UNITED STATES AIR FORCE
FSM
JUL 2007
FLYING SAFETY MAGAZINE

Human Factors

FSM
FLYING SAFETY MAGAZINE

AIR FORCE RECURRING PUBLICATION 91-1

contents

Cover:
USAF Photo by A1C Vernon Young
Rear Cover:
USAF Photo by TSgt Richard Freeland
Photo Illustration by Dan Harman

U.S. AIR FORCE

Flying Safety Magazine online: http://afsafety.af.mil/SEMM/fsmfirst.shtml

Sage Advice

First, keep reading FSM and share it with your friends. FSM continues to win recognition for communication excellence in the publishing industry (see page 5). We take great pride in being your *forum for flight safety*.

Second, keep sending in those articles with photos. Help your buddies by telling your stories (we'll even publish them anonymously if you like)–if someone else can learn from your experience, then that's one less link in the chain leading to a mishap. Speaking of missing links …

This entire issue is full of human factors. We have serious articles by experts in the field (see "Are You Ready To Fly?"), as well as the old standby "There I was …" tales for Friday afternoon discussions (see "Crosscheck This!", "Something's Wrong", and "A Lesson From the Chamber"). My personal favorite this month was "The Stupidity Theory"–maybe I just like the title.

Don't miss our next issue on "Changing the Safety Culture."

Stay involved, and keep sending those articles!

– The Sage

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

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

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

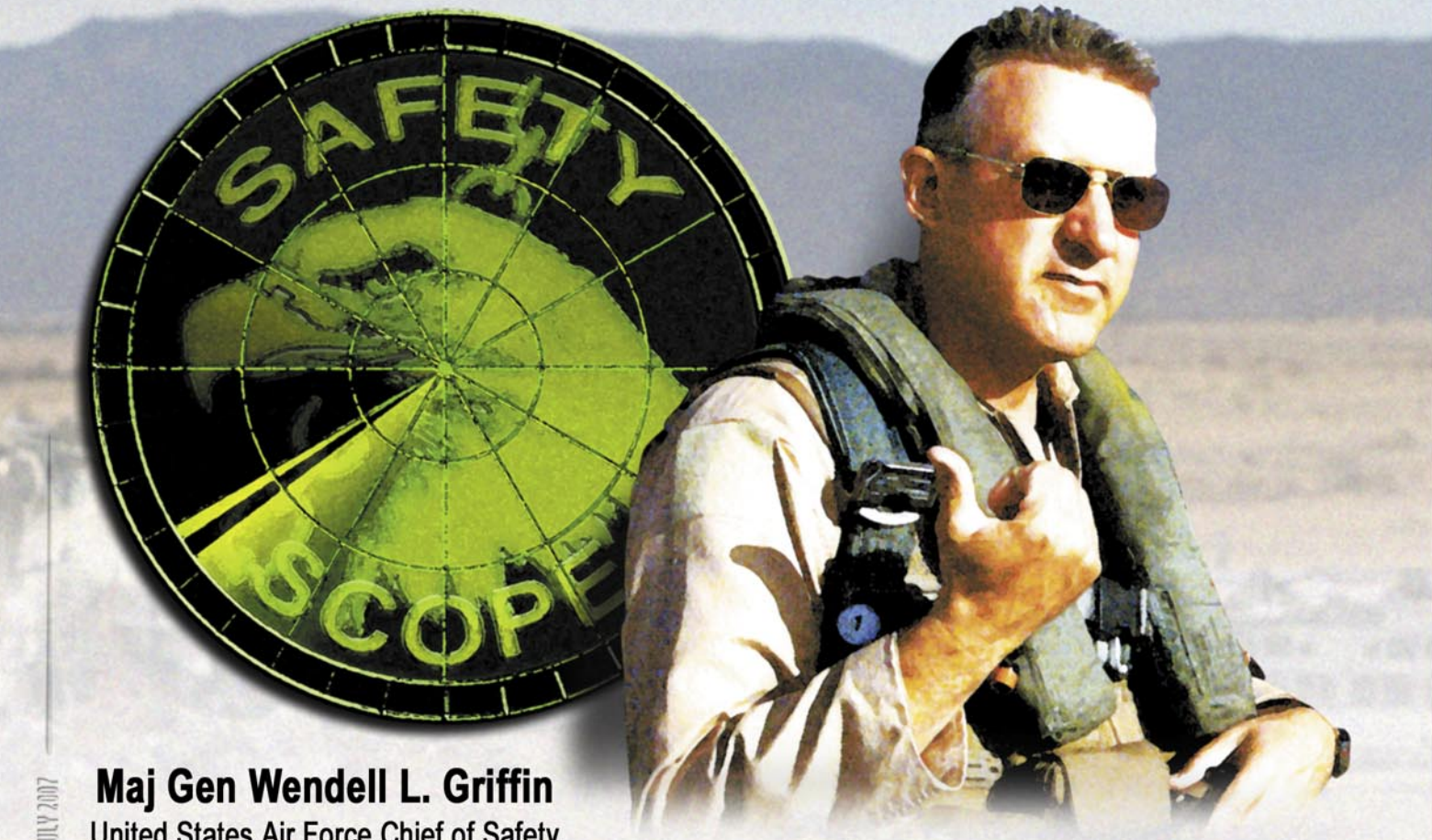
POSTAL INFORMATION — ***Flying Safety*** (ISSN 00279-9308) is published monthly except combined Jan/Feb issue by HQ AFSC/SEMM, 9700 G Avenue, SE, Kirtland AFB NM 87117-5670. Periodicals postage paid at Albuquerque NM and additional mailing offices. **POSTMASTER:** Send address changes to ***Flying Safety***,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

E-Mail — afsc.semm@kirtland.af.mil
Address Changes — afsc.semm@kirtland.af.mil

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**



Maj Gen Wendell L. Griffin
United States Air Force Chief of Safety
Commander, Air Force Safety Center

Photo Illustration by Dan Harman

Reversing the Trend in USAF Aircraft Mishaps

Folks, we had an outstanding aviation safety year in FY06 but we are now experiencing a disturbing trend within our aviation community. I am deeply concerned about it, and I believe you should be too.

As we enter the fourth quarter of fiscal year 2007, already we have destroyed 13 aircraft in mishaps–50% more than all of FY06–and have lost one aircraft in combat. Even more disturbing, we have tragically and irreplaceably lost three outstanding Airmen. Amongst the ruins of 14 aircraft and three fatalities lies a troubling trend. Questionable risk management, poor decision making, and/or inattentive maintenance and flying appear to be contributors in almost every one of these accidents.

Over the past six decades as an independent service, we have steadily improved our safety programs to the point we now expect such performances as that experienced in FY06 as the norm. Have we forgotten the hard work and vigilance that was required to make us so successful? **We cannot afford to become complacent, let our guard down, and lose focus when it comes to safety!**

In that vein, I am seeking your assistance as commanders, supervisors, maintainers and operators to re-focus attention on our aviation safety community! It is no mistake that safety is a **commander's** program. Discuss this issue in your commander's calls and staff meetings, make safety a regular part of your metrics, and I encourage you to make this a Special Interest Item (SII) discussed in every single mission brief. We **must** reverse this deadly trend. Every Airman and every aircraft we destroy is one less we have to take to the fight. ★★

USAF Photo

Don't Learn Safety By Accident: What's On Your Scope?

The production team of *Flying Safety Magazine* would like to thank our contributors and readers for your help in maintaining our standard of communication excellence.

WINNER

2007

APEX®

AWARDS FOR PUBLICATION EXCELLENCE

We couldn't do it without you. To assist the Air Force safety mission of saving lives and protecting vital assets, we need your continuing support to keep *Flying Safety Magazine* ...

Your Forum for Flight Safety.

T-37 GLOC Syndrome

CAPT JOSHUA BELL
37 FTS
Columbus AFB, MS

USAF Photo by Steve Arnold

So there I was, talking to my watch and relating to my fellow UPT students the exploits of my last solo ride in the mighty T-37B Tweet. I did all the aerobatics, pulled a bunch of Gs, and in all other ways had a blast. Everyone was thoroughly impressed. What I failed to mention to this band of believers was my diving save from busting the bottom of the area. At the end of one of my over-the-top maneuvers, I met the exit parameters but developed a ridiculously down-hill vector pointing out the bottom of the area. No problem. I simply pulled a bunch of Gs at an excessively rapid onset rate to stay in the block. Soon thereafter, my world (previously full of vibrant colors) turned black. You guessed it. I was behind on my G-strain. Well, I released back stick pressure, my vision came back, and I finished my profile. No big deal, right?

I did not really grasp the gravity of this situation until several years had passed and I returned to pilot training as an instructor. I was going through much of the same physiological training I went through as a student with an instructor spin on it. The aerospace physiology lieutenant reminded everyone in the class of the stages one goes through as blood pools in the lower extremities, and oxygen runs from the brain during high G-force maneuvering. Basically, the brain reacts to this loss of oxygen by changing the pilot's vision from full-color to gray (thus, the term "gray-out"). Next, the brain steals away the pilot's peripheral vision and trades it for the infamous tunnel vision. The last adaptation the brain has is reverting to no vision whatsoever, or what we call a "black-out." If this lack of oxygen persists, there is no recourse left for the pilot's brain, so it will slip into the G-Induced Loss of Consciousness (GLOC).

So why did a rehash of an old aerospace physiology lesson get me concerned about an incident several years in the past? The answer is I didn't really understand how close I was to GLOC-ing that day until I remembered the sequence of symptoms experienced. I basically skipped the preliminary visual cues (loss of color vision, loss of peripheral vision/tunnel vision) and went straight to the "black-out" condition. I was truly fortunate I didn't lose consciousness that day! A quarter of a

G more, a millisecond quicker onset, a millisecond longer of pulling or any number of physiological inputs could have pushed me over the ledge of consciousness into the abyss of GLOC--while solo! This was not a comfortable realization.

It was a realization made more brutal given the dubious distinction the T-37B holds: the airframe with the highest number of GLOC incidents in the entire Air Force inventory. This is nothing new to most readers. But what has surprised me is that the numbers continue to grow with no appreciable decrease in rate. As an assistant flight commander and subsequently a squadron safety representative, I have personally worked four GLOCs in only a year. More astonishing is, as of this writing, there were approximately 300 documented instances of GLOC in the Tweet from 1993 until present (Air Force Safety Automated System [AFSAS]). Three Hundred! And that is only since 1993! This doesn't include incidents prior to the use of the automated tracking system or the undocumented incidents. Have we not learned our lesson?

To be sure, there are several reasons the T-37B maintains this lofty position. First, it has one of the most rapid G-onset rates of any airframe in the current inventory (the pilot can reach the maximum allowable positive G force of 6.67 in less than one second's time). Second, the pilot wears no G-Suit during flight. Finally, student pilots are the primary flyers of this fully aerobatic jet.

The first of these factors is an obvious, but uncorrectable problem. The rapidity of G-onset does not allow for much lag time on the Anti-G Straining Maneuver (AGSM), but it has been that way since the beginning. The second factor is also uncorrectable at this stage of the T-37's history, but is not as problematic. Most G-suits only give the pilot an extra one-to-one and a half Gs of tolerance, so not having one should be manageable. The third factor, the student pilot, is the most difficult to manage.

