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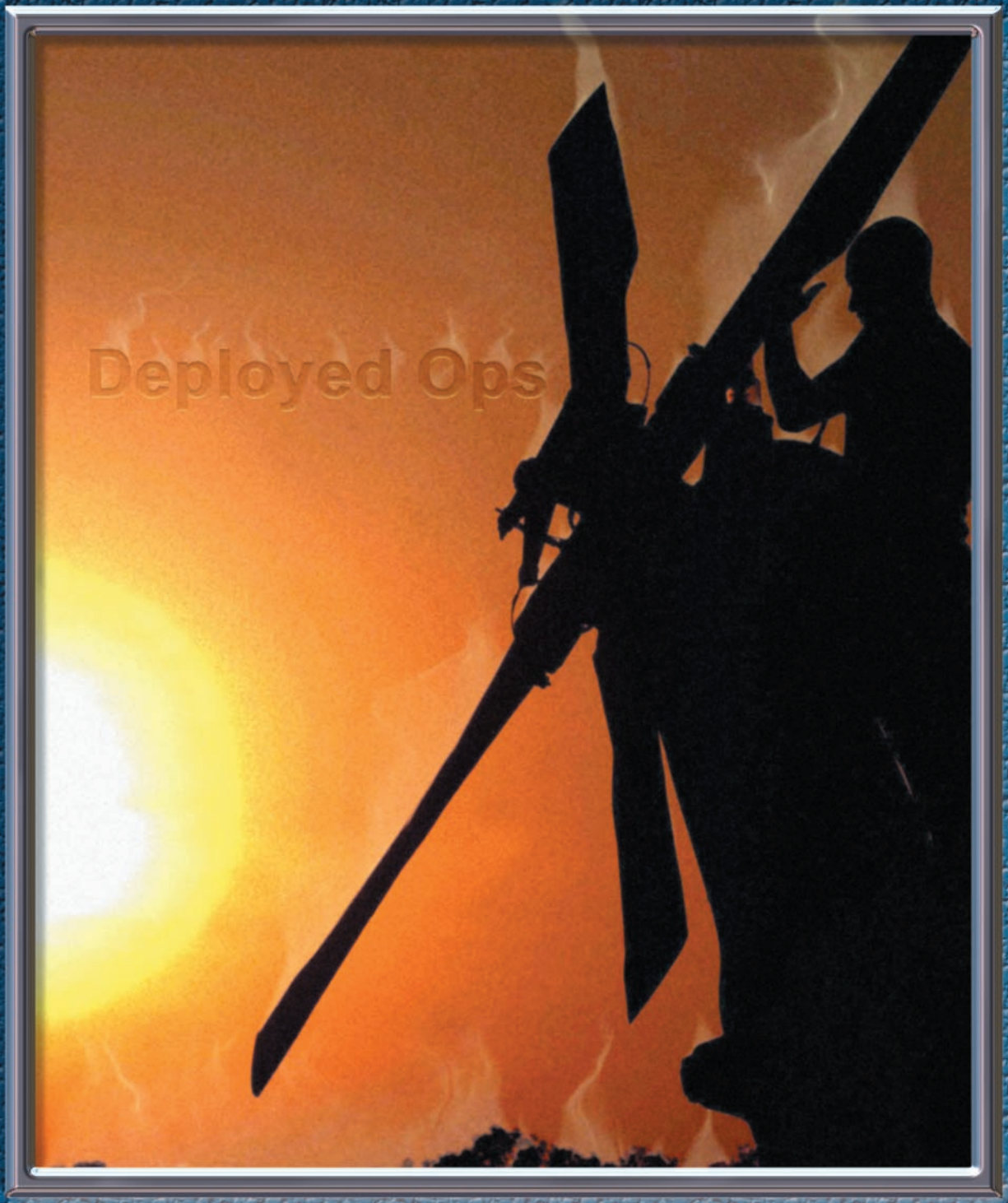
FLYING SAFETY MAGAZINE
JUN 2007



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FLYING SAFETY MAGAZINE

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U.S. AIR FORCE

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SAFETY SAGE

Livin' In Tents …

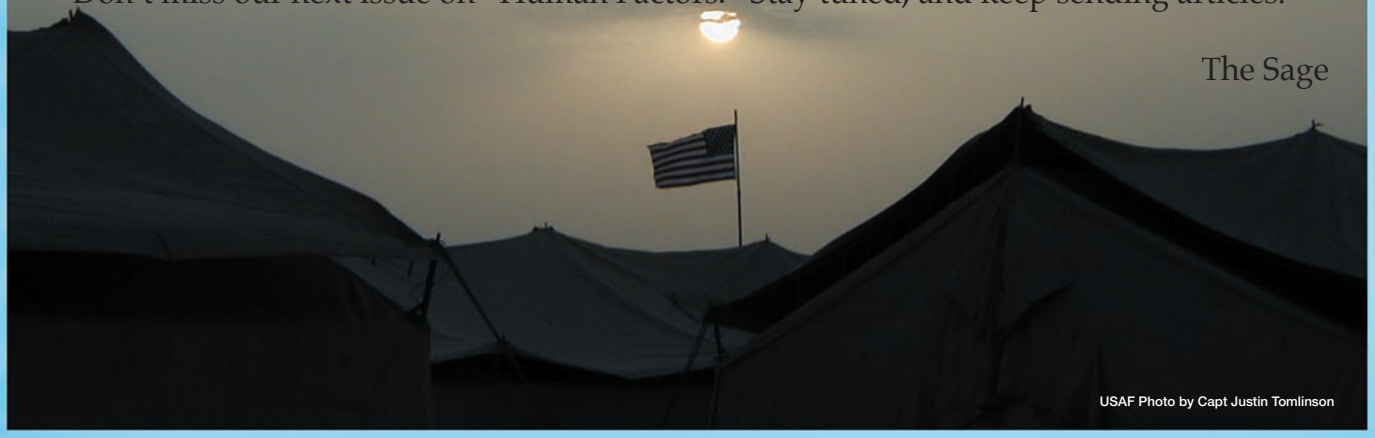
If you are in the Air Force, you know what I'm talkin' about … or you will. Deployed ops have unique challenges: heat, cold, ops tempo, sleep issues, long days, strange faces, etc., that you don't get at home.

Take a look at Col Good's article on deployed safety. As the CENTAF/SE, he has some good advice. The article appeared once in *Combat Edge*, but it applies to everyone so I asked him if he minded letting us share it with the rest of you.

So have a drink (stay hydrated) and enjoy a few good "there I was" stories. Fighter pilots might enjoy "Belly Up And Blind, With Too Much Speed" about a near-miss over Iraq. Tanker guys need to read "Fatigue Management For The Deployed Airlifter." "NVGs, Sandstorms And CRM" might interest the helo community. And "The Deployed Crewchief" is a good lesson for everyone.

Don't miss our next issue on "Human Factors." Stay tuned, and keep sending articles!

The Sage



USAF Photo by Capt Justin Tomlinson

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

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USAF Photo by SMSgt Mark Moss / Photo Illustration by Dan Harman

CAPTAIN BARTLEY J. WARD
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Summer is here, bringing months of fun and sun. Although the warmer weather is a welcome change after winter and spring, the threat of *heat* comes with it. We can feel the effects of higher temperatures anywhere, from normal operations at home base to worldwide contingency operations. Counteracting heat-induced effects is essential for a military unit to sustain operations–especially flying. There is no doubt hydration is one of the keys to success in combating this danger, but what's the best way to accomplish it? In the past, the answer was easy: drink water. However, this has changed because now we have scientifically engineered sports drinks. So, the question must be asked: "What works best for hydration, water or a sports drink?"

Pilots regularly encounter heat and the effects of dehydration it causes on their bodies. The dangers of dehydration are caused by its insidious and relatively quick onset. The effects are very subtle because we are exposed to them often without realizing it, and they can occur in as little as 50 minutes of outdoor activity in a hot climate.[1] The common physiological symptoms of dehydration are thirst, fatigue, irritability and impaired mental focus. These symptoms may seem mundane because some individuals experience them every day, and the extent of impairment varies from person to person.

So, how does this directly apply to flying operations? Consider what a pilot goes through between briefing and takeoff for a mid-day sortie in July. For this general example, a step time of one hour is used. At step time, the pilot shows at the squadron ops desk dressed to fly with all his gear. The pilot then steps to the flightline after receiving the step brief from the squadron Top-3. Ten minutes after step time, the pilot arrives to the assigned aircraft's parking spot. These ten minutes can occur mainly in an air-conditioned environment and may not impact the flyer physiologically. Arriving at the aircraft, the pilot reviews the forms and performs a walk-around for 10 to 15 minutes. Upon entering the (warm) cockpit, the pilot spends 15 minutes running ground ops then taxis 15 to 20 minutes before takeoff. The cockpit will not cool

to an environmentally neutral temperature until just before takeoff. An environmentally neutral temperature causes limited dehydration in a static individual through sweating (usually 65-75 degrees Fahrenheit). Taking this example into consideration, a pilot about to launch for a sortie has been exposed to a hot environment (greater than 90 degrees Fahrenheit) for close to 40 minutes. This means noticeably degraded mental and physical performance caused by dehydration could occur within the first 30 minutes of flight. Dehydration will likely occur sooner because this example assumes the pilot to have optimal hydration at step. This doesn't take into account the morning coffee (or several), and caffeinated beverages throughout the day.

Dehydration is defined in terms of percent loss in body weight of sweat (greater than three percent). Slight dehydration, one to two percent loss in body weight, is enough to cause a negative impact on human performance. The effects of dehydration are difficult to detect, and the normal human thirst mechanism is too inefficient—–the focus must switch to the cause of dehydration. Since we define dehydration in terms of percent of body weight loss due to sweat, the amount of perspiration serves as a useful indicator of how quickly we are dehydrating.

To apply this, use the example of the pilot above. During level-off, the pilot notices a higher than normal sweat rate. Let's assume he is a moderate sweater–one liter per hour. In order to return to an optimal hydration or at least his hydration level before stepping, the pilot would have to drink one liter of fluid. The best fluid replacement technique requires consumption in evenly-spaced intervals. Therefore, the pilot would drink eight ounces of fluid every 15 minutes to achieve the desired effect. Unfortunately, for most pilots, taking a drink break every 15 minutes is not always possible. However, rehydration is still achievable if the pilot uses the resources made available in life support. By using two green flasks, the pilot would have approximately 24 ounces of fluid (1 liter) for rehydration. With one flask in each G-suit pocket, the pilot could drink one on departure and the other after completing range work. This replaces the fluid lost in the hour of sweating before getting airborne, but it does not take into account the sweat lost during the sortie, which would require more fluids. It also raises another issue, not all sorties are limited to one hour, and cockpits only have so much room to accommodate flasks and water bottles.

Hydration with water will combat dehydration. The water intake must equal the fluid lost sweating during any activity. Unfortunately, water does have a few drawbacks. First, water is an excellent thirst quencher despite being tasteless. At first look, this appears to be good, but if drinking only a small amount of water makes an individual stop hydration, that person will have to rely on willpower alone to continue drinking. This creates a problem if an individual needs to drink large amounts of water. Second, water does not replenish electrolytes, which directly relate to muscle fatigue. According to Chris Carmichael, Lance Armstrong's training coach, this is not a problem for short duration physical activity (i.e., a one hour sortie). [2] However, this does become a factor in longer duration sorties, say a pit-and-go day. In order to stay hydrated for a multi-sortie day, the pilot now has a cockpit full of water bottles with little space to store all of them (not to mention the piddle packs this might cause). There must be a better solution.

