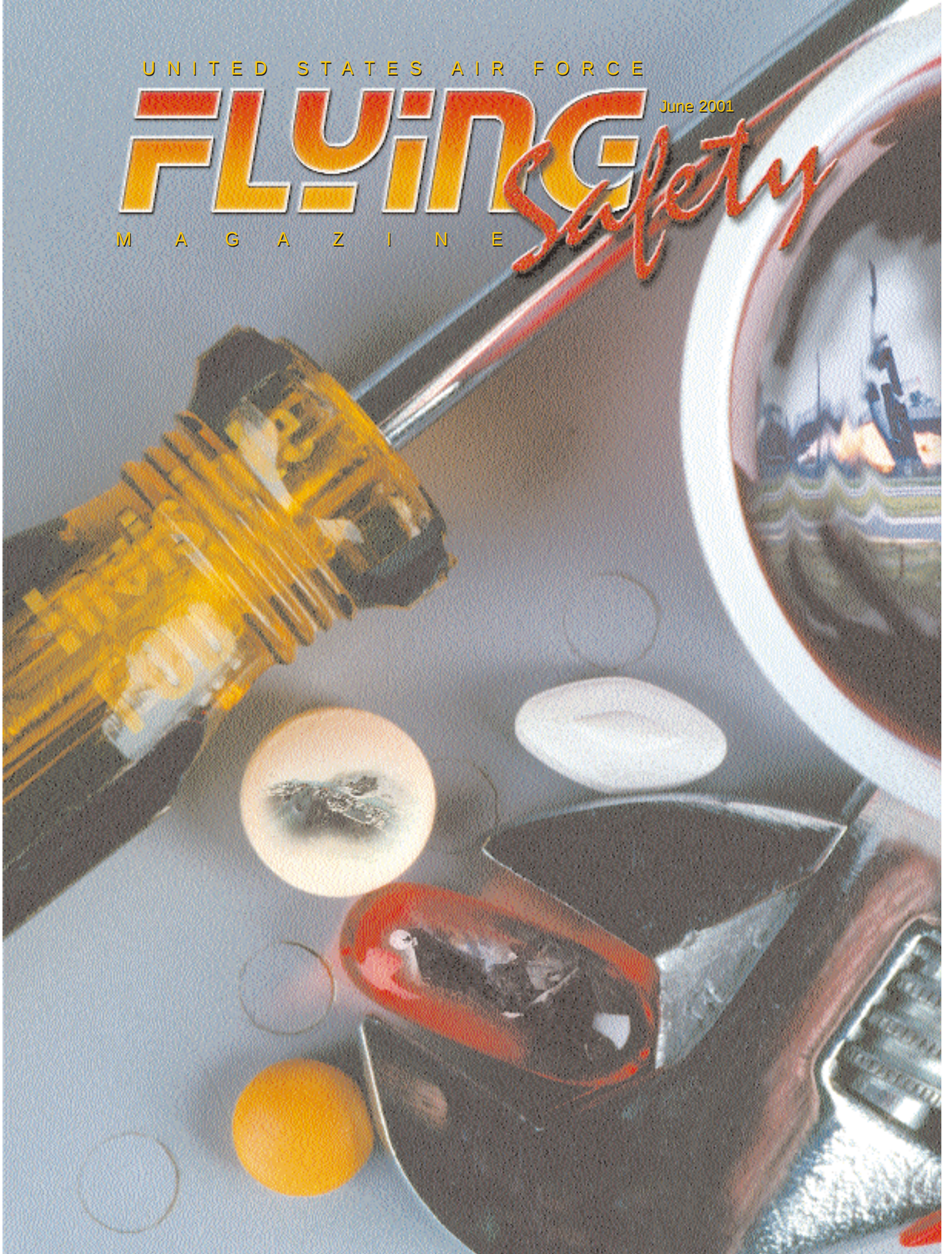
UNITED STATES AIR FORCE

FLYING Safety

MAGAZINE

June 2001



AIR FORCE RECURRING PUBLICATION 91-1 June 2001, VOL 57, NO 6

This Issue:

4

16

20

Cover: HQ AFSC Photo by TSgt Michael Featherston
Photo Illustration by Dan Harman

UNITED STATES AIR FORCE
FLYING Safety
MAGAZINE

GENERAL MICHAEL E. RYAN
Chief of Staff, USAF

MAJ GEN TIMOTHY A. PEPPE
Chief of Safety, USAF

COL MARK K. ROLAND
Chief, Safety Education and Media Division
Editor-in-Chief
DSN 246-2968

JERRY ROOD
Managing Editor
DSN 246-0950

CMSGT MIKE BAKER
Maintenance/Technical Editor
DSN 246-0972

PATRICIA RIDEOUT
Editorial Assistant
DSN 246-1983

DAN HARMAN
Electronic Design Director
DSN 246-0932

TSGT MICHAEL FEATHERSTON
Photo Editor
DSN 246-0986

Air Force Safety Center web page:
http://safety.kirtland.af.mil/
Flying Safety Magazine on line:
http://safety.kirtland.af.mil/magazine/htdocs/fsmfirst.htm

Commercial Prefix (505) 846-XXXX
E-Mail — roodj@kafb.saia.af.mil
Address Changes —
patricia.rideout@kafb.saia.af.mil

24 hour fax: DSN 246-0931
Commercial: (505) 846-0931

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 direct aircrew support and maintenance personnel.
POSTAL INFORMATION — *Flying Safety* (ISSN 00279-9308) is published monthly 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.

FSM Potpourri

CANDY DROP

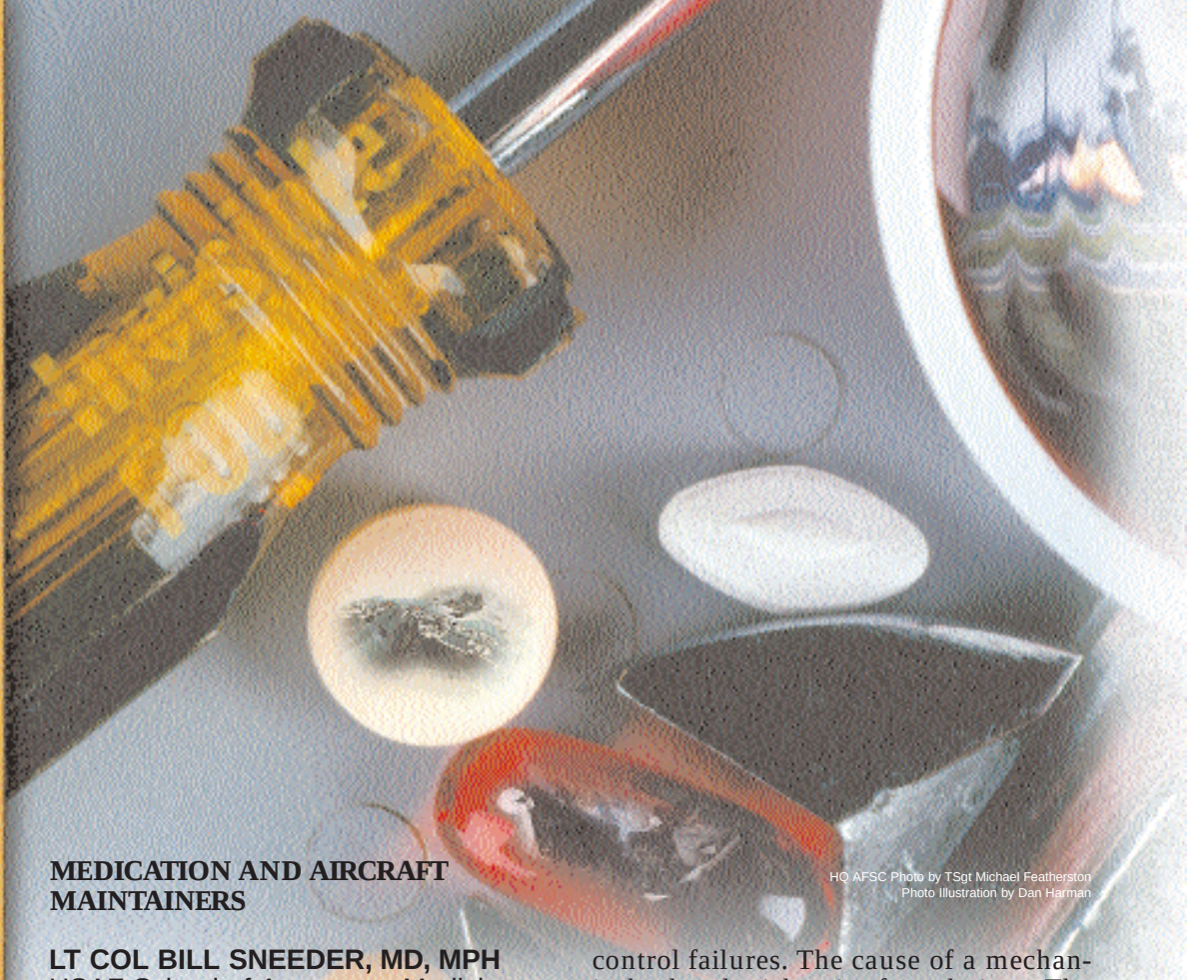
Courtesy ASRS *Callback* #254, Oct 00
NASA's Aviation Safety Reporting System

As colorful stockpiles of candy in grocery store aisles signaled the approach of Halloween and other fall holidays, several ASRS reports remind us that confections in the cockpit may not always bring sweet endings. From a GA pilot whose "candy drop" turned into a real dud:

• *Events began with a descent into Low Altitude Flight (1000 feet AGL) in order to fly close to a family outing. This was at my family's farm which was out in the country, and I desired to drop a bag of candy out as [a] fun gesture. After three passes, I proceeded to turn for a fourth and dropped to 500 feet AGL in order to make the drop... After the drop was made and all was clear, I proceeded to add full throttle to depart and to land at [home] field. The adding of full throttle only produced a maximum 1800 RPMs. I pulled carb heat, applied full mixture, full throttle, and checked mag position. I was unsuccessful with power recovery and now was descending below 500 feet AGL. Power lines and trees became a big concern. I cleared power lines easily but brushed the top of trees. At this time I knew a forced landing was needed. I proceeded to land in the nearest pasture, making a clean landing. Once I had completely stopped the airplane, I called ATC to inform them of my location and good condition...*

I had a certified mechanic do a thorough check of the engine and structure... The mechanic informed me that the aircraft was in normal condition and airworthy... I feel that the conditions leading up to the forced landing are now clearer. Even with temperatures over 85˚, the high humidity and slower flight led to carburetor icing... Application of carb heat started to occur but without much altitude, [and] there was not sufficient time for the ice to melt.