It is not my intent to harass student pilots with this article, but I highlight their role as primary since all of the above-mentioned instances of GLOC belong to this category (i.e., not instructor pilots). Specifically, this history of GLOCs involves student pilots using an inadequate, incomplete, misapplied or ill-timed AGSM. Only a handful of instances in AFSAS mentioned illness or other such factors as causal, and many of these also mentioned an improper G-Strain as contributory. This is where we should focus on improvement since there are still several years of T-37 flight instruction remaining.

First, we can improve student performance of the AGSM through training and technique. This does not mean student pilots don't receive adequate training in academics. They do. And they practice the AGSM during their academic phase. But perhaps physiology personnel could perform more evaluations of the students' techniques. Students also receive extra instruction as prescribed by the syllabus early in their flightline training on the importance of the G-Strain. Local units have even instituted a local requirement to fly a "G Warm-up" turn prior to any maneuvering during early blocks of training. But maybe the syllabus has room for more ground pre-briefs, or more G-training (IP flown) earlier in the program. To date, many such recommendations for syllabus changes have been rejected.

Second, the student must be "ready for the Gs." Given appropriate training, a good strain would have prevented nearly all of the previously-mentioned GLOCs. If, however, the student does not anticipate when to apply this strain, he may soon find himself recovering from a GLOC while dancing to the tune of "The Funky Chicken." The classic example of such ill-preparedness is a pitchout to follow flight lead during formation training, wherein an aggressive turn results in a rapid and high G-onset. While focusing on lead, without recognizing the aft stick forces necessary for the maneuver, the student may neglect his strain causing GLOC.

Finally, to ensure the success of the AGSM, students must recognize their G-tolerance will change given the day's circumstances. There are a myriad of physiological inputs to this condition, and the student pilot must identify them prior to flight for a successful strain. Will it be hot on today's sortie? Did I get enough sleep last night? Am I stressed out because of my academic test next period? Each of these questions, and more, should be properly answered and the student should know beforehand whether their current AGSM will be adequate or if an earlier, greater strain might be in order.

Certainly instructors can assist in each of these areas. What the syllabus doesn't mention, the IP can provide. He can provide both instruction and demonstration of G-anticipation (i.e., "Here come the Gs"). Finally, close monitoring of the student's physiological condition prior to and during the sortie can assist in identifying possible G-tolerance complications. In the end however, it comes down to the awareness and discipline of the individual student pilot.

The GLOC history of the T-37B is well documented and remains a very real problem for its student pilots. Students and instructors should recognize each sortie as having the potential for another occurrence and plan accordingly. With proper training, good G-awareness and an adequate sense of one's own G-tolerance for that day, the student can ensure a solid G-strain for that sortie. Such an approach will prevent GLOCs and keep the student's world focused in vibrant color, instead of pitch black, and allow for more episodes of that ever popular show, "There I Was."

Pilot Error Doesn't Matter

CAPT ERIC HENDRICKSON
Aerospace Physiologist
Air Force Safety Center
Kirtland AFB, NM

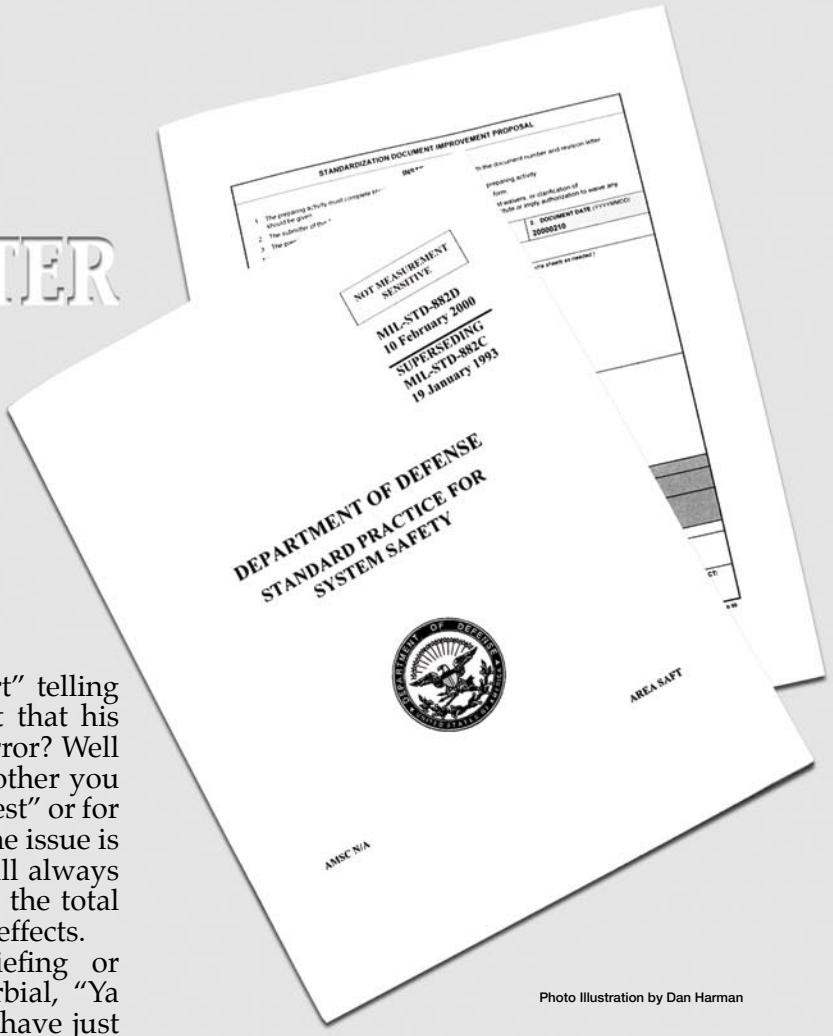


Photo Illustration by Dan Harman

What!? Why is a human factors "expert" telling me that pilot error doesn't matter? Isn't that his job to preach the importance of human error? Well actually no. I am sure at one point or another you have heard the phrase "Errare humanum est" or for you non-Latin types "to err is human." The issue is not that we screw things up. Humans will always error. We need to focus on how we limit the total number of screw-ups and minimize their effects.

You have all been in a safety briefing or commander's call and heard the proverbial, "Ya da, ya da, ya da, and see, if they would have just followed their procedures/TO this never would have happened." This is all too often followed by the solution to preach the need for better decisions, better attention, and strict checklist adherence. That's not to say that we shouldn't always strive to improve our decision making processes and checklist discipline, but it places the emphasis in the wrong area. It places an emphasis on individuals with the exclusion of the operational contexts which influences those errors. It also fails to utilize the most effective methods available to ensure those errors do not occur again.

When I first arrived here at the Safety Center, I read the Department of Defense Standard Practice For System Safety Identification, MIL-STD-882D. Buried within this brief and obscure instruction is a standard for identifying potential mishap risk mitigation methods. It's called the Design Order of Precedence (DOP) and its key steps include, in order of precedence: eliminating hazards through design selection; incorporating safety devices; providing warning devices; and lastly if safety devices do not adequately lower the mishap risk, developing procedures and training.

Recently, I experienced an operational situation in which the DOP was employed to prevent the near permanent hearing loss of the mishap crew. The family (my wife, I and three kids) began our daily trip to Wal-Mart in the trusty minivan when I heard the all too often scream from my four year old. Having just transitioned to a booster seat and now being responsible for her own buckling, my daughter became quickly frustrated with her inability to get the buckle to snap closed. Amidst her high pitched, ear piercing shrieks of frustration my six year old replied calmly with a sigh of annoyance, "Samantha, you always try to use the wrong buckle." She was sitting next to the window, so he took the center lap belt and snapped it into the corresponding receiver removing all possibility of her trying to buckle her shoulder harness into the wrong buckle. I turned to the wife and remarked, "Our six year old is genius. He identified a source of human error, and used the highest level, in the system safety design order of precedence for mitigating identified hazards, by completely eliminating the hazard through design selection." And of course my wife's reply was, "You're a dork." But this example begs the question, if my six year old gets it, why do we as an Air Force continually attempt to first use the least effective method by developing new procedures or training? The Air Force in me wanted to yell at my daughter that if she just used the correct receiver she wouldn't have a problem.

So how do we ensure a transition to a culture that adequately addresses the operational contexts that influence human errors and properly employ the most effective methods to mitigate those errors? I believe the Department of Defense Human Factors Analysis and Classification System (DoD HFACS) will be fundamental to this needed paradigm shift. DoD HFACS is currently employed by all the services as a mishap classification tool, but its concepts could also be applied to mishap prevention, performance enhancement, and process streamlining efforts. What makes this model so useful is that it forces individuals to look beyond the actions or inactions of the operators. Investigators are forced to also address the underlying conditions of the operators and the supervisory/organizational contexts in which they were placed. For instance, if an Operations Officer were to routinely authorize a mission or mission element that was unnecessarily hazardous without sufficient need, it would be critical to identify this unnecessary source of risk. Likewise at the organization level numerous factors can affect the risk of an operation. For example, inadequate program oversight/program management for a particular MDS could lead supervisors to task crews with missions they are inadequately equipped for, and thus contribute to crew members seeking unapproved off-the-shelf equipment which could lead to a dangerous situation.

During a recent class A mishap board, I made the mistake of writing a sentence weighted heavily in DoD HFACS jargon, "In an effort to further explain the contributing context, the latent preconditions of the operators will be discussed." The lead investigator quickly informed me this was a dork statement and to reword in normal English. I tried to convince him that we all would be talking like this someday, but he didn't buy it. My objective with this article is not necessarily to try to get Joe Aircrew to start using terms like "latent preconditions," but to begin thinking in the general concepts this term (and others like it) seek to describe. We need to seek to always address not just the poor actions of individuals, but also their underlying conditions and the failed supervisory/organizational defenses.

Even if one can identify the deficiencies it can sometimes be a daunting task to believe that you can actually affect change in such a large and bureaucratic system. There are actually numerous programs and advocates to assist even unit level Airmen in affecting real change. The challenge is being aware of these various resources. Case in point–how many of us are adequately familiar with the growing initiatives of Human Systems Integration or AFSO21?

