UNITED STATES AIR FORCE

FLYING Safety MAGAZINE

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Spatial Disorientation and You

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LESSONS IN SITUATIONAL AWARENESS

Courtesy ASRS ***Callback*** #243, Sep 99
NASA's Aviation Safety Reporting System

Situational Awareness–or SA, as human factors specialists like to call it—is a term referring to pilots' ability to "keep the big picture" in flight operations. This includes awareness of the aircraft's location and attitude, its proximity to physical hazards and obstructions, weather and environmental factors, engine and systems status, task priority within the cockpit, and many other factors.

Loss of SA is often associated with poor weather, aircraft emergencies, and other extreme situations. But more insidiously, loss of SA also occurs in good visual conditions during routine operations. An air carrier Captain describes a case in point:

While being vectored on a downwind leg to Runway 01L, Tower asked if we had the field in sight, which we did. At that time we were cleared for a visual approach to Runway 01L and a left turn back to the field was initiated to result in a final of approximately six miles. When approximately 60 degrees from the runway heading, tower reported traffic (a B-757) joining a final for Runway 01R. While looking for the traffic, the First Officer, who was flying the aircraft, took his eyes off the field and shallowed his bank. When I realized he was not just squaring off his final, but was going to overshoot the runway, I told him he was going to overshoot and ordered a turn back to our runway. He seemed disoriented and was slow in responding, resulting in a significant overshoot approaching the approach corridor for Runway 01R. A TCAS II Resolution Advisory resulted, with a "Monitor vertical speed" command, which we complied with. Tower questioned if we had the traffic in sight, which we answered in the affirmative. We corrected back to the (Runway) 01L centerline and landed with no further incident.

In talking to the First Officer after the landing, he indicated that he lost sight of the runway in the left turn. Also, (I learned) that he never actually saw the B-757. Although I indicated that I saw the traffic and pointed it out, the First Officer did not see it, but I assumed he did. I also assumed that he had the runway in sight, so I was unaware that he had lost SA.

The lesson to me is to never assume another crewmember is seeing the same thing I am and to work to communicate what I am seeing even when weather is good, and "easy" visual approaches are being conducted.

We trust this incident taught the First Officer the importance of communicating clearly with other crew when he does not have other traffic and the runway in sight. ✈

OPERATION OPEN SKIES:
THE EYE IN THE SKY

All photos courtesy of author

MAJOR MARTIN FASS
HQ DTRA/OSA

There is no such thing as prohibited airspace under the Treaty.

In 1955, President Dwight D. Eisenhower first approved the Treaty on Open Skies as a bilateral confidence-building treaty with the Soviet Union. Soviet Premier Nikita Khrushchev rejected the idea. In 1989, when Mikhail Gorbachev was preaching glasnost and perestroika, President George Bush reintroduced the idea to test Gorbachev's commitment to openness and transparency.

Before negotiations began, the concept morphed into a multi-national treaty that included North America, Russia, the former Soviet states, Western Europe and the Warsaw Pact nations. In 1992, the Treaty was signed in Helsinki by 27 nations.

What is "Open Skies"?

The basic concept is that a nation can overfly any other signatory, collecting imagery from optical, Synthetic Aperture Radar (SAR) and infrared sensors, all of which are strictly resolution-limited. (In general, Open Skies (OS) imagery is good enough to distinguish a tank from a pickup truck, but cannot detect a new radar pod on a fighter.) At the completion of the flight, the observed and observing nations each get a copy of the film, and any other signatory is entitled to a copy for the asking. With the exception of bona fide flight safety concerns, there is no such thing as prohibited airspace under the Treaty. In fact, our flight plans give us priority over all IFR traffic except emergencies, aircraft in actual combat, and Air Force One (yes, the FAA loved it when we flew through O'Hare's airspace at rush hour!).

The United States ratified the Treaty in 1993, and others followed suit over the years. Ukraine was the most recent to ratify, in April 2000. Only Russia and Belarus remain, and the Russian Duma is set to consider the Treaty this year. Once Russia and Belarus ratify, the process leading to entry into force (EIF) will begin.

A presidential directive established the On-Site Inspection Agency (OSIA) as lead agency for implementation of the Treaty. In 1998, OSIA became part of the Defense Threat Reduction Agency (DTRA) headquartered at Dulles International Airport in northern Virginia. The Air Force supports the Treaty mission, with a (nominal) fleet of three OC-135B aircraft, converted from WC-135s, operated by the 55th Wing at Offut AFB NE. One of the three, the interim operational capability (IOC) bird, is currently at the Davis-Monthan boneyard where its only

hope for resurrection is EIF. These aircraft are configured with optical panoramic and framing cameras, video cameras, SAR and an Infrared Line Scanner, all limited to Treaty specifications and subject to inspection before every flight.

Since 1992, the signatories have conducted Joint Trial Flights (JTFs). Frequency of JTFs varies widely from nation to nation depending on political and economic factors. Not all signatories possess Open Skies aircraft, and those that don't must rely on others. Russia and the US have been among the most active participants, along with Germany and the United Kingdom. These Open Skies training missions demonstrate that the Treaty's objectives of openness and confidence-building are already being achieved, and are preparing crews around world for EIF.

I've had the good fortune to fly numerous OS missions over the past two years, first in the role of Deputy Mission Commander (DMC) and more recently as international policy advisor. As you might imagine, these missions have many unusual aspects and so present unique challenges. These challenges fall into several categories, which I'll address in turn.

Crew Complement

This varies broadly depending on aircraft used. Generally, there are four "crews within a crew."

1. 45 Reconnaissance Squadron (RS) Crew: A typical USAF crew has a more-or-less common body of experience. Pilot and navigator training and the weapon system "schoolhouse" create a basis of terminology, habit patterns, and expectations of other crewmembers. The front-end crew from Offut (on missions where we use the US aircraft) exemplifies that, and their crew coordination is typical of a highly experienced AF flight crew.

2. DTRA Open Skies Mission Crew: A much different animal. As a joint organization, DTRA draws crewmembers from all four services—Army, Navy, AF and Marines. Members bring their own service culture, wildly varying training and experience and, of course, their own jargon on board the aircraft. The basic DTRA mission crew consists of a Team Chief, one or two DMCs, and two Linguist/Sensor Operators (LSOs). Due to limited flight hours, virtually every flight incorporates upgrade training in multiple crew positions.

DTRA crew positions and duties are as follows:

- Team Chief: A rated Lt Col or Navy Commander, the senior US Government representative on each mission. Has overall responsibility for all aspects of the mission but delegates all flight-related aspects to the deputy while concentrating on diplomatic and political aspects.
- Deputy Mission Commander: Rated Major or Navy Lt Commander. Primary flight follower for the mission. Plans and directs the flight, ensuring all US treaty rights are exercised. Acts as the hub of crew

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Not all signatories possess Open Skies aircraft, and those that don't must rely on others.

coordination inflight.

• LSO: Acts as linguist when flying with Russian-speaking counterparts. Operates sensors at the direction of the deputy (deputy may delegate sensor on-off calls to aircraft navigator).

3. Foreign Open Skies Team: Characterized by a wide variety of expertise. Some nations use primarily aviators, while others may use people with experience in photo interpretation or other fields. Team Chiefs are usually 0-5 or 0-6 equivalents, and deputies are 0-4 and 0-5. Sensor Operators are usually senior enlisted.

4. Strap-hangers: We have more than our share of politicians, flag officers, media, and contractors on board. They may be from observed, observing, or third party nations, and are sometimes seated with the team-chiefs and on headset.

Typically, the pilot or nav will query the DTRA deputy for clearance.

So, who's in charge? In general, the observing and observed team chiefs are in charge of the mission. They or their deputies must bless any changes to the flight profile inflight. Typically, the pilot or nav will query the DTRA deputy for clearance. That deputy will negotiate with his counterpart, with team chiefs becoming involved if necessary. DTRA's priority is treaty compliance. This coordination usually happens very quickly, but at times can be a problem. If ATC directs an altitude change or vector, the aircraft commander may feel compelled to take action before receiving clearance from DTRA. As always, the AC has final authority over safety of flight.

Mission Profile

We fly a variety of missions, but our main business is the JTF. Since the Treaty hasn't entered into force, the JTFs are designed to look as much like actual treaty missions as possible, the better to prepare all nations' crews for EIF. That said, there were two basic JTF profiles, each of which has its own challenges.

Profiles can be divided into passive (hosting another country's OS team) and active (sending our OS team overseas). On active missions, the DTRA crew is the "observing" team. They decide when and where to fly, and try to exercise the US treaty rights to the maximum extent possible. The passive or "observed" team ensures compliance with ATC and any safety concerns, and protects their country's treaty rights. When DTRA is the passive team, the roles reverse. Whether passive or active, missions may be flown with the OC-135 or any other nation's OS aircraft. To give you a general feel for the mission, we'll use the example of an active OC-135 mission.

A typical active mission using the OC-135 begins with the 45 RS aircrew departing Offut on Friday for Andrews AFB, MD. The augmented crew typically consists of three pilots, two navigators, two sensor maintenance technicians (SMT) and eight maintenance specialists (a requirement for a JFK-era aircraft flying long distances on high profile missions!).

The DTRA mission crew from Dulles catches a van to Andrews, meets with the 45 RS crew for a briefing, and they press on to Mildenhall, arriving early Saturday morning after quiet hours. They attend a weather brief and then enter crew rest. After a 48-hour period to help adjust the body clock,

take care of any aircraft problems, and resolve any last minute issues before going in-country, the crew will depart Monday morning to begin the mission.

The first day in-country begins with pomp and ceremony. After an uneventful transit flight, the aircraft lands at the designated OS base. The American Team Chief is first off the jet, followed by the DMC and the rest of the crew. Typically there is a receiving line on the ramp, headed up by the host Team Chief, his team, and typically a flag officer or civilian government official of high rank. Once that is complete, and the opposing DMCs ensure the aircraft sensor covers are firmly in place, the bags are unloaded and the team is escorted to the mission planning area for the point of entry brief.

After a few minutes of refreshments, conversation and renewing old friendships, the teams are seated and briefed on weather, local area procedures, and proposed schedule for the week. The DTRA team chief designates team members to escort technical representatives from the host country for an inspection of aircraft sensors, which can take several hours. At the same time, the DMC sets up the mission planning equipment. Finally, the crew is taken to quarters. An hour later, our hosts will pick us up for an informal dinner.

The next day, the DTRA crew shows up, updates weather, and presents the proposed flight plan to the host team. The rest of the day is spent negotiating the flight plan to satisfy both countries that their treaty rights are upheld, and that all safety of flight factors are taken into account. Flight altitude is critical, as deputies reconcile temperature and pressure altitude to put the aircraft at a particular minimum AGL for each leg (if we're too low, the imagery resolution is too fine). Those altitudes are then converted with help of the host nation to MSL altitudes consistent with host nation ATC rules and capabilities. That accomplished, the next step is the chair-fly, in which the DMC, pilots and navigators go through the route step-by-step, discussing turnpoint procedures (turning short vs. 270 degree turns) and crew coordination. After a long day, the crew is ready to turn in. But tonight, the hosts will want to wine and dine us, and we'll have to watch our crew rest requirements carefully.