Advice from the School of Experience: "Fly the airplane first."



HQ AFSC Photo by TSgt Michael Featherston
Photo Illustration by Dan Harman

Do some instances of improper maintenance occur due to the influence of maintainer human factors issues?

MEDICATION AND AIRCRAFT MAINTAINERS

LT COL BILL SNEEDER, MD, MPH
USAF School of Aerospace Medicine
Brooks AFB, Texas

When thinking about aircraft mishaps and their causes, we tend to focus on the pilot. After all, he's in the driver's seat, there to troubleshoot any problems that may arise, and he's expected to bring the "on-loan" aircraft back to base, in one piece, after a mission. If a mishap occurs, investigators look for causes related to pilot error along with evidence of mechanical failure, weather factors, runway condition and ATC issues. Reviews of data from civilian general aviation, commercial air and military aircraft mishaps show that the two most often cited causal issues are pilot error and mechanical/logistic factors.

Aircraft maintainers—jet engine mechanics, avionics, environmental and life support technicians, dedicated aircraft crew chiefs and others—have direct input into the reliable function of aircraft system components and the overall aircraft. We don't know, however, what role maintainer human factors play in mishaps associated with mechanical issues like engine or flight control failures. The cause of a mechanical-related mishap is often obvious: The part wore out before its service life expired, or it failed due to an unanticipated performance stress, etc. In other cases, human error played a role when someone forgot, overlooked or incorrectly installed or serviced something on the aircraft. Documented cases include incorrectly installed fuel sensors, flight control sensors or engine parts, forgotten tools, and overlooked items in the aircraft forms. So, the question arises: Do some instances of improper maintenance occur due to the influence of maintainer human factors issues, such as self-imposed stress (drug or alcohol use, poor diet, improper rest), fatigue, poor concentration, shift-work problems, inadequate training or lack of motivation?

Aircrew are closely scrutinized by their flight surgeons for illness and monitored while taking any medications. Those who fail the scrutiny are usually grounded from flying duties. In contrast, a maintainer's physician may not make the connection between an illness or medication and the impact on the maintainer's ability to perform his or her job of repairing and inspecting

their aircraft with optimum attention and diligence. Compromise of the maintainer's duty performance has the potential for endangering an aircrew and damaging aircraft and equipment.

What We Learned

Because of their important role in safe flight operations, researchers wanted to know if maintainers were returning to regular duty while taking physician-prescribed or self-prescribed medication (for a self-diagnosed ailment) that had a potential to impair their ability to perform critical tasks. Studies of medications such as antihistamines (e.g., Benadryl®), which are used to treat allergies and may cause drowsiness, have shown that they reduce scores on various motor skills and thinking performance tests.

In one study, a group of 214 USAF aircraft maintainers representing various specialties completed an anonymous questionnaire regarding medication and duty performance. Of the 83 airmen who recalled treatment by a physician or who had self-medicated during the six months preceding the questionnaire, 39 had taken medication with potential side-effects such as drowsiness. These medications included antihistamines (Benadryl®, Atarax®), certain common cold preparations (Contac®, Dimetapp®, Nyquil®), pain relievers (Tylenol® with codeine), muscle relaxants (Flexeril®) and digestive tract symptom relievers (Donnatal®, Lomotil®). About 67% (26) of these individuals returned to work without any reported duty limitation status. More importantly, among the 29 who experienced actual drowsiness side effects, 65% (19) returned to work while on the medication.

What It Means

Apparently, some maintainers in this group returned to their regular duties—servicing, repairing and inspecting various aircraft components—while impaired. Not only was there impairment due to the medications the individuals took but, combined with the symptoms of the underlying ailment, the effect of the medication was likely compounded. Self-medication is most worrisome because maintainers and other non-flying operations personnel don't have the benefit of a physician to help determine if a medication is safe to take while doing their particular job. Even the most seemingly harmless over-the-counter medication can carry hidden risks, including cross-reaction with other medications and exacerbation of pre-existing medical conditions. For example, scientific studies have shown that, as with alcohol, sedating antihistamines may even cause performance impairment in the absence of drowsiness, without the worker realizing it.

To put things in context, however, there have been no documented Class A, B or C mishaps in the USAF directly linking a maintenance error to impairment caused by a prescribed or over-the-counter medication (mainly because we historically haven't looked at the effects of these medications on maintenance personnel). But the safety issue remains: Any medication you take, over-the-counter or prescription, may be detrimental to performance, including attention, memory, vigilance and motivation. Mistakes that result from ground crew human factors create a risk for loss of life or serious injury, and they can be dramatically costly in terms of equipment damage, with direct impact on flight operations during training and combat.

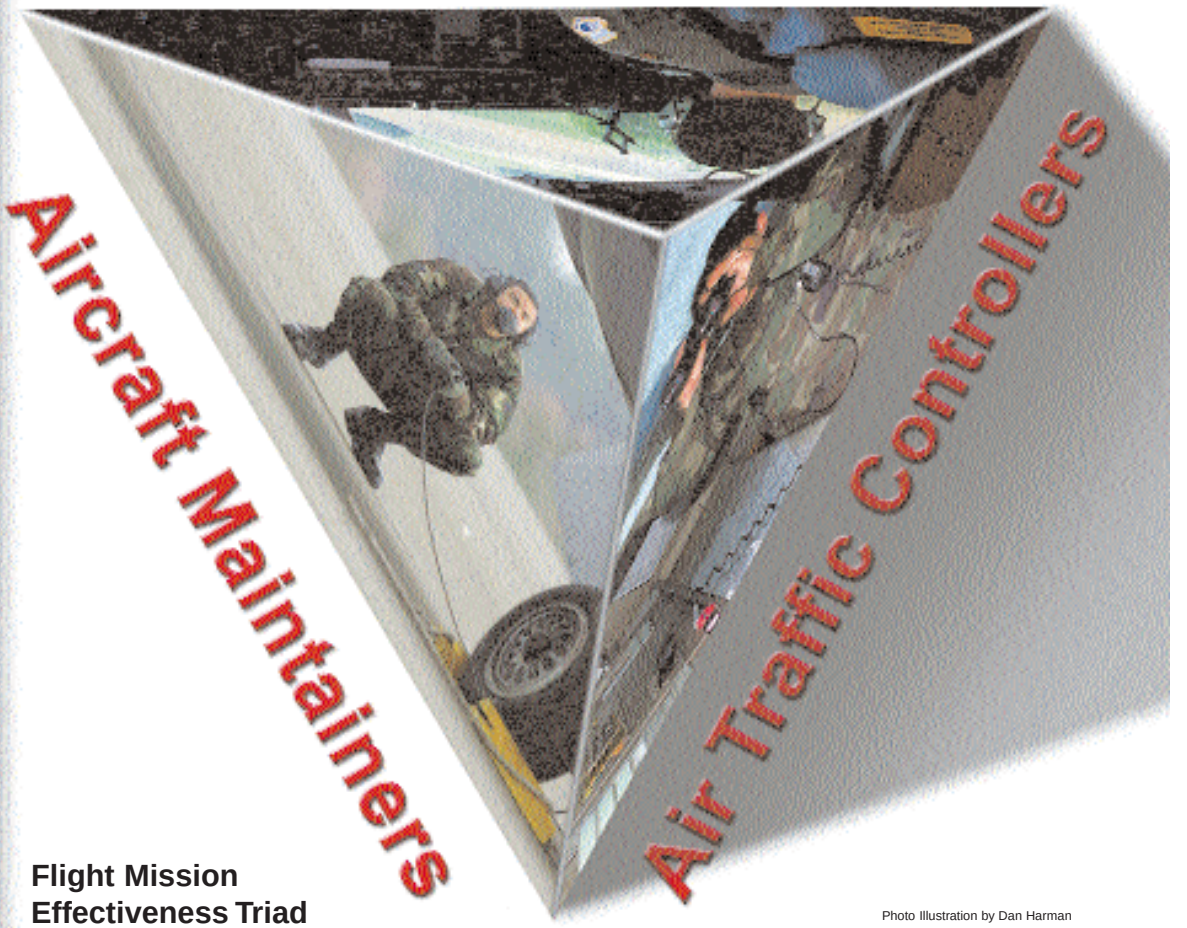
At our base, we discussed these concerns with the appropriate squadron commanders and supervisors, and we published an article in the MAJCOM safety magazine about self-medication. We also briefed the professional medical staff (family practice, primary care and other specialists who may see ground crew personnel) about preventive medicine issues. We emphasized the importance of determining a patient's occupation, the potential for medications to interfere with job functional requirements, discussing and documenting of medication side-effects, and the use of limited duty or quarters recommendations with a follow-up plan to determine fitness to return to duty.