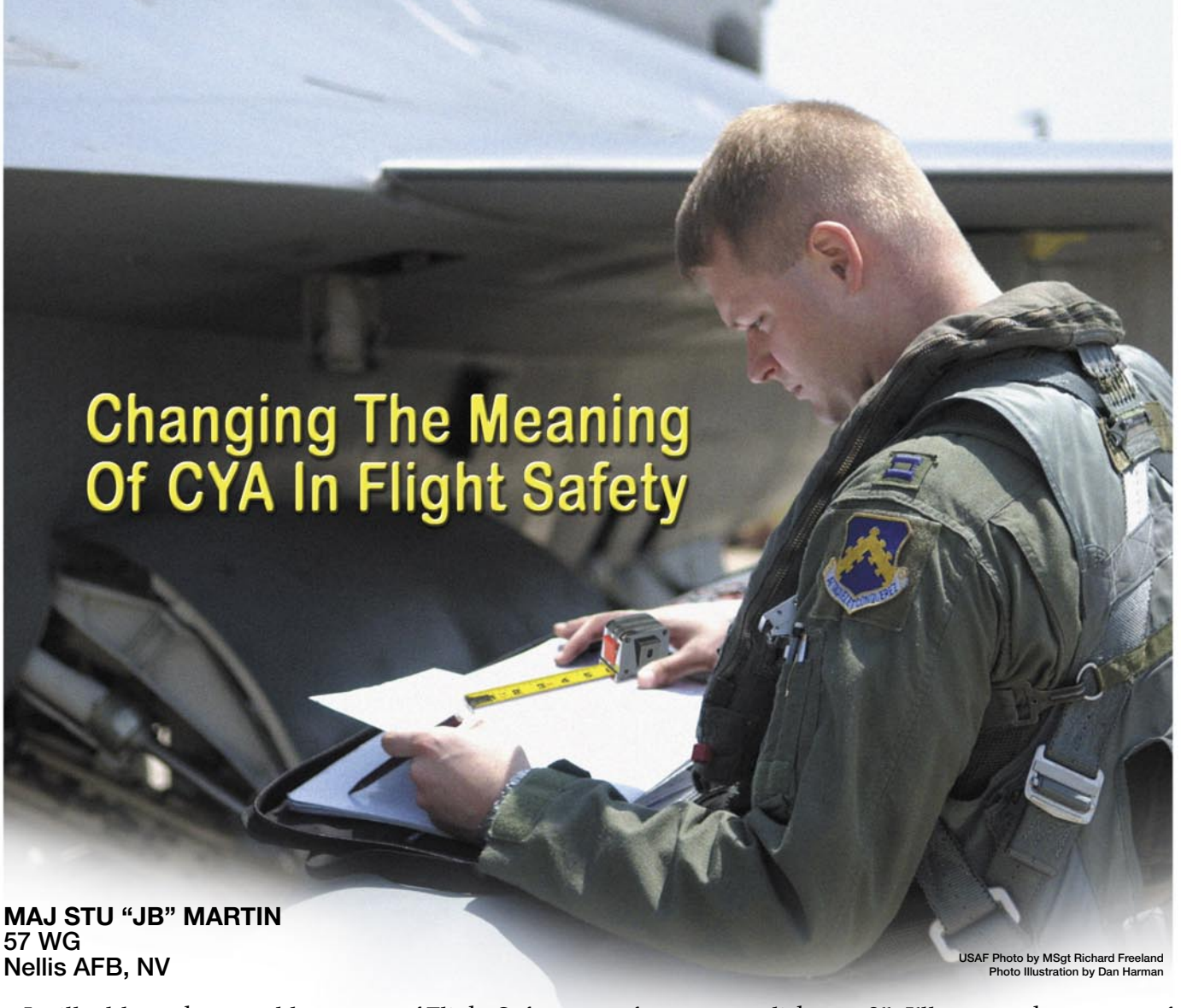
Are you familiar with the efforts and resources provided by Team Aerospace? On a daily basis your Flight Medicine, Public Health, Bioenvironmental Engineering, Aerospace Physiology, and Health Promotion counterparts work to optimize and sustain your performance. For example, under the larger umbrella of Human Systems Integration (HSI), Team Aerospace works with operators to develop a "comprehensive strategy used early in the acquisition process to optimize total system performance, minimize total ownership costs, and ensure that the system is built to accommodate the characteristics of the user population that will operate, maintain, and support the system." One initiative to accomplish the goal of cradle to grave integration of the human weapon system is the Capability Gap Analysis (Cap Gap) program described in AFI 48-101, Aerospace Medicine Operations. Through their Cap Gap process, Team Aerospace works to develop solutions for operational needs identified by individuals in the field. Working with Team Aerospace provides just one more additional avenue to identify and develop local solutions and get those needs systematically forwarded up for evaluation, prioritization and eventual resolution.

AFSO21 provides another example of the many avenues for change. In general, AFSO21 asks, "Can this organization manned with these people with this training and equipment perform these tasks to the right standard under these conditions?" Key to the program is ensuring that all Airmen understand their role, develop the ability to affect change and continuously learn new ways to improve processes in their daily activities in order to save resources, eliminate waste, and increase performance. AFSO21 provides just another example among a list of numerous avenues available to those faced with a seemingly bureaucratic and immovable system. Other examples include the Air Force Idea Program, formal suggestions through one's chain of command, AF Form 847/AFTO Form 22 submissions, and the list goes on and on.

In summary we need to move away from a "blame the individual" culture to one that sources human error along all the levels outlined by DoD HFACS. Then and only then can we begin to systematically address the errors which lead to organizational failure (major accidents). Although a daunting task, especially for those young Airmen "turning the wrench" or "flying the line," however we can and do have the resources and programs available to affect real change.

I am not the first to suggest the need for such a paradigm shift, but someone reciting the thoughts of those much smarter than I. If you want a short, easy read on this subject review the work of Sidney Dekker, "The Field Guide to Understanding Human Error." For those more ambitious, the lengthy psychobabble of James Reason's "Human Error" is good. These two books serve as a staple to any serious student of human error. And we are all students of human error. For me at least, this is one test that I don't want to fail.

Changing The Meaning Of CYA In Flight Safety



MAJ STU "JB" MARTIN
57 WG
Nellis AFB, NV

USAF Photo by MSgt Richard Freeland
Photo Illustration by Dan Harman

I will address three problem areas of Flight Safety, so please bear with me while we get through this article "mishap free" together. First, safety is hard … to measure. Accidents, or lack of them, are not necessarily valid measures of "being safe." Second, I will argue that safety is something that all aircrews should accomplish everyday when they fly and execute their missions. Sometimes we fail. But the important point is that safety is not separate and distinct, rather it should be an indistinguishable part of the flying mission. Third, leadership at all levels, either directly or indirectly, is the second biggest factor for our aircrew to safely accomplish their missions. By briefly reviewing these issues, I want to help FSOs change the meaning of "CYA."

Safety is not hard to do, but it is hard to measure. There are practical problems that drive our safety shops (and the leadership that directs them) into working towards "high and unachievable goals." It's a seemingly unsolvable problem that safety is difficult to measure. As pilots, we want objectives that are clear and quantifiable. Safety, on the other hand, has problems in this area and if forced into our mold, can quickly become ineffective or counterproductive to accomplishing our mission. For instance, when asked "What's your greatest safety accomplishment?" I'll argue that most of us don't really know. The obvious answers might be limping a plane back with battle damage (or a bird strike,) landing a jet single-engine, or single-handedly keeping a wingman from making himself part of the countryside. I would challenge that each of you has done much more than that, so stop right now and pat yourself on the back. I would guess that in any given year of flying, every aviator stops more mishaps than can be counted.

The problem is we don't *know* that we've stopped these mishaps. One afternoon at the squadron bar you gave some advice, or told a personal story to a young wingman that emphasized the importance of not going craniums down in a low-altitude turn. As Top-Three, you stepped a four-ship and made a comment about new range restrictions that materialized while the pilots were briefing to fly. You gave a young IP advice about how to alter his students' profiles when airspace, weather, or the student weren't what was planned. During a pilot meeting, an ops officer tells his squadron that during upcoming surge operations (where pilots would fly three times a day and four days a week) that it's "their call" to not fly when they're too tired.

In an alternate universe where these seemingly

inconsequential things were not done, a wingman hit the ground trying to plot while he was in a turn at 500 feet, the four-ship strafed an Explosive Ordnance Disposal (EOD) crew that was not on the original range schedule, the young IP watches a young flight lead upgrade impact the ground during off target maneuvering on an unplanned low-altitude Close Air Support (CAS) sortie. Lastly, one pilot damages an Electronic Counter Measures (ECM) pod during taxi on his eleventh flight in four days, while another manages to unintentionally shoot a 2.75-inch rocket off the range due to a switch error on his twelfth flight of the week. In our own universe though, nothing actually happened.

As an FSO, I can't measure these proactive actions that resulted in the lack of a mishap. What we tend to focus on are the reactive measures. An accident happens; we find the causal factors and determine how to possibly avoid the same thing when similar circumstances arise again. We rarely measure accidents that don't happen or why they didn't happen, because it's almost impossible to gauge. So aviators mostly associate safety with things that went wrong and ended badly; instead of the safe decisions and actions that we executed hundreds, if not thousands of times since the last quarterly safety meeting.

The next problem with safety is its division into a separate and distinct category in our lives, our jobs and the flying missions that we execute. All of the situations outlined above fall into my personal definition of "safety." Maybe not what we think of everyday as "safety," but nonetheless, I argue that these situations are the very basis of safety. With our leadership's delegation of safety to the lowest level, we ought to unconsciously "be safe," every time we brief, fly, debrief and even talk tactics at the squadron bar--it's not a separate subject. It should be infused into what we do everyday.

Far too often, we execute safety practices as "square fillers," instead of as an attitude. For instance, a computerized ORM sheet that pilots fill out (and is never really referenced) might be far less effective than a simple look in the eye by a Top-Three, who uses what he sees and hears to help with that flight's risk reduction measures. The former will look better in a UCI but fails at the most basic level … the intent of ORM. So, why hasn't ORM been explained as something that we've always done? In this example, ORM simply provides a formal framework to help ensure that we don't miss the identification of risks, hazards and ways to mitigate them.

When ORM ceases to do these things and is simply a checklist, we've taken a step backwards, not forwards. When we divide safety into a separate category, we cloud rather than clarify. Every time we make safety into a quarterly meeting, a specific topic of the flight briefing, a job, or a special qualification, we further reduce its effectiveness. This is because we subconsciously fail to accept the responsibility for this all-encompassing aspect of our flying missions and delegate it to an outside shop or agency. This is ludicrous, since we all have a safe flight in mind from the time we start to plan until we finish the debrief. Taken in this context, we cause the idea of "safety" to be something left behind at the Ops desk after we step to the aircraft.

Where did I get this last premise, that safety is something we do--not a job, an office, a program, or a checklist? The answer is quite simple: my leadership. Over the past decade, some of them were gruff, some were quiet, some were flight leads while others were wingmen, some were squadron CCs and ops officers, some were weapons officers, while others were actually no-kidding safety officers. Some talked openly about safety, while the best of them … I can't even remember them mentioning the word. Leadership, at all levels, is the second-most important issue affecting flying safety in a unit. Leadership, both formal and informal, does this in many ways. A weapons officer explains how to properly execute a specific tactic, a life support officer provides quality instruction during hanging harness and egress training, a flight commander schedules his people for appropriate upgrades and lastly, the ops officer gives his aircrews the obligation to "make the call."

So, why do I say that leadership is the *second* most important factor in safety? I say this simply because the aircrew must be the most important factor. Our leadership can only give us flyers the necessary atmosphere, culture and tools to "be safe." Aviators have to understand the problem, understand that they have the power to affect change, and be willing to accept the responsibility and act upon issues that are identified.