Flying the OS Mission

Wednesday is fly day. It begins similarly to any other mission, with a weather brief and safety brief, and there is controlled takeoff time, due to our ATC priority. The aircraft is typically crowded. OS crews from both nations are in the seats, usually (in the case of the US team) with instructors over their shoulders. Other strap-hangers might include OS crewmembers from other signatories, as well as host country news media and legislators. Interphone discipline with such a varied group can be tough to maintain, with three separate hot mike circuits and four interphone circuits in play. To keep chatter down for the 45 RS crew, the DMC runs checklists on his own circuit in the mission compartment and normally handles all interphone communication with the front end. While crew coordination is a challenge at best, we can alleviate the problem somewhat with practice missions in CONUS. When DTRA, the 45 RS crew and the aircraft are available at the same time, we can fly the proposed mission profile over the CONUS. This gives the crews a chance to work together and to work out any bugs in the route before the actual JTF.

In many instances, a host country representative is on the flight deck to help with any ATC communications problems. There are two types of ATC problems on these missions. The first is simply language. While the international aviation language is English, controllers in some regions of Eastern Bloc countries may have only rudimentary skills. That's where the host country representative on the flight deck comes in. Other problems arise because our mission profiles are unusual and each signatory nation sees limited numbers of OS missions. Coordinating 270 degree turns to line up for photo runs, understanding that we should not be diverted for other traffic, and being "spring-loaded" to respond to altitude change requests for us to stay below clouds are typical challenges, both at home and abroad. When possible, we try to have ATC representatives available on mission planning day to iron things out in advance, particularly outside CONUS.

Another factor to account for is the fact that these are diplomatic missions. It is often said that it's not so much about the imagery as it is about the personal relationships that come from mission planning, flying, and socializing. In particular, most of our European counterparts like to dine late (dinners can last from 9 to midnight) and consider it bad form to leave early. Their concept of crew rest is generally much less strict than what we are used to. Since we rely on

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While the international aviation language is English, controllers in some regions of Eastern Bloc countries may have only rudimentary skills.

our hosts for transportation to dinner and back, we are often at their mercy. Getting into crew rest without insulting our hosts is always an issue.

As is true of any aircrew with a global mission, circadian rhythm is an issue. On Open Skies missions, this physiological factor is magnified by our full-time commitment to be with our hosts. Unlike most missions, we're "on duty" the whole time we're in-country, with very little down time.

As is true of any aircrew with a global mission, circadian rhythm is an issue.

When we fly CONUS on non-JTF missions, other factors come into play. One common profile involves certifying camera combinations for particular altitudes. On those missions, we might orbit over a target at Wright-Patterson AFB seven hours a day, for a week in a row. There we face three enemies: Complacency, fatigue and air traffic (flying block altitudes in a crowded airspace without our usual ATC priority).

The Challenges

Another fact of life is the age of our OC-135s. Let me say first that the 55th Wing does a great job keeping us in the air. However, as with all older aircraft, parts commonality is a growing problem. Another factor is that many Open Skies runways are less than 8000 feet, and with our E-model engines, aircraft performance becomes a factor. Additionally, our radios aren't compatible with the European airway structure, so we're held to lower altitudes there (this is scheduled to be fixed by late summer). Finally, the OC-135 doesn't meet requirements for Reduced Vertical Separation Minimum (RVSM), which include a more precise altimeter and Traffic Collision Avoidance System (TCAS), so we can't get optimized routing across the Atlantic. This problem is also being addressed by ACC and the depot, and is due to be fixed within the next two years.

Issues when flying aboard foreign aircraft:

Aircraft Familiarity: When we're not on the OC-135 with our friends from Offut, the DTRA crew might be in a British Andover, a Bulgarian Antonov AN-30, a Hungarian AN-26, an Italian C-130 or a Russian Tupolev TU-154, to name a few. Each of these aircraft has different systems, emergency procedures, interphone setups, and so forth. In a typical three-year tour at DTRA, a crewmember will never have a chance to be fully proficient in each type—in fact most of us finish our tour without flying all types even once. Questions are as basic as "Where do I sit?", "What instrumentation will be available?", "Is there a window to plug in a GPS antenna?" and "Can I communicate with my LSO and monitor the primary radio?" Often we don't have all the answers until we arrive at the aircraft.

More Crew Coordination Challenges: English is the ICAO standard, but some countries are more relaxed about it than others. Think situational awareness is hard to maintain with a big crew? Try keeping your situational awareness when your foreign hosts do most of their hot mike coordination (and some of their ATC communication) in another language, as happened to me on one C-130 mission.

The Treaty on Open Skies has a strong record as a confidence-building measure among nations. As military members and aviators, we find more in common and forge stronger bonds with former adversaries with each mission. As we continue moving toward EIF, it's important that all members of our US Open Skies team not lose sight of the basics. Crew coordination, interphone discipline, and respect for safety regs and personal limits will help make sure that at the end of the day we can celebrate another successful mission. ✈

(Major Fass is a DTRA Open Skies Deputy Mission Commander/Instructor/Evaluator, and is currently working as International Security Affairs Officer for the OS Treaty.)

Will Ginkgo Biloba Make Smarter Pilots?

FREDERICK V. MALMSTROM, Ph.D., CPE
USAF Academy, CO

*(Note: Air Force regulations **prohibit** use of any medication, including herbals, by anyone on flying status, without evaluation by a flight surgeon.)*

An estimated 18% of Americans now take some form of herbal, over-the-counter medications. One highly-touted remedy is an ancient Oriental herb called ginkgo biloba, which is proudly (and loudly) claimed in television commercials to improve brain blood circulation and decrease memory loss. Essentially, ginkgo claims to be a "smart pill." Since nobody wants a stupid pilot, *is* there such a wonder drug?

My short answer is NO. There are plenty of drugs that'll make you stupid, like alcohol and glue-sniffing. However, the two things which make you smart don't come in pill form. They are your 1) genetics (your parents), and 2) education (hitting the books).

The Ginkgo tree is a living fossil, a survivor from prehistoric times, well over 150 million years ago—long before flowering plants or the Tyrannosaurus Rex appeared on earth—and it will probably outlast humanity. This beautiful tree, with its unique fan-shaped leaf, is loaded with natural toxins, antivirals, and fungicides, and it has an amazing inborn resistance to pollution. Ginkgo also has an unforgettable ripe fruit with a very unpleasant smell. In fact, ginkgo has long been known to contain urushiol (the blistering agent found in poison ivy) and butyric acid (a compound found in decaying flesh). Yuck.

Serious ginkgo research is skimpy. MEDLINE lists only 541 articles and reviews published since 1967. This is surprisingly little serious research, considering the drug's proponents make such sweeping claims for it. Fully one-half of the published research comes from China and Germany, countries well known for their mainstream promotion of alternative medicine.

The enthusiastically advertised claims that ginkgo improves memory seem to be based on animal research which is 10 and 20 years old. (Shame on the advertisers!) There's no evidence that this product will help you locate your misplaced car keys or react to in-flight emergencies faster. Recent research is considerably toned down and much more specific.

Ginkgo extract contains two main active organic ingredients: flavonoids, which act as free-radical scavengers; and terpenes, which act to promote peripheral blood circulation. More simply stated, ginkgo extract shows promise of slowing down some nerve-aging processes and also improves the flow of blood and oxygen to the extremities. Unfortunately, recent research indicates a person has to take ginkgo for at least four to six weeks before beneficial effects, if any, are noted. Fresh broccoli and black coffee will give you quicker effects. Furthermore, there is precious little research on how this extract interacts with prescription medication. One side effect is believed to be spontaneous bleeding. This caution stresses the rule that *there is no such thing as a drug without side effects*. Ask your flight surgeon before you take *any* meds, herbal or otherwise.

The bottom line is: The jury is a long, long way from a final verdict. Healthy crewmembers probably don't need ginkgo. They'd be better off eating fresh broccoli instead, and they'd have fewer side effects. However, there are some promising, but still far-off medical uses for it. For example, when given to some elderly Alzheimer patients, it appeared to slow down their onset of symptoms.

Preliminary reports show ginkgo extract has shown some medical promise if you suffer from chronic:
Alzheimer syndrome (senile dementia)
Asthma
Baldness
Brain edema (subdural swelling)
Chronic Hepatitis B
Cataracts
Diabetic retinopathy
Hypoxic hypoxia
Ischemia (temporary interrupted blood flow to the brain)
Macular degeneration (foveal blindness)
Penetrating brain injury
PMS congestion
Tinnitus (chronic ringing of the ears)

*(Note: Aside from baldness and PMS, if you suffer from these disorders, you probably shouldn't be flying anyway**!)***

The author is indebted to his late colleague and mentor, plant pathologist, John H. Standen, Ph.D. ✈

The bottom line is: The jury is a long, long way from a final verdict.

COLONEL PAUL F. ROST
Directorate of Aerospace Safety
Flying Safety, Mar 84

(Note: Our thanks to 355 TRS at Davis-Monthan AFB for updating the NVG information.)

It is up to you to take care of yourself—i.e., know thyself.

People have always been fascinated with the beauty of flight. Certainly one of the joys for fighter pilots that earthbound people miss is the feeling of freedom and power we experience as we "slip the surly bonds of earth." To me, piloting a high performance fighter provides the ultimate challenge—to become one with your machine through total control of your physical and mental skills. No other profession or sport taxes both the mind and body as much—or requires such precise control of our hands and legs while under physical and mental stress.

Granted, there are a few pilots out there whose physical abilities are more suited to working with pipe wrenches and the like, but they are the exception. Given all of the above, it has always fascinated me that survival in this game requires a balance between two seemingly contradictory values—the feeling of freedom that flight provides and the self-discipline necessary to handle that freedom.

While 1983 was a banner year for the Air Force in reducing flight mishaps, the gain has been primarily made on the logistics side of the house. The Ops cause factors have remained the same. In this article I'd like to share some things you can do to avoid becoming one of those Ops statistics. Sort of a personal survival kit for the fighter pilot. My belief is that the keys to survival lie in the following areas that should be of concern to all of us:

- Self-Discipline and Ego
- Risk Taking
- Crosscheck
- Habit Patterns
- Task Saturation
- Night Flying
- Stress
- Fatigue

Let's talk about each of these areas and see if you agree.