We discussed the benefit of the person's physician, with the concurrence of the person under treatment, talking to the person's supervisor to help limit the impact on the workplace due to illness/injury and treatment. We also discussed the option of using some sort of tracking and documentation system similar to the Personnel Reliability

continued on next page

Combined with the symptoms of the underlying ailment, the effect of the medication was likely compounded.

Any medication you take, over-the-counter or prescription, may be detrimental to performance, including attention, memory, vigilance and motivation.



Flight Mission Effectiveness Triad

Photo Illustration by Dan Harman

Program (PRP) or AF Form 1042, *Medical Recommendation for Flying or Special Operational Duty*. With a computer-based interface to the workplace, medical providers can ensure supervisors are aware that a maintainer may not be fully functional to perform critical aircraft maintenance repairs and inspections after a visit to the doctor. Information like the nature and duration of impairment could assist in manning forecasts for maintenance tasks.

The review of selected USAF Class A mishap reports showed that questions of maintainer human factors generally have not historically been considered in maintenance-related mishaps. Furthermore, non-mishap incidents and ground mishaps are not usually investigated or documented so extensively. Adding a maintainer human factor review checklist item to the mishap investigation report template may prevent overlooking a potential element in the cascade of events leading to an aircraft mishap.

By presenting this information, I hope to contribute to the already-vigilant efforts to provide aircraft which are safe and functioning at peak performance. This can best be achieved by ensuring that the folks "turning the wrenches" are fit and at peak performance themselves—and are aware of the limitations caused by illness, injuries and the medications used in treatment. Accomplishing this requires education and guidance from medical support personnel and maintenance leadership. The effort required is justified, since these highly skilled, professional and dedicated individuals form the foundation to the flight mission effectiveness triad: Air Crew, Air Traffic Controllers, and Aircraft Maintainers.

Fix 'em safe!

MAJ CLARK DAVENPORT
LT COL DON WHITE
HQ AFSC/SEFL

During these days of "more with less"—increased taskings and deployments, accompanied by fewer resources—how can we keep our most critical link in the operations chain—people—performing effectively and safely?

How about a "one-size-fits-all-off-the-shelf" CD ROM disk with all the answers? No such luck! Why? Each unit, each wing, each deployment has its different challenges to overcome. Yes, there are some similarities, but also distinct differences. A CE squadron has different challenges than a fighter squadron or a maintenance squadron. Therefore, we need a tool that addresses the individual requirements of each wing/squadron/unit, as well as the basic stuff.

There is a new USAF concept to help address and provide support for human factors and performance challenges, the "Human Performance Team" (HPT). The HPT concept provides wings with resources to help with sustained operations and human performance. Unlike a generic, HHQ-developed program, HPTs target specific challenge areas within the wing. Since they belong to your wing, they're familiar with the challenges you face and can tailor interventions and mitigation strategies to fit your situation.

Who comprises an HPT? First, you might have the makings of an HPT in your wing now. Who are your human factors (HF) experts? How about your flight surgeons? They receive HF training and are smart about industrial safety and health issues (occupational safety and health). If you have a physiological training unit, the physiologists and physiological technicians have extensive training in human factors and performance. (If you don't have an aerospace physiologist and physiology technician now, the USAF will appoint you one.) You've got flight and ground safety officers. They're up on safety issues and ways to ID and categorize operational threats. Your life support officer (wing or squadron) is a critical source of information regarding the use/misuse of equipment and the problems related to life support equipment, i.e., thermal stress complaints with COMBAT EDGE. Finally, if you have an aviation psychologist on base, then you have another human effectiveness resource available to provide assistance with psychological and organizational issues.

What can an HPT do for your wing? Here are some examples: HPTs helped train security forces personnel on the proper use of night vision devices and on human performance issues regarding shift scheduling and "clean living" issues (smoking, nutrition, hydration, all those things flyers hear incessantly). As a result, the SFs reported fewer problems transitioning to night vision devices and shift changes. HPTs worked with maintenance squadrons to help them work shift scheduling as a result of fuel-spill problems resulting from fatigue-related inattention during the night shift. The HPT assisted the maintenance supervisors by helping them assess rest facilities and schedules, and by providing tactics on how to employ schedules that provided maximum rest and recovery between shifts. As a result, the number of fuel spills decreased significantly. Additionally, HPTs helped aviators cope and work around the thermal stress issues attributed to flight gear in hot environments.

What about assessing the risks and applicability of operational "work-arounds" required so you can perform your mission? The combined safety and HF experience of HPT members can give you a good, objective look at the suggested work-around and possible alternatives if a work-around is needed. For instance, you're flying NVG missions but you're using "Christmas tree" lights for NVG-compatible instrument illumination. Your pilots notice the lights don't illuminate the instruments adequately and the light strings fall off in flight. Your flight safety officer, life support officer, aerospace physiologist and flight surgeon can provide you with the tools necessary to develop an appropriate solution. Finally, HPTs are portable assets to assist you on deployments by providing additional help with health and performance risk assessments and mitigation strategies.

Overall, HPTs provide you with a broad spectrum of services, from briefings to actively developing interventions and enhancements in both the aviation and ground operations. The bottom line is this: HPTs are another tool in your bag you can use to help keep your units functioning at their peak effectiveness. Make use of them!

Acceleration Bites

How can we keep from going to sleep in the operational G-environment?

(WHEN YOU LEAST EXPECT IT)

LT COL DON WHITE
MAJ CLARK DAVENPORT
HQ AFSC/SEFL
MAJ CHARLIE CARLTON
KADENA AB JAPAN

This article is not intended to teach the Anti-G Straining Maneuver (AGSM); it *is* intended to jog your memory regarding some important points about acceleration countermeasures. First, there's good news: The acceleration safety scorecard over the last ten years shows a steady decrease in the Class A GLOC trend. The fighter/attack communities have seen a steady downward trend in the Class A GLOC incident rate from .07 per 100K flying hours in 1991 to .03 in 2000. There were 11 Class A GLOC events over this ten-year period, with eight fatalities. During the same period of time there were 36 reported physiological GLOC incidents in the fighter/attack community. The training community had no Class A GLOCs; however, there were 188 reported physiological GLOC incidents, primarily in the T-37.

Hopefully the Class A downward trend will continue, but in our business the one thing you can count on is that safety is a dynamic non-event, and we are the limiting factor. So, how do you explain this trend? A more fit force? Improved man-side equipment? Better acceleration training and/or fewer hours at G? There are a lot of explanations, so for the sake of this article we will focus on the limiting factor—you. We won't bore you with the mnemonic "One-two-breathe-squeeze your lower body" routine, because we're not teaching the AGSM.

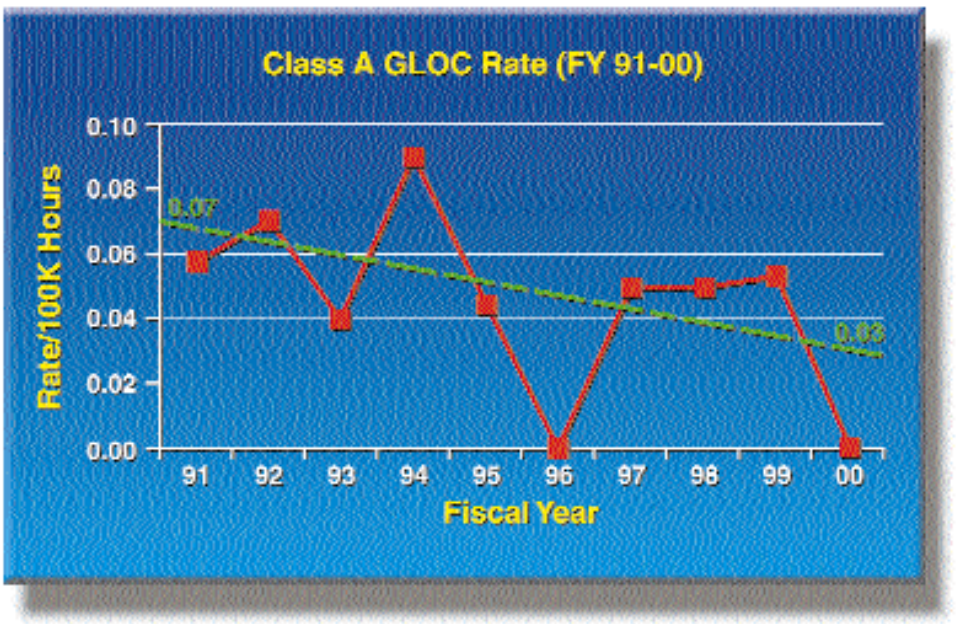
Let's just get practical: How can we keep from going to sleep in the operational G-environment? Simply remind yourself what works and what doesn't. What have the training environment and the "spin-and-puke" shown as the common mistakes? What is the tactical significance of the AGSM? What is important to remember about COMBAT EDGE? What is physiologically significant when preparing for and pulling Gs? And finally, what are some common sense rules for a dynamic G environment?

The centrifuge is a good motor-learning training device—all you are really trying to do is set up an AGSM motor pattern. Why is the centrifuge a good training device for this? Because the AGSM is all you have to do. Despite the subtle side effects of being beat about the head and neck, trying to overcome the overwhelming gastrointestinal

awareness and an unrealistic vestibular overload, it is good training. In the operational G environment, you can't be thinking about AGSM mechanics. It must be a natural motor response. However, you still have to consciously decide "when" to perform the AGSM, despite the fact that it is a learned motor response. Your G-tolerance and your endurance change from day to day. The G-awareness turns set your personal G limits for that motor response, so pay attention. If something isn't right, fix it or say something. That G response becomes one more object in your situational awareness clue bag. The bottom line is, the AGSM is a habit pattern worth building well.

