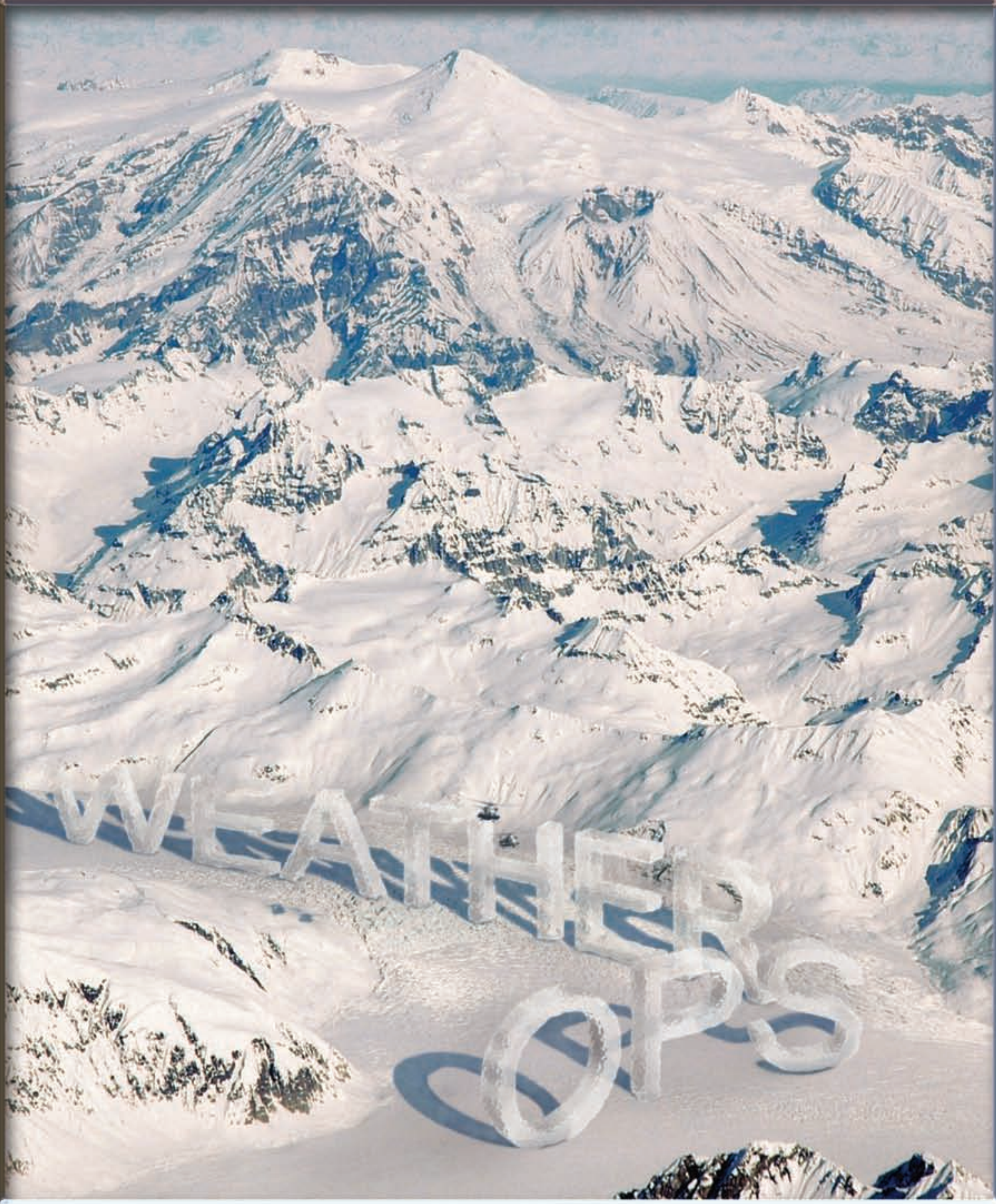
UNITED STATES AIR FORCE

FSM

NOV 2007

FLYING SAFETY MAGAZINE



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AIR FORCE RECURRING PUBLICATION 91-1

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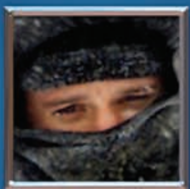

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U.S. AIR FORCE

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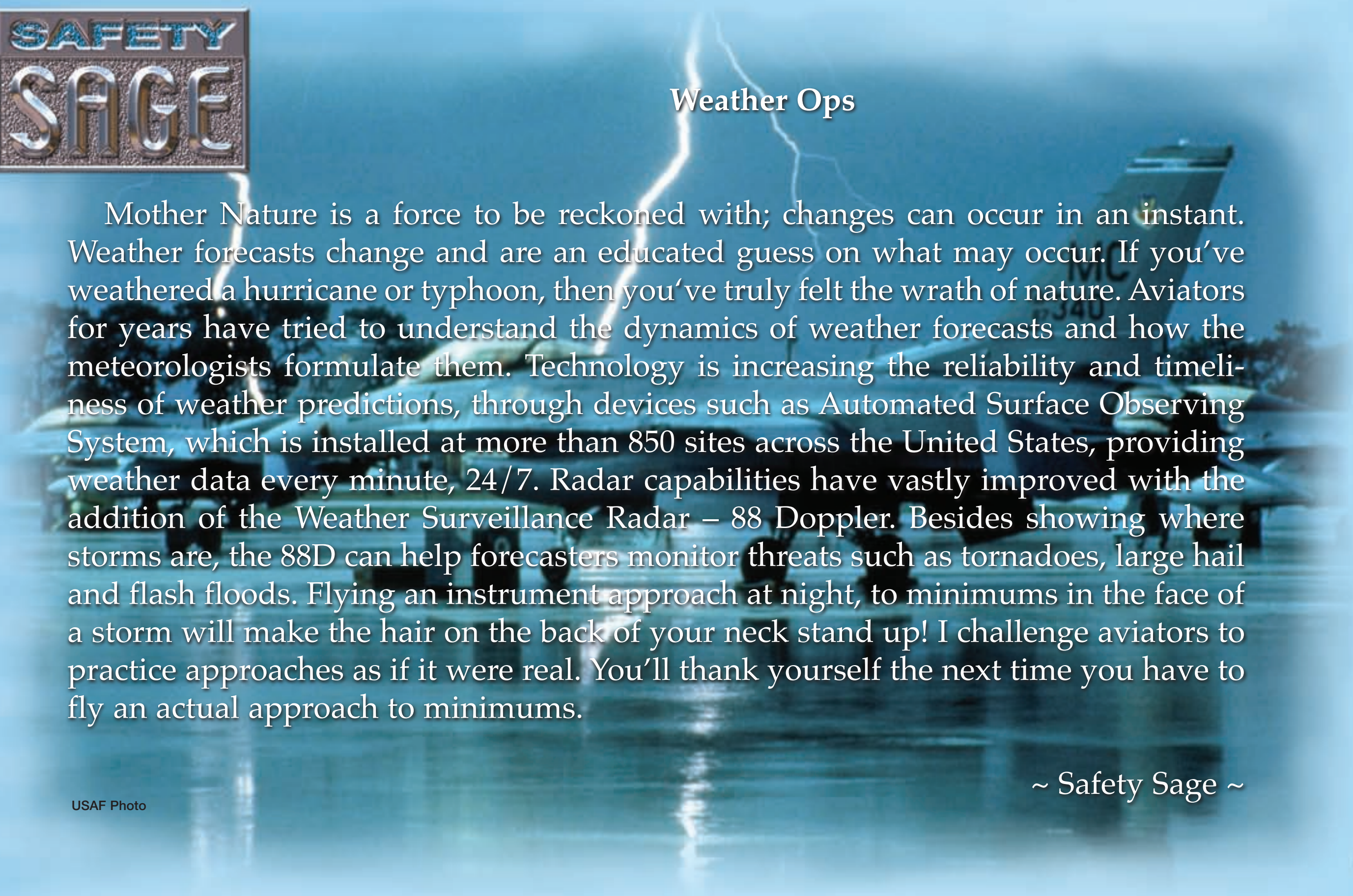
SAFETY SAGE



Weather Ops

Mother Nature is a force to be reckoned with; changes can occur in an instant. Weather forecasts change and are an educated guess on what may occur. If you've weathered a hurricane or typhoon, then you've truly felt the wrath of nature. Aviators for years have tried to understand the dynamics of weather forecasts and how the meteorologists formulate them. Technology is increasing the reliability and timeliness of weather predictions, through devices such as Automated Surface Observing System, which is installed at more than 850 sites across the United States, providing weather data every minute, 24/7. Radar capabilities have vastly improved with the addition of the Weather Surveillance Radar – 88 Doppler. Besides showing where storms are, the 88D can help forecasters monitor threats such as tornadoes, large hail and flash floods. Flying an instrument approach at night, to minimums in the face of a storm will make the hair on the back of your neck stand up! I challenge aviators to practice approaches as if it were real. You'll thank yourself the next time you have to fly an actual approach to minimums.

~ Safety Sage ~

USAF Photo

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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.

DISTRIBUTION — One copy for each three aircrew members and one copy for each six maintainers and aircrew support personnel.

POSTAL INFORMATION — *Flying Safety* (ISSN 00279-9308) is published monthly except combined Jan/Feb issue by HQ AFSC/SEMM, 9700 G Avenue, SE, Kirtland AFB NM 87117-5670. Periodicals postage paid at Albuquerque NM and additional mailing offices. **POSTMASTER:** Send address changes to ***Flying Safety***, 9700 G Avenue, SE, Kirtland AFB NM 87117-5670.

CONTRIBUTIONS — Contributions are welcome as are comments and criticism. The editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning.

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24-hour fax: DSN 246-0931
Phone: DSN 246-1983
Commercial Prefix (505) 846-XXXX

HQ Air Force Safety Center web page:
http://afsafety.af.mil/
***Flying Safety Magazine* online:**
http://afsafety.af.mil/SEMM/fsmfirst.shtml

USAF Photo by SSgt Adam R. Wooten

Cold Weather Ops

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Weather is one of those topics that everyone seems to have a "There I was…" story and I guess I'm not much different. I am, however, going to take a bit of liberty in discussing a few instances of cold weather safety instead of just one topic. I will try to take things from stepping to the jet to landing in order, but there are few areas of ground operations along the way that apply to all personnel that I will also discuss. This article is meant more as a primer for discussion, because the reality is that the discussion of cold weather operations needs to take place before the first snowfall happens so that crews are prepared, and plans are in place, ready, and possibly even practiced.

The first thing to discuss is what we do after a snow shower, ice storm, or just the standard morning frost, whatever leaves a layer of frost or ice on the airplane. AFI 11-202v3, *General Flight Rules,* states that:

5.27. Takeoff with Ice or Frost. The PIC will not take off with ice, snow, or frost adhering to the wings, control surfaces, propellers, engine inlets, or other critical surfaces of the aircraft, unless authorized by the aircraft single manager or flight manual.

5.27.1.2. Light frost (up to 1/8 inch thick) caused by supercooled fuel is permitted on the lower wing surface (i.e., below the fuel tank area) if the fuselage and all other control surfaces are free of all icing. If deicing is required on any other aircraft surface, the underwing frost shall also be removed.

The airplane, after sitting all night and collecting this frost and ice, will probably be cold soaked and the benign walk around can send a few people to the hospital with contact frostbite during ops normal. Most people have seen or heard about "A Christmas Story," when the kid gets his tongue

Wind Chill Chart

Temperature (°F)

Wind (mph) \ Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55	25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60	25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 Minutes | 10 Minutes | 5 Minutes

Wind Chill (°F) = $35.74 + 0.6215T - 35.75 (V^{0.16}) + 0.4275T (V^{0.16})$

Where T = Air Temperature (°F) and V = Wind Speed (mph)

Effective 11/01/01

stuck on the flagpole. Well, for some reason, the concept of bare skin touching cold metal doesn't universally transfer to some people during their touchy-feely walk around, and they reach out without a gloved hand (maybe due to bad habit patterns during the warmer months) and earn themselves a trip to the hospital.