Self-Discipline and Ego

My basic premise is that these two make up the foundation of any good pilot, and fighter pilots in particular. And to really understand how we are affected by them requires that we put ourselves through a form of self-analysis. That shouldn't be too hard to do since that is exactly what we should do in every debriefing. Why do we need self-discipline? Because all the supervision in the world will not prevent you from killing yourself in a single-seat fighter. All supervisors can do is reduce that risk by limiting your exposure. It is up to you to

take care of yourself—i.e., know thyself—and develop the self-discipline to control yourself. Just as a football team must wield controlled aggression to win, we must do the same.

Let's talk about ego—something fighter pilots are famous for having in abundance. If you didn't think you were a heck of a pilot, you wouldn't be a fighter pilot. Some fighter pilots disguise it, others flaunt it—but we all have that inner level of consciousness that says "I'm the best." Not second, third or fourth, but first.

That is the only place we want to be. If you don't believe that, you need to change jobs because the basic premise of our business is that the team that comes in second place dies and/or loses the war. I know of no other honorable profession that has such a stringent pass/fail criteria. Therefore, it is no wonder strong egos are involved—and certainly are desirable.

This strong ego, combined with the power and freedom of flight, is both our biggest asset and liability. It is our strongest asset when we control it to give us drive, tenacity, and self-reliance. It gives us the self-confidence to succeed in battle even when outnumbered and outgunned. Uncontrolled by our self-discipline, it becomes our strongest liability and leads us to overreach our needs or abilities.

I submit that there are no "old head" undisciplined pilots. Granted, in the past some may have even willingly violated regs, but if they have survived for any extended period of time, they have plenty of self-discipline in their flying.

We all take risks—life itself is a risk—and sooner or later, the Grim Reaper will get us. The game is in delaying the inevitable. The bottom line is that the smart pilot understands how his ego drives him and uses self-discipline to control it and turn it to his advantage.

Risk Taking

As you fly, you often reach decision points that involve risk taking. In a split second you ask yourself—what is the risk?—is it worth it?—if it is, then press on—if not, don't. In some cases this may mean a balance between feeding your ego and complying with the rules. My experience has been that most people have a pretty good "feel" for what the odds really are. Usually when we get into trouble, it is because we didn't consider the risk at all.

Most of our risk analysis is done on the ground in emergency procedure study. Section III of the flight manual is really a listing of steps to take the lowest-risk path for a given malfunction. I am a strong believer that you should never "react" automatically to warning lights. If you know your aircraft well, it only takes a split second to confirm in your mind the proper actions to take. To me, a fire warning light shortly after I'm committed to takeoff is not the time to throttle back in a single-engine fighter—as long as the engine is still producing thrust. I want ejection altitude first, then I'll worry about the light.

One thing about risk taking that has always amazed me is how some pilots are so ready to put all their eggs in one basket. Always have a backup option. Don't box yourself in. Too often I read of pilots who hit the barrier at unnecessarily high speeds without much apparent concern for the consequences should the hook skip over the cable. Barriers are backups, not primary means of stopping.

Before landing, think beyond the barrier. At what speed will you bail out if you go off the runway? When will you shut down the engine? Would you prefer to leave the runway straight through the overrun, or is it safer going off the left or right side? All of these decisions involve risk assessment that you should be thinking through, first on the ground, and then for each emergency as you face it.

Usually when we get into trouble, it is because we didn't consider the risk at all.

Crosscheck

A fundamental of flying that I see violated more and more is that, for precise flying, when the hands move on the controls, you should be looking out the front of the aircraft or at the ADI. This means that low-altitude turns are done by looking straight ahead over the nose where you have both pitch and bank references—not over your shoulder. I don't want to get hammered by a MiG any more than anyone else; but if I make turns looking behind me, it won't be the MiG that gets me. The crosscheck should be—clear six and the area of the turn—fly through the turn, crosschecking over the nose—and return to clearing.

In air-to-air, I know we always preach, "lose sight, lose fight." But, the truth is we also need to keep track of our flight parameters. The adage is great when you've got a long-range rally and know you have a lot of smash. However, when you've cleverly got the bandit trapped at six and you want to reverse, you'd better know your energy state—and that means crosscheck. If you can't afford a check of your airspeed and

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USAF Photo by SSgt Andrew N. Dunaway, II

Airplanes today still demand that flying the aircraft is a vital part of fighting with the aircraft.

altitude, and still come back out and find the bogey, you either have the world's slowest crosscheck or need glasses. (Your eyes only have to see the gauges for a split second to read them—interpreting what they mean should be done with your eyes outside, not staring at the gauges.)

All I'm saying is that even our "magic" airplanes today still demand that flying the aircraft is a vital part of fighting with the aircraft.

Every time you're tempted to exclude the airspeed/altimeter, etc., from the crosscheck because they're not necessary, bells and whistles should go off in your mind warning you not to do it. Mishaps have occurred where the pilot failed to crosscheck his altimeter for an extended period of time—45 to 60 seconds. Did the pilot forget? I don't think so. I think the answer is, he deliberately excluded that instrument from his crosscheck because he felt confident he knew where he was.

During my first tour in SEA, we lost two pilots during night formation rejoins. Both were wingmen trying to rejoin immediately after takeoff in clear VMC. Both had aggressive cutoff angles established and only had to maintain that position as they closed with lead. Instead, both descended into the ground. Why?

I think it was because they were rejoining using only visual references, and forgot that at night they had no perception of how close (or rather how far) they were from lead. The altimeter was the only way to know they were heading back into the ground, but they had deliberately excluded it from their instrument crosscheck since they were flying a VMC rejoin. The lesson learned is to beware of dropping items from your basic crosscheck because you *know* where you are.

Flying on autopilot provides the same trap. The only thing an autopilot does is to let you physically remove your hand from the stick. The crosscheck must continue or someday, somewhere, you'll pay the hard way.

Habit Patterns

Do you have specialized or general habit patterns? To the maximum extent possible, basic habit patterns you develop should be transferrable from weapon system to weapon system. The basic instrument crosscheck should include the same instruments—perhaps in different locations—as you transition to other aircraft.

In particular, when you transition to a new aircraft, review your habit patterns and see where the old ones may conflict with the new. Ejection seat handle location is one of the most critical. Like it or not, the habit patterns you learned best (usually your first operational aircraft) will come out at the most unexpected times. They could mean trouble.

A simple example I personally experi-

enced was in the back seat of a T-38. I was not current in the aircraft and the IP offered me a chance to do a back seat pattern. As I started the final turn, I was amazed to see a horrendous nose slice—until I realized I had put in full rudder, just as I had used two years prior in the F-100. Without realizing it, my mind had equated the T-38 performance with my F-100 experience of years ago and I reverted to the old habit pattern.

It should be obvious that where we put the gear down should be a "standard" location throughout our flying careers.

What do you do when you get that uneasy feeling that you've broken your habit pattern? My solution is to go back at least two steps prior to what I think I've previously finished and start over from there. Often, I've found the interrupted step, which I thought I had completed, was what I had missed. By going back two steps, I make sure I've gotten everything.

Task Saturation

This is a very common factor in Ops mishaps and all of us seem to become task-saturated at some time. How can we control it?

Hopefully, we all know that *complete* mission planning is mandatory in a single-seat fighter. If you step to the aircraft without knowing exactly what you are going to do, then you are asking for trouble. What appears like good inflight mission planning by "old heads" is actually application of options already preplanned on the ground.

There is another aid we have inflight to help prevent task saturation. Timing patterns. One of the things that should have been drilled into us in pilot training is that a disciplined crosscheck—visual or instrument—allows us to be consistent in making corrections. This means that if you use the same parameters for making control corrections, you eventually develop a sense of timing of when it is time to crosscheck that parameter again, i.e., altitude corrections should take 30 seconds, regardless of the size of the correction.

Avoiding task saturation requires that you be a jack-of-all-trades, master of none. What I mean is you must be able to detect errors in altitude, airspeed, and heading while trying to concentrate on tactical events—and make corrections without devoting 100 percent attention to any single item (channelized attention).

The most important thing about task saturation is to preempt it. That's why flight planning is so important. It's much easier to keep up rather than catch up, so have a plan. When you detect task saturation coming on (falling behind in your crosscheck or unsure of what is coming next) it's time to call for a "Knock It Off." At low altitude, climb to cope. Get on a basic crosscheck, visual or instrument, and catch your breath. Check your fuel.

If you're handling an emergency, go for survival issues first. Once they're handled, you can talk to the rest of the world. If the emergency occurred in the training area, chances are you won't become task-saturated until the approach phase. Tell them you want a single-frequency approach.

If possible, prior to sticking your head in the clouds; burn down the fuel, if that is necessary. Remember, "land as soon as possible" really means "as soon as prudently possible," not 500 kts until on short final. A 360-degree turn to give you time to get your act together may be just what you need to keep ahead of the game.

Avoiding task saturation requires that you be a jack-of-all-trades, master of none.

Night Flying

It seems a higher number of accidents occur at night than is proportional to our night flying hours. When I hear people talking about turning down their interior lights to save their night vision, I get the impression they are flying at night using outside references. There are only two references I use at night.

One is my leader if I'm in route formation or closer; at all other times I use the gauges. Interior lighting should be high enough that you can immediately and accurately read the instruments. With better lighting, you won't need your head in the cockpit as much (allowing you to clear better in VMC) and your night vision will not be impaired. Put the lights on the bright side rather than the dim side. If they're dim, and you get vertigo, you'll add that much more to your problems as you are forced to stare at the instruments to read them. You'll be task saturated for sure then; inadequate lighting will only make it worse.

Using Night Vision Goggles (NVGs) in single-seat fighters presents its own set of hazards. A high level of proficiency is required to fly with NVGs safely. You need to be aware of the possible visual illusions associated with NVGs, and you need to have experience using NVGs under varying illumination levels. Varying degrees of moon illumination, starlit versus overcast skies, and the differing reflectivities of the

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terrain you are flying over all contribute to how effective your NVGs will be. You can only get the experience you need by night flying with NVGs regularly.

Cockpit lighting affects your ability to safely use NVGs. Fighters with unmodified cockpits have instrument lighting that is incompatible with NVGs. The temporary fix has been to turn off cockpit lights and use the chemical glow sticks to illuminate the instruments. If you don't use the approved and tested cockpit glow stick setup, you may not be able to read your gauges at a critical time, like if you inadvertently enter the weather. Even in fighters with modified cockpits, you need to have the lights up bright enough to read your gauges. NVGs are focused at infinity, and are used to see things outside the cockpit. The bright goggle tubes in front of your eyes all but eliminate your night vision, and since you read the gauges with the naked eye, they need to be well lit. NVGs are an awesome tool that makes us more effective at night, but you need to be aware of their limitations to fly with them safely. Remember, NVGs don't turn night into day!

Sometimes we enter a high stress situation without recognizing it—and that can be dangerous.

Stress

Do you recognize when you're in a stressful situation? What is your personal reaction to it? I've found mine is to start humming to myself. When I see this reaction, I stop and analyze what is causing it. Sometimes we enter a high stress situation without recognizing it—and that can be dangerous. If we recognize it, we can take action to handle it better.