GLOC does not usually occur as a sudden acute event; various physiological variables are almost always present. Fatigue, layoff, recent illness, hydration and physical conditioning are the big players.

The last thing we'll mention is your life support equipment, specifically COMBAT EDGE. COMBAT EDGE does not increase G-tolerance; it increases G-*endurance.* COMBAT EDGE will not compensate for a poor AGSM. Your AGSM must be the same when you wear COMBAT EDGE. Therefore, it is important not to get complacent with the AGSM when wearing COMBAT EDGE.



Your G-tolerance and your endurance change from day to day.

A topic which has received a lot of attention over the last couple of years is the thermal load present with COMBAT EDGE. Research has shown that the thermal load is not significantly different between the CSU-13B/P G-suit and COMBAT EDGE. However, crewmembers report subjectively that it is hotter. You don't have to be a thermal physiologist to recognize that the more layers of stuff you wear, the more difficult it is to dissipate heat. Regardless of what research shows, COMBAT EDGE is hot, you sweat, you are uncomfortable – prepare for it! The solution? Ensure you hydrate, and limit environmental exposure in hot weather.

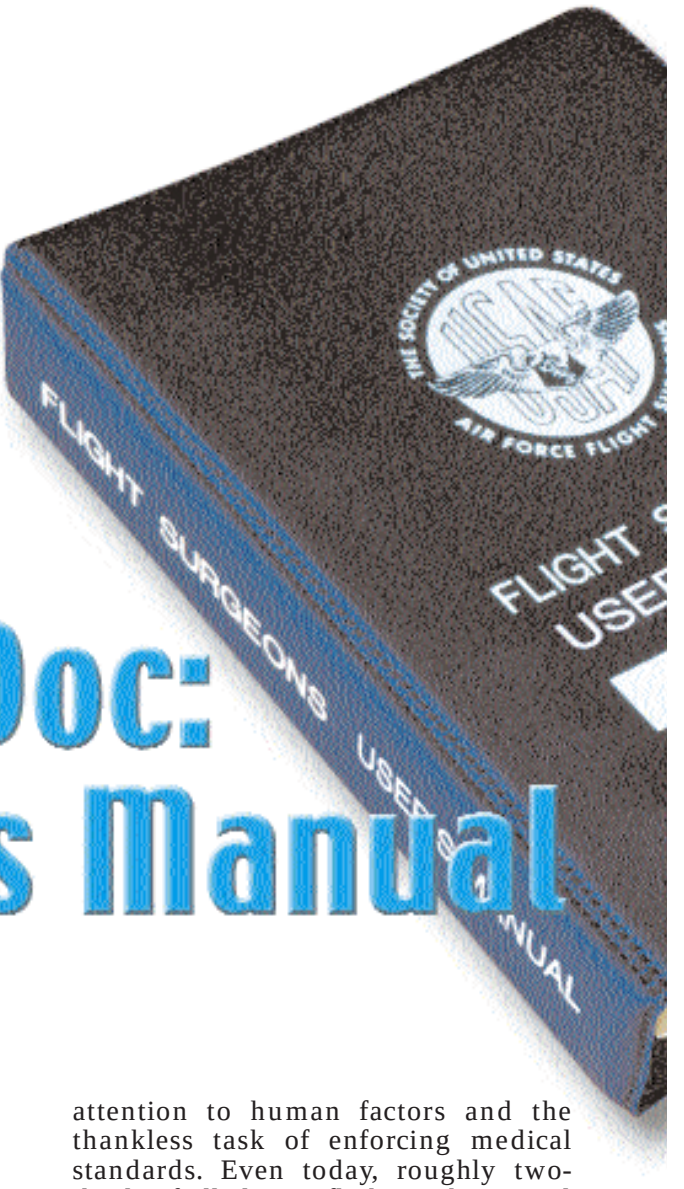
So what's new? G-awareness is still an interest item; don't get complacent. It is natural to GLOC. Until we stop being a hydrostatic column and get rid of gravity, we will continue to GLOC. Don't just sit there; recognize your limitation on every sortie. Pay attention to those things that you know reduce your G-tolerance, and follow a few common sense rules:

Common Sense Rule Number One: If you are behind on your strain and the G, the likelihood of catching up while you are pulling harder just don't justify the risk.

Common Sense Rule Number Two: Start the AGSM *before* G-onset, not *during* onset.

Common Sense Rule Number Three: Breathe.

Your Flight Doc: A User's Manual



Have you made your flight surgeon part of your team?

LT COL TOM LUNA
HQ AFSC/SEFL

A good, involved, Flight Doc is a boost to the physical and emotional health of your flying squadron. This translates into improved safety and a reduced DNIF rate. This in turn leads to improved aircrew/sortie generation and mission accomplishment. Do you educate, train and support your flight surgeon? Have you made them part of your team? Do you go to bat for them when they need it? Bottom line: Is your Flight Doc "on board"?

The modern flight surgeon came on line in World War I. In that conflict, only 2% of in-theater aircraft losses were due to combat damage; 8% were due to mechanical/logistics problems, and a whopping 90% were due to human factors. Flight surgeons quickly became critical to flight safety through careful attention to human factors and the thankless task of enforcing medical standards. Even today, roughly two-thirds of all class A flight mishaps, and over 90% of fatal flight mishaps, are due to human factors. The role of a fully-engaged, operational flight surgeon is as critical today as ever.

Is your Doc active in the squadron? Are they active in flight (or asleep/catching up on paperwork in the back)? Do you make your Doc an active and integral member of your crew? Staff meetings? If you want to get the most out of your Flight Docs, you need to take an active role in helping them to be fully educated and trained in your operations and to have an active role in your unit. In order to do this, flight surgeons need to spend time with your flying unit—flying, training, attending meetings and social events, and sometimes just hanging out in the squadron. They

HQ AFSC Photo by TSgt Michael Featherston

also need to spend time with the life support crew and maintainers. Flight surgeons need to be familiar with, and fly all mission profiles in, your aircraft in order to put an operational "face" on their academic training in flight medicine and human factors. If you don't have any multi-place aircraft, you'll need to get them in whatever simulator you have available. This all takes some effort on your part. If you do this right, you can then use their advocacy to proactively address human factors issues like fatigue, scheduling, stress and ergonomics, as well as go to bat for your squadron on medical standards and preventive medicine issues.

Does your Doc spend time in the squadron, or does the Doc get buried in patient care? If continually buried in the clinic, they cease to be operational Flight Docs and are reverting to primary care providers. Many people don't realize that Aerospace Medicine is a *preventive* medicine specialty, *not* a primary care specialty. For instance, primary care for aircrew dependents is performed for the peace of mind it provides to the aircrew and the insight it provides the Flight Doc into the stresses the aircrew is under at home; it is done first and foremost for safety and prevention reasons. The excellent care received by dependents is truly essential—but it is an added benefit to its purpose of aircrew safety and preventive medicine.

A longtime rule of thumb has been that flight surgeons should spend only about 50% of their day in direct patient care. They should spend the rest of their time on operational, occupational, preventive medicine/public health and administrative medicine (usually in support of their aircrews ... you generate a lot more medical paperwork than non-aircrew!). Patient care is important, but there are many providers at the local medical treatment facility (MTF) trained to provide primary care as their chief duty. Only flight surgeons can provide the operational medicine critical to flying units, and the bulk of that occurs not in the MTF but on the flightline. Operational medicine and flight safety programs should not suffer due to primary care pressures.

Historically, most senior medical staff at base level had flight medicine training. Several years ago, however, medical leadership opportunities were broadened. This was a big step forward in many ways, but unfortunately there was a concomitant loss of flightline knowledge for our base-level medical leaders. Nowadays, in many cases, they may have little understanding of what flight surgeons do and are responsible for. In some cases, they may need you to explain to them how important flight surgeons are to your operations.

Do you ensure your Flight Docs are an active part of your squadron staff meetings? Do you ensure they engage on deployment planning and scheduling issues? Do you get their advocacy on life support and ergonomic issues? Can you count on your Doc to give you the pulse of your unit when you need that? With proper care and feeding from you, your Flight Doc will be a fully-engaged aircrew generator and safety proponent.

Is your Flight Doc on board?

Flight surgeons need to be familiar with, and fly all mission profiles in, your aircraft.

