorm and crashed on landing, killing 11 people. This aircraft was equipped with modern weather avoidance radar equipment. Two days later, the Massachusetts Institute of Technology released the results of a NASA-sponsored study on Thunderstorm Penetrations and Deviations in the Terminal Area. The results were eye-opening. In observing nearly 2000 aircraft encounters with severe weather in the terminal area, they found that nearly two-thirds of all aircraft chose to penetrate the convective activity rather than deviating around the storm. Particularly noteworthy were the factors that most influenced whether a pilot would penetrate a storm rather than deviate:

1. Close to the final destination.
2. Following another aircraft.
3. They had already burned at least 15 minutes of their planned holding fuel.
4. Flying at night.

Although this study centered on commercial aircraft, all these factors apply to the military as well. As we enter the severe weather season for most of the CONUS, now is a good time to review what thunderstorms are and what you can do as a pilot to minimize the hazards associated with them.

We have all been told since the beginning of our flying careers, DO NOT FLY IN THUNDERSTORMS. This is great advice, given all the hazards associated with them. Severe turbulence, icing, heavy rain, hail, lightning, windshear, microbursts and possible tornadoes are all things that can really ruin your day.

The problem with this advice is that it is like telling someone they should buy low and sell high in the stock market. The end goal is pretty obvious, but the nuts and bolts of how to do it properly is often lacking. So, let's look at practical pilot actions to bring about the safest flight possible in severe weather.

First, start before you ever get to the aircraft. That means a good weather briefing from the OWS, military weather forecaster or other MAJCOM-approved forecaster. But that's only a start. Although these are the only sources approved in AFI 11-202, Volume 3, *General Flight Rules*, that does not mean you should not review all available sources to give you the context for the official briefing. Flight service stations, government-approved internet sites (such as the National Weather Service) or even locals who can tell you typical trends in the area, can give you a bigger picture of where storms normally form,

where they move and other general guidance. Knowing certain information—where the atmosphere is unstable, where the moisture to fuel a thunderstorm is available, where there is lifting action in the atmosphere, and your backup divert locations—can put you on the leading edge of the planning, even before turning a wheel.

Once airborne, even if you have no airborne radar equipment on your aircraft, you still have the most important tool available—your eyes. Start by looking for unstable air, which normally looks like towering cumulus or clouds developing along mountain ranges or frontal lines. If these areas coincide with prebriefed unstable airmasses, you have trouble brewing. Other visual signs include virga. Virga is rain that falls from the clouds and evaporates prior to hitting the ground, producing a cooling effect and creating a downdraft. When this downward flowing air hits the ground, it spreads out in all directions. When it turns in the direction of the predominant surface wind, its effect is magnified and can cause windshear.

Also, note how high the clouds have developed. With cloud tops at low altitudes, the storm is probably in the building stage with the most common hazard being updrafts. During the mature stage is where most of the hazards are likely. Once the clouds have developed above the freezing level (usually around 25,000 feet in the middle U.S.), the moisture that has just been lifted can now develop into hail, and lightning becomes likely. Also, the cooled air sinks at high rates at the same time the updrafts are still continuing, creating potential extreme vertical shears and turbulence.

Eventually, the downdrafts created in the mature stage overtake the updrafts and the storm starts dissipating. During the first portion of this stage you will see the strongest surface winds.

One important consideration for international flying is that the airmass throughout the world is not constant. The height of the tropopause (top of the troposphere) over any given surface varies with geographic location and season of the year. If a storm has enough energy to penetrate the tropopause, it is definitely a storm to be avoided. Because of this, a much lower altitude storm in colder areas (e.g., Europe) can be just as devastating as a higher storm in a warmer location.

But what about storms you can't see, either because they are too far away or because they are embedded in other clouds? This is where radar can be especially useful. The biggest problem with radar in aviation is the inconsistent level of training crews receive in its use. There are several important things to know about a radar's capability and limitations before making a decision on what your display screen is showing you.

First, let's look at some limitations of airborne weather radar. It is important to know that the radar is only showing you reflectivity off water surfaces (read that as rain droplets). It will not show returns for ice crystals, fog, very small rain droplets that are far away or dry hail and snow. Considering that the worst storms extend well above the freezing level, you can see there may be hail that will never show up on your radar. Bigger, wetter precipitation will always show better than small, dry precipitation.

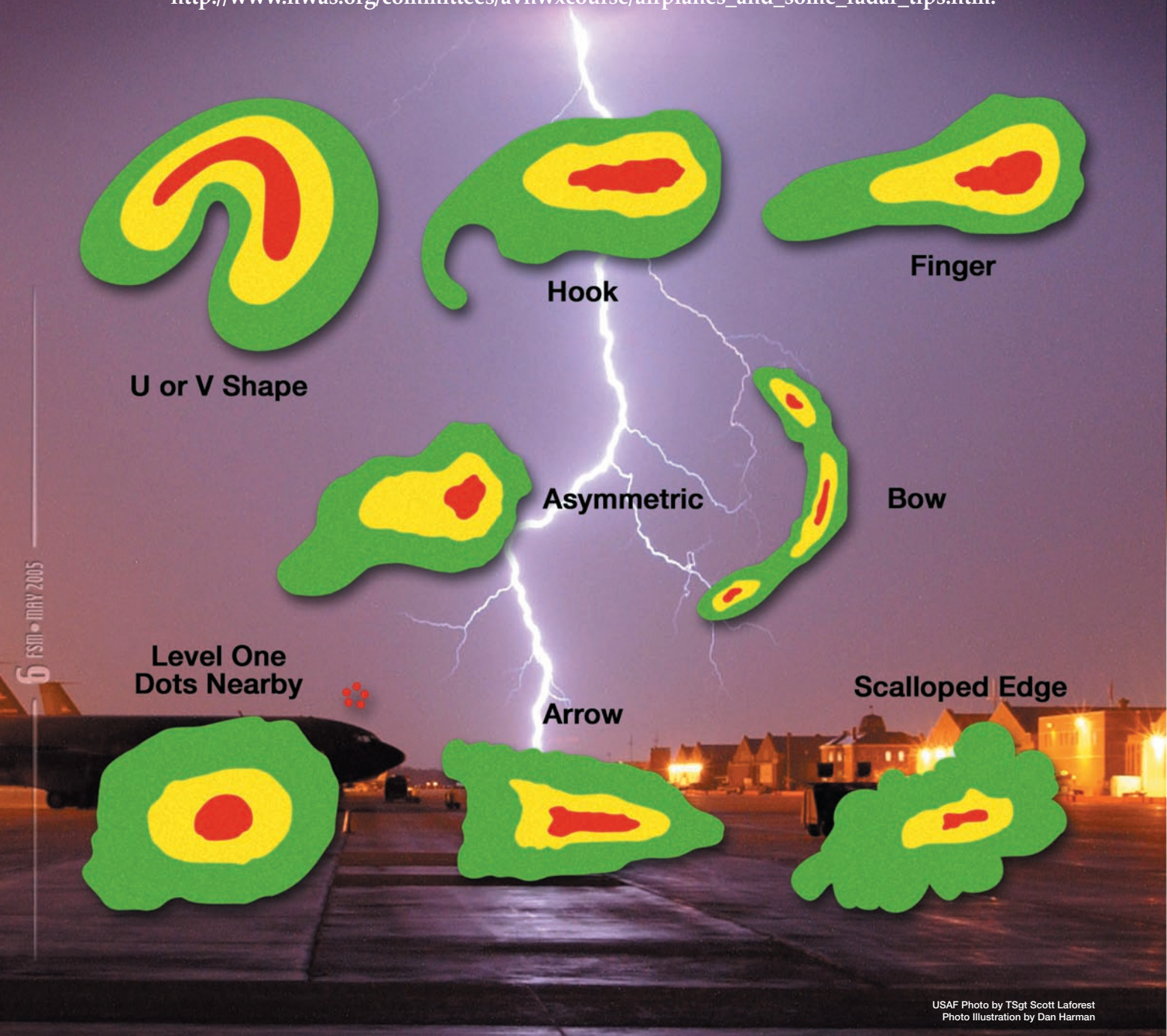
Another limitation is mechanical. The size and strength of radar equipment varies greatly between aircraft, and even older and newer versions of the same aircraft. A radar beam is like a flashlight in that it expands as it gets further away from the transmitter. One plane may have the ability to pinpoint specific cells because it has a larger radar dish and smaller beam than another plane. The receiver is unable to determine if a return takes up only a small portion of the beam or the entire thing, so it will show up on your screen as worst case. That's the reason you may have noticed that returns get smaller and often break up into multiple cells as you get closer.

Finally, and most importantly, learn how to use the tilt control on your specific equipment. The tilt control is easily the most important pilot-controllable item on the radar. With proper use, and in combination with a basic 60:1 understanding, you can use it to determine storm tops, size, intensity at your flight level, upcoming threats, weather versus normal terrain features and, most importantly, the existence of radar shadows (discussed below). Unfortunately, it is also one of the least trained controls. Poor use of tilt control has been a contributor in numerous mishaps where proper use would have helped the crew avoid the weather that eventually overtook them.

Having looked at limitations, the reason radar is becoming an essential piece of equipment is because it does provide a huge amount of information. First, it gives very accurate information on distance and location of cells, especially the closer to the aircraft you look. It also gives a good indication of intensity (although not using the same scale as the NWS uses).