Wind chill is a silent factor that is always working, especially on the ground personnel, and there should be procedures in place at your base to allow for a cold weather work rest cycle. At the very least, if you are in an area that is exposed to cold weather (no, not the 60s in Florida), have some kind of personal protective equipment that includes protection from wind and melting precipitation. National Oceanic & Atmospheric Administration (NOAA) provides the following chart that depicts wind chill factors, to include frostbite. One additional factor to consider is hypothermia. Personnel need to be cautious after doing strenuous physical maintenance or pre-flight operations to keep themselves dry or to move inside to cool off versus simply removing their outer coat and rapidly chilling their body and core temperature.

Another potential danger is the step or ladder used to get into and out of your airplane. How many people tracking snow and ice through the crew door does it take to nullify the traction tape and turn it into a slipping hazard? Better yet is when you have heat applied through the same opening to help to warm up some of that sensitive computer equipment, and the snow starts to melt and then refreeze as the heat source is moved or removed. Those couple of feet can really hurt a person lugging pubs bags or life support equipment into the airplane, if they should lose their balance and fall.

I said that I would get back to deicing and anti-icing fluid, and this is about the point during preflight where this applies. A couple hazards come from this fluid. The first is an inhalation hazard, because the fluid is being sprayed from a high pressure hose and gets atomized into a white cloud of steam. Avoid being in the same area or at the very least, have some kind of breathing device on. After the fluid is applied, you probably want to inspect all surfaces for any remaining ice and frost. Be careful during the walk around, because the same properties that make this stuff good for deicing and anti-icing also make it a slippery mess, especially on the metal used for steps and ladders. One additional area of concern is that these fluids get into everything, and during your power-up sequence, allow time for the fumes to dissipate before trying to warm up the flight deck. One minor note during this warm-up time is to give your instruments and windows a chance to warm up. The last thing you want to happen is to burn out that multi-function display or crack a window pane because you applied heat too fast. Check out your TOs for further details.

There are a few types of deicing or anti-icing fluid out there, and it is extraordinarily important to know which one(s) you have and which one(s) you're allowed to use. One type has no holdover time, which means that if you have any kind of freezing precipitation between application and takeoff that builds up on your wings, you just wasted your time and the fluid. Another type car-

Temperature Correction Chart

Height Above Altimeter Setting

Reported Temp °C	200	300	400	500	600	700	800	900	1000	1300	1500	1800	2000	2300	3000	4000	5000
0	20	20	30	30	40	40	50	50	60	80	90	100	120	130	170	230	280
-5	20	30	30	40	50	60	60	70	80	100	120	140	150	180	230	310	380
-10	20	30	40	50	60	70	80	90	100	130	150	180	200	230	290	390	490
-15	30	40	50	60	70	90	100	110	120	160	180	220	240	270	360	480	600
-20	30	50	60	70	90	100	120	130	140	190	210	260	280	330	420	570	710
-25	40	50	70	90	100	120	130	150	170	220	250	300	330	380	490	660	830
-30	40	60	80	100	120	140	150	170	190	250	280	340	380	430	570	760	950
-35	50	60	90	110	130	150	170	190	220	280	320	390	430	490	640	860	1080
-40	50	60	100	120	150	170	190	220	240	310	360	430	480	550	720	970	1210
-45	60	60	110	140	160	190	220	240	270	350	400	480	540	620	800	1080	1350
-50	60	60	120	150	180	210	240	270	300	390	450	530	590	680	890	1190	1500

HAT/HAA

Example: TACAN RWY 35 - GRAND FORKS AFB, TEMP -25ºC. (CAT "D")

Note: Must round interpolated values to nearest 10 feet.

	ALTITUDE	HAT/HAA	CORRECTION	CORRECTED ALTITUDE
MDA STR IN	1300' MSL	389'	+70'	1370' MSL
CIRCLING MDA	1480'MSL	569'	+100'	1580' MSL

ries a holdover time with a gel-like fluid that will stick to your wings and continue to act through takeoff. The problem with this is that you now probably have to change your take-off and landing data to allow for an increased takeoff speed to stream this fluid off your wings. This might change your normal operations at a runway that is just long enough, to bringing out that pucker factor as you rotate an additional 2,000 feet further down the runway. Be careful and check with your local maintenance personnel to determine which type of fluid you have, and if there are multiple aircraft types at one location, the same fluid may not work for all aircraft.

After start up, you finally get to taxi, but now you are confronted with Runway Condition Reading (RCR) and Runway Surface Condition (RSC), which can lead to a lot of problems. RCR is a measure of braking action, and RSC is the amount of covering on the surface you are moving through. The crunch points are going to be anywhere that the aircraft had stopped with engines running, allowing the snow and ice beneath them to melt and refreeze; now you have to taxi over that spot that is much slicker than previously reported. The only thing you can do, other than avoid it, is to go SLOW and be easy on nose wheel steering; because just like hydroplaning, you may not get steering control back before you end up as a conflict to another vehicle.

This often overlooked area of the AFMAN 11-217v1 and flight information handbook can mean a lot to pilots that don't want to inadvertently contact obstacles on the final approach. AFMAN 11-217v1 says this about cold weather altimeter setting procedures:

8.1.4.1. To ensure adequate obstacle clearance, the values derived from the chart below will be:

8.1.4.1.1. Added to the published DH or MDA and step-down fixes inside the FAF whenever the outside air temperature is less than 0° Celsius

8.1.4.1.2. Added to ALL altitudes in the procedure in Designated Mountainous Regions whenever the outside air temperature is 0° Celsius or less

8.1.4.1.3. Added to ALL altitudes in the procedure whenever the outside air temperature is -30° Celsius or less, or procedure turn, intermediate approach altitude Heights Above Touchdown (HAT)/Heights Above Aerodrome (HAA) are 3000 feet or more above the altimeter setting source.

So the next time you're flying that approach into Colorado Springs, Bagram, Minot, or any other airfield that is addressed above, remember to pull out the FIH and make the correction to your approach to keep your body warm and pink!

As I said at the beginning, this is really a primer for discussion. I hope that I've provided enough topic areas for discussion in your squadrons to get you thinking about the inevitability or the rare chance of encountering cold weather operations and the associated procedures. ❄

Report Those Near Misses!

Photo Illustration by Dan Harman

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Serious accidents can cause real anguish and suffering so real and vivid that persons involved or nearby bystanders rarely forget them. An accident without injury though is more like a bloodless, painless fakery of television "violence"--perhaps without real purpose in the drama and therefore easy to forget. We all remember the C-141 midair incident over the South Atlantic, but how many other incidents "almost" occurred that went unreported?

In the real Air Force, there is a danger in brushing off incidents that do not hurt, harm, or damage. When these incidents (or "near misses" as we call them) happen, we should immediately run the red warning flag up the pole. Because a non-injury accident is like a 104-degree fever, it's a positive sign or symptom that something is wrong.

Sometimes we misdiagnose or completely fail to diagnose the symptoms of near misses, because luck or blind chance saved us from injury. We have all been flying along, exactly where we're supposed to be, and have seen another aircraft whose pilot thinks he/she is exactly where he/she is supposed to be, and suddenly has to take some kind of evasive action. We may tend to shrug it off and forget the near miss with a casual kind of ignorance. Hopefully everyone agrees that it's not a good practice to rely on luck for effective accident prevention.

I was on departure from a forward operating base, turning left on the departure. A C-17 was inbound on the arrival. We were both aware of the other's presence, and the controller had given us different altitudes so that no problem should arise. However, the next thing we see is the C-17 in a LEFT bank, slicing through our altitude. It happened so fast, we couldn't take any evasive action (and the C-17 should have taken a RIGHT turn!). Bottom line, we missed one another. We continued, now *VERY* alert, to Ramstein. But 8 hours later, who wants to fill out paperwork? The problem worked itself out, right? Additionally, you ask yourself, "Was it my fault? If I report it, I may be exposing myself." Regardless of the guaranteed immunity a safety report gives you, EVERY CREW MEMBER HAS A RESPONSIBILITY TO FELLOW AIRMEN TO REPORT ANY SUCH INCIDENT!!

One of the best ways to eliminate the likelihood of future close calls is through effective root cause analysis and effective corrective action taken on near misses. The near miss may have occurred on approach, maneuvering for departure, or even at altitude. In these days of reduced vertical separation minimums, the tolerances are much tighter; therefore our vigilance needs to be even sharper. It's best to learn the real lessons from these near misses, since they are very likely to continue to occur repeatedly until an accident occurs.The primary responsibility of reporting near misses lies with the aircraft commander. The AF Form 651, *Hazardous Air Traffic Report*, is the primary means of passing the critical information from any unusual occurrence. It may seem to the basic crew member that as long as there was no harm, there's no need to report it. However, any information collected today, can prevent a mishap tomorrow.

There was a study done many years ago that found for every serious or disabling injury reported, there were about 10 injuries of a less serious nature, 30 property damage incidents, and about 600 incidents (near misses) with no visible injury or property damage.

How can you help? Report each and every near miss incident to your safety office immediately in order to help prompt investigation and follow-up actions that will reduce the potential for future near misses. Safety officers must rely upon you and your fellow Airmen to report these to them, as they just can't see everything.

If you are involved with or witness a near miss incident, remember that you or your crew members may not get a second injury-free chance to hoist that red warning flag up the pole. Do your part to help make the skies safe for everyone involved. Report those near misses to your flight safety officer immediately!

"Fighter Pilots Don't Duck Under ... Do They?"

CAPT GARY GREICAR
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USAF Photos / Photo Illustration by Dan Harman

Have you ever heard this briefed? "The forecasted weather is pretty crappy, 500 and 2 with rain. Make sure you're on your A-game on final. We'll be heavy weight, so do your best to land on speed. Try to touch down within the first 1,000 feet, but don't duck under or anything." A simple variation of this may be all that will be mentioned about landing in the ten or so minutes spent on "motherhood" in a typical one-hour fighter brief.

Recent fighter mishaps have highlighted a potentially dangerous trend of pilots "ducking under" while landing from instrument approaches. While pilots aren't intentionally "ducking under," they may be victims of some negative habit patterns. Air Force Manual 11-217, Volume 1, *Instrument Flight Procedures*, is the guidance for Air Force pilots to execute instrument procedures. The problem, I submit, is that the average fighter pilot spends less then two hours a year actually reviewing this regulation. Reviewing instrument procedures often takes a back seat to studying weapons and tactics manuals, preparing for deployments, cleaning the squadron, performing additional duties in your one-man shop, mission planning, and flying that next pit-n-go. In order to help you with ever-present time crunch, I'll highlight some of the manual's landing points to keep you safe on your next approach.