The best solution for combating dehydration relies upon the use of sports drinks. Scientifically engineered sports drinks are designed to improve physical performance by encouraging fluid intake and promoting rapid rehydration. [2] Sports drinks have a balance of taste, electrolytes and nutrients that enable an individual to rebound faster and better from the effects of dehydration than by just using plain water. Sports drinks encourage fluid intake by being slightly sweetened with the presence of sodium. [1] This combination is designed to taste best to a hot, sweaty and thirsty individual. The electrolytes and nutrients in the sports drinks help reduce and prevent fatigue. In addition, sports drinks can achieve hydration status with less than 100 percent of fluid replacement. According to Carmichael in his book, *Food for Fitness*, performance will not improve any more by consuming more than 80 percent of fluids lost, as long as 50 to 60 percent of replacement fluids are sports drinks. He also states this is only true for sports drinks that include electrolytes and carbohydrates. This means that instead of carrying two 12-ounce flasks, one 20-ounce bottle would suffice in the above example. The ability to use less than a one-to-one ratio of fluid lost allows pilots to stay hydrated longer on less fluid quantity, and helps with limited cockpit space.

Dehydration is common for pilots and directly impacts the ability to perform operations, especially under stressful situations. We've depended on water for years, but improved products are available. Other hydration options may prove more valuable. A hydration plan including sports drinks creates an effective way to keep pilots performing at their best.

References:

[1] Murray, Bob, PhD, FACSM. Preventing Dehydration: Sports Drinks or Water. Gatorade Sports Science Institute. HYPERLINK "http://www.gssiweb.com" http://www.gssiweb.com 6/03/05.

[2] Carmichael, C, et al. *Food for Fitness*, 1st edition. New York: Berkley Books, 2004.

HOT WEATHER OPS

LT COL (DR.) KAREN "SNAPPY" HEUPEL
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Summer weather is around the corner. What things do you need to consider when flying in hot weather operations?

Everyone knows that in hot surroundings, sweating is the main mechanism to dissipate body heat, and when you stop sweating, it is even worse. Everyone also knows thirst is not a good indicator of dehydration. But do you know that a lack of alertness can occur in the early stages of dehydration? This begins when someone is two to three percent dehydrated–which is before they even realize they are thirsty. Decreased mental performance from dehydration manifests itself in delayed reaction time, higher error rate (errors of omission are more common), mechanical mistakes such as transposing digits or inadvertent operations of switches, channelized attention, poor response to emergencies and poor learning. Dehydration also affects physical performance by increased fatigue, increased motion sickness, increased hypoxic effects and decreased G-tolerance.

The people most at risk for dehydration and its effects are inexperienced aviators (such as students and those in upgrade training), people new to the unit (with a lot of new material to learn), shift workers (such as ATC and UAV pilots and operators), and individuals who are already fatigued or undernourished. Other factors that worsen the effects of dehydration include obesity (due to poor dissipation of body heat), drinking alcohol, lack of sleep and fatigue, and the requirement to wear layers of clothing and equipment.

The jobs that are most affected by dehydration include those tasks which require attention to detail, those that need concentration and short term memory (e.g. calculations, map plotting, coding messages, repeating communications), tasks which require arm-hand steadiness (e.g. aiming/shooting a weapon) and monotonous, repetitive, or boring tasks (the straight and level part of flying).

In addition, when it's hot many people become less interested in exercising. Lapses in physical training routines can produce decrements in fitness in about two weeks. Once the lapse in training occurs, the previously built up stamina for long flying operations also decreases. In order to stay (or get in) good physical condition during hot weather, the key is to remember to increase hydration before, during and after exercise. A rough way to determine if you are adequately hydrated is to look at your urine (not your buddies). If urine is darker colored than yellow lemonade (or looks like pink lemonade) or you can't remember the last time you urinated, then you most likely have an insufficient fluid intake.

Another problem is that people voluntarily reduce food intake by 20-40 percent when deployed in a field setting. This also leads to reduced fluid intake, which also decreases the desire to eat. It's a common misconception that the amount of food or energy needed decreases during hot weather. Although the desire to eat goes down, the actual amount of calories required increases in hot weather. Therefore aviators must use food and water as tactical weapons. Aviators need to eat and drink on a schedule, whether they are hungry or thirsty or not.

The effects of heat and dehydration are often insidious in character and the victims are most often unaware of changes in their own performance. It is those small (to not so small) losses of attention to detail that cause most mishaps. So stay vigilant. Watch out for yourselves and your fellow aviators and avoid those small stupid errors. Stay healthy and hydrated!

Photo Illustration by Dan Harman

BASH IN THE AOR

Photo Courtesy of Author

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If you think your BASH program is difficult to administer here in the states, try running one at an overseas location. If that isn't challenging enough for you, try running one while deployed in the AOR! It isn't enough to have everything from insurgents to IEDs … now you have to deal with birds that one would swear were sent directly by the Taliban or Al Qaeda. Yet another threat. Now, I know those of you who have been fortunate enough to visit Iraq or any of the "Stans" must be thinking, "You've got to be kidding, why would any self respecting bird ever want to spend time in such a hostile place."

Believe it or not, birds and wildlife only need the basics of food, water and shelter to survive, and what may seem hostile to us, might be perfectly hospitable to them. What may appear to be a bombed out haz hangar (and potentially dangerous for our occupation) is literally a five star hotel to a pigeon–and yes, they have pigeons in the AOR, lots of 'em. Not only do they have the common pigeon (or Rock Dove) they also have his much larger cousin, the Wood Pigeon. A bridge overpass or a bombed haz hanger makes a fine shelter for pigeons and their kin, and by design they aren't far from runways.

You might wonder, "If they have all these birds, where do they find enough food?" Funny you should ask. When feeding hungry troops three squares a day (plus midnight chow) you end up serving somewhere in the realm of 50,000 meals per

day. That creates quite a pile of garbage. All that garbage has to go somewhere. When you consider there are non-friendlies waiting just outside the wire, your only option may be to dump the refuse on base. At this rate, it isn't long before we have a very large pile of "pigeon chow" near our flight pattern.

Where are all those birds going to find something to drink? One can't eat all that food without something to drink can they? Once again, the same metrics apply regarding troop numbers and locations for support infrastructure. Everyone knows "you are not finished with a job until paper work is complete," and that means dealing with sewage/septic issues. We have to do that on base, inside the wire too. As septic and sewage requires ponds for the remediation process, we now have the complete food/water/shelter triangle. Once again, very near our flight ops.

Okay, now we know why we have a problem with wildlife in the AOR; but isn't the simple solution to have a BASH plan to take care of that? Not so fast. USAF rotations are normally between 120 and 179 days long. That may be a long time if you are tagged with the AEF rotation, but by the time you begin to understand your BASH issues, you reach the end or your tour. "Voila!" your woes magically become your replacement's woes and the whole cycle repeats.

But wait, there's more …

Even if your predecessor was judicious in maintaining a perfect continuity book, you may not own your environment. Normally, AOR bases are "purple" or jointly operated. That means other services (who may not place as much emphasis on BASH programs) may be in charge of running things like that aforementioned landfill. They might also be in charge of vector control and may view "vectors" as the Webster's Dictionary definition of an insect or other organism that transmits a pathogenic fungus, virus bacterium etc. In other

USAF Photo by SrA E.H. Littlejohn / Photo-illustration by Don Ryman

words, they don't consider a bird/wildlife aircraft strike hazard a "vector." Thus, they may be content to use vertebrate toxicants for rats but literally come unglued at the thought of using a similar technique on a pigeon (winged rat).

There is also the issue of supply. If you happen to be in charge of Flight Safety at your home station, you have access to regular sources of supply. Just get the National Stock Number (NSN) and, if you have the budget, go out and get that needed item. Over in the AOR, you rapidly learn that you just don't have the same support. And don't even think about taking that GPC card down to Home Depot; that's not happening! Even if you do succeed in negotiating all the wickets to order something as simple as pyrotechnics, they may not show up until you are back home.

So what is the answer? Again, there is no one answer that works in all situations. First, a comprehensive continuity book is a good start. Document what you were able to accomplish, because what worked for you will likely work its way around again and be useful to your replacement. Also, take good notes on what you were not able to accomplish and the office you were working with when you left. Communicate with your 9 AF counterparts at Shaw to keep them appraised on your efforts at working issues. Finally, understand that there are limits to what can be accomplished by one person in such a short time. Don't give up because three to six months was not enough time to finish work on a problem. Getting to the best possible solution under the circumstances may require persistence. A measure of success might only happen after much cooperation and coordination over successive rotations. So when you are back home, juggling your different safety jobs and think BASH is complicated, remember your brothers-in-arms … and don't complain.

Photos Courtesy of Author
Photo Illustration by Dan Harman

Belly Up And Blind With Too Much Speed

ANONYMOUS

USAF Photo by SSGT Ken Bergmann

By the time we landed I blamed myself for the near mid-air in the skies over Iraq. The lessons I gleaned from that dark September night were not new or combat-centric, rather they pointed back to basic airmanship and the dreaded "risk management."

I arrived at Al Udeid two weeks before the rest of the squadron as part of the ADVON team to handle some of the administrative trivia and secure the ration cards. Most of that time was used reading the SPINS, studying targets and catching up on the latest intel. As luck would have it the squadron we were replacing was from our own wing, making the transition seamless. Before our first jet arrived I'd flown with them three times, and was getting comfortable with the airspace and local operating procedures. They were all seasoned veterans–the month prior they pounded the Iraqi city of Najaf with great success, crushing the insurgent opposition. However, the first time I flew with them I noticed the flight lead's brief was very short and incomplete for a five-hour sortie. Although I chalked this up as efficiency, I knew my briefs would be considerably longer and more detailed for our inexperienced wingmen.

With the last bomb dropping weeks before, we were experiencing the mind-numbing lull of pipeline and power line Recce. It was a typical Middle Eastern night with low moonlight illumination, haze and poor NVG visibility. My briefing was thorough, focusing on the probable target sets and Designated Mean Point of Impact (DMPI) locations if we were fortunate enough to see some action. The wingman was a promising young pilot, who was crewed with an equally young weapon system officer (WSO). My responsibility as a supervisor and flight lead was to keep these guys out of trouble while getting the mission done.

The first hour of this sortie consisted of a boring drone up the "parkway" to get to our first refueling. I checked in with the first AOR controller and located our tanker on the radar. As I proceeded to the track, I was pleased to see number two was in position and hadn't gotten lost yet. My tanker rejoin brief was simple and, I thought, idiot proof.

All number two had to do was stay back in two-mile radar trail and let me do all the work. Once I got on board, he had six to nine minutes to rejoin to the tanker's wing while I got my gas. The geometry of the rejoin was such that the tanker was established in a 30 degree left turn with me in the middle of its turn circle resulting in a fighter turn-on rejoin. At about ten miles out, I checked our formation and position in the track and was satisfied with how it looked. The tankers ran with minimal lighting for protection purposes. It made visual acquisition difficult outside of ten miles. As I continued the intercept, I noticed the tanker must have increased his bank by the way the range was decreasing rapidly. However, it wasn't too bad so I selected military power and squared the corner, rolling out just outside of a mile behind the KC-135. In preparation for the pre-contact position, I unhooked my NVGs and stowed them. I continued looking through the HUD waiting for the tanker to breakout. What I saw next was probably the most nerve racking and unexpected sight I've ever seen in twelve years of flying. My HUD displayed 1.2 nautical miles to the tanker with about thirty knots of overtake. Unfortunately, the air-to-air TACAN to my wingman did not make sense. Expecting to see the standard 2.0 nautical mile range, which was where he was supposed to be, it read 0.8 nautical miles and decreasing. In the microsecond it took me to read the range and process what it meant, I saw two very large lights pass in front of my aircraft but behind the tanker, overshooting to the outside of the turn. The lights I saw were the telltale green and red wingtip position lights of number two, which I estimated to be two to three thousand feet in front of me. The fact that I saw both lights shoot across my HUD meant my wingman was in an aggressive left-hand bank, belly up and blind with too much speed. At that instant I knew I'd just escaped a mid-air. By the attitude of his aircraft and no radio communication, I was the only one who knew it.