One of the most important pieces of information you can pull out of your radar is where the worst weather is and where the signal energy has been absorbed by the weather to the point that you have no idea what is there. If the weather between you and some area on the screen falls into this situation, you know the weather you do see is the strongest possible and you can only assume the weather you cannot see behind it is at least as bad, or worse. *Definitely avoid any radar shadow*. A shadow is when the signal on your screen disappears after penetrating weather or the shape of a cell bows away from you instead of toward you.

**In addition to shadows, the shape of cells also gives you an indication of which way you should deviate to avoid the worst of the weather. The National Weather Association puts out this chart at http://www.nwas.org/committees/avnwxcourse/airplanes_and_some_radar_tips.htm:**




USAF Photo by TSgt Scott Laforest
Photo Illustration by Dan Harman

These shapes all indicate the presence of potential hazards. Storms with hooks, fingers or arrows indicate potential tornadoes. Areas with U-shapes, asymmetric shapes and scalloped edges indicate turbulence. Any changing shapes show rapidly changing storms with associated hazards. In severe storms, hazards such as hail and lightning have been observed as much as 20 miles outside the radar return. Unless you have more restrictive guidance from your MAJCOM, it is a good rule of thumb to avoid any returns.

Thunderstorms represent one of aviation's most hazardous phenomena. The ideal advice is to avoid them, if at all possible. You should always follow the guidance in applicable AFIs and MAJCOM directives for minimum clearance and increase that as much as possible. With the above techniques, you should be able to increase your margin of safety whenever the mission requires flying around hazardous weather.


USAF Photo
Photo Illustration by Dan Harman

**CAPT SKYE NAKAYAMA**
**55 WG**
**Offutt AFB NE**

It was just another sortie. My crew had been flying every day for a week, avoiding massive thunderstorms, and we had jelled into a very efficient team. Flying seven days in a row with the same crew made it easy to work well together. This particular mission was a scheduled 6.0 night sortie to support an exercise package. The planned profile was to get to the area, refuel, participate in the exercise and then RTB. The flight deck consisted of my same copilot and instructor/evaluator navigator, our student navigator, and the detachment Commander who was an instructor/evaluator navigator.

The weather shop briefed that there were multiple thunderstorms in the area with significant buildups rolling in, but we were clear for takeoff and the system should pass through by the time of landing. The area was looking even worse. Yes, the weather was bad and with thunderstorms, fairly volatile, but we had a mission to accomplish and our ORM was in the medium range. There was no real reason to weather cancel the sortie because the weather was less than ideal. Our plan was to take off, get to the area and deal with the actual weather by adjusting our orbit. We would have more than enough gas to give us the time to evaluate the weather and formulate our orbit and recovery plan. Armed with the latest weather forecast and our own radar, operated by two highly trained and experienced navigators, I was confident we could successfully nullify the weather's impact on our mission.

Takeoff was uneventful, and as we pressed up to the area we called for the status of the exercise and any updates. It was then we were told the exercise was canceled due to weather and we were to RTB. There were no other players up. We were it, and there was no exercise to support. With our fuel load and gross weight, coupled with system power up and shut down time, it would be a few hours before I could land unless I decided to dump fuel.

Instead, our orbit area was clear of weather, and I could accomplish significant training for my student navigator and backenders if I stayed in orbit for an hour or two. I discussed the plan to get the current weather and trends from home station. Depending on the report, I would stay on track to get a 95 percent effective sortie instead of a non-effective sortie. The weather report back stated thunderstorms currently over field and expected to stay on station for approximately one hour, moving east-southeast. Our current orbit would potentially box us in with the incoming weather, so I decided to shift our orbit to a nav leg that would keep us clear from any weather. I briefed the crew on the plan, with the exception that we would keep in close contact with home field to make sure we had an accurate weather picture. If the weather started to deteriorate, we would pick our best time to get back and land.

We had just started our nav leg, which would put us closer to the field, when we contacted Ops again for a local weather update. The picture they painted was looking grim. The previous forecast was now updated to say severe storms approaching and expected to stay on station for four hours. I had fuel to hold for three. With that, it was time to head back direct. The nav leg I had planned out was already bringing me back to the field, but I just cut out our timing triangles and headed home. I was still too heavy to land, but I wasn't about to dump fuel until I got closer in and knew I would have a shot to land. Otherwise, I would carry as much fuel as I had and hold or divert when I hit divert fuels. Our divert base was looking a little better, with an overcast mid to low layer. Way more than mins. The new plan was to get back to the field and hold nearby until the storm currently over the field passed. The forecast showed we should have a window of opportunity between the storms to shoot an approach to land sometime in the next hour or so.

Unable to get close enough to hold in the published patterns nearby, I coordinated with the controllers to orbit in a MOA and stated my intention to land as soon as conditions permitted an approach. We also coordinated our lost comm plan and divert field route in case the weather deteriorated. Between five and 10 minutes later, control advised us the weather was clear enough to shoot an approach if center would let us come in from the west instead of the east. West approaches were normally not allowed due to traffic flow; however, in this case they made an exception. We accepted vectors for a west approach and started to descend. Half the time we were on vectors we had to re-route with our radar. We were at 16,000 MSL and in the weather. High terrain was 13,000.

Our two evaluator navigators had relieved the student once we decided to call off the nav leg and head back to base. They were now picking their way through the storms with great success. Working with ATC and our own radar, we were able to get northwest of the field, successfully avoiding the severe storms. Our navigators said it would just be a few more minutes and we should break out of the weather any time now and be able to accept a southwest vector from ATC.

Then it happened.

I advised ATC that we could accept final vectors, and they gave us a descent and a left turn.

USAF Photo
Photo Illustration by Dan Harman

The copilot was then flying the jet on autopilot and started his descent. I had just asked the Nav to check terrain, since we were in a descent in mountainous terrain in the weather. Looking outside, I didn't like the amount of icing but a scan of our nacelles and wing helped me believe that our anti-ice was working. The Navs again assured me that we would be breaking out of the weather any minute now and that we should be clear of terrain, but they were still scanning.

As I strained to look through the weather for the supposed clear sky, I saw a small ball of light about the size of a fog light form in front of our nose. It all happened in slow motion. The ball expanded to the size of a basketball and then immediately contracted to a narrow beam and struck the nose of our jet. The sound and impact was like someone took a sledgehammer and struck the bottom of the windscreen as hard as they could. The wave of light that washed over the cockpit was intense and warm but not searing hot.

Being in a glass cockpit jet, I was expecting all my instruments to blank out. To my relief, they only blinked and came back. Then we got a TAWS alert saying, "Terrain, terrain." We were then passing though 13000 MSL. The copilot was still flying, and the navigator called out, "I don't see any terrain; I think we should be fine." I wasn't about to bet our lives that the TAWS just had a nuisance trip, so I immediately took the jet and started a mil power climb, telling ATC we were climbing up to FL 200 to get out of the weather and due to a TAWS alert.

As we climbed, we were again struck by static discharge somewhere aft of the bulkhead, and the backend crew called up to inform me of the hit. There were no apparent injuries or damage to the aircrew or airplane. At FL 200, we broke out of the clouds and were able to scan ahead at all the weather below. I called for a circuit breaker check by one of the navs as we assessed our jet for any damage. With none found, we were able to stay above the weather and take ATC vectors to the west of the field.

With the worst behind us, there was still the issue of getting it on the ground safely. Winds were 25 gusting to 45 knots, approximately a 20-25 crosswind component. The field blended in well with the blazing city lights on this approach, and I was unable to get visual on the field. I had my navigator call out clock position of the field, basically giving me an Airborne Radar Directed Approach (ARDA) until I could verify visual with the field in reference to the DME and clock position he was calling out. Once visual, we landed uneventfully and surveyed the damage to the jet.

Lightning had struck the nosecone radome and the right wing tip, blowing out three static discharge tips and exiting out the lower surfaces of the aircraft. Damage included a pinhole in the radome, a split UHF lower antenna, a quarter-sized hole in the left inboard flap and a dime-sized hole in the right wingtip.

Did we push too hard with the weather that was present? Maybe. Looking back, the one thing I wish I had done better was to initiate the climb above the weather sooner. I should have stayed high and then descended, but I was not respectful enough of the clouds or the freezing level and gave the rain cloud the static source it needed. Needless to say, we were all happy to be on the ground.

# The Fog Monster Strikes Again

USAF Photo
Photo Illustration by Dan Harman

**CAPT LANCE HOBSON**
**57 WG/SEF**
**Nellis AFB NV**

From the first day that I showed up for my first fighter assignment at Elmendorf AFB, Alaska, I had heard about the infamous "Fog Monster." I had even heard stories about it from retired flyers prior to going up north, but it never really meant much to me until one hectic night made it a reality for me.

Let me begin by saying that there is no catastrophic ending to this story. Thankfully, some luck—and maybe just a little bit of good preparation—kept this from becoming worse than it could have been. The event in question occurred on a cold, snowy, winter night, nothing out of the ordinary for Alaska in February. I was the WSO in flight lead of a four-ship of F-15Es doing a night Surface Attack Tactics training flight.

The tactical problem was somewhat challenging considering the weather, terrain, targets, and simulated threats we were going up against. Our scenario had us flying low, using terrain masking to get to a target area without detection by surface-to-air missile threats. Once in the target area, we would then execute a maximum range loft attack with laser-guided bombs against some command-and-control buildings. In order to fly low, we needed to use Terrain-Following Radar on a route that took us through some extremely mountainous terrain. I briefed the low-level, air-to-air game plan and how we were going to find and kill the target, and felt confident this would be a successful mission.