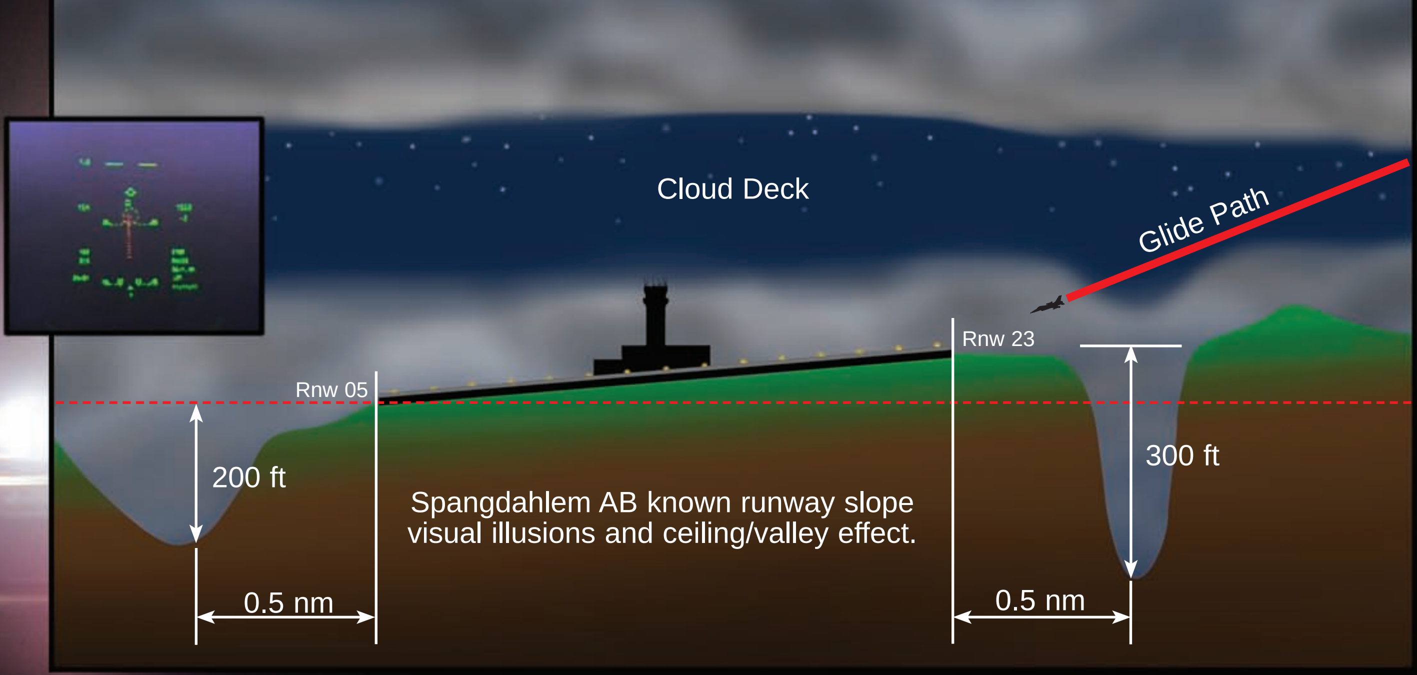
There is often a weather experience disconnect between pilot training and operational flying that doesn't set up pilots for success. The average fighter pilot may have gone to pilot training in Texas and then accomplished fighter upgrade training in Arizona. By the time they hit their first operational assignment in Asia or Europe, they may have very limited actual instrument meteorological conditions (IMC) experience. Top that off with mountainous terrain, night sorties, known airfield visual illusions, foreign countries, and low ceilings/visibility, and the new fighter pilot is faced with an extremely demanding flying environment.

Every fighter pilot strives to land approximately 500 feet from the threshold on a visual pattern and landing. Where fighter pilots get into trouble is when they try to land within that same parameter from an instrument approach. What are your personal minimums for transitioning to a visual landing picture verses aiming at the glide slope point of impact? It seems that most fighter pilots don't have one, and TLAR (that looks about right) is the landing technique of choice. The question fighter pilots need to reevaluate is what are the tools to obtain the "right" picture for the visual transition?

AFMAN 11-217V1, Chapter 15 discusses landing from instrument approaches. 15.2.2 sums up the typical fighter pilot pitfall: *"Studies have shown that the sudden appearance of runway lights when the aircraft is at or near minimums in conditions of limited visibility often gives the pilot the illusion of being high. They have also shown that when the approach lights become visible, pilots tend to abandon the established glide path, ignore their flight instruments, and instead, rely on the poor visual cues."*

If you are flying the proper precision glide slope, your flight path marker (FPM) or velocity vector (VV) will not be on the runway threshold when you break out of the weather. It will more likely be somewhere 750-1250 feet down the runway on the glide slope point of impact. Fighter pilots get into trouble when they see this picture and abruptly try to transition to a visual pattern picture to touchdown closer to 500 feet down the runway. AFMAN 11-217 throws out the following warning: *"Any abrupt attitude changes to attempt to bring the projected touchdown point into your visual segment may produce high sink rates and thrust or lift problems at a critical time. Those so-called duck-under maneuvers must be avoided during the low visibility approach."*

Most fighter pilots probably haven't read about a duck-under since pilot training, so I will quote the AFMAN 11-217 definition: *"The duck-under situation occurs when you attempt to land within the first 500 to*



1,000 feet of the runway after breaking out of an overcast condition. In this case, you may attempt to establish a visual profile similar to the one you use most often. Establishing the visual profile usually involves reducing power and changing attitude to aim the aircraft at some spot short of the end of the runway. In this maneuver, you may attempt to use as much of the available runway as possible because of a short runway or due to poor braking conditions. The duck-under is not recommended since high sink rates and poor thrust/lift relationships can develop which may cause undershoots or hard landings. Base your landing decision upon the normal touchdown point from the instrument approach, and if stopping distances are insufficient, proceed to an alternate."

The advent of the T-38C introduced the Head-Up Display (HUD) to fighter track student pilots. Pretty much all new fighter pilots are now known as "HUD babies." They can't fly without it. While the HUD is a valuable tool to use while flying instruments, it should not lead to a breakdown of your basic instrument cross check. Besides, they do tend to fail on occasion, so pilots need to be proficient in HUD-off approaches and landings. AFMAN 11-217, Chapter 20 discusses the uses of the HUD during instrument flight. Here is a quick quote: *"The HUD's location within the pilot's forward field-of-view: it can facilitate the transition from instrument flight to visual acquisition of the runway. Immediately upon visual acquisition of the runway, ensure the FPM/VV is coincident with the intended touchdown zone. If it is not, smoothly correct the flight path or discontinue the approach."* Sounds simple enough, but dudes are screwing it up.

Ask yourself this question: "What do I look for when I begin to break out of the weather?" Approach lights and the runway environment are the obvious answers, but what do you use to evaluate your glide slope once visual? I already discussed the FPM/VV and that it should be coincidental with your runway point of impact. When you break out, you need to cross check that your FPM/VV is aimed approximately 1,000 feet from the threshold and that it is also on a 2.5 – 3.0 degree wire. If you are below that wire or aimed short, it's time to level off and then re-intercept the glide slope. If you are steep or aiming long, you can accept a long landing or go missed approach. Don't ever be afraid to take it around for another attempt. Another great tool to cross check your glide slope during your visual transition is the precision approach path indicator (PAPI) or visual approach slope indicator (VASI). The lights are just as useful during the day as at night, so use them! Your FPM/VV should be pretty much abeam those lights, all the way through your transition to the flare. Be advised that sometimes the PAPI/VASI is not coincidental with the approach glide slope. This will be written on the approach plate, so make sure you read all the notes.

Lastly, have you ever seen approach lights that were too bright at night or too dim during the day? Who owns the approach lights when you are flying an approach? You do. If you don't like them, tell tower to change the intensity for your remaining flight members, or at least tell the flight what to expect to see on final. The last thing you want to be doing is readjusting your HUD as you are transitioning to land. Useful nuggets like when you broke out, visibility, lighting issues, and crosswind factors could be key information for the safe execution of an approach by the next pilot down the chute.

In summary, fighter pilots don't spend enough time studying instrument flight procedures due to the nature of the missions. Don't let poor landing transition habit patterns put you in a dangerous situation. Spend a few minutes in the brief talking about your transition techniques and evaluating your execution in debrief. There is an art to landing 500 feet down every time, so you can do it when a situation requires it. Don't practice that skill on those low ceiling days and be the next guy to land in the overrun, take out some approach lights, or damage a perfectly good airplane.

Weather Woes!

ANONYMOUS

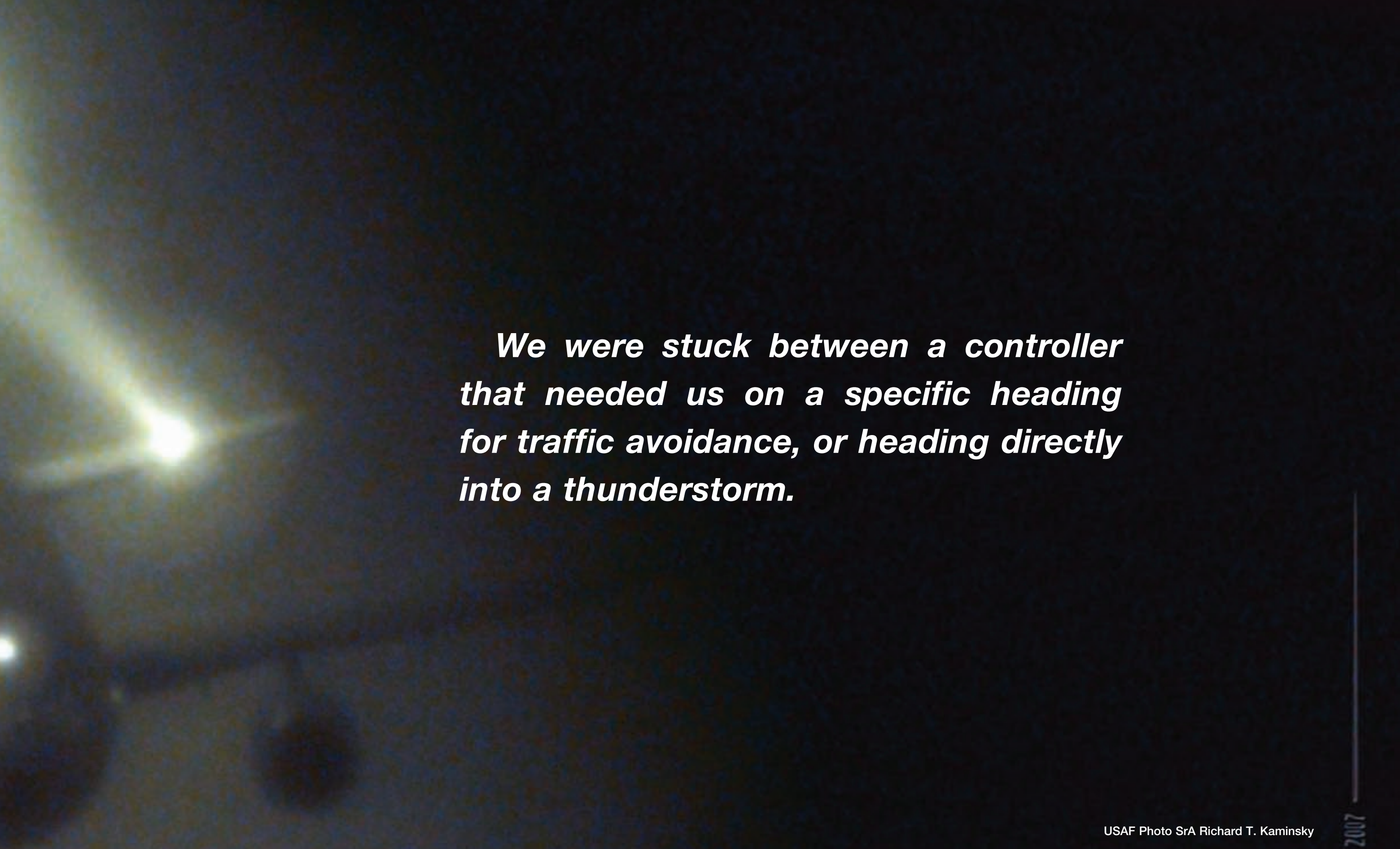
It was a beautiful Canadian morning. The air was so refreshing that you couldn't take enough deep breaths. The mission was dragging foreign fighters from Canada to New Mexico. The plan was for the fighters to depart the formation in Southern Colorado and continue on their own to their destination, and we would make a left turn toward the East Coast. The fixed base operation we were working out of was not ideal. The computers were not working that day, so the majority of our planning and coordination was done over the phone. The weather outlook was good for the majority of the mission, but there was a chance for thunderstorms upon our arrival into McGuire.