My wingman shot so far to the outside of the turn that deconfliction was regained as I told him to roll out and confirm he was visual (I knew the answer). After a pregnant pause he responded, "two's visual," and I cleared him to the observation position while I continued my rejoin. The next couple of minutes were spent catching up my WSO, since he didn't see number two's high-speed pass because of the cockpit lights reflecting off the canopy. I did find it hard while I was on the boom not to pull out my 9mm and shoot number two as he rejoined to the tanker's left wing. Over the remaining five-hour sortie, anger at my wingman shifted as I began to re-realize he was my responsibility.

Once we fenced-out of the AOR and droned back to base, I contemplated how I was going to handle the situation in debrief. Since I was his supervisor, I would have been justified to ground him for gross loss of SA that almost killed four people. However, my WSO and I discussed other options, including my four-hour old recommendation of shooting him. Since we were unsure of exactly what was going on in their cockpit, I decided to have them explain what happened during the debrief. The flight back to base was uneventful and their cavalier attitude prior to debrief told me they had no idea what happened.

Fortunately, that night was quiet in the AOR except for our own buffoonery. I covered the debrief with the standard plans, products, admin to/from and then the sequence of events inside the container. Since the near miss happened on the first air refueling it was to be discussed first. As the saying goes, "How do you know you lost SA? When you start getting it back." I asked my wingman what was going on in the cockpit during the rejoin and was horrified at what he said. By his account, he committed nothing more than an overshoot when I jumped on the radio and asked if he was visual. His WSO was craniums-down during the terminal phase of the rejoin and never knew what happened. When I asked him to draw the rejoin on the white board, the facts began surfacing and the chain of events started adding up. Just before our turn for the rejoin, he locked the tanker up on his radar and proceeded to keep two mile trail formation off the KC-135 instead of me. As the tanker increased bank angle so did he. This caused him to pull further in front of me while belly up and blind. When I took the pens and drew what really happened, both he and his WSO looked as if they had seen a ghost. I continued to focus on the breakdown in cockpit responsibilities and the mis-utilization of a two-person aircraft.

After I was done the two flushed Lieutenants were fully expecting the hammer to fall, and to sit for a while. However, after his recount of the situation I realized he had made a terrible mistake, not a crime. I was in the wrong as well. Flight leadership is not just the active role of leading in the air and calling plays real time. It's a compilation of many calculated factors including threats, tactics, weather, and experience levels. What I failed to do that night was methodically highlight the parts of the sortie that could pose difficulties for an inexperienced wingman and WSO. Although he had flown successful night AR sorties, he never encountered poor visibility from haze, the tanker's reduced lighting, and a non-standard rejoin all at once.

I walked away from that experience with a renewed appreciation for the principals of risk management. Loosely defined, ORM is: "a continuous process designed to detect, assess, and control risk while enhancing performance and maximizing combat capabilities." If I had taken a few moments before that sortie to apply ORM, I would have realized the potential risks and could've controlled them with adjustments to my brief or execution.

Fatigue Management For The Deployed Airlifter

USAF Photo by SSgt Jacob N. Bailey

ANONYMOUS

It is a constant battle in the airlift business to obtain the recommended allotment of crew rest prior to a mission. The purpose of this article is to offer alternatives to the use of drugs such as *Ambien* or *Restoril*.

By the time you toss in crossing time zones and lines that launch around the clock, the hazards of inadequate sleep have a tendency to manifest themselves as missed switches, repeated motions and incomplete communications attempts. The accident reports are littered with these observations.

Non-aviation-related tragedies where fatigue was a contributing factor include:

Three Mile Island nuclear power plant
Meltdown at Chernobyl
Union Carbide in Bhopal
Exxon Valdez grounding

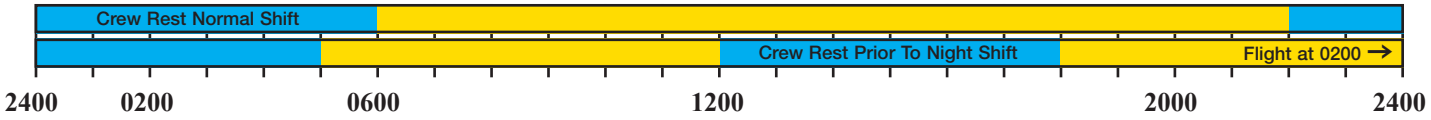
These are the standard horror stories of fatigue-related inattention. The commonality of all these incidents to many aircraft mishaps are:

Timing: These events all occurred in the early morning hours while fatigue levels are at their peak.

Procedural And Mechanical Failures: Three Mile Island maintainers had mistakenly closed auxiliary valves. At Chernobyl, the crew was using a non-standard procedure.

Judgment And Reaction Time: Judgment and reaction times were reduced in all of these instances and the attributed cause of the deficiencies was fatigue. Obvious courses of action were overlooked, standard safety procedures were ignored and mistakes were made.

The rest/requirement equation becomes more tenuous when an aircrew is thrown into a contingency operation. History from DESERT STORM and IRAQI FREEDOM shows that, in the initial push, quality rest becomes harder to obtain as the crews are asked to billet in tents with as many as 11 other crewmembers. These crews all share the same noisy zippered entryway. The sneezing, snoring and restlessness affects all who are unfortunate enough to not have established a sleeping area close to the white noise of the air conditioning system. The operational requirements in the initial phases of a contingency operation are at peak levels. Airfields are unfamiliar, ramps are congested, and air traffic control has yet to develop the intui-



Day Of Shift Change

(1) Work schedule:			▲ Start work
(2) Sleep schedule:	▲ Awake early	▲ Sleep	▲ Awake
(3) Exposure To Sunlight:	▲ Limit throughout the day		
(4) Exercise Schedule:	▲ No exercise until evening		▲ Exercise
(5) Caffeine Use:	▲ No caffeine	▲ No caffeine	▲ Use caffeine
(6) Eat Meals:	▲ Light breakfast	▲ Big lunch	▲ Light dinner
(7) Crew Rest:		▲ Crew rest begins	▲ Crew rest ends

tive knack that they will acquire as the weeks roll by. In short, there is no established routine for the aircrews, flight planners, maintainers, etc. This gap in awareness prohibits the checkpoints that will develop over time from being implemented.

Conversely, the fact that your crew is captured in a monastic environment can create an excellent climate for the challenge of shifting schedules. To mitigate the risk of high ops tempo driving your crew into the Chernobyl/Exxon Valdez scenario, you can adjust your behavior to maximize the effectiveness of rest periods. Exercise, diet and caffeine use can be used to adjust crewmembers rest cycles. You may have to forgo the treadmills and the gym for pushups, sit-ups and jogging for the first month or two, but MWR will eventually catch up and the facilities will appear.

Most experts agree that the key to adjusting to a changing cycle is to establish routines throughout the day. These routines will key your system into recognizing when to sleep. This can be illustrated by the following excerpt obtained from Lt Col Paul 'Bugsy' Gardetto, Aerospace Physiologist, 377 AMDS/KAFB.

Scenario: Individual has been working a day schedule for the past few days awaking at 0600 and sleeping at 2200. Tomorrow his show time is 2000 for an 0200 flight. How should he manage crew rest prior to tomorrow's night flight?

In this scenario, the individual will begin work at 2000 hours and has the day off for crew rest. Let's discuss each of the time setters and how they should be managed.

(1) Work schedule: Set by operations–nothing we as individuals can do to change the situation.

(2) Sleep schedule: Do not sleep-in on the morning of a night shift. Wake up an hour earlier than normal, so you are tired enough to sleep in the afternoon. Sleep in the afternoon for six hours so you wake up two hours prior to show. Even if you can't sleep, resting will be beneficial. Wear ear plugs, darken the room, and stay warm to aid in daytime sleep.

(3) Exposure to sunlight: Avoid exposure to sunlight, especially early in the morning. Stay indoors as much as possible. Avoid lying awake in bed. Get up and be active, just not outside during the day. Once you awaken from your afternoon nap, sunlight is encouraged if it's still light out.

(4) Exercise Schedule: Exercise is an important time setter. It raises the body's temperature, opposite to what occurs during sleep. Avoid exercise in the morning and during the day. Light activity is encouraged during the day to avoid lying around. Exercise in the evening prior to show is mandatory for maximizing performance.

(5) Caffeine use: Caffeine is a valuable drug in our arsenal. It's very effective at increasing alertness and your body clock will set based on the time of day you use it. It is imperative that you avoid all caffeine use during crew rest. Do not have any caffeine until an hour prior to show, at which time you may drink as much as you like and continue its use throughout the evening (if you normally would do so). End its use two to three hours prior to beginning crew rest after your evening shift. Caffeine is such a strong time setter that if you fail to heed this guidance you risk acute mental fatigue during your evening shift.

You will need to fine tune your own techniques and methods. The purpose of this article is to offer alternatives to the use of drugs such as *Ambien* or *Restoril*.

"It is common sense to take a method and try it; if it fails, admit it frankly and try another. But above all, try something."

Franklin D. Roosevelt

Is It Ever Really That Important?

ANONYMOUS

Have you ever looked back on a series of events during a sortie and asked yourself, "Why did I just do that?" That is exactly what I asked myself after landing at an airport in Iraq that had recently been attacked by several mortars.

The scenario can be described as follows: the crew consisted of two aircraft commanders, a third pilot, an instructor loadmaster and an additional loadmaster. It was the third leg of a planned four-leg day, almost 15 hours into a planned crew duty day of 19 hours. It was a night sortie where the local time was 0330. We were flying on night vision goggles, but unfortunately the visibility was low due to several factors. A dust storm had been blowing all evening, there was a significant amount of ambient lighting from the surrounding city, and there was only a nine percent moon illumination. We had been notified by the controllers 45 minutes prior to our planned arrival that the base had come under attack and had gone to alarm black. So we entered holding to wait for the all clear message. About one hour later, the alarm black had been upgraded and the field was re-opened for operations. Unfortunately, due to the bombing, all electricity on the base was still out and none of the required airfield lighting was in place for the arrival and landing. The local command post contacted us, advising that we had some very critical cargo on board that they really wanted us to land with. We explained to command post that the airfield didn't have the lighting required per regulation and we would have to divert. They countered our statement with pleading comments and asked if they put out temporary lighting would that work. Of course, since this was during "war-time" everybody was concentrating on getting the mission done. Because we were already in holding near the airfield, it only made sense to do all that we could do. We were leaning forward. We decided to try and get a waiver for the airfield lighting. In typical contingency fashion we were doing more with less, and the "temporary lighting" consisted of chemical sticks laid out along the edge of the runway. We called for the waiver and the TACC contingency cell approved it. Pressing on with the mission, we lined up with the runway (to tell the truth, we lined up the computer's magenta line with the computer-generated runway depicted on the CRT screen.) Searching, we just keep looking outside trying to visually acquire the runway. Passing through 1,000 feet AGL … still searching … passing through 800 feet, passing through 500 … still searching. Now we are getting down there … 300 … 200 … down to 100 feet AGL and still not

USAF Photo by MSgt Kevin J. Gruenwald

one person has the runway in sight. "But It should be right there!" I was very nervous. I remember my heart racing and an extremely uneasy feeling about the situation we were in. Finally, at around 50 feet AGL we saw the runway (thank God that our GPS was *very* accurate,) and the runway was "right there." Thinking back, I asked myself "what about TERPS issues as we were flying that low to the ground without a runway environment in sight?" Any number of other things could have gone wrong. The chemical sticks were barely visible and we had to be very close to get any visibility of the runway. But we did it. We accomplished the mission. We got the cargo to the destination.