Stress means adrenalin, and that speeds everything up. Yet, the guys with the "right stuff" that we admire so much sound very cool and deliberate under stress. How? I think this is a learned response. With adrenalin pumping through you, you tend to do everything faster. But, there are physical limits as to how fast your hands can move and do it accurately. Moving too fast leads to mistakes—and more stress.

Instead, try to be very deliberate. When you reach for a switch, do it slowly enough to get it right the first time. Chances are it will only seem slow; you'll actually be moving faster than normal. The success in doing it right the first time will give you more confidence and help reduce the stress. However, you can't do these things until you recognize you're under stress—so learn your personal stress symptoms.

Fatigue

I believe fatigue is the most significant second-level cause of Ops factor mishaps. We'd all like to be nice and fresh for each flight, but it's a fact of life that it just isn't so. How you handle fatigue in yourself, and in the people who work for you, will determine your success in the fighter business.

First, your own fatigue. Part of being a fighter pilot is knowing you can hack it. None of us want to back down. This is where our self-discipline should come in. Before flying, you preflight both the aircraft and yourself. Are you really ready or are you betting on the odds that nothing will go wrong? My experience is that fighter pilots take themselves off the schedule only when they have genuine concern about being able to handle the routine. Our real concern should be whether or not we feel capable of handling the worst case situation. You owe it to your fellow pilots to take yourself out when you can't give 100 percent.

In every squadron I've ever been in, supervisors would tell us not to fly if we weren't ready, and that no retribution would be taken. This was true. However, when you saw the same supervisor flying when you knew he shouldn't be, you quickly got the unspoken message that those who couldn't hack it were "weak."

As a supervisor, make sure the unspoken message you are sending is the one you really intend. Also, remember that many highly motivated fighter pilots will press themselves farther than you want. A "pre-emptive strike," removing someone from the schedule who is obviously tired (even yourself), can show the troops that you really do not want them flying when overly fatigued. Give additional consideration to crew rest for night flying. Normal crew rest times may not adequately compensate for the change in the work/sleep patterns.

We've discussed some attributes and concerns which influence our long-term survival in the fighter business. While you may not agree with everything I've said, I hope you'll take the time to clearly define in your own mind how these factors should be handled. Because how you do handle them will determine both your success and longevity as a professional fighter pilot. Think about it—fly safe. ✈

Out For A Little Spin

USAF Photo by SSgt Andrew N. Dunaway, II

CAPT GUNNAR KLEVELAND
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There are many stories out there of aviators having brief encounters with unwilling aircraft and less-than-delightful environments. Pilots who have "slipped the surly bonds of earth and danced the skies on laughter-silvered wings" are sometimes jostled back to reality by some horrendous chain of events. Isn't that how flying is—hours and hours of standard operating procedures (or sheer boredom for some), interrupted by brief moments of terror? I know some sorties are more eventful than others, such as when you take a T-37 student on his/her first formation ride, or have him/her on the wing during the first formation solo. Nevertheless, we have all been there, or will be there, and here is one of my stories from the skies above Texas.

I was on my first instructor assignment, this time as an instructor pilot in the T-37. I had just made it through Pilot Instructor Training (PIT) and was meeting the students of a class that had recently started and who were a couple of weeks from solo. I was assigned two students, got through the first week fine, and it felt good to be there. The following Monday I was scheduled for two contact sorties, C2701, and didn't think anything special about them. The C2701 is the first sortie the students are introduced to spins, and it didn't strike me that this would be any different than any of the other "new" maneuvers previously introduced.

Little did I know that my first sortie that Monday was with a rather large German fellow who had read up on every horror story about spins he could get his paws on, and listened to numerous "There I Was" spin stories from fellow and former students. Let's just say he was preconditioned to be scared of spinning and didn't bother informing his instructor about that fact.

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"I have the aircraft" became more of an attempt to convince myself than anything else.

"Sir, was that a normal spin?" "No."

Anyway, I was happily unaware and planned the sortie for an auxiliary field drop-in followed by area work.

I did spend time briefing my German friend about the spin-prevent and spin-recovery procedures, which were the only new maneuvers of the sortie. The plan was to demo/perform each spin in a high-left prevent and a low-right recovery (why do I still remember that?). With happy hearts we set out to learn some more about flying the Tweety-bird, and boy did *we* ever!

As you would read in a mishap report, the sortie was uneventful until we began to train spins. My spin prevent was good, I thought, with the necessary instruction, and I expected a quick repeat of this maneuver from my student. His try was somewhat challenged, but he made a decent recovery back to level flight. Now it was time for the spins. Again, I was confident that my demonstration was enlightening my young charge to the finer points of spin recovery, although I have since realized that I might have been wrong.

My student took the aircraft for his spin, and I was ready to help as necessary throughout the recovery. The setup was good and the T-37 reacted as advertised with a slight jerk to the right followed by the appropriate response of prolonged application of aft stick and rudder: auto-rotation. At this time my student began to perform a spin prevention, but was quickly forced to refocus on the spin recovery. After four rotations I found it necessary to reiterate the instructions with step-by-step procedures. The result was an abrupt move (very appropriate) of the controls to the neutral position (very wrong). The result of this stunt was an immediate acceleration of the spin, which allowed us not only to witness, but also to experience just how fast a Tweet can spin.

Realizing that his spin recovery attempt was about to be a non-attempt, I took control of the aircraft. Taking control of the aircraft was much harder than I had expected, specifically because my student had a death-grip on the controls with no intention of letting go. My interest in the situation was accelerating almost as fast as my heart was beating. "I have the aircraft" became more of an attempt to convince myself than anything else.

Anyway, altitude became a factor when I glanced at the altimeter and realized we were entering the (active) area below us. So what do you do? I clenched my fist, assured myself of plenty of leverage, and struck my German student somewhere between the head and belly. It had the desired effect. I finally had the aircraft!

The rudders, unfortunately, begged to differ. They were stuck in the neutral position. In the desperate attempt for a quick fix to the situation, I further accelerated the spin with full forward stick, hoping to pop out. We were already spinning fast and I knew such a recovery was possible. I pushed the stick forward and, amazingly, after an even faster rotation, my "quick-fix" worked. The recovery from the dive was real expeditious and we started a climb for altitude, through the active area, and back into our assigned area.

Safely back in the area we began to communicate again.

"Sir, was that a normal spin?"

"No."

Then we headed home.

Lessons I learned:

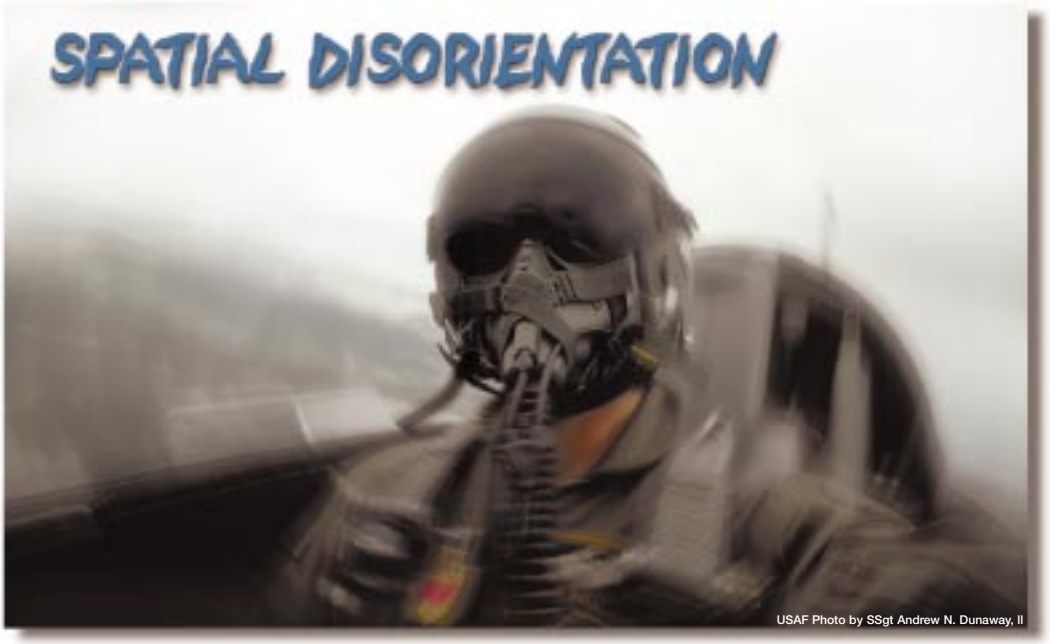
1. The spin sorties which taught me that an accelerated spin sometimes can be recovered with a spin-prevent, are very important.

2. The correct spin-recovery procedure always works, but I did not use it.

3. Know the limits and take the aircraft *before* the situation evolves (i.e., how far do I let the student go?).

4. Know what to expect from the student and know the student—expect the unexpected.

5. It is sometimes OK to hit a big German guy. ✈



MAJ CLARK DAVENPORT
HQ AFSC/SEFL

When someone mentions "spatial disorientation" (SD), what do you think of? Illusions you learned about in instrument refresher course or in aerospace physiology refresher training? Ever get disoriented while flying? Ever have a spatial disorientation event that scared you (i.e., "…them's were real big trees!")? What caused it? How'd you catch it? The following overview of SD in USAF Class A mishaps covers basic numbers, how much SD mishaps cost the Air Force in lives and aircraft and some of the underlying factors causing SD.

Before presenting the data, some assumptions need identification.

1. The mishaps used, from the Air Force Safety Center (AFSC) database, do not include mid-air collisions.

2. The definition used to collect the data and identify SD mishaps comes from AFMAN 11-217 V1, *Instrument Procedures:* "SD is an incorrect perception of one's linear and angular position and motion relative to the plane of the earth's surface. Specifically,

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The rate of SD mishaps is not decreasing.

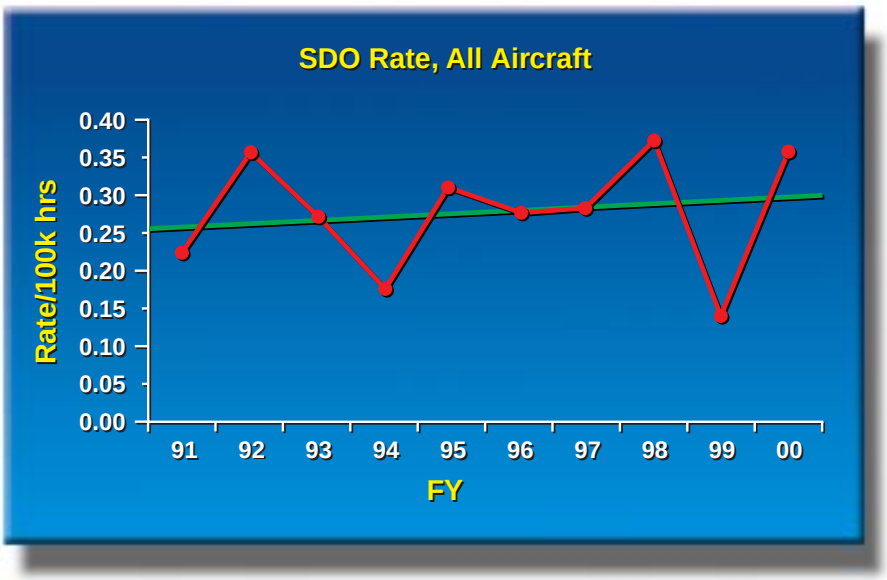

Figure 1. SD Rate for All Aircraft.