Our four-ship pressed through the mountains with minimum safe altitudes thousands of feet above us, using minimum communication and every flight member in the briefed position. My

***Most of the jets in the formation no longer had fuel to make the 200-mile trip to our primary divert.***

front-seater, who was the instructor pilot on this ride, made a comment about the lethality of our tactic: "Look at how masked we are in these mountains. These guys have no idea what we're about to do to them." As I saw the occasional reflection of our position lights reflecting off the steep faces of the mountains just a few feet from our jet, I couldn't help but agree. There were some low ceilings above us covering the tops of the peaks that were protecting us from detection, but this just reaffirmed our mentality that we were flying the Strike Eagle the way it was advertised to be employed—at night, low, and in any weather.

The intensity picked up as we got to the target area, where I managed to designate my target after taking a high-resolution map of the target area. I checked the formation, glanced at the Radar Warning Receiver for threats, took a last look at the air-to-air radar for air to clear the target area, checked six, and found the target in the target pod as we started up the chute for our loft delivery. I called "captured," and my nose gunner pickled off the bombs. I lased our simulated GBU-10s into the target and called the splash. The blood was still flowing as I put out some chaff at weapons impact and we began threat reacting for an SA-2 indication on our RWR. Once we got back to our "get well" point we practiced some other deliveries on that range and finally called it a night.

As we cruised back home at 31,000 feet, I had a chance to catch my breath and relax a little; clearly the hardest part of this mission was behind us. The night was unbelievably quiet and calm. We even caught a glimpse of a couple of shooting stars darting past the northern lights in the background. It was one of those nights that makes you thankful for being stationed in the Last Frontier State. Just to be sure, we called the SOF and asked if there were any changes to field. We were told the field was still VFR and forecasted to stay that way. Up to this point, the sortie may have been the quietest, most serene RTB I had ever experienced.

continued on page 30

## JUST HOW MUCH RISK ARE YOU ACCEPTING?

**MAJ BRIAN "ROWDY" YATES**
HQ AFSC/SEA

This story provides an excellent opportunity to point out one of the more insidious aspects of ORM—unintentionally accepted risk. The crew in the story did everything right. Their planning, execution, and judgment were all exactly what we expect from our square-jawed, steely-eyed warriors—top notch all the way.

The problem is that the risk mitigation measures to reduce the risk from the "Fog Monster" were not effective. The crew received a weather briefing, had a good plan for alternates, rechecked the weather coming off the range, made a good decision to proceed at the point where they could no longer divert to Eielson, and had good comms with the SOF and each other. None of these things worked. The fog rolled in *after* the point at which they no longer had gas to divert, and they were then required to demonstrate their superior airmanship in recovering to a short, icy runway with no cables.

What could be done differently? The squadron could require crews to have divert gas all the way to landing when fog is possible. There might be some way to alert the SOF earlier that fog is rolling in. It might be possible to use a closer range. The Air Force could even install zero-zero instrument landing systems on F-15Es. There are probably a million ways to attack this problem, but that is not the issue.

The point is that they (the crews and the unit) assumed the measures they had in place would effectively mitigate the risk from the "Fog Monster." The fact is that they did not, and the crews experienced greater risk than they thought they had accepted when they stepped to their jets. If they had known fog could roll in, they may have wanted to change something about their profile to deal with the problem.

What risks are you and your unit accepting unintentionally? Take a look around and ask a lot of "What If?" questions. You may be surprised to find things in procedures, training, equipment, or manning that are not working as they were originally intended. Putting the squinty eyeball on some of these measures may allow you to identify areas of unintentionally accepted risk. Whether you make changes or just accept the additional risk is up to you and your commander, but at least you will be making an informed decision.

# The Aircraft Doesn't Crash In Compartments

**CAPT MATTHEW LOWE**
56th Rescue Squadron
NAS Keflavik, Iceland

I never truly understood the old saying, "The aircraft doesn't crash in compartments," until one Sunday afternoon flying in the Icelandic interior. The crew was on the last day of a three-day VFR cross-country in the "all-weather" HH-60G Pave Hawk helicopter. The goal of the cross-country was to familiarize the crew with isolated airfields and to prepare for future Search and Rescue missions.

The trip had already been hair-raising and had included valuable lessons to place in my bag of tricks for future missions. The first day the crew had to climb above 12,000 feet (non-standard for helos without oxygen) to avoid building clouds and snow cells, eventually finding the clearest area for miles around—which happened to be our destination airfield. The second day involved flying under low ceilings, decreasing visibility, and over water to avoid steep fjords, only to find the airfield before it was engulfed by an angry spring snowstorm.

The trip was not all work and no play. Many beautiful sights were visited: waterfalls, glaciers, mountains, volcanic craters, lava beds, and surrounding islands. In keeping with the sightseeing theme, we flew across the interior to return to base. We picked through a few storm cells to see a sight that would make most Icelanders envious. One of the larger glaciers runs into a lake; it was frozen at the time. The blue of the glacier, contrasted against the snow and ice, was spectacular. We hovered over the lake for the flying crew chiefs and others to take some pictures.

While they were taking pictures, the aircraft commander (AC), who was monitoring the weather, announced it was time to go. The weather was closing in, and there was only one way out over the glacier. We did one more flyover of the deep, blue crevasses and started our climb over the glacier to continue our trip home. I had my fun flying, turned the controls over to the AC, and began to navigate off the

Photo Coutesy of Author
Photo Illustration by Dan Harman

moving map display tablet. The computer tablet in the aircraft is synchronized to the navigation system displaying your present position on a topographical map. I was heads-down and looked up when the pilot flying said he was losing ground references.

My first instinct was to look at the radar altimeter and then outside. The radar altimeter said 600 feet, so I was comfortable. I then looked outside the cockpit only to see a "ping-pong ball"—the white ground on the white sky left us with only the contrast of scattered black rocks for visual references. My comfort level began to drop.

The pilot flying announced to the crew "Popeye!"—pilot-speak for "I can no longer see and am in the weather." I frantically searched for any reference so I could take the controls. Then the front windshield began to freeze. I exclaimed, "Climb now!"

The flight engineer came over the intercom and told the crew that we were in icing conditions and the ice detector was indicating. He then braved the elements by opening the window and climbed out to look at the rotor-system to confirm we were collecting ice. The pilot flying was doing a great job staying stable and climbing. The challenge we now faced was inadvertent instrument meteorological conditions (IMC), the helicopter's main rotor beginning to ice up, and a 2000-foot climb in order to clear the 6600-foot glacier that we couldn't see in front of us.

I announced to the pilot that I was putting on the engine anti-ice and windshield de-ice. The anti-ice requires power from the engines and limits the power the helicopter needs to climb. The pilot flying then calmly directed me to give him a good heading to turn away from the mountain. I gave him a 180-degree turn, and we began a controlled, standard-rate turn. The ice had now begun to overcome the aircraft de-ice system. The pilot flying told me to look at the torque (power instrument) and see how much power it was requiring to keep a climb.

Just when we thought it couldn't get any worse, the rotor de-ice kicked in and the rotor began to shed the ice asymmetrically. If you've never felt it before, this causes a wicked vibration that leads you to believe you might shake apart in mid-air! The flight engineer told the pilot to descend out of the icing conditions—at the same time that I was telling him to keep climbing to minimum safe altitude. The pilot directed me to contact the Icelandic Air Traffic Control. After several attempts, we finally made radio contact. I explained the situation and they began to provide us separation from other traffic and gave us an Instrument Flight Rules (IFR) flight plan. We went through several more ice shedding vibrations and then, as if our prayers had been answered, the sky opened and we climbed over the clouds. The sky turned blue, and we saw sunshine.

After pulling the seat cushion from our tails and breathing a sigh of relief, we immediately debriefed the incident and discussed what had happened. Fortunately, we had positive lessons learned. First, everyone in the crew remained relatively calm. Crewmembers were directive when the situation demanded and took the time to explain actions when given an opportunity. Familiarity with the systems of the aircraft helped us to continue flying without having to devote too much attention to one single instrument. Throughout the emergency, all crewmembers announced intentions and did not keep any secrets. We performed procedures for unintentionally entering the weather without hesitating, just as we had practiced in earlier training flights. Finally, the helicopter worked as advertised! The de-ice systems truly allowed the helicopter to become an "all-weather" aircraft.

No, "The aircraft doesn't crash in compartments." It takes every crewmember to safely get through an in-flight emergency. The conditions *outside* the aircraft were unpredictable. The conditions *inside* the aircraft were clear and calm.

# Unnecessary Risk

**ANONYMOUS**

There I was…every great pilot story where something bad really should have happened but didn't starts that way. So, there I was, a brand new LT copilot in one of the most highly-trained units the USAF has to offer. And, of course, I was feeling my way around the squadron as to who were the good pilots and who were the bad ones. Right off the bat, I figured I was one of the bad ones, since I had a total of about 20 hours in the aircraft and had just figured out how to take the plastic off my pubs. Nonetheless, I got my special mission upgrades quickly and was soon sent on regular missions.

One day I looked at the Board of Wisdom to find out who I was flying with for the next night's mission. I was excited when I saw it was our Chief Pilot. This was THE authority on our aircraft and had golden hands. There was nothing he couldn't do or teach someone else to do. He had flown over Panama during OPERATION JUST CAUSE. He had flown during OPERATION DESERT STORM when the Iraqis thought they had a chance and fought back. He had so many night vision goggle (NVG) hours that he could see at night without NVGs. He had done all the initial testing for all the additions the Air Force could dream up for our aircraft. And he could teach a monkey to fly; he even taught me. I think it's safe to say I had put a slight halo over this man's head.