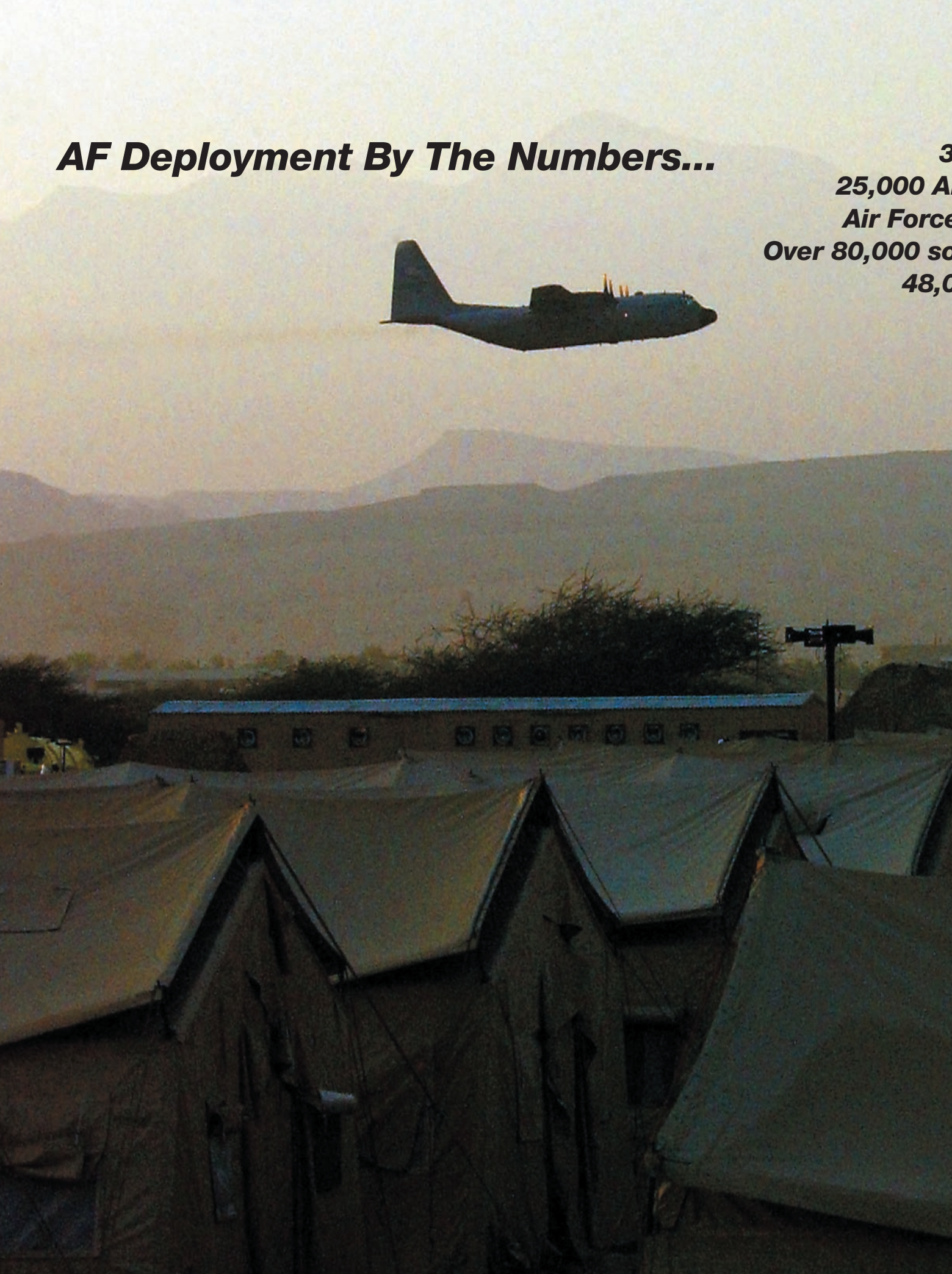
Now you say, not much of a safety story. But really it is. I'm still alive and there was no additional paperwork that had to be filed. That night, all the cards fell in the right place. We got lucky. Many things could have gone wrong, but they didn't. Unfortunately, we weren't the "heroes." We were just an aircrew doing as we had been told to do–get the mission done. Pallets of stuff moved from one location to another. But as I look back on that series of events, I wonder to myself, "why?" Why did we press the envelope that far? What was so important that it couldn't wait four or five hours, or even twelve hours longer to be delivered? The answer to that question is that there really aren't many items so critical that I should put myself, my crew and the airplane in a situation that is unsafe. What I failed to do was a proper Operational Risk Analysis. ORM really is a simple process. The Air Force has formalized the process (Reference AFI 90-901) and developed six steps:

Identify the Hazards
Assess the Risks
Analyze Risk Control Measures
Make Control Decisions
Implement Risk Controls
Supervise and Review

Seems a bit daunting, but it really isn't. We do it all the time. It's just a risk assessment. You merely ask yourself, "is the benefit worth the cost?" Or to put it another way, you ask yourself "is the level (cost) of damage or injury, versus the risk involved worth taking the action?" It's that simple. One of the ORM principles defined in AFI 90-901 is: "Accept no unnecessary risk. Unnecessary risk comes without a commensurate return in terms of real benefits or available opportunities. All Air Force missions and daily routines involve risk. The most logical choices for accomplishing a mission are those that meet all mission requirements while exposing personnel and resources to the lowest acceptable risk." This is crux of what we have to decide. Where do you draw the line for unnecessary risk? Not an easy question to answer. But if we are constantly thinking about it–we highlight the issues, and hopefully come to the best answer.

We have been lucky during this war. In the cargo world of Iraqi operations we haven't had many major mishaps, so the illusion that we are doing the mission safely is perpetuated by the historical data. What we don't know is how many of the "what if's" are out there. We don't know how fortunate we've been, or when the "straw that breaks the camel's back" will really happen. I urge all of you to look back over some of those situations that turned out good. Did you make *exactly* the right decision or just get lucky? Aircrew members need to make decisions quickly in a fluid and dynamic environment, but we need to do it responsibly. Use the tools that we have been given.

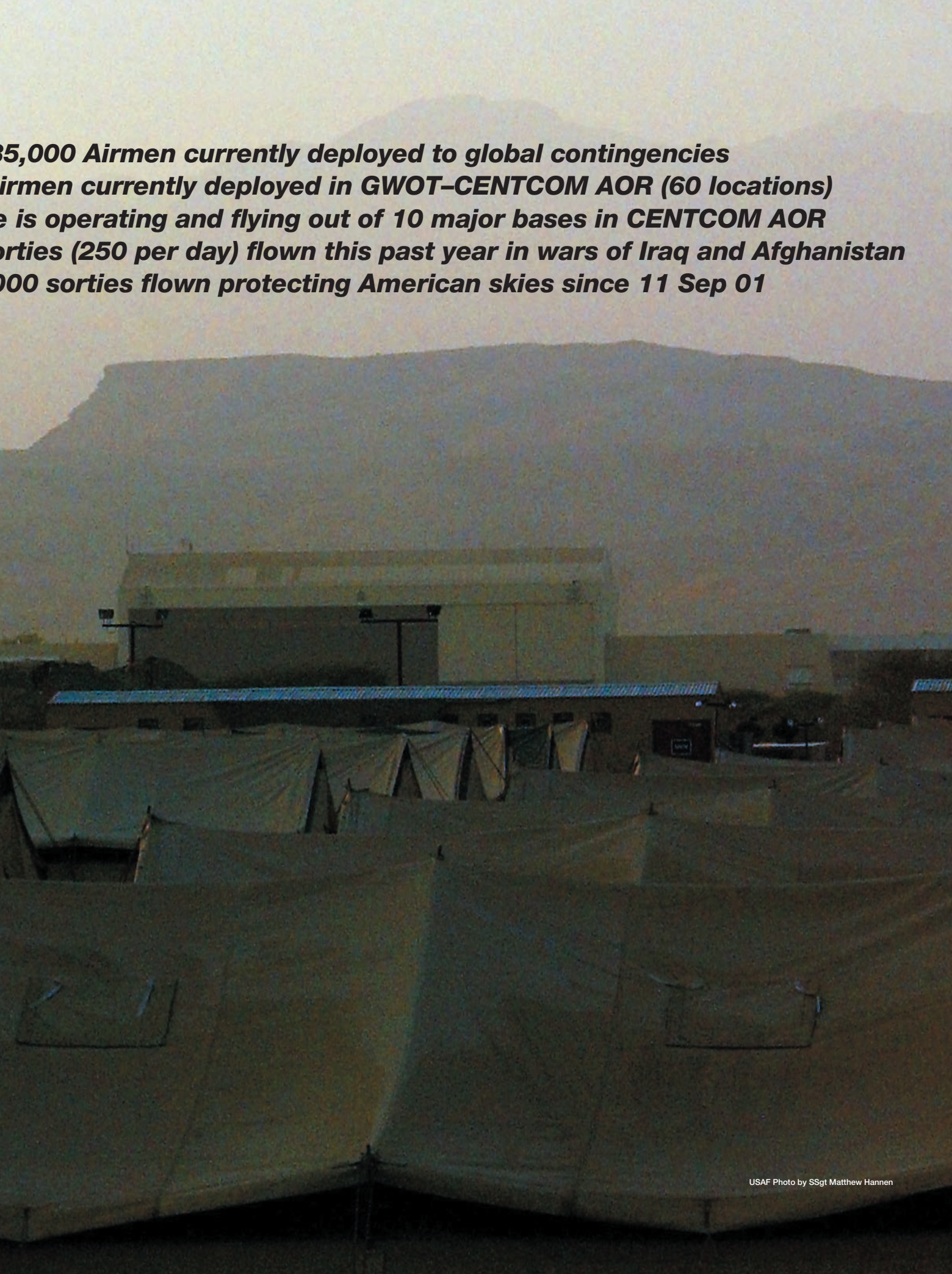
Our military system of moving cargo doesn't always seem the most efficient, but it's incredibly effective at delivering to the war fighter. Your mission is probably not the only mission in theater, although you may hear negative feedback from leadership if your particular mission is not accomplished for the day. Remember you are the leader of your aircraft. You are responsible for the safety of the crew and passengers on board in that particular moment and time. Your shipment of toilet paper may not make it to Iraq that day, but there's another run close behind.



AF Deployment By The Numbers...