Category	Total FY91-00	# SDO / % of Class A	# GLOC / % of Class A
Class A Mishaps	309	60 / 19.4%	11 / 3.5%
Fatal Incidents	89	34 / 38.2%	7 / 7.8%
Fatalities	292	57 / 19.5%	8 / 2.7%
Cost	$5.33 Billion	>$1.4 Billion / 26.4%	$174 Million / 3.3%

Table 1. All v. SD v. GLOC Class As FY91 through 2nd Qtr FY00

SD, many times, is a result of a breakdown in your crosscheck.

in the flight environment, SD is an erroneous perception of any of the parameters displayed by aircraft control and performance flight instruments."

The rate of SD mishaps is not decreasing. The following graph shows the number of SD-related mishaps per 100,000 flight hours compared to the G-Induced Loss of Consciousness (GLOC) Class A mishap rate.

FY99 was an excellent year and slowed the upward trend when figuring in the first two quarters of FY00. How many USAF Class A mishaps had SD as a major or causal contributor? Looking at mishaps from FY91 through the second quarter of FY00, 19% of our Class A mishaps involved SD (309 Class A, 60 SD-related Class As) and cost the USAF over $1.4 billion. Even more damaging than the monetary costs are the 53 lives lost as a result of unplanned impact with the ground. Table 1 shows the breakdown of SD vs. GLOC cost for FY91 through the second quarter of FY00.

When does SD occur? We're commonly told that in the absence of good visual cues, we're more susceptible to SD. This is true. However, looking at the database numbers, we found that most of the mishaps occurred during the hours of 0600 and 1800 hours local time. (Unfortunately, the database does not accurately describe the actual meteorological conditions, only that it was day/night/dusk.) Figure 2 shows the number of SD mishaps vs. the local time of day.

Looking at Figure 2, it appears most of the mishaps occur during daylight hours. But, a warning: We didn't develop a rate for daylight/night SD mishaps because the Air Force does not track day/night sorties or hours per aircraft. Therefore, the raw data as depicted in Figure 2 looks compelling, but be aware there isn't a way to tell if there's a significant difference between the number of day and night hours flown.

So, who's susceptible to SD? There was, at one time, a saying along the lines of, "The first 500 hours are the most dangerous, from 500-2000 hours are relatively safe, but the

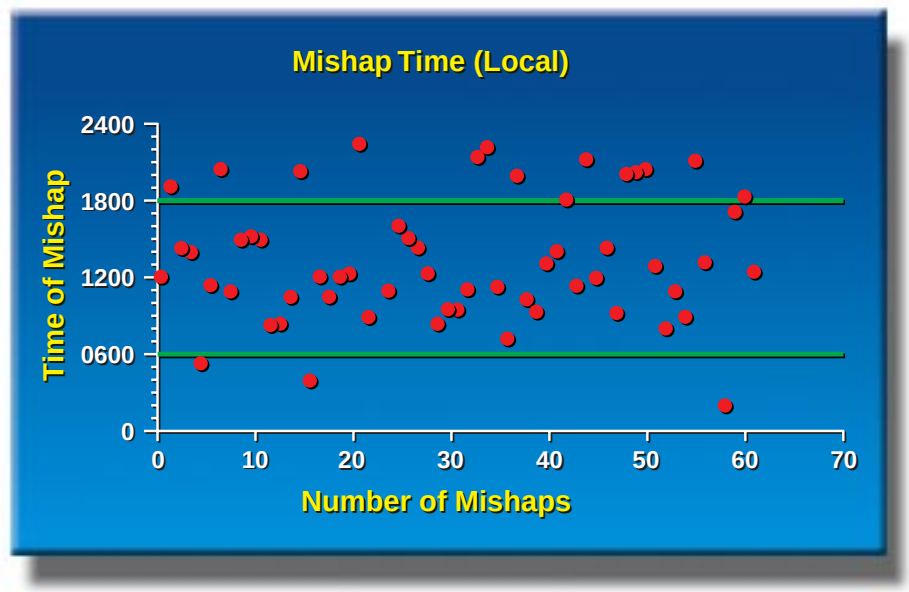

Figure 2. SD Mishaps v. Time of Day

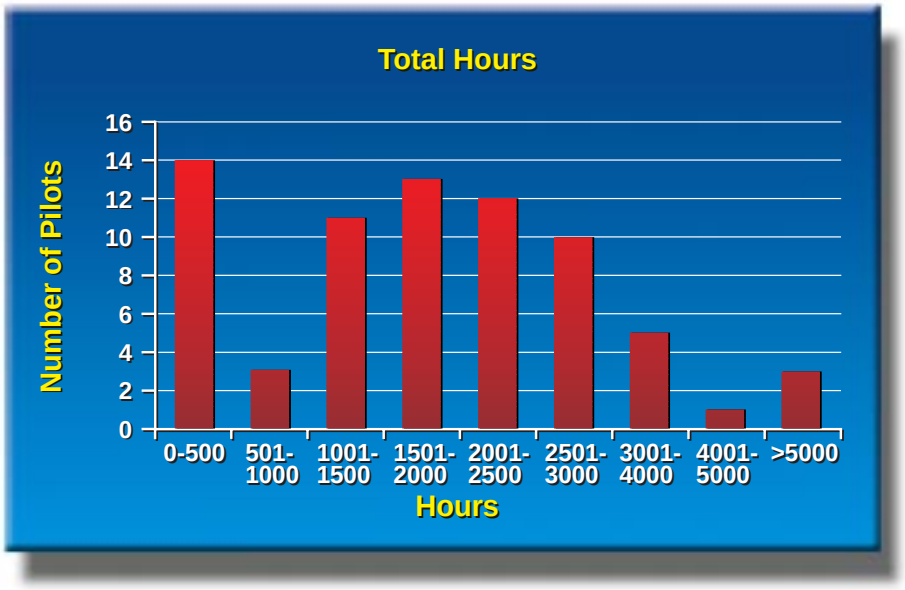

Figure 3. Total Flight Hours of Pilots in SD-related Mishaps

The first 500 hours are the most dangerous...

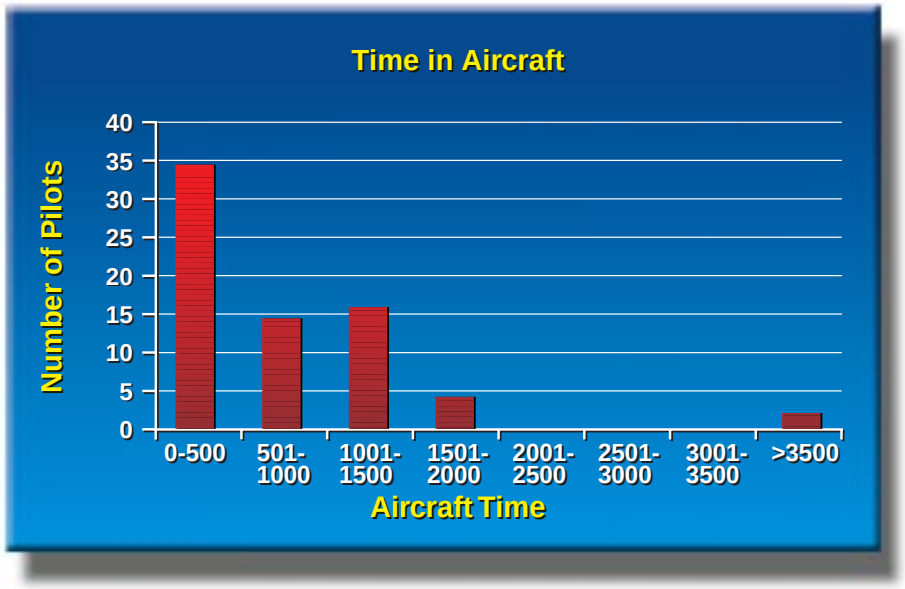

Figure 4. Hours in Aircraft of Pilots involved in SD-related Mishaps

danger increases from 2000 hours on up..." We looked at the hours of the pilots and co-pilots involved in SD-related mishaps. The following graphs illustrate the results. Figure 3 shows the total hours of pilots/co-pilots involved in SD mishaps. The majority in a single group are in the 0-500 hour range, where we might expect them. However, there is a large group spread over the 1000-3000 hour range. Is this possibly a result of more experienced pilots being exposed to the SD risk more often? Compared to pilot/co-pilots who experienced non-SD mishaps, there is no statistical difference in hours between the two groups.

Figure 4 shows the hours pilots had in their aircraft when they had their mishap. Looking at pilots' time in their weapon sys-

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Expectancy is a player in visual illusions where you must interpret the physical scene presented to your eyeballs.

USAF Photo by SSgt Jeffrey Allen

SD Contributors (Ranked Most Prevalent to Least Prevalent)	
Attention Management:	*Channelized Attention, Distraction, Habit-Pattern Interference*
Judgment and Decision Making:	*Task Mispriorization, Course of Action Selected*
Mission Demands:	*Vision Restricted by Weather/Haze/Darkeness*

Table 2. SD Contributors

tem paints a different picture. The majority of pilots involved in SD mishaps have between 0-500 hours in the aircraft. Here, it appears, the time in the aircraft may influence susceptibility to SD if aircraft time correlates with proficiency in the aircraft's mission.

Spatial disorientation is complex and influenced by many variables. A look at what human factors contributed to SD mishaps reveals what you already know: SD, many times, is a result of a breakdown in your crosscheck. For example, trying to find a target channelizes your attention outside of the aircraft, and you don't notice a slight descent. Or searching for a target on radar, reading an approach plate, and handling a task inside the cockpit which distracts you long enough for the aircraft to change flight parameters. And then there's "expectancy": What do you expect to see and when do you expect to see it? Expectancy is a player in visual illusions where you must interpret the physical scene presented to your eyeballs. Table 2 shows some common attention factors that contribute to SD.

Do the SD contributors correlate with the pilots' hours in their aircraft, i.e., their experience in the mission? How does the pilots' recency of experience, their "proficiency" performing their mission or particular tasks in the mission, mitigate or increase the threat of SD? For instance, how did you recognize you weren't pointed in the same direction you thought you were? What clued you in? How'd you recover?