So, here's what I propose: aircrew and their leadership at all levels, must "CYA," or "Change Your Attitude." I would argue that we, as aviators, don't actually have too far to go. As I've explained, we've been doing it all along. Of course, we can always improve and your safety shop can help. But, the attitude that needs changing is treating "safety" as a separate entity within our flying operations. If aircrews simply realize that we're already doing it, then I think we're more likely to internalize this "feeling" and know when it's absent. If we educate aircrew, and leadership gives them "the keys to the car," then I think they will better understand and internalize "safety." Here is what safety is not: It's not a quarterly meeting, it's not filling out an ORM sheet prior to step, it's not signing off the *Blue 4 News*, and it's not leadership saying one thing while meaning another. OK, there I've said it. In a perfect world I wouldn't have a desk job, because each of you would naturally be doing it for me (and I think that most of you do). Lastly, I used the word "safety" or "safe" forty times in this article. As a new FSO, I hope to use the word as little as possible in my new job. Each time I catch myself saying the word, I know that I've somehow separated the idea of safety into a separate category instead of a part of my life, job and mission. Enough said … Fly Safe.

USAF Photo by TSgt Keith Brown

The Tired Pilot

CAPT STEPHEN R.GWINN
458 AS
Scott AFB, IL

USAF Photo

Despite my current short-haul flights flying only CONUS, I have had the opportunity to transit many European countries in a past assignment. One country in particular has left a vivid memory of a culture unknown to Americans. Throughout my many extended stays in Seville, Spain, I was able to observe a daily schedule where siestas were still standard. This is in sharp contrast to the American way of pressing through weariness with that *Grande* coffee just after lunch.

The American way is in opposition to most current studies that prove taking short naps in the mid-afternoon is much more effective than caffeine, and the results are higher work productivity. So, why is this important for a flight safety article? Well, besides the fact that sleep is very near and dear to my heart, the FAA, NTSB, and many other flight safety organizations have stated crew fatigue is a major hazard to the transportation system.

A NASA study has shown that brief "power" naps during trans-oceanic flights significantly improved a pilot's alertness and performance. I'm sure the honorable Charles Lindbergh would agree on his 1927 Atlantic crossing. He stated, "My mind clicks on and off. I try letting one eyelid close at a time while I prop the other open with my will. My whole body argues dully that nothing, nothing in life is quite as desirable as sleep. My mind is losing resolution and control." Now I know, at least on a smaller scale, that many of you have felt this way on extended duty days or OEF/OIF missions–where you turn around and you're the only one awake. No, that never happens right? In fact, this phenomenon has become so important to the aviation industry that a laundry list of companies have begun studies. These include: Singapore Air, Civil Aviation Authority of Singapore, the Washington based Flight Safety Foundation, NASA, Emirates, the University of South Australia's

Centre for Sleep Research, and many more my limited research has turned up. Can the same be asked of Air Mobility Command? I honestly don't know but I do intend to research the facts.

Preliminary studies have shown that fatigue plays a role in all of our society, not just transportation. Fatigue has a negative impact on our safety, productivity, and our quality of life. Early research has shown that fatigue has the general effect of moderate alcohol consumption. Job performance is affected every hour of being awake from 10 to 26 hours on an equivalent scale of .004 percent rise in blood alcohol. The same study shows that being awake for 18 hours is equal to a blood alcohol level of .05. The legal limit for driving in most states is .08. Would we want to fly an airplane at a BAC of .05? Obviously the answer is no. However, I remember many channel missions where I was awakened during my normal sleep cycle to fly an augmented (24-hour) flight duty period without adequate rest. Flying a nighttime multi-step-down TACAN into Sigonella NAS at the end of an augmented day with the equivalent of a BAC .05 should raise some eyebrows in the safety community. Now consider those crews flying with Night Vision Devices (NVDs) into hostile airfields on a repeated basis.

I'm not a physiologist, but from my limited reading, the two main contributors to fatigue are sleep loss and circadian rhythm disruption. These two contributors have a direct effect on the amount of errors and aviation accidents that occur.

An additional problem is self-identifying fatigue, something that is difficult to do. NASA reported that pilots felt the most alert just six minutes before they actually fell asleep. Because of this difficulty, it is very hard to identify fatigue as a causal finding in an investigation. With this being said, we can still identify many well-known accidents where pilot fatigue played a major role. This includes China Airlines flight 006 in 1985, Arrow Air charter flight in 1985 (285 military fatalities), and the well-known American International flight 808 that crashed in Cuba. I don't know how many Air Force SIBs have stated fatigue as causal, or even an "other finding of significance," but I suspect fatigue is under the surface of a lot of mishaps.

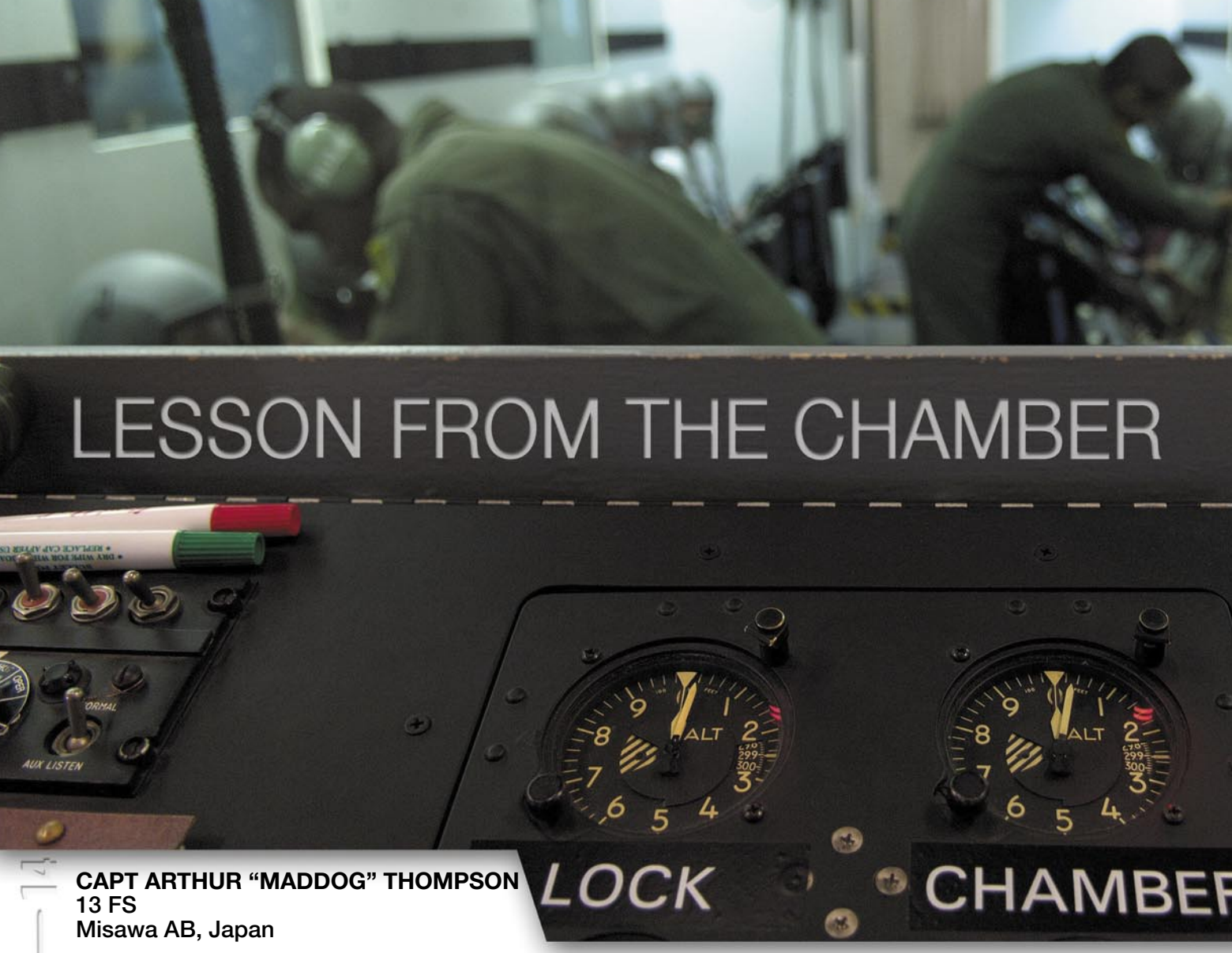
That of course is an "un-official" proclamation, based solely on conjecture. However, if our job as safety officers is to identify risk, I will be so bold as to identify fatigue as one of mobility crews' top risks.

So, what do we do about this risk? First, we can take clues from the civilian aviation community. Emirates are testing different variations of rest periods as well as three or four days off before or after each long distance flight (up to 18 hours flight time). Emirates are also considering a two or three day layover, mid-trip. Qantas and the Australian Civil Aviation Safety Authority are collecting data from monitoring long haul pilots with duty periods from 12 to 14 hours. Our mobility crews are flying very similar duty times, if not longer. Over night flights are very common within AMC and many aviation organizations are looking at collecting data from shift workers in order to understand the effects on working at night.

Research is also being done on the flight deck environment and the crew rest area located on the aircraft. The characteristics of the flight deck have been shown to make pilots more susceptible to fatigue. This includes movement restriction, variable airflow, low barometric pressure and humidity, noise, and vibration. On top of all of this is the more complex instrumentation and jobs associated with modern cockpits. Research has shown the constant vigilance required to operate in these modern environments decreases alertness by 80 percent in one hour.

The latest research has delved into crew rest prior to flight, including using drugs for sleep and crew rest during flight. This has led to FAA concerns and studies to help establish explicit standards for approving on-board flight crew rest areas. Again, the challenge is applying all of these studies to the Air Force mission. This means re-evaluating cargo's priority and when passengers need to arrive at their destination. Does a crew absolutely need to be alerted at 0300 for cargo to arrive at a certain Zulu time, when the possibility of transportation by rail, ship, or commercial air may exist? This also applies to transporting passengers. Is the risk of being awakened during a crew's circadian rhythm, as important as getting the passengers to their destination at a certain time? Is alerting crews before their normal wake time in order to fly a local training mission due to maintenance or training-requirement constraints worth the risk? I'm confident these ideas are already being considered, but they continually warrant a second look as mission requirements change.

Scientific analysis already proves that aircrew fatigue can raise the risk substantially during any mission. The least we can do is study on-going research projects, and perhaps fund a few of our own. I know I would love to see the brain activity analysis on a C-17 crew flying an augmented crew day into OIF and back. A study taking place on our mobility crews would offer invaluable information to the rest of the aviation world due to the amount of missions where the factors that contribute to fatigue are present in large quantities. Perhaps with the purchase of a new tanker, we will look at the crew bunk area and try to imitate those in the most modern commercial aircraft such as the A340-500 and the Boeing 777 ER/LR. Lastly, the ORM analysis used for pre-flight go/no-go decisions needs to be constantly updated, reviewed, and the importance reiterated so inadequacies and crew complacency don't contribute to a mishap.