3
25,000 A
Air Force
Over 80,000 so
48,0

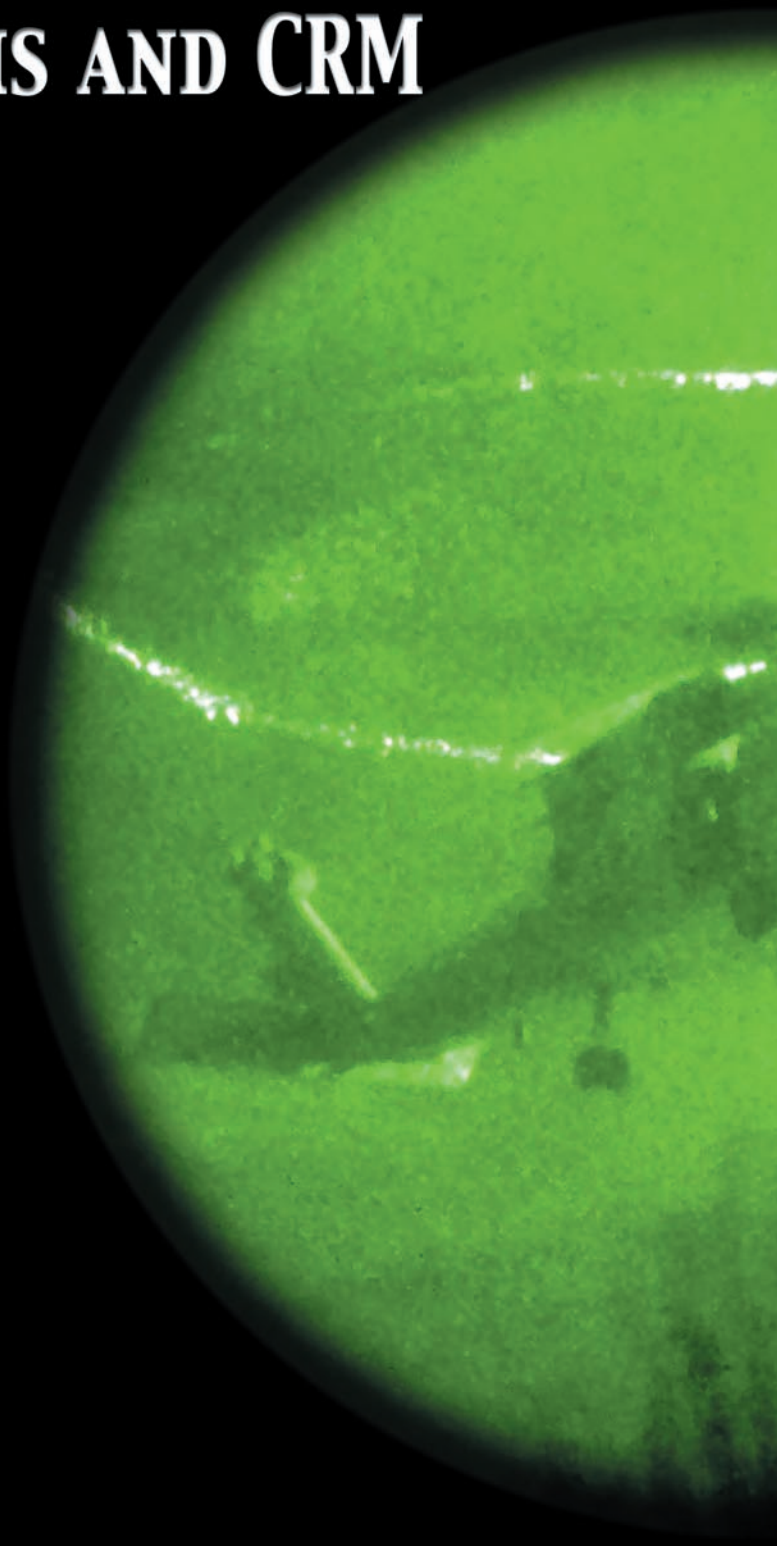
35,000 Airmen currently deployed to global contingencies
Airmen currently deployed in GWOT–CENTCOM AOR (60 locations)
e is operating and flying out of 10 major bases in CENTCOM AOR
orties (250 per day) flown this past year in wars of Iraq and Afghanistan
000 sorties flown protecting American skies since 11 Sep 01



USAF Photo by SSgt Matthew Hannen

NVGs, Sandstorms and CRM

CAPT AARON LATTIG
11 RS
Creech AFB, NV



Crew Resource Management (CRM) on any given day, is not something that comes up in a debrief as a point of contention … that is unless it's lacking. We train and rehearse the mission so often CRM becomes second nature. But what happens when events don't go as planned? As with many accidents, mishaps and close calls, there are rarely any "new" lessons learned … only revisited. This mission was no different.

Five years ago, we were nearing the end of an almost three-month deployment. Both crews were highly experienced, with exception of the copilots. The aircraft commanders (AC) were high-time, former Army Warrant Officers with over 3,000 flight hours. The flight engineers (FE) and gunners (MG) were all instructors or evaluators. All had numerous OPERATION SOUTHERN WATCH/ NORTHERN WATCH deployments under their belts. This was the first deployment for both copilots, me being one of them.

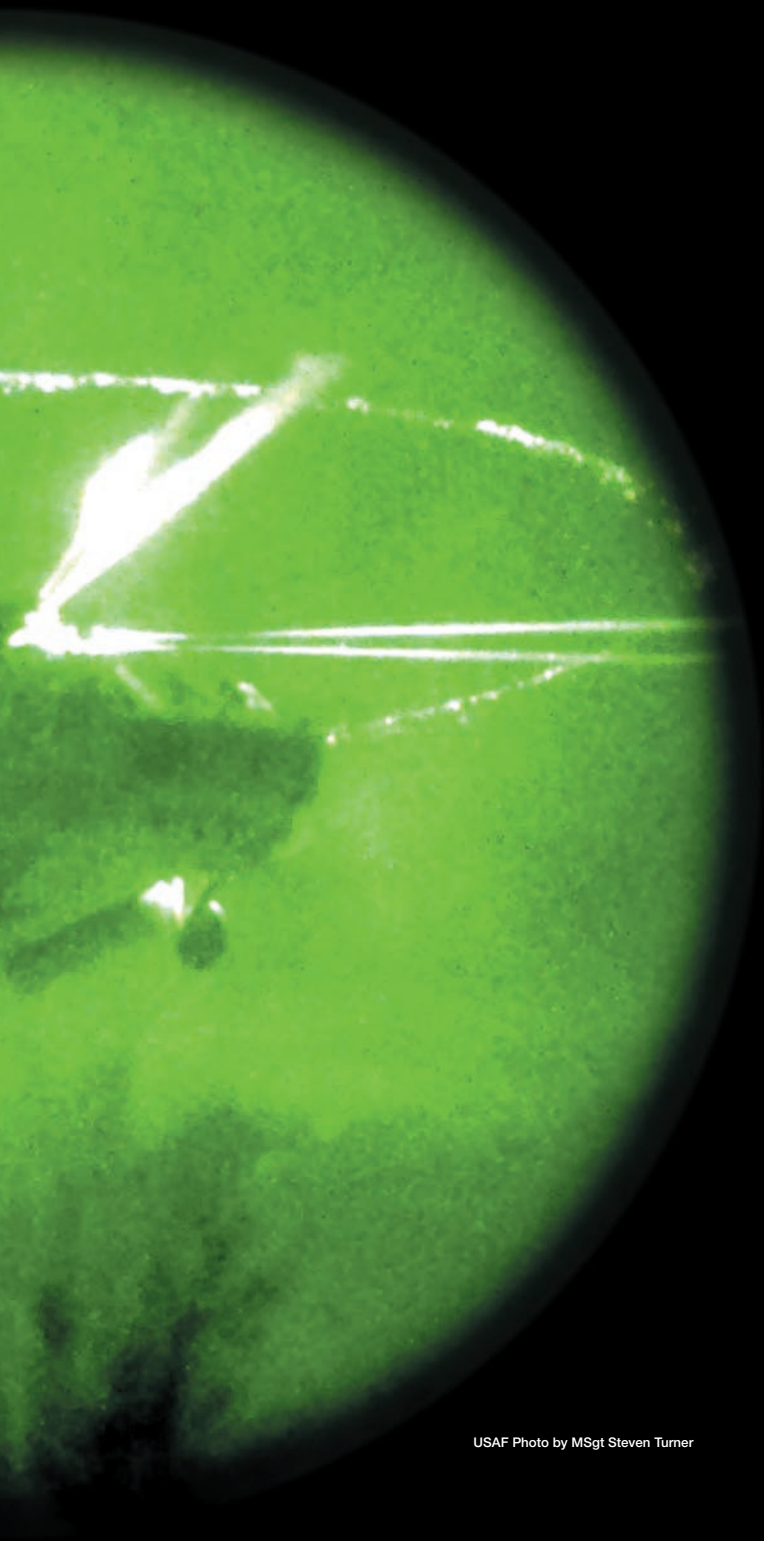
It's been said that Afghanistan is the toughest flying helicopter crews will ever encounter. We were being exposed to all the hazards: low-level mountain flying with peaks reaching as high as 16,000 feet MSL, power limited situations, 0/0 illumination, brown-outs, old maps, and of course the enemy. We all worked well together and confidence in our abilities had grown exponentially since our arrival.

Combat Search And Rescue (CSAR) crews train for missions under the cover of darkness. In our case, it had been awhile since our last Night Vision Goggle (NVG) sortie. Most of the flight's missions had occurred in daylight. We planned a short, night-tactical mission to include air refueling with our C-130 brethren.

The brief, preflight and coordination with our tanker went as planned. Weather was forecast not to be a factor. We would takeoff as Gecko 11/12 (flight of two) and head south toward the Aerial Refueling (AR) track. King, our tanker, would takeoff shortly thereafter and meet us approximately 20 minutes into the flight.

As we taxied out to the runway, illumination was good. Lead lined up on centerline and we took up position for a wing takeoff. As we pulled power, I watched our torque and called it out. Passing through 100 feet, I turned on my radar altimeter. Transitioning from the takeoff phase, we continued our climb to the AR track. It was very dark to the south, but we didn't think anything of it. Unbeknownst to us, the darkness was caused by an unforecast, unseen sandstorm making its way toward us. At the same time, lead's tail light started growing dim. Our altitude was 560 feet AGL.

"I'm losing you," my AC called out over the interplane radio, then we entered the green ping-pong ball. What took place next happened in about 15-20 seconds. Just before I totally lost lead, I looked inside to check the Air-to-Air (AA) TACAN for spacing. I rechecked to make sure we had the right frequency



USAF Photo by MSgt Steven Turner

as lead was not registering. To do this, I had to look down to my right and behind me (where the TACAN radio is placed). At the same time, the AC started a right-hand turn back toward the airfield.

"Gecko 11, I've lost you … right turn back to the field."

"Roger, we'll wait 30 seconds, head back in a left hand turn, and then head back as well. This isn't happening tonight."

"It feels like we are in a pretty good descent," our gunner called out.

And then it hit me. I hadn't felt it, but "heard" the descent way back in the back of my mind. As I scanned the instrument panel, we were descending at around 1,500 Feet Per Minute (FPM), in a 30- to 40-degree right-hand turn, passing 40 knots on our way to 0, and passing through 180 feet.

"Stop down," I told the AC, still calm.

"STOP DOWN!" … a bit more forceful when he didn't respond.

"STOP DOWN!" calling to the AC by name this time, remembering somewhere back in training that using an individual's name can get their attention. The AC was experiencing classic spatial disorientation, the onset of which began almost the instant we started the turn. At the same time I said this, I was grabbing the controls. (I later learned he was on the verge of giving me the controls anyway.)