We'd like to hear about your SD experiences. Let us know; drop us an email at the address below. We will not use your experience for anything else but data points. If you send us a particularly good experience that we'd like to use, we'll ask your permission to publish it anonymously, and we'll "sanitize" your contribution. So please send us your SD experience. Tell us how you got there, what you were doing, what clued you in to the fact something was wrong, and how you fixed it. ✈

Please send your SD experiences to clark.davenport@kafb.saia.af.mil or by snail mail:
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The "Luck Bag"

USAF Photo by SSgt Andrew N. Dunaway, II

MAJ WILLIAM J. SMITH
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Throughout your career there are people you interact with who have a profound impact on your life and actions. It might be their leadership qualities that affect you, something they say, or actions they perform. No matter what the occurrence, you remember it.

Such is the case with a particular mentor and friend of mine who I met on my first assignment… Lt Col (Ret) Randy "Slick" Olson. Slick came to our squadron at Eielson AFB, Alaska, about two years into my assignment and started leaving a lasting imprint on my psyche from the very beginning.

You see, Slick had a no-nonsense, pilot-simple approach to tactical situations, and to life in general. He saw action as a decorated Army helicopter pilot in Vietnam and was now instilling his wisdom on an eager squadron of A-10 fighter pilots. It was during a difficult time in our squadron that Slick said something which deeply affected me, and I've never forgotten it.

For a few months, our squadron was experiencing a rash of unrelated safety incidents, and it got to the point that something had to be done. As is normal in the military when a sequence of safety-related incidents take place, we took a day off to discuss what was happening and what could be done to remedy the problem. I don't remember anything else about that day except the fatherly "talk" Slick gave us about our "luck bag."

Slick began the discussion with an explanation of what a luck bag is. He said a luck bag contains all the luck a person has throughout their life. Each person is born with this invisible bag of luck and calls on it at different times to reap certain rewards or aid them during difficult times. Most people have heard the saying, "If you're not good, you'd better be lucky," but what if your luck runs out?

This was the point Slick was making. He said, "Yes, all people are born with a luck bag, but the problem is—*no one knows how much luck is in <u>their</u> bag*! You might be one of those people with a full luck bag who never has anything bad happen to them, no matter how many times you stray from the rules. Or you may be a person with an empty luck bag, who follows the book, day-in and day-out, and then one day you make a mistake and it's your last!"

Slick went on by questioning us, "Do you want to be up there flying some day, experience some unexpected challenge where you need some luck, and reach into your bag only to find it empty?" I don't think any professional pilot consciously relies on luck to get him or her through a mission, but just about every pilot has a story of a flight where either by luck or the grace of God, they avoided being another statistic.

I learned from Slick's brief, but insightful discussion that day… a lesson I try to live by daily, and that is, to *never rely on luck to make a mission happen.* Strict adherence to established procedures and avoiding the temptation to take shortcuts will help keep luck in your bag for when you really need it. I also realized taking the safer course of action in a situation will probably result in a more favorable outcome than following a more risky course. And finally, it *is* better to be good than lucky!

So next time you are faced with a situation, either flying or elsewhere in your life, where intense thought is required to help you out of it, just think of the Dirty Harry movie and ask yourself, "Do you feel lucky today… well, do you?" ✈

The problem is—no one knows how much luck is in <u>their</u> bag!

Sick with Guil

AMCS(AW) KEITH DENNIS
Courtesy *Mech*, Jan-Mar 99

Welcome to hell.

I couldn't sleep or eat. The guilt burned in me like acid. I still hadn't mustered the courage to admit that I was missing a tool from my workcenter.

It seems incredible that I let a pair of missing safety-wire pliers go without reporting them, but the thought of captain's mast promised by the MMCPO (maintenance material chief petty officer) scared me. I'm sure now that the threat was directed at people who didn't follow SOP for tool control, but that's not how I took it. I didn't want to get hammered for losing a tool. I also didn't want to get the LPO (leading petty officer) in trouble, but those are just excuses.

"The skipper had to bail out; his flight controls jammed..."

I'd been in my new A-7 Corsair II command for about six months after de-commissioning a Vigilante squadron. Tool control was lax compared to my last duty station; I thought I could help, so I volunteered to be tool-control PO for airframes.

Finishing up an at-sea period, we left a team of troubleshooters aboard to finish carrier quals. Upon our return to the hangar, I dutifully inventoried our tools and found a pair of safety-wire pliers missing from a tool pouch. I told my supervisor; he replied that we'd left an extra pair on the boat with our troubleshooter. I was uncomfortable with the answer, but being a brand new PO2 with all of three years' experience, compared to my supervisor's 17, I figured he knew best. He went on leave, and I anxiously awaited the boat det's return.

When a tall, lanky metalsmith walked in with his gear, I yanked the troubleshooter's pouch out of his hand. A cold shiver streaked down my back when I didn't find the extra safety-wire pliers he was supposed to have. Questioning him didn't yield anything but dumb looks.

I called my supervisor at home, but he'd left town. I knew I had to tell maintenance control, but the master chief had just told us that the next person who reported a missing tool was going to see the old man. Not exactly the kind of encouragement I needed. I went through the shop with a fine-toothed

comb looking for those pliers and came up empty-handed again and again.

I didn't sleep that night. I even discussed the problem with my wife. She convinced me to come clean with the MMCPO and take my lumps. The situation obviously wasn't going to fix itself, and the consequences were too risky to ignore.

The 10-mile trip to work took forever. It was a crisp, fall day with the sun shining brightly, but I made the trek from the parking lot filled with dread. With the first few steps into the hangar, I heard the chaos and excitement associated with something big. One of my coworkers dashed past me exclaiming, "The skipper had to bail out; his flight controls jammed, uncontrolled roll." Time compression made him sound like a bad eight-track tape. I prayed that the aircraft had crashed without hitting a hospital or school, and that it had burned and disintegrated. "Please, God, don't let them find my pliers."

Three days later, I was walking up the stairs to admin when I heard a slow, shuffling sound ahead of me. Looking up, I stared straight into the eyes of my CO. Ejecting at more than 400 kts at 30,000 ft with his visor up hadn't helped his complexion. His face was a sickly montage of purple, green, blue, black and yellow from the windstream hitting him. He was stiff and sore from the rocket ride, and he moved with slow, deliberate steps. He sniffled and was kind enough to ask me how I was doing. I wanted to scream out, "How am I doing? My God, I almost killed you!" We exchanged small talk, and then I excused myself to go vomit.

That chance encounter was bad enough, but the clincher came when I took my wife to a pre-deployment brief for dependents. I guess it was divine chance that the CO's wife sat next to me. The skipper's face had lost most of its grotesque hues, but he was still plenty sore. He addressed the audience and made a wisecrack about "being glad to be here—literally!" The crowd laughed politely, and I glanced over to see his wife's reaction. She sat there with a broad smile, arms wrapped around their two young daughters—tears streaming down her face. The chilling realization that we could have been attending his funeral sickened me once more.

The Corsair had landed in a Georgia swamp. The investigation attributed the mishap to a burst hydraulic line.

The safety-wire pliers? Our berthing PO returned from the ship and handed them over to me. He had walked into the shop while everything was being packed up for the off-load and just grabbed them to go hang bunk curtains! To the best of my knowledge, no one ever knew what happened except me.

Tool control has gone through a lot of refinement since that awful incident. I realize now that I misinterpreted the MMCPO's warning. No one should be threatened with NJP (nonjudicial punishment) for losing tools, but maintainers need to understand how deadly-important those procedures are. For the past 10 years I've told this story to my troops. It gets their attention. ✈

(Senior Chief Dennis was assigned to VAW-126 at the time this article was written. The incident he describes occurred in 1980.)

"Please, God, don't let them find my pliers."

Wouldn't it be nice to have someone who already understands the topic and can translate it into understandable terms?

MAJ PHILLIP P. TABER
49 FW
Holloman AFB NM

"Who's really the expert on this stuff?" For all of you FSOs who believe you must be the subject matter expert (SME) on every system/part/MX procedure involved with a mishap…

Have I got a deal for you! Use the assets your wing paid good money to train… the Aircraft Mishap Investigation Course (AMIC) trained maintenance officers!

Many wings do not take advantage of their trained maintenance (MX) investigators to assist with local Class C mishaps. These are the same individuals who are used by MAJCOMs and NAFs to investigate Class A and B mishaps; however, very few wings utilize their training and skills as investigators. It's not uncommon for these resources to go untapped. The direct benefits to the wing, wing safety office and the Air Force are virtually immeasurable.

FSOs: How many times have you said, "I don't have enough time to learn enough about this system/part/MX procedure before I write/finish this report"? Wouldn't it be nice to have someone who already understands the topic and can translate it into understandable terms?

FSNCOs: How many times has your FSO left (dumped) a mishap report on your desk on the way out to fly, mumbling something about finding a Tech Order which covers the assembly and an illustrated parts breakdown (IPB) of a vertically-enhanced widget? Of course, you know all there is to know about those widgets, but you still have the monthly ground abort rates to calculate, a junior FOD meeting to attend, the updating of the SIB roster, and about eight other projects which cry out for attention. Wouldn't it be nice if the FSO was working with someone else who could do the thorough research/investigation required for a world-class mishap report?

Chiefs of Safety: Have you ever had a squadron commander, squadron maintenance officer or the Air Force Safety Center (paid advertisement) hand you one of your mishap reports and graphically explain to you how "There is no way on God's green earth that the mishap could have occurred like that, because the widget is actually AC powered versus the DC power cited in your report!"? Wouldn't it be nice to have someone who can not only ensure that doesn't happen, but can also act as quality control on those mishap reports which are extremely technically oriented?

Train Like You Fight

Normally, an AMIC-trained MX officer's

first mishap is a Class A involving a minimum of $1 million in damage or a loss of life. This would be comparable to sending a promising pitcher directly from the minors into the seventh game of the World Series, with the series and score tied, no warm-up, a patch over one eye and one arm tied behind his back. Get the picture? It's a blueprint for disaster. Consider a Class C mishap to be a warm-up for a Class A or B mishap. This type of program also gives the FSO an opportunity to warm up. Utilizing the MX member requires the FSO to "lead" a mishap investigation team, similar to an actual Class A investigation. Both the MX member and the FSO can gain invaluable experience in mishap investigation.

So You Want To Go To AMIC?

There are inherent responsibilities associated with accepting/receiving any type of formal training. Many personnel view AMIC as OPR fodder and sometimes don't consider the possible ramifications of being involved in a real mishap investigation. A good AMIC-trained MX officer can make a significant impact on a mishap investigation, which can have ramifications felt Air Force-wide! With funding for training slots becoming scarce, wings should strongly consider training MX officers, since they're in a position to actively participate in wing-level investigations. The luxury of sending everyone who asks for a training slot has gone the way of the 8-track tape deck.