The departure and join up went as planned. The formation of five fighters and one KC-10 was headed south into the states. The fighters took their offload plus a little more. During mission planning, we requested a little extra gas, due to the fact that we might have some weather avoidance issues later in the day. Over southern Colorado we coordinated the formation breakup with ATC. The fighters continued south, and we made the planned left turn to McGuire.

Knowing the weather could be questionable upon our arrival at McGuire, we contacted metro in route to get a weather update. Again the report was for scattered thunderstorms. We took a quick look at our gas, and we had quite a bit more than the flight plan called for. We could hold for a while and still have divert fuel. As we passed over the border into Pennsylvania, it was pretty evident our day would get interesting, as we could see the thunderstorms building in the distance. We ran our descent checks and the aircraft commander (AC) implemented some CRM and assigned the additional crew member with an extra task. We had the boom operator up on one of the UHF radios, giving us continued weather updates from metro.

We had the weather radar up and painting some pretty intense cells in the distance now. We began our descent, and not long thereafter, we received holding instructions from ATC. ATC advised us that the weather was backing up traffic getting into the Philadelphia area. We entered holding as assigned and reevaluated our situation. We calculated a bingo fuel to continue and then divert to Wright-Patterson. The weather reports were good for Wright-Patterson, and we felt comfortable with our decision. We continued to get updated weather reports for McGuire. It seemed the build-up was between us and McGuire. McGuire was only reporting 4,000 ft ceilings and light rain.

It was no more than two or three turns in holding, when we received clearance from ATC to continue flight plan route and to continue our descent. We were painting some thunderstorms on radar, but the flight plan route was going to keep us clear for now. Not even five minutes had passed since our last clearance, and once again we received holding instructions. You could hear the tension in the controller's voice as the radios kept getting busier and busier as we headed east. Again, we entered



We were stuck between a controller that needed us on a specific heading for traffic avoidance, or heading directly into a thunderstorm.

USAF Photo SrA Richard T. Kaminsky

holding, but had to request left-hand turns, since the holding pattern was putting us too close to the building thunderstorms. Once again, we set a bingo fuel for a divert to Wright-Patterson.

As we sat in holding, we built up our situational awareness by maintaining weather updates at McGuire and by listening up on the radios, staying attuned to other aircraft ahead of us diverting around the weather. Now we were within a hundred miles of McGuire. We were getting reports through ATC that traffic ahead was making it into Philadelphia with only heavy rain.

We received our clearance to continue. I was flying, and the AC was on the radios, while the engineer and boom operator were backing us up. Our first heading out of holding was sending us straight into a thunderstorm. We requested a deviation, and it was granted. We were below ten thousand now and within 50 miles of McGuire in IMC conditions. Philadelphia approach was now controlling us. The controller was extremely busy and the tension in his voice was readily apparent. The controller gave us a heading. We reported back that the heading was going to take us right into a thunderstorm. We turned in the direction of the heading, but reported back what our new heading would be, to remain clear of the thunderstorm. The controller reported back emphatically that he needed us on the previous assigned heading. Now we were stuck between a controller that needed us on a specific heading for traffic avoidance, or heading directly into a thunderstorm. We reported back that we could not take that heading and requested a more southerly heading at that time. The radios were extremely busy and it was difficult to get clearances from ATC. We were forced to make slight heading changes on our own without ATC clearance, or risk flying right into the thunderstorm. The controller was working with us as best he could. We were now within 10 miles of the field, but on the wrong side of the field. The weather was breaking up a little below us, but along the approach path, we were still painting thunderstorms. The controller again was giving us a heading back into the weather. The AC took a quick look at the gas. We still had the gas for our Wright-Patterson divert option. He then made the decision to divert. He requested a climb and clearance to Wright-Patterson. We diverted to Wright-Patterson uneventfully.

There were many lessons learned for me as a young co-pilot that day. I was impressed with the entire crew. The crew pulled together, used good CRM, and let the AC be the AC when it was his decision to divert. The weather that day was bad, but the additional traffic and an over tasked controller was what ultimately led us to divert that day. Had we been the only aircraft in the area, we could have easily avoided the thunderstorms and made it into McGuire. So the biggest lesson learned for me was not only do you require an understanding on how the weather will affect you and your destination, but also how it may affect the environment around you: ATC, for example.

Flying VFR In The Weather!

MAJ MARK LOZIER
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I had been at the top of my game – about a thousand hours as a co-pilot in C-130Es and able to fly any mission our squadron could offer, from the right seat, that is. Now the tables were turned. I was about to go to aircraft commander (AC) school and had started a series of flights from the left seat to prep for the course at Little Rock. Its strange how switching seats makes such a big difference. I had almost adjusted to the different sight picture from the left seat, so my landings were progressing, although I still tended to land in a slight crab. The biggest adjustment was training my brain to use the left hand for the yoke and the right for the throttles. What had been second nature last week, now took considerable thought and fine-tuning to fly with some semblance of ability.

Today's sortie was a six-ship tactical; we would take off to the east, fly for about 30 minutes in the visual pattern at our aux field, then fly 4 low-level routes, a mix of visual and instrument flight rules (IFR) airdrops using station-keeping equipment (SKE) to maintain position in the weather. I would spend most of the flight as the number 2 aircraft in the first element. There were three elements, and back then, we flew three-ship elements with phantom wingmen to fill the remaining spots in each element. I was quickly learning that the duties of co-pilot and AC were vastly different when flying tactical. As a co-pilot, I would usually chart read and give visual aim points to the pilot. I would run the radios, program SKE, and maybe fly for a few minutes on each low level. As the AC, though, I would have to set the pace for the flight. Now I would have to call for the appropriate airdrop checklists, while concentrating on hand flying and maintaining position behind lead.

The SKE routes were a little easier, since we flew position off our instruments. It's a little like flying a 35-minute instrument landing system (ILS), but once you matched speed, maintaining position was usually a matter of fine tuning. The visual routes were another story. With all the yanking and banking, we constantly made large control inputs to maintain spacing as lead maneuvered around pop-up threats. With the lack of dexterity that came with switching seats, it was a constant battle staying out of wake turbulence. We were almost halfway through our last low-level route of the day, and I was getting pretty tired. We had been pushing low ceilings throughout the day, and it was about to bite us.

Standard wing spacing was 2,000 ft, but I still managed to overrun and pass the lead aircraft. He had slowed down to avoid being early on the run-in to the drop, and I had simultaneously put in a large power correction to get back into position. Unfortunately, I didn't catch the overtake in time and ended up to the right and slightly ahead


USAF Photo by SrA Julianne Showater

of the lead aircraft. A few seconds later, Murphy stepped in, and we hit the low ceilings. Now we were in and out of the scud, as I attempted to lose airspeed and resume position as number 2, while lead was switching to instruments and recovering the formation using SKE. It didn't take long before we were solid IFR. Meanwhile, the SKE proximity warning horn was going off and the gear warning horn was also blaring, since I had the power so far back. What started out as something worthy of buying beer in debrief, soon became an event almost resulting in a need for surgical removal of a seat cushion.

I don't know if other airlift squadrons are the same, but we generally need to relearn this lesson about once each year. *Don't push the weather!* We tend to get complacent since we have formation procedures and SKE onboard in the event of inadvertent weather penetration. It's not a big deal, right? (Never mind the risk of violation for busting VFR flight rules.) With the flip of a few switches, we could have a top down view on SKE showing the location of all six planes in our formation. Meanwhile, start a climb to minimum safe altitude (MSA) while lead picks up an IFR clearance, transition to SKE, drop back to 4,000 ft IFR spacing, and fly home. If SKE is inoperative, then the procedure is a little more involved–climb to the MSA plus 500 ft per element to deconflict, establish an offset vector for 2 minutes based on your formation position, then return to the base heading, work individual clearances, and come home single ship. Today Murphy had an extra surprise.

As we punched into the weather, the back two elements made the right decision and turned further west to avoid the clouds we had entered. That bought them enough time to make the transition from VFR to IFR while still in the clear. Now, if you aren't familiar with SKE, some important points to note are that there are four frequencies available for use, and one aircraft (usually near the middle) in the formation is designated as master to synchronize the timing signals. In our case, second element lead was the SKE master. When the other four aircraft broke off and stayed clear of the weather, they decided to select another SKE frequency and make their own way back to home station. That way, they wouldn't interfere with us on the original frequency. Unfortunately, for the two of us in the clouds that were demonstrating the big sky theory, as soon as second element lead selected an alternate SKE frequency, we no longer had synchronization for our SKE equipment. We were now blind. What had been a minor problem now became a much bigger problem. At the time, we didn't realize that the SKE could lose synchronization so quickly, or that we needed to select a new SKE master for our two-ship formation. As we continued the climb through the clouds, I still remember catching a glimpse every 5 to 10 seconds of lead's anti-collision beacon as we passed through intermittent thinner cloud patches – all the while, trying to regain something resembling a standard formation position.

As I was contemplating how to accomplish the inadvertent weather penetration without SKE procedure from my irregular position of about 300 ft to the right of lead, I continued to demonstrate my lack of dexterity in operating the flight controls from the left seat. Luckily the cloud deck was only a few thousand feet thick, and in due course, we popped out on top with safe separation. Thankfully, the remainder of the flight for both groups of aircraft was uneventful.

In time, I adapted to flying from the left seat, and then got to demonstrate proficiency from either seat as I progressed to instructor and evaluator. But I will never forget how I learned that complacency and reliance on systems that may not be operating when you need them can make a bad situation much worse. Don't just brief inadvertent weather penetration as "standard." Go out and practice the procedure, so that there are no surprises when it happens for real. Think through the effects of changing SKE frequencies on others in your formation, before someone loses presentation. Hopefully, some of you will learn from my mistakes – fly safe!

The Perils Of Icing

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As I was upgrading to aircraft commander in the KC-135, I experienced a situation we often hear about in our training, but never really think it's going to happen to us. It was late December at Grand Forks AFB, and I was going out to fly a pattern-only to complete the last few requirements for my upgrade training.

USAF Photo

My instructor pilot, boom operator, and I showed up for our mission planning and received our weather briefing. The weather was overcast at 1,000 ft and five miles of visibility, and then our briefer said something they say a lot in Grand Forks: forecast light rime icing in the clouds. Being winter and already experiencing two winters there, I didn't think much of it, just like I always had. Because the entire crew had been at Grand Forks for a little while, we really didn't cover any of the weather in our briefing, because after all, it was just forecast.

We finished up in base operations and headed out to our aircraft. The pre-flight went well, we started engines, and headed out to the runway. Our plan was to do about two hours of pattern work and then call it a day, so I could take my check ride in a couple of days. Little did I know, this was going to be the start of an experience I will never forget in the tanker.

I did the takeoff from the left seat and started to think about my first approach, a four engine ILS touch-and-go to get warmed up. The radar pattern started out without incident, but then got a little weird. I received vectors to turn base, and I configured with flaps and gear, one of my normal habit patterns, and added power to compensate for the extra drag. It was right here where everything started to feel funny to me. It was taking more power than I expected to hold my altitude and air speed. I just shrugged it off, because I was still pretty inexperienced in the left seat.