The mission profile was simple enough. Fly an NVG low-level to some blacked landings at one of our outlying airfields. We had both done this type of mission enough times to not get too worked up about it, so we decided to do our mission planning the day of the mission. When we showed up the next day, everything went as it always does. Weather was forecast to be severe clear, and we had no problems from range control.

Oddly enough, the mission went as planned. Everything was smooth sailing until our final approach into home station. It seems our weather forecast was not exactly correct. We were supposed to have clear skies with unlimited visibility. BUT...the typical late night occurrence at our base was sea fog. The sea fog rolled in about 15 minutes prior to our scheduled land time. It significantly cut ground visibility to approximately 1/8

USAF Photo by SSgt William Greer
Photo Illustration by Dan Harman

mile. It was my turn for an approach, and I was required to accomplish an overt ILS approach. No problem, because at 15 miles out we could see the runway. The approach was uneventful all the way to decision height. We could tell there was fog but we could still see the runway at 200 feet AGL. Proceeding visually, we entered the sea fog at 100 feet AGL. As soon as the landing lights entered the fog, we were IMC because of the reflection, and I initiated a go-around. On radar downwind the aircraft commander decided he would try the approach but only use taxi lights to reduce the amount of light entering the fog. His approach went just like mine. At 100 feet AGL we initiated another go-around. At this point I was considering our recovery options. None of them sounded great since we would have a long bus ride back to our home base because there was no lodging at our outlying fields. On radar downwind, the aircraft commander decided to try the approach one more time.

On this approach we would proceed down the ILS, but this time we would use our NVGs. Due to the way NVGs work, you can see through some, not all but some, moisture in the air that usually obscures vision. We would not turn on our overt lights. We also contacted tower and had them turn the runway lights down to the lowest setting so they wouldn't create too much light for our NVGs. No problem, right? We were an NVG-qualified crew accomplishing the same type of landing we had been doing all night.

The approach started just like the rest: down the glideslope, decision height, at 100 feet AGL, we enter the fog. This time, though, we could see through the fog. The combination of NVGs and low runway lights allowed us to continue the approach visually since we could still see the runway. At approximately 10 feet AGL we entered the flare for landing. The change in aircraft attitude and the limited field of view caused the aircraft commander and me to momentarily lose sight of the runway lights. We remained in the flare at 5-10 feet AGL for approximately 6000 feet of the 12,000 foot runway. Once we regained sight of the runway light in our peripheral vision, we touched down with 5000 feet remaining. The aircraft commander applied brakes and reverse thrust with approximately 3000 feet remaining. We stopped with about 150 feet of runway remaining. Great; we landed!

We pulled off the runway and removed our NVGs for the long taxi to parking. This is when I noticed something odd. We could only see two taxi lights, the one next to us and the one approximately 25 yards in front of us. Tower called and asked if we had landed yet and I acknowledged with an affirmative and requested taxi to park. They said we were cleared to taxi but they could not see us. It took us 45 minutes to taxi to a parking spot that would normally take 10 minutes.

Here are my lessons learned from this event. First, no matter how experienced or how good a pilot is, they can still make poor decisions. Do not put a halo around a person's head just because they are, in many people's eyes, the best in the business.

Second, don't be afraid to raise concerns about what is going on in the aircraft. If you are uncomfortable with what is going on, speak up. In most cases the aircraft commander should be able to give you a reasonable explanation of why he/she is taking that specific action. Your actions may also free up others who feel too intimidated to voice their concern over a certain action. Of course, the aircraft commander is the ultimate authority, but your concerns may make him/her think twice about what you think is a poor decision.

Finally, an uncomfortable bus ride is no reason to push the envelope of your equipment or crew experience. Yes, it worked out for us that time. But a different crew on a different night may have put the aircraft off the end of the runway. It was an unnecessary risk.


An Aircraft Makes A


USAF Photo by TSgt Erik Gudmundson
Photo Illustration by Dan Harman

# BECOME BRILLIANT

**CAPT JAMES P. MOSS**
388 FW
Hill AFB UT

USAF Photo
Photo Illustration by Dan Harman

There I was… What aviator doesn't have a story that starts like this? There have been many stories, and some, of course, will never see the public light of day. They're internal lessons learned that only apply to me, and my perpetual learning curve in the flying business. But there's a saying that goes, "A wise man learns from his mistakes. A brilliant man learns from *others'* mistakes." Let me make you brilliant men and women.

There I was, a newly-minted flight lead leading a two-ship of the world's greatest fighter, the mighty Viper, to provide realistic threat training to two Marine F/A-18Cs. What's better than Dissimilar Air Combat Training? Great! Sign me up! Everything was ops normal and pretty straightforward, really. After receiving a Red Air SPINS (special instructions) fax from the adversary, we went over the presentations at length over the phone, flight lead to flight lead. We were set, all questions asked and answered, and the brief went smoothly, covering all the bases. My wingman and I briefed the weather at length, reviewing the radar picture and forecast. It was summer, and thunderstorms were the norm in the early afternoon. I noticed on the weather map we had buildup near our working airspace, and I made a mental note for later. Again, I was pretty confident I could get my two-ship out and back, provide realistic training, and update any currencies, time and average sortie duration (ASD) permitting.

Departure and en route to the military operations area (MOA) airspace was ops normal. No problem. I checked in with the Hornets and passed the MOA weather brief to our adversaries. "Sky clear, unlimited visibility, with thunderstorms building south of the working airspace, appearing to move toward us, but not currently a factor." We set up for our first Red Air presentation. Things went smoothly and we reset our two-ship to the south of the MOA for another presentation. I noticed the thunderstorm getting somewhat closer and repositioned my flight to avoid the weather, while stepping up the Red Air scenario, in accordance with the brief. After several sets of Red Air, I noticed that the thunderstorm had moved across the MOA's south border and started to become a factor to the flight.

I found a section of the MOA airspace that provided enough room for the fourth and final presentation, a 10-NM lead-trail picture with me as the trailer. Skirting safely around the thunderstorm, I was pushing it a bit, but I wanted to give the Hornets the training they needed. As I set my wingman in front as the leader and maneuvered my Viper in the trail group, I became heads-down. In other words, I was buried in the "drool bucket" trying to perfect the lead-trail presentation. When I looked up, I noticed I was entering a cloud. Not a dark, evil-looking cloud, mind you, but the white, wispy kind. I didn't think much of it at that instant (apart from the fact that I was busting a training rule, and I made a mental note to debrief that) since I thought I would just pop out on the other side and continue the presentation. But the white, wispy cloud got darker…much, much darker. The next thing I knew, I was entering a full-up, angry thunderstorm.

Time stopped. Then the rain and what I thought was hail came (it later turned out not to be hail, but heavy rain). But that was the lesser of the two evils. As I slowed my jet to thunderstorm penetration airspeed, it felt like the world was beating up my jet. Rain slammed the canopy, and I had zero visibility. It sounded like evil people were hammering away on every piece of my Viper. I was tossed around. I couldn't hear. I couldn't see. I lowered my seat and turned up the lights. I stared at my engine gauges like a hawk, saying a silent prayer that my single-engine would not flame out due to water ingestion. As I was sitting there staring, I noticed the radios had become instantly filled with static. "Oh, #@!%*$," I thought, "Here it comes." The first lightning hit was like being blinded by a flash that didn't go out. I never heard the crack, but I sure felt it. The hair on the back of my neck stood up, and I was thinking, "This is not good." I saw the bolt hit the nose of the aircraft and that was about it. My hands and arms were off anything metal. I was hunkered down. My headset filled with static again, and I prepared for another lightning strike. Bam! Bam! I counted several more lightning strikes in a period of seconds.

What felt like an eternity was soon over. I literally popped out on the other side of the thunderstorm into bright, blue sky. It was an eerie transition. One second, chaos; the next, calm. I can still remember it to this day. I called a Knock-It-Off (KIO) as soon as I could and instructed my wingman to rejoin. The Hornets were finished and were departing the airspace. My No. 2 rejoined, and I told him I had just gone through a thunderstorm. I told him to do a thorough battle damage (BD) check to see what was damaged. I knew my AIM-9 seeker dome was missing, broken off either by the rain or hail. It was flapping in the wind. Other than that, from my vantage point everything looked somewhat normal. That's when No. 2 got back on the radios.

My wingman informed me that I had some slight damage to my centerline ECM pod, my AIM-9 seeker, and some gray paint was missing on the right horizontal slab. We RTB'd and called the SOF. After landing from a straight-in approach, I shut down and egressed normally. Then I surveyed the damage. Not good, but I was lucky. It could have been worse…much worse.

There is no peacetime mission that justifies penetrating a thunderstorm. Become brilliant.

# INTO THE TYPHOON

**CAPT ROBERT WOLFE**
C-5 Instructor Aircraft Commander
436 AW
Dover AFB DE

Photo Courtesy of NASA
Photo Illustration by Dan Harman

I guess the only way to start is to say, "Wow, if I had known then what I know now."

We were flight planning in Thailand. I'm sure you've all been there before: At any normal US installation, we are accustomed to computer screens, radar and all the other amazing weather gizmos they have at the shop. To top it off, our equipment is state-of-the-art, and our weather personnel are on top of their game. Well, this was more like when our weather folks used to draw the isobars by hand, and all the forecasts were drawn and typed and placed up on the wall with clipboards. But this wasn't the 1970s, it was 2001.