CAPT ARTHUR "MADDOG" THOMPSON
13 FS
Misawa AB, Japan

What did you get out of your last TDY? Did you have the chance to spend a weekend in a cool country? Maybe you were soaking up rays somewhere on the Mediterranean; got to hang out with some old college buddies or family; bought some suits that would hopefully fit for the next twenty years; or maybe you were just able to escape the queep from back home.

What about your last chamber course? Did you cash in to see the sights of the Netherlands, hit Chili's at Kadena, or make friends with the locals at a chamber base in the states? What can you remember about the course? Can you remember what lessons were covered or what your personal hypoxia symptoms were?

It seems as if the training is never ending. Every five years we are required to go back to the chamber for a refresher course. We go over all types of information throughout the day. Usually the first part is made up of academics. Lessons cover basic anatomy, the elements of the atmosphere, and how gas laws affect those elements. Other topics include Situational Awareness (SA), physiological affects on the body, and use of our senses. The class reviews some past accidents and how we can learn from them. We also get a refresher on Crew Resource Management (CRM) and Operational Risk Management (ORM). We go on to talk about circadian rhythms, proper G-strains, workout programs, and so forth. The afternoon consists of actually getting in the chamber. That's where we see our personal symptoms of hypoxia. That's where I learned a lesson that saved my life.

So there I was, flying 1-V-1 Tactical Intercept (TI) training at night, while wearing Night Vision Goggles (NVGs) over the ocean. Both my flight lead and I were able to execute multiple intercepts with threat reactions. Everything up to this point had been executed as planned. During the return-to-base I noticed something was "just not right." I was number two on a radar-assisted trail recovery flying in and out of the weather. Passing 4,000 feet on a long base to final, my lips started tingling. This incident immediately took my mind back to the chamber. For me, a tingling sensation in the lips (or numb lips) was one of the symptoms I had


USAF Photo by SSgt Samuel Rogers

during chamber exercises. Then I found that it was somewhat difficult to breath. Something else weird happened, my forearms started to feel sore as if I had just completed a strong workout.

After I got the tingling sensation in the lips, I began to troubleshoot. The oxygen gauge was fluctuating, but within limits. I proceeded to check the oxygen panel switches to make sure none of the switches had been knocked out of position during flight. I also checked the oxygen hose to see if was tangled up or disconnected. After that, I checked the oxygen PSI gauge.

The oxygen panel switches were in their normal positions, nothing was wrong with the oxygen hose, and everything was connected properly. The oxygen PSI was normal and operating in the proper region.

That's when I started to get another symptom. I began feeling nauseous and decided to drop the mask since I was at low altitude. I found I was able to breathe normally with the mask down and proceeded to land the aircraft.

In the chamber, you are reminded to find a couple of hypoxia symptoms you can recognize in flight. Personally I noticed that completing simple tasks became tougher. For example, it took longer to fill out worksheets with simple math problems the physiologist gave us. When I was flying the radar-assisted trail recovery, something that was fairly common and non-demanding, I felt I was getting behind the aircraft around the time I started getting the sensation of tingling lips. It's said "you know you have lost SA once you've gotten it back." I realized at the time that I was getting behind the jet, but once I landed I could look back and see where my reactions and thoughts were definitely taking longer than normal. A simple task took a lot of concentration.

It's not that I thought this would never happen to me--I tend to think the opposite. But I did think that the risk of getting hypoxic as a pilot who always wears a mask was less than that of a crew airplane, where oxygen masks are stored within arms reach.

I'm lucky what happened to the famous golfer Payne Stewart, his fellow passengers and flight crew, did not happen to me. I wonder what would have happened if my oxygen system would have failed while I was flying the TIs out in the training area, at night, wearing goggles, over the water, while pulling Gs. Would I have been able to comprehend that something was wrong while reacting to the other aircraft? While in a dive, would I have been able to recover prior to hitting the water? I don't know for sure. Too many factors would have to be looked at. How fast would the symptoms become present? Would I be able to recognize the symptoms and "knock off" the fight in order to put the jet on the ground?

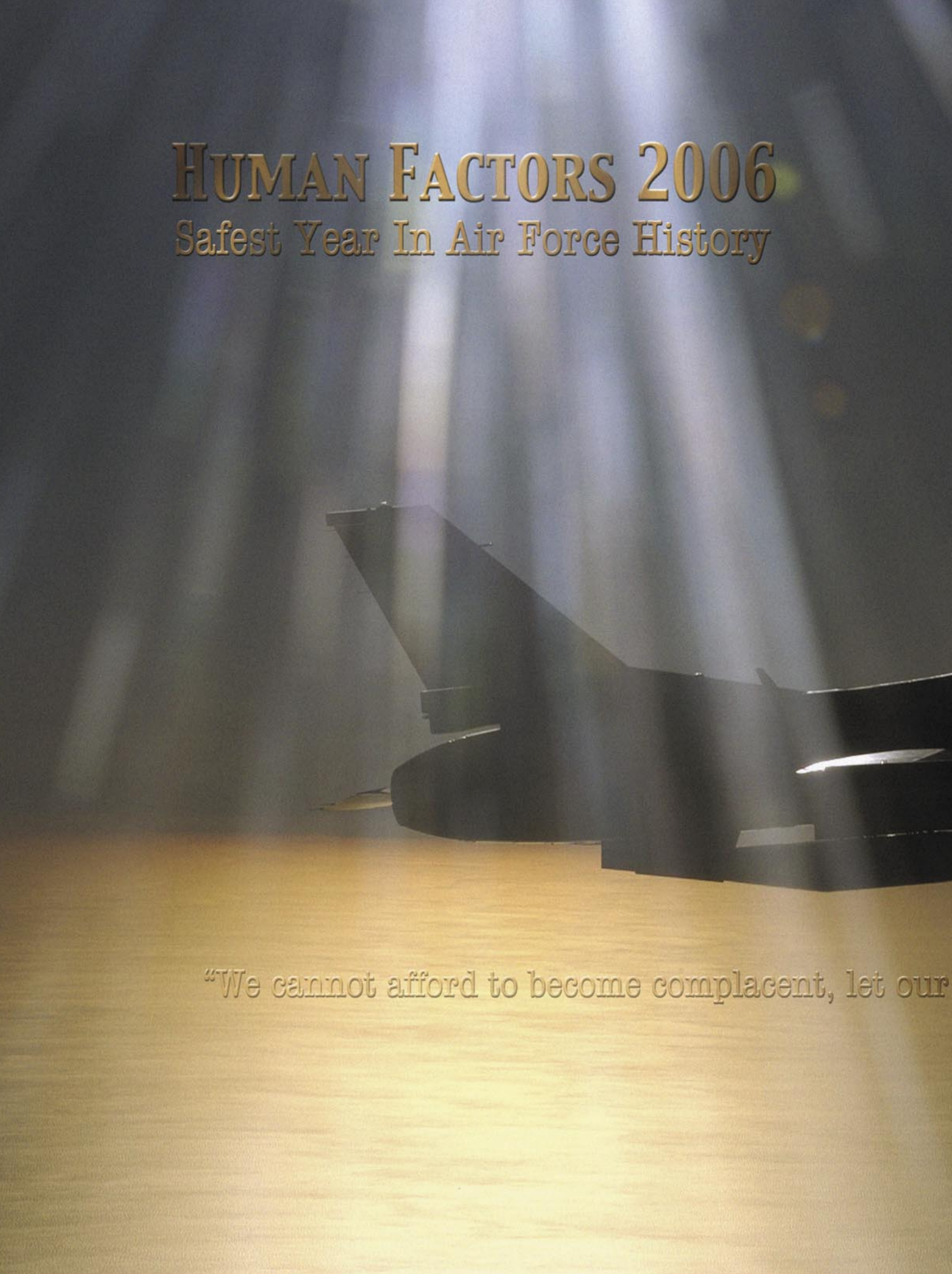
I was fortunate with the timing of when the symptoms took place, or more realistically, when I was finally able to realize that something was wrong. Because of the chamber training I was able to recognize and respond to the oxygen system problem. I could have "gang loaded" the regulator or used the emergency oxygen bottle, but since I was at low altitude, I decided to just drop the mask. It could have been worse. I could have been in a state where I was unable to perceive there was a problem--and continued to fly until impact with the water or ground.

This is not written to say (again,) "Don't think this will never happen to you." What I do want to remind others is that, for the most part, the training we receive is for a good reason. No matter what course or class you are taking, try to remember some valuable information, because that information could be the one thing that saves your life, the life or your bros, or the lives of others on the ground. Training actually does pay off. It might not for everyone, from every course or class, but in this case … it did for me.

(Sidebar) Investigation revealed the air pressure valve regulator failed to work properly.

Human Factors 2006

Safest Year In Air Force History



"We cannot afford to become complacent, let our

Disturbing Trend In 2007:

14 Destroyed aircraft (50% increase to FY06 period)

1 Aircraft lost in combat

3 Irreplaceable, outstanding Airmen lost

guard down, and lose focus when it comes to safety!"

Maj Gen Wendell L. Griffin

Air Force Chief of Safety / Commander, Air Force Safety Center

USAF Photo by MSgt Michael Ammons
Photo Illustration by Dan Harman

MAJ RANDY "COOTER" MCCALIP
14 MOS
Columbus AFB, MS

USAF Photo by TSgt Ben Bloker

An A-10 recently crashed while performing a Night Vision Goggle (NVG) upgrade training mission. The Accident Investigation Board (AIB) concluded that the pilot experienced spatial disorientation and wasn't able to recover the aircraft. That night, the USAF lost one of its most valuable assets: a combat proven pilot who lived and breathed A-10 tactics. How can a pilot with so much flying and NVG experience succumb to a threat as well known as spatial disorientation? After carefully reading the report, it's clear the mishap pilot was not "on his game" and allowed self-imposed threats to negatively affect his flying abilities.

Prior to each flight, you check the aircraft maintenance records, talk to the crew chief, complete your walk-around and run preflight checks. By engine startup, you are confident the aircraft is ready to perform its mission. But who accomplished the preflight on you? The aviator has always been the most critical piece of the flying puzzle. It is imperative that aviators accomplish good preflights on themselves and take stock of their ability to perform. This is where the **IMSAFE** checklist can save lives and prevent mishaps.

I—Illness is inevitable and we have the routine down pat; visit the flight doc, medicate and go home. When we feel better (notice I didn't say 100 percent), you swing by the flight doc to Return To Flying status (RTF). Hypoglycemia, dehydration, fatigue and disruption in routine are all residual effects of illness that can affect human performance and jeopardize flight safety. When you RTF, the residual effects are still present and it could take days before you feel 100 percent. This is not a good time to fly an especially demanding sortie.

M—Though AFI 48-123 prohibits self-medication, we have all, at some point in our flying careers, chosen to self-medicate. For example, it's Friday night and you get a cold. It's not urgent, so the ER is out of the question. Moreover, who wants to sit for hours in a room full of sick people? By no means am I advocating self-medication … but if for some reason you do, ensure you visit the flight doc before you fly because the residual effects of medication are the same as those of an illness.