As we turned to intercept final, I started to notice some ice build-up on our windshield wipers. This is where the first visible indications of icing normally occur on the KC-135. I intercepted final, configured for landing, and started down the glide slope. I again noticed my power was four percent higher than I expected, and the aircraft seemed sluggish on the controls. I again didn't say anything to my instructor, because I was still new in the left seat, and had never really experienced icing before. As we got to about four miles from touchdown, I was still adding more power to maintain my approach air speed and stay on glide slope. It was here when I finally said something about the extra power I was carrying, in order to keep the aircraft on the ILS. The instructor looked at me and replied, "You're right, what are you going to do about it?" I turned and told him this really didn't feel right, and I was going to go around when we got to minimums, since I had a funny feeling about it. As the aircraft approached minimums, I executed a go-around and started to think about what was going on and what to do for my next approach.

At this point, the icing was starting to get worse, and a ball of ice about an inch in diameter formed on the nut that holds the wiper on. The crew and I briefly talked about continuing, because after all, it was just a training mission. We decided to keep going and try to get all of my training accomplished before calling it quits. By then, we were established on downwind and started to prepare for my second approach, another four engine ILS. All of a sudden, I was watching my altimeter and air speed pointers start to go nuts. The altimeter was going up and down about 300 feet, and my air speed pointer was gaining and slowing about 15-knots each direction. I immediately confirmed this with the instructor's instruments and his were deviating almost as much, but not in unison with mine. The funny thing about it was that I couldn't feel the aircraft changing altitude or air speed. I asked my instructor if he was seeing the same thing, to make sure I wasn't making this up, and he confirmed what I was seeing. We both stopped for a second, looked at each other, and I broke the silence by saying this was going to be a full stop, and we were going to be done for the day.

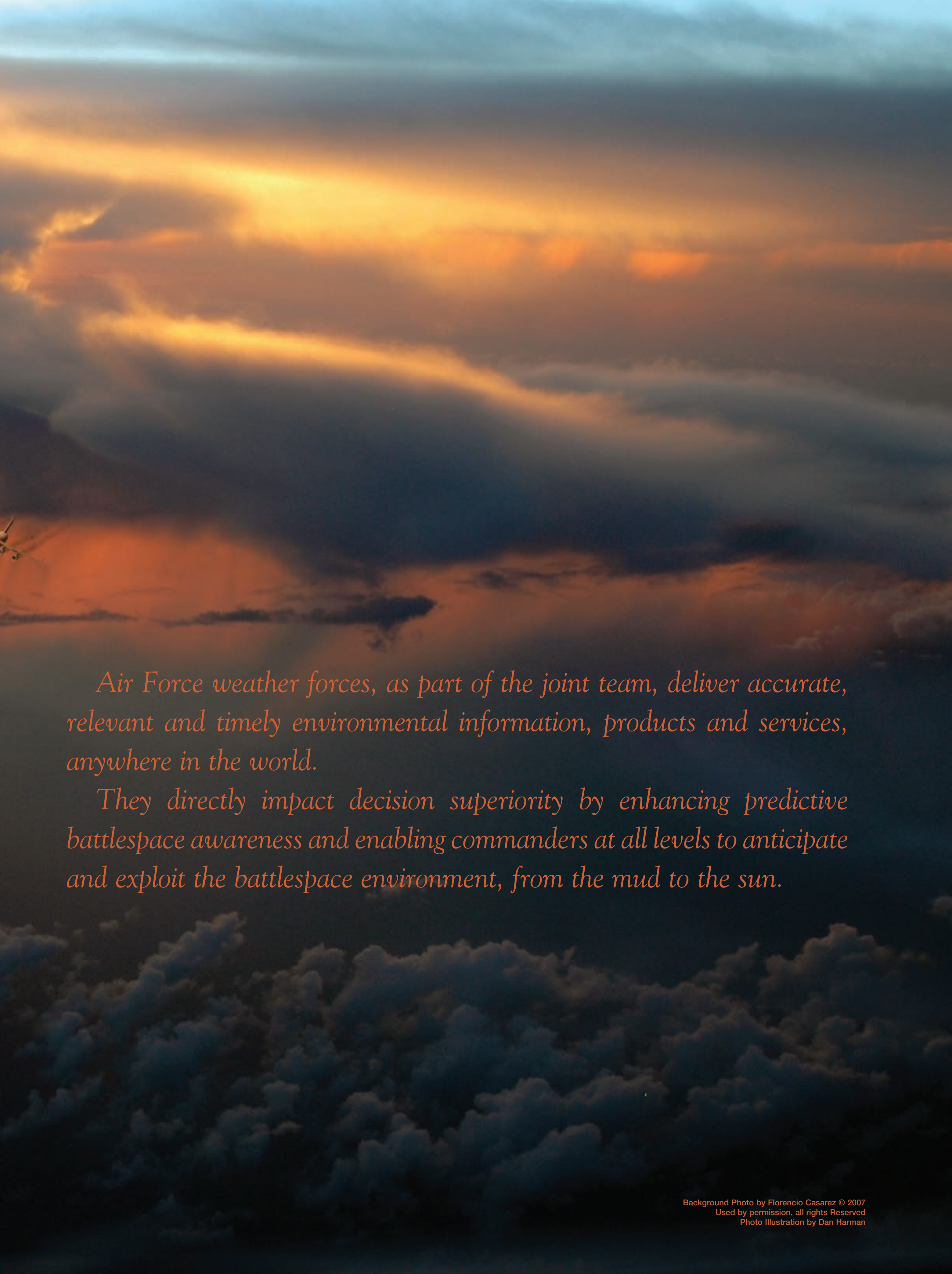
We finally looked a little bit harder at the wings and engines now, and discovered we were starting to accumulate ice on the leading edges of the wings and also the engine spinner cones. We talked to approach control, asked for tight vectors, and gave them a pilot report about the moderate icing we were experiencing in the clouds. I decided to fly the approach 10-knots fast to help make up for the extra weight caused by the ice build-up, because I wasn't sure how much was really there. We flew the rest of the pattern with the extra speed and landed without event.

I taxied the aircraft back to the chocks and shut down the engines. It was here where I got my first glimpse of what ice accumulation really was. As I did my post-flight walk around, I saw ice everywhere. There was at least ½ to 1 inch of ice on the leading edge of every surface in the aircraft, including the flaps, wings, and landing gear. Looking at the engines in particular, there were two-inch inverted cones coming off of the engine spinner cones. And to my surprise, there was even two inches of ice on the front point of our HF antenna on top of our vertical stabilizer. There was ice everywhere.

Looking back on this flight, the results could have been a lot worse than they turned out to be. Not accounting for that much ice build-up could have been disastrous. The KC-135 flight manual references icing: *"Flight in moderate icing should be avoided whenever possible, and if encountered, will be exited as soon as conditions and situation permit"* (1C-135(K) R(I)-1, p. 7-24). I found out that day that icing is not something to be taken lightly. Since 1994, there have been four aircraft severely damaged or destroyed because they entered icing conditions (AFSAS – 3 Class A mishap reports 1994, 1999, 2001).

All of these could have been avoided if they had just thought about what icing does to aircraft. I got lucky that day because I was able to land the aircraft safely. It's something I will always remember and think about when I get briefed on icing conditions.

Weather Ops



Air Force weather forces, as part of the joint team, deliver accurate, relevant and timely environmental information, products and services, anywhere in the world.

They directly impact decision superiority by enhancing predictive battlespace awareness and enabling commanders at all levels to anticipate and exploit the battlespace environment, from the mud to the sun.

Background Photo by Florencio Casarez © 2007

Photo Illustration by Dan Harman

Avoiding The Slippery Slope To A Mishap

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Wintertime ops present many new challenges for the flying world, especially if you live in a cold climate. Extremely cold temperatures, snow, ice, low runway condition readings (RCR), fog, and night flying are some of the factors that pilots must consider during the winter months. If you live up in Alaska, as I do, you face all of these elements simultaneously every time you step to fly. The ORM process for these flights starts at the mission planning phase and doesn't end until you're back in debrief. During the winter, the saying "Go slower to get there faster" is more applicable than ever, and in a training scenario, you need to know when to call 'knock it off' if the risks outweigh the reward.

Being in Alaska for two winters and facing bad weather and ice, and experiencing a 50,000 lb Eagle doing spins on a taxiway, I learned that caution and risk analysis are paramount. One experience last winter put my ORM process to the test. A four-ship of F-15C Eagles diverted into Anchorage International Airport after a Strike Eagle shut down the runway at Elmendorf AFB. The reported RCR readings at the airport were all within limits, and they landed uneventfully. As No.2 pulled off the runway and his jet did a 360 degree spin, it was clear that the taxiway and ramp was a little slicker than reported. In fact, the entire parking area was covered with a thin layer of ice. After shutdown, airfield management was contacted to remove the snow and ice, so we would be able to get our jets home the next day.

I was part of the four-ship that went to the airport the following day to pick up the jets and fly them home. Although the airport services ensured us that the RCR readings were within tolerances, the fact that we could barely stand up without slipping next to our jets and a snow storm rolling in, we decided to cancel that day's sortie and return the following afternoon to try again.

Understandably, the wing was eager to get the jets back home. When we went out to our jets, we again found the ramp too slick to taxi, and we refused to take the jets until the RCR conditions improved. After waiting around in the airport for six hours, the taxiway was finally good enough to get out of there and fly back home. Our mission had gone from a daytime air-combat maneuvering (ACM) sortie to a nighttime "just get the jets home" sortie. As we were finally about to step out to the jets, we received a call from the SOF telling us to hustle up because the winds were picking up, and blowing snow could soon cause the runway at Elmendorf to fall below RCR limits. Our expectations for a smooth sortie dwindled with this latest news. The last thing we wanted was to take off and have to divert back to the international airport.