That's when our FE stated, "I've got lights! Two o'clock." "Okay, I've got 'em!" called the AC. He held the power, rolled out, and pushed the nose forward to gain airspeed. We flew out of the quickly deteriorating condition.

Flying as fast as we could back to the field, we executed a roll-on landing and exited at the first taxiway. Unsure of where lead was, we were trying to get clear of the runway as quickly as possible so he could land. I called King on our taxi back and told him we were cancelling. His reply: "Roger, we can't even see our marshaller." Once back in parking, we shut down the APU so we could monitor lead on the radios. Murphy's Law: once on the ground we were able to receive their AA TACAN. It slowly ticked down the distance and then, with no aircraft in sight, it started increasing again. This happened four more times. Figuring they had gone to the radar-approach frequency (and not wanting to step on the radios) we kept quiet. Murphy's Law No 2: the runway lights went out.

Here's what happened in lead's aircraft: as they were executing the left-hand turn back to the field, the MG cried out, "Oh my God, we're going to die!" He thought they were straight and level and witnessing an aircraft flying right at them … another case of spatial disorientation.

The call made everyone freeze. What was happening?

"I've got lights right outside my window!"

"I don't see them, give me a direction!" said the AC, "Never mind, we're going around."

The MGs call made everyone temporarily take stock of the situation. By the time they realized the lights were tents near the runway, they were in no position to land. They contacted approach and started a Precision Approach Radar (PAR). The problem was neither FE nor MG had ever heard of a PAR due to the lack of such approaches back at our home base. When the controller told them to

Photo Courtesy of Author

"start your descent" they were talking about visual references (or the lack thereof). Realizing they were getting close to the Missed Approach Point (MAP), they executed a go around for a second try. This time AC reminded the crew to "keep it down" so he could hear the controller. Somewhere between the first and second PAR, the runway lights went out … nobody told Gecko 11.

The second attempt was a good approach, but due to the lights being out, the crew never saw the runway and went missed approach. The AC queried the tower about the lights and then "kindly" requested the lights be turned back on.

"Roger, we're working the problem. Your wingman had us call the fire department and they are on the way out to the runway. The fire department and a Humvee will have all their lights on."

Third attempt and all was well–until the MG stated he thought he could see the ground. The crew missed the decision height call from the controller and, with a high descent rate passing through 90 feet; the pilot pulled full power and started a climbout back to the radar pattern. At this point, with nerves frazzled, the crew opted to divert to an airfield two-hours north with better weather. Murphy's Law no 3: the time when you really need all that extra gas is the time you can't use it. While discussing all their options, the copilot attempted to transfer gas from the auxiliary tank to the main tanks. Of course it didn't work, so they were stuck attempting more PARs.

… On the next approach, the PAR equipment went dead.

Finally they caught a break. "Tower, we've got the Humvee in sight. We'll shoot an approach just short of the lights."

Back in my aircraft, we watched as the AA TACAN continuously counted down and then back up again. We never did see them until the last approach.

"Gecko 11 on the deck." Everyone was a bit shaken but much wiser to the perils of helicopter operations in Afghanistan.

… And then the runway lights turned on again.

In the debrief, we determined several CRM issues were present:

First, (in Gecko 12) everyone noticed it was dark to the south, but no one spoke up or questioned if this was normal or not.

Second, when I started noticing lead disappear, I immediately checked the AA TACAN. Not bad in itself, but when the AC started the turn in Instrument Meteorological Conditions (IMC). I should have been on the instruments. Spatial disorientation could have very easily affected me as I looked down at the panel. As it was, I got lucky and stayed "caged" throughout the flight.

As often happens in sensory overload (or in our case deprivation), there was period of time where no one was talking. It wasn't until the MG spoke up that I realized what was going on, and it wasn't until I called out the AC's name that he started to give up the controls.

After it was over, the AC asked if I would have been able to fly us out of the situation. I replied "yes." Sometimes CRM can mean taking the controls from an unresponsive crewmember in order to stay safe.

Concerning Gecko 11, perhaps the biggest CRM issue was the MG's call, "We're all going to die." Calls like this don't help anyone. They only serve to paralyze the crew. CRM in the helo community is well choreographed. Directive and informative calls are what we are looking for.

Although we had been flying in-theater for three months, no one thought to sit down with the FEs and MGs to explain what's involved in a PAR approach. Had this occurred, perhaps lead would have made it down on his first attempt.

What went right?

Inter-aircraft CRM: Once Gecko 12 landed, we decided to keep the APU running to give mutual support to lead. When the runway lights went out, we coordinated with tower to get the lights back on, and the fire department out on the runway.

The trapped fuel on Gecko 11 was quickly identified by the crew. Everyone was involved in troubleshooting the problem and providing useful inputs.

This is one (extreme) example of the numerous CRM issues that could arise on any flight. CRM is relatively easy when all is going well, but out-of-the-ordinary circumstances force us to fall back on what we've learned or continue down the slippery slope toward disaster.

The Deployed Crewchief

MAJ KURT STEGNER
116 ACW
GA ANG

Photo Courtesy of Author

There I was, it was the second sortie of my fifth FOL deployment and everything was on schedule for a night sortie. We even had good weather. Thirty minutes prior to takeoff we were starting engines and all was looking good. Our crew chief went through a flawless engine start procedure and cleared all ground equipment. We checked in with our tanker (who was also in the green) and awaited our taxi.

We were running through our normal checks when we received a call from the back of the aircraft. They were having radio issues and needed maintenance to come on board to check things out. We called down to the crew chief on headset and he told us that comm/nav was on the way.

About ten minutes before our scheduled takeoff time, I radioed the tanker and stated we here having a minor maintenance issue and queried as to how long they could delay (we were their first customer of the evening.) They said that they had another refueling twenty minutes after ours and couldn't delay. Not wanting to coordinate for an alternate tanker and mess-up of the flow for the evening, I got into the "hurry-up-and-go" mode. I asked the tanker to standby while I checked our maintenance status, and I would get back to them in ten minutes. At our scheduled takeoff time, the comm/nav troops advised me they had corrected the problem and were getting off the aircraft. I radioed the tanker and told them we would be about ten minutes late for takeoff but would be on time for the refueling.

Once I assured the maintainers were off the aircraft and all doors were secured, I rapidly finished the engine start checklist and jumped right into the taxi checklist. The crew chief reported my chocks and ground equipment were clear, so I cleared him off.

And so started the first of several mistakes of the evening …

When I cleared off the crew chief, I failed to ask him which direction he was going or how many other maintainers were around the aircraft. Normally I can put a voice with a face when talking to the crew chief. However, on deployments, the maintainers and the ops personnel don't always rotate in and out together. New personnel show up at different times and you don't always knowing who you're working with. When I began working with this crew chief, I looked out the window and thought I had identified the individual I was talking to.

However, this was to be my second error …

After clearing the crew chief off headset, the standard practice is for him or her to exit to the left of the aircraft and give a "thumbs up" all clear. The individual I thought was the crew chief was standing clear on the left, but did not give the normal thumbs up signal. Not wanting to waste any more time, I gave the cursory flash of the landing light to the marshaller and watched as his lighted batons moved straight up in the air. At this point I added a fair amount of power and slowly released the brakes. When I felt a defiant movement of the aircraft I gave a quick look to the left and (to my amazement) noticed several ground personnel giving me the stop signal.

I jammed on the brakes, set the parking brake, and motioned to the ground personnel to come on headset. After a few seconds I heard the voice of my crew chief– and realized he was not the same individual currently standing off the end of my left wing! He had partially unplugged but his comm cord got tangled, and he had to rapidly move clear as I started taxiing. Due to my hurry-up attitude, I made several crucial mistakes which could have resulted in a serious injury or worse. The lessons learned were:

Don't sacrifice good checklist discipline and safety to meet takeoff time.

Know who you are communicating with on the ground, and visually verify their identity.

Know the number of people working around your aircraft and their positions when you taxi.

Always confirm with your crew that you're getting a good "move forward" signal from your marshaller.

Use the crew concept and verify, verify, verify!

A-10 Close Air Support

CAPT DANIEL CRUZ
354 FS
Davis Monthan AFB AZ

I was recently deployed to OPERATION ENDURING FREEDOM flying A-10s out of Bagram Air Base, Afghanistan. My squadron deployed for over four months supporting missions like aircraft escort, helo escort, convoy escort, recce, combat search and rescue (CSAR), and our bread and butter–close air support. We'd been in theater for about three months, so I was pretty familiar with the area and had been a part of or seen most of the missions we were supporting.

On one particular mission, my wingman and I had briefed and stepped to fly a relatively routine sortie. We were supporting an Air Strike Request (ASR) for an Army battalion conducting cordon and search activities in a nearby village. Just before taking the runway, our flight was re-tasked to support a troops-in-contact situation that had just begun in central Afghanistan. We departed Bagram as quickly as we could get airborne and headed direct to our new tasking. En route, we learned that a small convoy from one of the Forward Operating Bases (FOBs) had been ambushed and was under attack by an unknown number of Anti-Coalition Militia (ACM). A two-ship of British GR-7s were the first to arrive on station to assist the friendlies, but they were low on fuel and had to return to base. They informed us of the current ground situation, and passed coordinates for both the friendly and approximate enemy locations. Once we arrived on station, we informed the Joint Terminal Attack Controller (JTAC) we had received a ground situation update from the British GR-7s and confirmed both sets of coordinates. We had eyes on the friendlies and could see five vehicles pinned up against the base of a mountain. In addition, the friendlies were separated from the ACM by a river. The JTAC directed us to employ weapons on the other side of the river. After marking the area with two Willy-Pete (white phosphorous) rockets and receiving confirmation from the JTAC, my wingman and I expended approximately 1,000 rounds of 30mm High-Explosive Incendiary (HEI) bullets on the river valley. The JTAC informed us they were no longer receiving fire, and they were sending a patrol across the river to investigate. My wingman and I momentarily checked off station to refuel and were back on station within minutes. The JTAC informed us they had found multiple Enemy Killed-In-Action (EKIA) armed with AK-47s, RPGs and ammo. In addition, they had also captured five

USAF Photo by SSgt Lance Cheung
Photo Illustration by Dan Harman

ACM and were pursuing several more. Our flight remained on station and escorted the convoy back to their FOB with no further problems.

My wingman and I pointed our noses toward home and were feeling pretty good about ourselves for being able to assist the friendlies. We were quite relieved they had not sustained any injuries due to enemy fire. By now, the sun had set and we were both under Night Vision Goggles (NVGs). Looking toward home, we noticed the weather was rapidly deteriorating. A quick radio call to our squadron ops confirmed the ceiling had dropped to about 500 feet with 1½ miles visibility and light snow. Bagram does not have an ILS and the most precise approach was the Precision Approach Radar (PAR). I requested an in-flight split and had my wingman shoot the approach first. If he didn't break out of the weather by his minimums, and go missed approach, I would be able to escort him to Kandahar. After shooting the approach, my wingman notified me on our inter-flight radio that he had broken out at his minimums and the snowfall was getting worse. I followed my wingman in, after I knew he was safely on the ground, and I broke out right at my weather category minimums. Picking up the runway environment was one of the most difficult challenges I've faced to date. My NVGs were useless because the blowing snow was washing out and gaining down my goggles. Fortunately, the PAR controller had lined me up perfectly with the runway, and I was able to make out faint runway threshold lights for a safe transition to landing.