So, there I was in base ops. We had just found out that our weather radar was completely broken and there was a typhoon brewing just north of our course from Thailand to Hickam. The weather folks at base ops gave us their best guess and said the weather was going to stay north of us. We had no access to the internet and, at the time, no real access anywhere else.

I was just a brand-new mission-qualified copilot at the time. My Aircraft Commander was a highly experienced IP with thousands of hours in ole' "Fred." The First Pilot on the crew had arrived on station probably a month or two ahead of me, but he was a First Assignment Instructor Pilot (FAIP) with over 1500 hours in the mighty Tweet. Both Engineers and Loadmasters were also very experienced. So, basically, I felt I was the weakest link in the chain. I was by far the least experienced member on the crew.

We started the day in Guam; this was our second leg. I told the AC I was uncomfortable with taking a plane with a broken weather radar toward a typhoon. The AC took my opinion into consideration and talked to the rest of the crew. Everyone else was ready to take the plane…we had to move the mission. The AC placated my "naiveté" by explaining we would be able to maintain VMC conditions and we could work with ATC through the night to pick our way around any bad-looking

clouds that might pop up. Our flight plan basically called for a straight line from Thailand to Hawaii. This should have been no problem. He even topped off the tanks "just in case." (By the way, with our large cargo load and high temperature, "topped-off" was nowhere near a full tank of gas. It was, honestly, just a little extra.)

As usual in AMC, we took off in the wee hours of the morning. The mission went just like the AC said it would. We picked our way around every cloud out there. We worked with ATC, and everyone was very helpful. We were even able to get updated weather via the HF radio. Sure enough, the typhoon was moving quicker than predicted, but my AC was able to maintain VMC and we were right on track. I was learning a lot. Mostly, I was learning how to "move the mission!" What a great example of leaning forward: If the AC had listened to me, we would have been back on the ground in Thailand and the mission would have been delayed. Instead, this mission was actually going to arrive early!

Daybreak came and, whew, we made it. We picked our way all night and stayed out of the weather. We were just a little south of our planned track, but we were still looking great. Good thing we topped off the tanks. The AC decided that it was time for a rest and got out of the seat. The First Pilot (our 1500-hour FAIP) got out of the bunk and jumped in the left seat. I stayed in the Copilot's seat on the right. Soon enough, the AC was in the bunk and lights out. Things were going great! I updated the weather again, and sure enough, the typhoon was still coming faster than expected. Everything was clear to the south and on the west side of the typhoon.

The FP took the airplane and I took the radios. I'm sure you all know how bad the HF radios can get out there. Well, this was no exception. We were driving back on track, but I was having a hard time relaying our position reports over the static. And even then, many calls were in the blind. I bet you guessed it by now: Sure enough, as it got brighter, we found ourselves flying right towards the biggest, darkest wall of clouds I have ever seen. It filled my windscreen from top to bottom, left to right.

Being an astute and respectful young copilot, I passed the weather to the FP and explained that it was clear to the south of this buildup. He agreed and told me to request a deviation to the south from ATC. Well, if you can imagine, the static was so loud I couldn't get ATC on the line. Unable to contact them, I again told the pilot it was clear to the south and we should start heading that way. I was told, once again, to coordinate with ATC. The pilot explained to me that we couldn't just head off course without coordination. He wasn't going to get us violated on his watch. Respectfully, I acknowledged with a "Yes, sir," and tried to contact ATC again.

About three minutes from the wall of the typhoon, I respectfully told the pilot to make a turn to the south and that I would continue to coordinate as soon as I could reach ATC. I continued to tell him to turn south, and he continued to tell me that I must contact ATC before he did anything. This must have sounded like an argument to the rest of the crew listening on interphone. I got off one last call and announced in the blind that we were turning south. That was the last call I got out.

I barely had time to tighten my harness and—BAM!—we hit the wall. It went completely dark. I yelled over the interphone to turn south. Just then, I looked down at my instruments and we were in a 60-degree turn to the north (into the typhoon) and had lost 2500 feet. The autopilot kicked off and everything was thrown about the flight deck. We rocked back and forth and up and down. "Severe wind shear" would be an understatement. Finally, the pilot managed to maintain a turn to the south, and as fast as we went in—POW!—it was sunny again. Wow, was I glad to see blue skies.

Needless to say, no one could sleep anymore and the AC was back up front in no time. He was completely at a loss. Somehow, he and I had managed to stay out of the clouds all night, and now the FP just flew through a typhoon.

I would like to say the story ended here and the rest of the flight was uneventful, but that would be only half true. In fact, we were now extremely south of course. Remember that our flight plan was a direct route from Thailand to Hickam? Well, we ended up down off the northeastern coast of Australia. Yup, all I had to do was look out my right window and, sure enough, that down there was Australia. I'd never seen Australia before. Fortunately, we were able to circumnavigate the typhoon and landed at Hickam AFB on fumes.

So, what do I know now that I didn't know then? I know that when CRM works, rank, experience levels, seat position or anything else cannot get in the way of flying a safe airplane. I was only an LT just out from Altus, and that First Pilot was a highly experienced Captain. Yet, somehow, I let him almost kill everyone on board the airplane. I needed to be more forceful and less complacent. I should have called, "Time out." And if nothing else worked, I should have said, "Copilot's airplane!" We should all remember the credo "Aviate, Navigate, Communicate."

I also learned not to take a bad jet into the air. I should have made a stand with the bad weather radar. If I had known then what I know now, I could have done a lot of things differently that mission. Luckily, I lived to talk about it.

Oh, just so you know, that AC has never slept on a plane since. ✈


USAF Photos
Photo Illustration by Dan Harman

**CAPT IAN IRVINE**
**55 WG**
**Davis-Monthan AFB, AZ**

Have you ever sat down for a mission brief in the AOR and thought, "Here we go again"? Does it seem like you've flown this mission before and there shouldn't be any problems because you did this yesterday? Before we become too "comfortable" with our habit patterns or content to skip the details in our deployed operations, we should think twice about what we're doing. The routine of flying in the AOR day after day presents its own unique challenges we must address, lest we become complacent and introduce unnecessary risk.

As I began my second rotation for OPERATION ENDURING FREEDOM only five weeks after returning from the first, thoughts of "been here, done that" had entered my thoughts. Having left the same deployed location for home just over a month earlier, I continued to remind myself that this was a different TDY with a different crew and that, unlike the food in the chow hall, most everything would certainly have changed since I left.

My previous tour occurred during the hot summer months typically found in Central Asia, complete with the decreased aircraft performance one would expect from a heavy EC-130 on a hot day. Now that winter had arrived, we were dealing with the possibility of weather near mins due to thick fog and the occasional snow shower. I quickly realized this wasn't going to be the same rotation all over again. In fact, I approached the beginning of our crew's tour with a specific mindset. I would make my best effort to look at each flight with a new perspective and work to combat the effects of complacency in our day-to-day flying. I wanted to apply what I had learned from the first rotation to the new challenges this time around.

Daily flying in the AOR can lead you to fall in the same trap as flying around the flagpole back home. You begin to notice that today's mission looks a lot like yesterday's mission and references to the movie "Groundhog Day" were always around us. For example, we saw what seemed to be the same mission brief, the same weather forecasts and flight plans, the same departure and arrival procedures, the same tail numbers and, like I mentioned before, the same faces every time we flew. The repetition in our daily flying operations highlighted the need to refocus on what we were trying to accomplish as a crew and reemphasized both the good and bad side effects that can arise from the "lather, rinse, repeat" of flying in the AOR.

**The Good:**

Flying with the same crew on each flight directly contributed to how well we worked together. We recognized each other's habits and more importantly, developed techniques as a crew to work together more efficiently. Thankfully, our leadership's plan to mix the experience levels of the crewmembers and our own attitudes towards CRM provided the basis for our crew's success. Our aircraft commander, fresh out of upgrade from Little Rock, worked hard to include the entire crew when a problem presented itself and showed by example the enormous benefit a positive attitude can have when you're flying long, often uneventful missions repeatedly.

Another benefit of becoming very familiar with a routine or standard way of doing things is that when something unusual does happen, it is very obvious. Imagine seeing the same weather conditions every day and then one day noticing that the visibility for your arrival is not what you expected. Instead of the normal VFR conditions, you notice the forecast calls for fog at both your base and your alternate. Of course, this would get your attention immediately and cause you to consider "what if" scenarios. On the other hand, if you've briefed the same mission and the hazards associated with it countless times, it is understandable how an aircrew can quickly dismiss its importance in the brief and skip over details they once considered important. This leads into the dangers of complacency and the negative toll that repetitive tasks can take.

**The Bad:**

You've heard the same brief every day and you've accomplished items in your checklists countless times. Nowhere is attention to detail more important than when you least expect it. Murphy's Law isn't limited to flying over the CONUS, and your risk management skills shouldn't be left there either. From the planning phase to mission execution and all the way to returning the aircraft back to maintenance, look at every flight with a fresh perspective and renewed interest in mitigating risk.