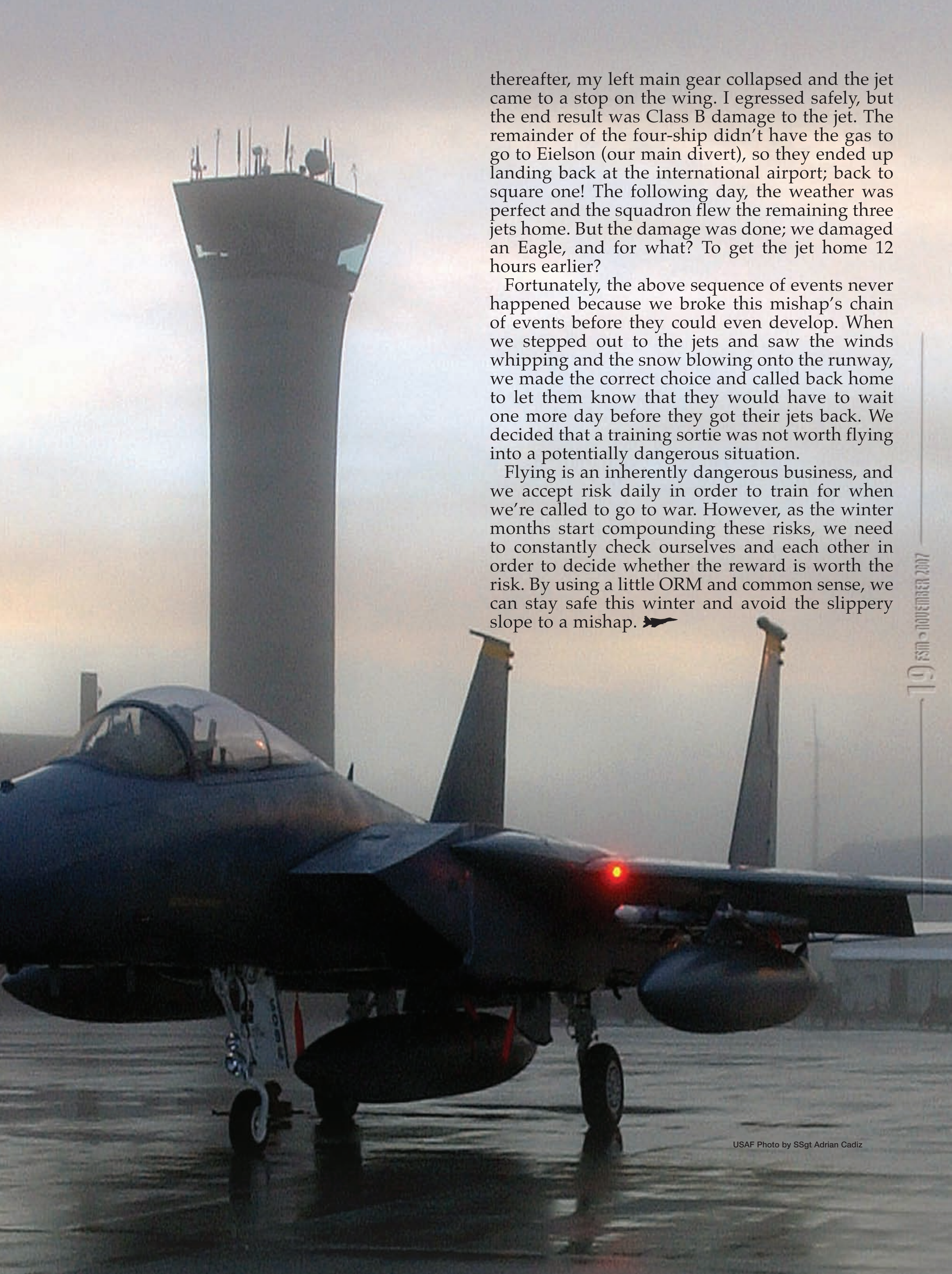
After briefing up our mission, we hurried out to our jets. We were pressing pilot rest times and were up against crosswind limits and blowing snow. The winds were whipping and the blowing snow started to accumulate as we took the runway. We gave one more call to the SOF to make sure we would still be able to land back at home. We were told that the sooner we could land the better, as the winds and RCR readings were getting worse. Takeoff was uneventful, and we got out to the airspace and burnt down gas as quickly as possible so we could get these jets on the ground ASAP. We started our return to base as two separate two-ships in trail formation. I was the first one in the string on an ILS approach for a full stop back at Elmendorf.

On short final, the crosswinds were noticeable, and it took a considerable amount of control inputs to land on the centerline of the runway. As my Eagle settled to the ground, the crosswinds in conjunction with the low RCRs due to blowing snow caused my jet to drift toward the edge of the runway. Despite correct control application, the jet continued to slide towards the edge until it departed the runway. My right main gear dug into the snow causing me to swerve to the right. Soon

thereafter, my left main gear collapsed and the jet came to a stop on the wing. I egressed safely, but the end result was Class B damage to the jet. The remainder of the four-ship didn't have the gas to go to Eielson (our main divert), so they ended up landing back at the international airport; back to square one! The following day, the weather was perfect and the squadron flew the remaining three jets home. But the damage was done; we damaged an Eagle, and for what? To get the jet home 12 hours earlier?

Fortunately, the above sequence of events never happened because we broke this mishap's chain of events before they could even develop. When we stepped out to the jets and saw the winds whipping and the snow blowing onto the runway, we made the correct choice and called back home to let them know that they would have to wait one more day before they got their jets back. We decided that a training sortie was not worth flying into a potentially dangerous situation.

Flying is an inherently dangerous business, and we accept risk daily in order to train for when we're called to go to war. However, as the winter months start compounding these risks, we need to constantly check ourselves and each other in order to decide whether the reward is worth the risk. By using a little ORM and common sense, we can stay safe this winter and avoid the slippery slope to a mishap.


USAF Photo by SSgt Adrian Cadiz

Sleep Improvement


USAF Photo

1LT CHRISTINA DALUZ
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Recently I was invited to teach a one-hour class at the Health and Wellness Center (HAWC) on sleep. Hmm, that's a pretty big topic to tackle and if you're like me, you're thinking, "What about sleep?" I soon found out that the folks at the HAWC were marketing this as a "sleep improvement" class. At first I was a little stressed about this, because one of the only things I knew about sleep was that I couldn't get enough of it, especially after my 4-year sleep deprivation experiment called, "college." After I thought about this for awhile, I relaxed, because it occurred to me that no one attends those classes, anyway. So like any good teacher would do, I did my homework, I read tons of information, and prepared my slides.

My class was scheduled for a Tuesday afternoon from 1200-1300. I showed up early to "pre-flight" the equipment, because as Murphy would have it, the only time you don't do that, things go wrong. And, as I expected, there were a only a few people sitting in the classroom. Slowly but surely though, a few more people showed up, then another few, and it continued this way until there was standing room only. I had fully planned on having older retirees and housewives in that room, but as I looked around, I had quite the motley crew–from civilians to Chiefs to full-bird Colonels, and everyone in between. When I saw this diverse group, I assumed they were there as supervisors to help get information for the shift workers under their supervision. After having everyone introduce themselves though, I found out that they were there solely to (gasp) improve their sleep. So if you're reading this in hopes of improving your sleep, know that you are NOT alone.

So why do so many people need help with this basic biological function? There are many different reasons, but I believe a primary reason is because our society often sees sleep not as a necessity, but more of a luxury. If you've looked at the newsstand lately, you've probably seen articles on sleep research that link fatigue with a myriad of negative things, such as decreased performance (in fact, it is estimated that lost productivity costs approximately $18 billion per year). If you look at mishap statistics, you'll see the high price of fatigue not in dollar amounts, but in loss of life. I realize though, as I'm sure you do, that not everyone who is tired is or will be involved in some type of mishap.

After researching sleep, I did come across something interesting that most Americans will be involved in–the battle of the bulge. I know this is the case because statistics show that more than half of the U.S. population is overweight while about 30 percent are obese. You see, when we sleep, our bodies are hard at work. If we don't get enough sleep though, our bodies don't have time to perform all necessary functions, including hormone production. In particular, those hormones that tell us when we are hungry or full are thrown out of balance with sleep loss. This can lead to weight gain or further difficulty taking those few extra pounds off. Oftentimes those added pounds can lead to a worse sleeping problem than they started with.

Being overweight often causes fat to build up near the back of the throat causing a sleeping condition called sleep apnea. Sleep apnea causes an individual to wake up throughout the night, sometimes up to hundreds of times, because they stop breathing. This disruptive sleep denies that person the deep sleep that is needed to feel refreshed the next day. This vicious cycle of sleep problems and weight gain can be extremely difficult to overcome. Additionally, those extra pounds can also lead to heart problems. Research has also shown that sleep loss can cause cardiovascular issues, such as increased blood pressure.

How then do we prevent ourselves from becoming part of this cycle? There are quite a few things that we can do to improve our quality of sleep. Exercise is a great way to start. Although researchers don't know why exactly we sleep, one theory points to a drop in body temperature; this is called a thermogenic hypothesis. Exercise mimics this natural drop in body temperature. When we work out, we raise our core body temperature, and following the workout, our core temperature will fall below what it was to begin with (recommend a gap of two-four hours between workout and sleep). Researchers believe that this drop in temperature helps induce sleep.

We can also create an environment in our bedroom that is conducive to sleep. Your bedroom should be dark and cool; the ideal temperature is between 68-72 degrees. Bedding is also an important consideration, and if you've visited your local mattress store, you can see that it's big business. If it's been more than 10 years since you purchased a new mattress, then it's probably time to think about getting a new one. Now, unfortunately there is no tried and true formula for picking out a mattress, so plan on trying out a lot in the store. The same idea goes for your pillow: if it's been more than about a year since you changed your pillow, it's probably about time. You spend between 2,000 and 3,000 hours (that's 83-125 days) each year lying on your pillow, so spend a little time and money on getting exactly what you want.

The environment outside our bodies is key to helping us get a good night's sleep, so what's inside our bodies? You should limit caffeine and tobacco intake approximately four-six hours prior to bedtime. These substances are stimulants and will probably keep you awake. Alcohol should also be limited before bedtime. Alcohol doesn't allow for deeper stages of sleep that help keep our minds sharp the following day. All these things should be avoided to improve sleep.

Some things you can add to your regimen to improve sleep quantity and quality includes yoga and/or stretching prior to bedtime. Another technique to try is visualization. One visualization technique involves putting each one of your thoughts, care, or concerns in a bubble and watching them float away from you. By "releasing" your worries, you will improve your sleep. The same idea can be done if you have someone to talk to prior to bedtime. Additionally, you should not be actively engaged in anything that requires a great deal of mental activity shortly before bed, especially if you are lying in bed.

You are the only person who knows when you feel at your peak performance. Take the time and effort to practice some of these tips and strategies, and figure out what works best for you. Visit your local HAWC to see if they have a fatigue or sleep class (people do attend them). And if your sleeping problems persist and are interrupting your everyday life and functioning, don't just ignore them; make an appointment with your doctor.

In A Flash–A Lesson In CRM, ORM And Timely Decision Making

ANONYMOUS

It was another mission, a cookie cutter of our flights from weeks before. We were supplying fresh food and supplies to the participants of a USCENTCOM exercise, and the day had gone just as planned. The Mediterranean skies were clear on our southbound leg, and we expected nothing less on the return. In fact, we had made up some time throughout the day, and calculated that we could make it all the way back to Ramstein and take a couple of full days off, before it was time to do it again.

We had been together as a crew for nearly two months, and group dynamics were in full effect. We had "naturally" fallen into two cliques, but it seemed like we could put any differences aside once the crew door closed. Our previous missions had gone smoothly, and we had developed a mutual trust that everyone was capable and competent. In fact, we had recently accomplished a semi-risky unusual procedure (with all of the appropriate waivers, of course) without a hitch, and were feeling pretty comfortable with our skills as a crew.

As evidence of thunderstorms popped up on our radar that night, we had no doubt that our navigator would do his best, and succeed in keeping us clear and safe. After we had "picked our way through" a number of cells, it appeared as though we were about to break through. We were on the navigator's vector, and we were going to miss the next cell by 25 or 30 miles (it was difficult to determine an exact distance based on the resolution of the radar). As we were "shooting the gap" between the cells, the classic signs started to appear. First, I noticed "St. Elmo's Fire" coming off of the windshield wiper. It was only a few seconds until the blinding flash, the deafening noise, and the beginning of a very long night. After a few seconds of silence came the "Battle Damage Assessment check" around the crew. Everyone was OK, but obviously shaken. Were we, a skilled and conscientious crew, just struck by lightning?

There was no apparent damage to any aircraft systems. Our flight instruments seemed to be unharmed, and we were soon able to verify them, as we broke out of IMC and had a distinct horizon. This is where the crew really pulled together, and although no one said the exact terms, began

USAF Photo by MSgt Timothy Landcaster

a thorough tactical-level risk assessment. Aviano was our closest divert base, but at this time of night it was closed. We had the fuel and duty day to make it to Ramstein, or could always turn back to Naples (our original RON location). After discussions around the crew, taking into account the adrenaline that was now starting to wear off and the uncertain condition of the aircraft, we started coordinating for an after-hours opening of Aviano. After an hour or so of coordination, a tower controller was called in, and we were able to safely land. Upon inspection of the aircraft and much to our surprise, there was no external damage to the aircraft. So, maybe we hadn't been hit, but something unusual had definitely occurred. Perhaps we had experienced a static discharge from the airplane? Regardless, with no damage to systems, we planned to return back to Ramstein the next day.