The Aviation Safety Reporting System (ASRS)

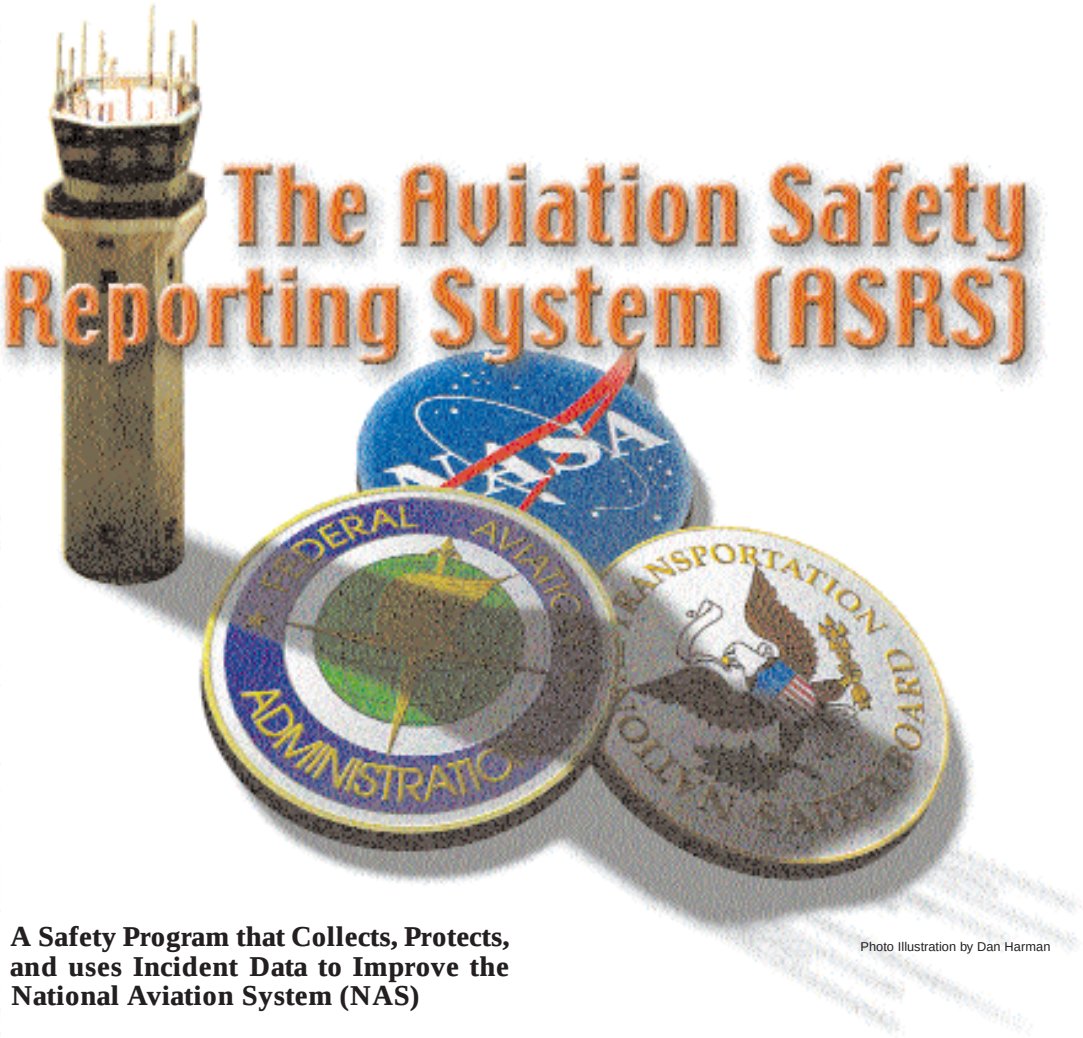


Photo Illustration by Dan Harman

ASRS invites pilots, controllers and others to voluntarily report to NASA any actual or potential hazard to safe aviation operations.

A Safety Program that Collects, Protects, and uses Incident Data to Improve the National Aviation System (NAS)

MSGT KEVIN ELLIOTT
MAJ RAY KING
HQ AFSC

In 1974, a Boeing 727 crashed on final approach to Dulles Airport in Virginia. During the National Transportation Safety Board (NTSB) investigation, Air Traffic Control (ATC) and cockpit voice recorder tapes discovered the crew was confused over information concerning the approach instructions, specifically from the approach charts and "Clearance for the approach" by ATC. It was later discovered that another airline had experienced a similar chain of events, but they detected the error and increased their altitude. This corrective action allowed them to miss the oncoming mountain, hence becoming an incident rather than an accident. A difference that is critical for longevity.

Information about this near collision/near disaster spread rapidly in this airline, but did not reach other airlines. As a result of NTSB findings, the Federal Aviation Administration (FAA) and National Aeronautics and Space Administration (NASA) created the Aviation Safety Reporting System (ASRS) in 1976. This cooperative safety program invites pilots, controllers, flight attendants, maintenance personnel, and others to voluntarily report to NASA any actual or potential hazard to safe aviation operations. The FAA provides most of the program funding. NASA, "the honest broker," administers the program, assures confidentiality, sets policies in consultation with the FAA and aviation community, and receives and analyzes the submitted reports.

Purpose

The ASRS operates under two mandated purposes: First, it identifies deficiencies and discrepancies in the National Aviation System (NAS). Second, it provides data for planning and NAS improvements by enhancing

the basis for human factors research. It also allows recommendations for future procedures, operations, facilities, and equipment.

Over the years, the aviation industry has learned many valuable lessons from this reporting system, without bent metal and the loss of life. The evaluation of these reports, describing specific incidents, is used to provide information to airlines, the FAA and others, to determine major issues, identify potential problem areas and create solutions to prevent accidents.

Protection Features

The FAA offers incident reporters two important guarantees: *confidentiality* and *limited immunity*. The FAA is willing to offer these guarantees because of its value to mishap prevention and products obtained through the program.

- **Reports are held in confidence**. More than 490,000 reports have been submitted without a single reporter's identity being revealed. ASRS removes all personal names and other potentially identifying information before entering reports into the database.
- **Reporters receive limited immunity.** The FAA will not use information that has been filed with the ASRS in an enforcement action, and will waive fines and penalties for unintentional violations of federal aviation regulations (FARs) that are reported, as long as violations are reported within 10 days of the occurrence. However, accidents and criminal activities are not protected from enforcement actions.

But… When In Doubt, Fill It Out!

ASRS Report Submission

Reporting forms have been prepared specifically for intended users. Four different forms in the NASA Ames Research Center (ARC) 277-series are currently available.

1. ATC Form (NASA ARC 277A)
2. General/Flight Crew Form (NASA ARC 277B)
3. Cabin Crew Form (NASA ARC 277C)
4. Maintenance Form (NASA ARC 277D)

The NASA forms are preaddressed and postage-free. Alternatively, there is a website to obtain these forms: http://asrs.arc.nasa.gov/forms_nf.htm.

Search Database

The ASRS database is available for search requests, research studies, and topical safety interest. Santizied information in the ASRS database is available to all interested parties. Individuals and organizations having a need for specific ASRS data will be provided with a set of relevant reports. You can order searches by mail (ASRS, ATTN: Search Request, 625 Ellis St., Mountain View CA 94043) or by accessing the ASRS Internet site (http://asrs.arc.nasa.gov). The current database includes reports submitted from 1988 to the present. Earlier years are archived. Additionally, the database is available through a private company on CD-ROM and on the Internet through the FAA, Office of System Safety, and National Aviation Safety Data Analysis Center (NASDAC).

What's In It For You?

OK, what does any of this have to do with military aviation? There is nothing preventing military aviators, maintainers, or other military personnel from submitting reports. After all, we share the NAS with our civilian brethren. While military reporters do not need the immunity afforded by ASRS (USAF personnel can submit High Accident Potential [HAP] reports through their Flight Safety Office), some incidents may be appropriate for ASRS. We at the Air Force Safety Center hope the protection of confidentiality afforded by ASRS will encourage increased reporting of incidents and conditions that would otherwise go unreported. By helping to identify trends before they become mishaps, you can positively influence the course of safety in the USAF.

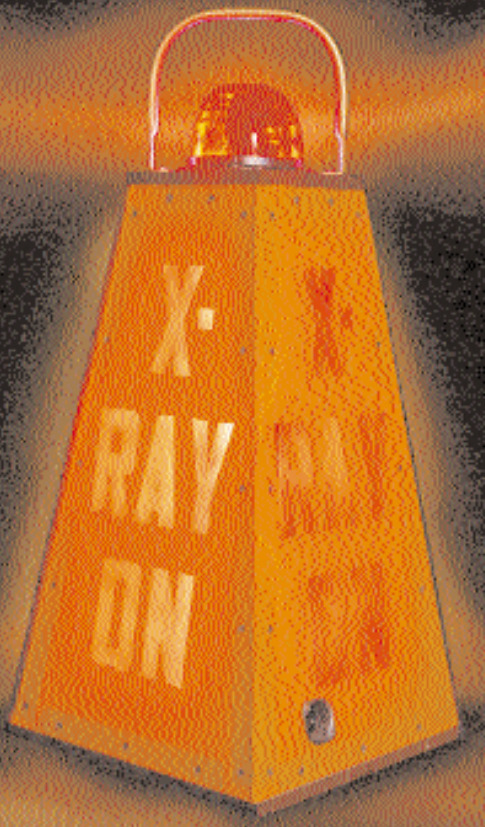
Conclusion

It is the experience of the ASRS that a voluntary, confidential, non-punitive incident reporting system is a logical and effective means of acquiring unique data, as well as supplementing information obtained from conventional accident investigation techniques and other system monitoring programs. If you have any questions, contact MSgt Elliott at DSN: 263-2034 or email: elliottj@kafb.saia.af.mil.

Thanks to Ms. Linda Connell, ASRS Director, for her contribution to this article.

Over the years, the aviation industry has learned many valuable lessons from this reporting system, without bent metal and the loss of life.

Assume Nothing



HQ AFSC Photo by TSgt Michael Featherston

We never figured anyone would be stupid enough to fall asleep inside the cockpit.

MSGT DEWEY BUCK, USAFR
403 MXS/NDI LAB
KEESLER AFB MS

It was dark, humid and hot, a typical May night in Thailand, 1973. I was a buck sergeant in the 432 FMS NDI Lab. Along with the rest of the lab personnel, I had been placed on 12-hour/seven-days-a-week shifts. This had been our way of life for the past several months. For everyone routinely involved in aircraft maintenance, it was all the same, 12 on and 12 off. With 125 F-4s assigned and a war going on, maintenance activities filled our every minute. But this night would turn out a little different from what we'd been conditioned to.

Maintenance Control, as it was called back then, had scheduled the usual three or four F-4 vari-ramp FOD inspections for the lab to X-ray. The three-man crew had worked together for several months, and we knew the routine backwards and forwards. The aircraft would be towed to the authorized spot. We would rope off the area, set up the X-ray equipment and place the films in the appropriate areas on the aircraft. We'd radiate the films. We would remove them, pack up the equipment and head back to the lab. Once there, we would hand-process the film and give the final results to Maintenance Control.