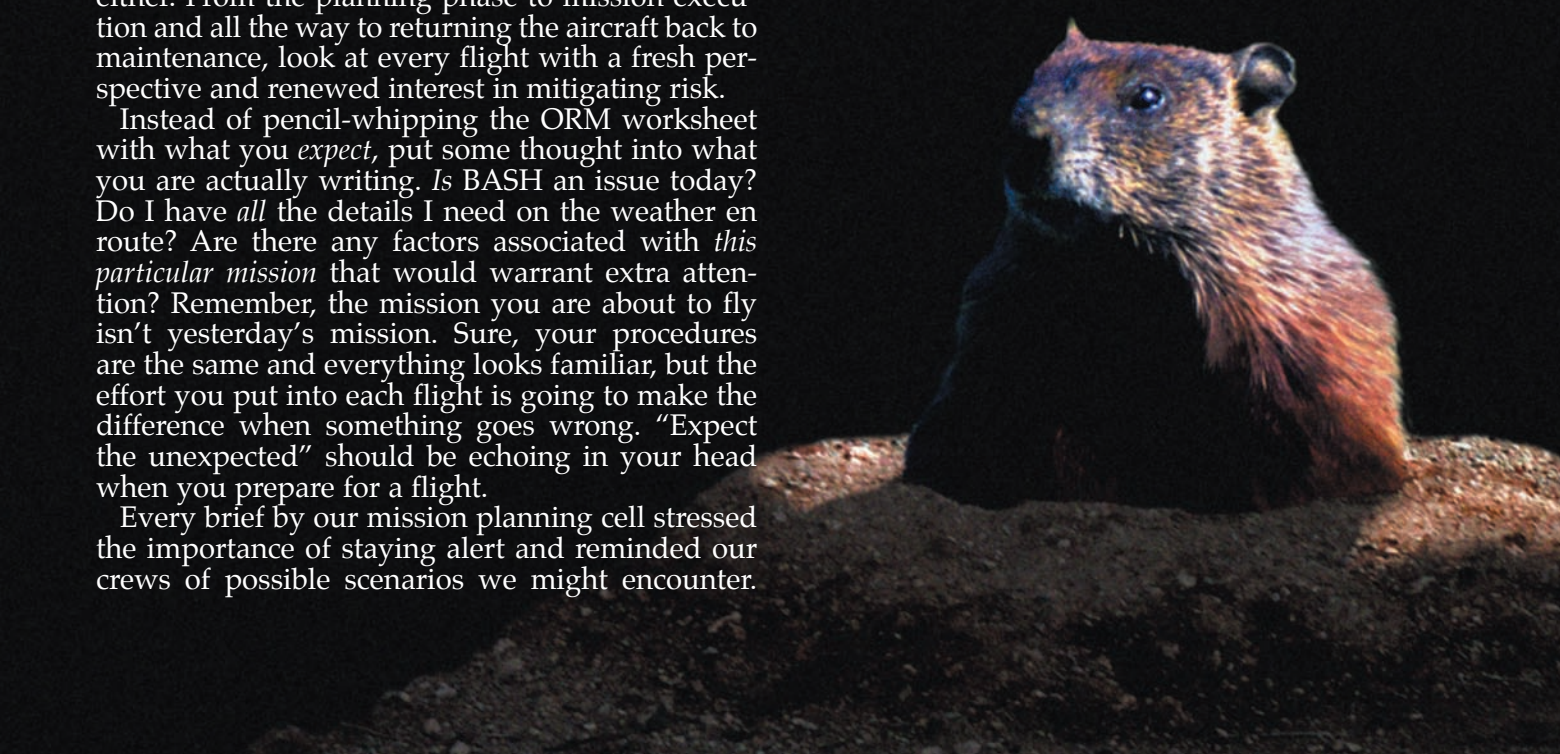
Instead of pencil-whipping the ORM worksheet with what you *expect*, put some thought into what you are actually writing. *Is* BASH an issue today? Do I have *all* the details I need on the weather en route? Are there any factors associated with *this particular mission* that would warrant extra attention? Remember, the mission you are about to fly isn't yesterday's mission. Sure, your procedures are the same and everything looks familiar, but the effort you put into each flight is going to make the difference when something goes wrong. "Expect the unexpected" should be echoing in your head when you prepare for a flight.

Every brief by our mission planning cell stressed the importance of staying alert and reminded our crews of possible scenarios we might encounter. Aircrew fatigue, comm problems and how they could affect our contribution to the ground mission we were supporting, bad weather on orbit and at home station, BASH, and a host of other issues were addressed. It's one thing to pay them lip service and another to discuss with your crew how you are going to address each, should it arise.

We didn't actually come across this until late in the year when the weather had different plans for our mission. Our flight had begun over a half hour prior as we climbed through broken layers to our cruise altitude. In contact with center and flying in and out of the clouds there was no need to worry—that is, until we were cleared tactical by center and released to proceed to our first orbit point. It was then apparent that thunderstorms were building throughout our route and it would be difficult to find our way through. Did I mention that we were instructed to maintain VMC throughout the tactical phase of our mission? This wasn't exactly an easy task, considering the storms were covering half the country, the mission dictated exact station times to support ground forces, and we would eventually have to bingo out in order to be able to recover back with enough fuel to proceed to the alternate should the weather over the field become a factor.

What made all the difference was that we considered this situation before stepping and through communicating with our planners at home field to get frequent weather updates. Eventually, we were able to find our way through the weather and accomplish the mission without diverting.

Through careful and thorough mission planning, coordinated CRM and attention to detail, we were able to deal with the unexpected in this atypical flight, but it's easy to see how the situation could have been much worse without them. Don't let the dangers of complacency lure you into a false sense of safety.



# IN THE FOG

## OPERATING IN LOW VISIBILITY

**ANONYMOUS**

It was a formation night sortie like all the others. On this particular night, we had a standard formation departure followed shortly thereafter by an hour of air refueling. After passing gas, it was on to Belle Fourche for multiple simulated bomb runs and defensive signals. During the pre-departure brief, we were informed by the weather shop that rain and fog were supposed to be on station during our transition period. With that information, we made sure before we left that we had the proper frequencies to contact a metro station for a weather update while in the Powder River Training Area.

When we got hold of Minot Metro, the current weather was above minimums but expected to drop below minimums within the next couple of hours. After discussing with No. 2, the formation decided to head back and try to get on the deck before it was too late. Multiple crewmembers within the formation had to catch commercial flights early the next morning. This was also a deciding factor in heading back early.

Upon arrival at the home station, weather was being called above minimums. We contacted the SOF to confirm the runway and weather conditions. The formation in front of us had just landed and said the visibility was adequate but decreasing.

During our pre-departure brief we had discussed low visibility approaches and what each crewmember's duty was. After hearing what the actual conditions were, we re-briefed that the pilot flying would land the aircraft and the pilot not flying would back up the other on the instruments and call out visual cues. We broke the formation up, briefed up the approach and came in for the ILS. In the ensuing attempt we completed our checklists. Before starting the approach, we got a weather update from arrival control to determine if we would continue. The report was above minimums, so we continued. We performed our duties, and on short final I started picking up approach lights and called out cues to the pilot flying. We continued down to one hundred feet and continued seeing cues and saw the runway centerline. The only problem with seeing the centerline was it tempted us to continue the approach. But the fog was so thick that all our depth perception was gone. With the landing lights' blazing reflection off the fog, forward and side visibility was almost non-existent. The immediate decision was to go around for another attempt. While back out in the radar pattern, we heard our No. 2 aircraft go around. Shortly thereafter, the tower updated the ATIS, which dropped our weather to below minimums. We then went up into holding. With the weather expected to only get worse, we diverted for the night.

Looking back, this sortie was full of new learning experiences for a relatively new copilot. Low visibility approaches are not something to take lightly. Without the proper planning and prior discussions, a lot could go wrong very quickly.

***Everyone on the crew must feel free to speak up in case they see something they don't like.***

USAF Photo by MSgt Andrew E. Lynch
Photo Illustration by Dan Harman

Being down in the soup at 100 feet and traveling at 200 mph is no place to be making mistakes. One thing that helps is to get in the sim and practice low visibility approaches with your primary crew. Procedures learned in the sim go a long way in properly accomplishing your duties when the time comes.

However, although simulators may be good for refreshing and improving your skills, the real thing teaches you so much more. Being in conditions with ceiling and visibility down to minimums—and possibly below minimums—brings about many new experiences and sights. For this particular flight, flying at night brought many illusions. With fog and rain bringing visibility down to one-half mile and below, and with a slight breeze moving the fog around, it was an interesting approach.

One negative to be aware of is that your depth perception is reduced significantly at night, with only your landing lights illuminating the fog and some of the runway environment. But one thing going for you is that the approach lights are much more visible and the landing lights do illuminate runway markings.

Daytime low visibility approaches also have their own pros and cons. Depth perception is much better during daytime low visibility approaches, while runway environment markings may be more difficult to see. These are a couple of things to be aware of during your low visibility approaches.

Coordination within the crew is also a very important safety factor when accomplishing low vis approaches. When flying with a minimum of five crewmembers on any given sortie, it is extremely important that everyone is on the same page. To correctly execute an approach, it's good to have the confidence that every crewmember knows their duties. At any point where somebody feels uncomfortable with the approach, they should feel free to call missed approach and not get chastised by a fellow crewmember.

Good Crew Resource Management (CRM) is one of the key players in safely executing a low visibility approach. Communication between crewmembers is important in getting checklists done, approach briefed, and anything else that has to be accomplished before arriving at the final approach fix (FAF). It is important to keep chatter to a minimum after the FAF, but everyone on the crew must feel free to speak up in case they see something they don't like.

We in the Air Force have had too many mishaps that have been caused by a lack of knowledge, poor CRM, and poor decision-making. The individual can only increase his/her knowledge by getting in the books, practicing in the simulator, and getting out and flying in adverse weather conditions. These will all help expand their breadth of knowledge and experience. And both increasing our knowledge and practicing our CRM skills will help eliminate poor decision-making.