My wingman and I took two lessons learned away from that sortie. The first lesson was the importance of compartmentalizing. Our flight had just flown an extremely eventful and intense sortie. In fact, we had spent most of the flight home discussing what we had done, and could still feel the adrenaline pumping through our veins. After seeing and hearing about the deteriorating weather, it was extremely important to refocus our attention on the instrument approach, negotiating the weather and getting two aircraft safely on the ground. Realizing the hazards the weather presented to our flight, we had to switch from a "combat mode" to an "instrument mode."

This "instrument mode" leads me into my next lesson learned: The importance of training how you fight. Whether you are a heavy pilot, a fighter pilot, or part of a crew (in the air or on the ground), the manner in which you train will dictate how you will perform in a real-world situation. Our training back home allowed us to be successful in helping the friendlies, but now a successful sortie hinged on the ability for my wingman and I to fly with a good instrument cross-check and get our aircraft on the ground. The importance of exercising good instrument procedures had been stressed since pilot training. Practicing good instrument procedures back home and maintaining a basic level of proficiency allowed us to be successful this particular evening. Training was equally important for the PAR controllers that guided us in that night. We could not have found the runway without the accuracy of their inputs every five seconds. This was paramount to the success of safely landing our aircraft. The fact that their control allowed us to break out of the weather on runway centerline and on the proper glide slope demonstrated they were proficient in this real-world situation.

Despite the fact that the sortie was supposed to be a relatively routine one, there were many important lessons learned that day. The importance of being disciplined in compartmentalizing, and a continued effort to train the way you fight allowed our flight to be successful that day. These lessons learned will remain important throughout the rest of my career, and would also serve all Air Force personnel by providing the greatest possibility for success in the future.

Nothing But Air-To-Air Training

CAPT AARON "PINE" SAUL
555 FS, Chief of Safety
Aviano AB, Italy

As the proverbial "There I was" goes, I start off this story with hopes of providing you, the reader, with some lessons learned. They're taken from a potentially life-ending incident I had while I was still an inexperienced wingman in Korea.

So there I was … 12 months into my one-year remote tour, excited about the fact that I had only one month remaining (by choice extension)–a full month remaining of nothing but air-to-air training, which is a rarity in the F-16. Our squadron was on the verge of hosting our annual air-to-air exercise. We bring in a dissimilar unit (normally F-18s) to conduct nothing but air-to-air training in order to develop and refine our skills in aerial combat. This exercise, known as Hollandia, lasts for three weeks starting with basic intercepts and leading up all the way up to a 4vX.

USAF Photo by SSgt Quinton T. Burris

Prior to this exercise, the main focus of our wing was to prepare for and conduct an ORI. So with that being said, our primary role for almost the entire year I was there was to conduct air-to-ground training. Upgrades, in between monthly exercises, got most of the air-to-air lines. This will have a minor role in the incident, but does bring up the proficiency issue and highlights my inexperience in the air-to-air arena.

"Our jets were still closing toward each other. It appeared we were about to collide."

The day before the incident, I happened to be walking by the scheduling office and noticed a last-second change to our weekly schedule. It's not uncommon in a fighter unit to have a fluid schedule that changes daily based on fallout of airspace, or personnel, or even aircraft. We adapt quickly and as the saying goes, "those who plan early plan often." For this particular change we went from a four-ship doing 2v2 Tactical Intercepts (TI); to a three-ship, flexing to an ACM ride due to a line falling out. TI turning into ACM is not a bad deal so I was looking forward to it–and the fact that this was going to be a continuation training (CT) ride even made it better.

That evening I met with my flight lead (another Lieutenant) to discuss game plans and what we both wanted to work on for our objectives. A CT ride allows pilots to step away from the canned scenarios we see during upgrades, dig a little more into tactics we would like to try, and see if they work effectively or not. After discussing our objectives that evening, my flight lead (who happened to live right beside me in the dorms) explained his game plan. He talked about what he was going to brief that morning, and we talked about how to execute it.

The morning of the sortie everything was Ops normal in the sense that weather was perfect, the brief went as planned, and the jets were ready on time. Before we stepped that morning, we assessed our ORM to be somewhat high based on the fact that we had not flown ACM in a couple months and the experience level between the two of us was extremely low. Our bandit for the day happened to be a highly-experienced squadron supervisor (ADO). He knew we weren't attempting anything cosmic, just trying a couple of different game plans for a tap-the-cap scenario.

Step, start, taxi and takeoff were uneventful and we headed out to the airspace for the sortie. We checked in, accomplished our G-check, and we were ready for the first set-up with our bandit attacking us from an unknown direction. As we continued to maneuver and scan for the bandit, we both picked him up at our six o'clock position. We began to maneuver in accordance with our game plan–our game plan for a bandit at our six o'clock was to first determine who he was leaning on by getting some spacing between us, then forcing a one-circle fight with the defending fighter. The supporting fighter would explode to the vertical to gain weapons separation and allow the defending fighter to get the ID. This went exactly as planned. The bandit leaned on my flight lead and I immediately went nose high to explode in the vertical, while maintaining visual with both my flight lead and the bandit.

At this point, I was confident we were a mere few seconds away from getting the ID and me tipping in to get the kill. I would find out within seconds that this was not the case. As my flight lead forced the one-circle fight with the bandit he came over the radio, gave me the ID, and stated he was engaged one-circle. This was my cue with a clear avenue of fire and weapons separation to tip in for the shot. My visual perception at the time was exactly what my flight lead had stated, as far as him being engaged one-circle. What I didn't realize was–that was not quite the case. As I brought the nose of my F-16 around and started pointing at the bandit, I immediately went for the missile shot and started the mech to accomplish this (Training Rule [TR] Violation 1). As I attempted the shot I noticed the bandit was no longer engaged with my flight lead, but was in fact pointing uphill directly at me. With approximately 1,000 knots of closure between our aircraft, the only immediate action was to pull hard away to the right. This, in turn with max AOA on my jet while pointing downhill, put my jet into a full skid. The bandit did the exact same thing and now our jets were still closing toward each other. It appeared we were about to collide.

By shear luck we did not put our jets together that day. Later on we would review our tapes and realize we missed each other by a mere 47 feet! This was the second TR violation that occurred during that sortie, but there was still one really stupid decision yet to come. After our close pass I immediately initiated the appropriate Knock-it-Off and we separated. My flight lead and I rejoined to discuss what had happened. All three of us discussed our close pass on the radios. We determined that we hadn't hit and we would continue to fight. This decision to continue, although there was an apparent lack of SA on my part, would be highlighted as our poorest decision of the day.

We continued to fight uneventfully for four more engagements and returned to base. After landing, while we were in the crew van returning to our Ops building, we knew we had to immediately let the DO know what had transpired. I was still a little wobbly in the knees. We met with our DO and told him what happened. We went to the vault, reviewed our tapes together, and realized how close we had actually come to running two jets together that day. A reaction time of 0.03 seconds later and I would not be writing this story for you to read.

Our actions that day proved to be a learning point for the entire base as we were getting ready for this air-to-air exercise. It provided several lessons. Of those lessons learned, the most important was to realize when things go wrong (like they did) we needed to step back and say, "today is just not the day" … let's bring the jets home right then and there.

Additional lessons learned that day were that we have TRs designed for reasons, and those reasons are what keep us safe day in and day out. Now that I am about to be an instructor in the F-16, I make it a point to emphasize the importance of the TRs and strict adherence to them.

USAF Photo by TSgt Jeffrey Allen / Photo Illustration By Dan Harman

Deployed Safety is Job One

COL JOHN B. GOOD
9AF Director of Safety
Shaw AFB, NC

"What's so special about deployed safety? We did that during Operations DESERT SHIELD, DESERT STORM, and SOUTHERN WATCH! Why, we even did that when we deployed in support of SALTY BEE (when we demonstrated we could generate, deploy, operate, and redeploy from the European theater during the Cold War)! There ain't anything new under that rock!"

Yep, I'm old alright. But I know this new game isn't like the old one. Deployed (you may choose the term "expeditionary") safety is different. It's different this time because the war covers more than 10 bases, over five regional time zones, where winter, spring, and summer may be occurring simultaneously, and someone's trying to kill you every day. Joint and coalition mishaps occur. Mishap investigations, even Class Cs, are more difficult, especially when staffing in theater is not set high enough to make winning the war while conducting an accident investigation easy. Imagine all those engine investigations some of you have done stateside; pretty easy, unless you're trying to win a war while a no-kidding alarm red is going off on your part of the base? How about trying to do a Class A investigation when evidence you need sits in enemy territory? What if that vehicle involved in a Class A is serviceable and you can put it back into combat quickly; do you do that or hold off until a formal investigation runs its course? Do you think your persuasive skills would be challenged by a unit about ready to employ in combat for the first time when all they interpret from your words is "be safe?" What about lines of authority; who do you call; who makes the call; who does 'what' to 'whom?'" "*Auntie Em, Auntie Em, help, it's a twister!*" Hey, this is just to stimulate your thinking. I'm only scratching the surface of the new deployed safety paradigm.

The most important thing about deployed safety is true anywhere the military operates. The mission is "job one." However, the mission must be clearly defined in simple, operational terms. Once that is accomplished, the next step is to understand that there is a tension, a balance if you will, between risk and benefit. In some cases, the priority of the mission dictates the operational necessity to take on more risk. The challenge for safety is to evaluate those missions to ensure unnecessary increased risk is not unwittingly incurred which might needlessly jeopardize the successful execution of those higher priority missions. The third most important thing is to understand the rules under which the mission is to be accomplished and why those rules were instituted. With these three items clearly in view, deployed safety can be very effective because the boundaries of the mission are plain, risk-benefit

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USAF Photo by A1C Austin Knox

balance is assessed, and the foundation on which the mission is laid is understood. The value of this combination is that decision making in terms of safety now has a context, or environment, to temper its processes.

For example, imagine an F-22A unit deployed to Balad Air Base, Iraq, with one of its jets down for engine Foreign Object Damage (FOD). Did you know that these engines cost $10.5 million each? Such expenses make engine FOD Class As on F-22As more likely than some of our other jets. Apart from the sterile textbook safety process in terms of conducting a Class A investigation, a combat commander wants to know what the cause was, how to prevent its recurrence, and when the unit can get their jet back. Can the war stand to have one of its jets down for 30 or more days while a safety investigation runs its course? The answer may vary. However, if that jet can be returned to combat inside of an investigation timeline, the commander might want that jet in the air rather than wait for the conclusion of an investigation. So, after gathering the data, do we still hold the jet back from returning to flight quickly? This is the commander's call.

OK, try another example. A convoy in enemy territory has a vehicle flip over apart from enemy involvement and someone is killed. Sounds like a Class A mishap. From a safety perspective, what should we do? Should we go out and take pictures of the site, put the evidence on a truck, and head back to base for interviews, tox testing, and completion of the investigation, or is the risk-benefit scale out-of-balance with some of these activities? Should we take what we can get at minimal risk and complete the investigation in a more permissive environment? Again, your answer may vary, and you might even think I haven't told you enough to decide. Certainly, the in-theater commander might know more than most as to what call to make, since they are closest to the action. In this example, which is similar to real-world mishaps we in USCENTAF have had to address since Sept. 11, 2001, a benefit could be realized through formalized relief incorporated into Air Force Instructions (AFIs). Tempered by real-world constraints, modifying the AFIs will facilitate this balancing act and yield an adequate safety investigation. Some changes have already been instituted to adapt our safety programs to the reality of today's Air Force and can be found at https://wwwmil.shaw.af.mil/Publishing/E Pubs/91series/uscentafi91 202/USCENTAFI91 202.pdf.