S—As crewmembers, we sometimes avoid talking about stress. We all have it and deal with it in different ways. Aircrew are usually very good at compartmentalizing their lives. Most can leave personal troubles in the flight locker while they perform the mission. But what happens when you can't set the issue aside? Consider this a knock-it-off red flag. If the mission dictates pressing on, be aware of internal distractions and their affects on your performance.

A—We get briefed to death about alcohol. We all know the 12-hour bottle-to-throttle rule, but the "or its after effects" clause is much less adhered to. Friday night seems to be the night everyone "pushes it up" because they have all day Saturday and Sunday to recover. Depending on how pickled you got, you may have some residual effects come Monday morning.

F—I believe fatigue is a factor in the majority of motor vehicle and aircraft accidents. We live in a 24-hour society that gives us many opportunities to short-change ourselves on sleep. There is no substitute for proper sleep. Caffeine will help you feel alert but your cognitive function is still degraded. *(SEFL Editorial note: Caffeine may actually improve cognitive function, but the effects are mediated by dose, tolerance, and hydration.)* The aviation world is demanding and highly intolerant of simple mistakes. In a fatigued state, you are much more prone to these simple errors. Keep sleep sacred; if it's time to hit the sack, turn off the TV and stay away from eBay.

E—I know of an incident where nutrition (or lack thereof) was a factor. Due to the pilot's poor nutritional habit patterns, all he ate or drank in the previous 19 hours was a granola bar, four large cups of coffee and a diet soda. Due to mission demands and flying schedules, skipping meals almost becomes a part of the mission. However, the brain needs a steady dose of fuel and even though it can steal from its stores, there is no substitute for a steady influx of high-quality nutrients.

With the GWOT, high ops tempo and erratic flying schedules, we rarely feel 100 percent mission capable. However, before your next step, ask yourself this question: "Am I mentally and physically prepared for the worst emergency procedure imaginable?" Flying is demanding, unforgiving and most missions require you to operate near your personal limits. So the next time you're mission planning, don't forget to preflight yourself with the IMSAFE checklist.

(Sidebar) The "after effects" of alcohol on the cognitive processes can last for 18-36 hours depending on the dose.

USAF Photo by SSgt Bethann Caporaletti
Photo Illustration by Dan Harman

Something's Wrong

ANONYMOUS

Like most pilots in the Air Force, I knew I would not get into an accident. That only happens to the other guy. I had the best training and flew the world's most sophisticated equipment. It can't happen to me, can it? Well every pilot out there has a story to tell about their flying career. It can revolve around something spectacular–saving their plane or lives. But more times than not, they are centered on something they screwed up or (more importantly) something they missed. I'm no different.

Here's my story: Unfortunately, it's not about something spectacular. The results could have been catastrophic, but I got lucky.

My flying career started in the pit of an RF-4. I was a back-seater at that time and truly loved flying that plane. I spent three years filling the "clue-bag" with great flying experiences. Any pilot will tell you the importance of filling that clue bag. Talent and equipment are important, but there is nothing more important then good experience. That experience got me out of some challenging situations in the low altitude environment where we flew. Unfortunately, we lost six aircraft to class A accidents during that short period of time. Still, that couldn't happen to me, it only happens to the other guy. Sadly those "other guys" were in my squadron. I lost some good friends and the Air Force lost some good aviators.

I decided to take that experience and go to UPT, and spent a challenging year at Columbus AFB. I finished the program and was assigned to an F-16 RTU at MacDill AFB. I was sitting on top of the world. I flew on of the best fighters of all time--the Rhino, and now I was moving into what I considered the best fighter of the day. It just couldn't get any better.

It was two months into the program and things were going great. We were moving into the refueling phase of training. I really enjoyed those missions in the Rhino and I knew it would be a challenging and rewarding mission here as well. It was my first ride in this phase so I had an IP in the back seat. The mission was scheduled as a two-ship BFM ride, refueling, and then return for more BFM. Our briefing covered all refueling specifics and BFM techniques but it went just a little long. I figured that wouldn't be a problem, I'd been late numerous times in my flying career. I'd just hurry through my pre-flight checklist and make up the time. So I did … I rushed through the checklist and made up the time. Unfortunately I was in such a hurry I missed a critical step.

It was an uneventful ride out to the working area. We checked in and it was time for the 1V1. I was pumped and ready to go. The first engagements went great. I correctly performed our pre-briefed maneuvers and got into position to take missile shots. They couldn't have gone any better … and then things started to happen.

I couldn't put my finger on it, but I just wasn't on my game, like I was before. The following engagements got progressively worse. I went from flying a good plane to getting killed, *quickly*, in each engagement.

The next phase of the flight was about to start, refueling at FL280. On the way to the tanker route, things went down hill. I had problems controlling the aircraft; I noticed my fingers tingling and had a total lack of concentration. I couldn't even remember the IP's name. I remember seeing the tanker and giving control of the aircraft to the IP. The next thing I remember is level flight at 3,000 feet--returning to base and feeling fine. The flight back was an uneventful trip and a normal landing. I was met by the flight surgeon for that long trip to the hospital.

Looking back on it, it's so easy to see what happened. I had five years experience flying high performance aircraft. I'd been through the altitude chamber numerous times. Still, I missed every one of my hypoxia symptoms. I was concentrating so hard on flying, this experienced pilot let the situation progress from a mild case to a totally incapacitating form of hypoxia.

How could this have happened? I thought back to my pre-flight and realized that in my rush to complete the checklist, I must have failed to accomplish the PRICE check on the oxygen regulator. And just my luck, this was the day my oxygen regulator wasn't working correctly. In fact, it failed numerous maintenance checks on the ground.

I always thought I couldn't get into an accident. Plain and simple I got lucky! I made two critical errors that day, and if it weren't for the IP in the back seat I wouldn't be here. Since that day, I have a new appreciation for flying. Unfortunately, accidents do happen. It's just my job to utilize good checklist procedures and make sure I'm ready, mentally and physically, to fly every mission.

"Herc, There I was..."

CAPT MATT SCHNELL
61 AS
Little Rock AFB

Fat, dumb, and happy after inhaling Hawaiian chicken-salad sandwiches from Base Z, my crew and I experienced what some might say is one of the "least desired scenarios"–smoke and fumes onboard our aircraft. Before I explain the actions we took to handle the situation, let me provide some background information. Our C-130E was on an AMD-directed mission within the CENTCOM AOR to deliver over 50 Army combat personnel to their final location. My crew was on the second to last leg of our standard multi-leg day. As a relatively new Herc aircraft commander (AC) (200 hours in the C-130 and 1,500 hours in the C-21), I was fortunate to have a highly experienced co-pilot (800+ C-130 hours), evaluator navigator (1,700+ hours), superb flight engineer (600+ hours), and two exceptional load masters (1,500+ combined hours).

After flying as a crew for 2-months, we had experienced our share of EPs, and melded well together to solve any problems we had encountered up to this point. So, let's get back to the scenario. Cruising at FL 210 and halfway between Base X (final destination) and Base Y (intended destination), Loadmaster 1 informs the crew that there is smoke in the aft cargo section that isn't dissipating and is now moving forward. First though, "Oh #^&*!" I thought all my hours of blood and sweat on the "flickerball" field prepared me for this scenario, but add in a combat zone and chaotic communication flow, and the problem becomes a bit more difficult to solve. Fortunately, my highly attuned flight engineer is the first to chime in and directs me to descend immediately. At the same time I'm diving for terra firma, I direct the rest of the crew to immediately go 100% oxygen and check-in. Check-in is uneventful and the loadmasters have already distributed the EPOS to our Army passengers before I direct them to. "Any apparent damage to the aircraft load?" "No damage pilot, just a bunch of smoke." I asked the nav what field we were closest to. Before I could finish my question–"Pilot, doesn't matter; we're halfway between Base X and Base Y." Decision time–press to Base Y and complete the mission or press to Base X where maintenance is available and better medical facilities. Sorry Army dudes, we are diverting where I know we can get the best support, and we'll sort the rest out when we're on the ground. As the flight engineer is finishing up all applicable emergency checklists, he's working with the loadmasters to determine the source of the smoke, as I'm focusing on getting the aircraft on the ground ASAP. The co-pilot and nav are working together and with ATC to determine the best route and altitude to avoid any threats and ROZs, but to also coordinate emergency assistance on the ground. Needless to say, the increased communication is being drowned out by the deep breathing of oxygen and the situation, and it's getting to the point of being counter-productive. At this point, the only thing I could think of was to tell the crew to settle down and keep the com-

Loadmaster 1 informs the crew that there is smoke in the aft cargo section that isn't dissipating and is now moving forward.

USAF Photo by SSgt Karen Z. Silcott / Photo Illustration by Dan Harman

munication related to solving our problem and to finish up all the checklists. The loadmasters and flight engineer work together and determine that the source of smoke is pouring out of the cargo air-conditioning unit. The engineer isolates the source, and the situation gets better in the cargo compartment–small victory achieved. It's time to land this aircraft. Although I'm 99% sure we've isolated the source of our smoke, I know that you can never be sure that you've thought of everything. The co-pilot informs ATC that after landing, we'll clear the runway and emergency ground egress. With the knowledge of how crews have masterfully handled EPs in the air but dorked up the ground egress, we review the ground evacuation while we have the time. Although I don't want to be "that guy," more importantly, I don't want someone to be injured departing a perfectly good aircraft. Luckily, I can say that "the crew landed uneventfully," and we successfully ground-evacuated all crew members and passengers. Although our passengers weren't exactly happy to be at Base X, they were sure glad to be on the ground in one piece. So, what's the point of this story? Get back to the basics: fly the plane, figure out/solve the problem, and land. Even though you might be the AC, you might also be the least experienced on the aircraft, so trust your crew. Last, remember that as the AC, you set the tone; how you conduct yourself can have success or failure in the least desirable scenarios. Don't make a bad situation worse.

USAF Photo by MSgt Jon Nicolussi

MAJOR K. B. JAMES
97 AS
McChord AFB, WA

USAF Photo / Photo Illustration by Dan Harman

It's been along time since I was in UPT, but I still remember quite clearly that the Unit Standardization Evaluation Member (USEM) hated all students. He seemed to take particular glee in flicking individual name tags off of the flying schedule. "Captain Hook" always said if we ended up in a smoking hole in the ground, it was probably because we had done something stupid.

In fact, almost 80 percent of Air Force mishaps are due to human error/human factors. What this doesn't mean is that 80 percent of mishaps are due to our own stupidity. People are one part of the mishap equation. They are subject to a number of potential problems: task saturation, spatial disorientation, channelized attention, etc. Many of our weakness' as human beings are things we cannot change. However, one area we can improve on is in exercising good judgment. In other words, how can we stop doing "dumb" things?

Judgment and wisdom often come with time and experience (and sometimes a little luck). Judgment is also a product of good training and good habit patterns. What was that phrase Capt Hook used? … "Don't do anything dumb, dangerous, or different." This is sound advice (from an evil man) I have heard repeatedly throughout my flying career.