When setting up the radiation barrier around the aircraft, it was a safety practice to check the surrounding area for unauthorized personnel, like a crew chief or aircraft brakeman (one is required when towing an F-4 to a spot). We never figured anyone would be stupid enough to fall asleep inside the cockpit when NDI was going to X-ray, so we always checked the aircraft outside, never inside. (We thought, "Hey, no place to hide!") Anyway, as luck would have it, this time we had a problem locating the aircraft forms. I took it upon myself to check the cockpit, just in case they'd been left there. Now you can imagine the look on my face as I opened the canopy and found the brakeman asleep in the seat! As I woke him up, I noticed the aircraft forms in his lap.

That night set into motion a change in the rules and guidelines for setting up nighttime X-ray operations. My awareness for safety had been changed for the rest of my days in NDI. Now, 28 years later, I still remember that look the brakeman gave me. Lessons learned were many, but the one that stands out the most was: Never assume, just check it anyway! There might be a stupid person in your area.

HQ AFSC Photo by TSgt Michael Featherston

What Can Health Care Learn From Flight Safety?

Health care finds itself in the unenviable position of trying to maintain an aura of perfection.

MAJ RAY KING
HQ AFSC/SEPR

I have been privileged to be a guest in two complex worlds during my Air Force career: Health care and flight operations. Both of these professions demand sustained, high-level performance and both have very high stakes—to include preservation of human life itself!

The medical and flying professions attract some of the most talented individuals around and offer very sophisticated training. How could health care benefit from the experience of flight safety? In the attitude and management of error. Most aviators understand that errors are an integral part of what they do and hence try to manage ("trap") them. When a mishap occurs despite an aviator's best efforts, there's a concerted effort to understand the process and prevent similar mistakes.

Health care, on the other hand, finds itself in the unenviable position of trying to maintain an aura of perfection. With this mindset, recognizing and documenting errors is *discouraged.* I once witnessed a physician criticizing a nurse because she (the nurse) documented a medication error in a patient's chart. Was the physician in this example a "bad actor"? No. He was coping the best he could under the constraints imposed on him. He was concerned about creating an "audit trail." Part of the problem may be our legal system; to admit mistakes is to lose ground in an adversarial system.

On the other hand, per AFI 91-204, *Safety Investigations and Reports*, formal safety investigations enjoy privilege: That is, the information gathered is used solely for future aircraft mishap prevention. Under such an arrangement, error can be freely admitted without fear of legal repercussions.

What's the lesson here? Safety, whether in health care or flight operations, is best served when an atmosphere of openness—instead of a culture of blame—exists. To all of you Flight Safety folks out there: Keep up the good work!

Judgment...Can It Be Regulated?

Judgment isn't something that can be taught through a definition, textbook or even a cookbook!

LT COL WILLIAM J. SMITH
80 FTW/SE
Sheppard AFB TX

An anonymous quote found in AETC's Handbook 11-1, "Road to Wings," summarizes judgment pretty well: "We should all bear one thing in mind when we talk about a troop who rode one in. He called upon the sum of all his knowledge and made a judgment. He believed in it so strongly that he knowingly bet his life on it. That he was mistaken in that judgment is a tragedy, not stupidity. Every supervisor and contemporary who ever spoke to him had an opportunity to influence his judgment, so a little bit of all of us goes in with every troop we lose."

When you think about it, that's a pretty sobering comment to an audience whose jobs are inherently dangerous and require mass quantities of instantaneous judgment. But "human factors" have accounted for an average of about 69% of aircraft-related mishaps across the past ten years, with approximately 54% of the human factors aircraft-related mishaps involving errors in judgment. With this one item (judgment) identified as one of the most frequent causes of aviation mishaps, can we regulate it to decrease the number of incidents?

Webster's defines judgment as "The ability to make a decision or form an opinion by discerning and evaluating ... The capacity to make sound and reasonable decisions: good sense." I especially like the part about "good sense" because it seems to be lacking in people at times. But what this definition doesn't explain is how one goes about acquiring good sense or judgment. This is because judgment isn't some-

Illustration by Dan Harman

thing that can be taught through a definition, textbook or even a cookbook!

Judgment is a cognitive skill, learned during the on-going process of education and experiences throughout one's life. The Air Force mentors us by providing technical training courses to advance our knowledge and establishing upgrade programs to advance our skills. This, combined with experience developed over time, is designed to improve your judgment ability.

However, experience alone is not the sole qualifier for judgment. Everyone has seen an example of a highly experienced person making a poor judgment call. Numerous mishap reports and "There I Was" stories talk about pilots with "thousands of hours" or "doing it a hundred times before," making a bad decision. Or, on the other hand, a young second lieutenant making an input to the crew during a critical situation and saving the aircraft.

So this brings us back to the original question: Can judgment be regulated? The Air Force makes a valiant attempt to regulate judgment through written restrictions, operating instructions, and technical manuals, but does this really "regulate" judgment? Can it?

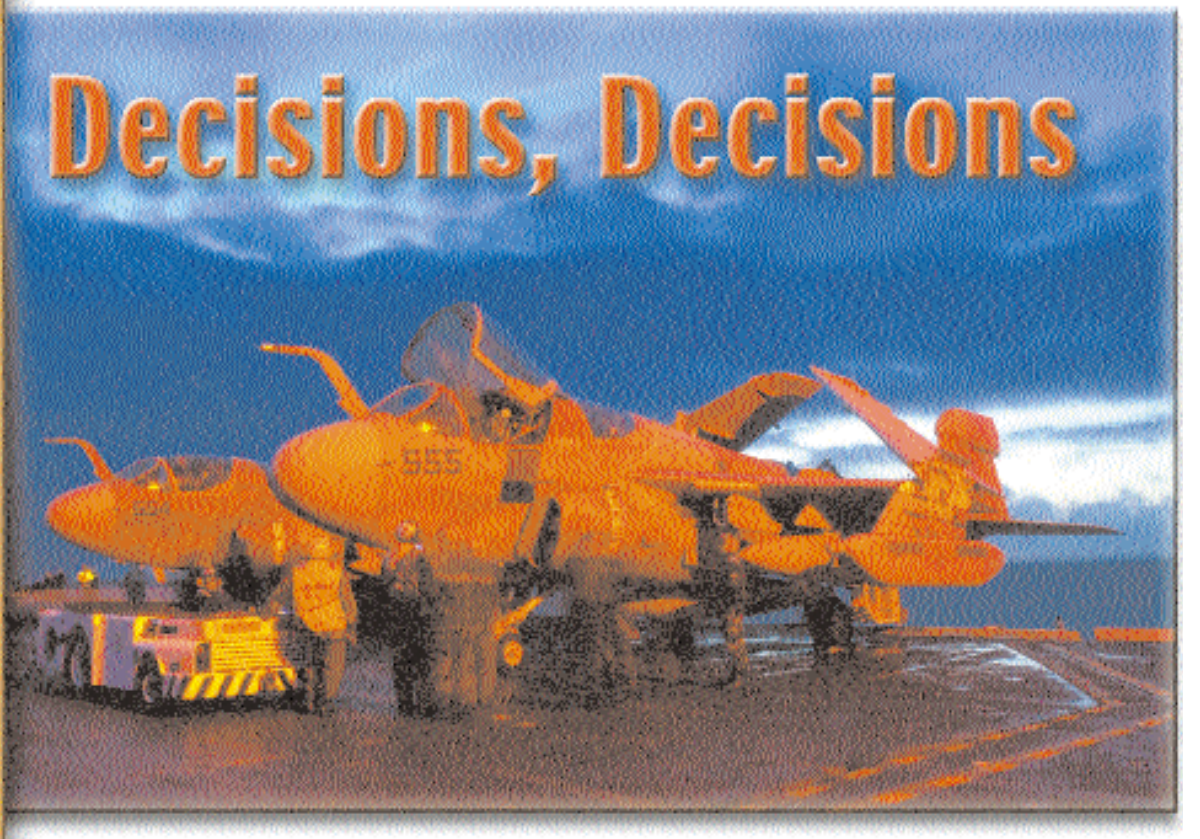
Taking a consensus of experienced pilots, it can be said that judgment can't be regulated. So why do we have all those written restrictions and operating instructions? The best way to look at it is to view regulatory guidance as parameters, established to limit our choices that directly influence our judgment. In other words, until you acquire that breadth of experience over time that is helpful in developing judgment, the regulations and instructions are there to aid you and give you guidance. Even after you have developed a wealth of experience, the regulatory guidance is still there when you need it.

It's like a flow diagram kept in your head that you review each time a decision is made. By knowing what is legal, what the capabilities of your aircraft are, and what your personal limits are, you can more effectively make a good judgment decision when presented with a situation. Over time, the decision process becomes more intuitive as your experience builds, until one day you graduate from the "school of hard knocks" and are awarded a degree in "judgment."

After you acquire what you think is judgment, keep this quote by Mark Twain in your hip pocket for those times when you're just not sure which way to go: "It is better to be careful a hundred times than to be killed once." In other words, taking the safer course of action most likely will keep you out of trouble during those times when things just aren't going your way. So continue to build your judgment, work on your knowledge and fly safe!

Until you acquire that breadth of experience over time, the regulations and instructions are there to aid you and give you guidance.

Decisions, Decisions



US Navy Photo by Photographers Mate 3rd Class William K. Fletcher

Just as we closed the checklist, the Stab Aug failed, causing the jet to lurch to the left.