Let's revisit engine mishaps once more, but from a board-convening perspective. In a combat environment, an organization is sized to accomplish "job one": prosecute the war. Activities other

When someone says "be safe," what does that mean to you?

than this particular "job one" are distracting and manpower draining. Unit effectiveness to accomplish "job one" may be adversely affected, to some degree, by other activities not directly related to "job one." In our example, a formal board must be convened while the interim board gathers and preserves as much mishap evidence as possible. With the advent of equipment like the F-22A, the possibility of a Class A mishap increases (even if the cause merely appears to be due to engine FOD), simply because of the relative nature of equipment costs in relationship to mishap category dollar thresholds. Considering the upswing in costs of new equipment, with no change to mishap category thresholds, the recurring need to deploy O6 led safety investigation boards should also increase. These boards require space to do their work and some attention from the deployed host unit. However, in terms of engine mishaps, much of the investigating work (apart from cracking open the engine) can be accomplished quickly by the interim board prior to the engine being shipped back to depot. Once the engine is at depot, more discovery may occur and conclusions may be drawn by benefit of exposure to new information as well as the data provided by any on-scene board. In terms of engine mishaps in a combat environment, a combat commander would profit from the formal board conducting its work from depot rather than within the combat environment.

Tough questions, huh? However, these are the types of issues being grappled with in the safety world of combat operations today. Now, let's move beyond examples.

When someone says "be safe," what does that mean to you? Does your perspective of that meaning change in combat? Is the guidance utilized for employing your skills any less applicable, merely because someone is really trying to kill you? If you think published guidance on how to conduct your business is any less applicable, let me offer a sports analogy. Does a team win a championship by deviating from what got them to the championship game? Not usually. The team might modify their approach to exploit the weaknesses of their opponent, but the basics (e.g., running, shooting, passing, bread-and-butter plays), the stuff they're good at, provide confidence and an expectation for success in that championship game. Why should we think we in the Air Force should be any different when employing our trade in combat? Frankly, the combat environment demands more of us in terms of personal and professional discipline, diligence, and an eye for detail than the training environment does. The combat environment, like in any game you want to win, requires some degree of adaptability. However, as some say "physics is physics." What got you to the game is, by-and-large, going to see you through. Therefore, when you hear someone suggest that because they're in a

USAF Photo by SSgt Eric T. Sheler

combat environment the rules don't apply, educate them on what "got them to the game."

So what about joint mishaps, ones where multiple services are involved? Do all the services share a common base in terms of processes, procedures, standards, thresholds, and perspectives? Yep, you're right! They don't all possess this shared (or common) reference. Should they? Well the more we operate jointly, the more likely joint mishaps will occur. Currently, the services utilize instruments like memorandums of understandings (MOUs). While MOUs are helpful, they lack a broad and needed base of common terms, processes, standards, and thresholds to prepare their collective expectations and to facilitate more effective and efficient collaboration under the safety tent. A simple set of joint doctrine is needed to serve as a common point of departure and bring safety into that joint arena.

Have you considered the size and composition of that deployed safety office? While the basics are frequently the same (i.e., the need for a chief of safety, as well as ground, flight, and weapon safety offices), a particular safety office might need to be more than one body deep to cover base responsibilities in addition to any detachment activities or regional demands dictated by the combat environment. For instance, USCENTAF is experimenting with a concept of drawing down safety manning at some wing detachments while increasing the manning at the wing headquarters. In the case with this particular experiment, overall safety manning under the entire wing is reduced, while safety manning at the wing headquarters (where mission activity is very busy) is increased. This increase is not only helpful in support of safety efforts at the wing headquarters, but is intended to enable the wing commander to examine the safety environment at bases never directly supported by on-scene safety personnel but where that wing has occasional operations or potential operations. The impact should be a reduction in theater personnel and an improved level of combat safety.

Deployed safety offers unique and exciting opportunities. In combat, the challenges are endless. The need to make safety relevant in a combat environment is essential. A relevant safety program in combat serves to "enhance combat effectiveness by the reduction of preventable mishaps" (i.e., the safety mission statement we use at USCENTAF). An adaptable safety program exploits these opportunities to remain relevant. Perhaps now you realize "what's so special" about deployed safety.

Col Good is Director of Safety for Ninth Air Force and US Central Air Forces (USCENTAF). He looks forward to discussing this article with you. He can be reached at john.good@shaw.af.mil or at DSN 965-3179. Col Good offers special thanks to Colonel Creid Johnson who was the impetus behind some of these concepts.

FY07 Aviation Mishaps
(Oct 06-May 07)

16 Class A Mishaps (15 Flight)
0 Fatalities
9 Aircraft Destroyed
3 UAS Destroyed

FY06 Aviation Mishaps
(Oct 05-May 06)

20 Class A Mishaps (15 Flight)
1 Fatalities
6 Aircraft Destroyed
4 UAS Destroyed

02 Oct	✈	A C-21 departed runway near approach end and caught fire.
02 Oct		An F-15E had multiple bird strikes; damage to #2 engine and left wing.
26 Oct	✈	An F-16C caught fire on takeoff; pilot aborted.
27 Nov	✈	An F-16C CFIT-fatal (IAW CSAF guidance; a non-reportable loss under DoDI 6055.7)
04 Dec	✈	An F-16D experienced engine failure.
26 Dec		A C-5 experienced multiple bird strikes on takeoff; damage to #2 and #4 engine.
17 Jan	✈	An MQ-1B experienced engine problems and impacted terrain.
18 Jan	✈	A T-38C had multiple bird strikes; pilot ejected.
19 Jan	✈	An F-16C encountered engine failure on a training sortie.
31 Jan		A C-17 experienced engine failure on a training sortie.
22 Feb	✈	A T-38C departed controlled flight during BFM.
23 Feb	✈	An MQ-1L encountered engine failure and impacted terrain.
12 Mar	✈	An F-16D departed controlled flight during BFM.
12 Mar	✈	An F-16C experienced an engine control malfunction and impacted terrain on final.
21 Mar	✈	An F-15E experienced a bird strike on final to the #1 engine.
26 Mar	✈	An MQ-1L impacted terrain on landing.

- 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. Overall totals represent all categories as listed below under "✶" (except for UAS listed separately).
- 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.
- "✶" Denotes a Class A mishap that is not in the "Flight" category. Other Aviation categories are "Aircraft Flight-Related," "Unmanned Aerial Vehicle," and "Aircraft Ground Operations".
- Air Force safety statistics are updated frequently and may be viewed at the following web address: http://afsafety.af.mil/stats/f_stats.asp
- **Dated mishaps are only listed after the investigation has been finalized (as of 17 Jul 07).**

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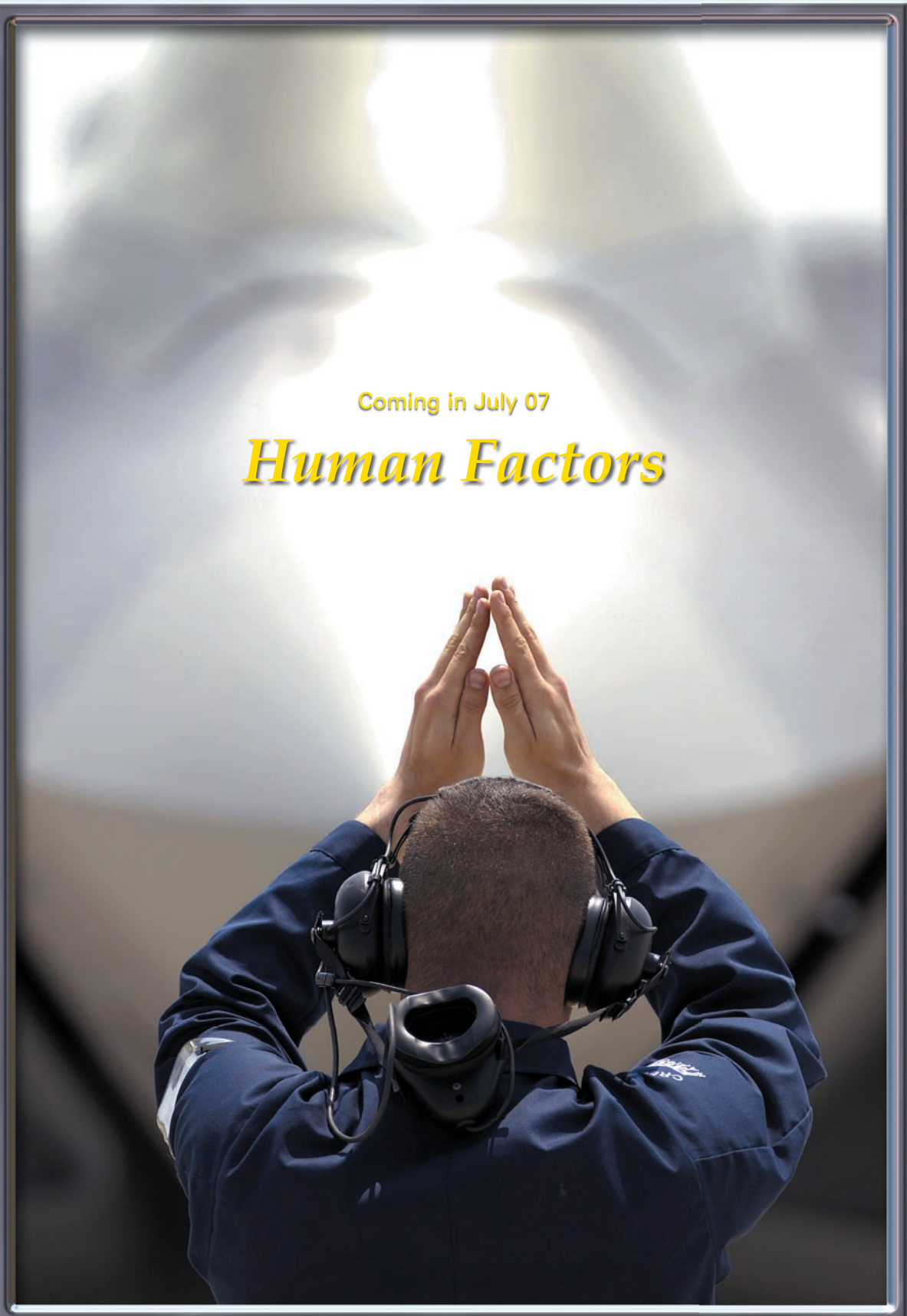
AVIATION

The Aviation Well Done Award is presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Mishap Prevention Program.

Captain Brian Crum and Captain Julie Moore
35th FW
Misawa AB, Japan

Captain Brian Crum and Captain Julie Moore were awarded the Aviation Safety Well Done Award in recognition of exceptional contributions to aviation safety while supporting Operation NOBLE EAGLE. On 21 September 2006, Captain Crum and Captain Moore were scheduled as a two-ship of F-16CJs providing protection for the President of the United States. As Captain Crum's landing gear was retracting, the Shaw Tower transmitted that Captain Crum appeared to be trailing fire. Captain Crum immediately began an analysis of the engine instruments and scanned the exterior noting flames emanating out of the right aft fuselage. Captain Moore immediately executed a check turn to gain visual mutual support and recommended that Captain Crum delay the jettison of his external fuel tanks to avoid dropping them in a populated area. She crosschecked her wingman's parameters to ensure a proper position for an engine out landing while Captain Crum jettisoned his external fuel tanks over a field. Their sound judgment and outstanding airmanship, while performing a heavy weight takeoff with live weapons, averted a potentially catastrophic engine fire and allowed for the recovery of a multi-million dollar asset.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