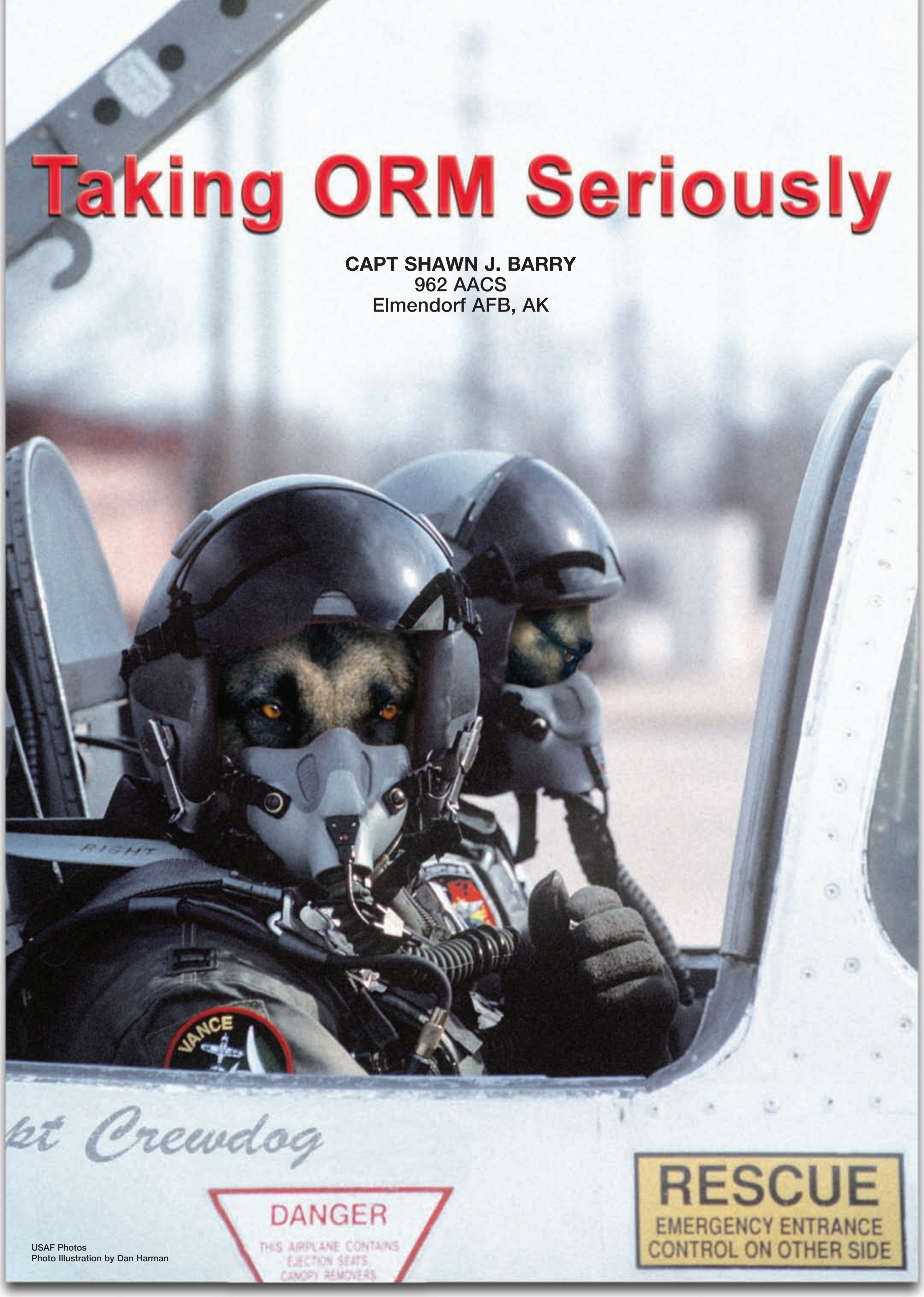
I was a young co-pilot, and although I had signed off an ORM sheet many times, the events of that night and the way we handled them as a crew, drove home what risk management is all about. We identified the hazards: the potential condition of our aircraft, distraction caused by our own state of mind, and fatigue, due to the fact we were within a couple hours of our max crew day. We evaluated the potential courses of action and impacts of each. Although we knew calling some folks out of bed would put a strain on Aviano (not to mention what it would do to our popularity), we knew that continuing on would at best put a tired crew in the air for two more hours and could lead to worse problems, either mechanically or as a result of human factors.

As I reflect on that night and for that matter the entire deployment, I can't help but consider the role CRM played each day–usually with a positive effect, but occasionally leading us to eagerly anticipate the opportunity to fly with someone else. We had flown together for a while and had flown this same route three times a week for the last couple weeks. It started to seem routine, but Murphy has a way of making the routine exciting, and a complacent crew can quickly be overcome by what would otherwise be a manageable situation. Early in the day, our senior aircraft commander was confident that we could make it back to Ramstein, but it would be right at the max duty day, and we would be arriving after quiet hours once again. His strong personality prevailed, and pressing all the way back was the decision he made, without much dissension from the crew. There was rarely dissension, at least overtly, with the decisions he made. Second, we trusted the navigator to do what he had done before – keep us in safe, legal airspace. It is no doubt important to trust our fellow crew members, but trust is no substitute for using our own knowledge and skills (not to mention our "Spidey Senses") to keep us out of dangerous situations. If anyone was unsure about penetrating the line of (what we considered) scattered thunderstorms, they didn't speak up.

At the end of the night, we were undoubtedly relieved to have recovered the aircraft safely, and although it was a successful mission on the surface, I think there are some important lessons to apply. When operating with a "hard crew," it's critical to understand the dynamics of the individuals, capitalize on strengths, and use a concept of mutual support where any weaknesses may exist. Equally as important is to identify any potentially harmful attitudes, address them directly, or work with leadership early, before the attitude begins to degrade the effectiveness of the entire crew. Finally, when Murphy decided to join our crew, performing a time-critical risk assessment and making decisions that were reasonably conservative allowed us to land safely, catch our breath, and continue the mission the next day, when again the skies were sunny, the crew was fresh, and we could fly undoubtedly safe.

Taking ORM Seriously

CAPT SHAWN J. BARRY
962 AACS
Elmendorf AFB, AK



USAF Photos
Photo Illustration by Dan Harman

Every flyer in the U.S. Air Force knows about Operational Risk Management (ORM), and hopefully every flying unit in the Air Force practices some form of ORM. The concept has been drilled into our conscious, since we all began flying military aircraft, at least during my career. The commander touts it, the director of operations swears by it, and the safety guys live it. It is a wonderful tool created with the best of intentions. But after years of taking ORM into account, are our crews really taking it seriously? And in turn, do they truly believe ORM concerns can be used as a reason to postpone or cancel missions that pose unwarranted risks? I believe aircrews have recently been taking an apathetic attitude towards this important tool–ORM must be taken seriously to prevent mishaps in the future.

How many times have you run your ORM numbers before a flight, and pretty much pencil-whipped the whole thing? Flying an aircraft with a crew of upwards of 25 people, I invariably hear and watch other crew members essentially blow off the ORM card by not answering the questions honestly. Instead of carefully going over the ORM list to find out where they truly stand risk management-wise, many crew members put down a number they feel they are expected to put down. It may not seem like a big deal for one person on a crew of 25, but when you have ten other people on the same crew doing the same thing, the numbers get skewed. This action makes the job of the aircraft commander and leadership extremely difficult when assessing the ability of their crew to perform the mission. During training and operational sorties, all crew members at all times need to be forthright and honest when it comes to assessing their ability to carry out a mission. Seemingly small, insignificant things can add up to big problems when combined, potentially leading to a disastrous situation. When you have multiple members of a crew not 100% prepared to fly, bad things can happen. There is always a chain of small events that leads to mishaps. When discussing mishaps, you always hear, "One event in the chain of events was taken out, so the mishap could have been avoided." Well, the chain of events begins before you step to the jet, which is why ORM needs to be taken seriously.

Why are Airmen not taking this ORM process seriously? Most of the apathy towards ORM, I feel, comes from peer pressure. The thinking goes, "If you are scheduled to fly, and you are not sick, you need to tough it out and fly." I think many flyers believe they will be ridiculed, or worse yet, labeled for pulling the "ORM card." Being sick is not the only reason not to fly. Various other factors can contribute to a situation where it's probably not in your best interest, nor in the best interest of your crew, for you to fly. Many outside influences can put you in a mental state of mind where you're not ready to fly. Maybe your kids are sick at home and kept you up all night. Maybe you're going through a tough time with your spouse. Or maybe it's something you feel others may find trivial, like a pet dying. All of these things can hinder your state of mind and affect your performance. There should be no reason for an individual to fly when they're not mentally prepared. Flying is an inherently dangerous business, and any degradation in your ability to perform, could be very dangerous.

Another reason I feel flyers don't take ORM seriously is that they truly don't believe leadership will cancel a mission based solely on ORM. From my experience, I feel leadership does not and will not ignore ORM issues brought up by an aircraft commander. The thinking goes that leadership has other agendas to attend to, like contract flying hours, avoiding ops deviations on the schedule, etc., and they are willing to neglect ORM in order to tend to these agendas. Good squadron leaderships are receptive to ORM concerns and will review sorties red-flagged by their aircraft commanders. I have never seen nor heard of a crew being forced to fly a training mission that the crew leadership deemed an ORM hazard. Operationally speaking, this may not be the case. And this is where the ORM process differs from training sorties to operational sorties.

For operational sorties, we as crew dogs don't always have all the information available. We must make our judgments based on what we know, and not on what we perceive. It's our job to alert our leadership when we feel there's an ORM concern. But it's also our job to trust in our leadership when they override our ORM issue. We don't always have the big picture, and it's the job of leadership to weigh a crew's known ORM issues with issues on a higher priority or scale. Personal factors not only make up ORM, but external factors like weather, crew experience, duty day, familiarity with mission, and operational importance all make up a vital portion of the ORM process. Leadership must apply the known ORM when calculating the overall ORM, factored against operational risk. In the grand scheme of things, this situation highlights what we are paid to do: make difficult decisions when weighing safety against the mission.

Overall, ORM is a very important tool that everyone must take seriously. From the one-striper Airman, to the aircraft commander, and on to the director of operations, ORM must be a priority. On training missions, ORM issues should be transparent to everyone involved. For operational missions, however, things are not always cut and dry to crew members, and we must trust in leadership, who has all the pieces to the puzzle. All in all, we must remember ORM is an important tool to help prevent unnecessary mishaps in the future.

There I Was...

USAF Photo by Kristin Royalty

ANONYMOUS

We were cruising at flight level 250 when the Turkish controller had us contact the US Air Force's E-3 aircraft controlling northern Iraqi airspace. The sky took on a reddish hue as dusk approached.