LCDR PAUL JENNINGS, USN
VAQ-134

It wasn't any big deal, really. But when it was over, I was amazed at how many decisions my crew and I were faced with in handling a routine malfunction during a routine Operation Southern Watch (OSW) flight. I thought it worthwhile to jot them down so that you, the "armchair quarterback," could look at our experience and decide, (1) "What a bunch of idiots," or (2) "What amazing American heroes."

The squadron was two weeks into its 90-day deployment, flying out of lovely Prince Sultan Airbase (PSAB), Kingdom of Saudi Arabia, with the USAF's 363d Air Expeditionary Wing. The turnover had gone well with the outgoing Prowler squadron and we were quickly settling into the OSW routine. My crew and I were on our fourth flight into "The Box," Iraq's Southern no-fly zone. With about 15 minutes left to cover in the vulnerability window, I noticed the left combined hydraulic pump reading almost zero PSI.

Decision 1 was easy: Turn south *now*. As we proceeded to the Saudi/Iraqi border, we contacted the AWACS, told them our problem and asked for weather at the primary divert field. Al Jaber in Kuwait. AWACS reported it as two miles visibility, with blowing dust. During our two short weeks in the desert, we'd all gained a healthy respect for how quickly a 120-degree bright and sunny day could go to 1/4-mile visibility on the deck due to blowing dust—sort of a "chocolate milk" bowl effect.

Decision 2 reared its ugly head: Where do we land? Al Jaber was only about 60 NM away, and we had 6000 pounds of gas. Easy to make that, but what about that weather? PSAB was calling sky clear with visibility unlimited, but it was about 45 minutes away, and a fight with the KC-135 stood between us and PSAB. We were now at the border and entering the tanker tracks. We'd completed the checklist for loss of a single hydraulic pump; no real guidance there, other than "land as soon as practicable." Just as we closed the checklist, the Stability Augmentation System failed, causing the jet to lurch to the left. I trimmed the rudder to center the ball, tried re-engaging Stab Aug and got the same results as it immediately clicked

off. Hmm…plugging the KC-135 without Stab Aug didn't really appeal to me, so Al Jaber was looking more and more likely.

Now, as the OpsO and ASO, I'd always preached to leave external issues out of the cockpit when flying, but I couldn't help but think of the logistical nightmare of having a jet (or possibly two, since our wingman was dutifully following along) stuck in Kuwait and missing future OSW sorties as a result. I was still waiting for the other combined pump to fail, as is the norm for the Prowler, making the divert decision easy, but so far no "luck."

I spotted our tanker about seven NM away and was faced with Decision 3: Should I try tanking without Stab Aug? I decided to go ahead and give it a try, and if the tanking went OK, Decision 2 would be easier—we'd head to PSAB. As I lined up behind the basket, the thought ran through my head that I should let my wingman tank first so if I ended up wearing the basket, at least he'd have his gas and could get to PSAB. Decision 4: Do I back off the tanker and let him go first? One look at my fuel quantity at 5000 pounds made me decide to go first. If that other pump failed, I'd be looking at a fairly lengthy checklist to get the jet dirty via the backup methods and would need the extra gas. Also, the thought of multiple approaches at Al Jaber due to the poor visibility came to mind.

After a few stabs at the basket, we were in and taking gas. OK, things were looking up. We took about 7000 pounds, pulled out, let the wingman fuel up and proceeded south toward PSAB. The lone combined system pump was hanging in there like a champ, and the flight system was going strong as well. A visual check by our wingman didn't reveal anything leaking, smoking or otherwise unusual about the exterior of our jet, so we all breathed a little easier. About that time, the Mission Commander piped up from the back seat that we should call the Supervisor of Flying (SOF) and advise him of our situation. We Navy guys aren't used to using the SOF, but he's a great asset—kind of like a CATCC rep for the whole base.

We contacted the SOF and told him our situation and to expect a short field arrestment. He immediately got the wheels in motion and set up holding and tanking for the rest of the OSW package so we could get in first. The prescribed corridor leading from Iraq to PSAB was taking us east of the field to avoid Dhahran's airspace. I figured I didn't need any undue delay, so we elected to play the 7700 card to get priority handling direct to PSAB. It worked. As we approached the field, ATC descended us and set us up for a PAR. Once level at 5000 feet, with our wingman observing, we dirtied up. The lone combined pump strained under the load of the gear and flaps coming down, but sprang back up to 3000 PSI once everything was down and dirty. We detached the wingman for his own approach and completed our landing checklist.

Decision 5: Even though things were looking good, do we take the trap as a precaution? With all of OSW waiting to land behind us, I decided to leave the hook up and advised the SOF of our plan. I'd seen pumps fail on touchdown before, so was watching closely as we landed, to see how things went with our ailing hydraulics. If the pump did quit, I'd lose normal brakes and have to go to the aux system. Fortunately, things went in our favor. We full-stopped, taxied clear of the runway, met the armada of USAF emergency vehicles and had our gear pinned before taxiing back to the line.

In retrospect, the most conservative route would have been to head for Al Jaber and take a trap. We did neither. All's well that ends well, right? Sort of. While what we did was perfectly legal and fully discussed and agreed upon amongst the crew, nobody would have faulted us for ending up in the arresting cable in Kuwait. Of course, had we ended up with a souvenir KC-135 basket on our probe or, worse yet, in our ejection seats 100 miles from PSAB due to some catastrophic hydraulic failure, we'd have been the subject of a Grandpa Pettibone article in no time—"Gol' dangit, what were those guys thinkin'?"

We are paid to make decisions based on our training and experience every time we man up an aircraft. We made ours, but I'll leave it up to you to decide what you would have done in similar circumstances.

If the pump did quit, I'd lose normal brakes and have to go to the aux system.

Can You Teach Common Sense?

MAJ KURT J. SALADANA
(CANADIAN AIR FORCE)
HQ AFSC/SEFF

When reviewing aircraft mishaps, we at the Safety Center are constantly amazed by the actions of the people involved. Almost without exception, somebody in the sequence of events did something so illogical or made a mistake so basic that it's hard to believe. Since the purpose of a mishap investigation is to determine why an accident occurred and then propose methods to prevent the same mistakes from happening again, it falls upon the mishap investigators to come up with appropriate recommendations.

In cases where a mishap occurred because somebody in the sequence of events didn't do his (or her) job, or did something illogical, an investigator's first impulse may be to include a "do your job" or "use common sense" recommendation. Since the Air Force already expects its people to do their jobs and use common sense, recommendations like that are "unacceptable" and never proposed. However, sometimes people didn't "do their job" because training, training publications or directives were inappropriate or incomplete. If that's the case, then mishap investigators will recommend changing training or the associated publications and directives.

When a failure to use common sense is identified, there isn't much anyone can do because, as the cliché goes, "You can't teach common sense." This might be true, but you can present people with examples of the use of common sense and hope that something "clicks" in their brain. At the very least, you can hope they won't repeat someone else's bad decision. The following is a test, using examples of common sense decisions taken from aviation mishaps worldwide. There are undoubtedly better answers for some of the choices available, so pick the one that best demonstrates use of "common sense."

Sometimes people didn't "do their job" because training, training publications or directives were inappropriate or incomplete.

1. You must abort for a mechanical problem during take-off roll. According to the Dash-1, based on your aircraft weight and the speed your aircraft attained, you'll almost certainly end up with hot brakes. Do you:

a. Taxi off the runway and conduct normal post-landing checks?

b. Troubleshoot the mechanical problem that caused the abort while taxiing back for another take-off attempt?

c. Tell the tower that you may have hot brakes and proceed directly to the hot brake area?

2. During a routine peacetime training mission in the CONUS, your wingman has an engine failure and ejects. While performing SARCAP, do you:

a. Fly as low and as slow as possible over his PLF (Parachute Landing Fall) location to ensure he's okay?

b. Stay on scene, even though another aircraft with more fuel is overhead?

c. Recognize that you've just been involved in a mishap, mark the position and hand off SARCAP duties to the first capable aircraft and crew that arrives on scene?

3. Your single engine fails. You're below the minimum airstart altitude, below the minimum recommended ejection altitude and there's no suitable landing area within gliding distance. Do you:

a. Attempt multiple engine restarts?

b. Delay ejection until you get ground rush from the three-foot high corn in the field around you?

c. Zoom, point the aircraft toward an uninhabited area and eject?

4. During takeoff and climb-out, your fly-by-wire aircraft is struck by lightning. You saw the flash, felt the strike and are sure that you were hit, but all aircraft systems appear to function normally. Do you:

a. Continue the flight because the aircraft seems okay, the mission took a lot of planning and this flight will be your only one for several weeks?

b. Immediately declare an emergency, perform a teardrop and land opposite direction on the take-off runway?

c. Inform ATC and the SOF that you were likely struck by lightning, then request clearance for approach and landing with vectors around any detected weather?

5. Your single-engine, ejection seat-equipped aircraft has a recent history of frequent compressor stalls. On climb-out, you hear a loud bang that sounds like a compressor stall. Do you:

a. Immediately go into the compressor stall critical action procedure while entering a turn to dumbbell back and land opposite-direction on the active runway?

b. Eject, because you're below both the minimum airstart altitude and recommended ejection altitude?

c. Assess engine instruments and available thrust first, because that loud bang may have been something besides a compressor stall?

6. You've been flying nighttime missions for a few days and know you're fatigued. During yet another "O'dark-thirty" mission, you have to fly an approach into an aerodrome serviced by an ILS on the active runway. You're on an IFR clearance, the weather is VFR and you have the runway in sight from thirty miles away. You decide to save time. Do you:

a. Cancel and proceed VFR-direct to a point on the extended centerline of the active runway while descending on a visual glideslope?

b. Ask to shoot a VFR approach to the opposite runway because it's closer and will save even more time?

c. Request a visual approach and proceed directly to a point on the extended centerline of the active runway that lets you maintain the ILS on course and glideslope?