Techniques for Implementation and Proper Utilization

Support. For a program of this nature to be truly successful, it requires the support of the wing CC, OG, LG and SG. Quite often, local mishaps are viewed as insignificant: "I'm sorry, Lt Dudley is too busy with the upcoming (fill in the blank) to participate in your little investigation. You need to find someone else." It's probably safe to say you can more easily find someone "trained" in the fine art of (fill in the blank) than it is to find an AMIC-trained, steely-eyed investigator. The wing leadership must buy in to this type of program or it will die due to lack of support by the organizations that own the MX officers. Do not allow the importance of a Class C investigation to be minimized. Remember: Most Class C mishaps are Class A or B mishaps that didn't grow up...

Training. At the onset of this program, all of the wing FSOs/FSNCOs and MX officers need to thoroughly understand the ground rules for incorporating the MX officer into the mishap investigation team. The MX officer is a qualified investigator and should be utilized as such. MX officers are not a newly found source of administrative support. Abuse of this resource will result in its loss. FSOs will also require training/guidance on the optimum use of the MX member. Again, this training will prove invaluable if the FSO is assigned to a formal SIB. Once the initial training has taken place, it can be incorporated into established/annual training cycles such as the new FSO/MX officer training (IAW AFI 91-202/ACC SUP 1), annual board member training, locally developed wing safety training events, etc. To eliminate any questions on the topic, the Chief of Safety (COS) should consider issuing a policy letter either from the COS or wing CC.

Cost of Implementation. Cost is often the bottom line on any new program or concept. The beauty about this program is the cost: approximately $0.00. The cost in manpower? Maybe ten hours of staff work to develop and build an implementation plan for your wing.

The Dividends. Like many safety programs/initiatives, it is difficult to impossible to accurately determine actual impact. However, the dividends of a properly implemented program of this nature can produce one of the following scenarios which can have a direct impact on the wing's safety program:

Worst Case Scenario: More accurate mishap reports and a distribution of the wing's investigative workload.

Best Case Scenario: A world-class mishap investigation team which can make a difference in mishap prevention.

The bottom line? An AMIC-trained MX officer can provide an excellent addition to a mishap investigation team. Developing this program will allow your wing mishap investigators to walk before entering an Olympic marathon. The interaction between wing safety personnel and MX officers can also bring forth a wealth of fresh ideas and approaches to mishap prevention.

Every airframe we save and every injury we prevent translates directly to combat capability. Fly Smart. Fly Tactical. Fly Safe. ✈

The wing leadership must buy in to this type of program or it will die due to lack of support.

OPS TOPICS PRESENTS...

The Strange Case of the Meshugga Glideslope... And More

THE STRANGE CASE OF THE MESHUGGA GLIDESLOPE*

Here's an eye-opener for all airfield operations-type folks.

A flight of two Falcons flying in daytime "clear and a million" weather was cleared by Approach for the ILS runway. Once established on the localizer portion of final approach, the flight Lead noticed there was a discrepancy between his glideslope indications and his actual flight path. Lead's wingman confirmed he had noticed a discrepancy, too, and that *his* glidepath information appeared to be erroneous.

As they proceeded with the approach, their glideslope and flight directors commanded an ever-increasing amount of descent until, at four NM, their glideslope indicators presented full-scale down deflection. Knowing that the glideslope indications couldn't be correct, they discontinued the ILS approach and proceeded to the field visually. So what had happened?

Turns out that Air Traffic Control And Landing Systems (ATCALS) maintenance personnel had been manually manipulating the glideslope signal as part of an in-progress, FAA flight check that was part of a required annual verification of the airfield's ILS.

Both Tower and ATCALS maintenance knew a month in advance of the annual verification and, on the day of the FAA flight check, maintenance had called Tower personnel to discuss it. However, there was no discussion between the two parties about what specific maintenance actions would be taken to support the flight check or how ongoing flight operations might be affected. As a result, Tower assumed operations would be virtually unaffected and simply included "Flight check in progress" in the ATIS (Automatic Terminal Information Service). ATCALS maintenance personnel assumed Tower was aware that glideslope information would be unreliable and proceeded to manually manipulate the glidepath signal as part of the FAA flight check.

It was later learned that had the pilots obeyed glideslope commands, they would have been about 400 ft below actual glideslope. And had it been night or bad weather instead of "clear and a million," these two F-16 drivers could have been in a world of hurt.

As a result of the HATR filed after this near-mishap, ATCALS maintenance and Airfield Operations personnel met, took a hard look at the events preceding the incident and developed actions to prevent recurrence.

How about your operation? Are NOTAMs issued anytime NAVAIDs are undergoing maintenance? Are there weather minimums established for performing NAVAID maintenance or checks? How effectively do your maintenance and Tower entities communicate with each other? Is a risk assessment process in place and followed? If you'd like to learn more about the specifics of this HATR, please contact MSgt Kevin Elliot, the HATR Program Manager here at the AF Safety Center at elliottj@kafb.saia.af.mil.

*Me-*shug'*-ga: Mentally unbalanced; crazy.

USAF Photo

SLIP-SLIDIN' AWAY

Are you ready for winter? The following Class B mishap had its roots in a near-mishap that had occurred the previous winter. In that instance, snow-plowing operations had caused a snow berm to be formed at the intersection of two runways. A Hercules crew performing an assault landing spotted the berm in time to stop its aircraft, and further assault landings were suspended until the snow berm was cleared. In addition, a supervisor identified the hazard to the OSS. Even though no written guidance was issued, it was believed there would be no further instances of berms on runways and taxiways. Not exactly…

The C-130 was executing a touch-and-go to the snow-covered north/south runway at the home drome. It landed 1500 ft down the runway and slightly right of centerline, but the pilot easily corrected the aircraft back to center. However, shortly after advancing the throttles to takeoff power, the crew spotted a 30-inch-high (!) snow berm at the intersection with the east/west runway, directly in the Herc's path. Unable to take evasive action, the C-130 slammed into the berm at 110 kts.

The collision collapsed the NLG and damaged the MLG doors, and the aircraft slid down the runway at high speed on its nose. The pilot pulled the throttles to ground idle with no effect. The copilot tried shutting down the engines using the condition levers but was unsuccessful, too. Unbeknownst to the crew, the nose gear impact had caused an internal bulkhead to collapse onto the throttle and condition lever cable linkages, trapping them. The bulkhead had also severed some key hydraulic lines, so when brakes were applied, they didn't work either.

Fortunately, the engine fire handles still worked and pulling them did shut down the engines. The crippled C-130 came to a stop with less than 400 ft of runway remaining. The crew egressed the aircraft, shaken but uninjured.

For the aircrew, this event will undoubtedly make for great storytelling, both to grandkids and fellow aviator buds. All things considered, it could easily have ended in injury or death and the loss of an aircraft, so the bill for $400,000 damage seems pretty cheap. On the other hand, when you consider that the hazards posed by snow berms on runways and taxiways had been identified long before this mishap occurred, this was one accident and $400,000 damage that didn't have to happen. So. Are you *really* ready for winter?

USAF Photo by TSgt Fountain P. Carlisle

THESE BOOTS WERE MADE FOR… BLISTERING AND DELAMINATION???

The H-model C-130 was on descent to an en route station when it encountered icing conditions. Aircraft anti-icing/deicing systems were turned on. Once the Herc had exited the icing conditions, wing and empennage anti-icing systems were turned off, but prop and engine anti-icing/deicing systems were left on.

Because this was an unfamiliar en route location, during the approach to the field, all eyes were outside the cockpit watching for "small aircraft" traffic.

Landing was uneventful and, once clear of the active, the "After Landing Checklist" was called for. Again, because it was an atypical en route stop, the taxi to parking via unfamiliar taxiways, and in close proximity to lots of small aircraft, required added vigilance. *It also provided the opportunity to get distracted…* Once parked, Transient Alert delivered a ground power unit. The C-130's flying crew chiefs refueled the aircraft, secured it for the night and went with the crew into crew rest.

On return to their aircraft for departure the next day, the crew learned there would be a "short" delay before continuing the mission. Turns out the propeller spinners and boots were deformed from (obvious) overheating. Cost to repair? About $130,000.

Generally speaking, even absent icing conditions, prop anti-icing/deicing can be left on, so long as there's airflow present to provide cooling to the heating elements. Once on the ground, however, the 1C-130(K)H-1 has a "Caution" that prohibits ground operation of prop anti-icing/deicing unless the affected engine(s) is (are) running to prevent overheating of the heating elements.

It's important to always follow the checklist… *Especially* when things get busy. ✈

USAF Class A Mishaps

FY00 Flight Mishaps (Oct 99 - Jul 00)	FY99 Flight Mishaps (Oct 98 - Jul 99)
11 Class A Mishaps	27 Class A Mishaps
5 Fatalities	9 Fatalities
8 Aircraft Destroyed	22 Aircraft Destroyed

3 Oct	♣	While conducting a SAR mission, a UH-1N went down.
17 Nov	♣	Two F-16Cs flying a night vision goggle upgrade sortie collided during a VID intercept. One pilot ejected and was recovered uninjured. The other pilot returned safely to base.
22 Nov		An OA-10A departed the departure end of the runway. The pilot ejected successfully.
6 Dec	✶	An RQ-4A Global Hawk UAV was extensively damaged while taxiing after landing.
10 Dec		A C-130E touched down short of the active runway, then diverted to another airfield and belly-landed. Three personnel were fatally injured.
15 Dec		An HH-60G rolled over at an LZ following a hard landing.
20 Jan	♣	An A-10 crashed on RTB. The pilot was fatally injured.
16 Feb	♣	An F-16CG on a routine training mission experienced an engine malfunction. The pilot ejected.
16 Feb	♣	An F-16DG flying a night vision goggle upgrade sortie crashed. Both crewmembers ejected.
28 Feb	✶	A maintainer sustained fatal injuries after falling from the lower crew entry ladder on a C-5.
19 Mar	♣	An F-16C crashed while performing at an airshow. The pilot was fatally injured.
31 May	✶	An F-15E was damaged after a high-speed abort. (Erroneously reported as a "Flight Mishap. It was a "Ground Ops" Mishap.)
Correction		(The 2 June C-17A Class A mishap reported last month was downgraded to a Class B mishap.)
16 Jun	♣	An F-16C on a routine training mission had an engine malfunction. The pilot ejected successfully.
21 Jun	♣	During egress off target during a ground attack sortie, the pilot ejected successfully from an F-16CG.