So why do we sometimes defy common sense and take the stupid option? There are lots of reasons. We all want to succeed in our missions. We underestimate the risk. We all believe in our ability to get the job done. Ultimately, when we fall victim to bad decision making, we have ignored the little voice of common sense in all of us. Another thing that can foil common sense is the bad advice of others. How many of you have been talked into doing something that was against your better judgment? I have.

Maybe my old USEM should have said, "If you do something stupid, OR if somebody talks you

into doing something stupid … you will end up a smoking hole in the ground." You know, Jedi mind tricks only work on the weak-minded. Over the years, I have come up with a lot of observations and "theories." Thus, the "stupidity theory" was born.

The stupidity theory is a lesson I have witnessed or been the victim of on several occasions. The first time I learned this lesson, I was a brand new T-37 IP …

I was on my first cross-country training mission with my buddy IP (you know … the experienced guy). The first leg was uneventful, but on the second leg we encountered thunderstorms and much stronger headwinds than we had anticipated. It soon became apparent, even to a young guy like me (I had about 250 hours total time), that we really should seriously consider diverting. My buddy and mentor assured me, we would have plenty of gas. I was somewhat pacified. After all, he had lots of experience, and surely he knew what he was talking about. As the fuel gauge descended towards zero, our conversations diminished accordingly. The longer we flew, the quieter things got. I strongly encouraged a divert. Again, I was assured that we had "no problem."

"DUDE, we NEED to divert!"

"No, no, we'll be fine, TRUST ME." *Those two words should strike fear in the heart of every aviator.*

Well, we didn't divert. We did the stupid thing. Emergency fuel? Oh, you better believe it. And although we didn't have a mishap, we did shut down with less fuel in the tanks than my wife has in her Suburban. Not a good thing.

At least I learned an important lesson. Listen to the little voice in your head … it's telling you the TRUTH!

Another story that demonstrates the theory comes courtesy of a good friend. Steve-O and I have been friends for over 15 years. Many years ago, we were IPs in T-37s. Steve-O was Chief of Ops Group Stan/Eval. One day Steve-O had an IFE …

After running applicable procedures and conferring with the SOF, he decided he should recover the aircraft via a no-flap landing. Then things got interesting. The Ops Group Commander got on the line, and called the no-flap landing into question. In fact, it got to the point that the commander told Steve-O NOT to do the no-flap landing. Now Steve-O had a problem much worse than the broken jet.

In fairness, the commander was pretty new and he had come from an aircraft where no-flap landings were not routinely accomplished. In the T-37, we did no-flap landings several times a week. Needless to say, Steve-O had quite a dilemma. He could follow published guidance and listen to the "little voice" in his head, or he could abide by the wishes of his boss. You can almost picture the little angel and the little devil on each of Steve-O's shoulders.

Well, he knew what he had to do. He followed procedure and flew the no-flap, saving the day in the process. He got called on the carpet for his actions. He had to defend his actions to the commander. Steve-O got the a$$-chewing that he knew was coming. He also earned the respect of his boss and all the pilots in the squadron. How many of you are willing to do the right thing, even if it means going against "the man"? Steve-O's answer was perfect. "If I'm the face of DOV, and I start freelancing and ignore what is in the books, what are the rank-and-file guys going to do in a similar situation?"

Stories are neat, but if they don't provoke thoughts and actions, they are kind of worthless. The best flight decisions we make are usually done during planning and preflight. Fight and fly the way you train. For most situations, we have already considered what we will do in a given set of circumstances. "You just got hit by an SA-7; Lieutenant, you have the aircraft …"

Flying combat and combat support sorties greatly magnifies the pressure and importance of accomplishing our missions. Unfortunately, we have suffered a number of mishaps in the last three years. Many of these could have been avoided if we could only side-step the "stupidity theory."

As fighting in Iraq and Afghanistan continues, the pressure to complete missions will continue to be relentless. On my last trip to the AOR, I had to declare safety of flight for the first time in 17 years of flying. None of us wanted to hold up the mission, but none of us had slept more than 5 hours the night before due to a billeting fiasco. So I got to talk to an irate Colonel about why I was knocking it off 18 hours into a 24-hour duty day. It wasn't a particularly fun conversation, but it was the right thing to do … for both of us. It's the Colonel's job to keep jets flying and missions moving. It's MY job to get it done right and to get it done safely.

When you start to see your procedures break down or your CRM go in the tank--Stop. Think about the situation and break the chain of events. Sometimes help can come from the other end of the radio. More often than not, each of us already has the knowledge, the training and the good sense to take any situation to a logical and safe conclusion. We have operated this way since we first put on a flight suit.

My final point is not to denigrate command and control, but to simply point out the limitations of folks who are not in the cockpit with you. YOU know your situation and the variables you are dealing with better than anyone else. Command your aircraft. That's what the Air Force is paying you to do. You may take heat for your decisions. Oh well. Getting yelled at is nothing compared to losing aircraft or aircrew.

CAPT PETER F LARRABEE
344 ARS
McConnell AFB KS

The takeoff regime is so critical, yet often overlooked in importance. In every pilot's mind the takeoff and landing are the most critical phases of flight (the emphasis has always been on landings). In all actuality takeoffs are just as important and can either make or break you. Normally, takeoffs are when you are heaviest, slowest, and closest to stall speed. If a pilot is not spot-on, there is very little room for error. Developing a cross check is of the utmost importance and will keep you from making a fatal mistake.

It is time to analyze what we all look at while accomplishing our everyday takeoff. Sure we all look at performance data. We ask ourselves a few last minute go/no-go questions, but once we are in the air, what is it that we all do to ensure we are meeting the parameters of our takeoff? The fudge factor is minimal. We have minimum maneuvering speeds. We have flap retract speeds. We have maximum bank angles. All of these ensure our safety and increase awareness.

Now let's take a look at our instruments. The crosscheck is the most critical thing we can do to ensure a safe, effective takeoff. Everyone has their own way of maximizing their instruments during takeoff. A "tickle check" here … a "tickle check" there. Experience and continuity are some of the most important tools to increase the effectiveness of that check. Each aircraft is different, but fundamentals of a crosscheck are the same. To illustrate the effect of a detailed crosscheck, I will describe the KC-135 airframe. Most aircraft today have digital and analog displays. This brings up the debate over what is easier to look at, the digital or the analog. So what do you look at more?

Personally I look at the digital displays before I begin to look at the analog (needles). If the digital fails then it is time to look at the needles. Here are some things to bring in to your day-to-day crosscheck if you have not already been doing so: VVI, AOA, altimeter, airspeed, bank angle, and last but not least visual references. Some of us are so busy staring at our instruments that we forget to look outside. (I occasionally look out to check the surf while flying out of island destinations.)

Other questions: "How good is your crosscheck at night?" and "Does the crosscheck get worse at night?" The only thing that might reasonably drop out would be visual references. Everything else is still there and sometimes easier to see if you have the cockpit lighting set correctly. The real problem exists when you get so focused on one instrument that everything else falls to the wayside.

It's easy to get channelized during takeoff. It's also the worst time to be channelized, but we've all been there. We get focused on, or distracted by, something and can't let it go. For some of us it takes us until level-off to get back on the same page as everyone else.

USAF Photo by SSgt Joshua Strang / Photo Illustration by Dan Harman

Luckily in crew aircraft, there's someone else to back you up. On one dark night I was lucky enough to have the situational awareness to know what was right and what was wrong …

This was a typical AOR Sortie. We were taking off with 150,000 pounds of gas. The conditions were standard: night, VFR, and calm winds. The AOR climbout required us to max perform the aircraft due to gross weight and field conditions. We had already flown more than ten times together. To us, the takeoff was another vanilla run. We had nothing to worry about. Because of the dual Aircraft Commander (AC) line, the least experienced pilot wore the AC hat to get experience. It turned out that this night was my turn to takeoff.

During my right-seat takeoff, as soon as the gear was up the left-seat pilot began yelling "CLIMB! CLIMB!" Immediately I began to worry. First off, I thought I was climbing. And second, there was a lot of yelling going on. I continued to look at everything and couldn't understand what the other guy was yelling at me for. I said I was climbing, looked back at the navigator who said "it feels like we are climbing." This comment and other comments had no affect on the left seater. Apparently he was seeing something that I was not.

It turns out that he was looking at one thing to verify climb rate.

I assured him that we were climbing. I said "look at your VVI, the AOA, the airspeed, and your altimeter. If I climb any more I will stall the airplane."

He was relentless. He continued to yell. I said "look, everything in this cockpit is telling me we are climbing. We will talk about it when we get to a safe altitude." Finally, some quiet in the cockpit.

I asked him later what he had been looking at. He showed me that the needles on the altimeter had frozen at zero. That stupid little needle was what he was so focused on! Both pilot and copilot needles had frozen. I couldn't believe he was that relentless because of a needle. It was obvious to me that he had become channelized.

This leads me to ask the question, "What could have happened?" I can only begin to speculate. If I were a brand new copilot I probably would have listened to my aircraft commander and increased the rate of climb--and eventually stalled the airplane. Fortunately for me, and the entire crew, I had enough sense to realize what he was telling me was completely wrong. I averted a near disaster because my crosscheck never fell out.

Luckily I had enough experience to know the other pilot was leading me down the wrong path. He *almost* scared me into stalling the airplane. Even I was blown away by the yelling.

At what point do you tell the other pilot he is crazy? There is no answer to this, but the old additive about when in doubt, comes to mind.

Communication And Knowledge—Keys To CRM

ANONYMOUS

USAF Photo by MSgt Scott Wagers

Sometimes people learn the hard way; sometimes people scare themselves enough to learn their lesson without paying a price. The lucky ones learn from the latter. No matter where or from whom you learn, certain lessons are essential in a cockpit, and among aircrew members. The two most important elements that have worked in my favor are communication and knowledge. Together, these two facets of CRM can help a crew get through the most arduous situations with success.

In a crew airplane, communication is the glue that holds you together in difficult situations. No matter what the makeup of a crew, the aircraft commander must establish criteria for communicating in the most precarious of situations. In the MC-130 variant aircraft, it is essential. Every crewmember plays an equally vital role in the successful accomplishment of a mission. Therefore, aircraft commanders must empower the rest of their crew. For example, during the crew brief, a superior aircraft commander will tell his or her crew to speak up if they are uncomfortable with what's going on. Words like "time out," "knock it off," or simply "what is going on?" can be enough to knock some sense into us. Sometimes the crewmember not directly involved in a situation can take a step back and look at the bigger picture, often finding some clue that everyone else had missed. There have been many times when a person without a seat upfront has saved an entire crew. I nearly paid the price … if not for the remarkable help of my crew.

We were flying in the mountains on a planned NVG low-level, with some self-contained approaches to round out the evening. Everyone was anxious to get this flight over. There were four checkrides occurring on the airplane, and we had cancelled for maintenance three times trying to accomplish the same events. The evening started just fine with normal checklists, and even a few planned airdrops that made it perfectly onto the drop zone.