# OPS TOPICS

**Editor's Note: The following accounts are from actual mishaps. They have been screened to prevent the release of privileged information.**

What we have this month is a hodgepodge of stories that were cut out of previous editions due to having too much material. So, there is no central theme, but some interesting info that may help you prevent mishaps.

### F-16s Versus Water

The mishap sortie was planned, briefed, and flown as a four-ship suppression of enemy air defenses (SEAD) sortie. All aircraft were configured with 3 x AIM-120, 1 x AIM-9, 2 x AGM-88, 2 x wing tanks, 1 ALQ-184 ECM pod and 1 x HTS pod. Ground ops, takeoff, departure, and the first air refueling were uneventful. Following the first air refueling, the mishap flight contacted command and control (C2), but C2 was unable to pass a weather update, status of package, and position/status of their next tanker. The flight proceeded to the air refueling track for a second refueling prior to the start of their vulnerability time. The pilots "attempted" to deviate for weather by climbing and flying north; however, due to IMC conditions, the formation was radar trail. In an attempt to locate the next tanker, the flight lead switched the radar to air-air mode providing the flight no capability to detect severe weather. Then Murphy took over and they flew through heavy rain damaging two ECM pods and two AIM-9 missiles. After entering the heavy rain, the flight lead directed a 180-degree turn to get out of the weather. After determining the mission could not be completed due to the weather, they informed C2 and returned to base. Here's a case where they tried to do the right thing during a real-world mission, but when they tangled with Mother Nature she took away part of their combat capability. What do you think the flight lead could have done to prevent them from entering the rainstorm?

### Wayward Flare

The pilot was tasked as fighter support for a night combat search and rescue sortie. Approximately 45 minutes into the sortie, the pilot released two flares over the range at 10,000 feet MSL and 250 KIAS. One of the flares illuminated directly over the target. However, the other flare did not ignite. The illumination from the first flare made it possible for the pilot to visually acquire the unlit flare as it floated under its chute and confirm the flare was expended rather than hung. Because the second flare did not ignite, it remained floating under its chute for an undetermined amount of time, and the pilot was unable to see where the unlit flare landed. Local authorities discovered the unlit flare intact 4.5 nautical miles northwest of the target.

The sequence of events for a normal LUU-2A illumination flare set for 500-foot fall is as follows: the flare is released from the SUU-25 and free falls for the pre-set 500 feet (6.6 seconds). The parachute then opens, and the flare ignites. The flare should burn for approximately five minutes with an average descent rate of approximately 11.2 feet per second. The flare should descend approximately 3500 feet during the five-minute burn time (for 5000 feet target density altitude). During the flare burn the flare housing is consumed, allowing the flare to hover during the last two minutes of burn. When the flare finishes burning, an explosive bolt fires to release a parachute support cable collapsing the parachute's risers, and the flare then falls to the

ground without the parachute.

The pilot took into consideration the current winds in order to calculate his flare release point. However, he failed to incorporate the possible additional drift time an unlit flare would experience. Candle burnout initiates the explosive bolt which causes the parachute to collapse. Because the flare did not light, there was no candle burnout, and the parachute remained intact. The flare drifted at a northerly heading for an additional 6000 feet of altitude under the parachute increasing its drift and placing it 4.5 miles north of the target. There is little written guidance on how far a ghost flare would drift so the unit contacted the experts. The subject matter expert for the LUU-2 provided two rules of thumb for the distance that a ghost flare should travel: 600 feet per 10 knots of wind every 1000 feet. For a 20-knot baseline, an unlit LUU-2 will drift horizontally in feet the same AGL altitude that it was under chute. So, the next time you have an unlit flare you can calculate its location more accurately so we can find the wayward weapon.

### Not Quite Down

The UAV was on a 22.5-hour reconnaissance mission. The crew consisted of four pilots and eight sensor operators who flew on different shifts during the mission. The mishap pilot (MP) came on duty approximately halfway through the mission with the rest of the crew coming on duty two hours later. The crew took breaks from flying during their shifts. During the recovery after an uneventful mission, the MP began a night visual approach with the mishap instructor pilot (MIP) monitoring. After the MP established a landing attitude, and thinking he was on the runway, the MP relaxed back pressure on the control stick and the UAV's nose dropped four degrees low. Unfortunately, the UAV was still 12 feet above the runway. The UAV landed nose-wheel first and bounced four times before veering off the runway to the left. The UAV was damaged beyond economical repair. Even in unmanned aircraft you need to know your relationship to the ground. The pace is long and hard but we need all our assets to fight all the wars.

### Lightning Strikes KC-135

Mission planning and preflight were normal with no problems noted. Takeoff, climbout, and level-off occurred without incident. The crew was in a descent, approximately 13,000 feet MSL, to rendezvous with the receiver and flew through severe icing, causing temporary loss of pitot-static instruments. The crew broke off the rendezvous and climbed to FL280 and regained pitot-static instruments. The crew then attempted a second rendezvous, since the receiver reported better weather in orbit at 11,000 feet MSL. Passing 12,000 feet, lightning struck the nose of the aircraft and exited through the boom, which was extended approximately 10 feet. Wisely, the crew terminated air refueling and elected to return to base. The aircraft landed without incident and maintenance found the IFF antenna, radome, and the Comm 3 antenna damaged.

Troubleshooting found the lightning entered through the nose radome producing a three-inch hole, damaged the upper IFF and Comm 3 antennas and then exited through the boom. No damage to the boom was noted. The navigator observed mostly green, occasionally yellow radar returns during both rendezvous with the radar gain set to "calibrate." The crew discussed the second rendezvous and would not have attempted it for a training mission, but out of concern for their receiver's fuel state and combat mission, a second rendezvous was justified. Does the mission justify the risk? That is a decision that only you can decide.

### Busy Runway, No Clearance

A solo T-38 instrument student on an out-and-back sortie taxied into position and performed a takeoff without clearance. The T-38 RSU had a lot of traffic at the time of the incident and the radio was busy. When the solo student was No. 1 for departure, there was another aircraft that requested a closed pattern from runway 15C. The controller told him to stand by. After a few seconds, the controller cleared the aircraft and called the winds one-seven-four at fourteen gusting seventeen. The student mistook this radio call for his clearance for takeoff. This probably happened because of calling winds with the number four in there twice, in combination with the fact that calling winds is normal for a takeoff clearance. The RSU controller did not hear his read back of the "clearance." As the student taxied into position, he saw an aircraft rolling out on final but thought the RSU controller was trying to launch him and give the aircraft on final a restricted low approach.

When the RSU controller saw an aircraft taxi onto the runway, he immediately sent the aircraft on final around. Tower sometimes launches aircraft on the runway, but they need to coordinate with the RSU prior to doing so. The RSU controller was not sure if this aircraft was cleared onto the runway by mistake or by the tower, and called the tower to ask the question. Tower quickly informed the RSU controller that a clearance had not been given. As the student started his takeoff roll, the RSU controller tried to call him for an abort since he was not cleared for takeoff and did not have the IFR release needed from tower. The student did not respond to the radio call, and after a successful takeoff the student contacted RAPCON on departure and the situation was resolved. Everyone needs to know who is in control and make sure the clearance received is the right clearance.

# Maintenance Matters

**Editor's Note: The following accounts are from actual mishaps. They have been screened to prevent the release of privileged information.**

Here is a hodgepodge of stories form various issues where I had so much material that the artist had to edit some out. So here, for your enjoyment, is what you missed!

### I Stand Where?

In the busy flightline of the cargo haulers, spotting cargo is a routine task that can be hazardous to your health. Here we have a maintainer spotting an air transport forklift that was loading a pallet onto a C-17 when the forklift rolled onto his foot resulting in injury. Here is another location that is blacked out and they are using chemsticks and flashlights to load the aircraft. This individual was trained and fully qualified for the task, and was spotting the forklift up to the C-17. He was standing abeam the pallet as it approached the aircraft. The loadmaster was located on the aircraft ramp and was using a flashlight to direct the driver. As the forklift moved toward the aircraft, the spotter was momentarily blinded by the loadmaster's flashlight, causing him to lose his balance and step in front of the forklift. The forklift driver saw the spotter fall and reacted as quickly as he could to stop the forklift; however, the forklift rolled onto the spotter's foot. By not being in the right place at the right time the spotter set himself up for injury. ORM and mishap prevention takes everyone's involvement.

### Slapped A-10

After landing, the pilot taxied to parking for an integrated combat turn (ICT). A pre-shutdown inspection was accomplished and the aircraft was shut down and pushed back into the hardened aircraft shelter. The ICT was accomplished, with the pilot remaining in the aircraft cockpit at all times. After the ICT was complete, the pilot started engines and accomplished ground ops checks for the second sortie. The pilot taxied, took off, flew the second sortie and landed uneventfully.

Once parked the second time, the crew chief noticed the lower outboard edge of the bottom right deceleration board was damaged. The crew chief directed the pilot to taxi to another location where the aircraft was shut down. The cause of the flight control damage? Failure to move the B-4 stand clear of the aircraft once the chaff/flare was installed. Where was the ICT supervisor? We have had way too many minor mishaps due to equipment not being clear of the aircraft before parts were moved. Be aware of your surroundings and the next action for the aircraft. Not to mention that tech data says to clear the aircraft of all equipment.