- ❑ 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.
- ❑ "♣" denotes a destroyed aircraft.
- ❑ "✶" denotes a Class A mishap that is of the "non-rate producer" variety. Per AFI 91-204 criteria, only those mishaps categorized as "Flight Mishaps" are used in determining overall Flight Mishap Rates. Non-rate producers include the Class A "Flight-Related," "Flight-Unmanned Vehicle," and "Ground" mishaps that are shown here for information purposes.
- ❑ Flight, ground, and weapons safety statistics are updated daily and may be viewed at the following web address by ".gov" and ".mil" users: http://www-afsc.saia.af.mil/AFSC/RDBMS/Flight/stats/index.html
- ❑ **Current as of 25 Jul 00.** ✈

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FLYING SAFETY
MAGAZINE READER SURVEY

Flying Safety magazine (FSM) is published for aircrews, maintainers, and other personnel directly involved in aircraft operations, generation and control, and their commanders and supervisors. This is your magazine, and it is intended to help you do your job more effectively and safely by providing mishap awareness and prevention information that you can use. Please take a couple of minutes to complete the attached, pre-addressed survey and tell us: (1) How we're doing; and (2) How we can better meet your needs.

In accordance with Privacy Act concerns, we provide the following. Any information you may provide is strictly voluntary. This poll is conducted solely to improve FSM's usefulness to you, the reader, by gathering opinions on the quality and effectiveness of FSM content. Since no personal information—names, SSANs or the like—is requested or will be kept on file, none of the respondent information is considered Privacy Act data requiring the protections defined and described in AFI 33-332, *Air Force Privacy Act Program.*

Thanks for participating in the survey!

1. My current status is:

- ❑ Department of the Air Force Military (Active/Reserve/Guard)
- ❑ Department of the Air Force Civilian
- ❑ Sister Service Military (Active/Reserve/Guard)
- ❑ Other (Civilian, Armed Forces Retiree)

2. My AFSC and Duty Title (or Job Title/Position) are:

_____

3. My MAJCOM/FOA/Component (or Industry) is:

_____

4. FSM is published monthly. I read it:

- ❑ Every month
- ❑ Most months
- ❑ Occasionally
- ❑ This is the first issue I've seen

5. *Flying Safety* magazine exists to promote mishap prevention. It provides information that my coworkers/subordinates and I can use to accomplish the mission more effectively and safely.

- ❑ Strongly Agree
- ❑ Agree
- ❑ Disagree
- ❑ Strongly Disagree

6. I share FSM information by briefing it during roll calls (or safety meetings) or by posting it on the unit safety/bulletin board(s).

- ❑ Yes
- ❑ No

7. The level of writing for articles appearing in the magazine is most often:

- ❑ Too Basic
- ❑ Too Technical
- ❑ Just RIght

8. There is a good balance between words and images.

- ❑ Strongly Agree
- ❑ Agree
- ❑ Disagree
- ❑ Strongly Disagree

9. I enjoy the regular features: NOTAMS, Maintenance Matters, Ops Topics, The Class A Mishap Summary and The Well Done Award.

- ❑ Strongly Agree
- ❑ Agree
- ❑ Disagree
- ❑ Strongly Disagree

10. What types of articles do you find most interesting? (Check all that apply.)

- ❑ Technical
- ❑ General
- ❑ Humorous
- ❑ "There I Was..."

11. When I get an issue of FSM, I usually read:

- ❑ All of it
- ❑ Most of it
- ❑ Some of it
- ❑ Only those articles pertinent to me (aircrew, maintenance, ATC, etc.)

12. The top three topics/features I would most like to see in FSM regularly are:

1. _____

2. _____

3. _____

continued on next page

13. Here's how I would make FSM a better mishap awareness and prevention tool (Attach a separate sheet if you need more room):

_____
_____
_____

14. In terms of providing information you can use to do your job more safely and effectively, please rank order the following magazines from most useful (1) to least useful (8) to you. Please leave blank any pubs. with which you aren't acquainted.

___ *Flying Safety* ___ *Torch* (AETC) ___ *The AMC Forum* ___ *The Combat Edge* (ACC)

___ *Air Scoop* (USAFE) ___ *Approach* (US Navy) ___ *Mech* (US Navy) ___ *Flightfax* (US Army)

15. I resolve to write at least one short article for FSM during the coming year for which I'll receive the satisfaction of knowing that sharing my experiences really does benefit others, PLUS knowing that as a side benefit, even though monetary compensation isn't allowed, I'll also be given the choice of selecting either a *Flying Safety* magazine-logoed coffee cup or mousepad to keep for my very own at absolutely no charge that shows others "I'm an associate writer for *Flying Safety* magazine." (Okay, you don't have to answer this one, but think about, willya?)

❑ Strongly Agree
❑ Agree
❑ Disagree
❑ Strongly Disagree

We welcome your articles for publication, as well as feedback and suggestions. Please get in touch with us:

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Roodj@kafb.saia.af.mil, or DSN 246-0950

❑ Chief Mike Baker, Maintenance/Technical Editor
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You can Fax this survey to us at:
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OFFICIAL BUSINESS

CAPTAIN BRAD A. SEGER

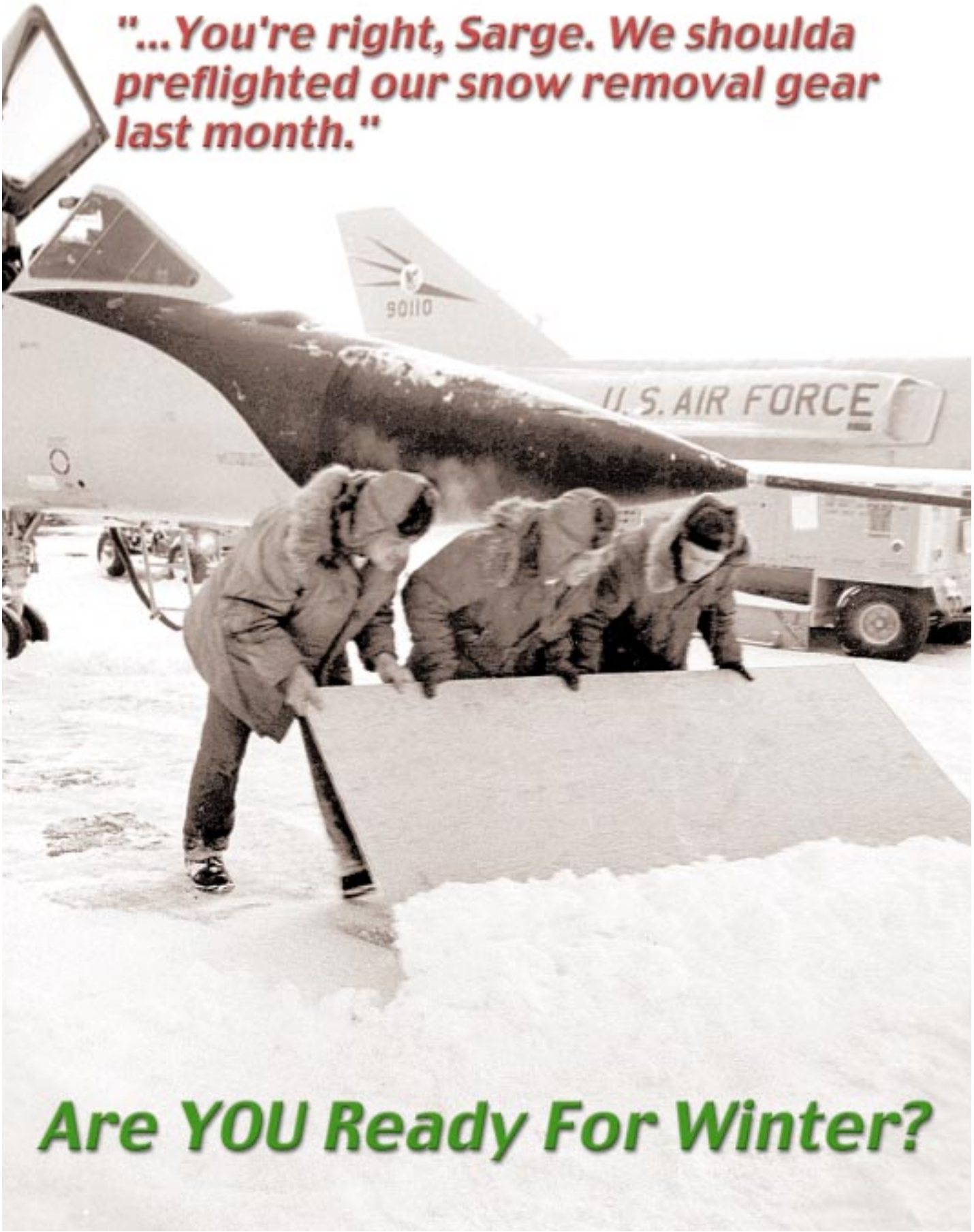
34th Fighter Squadron
Hill AFB, UT

In September 1999, Captain Seger displayed extraordinary situational awareness and airmanship handling an emergency during the extremely critical take-off phase of flight. He was scheduled to fly a LANTIRN surface attack mission. His F-16C was configured with external fuel tanks, bomb suspension racks, training missiles, and both LANTIRN pods for a gross weight in excess of 34,000 pounds. Mission preparation, briefing, and pre-takeoff ground operations were uneventful. As Captain Seger began his takeoff roll, the aircraft accelerated normally in full afterburner and achieved briefed performance parameters. As he began to rotate his jet to the takeoff attitude, he heard a loud bang, followed by severe airframe vibrations. He also observed shards of torn, black material flying up and over the nose and canopy of his jet, and felt multiple thumps in the cockpit floor. Suspecting engine FOD damage, Captain Seger selected idle power right as the aircraft became airborne at approximately 180 knots. With the aircraft still accelerating on residual thrust, he settled the jet onto the runway and initiated two-point aerodynamic braking, and advised the wingman that he was aborting. He immediately applied maximum wheel braking and lowered the nose to the runway. Captain Seger lowered the tail hook and continued three-point aerodynamic braking while simultaneously switching to tower frequency and transmitting, "cable, cable, cable."

At nose gear touchdown, Captain Seger experienced increased airframe vibration and the onset of aircraft directional control difficulties. He correctly determined that the nose-gear tire had catastrophically failed, and applied a combination of rudder input and minimal differential braking to keep the aircraft tracking straight while still maximizing his braking effort. He engaged the departure end barrier at less than 100 knots, easily stopping the extremely heavy aircraft. The energy of the abort caused both wheel brakes to heat considerably, and the tower advised Captain Seger that his brakes were on fire.

Captain Seger ground egressed the aircraft without incident. Inspection of the nose gear well revealed significant damage to electrical wiring and components. There was FOD damage to the top of the wheel well that was severe enough to dent the engine intake and dislodge paint into the engine. Further inspection of the engine showed that tire debris had indeed been ingested, requiring blending of several fan and compressor blades.

Captain Seger's superb airmanship, timely decisions, and expert handling of a unique problem during a critical phase of flight, minimized damage to and saved a valuable combat aircraft. ✈


"...You're right, Sarge. We shoulda preflighted our snow removal gear last month."
90110
U.S. AIR FORCE
Are YOU Ready For Winter?