I got into the seat, and almost immediately felt like I was behind the airplane. I kept waiting to hear things from the navigator, but there appeared to be a communications breakdown. He probably thought I was not listening to his inputs, and I thought he wasn't giving me enough information. At a certain point he reminded me that we needed to start climbing for the steep mountains along our flight path. I acknowledged, and asked *when* we should begin our climb. I didn't hear a reply. Eventually, one of the evaluators could no longer hold his tongue and pointed out that I needed to climb in order to avoid the big, mean mountains straight ahead of us. I was surprised because I had planned to go through a valley a few degrees off course.

Obviously, when I heard the evaluator speak up, I thought my day was over. This definitely did not help the communication on the flight deck. For a while it was nearly silent up front. Needless to say, silence is hazardous to one's health when flying

at 500 feet. I recall asking the navigator where he would like me to steer the aircraft a little while later. His response of "do whatever you want" did not make me happy in the least.

"TIME OUT"

That is what I should have said. We should have climbed up and discussed our frustrations and expectations and fixed the problems at 5,000 feet rather than 500. Moreover, we should have discussed our expectations of each other before we ever left the ground. I should have told the navigator how much direction to give and the pace of communication. Then the rest of the crewmembers would have known what to expect, and subsequently would be alert if there was a breakdown. Unfortunately, I did not have the courage to speak up in front of the evaluators--one of which was the squadron commander. Having not stopped the numerous factors building against us, I kept going in hopes of my luck changing.

15 degrees nose-up and 35 degrees of left-bank

This is how I (abruptly) maneuvered the aircraft to get us through a mountain pass. Again, I had not established enough of a positive rapport among the crewmembers for them to simply knock some sense into us (me and the Nav) and bring us back into the fold. I think there was some instruction going on behind me at this point, trying to get everyone on the same sheet of music. Things finally started to work out at the end of the low-level. I was still hopeful that I would survive the debrief with my head still screwed on tight. Usually, the evening would end with a few approaches, orchestrated by the navigator, followed by a few assault landings to end the evening with a "flare."

Everything appeared to have recovered to a status quo. We briefed up our approach, to minimums of 100 feet. Things were starting to gel as we commenced the approach. At this point the navigator took a final altitude calibration. That was all I knew at the time. Everything appeared copasetic as I intercepted the glideslope down to minimums. I was meticulously counting down my altitude and trying not to cheat by looking outside. The electronic warfare officer spoke up and called out AGL altitudes (we are usually looking for MSL altitudes). I would discover the reason later. As we were approaching the minimums, the pilot from the right seat aggressively input power and simultaneously called "go around!" Startled, I look up to see very little space between our airplane and the ground--with the runway over a half a mile away. I pulled the plane up and luckily climbed away from the ground without any additional incidents. We all caught our breath and pressed on for the rest of the evening. With our collective hearts beating in our chests, the rest of the night was nowhere near as exciting.

Know Everyone Else's Job

Before this encounter, I did not have a full grasp the intricacies of each crew member's role during these self-contained approaches. The "self-contained" portion means that the navigator is responsible for determining our altitude. I didn't realize it at the time, but we were in a degraded mode of operation. A simple altitude check and calibration will not suffice, as it can induce significant altimeter errors. I didn't realize this, and my ignorance nearly put us on a collision course with the ground. The electronic warfare officer realized that something was not right and was calling out AGL altitudes. It was his awareness that clued in the other pilot. The EWO was ready to call the go-around himself a moment later. By not knowing the responsibilities of others, I put the entire crew in danger.

Lessons Learned

My flight that day was one of the most humbling experiences of my life. I realized I needed to change the way I do business. First, as previously mentioned, communication is indispensable. Other people judge every aspect of your actions and reactions, especially as the pilot in command. They wait to see how one reacts to problems, which inevitably arise. Setting a good example and treating others with respect will yield dividends. Effective communication is at the core of interpersonal interactions. Antipathy, rudeness, and barking commands will lead to crew breakdown. Planning and flexibility are the methods for avoiding tension in the air. Being able to anticipate your crewmembers' next move or reaction leads to a synergistic effect.

However, the only way to anticipate is to know the procedures of the other crew positions. Obviously, it provides backup to one another as well. Knowing others' jobs enables us to correct mistakes before they become tragedies. This applies to all crew positions, all ranks, and all aircraft types. A loadmaster, or boom operator, might notice that a crew failed to complete a checklist. By giving him the environment where he knows he can speak up, he can save the day by just asking a question or two. As a pilot, I should have known what types of erroneous readings were possible. Moreover, I should have known exactly what the navigator was doing and how we were communicating to one another.

All these problems fall under CRM. We must be confident in our own capabilities before we can foster effective communication among the crew. We can't allow any person to be a "single point of failure." If one member forgets an item or gives the wrong input, there should be at least two others to correct him. An effective cockpit working relationship interwoven with job knowledge is the glue that ensures our safety.

Blue skies and Tailwinds!

Visual Lookout With Advanced Avionics

1LT MARCUS D. HUTSON
55FS/DOS
Shaw AFB, SC

USAF Photos / Photo Illustration by Dan Harman

In the air-to-air arena, with all the advances in technology that make a more lethal killing machine, the threat is still able to reach out and touch us. No, I am not speaking of the poor adversary you have locked up ready to launch your missile at. I am referring to the threat of a mid-air collision with your own flight members. Mid-air collisions are one of the top four leading causes of mishaps in today's Air Force. It's a threat that's never going away. It will always be there and we need to be aware of it. We brief and debrief countless training rules that are there to save your tail. As a professional Air Force officer, we follow these rules to the utmost. Even with the best coordination, establishing altitude blocks, geographical deconfliction, and Situational Awareness (SA)-enhancing aircraft displays, visual lookout will always be a necessary task. Not only will that help us to visually pick up the adversary trying to roll in at our six, but keeping our eyes out will keep us from swapping paint with other flight members. I was unpleasantly reminded of the importance of visually clearing your flight path …

We were misprioritizing in our jets, spending a considerable amount of time "eyes down" as flight paths merged.

It shocked both of us when we looked up and saw another jet cross our flight paths with minimal distance.

So here we go with the "there I was" story that inspired me to write about this topic. It was planned to be an Air Combat Tactics (ACT) 4v4 Flight Lead upgrade ride for number-one. This was his second to last ride in the flight lead upgrade program. I was two, an experienced wingman. The instructor pilot was three and four was also an experienced wingman. The sortie was planned and briefed well and we all were ready to execute the plan. We stepped to our jets confident with our abilities to defeat any tactic the adversary could think of. The weather was beautiful as we departed, and we flew to the airspace without any issues.

We committed out of our Combat Air Patrol (CAP) as the red air pushed from their CAP. As a flight, we targeted and sorted the leading edge. We took the available shots and, at abort range, we turned cold.

As we begin to work cold ops, we paused to build our SA and plan to target what was left. Over the radio, ground control informed us that there were two threats 20 miles at our six, one at medium altitude and another low to the ground. As we turned to target these threats, we were unable to upgrade them. We were going to merge to visually ID them.

As I worked my radar and targeted the threats I assessed the fight my wingman worked out who was going to engage the bandits.

What I didn't know … four couldn't find the mid-altitude bogey with his radar and our flight paths were merging. Both of us were fixated on finding the targets with our radars, and neglecting to look outside and see and avoid. We were both within the briefed altitude blocks; giving a false sense of security as we were trying to radar-target the bogeys. We were misprioritizing in our jets, spending a considerable amount of time "eyes down" as flight paths merged. It shocked both of us when we looked up and saw another jet cross our flight paths with minimal distance.

As I turned to engage this jet that unsuspectingly crossed my nose, I was surprised how an adversary was able to get so close undetected. I began to realize that my SA was not what it should be. As I looked at my Horizontal Situation Display (HSD), I realized that four had just passed uncomfortably close. We both *relearned* a valuable lesson and kept our eyes out the remainder of the sortie. We both knew this was definitely something to talk about in the debrief.

We were probably within 500 feet of having a mid-air collision. The HUD video showed how lucky we were that day. Four's jet filled my HUD as we passed. There were multiple lessons learned that day, but by far the most important is to keep scanning outside as we work the sensors. Too much eyes-down time could threaten your life more than the adversary.

This is just one of the many examples that might lead to a mid-air collision. Everyday we face this threat, whether it's in the tactical portion of the flight or back in the traffic pattern. Visual lookout is an essential part of every flight. Hazards are many, and as aviators we need to remember our responsibilities to see and avoid during all phases of flight.

3rd Quarter FY07
01 Apr 07 - 30 Jun 07

5 Class A Aircraft Mishaps
2 Fatalities
4 Aircraft Destroyed

3rd Quarter FY06
01 Apr 06 - 30 Jun 06

5 Class A Aricraft Mishaps
1 Fatality
3 Aircraft Destroyed

3rd Quarter FY07 Rate Producing Summary

16 May	ACC: U-2S hatch separated in flight and struck aircraft.
30 May ✈	ANG: F-15D crashed on a training flight.
11 Jun ✈	ACC: F-15C had a midair with an F-16C—F-15 crashed.
15 Jun ✈	ANG: F-16C crashed shortly after takeoff—pilot was killed.
26 Jun ✈	ANG: F-15A crashed on a training mission—pilot was killed.

3rd Quarter FY07 Non Rate Producing Summary

None to report.

A Class A mishap is defined as one where there is loss of life, injury resulting in permanent total disability, destruction of an AF aircraft, and/or property damage/loss exceeding $1 million.

- These Class A mishap descriptions have been sanitized to protect privilege.
- Unless otherwise stated, all crewmembers successfully ejected/egressed from their aircraft.
- Reflects all fatalities associated with USAF Aviation category mishaps.
- "✈" Denotes a destroyed aircraft.
- Air Force safety statistics are updated frequently and 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 30 Jun 07).** ✈

U.S. GOVERNMENT PRINTING OFFICE 2005-560-493-41032

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.

TSGT SCOTT RODATZ
19 SOS
Hurlburt Field, FL

The Aviation Safety Well Done Award is presented to Technical Sergeant Scott Rodatz, 19th Special Operations Squadron, Hurlburt Field, Florida in recognition of his exceptional contributions to aviation safety. On 28 July 2006, during a local training mission, Sergeant Rodatz was instructing a gunner student on firing the 105 millimeter gun. After three rounds, a catastrophic failure of the gun mount system occurred. Sergeant Rodatz instinctively jumped into action calling "cease fire" on all guns. He secured his student and advised the crew of the malfunction. He visually inspected the aircraft and gun for damage. Sergeant Rodatz found that the gun mounting system was severely damaged with six of the eight mounts destroyed and the gun mounting plate raised six inches off the floor. He then secured the gun and recommended immediate landing for in-flight emergency. Further inspection revealed that the aircraft structure had been seriously damaged. This prompted a one-time inspection of the twelve remaining AC-130U gunship's which revealed all the aircraft 105 millimeter mounts were stressed and required a Time Change Technical Order to upgrade the mounting system. Sergeant Rodatz's actions not only allowed his crew and aircraft to return safely, but also identified a deficiency that if left unchecked could have resulted in the loss of a thirteen-member crew and a multi-million dollar asset. Sergeant Rodatz' superior airmanship and ability to perform under extreme circumstances reflect great credit upon himself and the United States Air Force.

Coming in August 07

Changing The Safety Culture