### Gear Goes Pop

The aircraft was raised on jacks inside the maintenance hangar undergoing a landing gear retraction/extension (gear swing) test in the course of a No. 1 isochronal inspection. While performing the landing gear retraction, a loud audible "bang" or "pop" was heard by maintenance personnel performing the test. The operation was discontinued and maintenance personnel discovered the left main landing gear follow-up door was bent and sheared free from the hinge, and several connecting linkages of the assembly were bent. The damaged hinge appeared to have been *misinstalled* in reverse, such that the landing gear retraction caused a hyperextension of

the hinge, resulting in its failure. The landing gear was deemed safe to extend and the aircraft was lowered from the jacks for further investigation. A simple misinstallation, and once again we created more work for overworked maintainers. Let's do it right the first time.

**You're Fired!**

The mishap aircraft (MA) was undergoing scheduled time-change maintenance for the canopy jettison initiators. The canopy and ejection seat had been removed from the aircraft during previous maintenance actions. Mishap maintenance crew 1 (MMC1) had completed removal and replacement of both the external and internal canopy jettison initiators. They subsequently moved on to the installation of the internal canopy jettison handle. During the course of this procedure, mishap technician 1 (MT1) experienced difficulty installing the clevis pin, washer and cotter pin that joins the jettison handle to the internal initiator. MT1 spent approximately a half-hour trying to do this. As shift change approached, MMC1 prepared to turn over the procedure to mishap maintenance crew 2 (MMC2) and gathered their equipment. When MMC2 arrived, MMC1 informed them that the initiators were installed and they were currently in the process of linking the internal canopy jettison handle to the initiator.

MMC2 took over the procedure, thinking they were on step 2 of the job guide checklist. MMC2 experienced the same difficulties with installation of the clevis pin, washer and cotter pin. After several tries, MMC2 decided to attempt a re-alignment of the handle to the initiator. At the time of the mishap, MT4 was seated inside the cockpit and MT3 was leaning over the left cockpit rail. MT3 proceeded to remove the canopy jettison handle and the egress system fired. No one was injured in the incident and they quickly exited away from the aircraft.

This was a totally preventable mishap that had several causes. Can you see this happening at your base?

1. The internal canopy jettison initiator did not have a safety pin or safety wire installed.
2. The technician had removed the double strand of safety wire from the initiator, which was the safeing device.
3. They neglected to observe Step 1 of the checklist, which states: "verify canopy initiator safety pin or a double strand of safety wire and warning streamer (if substituted) is in the initiator."
4. Failure to follow tech order guidance when they neglected to attach a warning streamer to the double strand of safety wire used to safe the initiator.
5. Failure to follow tech order guidance when the initiator safety wire was ultimately removed.

**Bouncing Tow Bar**

A tow team was tasked to tow the mishap aircraft to the fuel cell maintenance. The tow team supervisor, along with four tow team members, attempted but was unable to connect the towbar to the aircraft. A second towbar was delivered and the tow team attempted to connect the second towbar, but was again unsuccessful. While attempting to connect a third towbar, the crew bounced the towbar up and down to try and engage the landing gear towing lugs to the towbar terminal plate. While bouncing the towbar, the tip gear turning bar, mounted in a carry bracket on the forward part of the towbar, took flight from its holding bracket and struck the aircraft's nose radome. The supervisor immediately stopped the connection attempt to investigate. Upon investigation, he noticed a hole in the bottom of the aircraft's nose radome approximately three inches in diameter. Higher supervision was notified and structural maintenance personnel evaluated the damage and determined the hole was not reparable at home station.

The aircraft had just returned from programmed depot maintenance (PDM) where the No. 2 main landing gear was removed and replaced. Shortly after the aircraft's return from PDM, maintenance personnel began experiencing problems connecting towbars to the aircraft. No action was taken at the time to determine the cause of the problem. The supervisor was also aware of this problem, and the tech data contains the following caution: "Exercise extreme caution when connecting or disconnecting towbar in order to prevent damage to electronic systems antennas mounted on the bottom of the aircraft..."It is a common practice to mildly "bounce" the towbar in order to connect it to the aircraft. The intensity of the bouncing is dependent on how easily the towing lugs fit into the terminal plates. In this mishap, the supervisor allowed the towbar to be "bounced" to an extreme degree. The severe bouncing of the towbar caused the tip gear turning bar to take flight and impact the aircraft's nose radome.

Following this mishap, an Air Force Engineering and Technical Services (AFETS) representative was notified of the problem. The AFETS representative discovered the No. 2 landing gear had incorrect size bushings installed on the tow lugs during assembly at depot. Hey, folks: When things are really tough, get help from the experts who are paid the big bucks to help. We all have things we do to make our job easy, like AFETS Representatives. I remember bouncing "a few" towbars myself, but make sure you have things properly secured and you don't go to extremes!

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As you may expect, that all changed in a "New York minute." As we started our approach from 31,000 feet, the SOF came back over our aux frequency and said, "Hey, you guys might want to push it up; looks like the Fog Monster is on its way." In other words, fog that develops in the Cook Inlet, and sometimes drifts temporarily over the field. We pushed it up and got set up for an ILS final and got a final ops check to get some SA on everyone's fuel state, in the unlikely event we had to divert. Sure enough, most of the jets in the formation no longer had fuel to make it the 200-mile trip to our primary divert, Eielson Air Force Base. We had been fooled by the VFR call and forecast, and now our options were somewhat limited.

We could see as we neared the final approach fix that the field was being engulfed by a thick layer of fog that made it impossible to see the runway environment. Our plan was to continue the approach and hold until the fog passed, or press to Anchorage International Airport, which had an icy runway and no cables. Executing the missed approach instructions, our No. 2 jet called to tell us they were experiencing a major electrical failure. They had no heads-up display or navigation information for the instrument approaches—they were in the dark, literally. No. 3 and 4 called for their missed approach shortly after, with No. 4 letting us know he was nearing minimum fuel. So much for the quiet night.

Prioritizing our tasks, my front-seater called for No. 2 to rejoin to a close formation while I coordinated with the SOF for a landing at Anchorage International, which required approval from the Operations Group commander. The radios were getting extremely busy as my front-seater began flying vectors to Anchorage, and while we both simultaneously worked the EP No. 2 was experiencing. As we quickly got close to final, my front-seater said, "Now, tell me about this approach we're doing?" Good question, as the final approach fix was defined from the intersection of two different fixes, and ILS for Anchorage included a side-step option, none of which we were used to doing at nearby Elmendorf. I got the approach set up, and the pilot got us captured on the glideslope and directed our wingman to land on the left runway, which was several thousand feet farther down from the right runway.

After No. 2 said they were taking over visually for their landing, we cleared them off and concentrated on our own landing on this shorter-than-usual, icy runway that didn't have cables. My front-seater made a textbook "Alaska" landing, held a good aerobrake to further help slow us down, and taxied to park without further incident. No. 3 and 4 followed us shortly after on the approach, and No. 4 scraped about a fourth of an inch on a couple of his nozzle "tail feathers" due to an overzealous aerobrake, obviously worried about the shorter, icy runway. Under the circumstances, we were pleased this was the only damage that occurred on this night.

What I learned from this flight was simply not to let my guard down, as anything can happen at any time. Additionally, spending the extra time to review the procedures at all possible diverts can save you many brain bites in the air.

Watch out for the Fog Monster.

USAF Photo
Photo Illustration by Dan Harman


**FY05 Flight Mishaps (Oct 04-Apr 05)**

**15 Class A Mishaps**
**10 Fatalities**
**7 Aircraft Destroyed**

**FY04 Flight Mishaps (Oct 03-Apr 04)**

**13 Class A Mishaps**
**12 Fatalities**
**6 Aircraft Destroyed**

| | | |
|---|---|---|
| **03 Oct** | | A C-5B sustained damage to 2 engines after multiple bird strikes. |
| **04 Oct** | | Two F-15Cs collided in midair; both returned to base OK. |
| **13 Oct** | ✶ | An MQ-1L experienced a hard landing. |
| **18 Oct** | | An F-16C tire tread separated on takeoff; barrier was engaged and gear collapsed. |
| **20 Oct** | ✈ | An HH-60G crashed during a rescue mission; 1 fatality and 5 injuries. |
| **27 Oct** | | A KC-10 had a #3 engine failure. |
| **24 Nov** | ✶ | An MQ-1L crashed during an FCF. |
| **30 Nov** | | A B-1B had an inflight fire in the aircraft equipment bay. |
| **09 Dec** | | An HH-60G had a hard landing. |
| **14 Dec** | ✶ | A B-1B nose gear collasped after landing. |
| **20 Dec** | ✈ | An F/A-22 crashed immediately after takeoff. |
| **29 Dec** | ✈ | An MC-130H impacted a hole in the runway on landing. |
| **18 Jan** | ✈ | A T-37B collided with a civilian aircraft; crew ejected OK. |
| **22 Feb** | | An E-4B suffered a bird strike. |
| **18 Mar** | ✈ | An F-16D crashed short of approach runway; pilot ejected safely. |
| **25 Mar** | ✈ | An F-15C crashed during a BFM mission; pilot ejected safely. |
| **31 Mar** | ✈ | An MC-130H crashed; 9 fatalities. |
| **05 Apr** | | A B-52H suffered a lightning strike to the radome resulting in an electronics fire. |

- 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 14 Apr 05**.



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*"Severe turbulence, icing, heavy rain, hail, lightning, windshear, microbursts and possible tornadoes are all things that can really ruin your day."*

see "Techniques To Avoid Thunderstorms", page 4