After a few minutes of static and frustration, my co-pilot finally made contact: "Reach 1194, and is position Kabal, on frag, request parrot and picture." "Roger, Reach 1194, sweet, sweet; cleared to proceed. State 'J' field." "Reach 1194 copy; destination J219" stated my relieved co-pilot. Finally, we were cleared for entry into the airspace! The combat entry checklist was completed; descent checklist was completed. Our flight segment from entry into Iraqi airspace to landing was quick, less than 30 minutes, so we needed to be on our game. "Good," I said. Two more radio calls and we are home free to focus on flying: one to "command post" and one to the control tower for our arrival and landing clearance. Our aircraft reached the pre-determined location for beginning our tactical maneuvering; I then initiated a high rate descent with idle power. I maintained 330 knots, pretty quick for a C-17, while following the navigation solution provided by our onboard computers. We eventually descended into a valley on a southeasterly heading, with a final turn to the east. I visually acquired the airfield shortly after turning the aircraft in an easterly direction. We slowed the aircraft, configured, and made an uneventful landing. As we parked facing west, I couldn't help but notice the last remnants of a reddish sun disappearing below the horizon. "It will be dark soon," I commented. We were scheduled to be on the ground for a little more than two hours. Shortly after parking our aircraft, the clouds began to roll in from the southwest, seemingly from nowhere. About an hour after landing, once complete with our cargo offload, we received notification of an urgent medical evacuation requirement from the local command post. We were instructed to hold our position while the medical personnel

USAF Photo by SrA Erica J. Knight

stabilized the casualty. Then the rain began to fall. At first it was a light sprinkle, then it became a total downpour! As it turned out, we were stuck waiting for approximately three hours while the doctors stabilized our short-notice passenger.

We waited for weather to clear out (it was a VFR only field at the time), and the wickets of command and control worked to assure our patient could indeed be flown to Germany without inducing additional trauma from a five-hour flight. By the second hour of waiting, torrential rainfall and overcast skies (with no moon) enclosed the airfield in complete darkness. The tactical situation in the region was such that there was no lighting anywhere near the ramp, except a few solar-powered lights outlining the ramp, as well as a minimal number of taxi and runway edge lights. The intense rainfall continued; in fact, it was so severe, the ground had become saturated and puddles were forming everywhere. Our engines were running the entire time we were on the ground, a requirement to prevent an aircraft from breaking down at an austere landing zone. Once our patient was brought out and positioned in the aircraft, I had the co-pilot request and receive taxi clearance from the control tower. "Rhino 25, Reach 1194, request taxi." They replied, "Reach 1194, cleared to taxi."

We donned night vision goggles (NVGs) and as I began the taxi, the co-pilot stated that the entire prepared surface appeared to have a watery sheen. Without thinking, I simply agreed and continued forward.

The ramp was parallel to the only runway, running east-west, and barely large enough to handle one C-17 and one C-130. The connectors between the runway and ramp were 45 feet wide, smaller than the 50 foot minimum required by C-17 regulations; however, command and control had approved a blanket waiver for this airfield (after all, we were at war). As we approached taxiway "Bravo" from the parking spot, I turned slightly right to gain an advantage on the tight taxiway. I then straightened the aircraft nose wheel and continued forward (keeping the groundspeed less than 3 knots) until the taxiway edge lights were underneath my seat. This technique is commonly used by C-17 pilots in tight turn situations, since the nose wheel is about three feet behind the pilots' seats. I then cranked the tiller full right to initiate a "square turn," which would have required the least amount of space. A few moments later, in the pitch black of night, with the sheen of rain water covering everything and only taxiway edge lights to guide me, I felt an odd "clunk" by the nose wheel. I immediately stopped the airplane, realizing what had occurred. I then straightened the nose wheel, reversed the engines, had another crew member clear the rear of our aircraft, and went full reverse on the engines. I ended up backing the airplane about 15 feet. I returned the engines to forward idle and deplaned a crew member to check on the nose wheel.

As feared, the crew chief informed me that we had exited the apron and gone into the mud. Quick thinking came into play. The night was not getting any younger, a series of helicopters were due in shortly, and now the nose wheel needed to be checked for damage. Fortunately, the crew chief we had onboard was qualified to complete the required "Semi-Prepared Operations" inspection on the nose gear that had departed the prepared surface. He did just that and confirmed no damage to the underside assembly. As an additional measure, given that I had max-powered the engines off the edge of a prepared surface, he had to inspect the engines for foreign object damage. The inspections all panned out, we received permission from command and control to continue, and completed the sortie back to Germany without fail. Our med-evacuation patient, who had stepped on a landmine, made it back safely as well.

Low-Level Deconfliction Problem?

TSGT WENDELL BROWNE AND
MAJ KEVIN FREEMAN
97 AMW
Altus AFB, OK

Is there a low-level airspace de-confliction problem? If you asked Maj Kevin Freeman, he would answer emphatically yes. During the late summer of 2005 while flying an otherwise uneventful flight, Maj Freeman found himself exiting his route at the same time another C-17 was entering. The route can best be described as a circle with a single entry/exit point. After he noticed another C-17 flying along side of him, he focused to see if there was some talking on the radio. There was none. He then tried to communicate with the other pilot; no answer (too busy?). His intentions were to find out what the other pilot's plans were. Just at that moment, the other jet changed directions turning into him with a left climb; Maj Freeman's response: a right dive; close call. It was then that Maj Freeman decided that there had to be a better way to do business.

The current de-confliction program, although better than nothing, could not catch the problem he just barely escaped from. Fixing this problem became a personal quest. He didn't want himself or any of the guys he knew to be the members of an avoidable mishap. In his own words: "I was very selfish in creating this program Air Movement Table (AMT v2.16), because I didn't want myself or anyone I knew to be involved in a midair collision."

The AF has identified a potential hazard, and it is low-level airspace de-confliction. This issue has a long history for Sheppard AFB and Altus AFB as far back as 1996. The first sign of low-level conflict between the two bases occurred in 2000. Maj Tom Baker took on the challenge of creating and introducing the AMT to Altus AFB. What is the AMT you ask? It's an Microsoft Access database program designed specifically to deconflict airspace for low-level missions.

More info on that to follow, but for now a little more history.

In July of 2002, 19th AF Safety Division updated conflicting routes and published them in FLIP AP/1B. Aug 02: Military Airspace Management System (MAMS), a program designed to solve many airspace issues is anticipated in 12 months. Tentative direction: "Continue De-conflicting Manually." Jul 03: Many delays getting MAMS operating. Tentative direction: "Continue De-conflicting Manually." Apr 04: MAMS - No estimate for completion. Tentative direction: "Continue De-conflicting Manually." Jun 04: Who is the "lead" agency for MAMS? HQ USAF/XOO-RA, MAJCOM reps, and

USAF Photo SSgt Matthew Hannen

computer specialists from Tinker. It's now over 12 years, several iterations (nothing has worked). Jan 05: Extensive delay; HQ USAF/XOO-ARA determined that the MAMS system cannot be used to do what it's supposed to do. Mar 05: 19 AF/SE Low-Level De-confliction Study comes out with some recommendations, but no replacement for MAMS.

It's during the summer of 2005 that Maj Freeman had his near mishap, and several other noticeable near-miss videos started to surface. By March of 2006, Maj Freeman had come up with a new and improved version of AMT. One year earlier, after noticing the flaws of the older program, Maj Freeman decided he could make a better mouse trap. Here is the quick down and dirty on what he designed:

The Air Movement Table (AMT V2.16) is an Microsoft Access database. AMT is a small base-level scheduling program that de-conflict's airspace around aircraft. All data is self-contained. The low-level routes are loaded once and are updated every 56 days in accordance with AP/1B. It has two zones: the first zone gives you about a three-minute buffer between you and any other A/C; Zone 2 is roughly a two-minute buffer.

The Concept

- Provides bubble of airspace around each aircraft when flying a low-level
- Size of the bubble is based on the speed of the aircraft and/or width of the corridor
- The program moves the bubble and aircraft in relationship with time throughout the entire low-level
    - Distance = Rate x Time
    - Distance using Vincenty's equation

The Vincenty equation is used because it more accurately pinpoints space and time around the shape of the earth. Most people don't realize that the shape of the earth is not perfectly round but more like an ellipsoid (a meat ball with a little more meat around the middle).

Focusing the Eye

- Average effective scan time is 20 seconds
    - 17 seconds outside scan
    - 3 seconds panel scan
- Eyes need 1-2 seconds to adjust/focus


USAF Photo SSgt Matthew Hannen

- The 10-degree foveal cone
- Visual acuity is only 10% of the foveal
- Inside the 10% a plane is visible at 5,000 ft
- Outside the 10% a plane is visible at 500 ft

The Scan

- Scanning 120-degrees
  12 blocks of 10-degrees each
  1 second eyes adjust/focus per movement
  2 seconds scanning the block (assumption)
  12 x (1 adj./focus + 2 scan) = 36 sec outside scan
  3 seconds out of 20 seconds inside scan
  2 Panel scans during 36 seconds
  2 x (1 adj. /focus + 3 scan) = 8 sec inside scan
  36 + 8 = *44 seconds* for 1 complete scan

TIME TO IMPACT (TTI)

Minimum Visibility on VR routes 5 sm
5 sm = *4.3 nm*
T-38 travels 360 knots
360 kts = 6 nm/min = 0.1000 nm/sec
C-17 travels 300 knots
300kts = 5 nm/min = 0.0833 nm/sec
Head to Head closure is 11 nm/min = 0.1833 nm/sec
44 sec (1 full scan) x 0.1833 nm/sec
8.1 nm (Whoosh – What was that?)

Simply put, your average closure rate for C-17 vs T-38 is about 8 nm every 44 seconds (the time of one full scan). When 500 ft of separation is considered well and clear, there is no room for error. Did you know that many wings use no more than a day runner to deconflict airspace? When a conflict appears, it's not uncommon to hear the words "step-and-clear more vigilantly." See-and-avoid breaks down above 250kts. Most mishaps have more than one factor leading to that outcome. There are usually other factors to consider when you examine the whole situation. Let's look at some of the other things that can be issues through the eyes of Crew Resource Management (CRM).

The Physiology Part, CRM is defined as the effective use of all available resources–people, weapons systems, facilities, equipment, and environment, by individuals or crews–to safely and efficiently accomplish an assigned mission or task. AFI 11-290, Cockpit/Crew Resource Management Training Program, identifies some very clear areas to be conscious of–situation awareness, crew coordination, and communication; risk management/decision making, task management, mission planning, and debriefing.

A breakdown in any one of these areas will add to the longer scan times or one of the many other attention anomalies that so plague our mishap rates. Things like the blossom effect, channelized attention, or negative transfer can leave a training pilot in an academic situation with no room for error.

So I ask the question once again: do we have a low-level airspace de-confliction problem? I think we do, and I also think we have some smart people working on solutions. Even with these challenges, we still manage to keep from running jets into each other on a regular basis; however, can we do a better job? I think so. If you would like to know more about any of the physiology part of this article, please contact the Human Performance Training Team (HPTT), and for the AMT, please e-mail Kevin.Freeman@altus.af.mil.

USAF CLASS A FLIGHT MISHAPS

FY08 Aircraft Flight Mishaps
(Oct 07 - Nov 07)

2 Class A Aircraft Flight Mishaps
0 Fatalities
1 Aircraft Destroyed

FY07 Aircraft Flight Mishaps
(Oct 06 - Nov 06)

3 Class A Aircraft Flight Mishaps
0 Fatalities
2 Aircraft Destroyed

Flight Rate Producing

01 Nov	F-22A		No. 2 engine FOD discovered during post-flight walk-around
02 Nov	F-15C	✈	Crashed on training mission: pilot suffered minor injuries

- A Class "A" aircraft 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 all fatalities associated with USAF Aviation category mishaps.
- "✈" Denotes a destroyed aircraft.
- Air Force safety statistics may be viewed at the following web address:http://afsafety.af.mil/stats/f_stats.asp
- **If a mishap is not a destroyed aircraft or fatality, it is only listed after the investigation has been finalized. (As of 21 November 07).**

U.S. GOVERNMENT PRINTING OFFICE 2005-560-493-41037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