7. During a routine fighter-training mission—which happens to be at night over a large body of cold water—you collide with lead, who ejects. Your aircraft handles unusually. Another two-ship of fighters arrives in the training area moments later. Do you:

a. Immediately assume SARCAP duties even though it's dark and you didn't see lead after the midair?

b. Immediately perform a controllability check to see if you can stay and carry out SARCAP duties?

c. Immediately—but gently—turn your aircraft toward the nearest suitable landing field, pass SARCAP responsibilities to the arriving fighters and delay the controllability check until you're "feet dry"?

8. During a night landing, you hit an obstacle. The obstacle breaches the fuselage and causes injuries to personnel on board, and it's apparent that both the undercarriage and rear of your aircraft have sustained serious damage. You don't know if fuel dump will work and there's a good chance you're leaking combustibles. Your aircraft is equipped with flares but, to make matters worse, these flares can't be jettisoned, only expended, and the dispenser is located in the area of known damage. What do you do?

a. Delay landing in an attempt to dump fuel and get rid of the flares (which will ignite when dispensed). (Delaying landing also means delaying medical treatment for the injured.)

b. Set up for the quickest landing possible, even though emergency response won't arrive before you're stopped.

c. Declare an emergency, proceed to the nearest suitable runway and plan to hold until ATC confirms emergency response is rolling and fire trucks will be

continued on next page

It's apparent that both the undercarriage and rear of your aircraft have sustained serious damage. You don't know if fuel dump will work...

standing by during the landing.

9. While performing cockpit checks on climb-out for a multi-ship ACT (Air Combat Training) mission, you discover your anti-G system isn't functioning properly. You decide to complete the sortie anyway to get the flying time. Do you:

a. Continue the briefed mission but resolve to limit yourself to no more than five Gs?

b. Fly a low-level navigation route and hit some "canned" targets along the way?

c. Return to base and shoot instrument approaches until the planned recovery time?

10. The type of aircraft your unit operates has a recent history of flight control problems linked to several mishaps, one of which resulted in fatalities. During flight, the control column on your aircraft binds and the trim wheel moves with no inputs from you or the copilot.

As the Aircraft Commander, what do you do?

a. Try to duplicate the problem again but, being unable to duplicate the problem, continue the mission with the intention of writing it up for maintenance to look at after landing.

b. Brief the rest of the crew on the problem, assign one of them to monitor the trim wheel and continue the mission.

c. Trim the aircraft manually until able to land at the nearest suitable aerodrome and file a flight safety report.

As the maintenance organization performing postflight maintenance, what do you do?

a. "CND" the write-up since you couldn't find anything wrong.

b. Remove and replace (or repair and reinstall) the item that checks bad.

c. Impound the aircraft, notify the SPO (System Program Office) of the problem, troubleshoot as directed and then send all suspect items to the SPO for thorough evaluation.

11. At one place in the directives/regulations, the pilot is directed to recover from a stall upon "any indication from a pre-stall warning device." However, in another place in the directives/regulations, the pilot is directed to recover "at the first indication of a stall," which the Dash-1 describes as "classic stall symptoms," like shudder, wing drop-off, altitude loss, etc. Attempting to become as proficient as possible flying your aircraft (one authorized to practice stalls), you decide to explore the stall envelope. Do you:

a. Enter a full, landing-attitude stall, below minimum stall recovery altitude and, since you're there anyway, choose to experience all of the symptoms of a full stall?

b. Enter a full stall well above minimum stall recovery altitude, but hold the stall until the aircraft departs?

c. Enter a full stall well above minimum stall recovery altitude, and initiate recovery immediately at the first "classic stall symptom"?

12. You're lead of a four-ship low-level, ground attack training mission and your target is located on an air-to-ground range. The threat scenario has the target well defended with handhelds and triple-A. Do you plan to:

a. Do a single-axis, trail attack, with minimum timing between weapons deliveries and all aircraft egressing on the attack axis, with deconfliction based on all players being exactly on-time and on-track?

b. Do a single-axis, trail attack, with minimum timing between weapons deliveries and all aircraft egressing on the attack axis, but tell all players to keep their heads up in the final phase of their attacks (when they will be concentrating on acquiring the target) to prevent a midair?

c. Do a single-axis, trail attack, with minimum timing between weapons deliveries, but have all players egressing away from the defenders axis of fire and rejoining outside of the threat area?

13. The scheduled mission is a night, NVG, four-ship fighter upgrade. The pilot upgrading is new, directly out of the schoolhouse. He has been assessed as "average," with degraded performance when heavily tasked. The planned mission involves taking off and climbing directly to hit a tanker, then going straight into a trail, high-altitude, high-angle weapons delivery, then maintaining formation position for several more bomb passes. There's no slack time built in for delays, and just enough time for an experienced, combat-ready pilot to complete all required checks between each phase of the sortie.

As the Instructor Pilot, do you:

During flight, the control column on your aircraft binds and the trim wheel moves with no inputs from you or the copilot.

a. Recognize the mission is extremely demanding but, since it's the same profile all upgrade pilots fly and nobody has gotten hurt yet, treat the sortie as "routine"?

b. Recognize the mission is extremely demanding and spend extra time with the upgrade pilot to ensure he's aware and well-prepared for the intensity of the profile?

c. Recognize the mission could likely overtask the upgrade pilot, get the appropriate supervisors involved with a risk assessment and possibly alter the profile and upgrade pilot syllabus?

As the upgrade pilot what do you do?

a. Recognize the mission is extremely demanding but, since it's the same profile all upgrade pilots fly and nobody has gotten hurt yet, treat the sortie as routine.

b. Recognize the mission is extremely demanding and request extra assistance from your IP to make sure you're thoroughly prepared.

c. Recognize you're an integral part of the safety process—and besides, it's your life at stake—and approach an appropriate level of squadron supervision with your concerns about the planned profile.

14. It's Friday and you've just completed turnaround at a civilian airfield on the first leg of a weekend cross-country trip. On engine start, your aircraft ingests a pair of ear defenders from the civilian ground crewman who was acting as fireguard. You shut down and pull the mangled ear defenders from the front section of the engine and inspect the intake and blades for damage. Since you see nothing amiss, what do you do?

a. Start up again and, since there are no indications of a problem with the suspect engine, continue on to your destination and spend the weekend there. RTB Monday morning but don't submit paperwork on the incident because the engine ran fine and you don't want to waste the time of the FSO or maintenance.

b. Start up again. You see no indications of a problem with the suspect engine, but since you don't feel comfortable flying it for several more hops, you RTB and then write up the aircraft for possible FOD.

c. Call home, tell them what happened and wait for qualified maintenance personnel to inspect the aircraft so they can advise on a correct, safe course of action.

15. You're flying a routine air combat training mission and have ended up in a turning fight with a similar aircraft. In the middle of a slow-speed scissors, the other aircraft calls "Blind" just as you take your eyes off him for a second to check your fuel state. When you look back out to his expected position, he isn't there. You do a quick scan and don't see him, but you're certain because of the geometry he's going to kick out towards your front left at about 3000 feet if you continue flying a shallow right turn. Do you:

a. Delay calling "Blind" and instead call, "Continue," because you have good situational awareness?

b. Call "Continue," then count "One potato, two potato" and reverse your turn, because this exact same situation has let you get a good guns shot on dozens of occasions before?

c. Call, "Blind. Knock-it-off!" then call your altitude and maneuver away from the other aircraft's called position?

16. You're flying an aerobatic training mission with a student pilot. You've been working above a cloud layer topped at 12,000 feet for about 15 minutes. When you came out to the area the clouds were based at 9,000 feet. There are other aircraft working in the same area both above and below the clouds. Coming off of a vertical maneuver the student puts you into the clouds. Do you take control of the aircraft and:

a. Pull to dive the aircraft in the pure vertical to ensure that you get out of the clouds as fast as possible, even though there's a good chance you'll exceed the aircraft's maximum speed restriction and you no longer know if the cloud is still based at 9000 feet?

b. Put the aircraft into a spin because it's a controlled maneuver that will permit you to stay in a small airspace while keeping your airspeed under control and giving lots of time to recover upon exiting the cloud base?

c. Roll out, transition to instruments, transmit your position on Guard and, if able, get an ATC clearance to avoid any conflicting traffic? Or, if unable to talk to ATC, climb at your best sustainable rate until clear of the cloud?

17. You've just ejected from your aircraft and have more than adequate time

continued on next page

On engine start, your aircraft ingests a pair of ear defenders from the civilian ground crewman who was acting as fireguard.

you notice that the gun lubrication line is disconnected and there's no way to tell how long ago it came off.

hanging under the parachute to go through all of the post-ejection and PLF considerations. All the training you've received and all pertinent publications say to discard your oxygen mask. Do you:

a. Tuck it inside your vest and risk breaking your ribs because the mask will make a cool souvenir?

b. Leave it connected to your helmet, because you'll re-don it just before ground impact to prevent getting your face scratched by the cacti and other prickly vegetation on the desert beneath you?

c. Do as you've been trained and discard the mask?

18. You and a coworker are doing some maintenance out on a weapons range. You hear two loud bangs, look up, and see two parachutes in the distance. You and your partner both have current first aid and CPR qualifications, so you hop into your four-wheel drive pick-up truck, turn on the range radio and start heading toward the chutes. It's taking some time to reach the downed aircrew and you hear on the radio that the nearby host base has launched a rescue helicopter with emergency medical response personnel on board. The helo's arrival time is about 15 minutes. You come upon a pilot standing and talking on a handheld radio and head toward him. When you reach him, he says that apart from a sore back and neck, he feels fine. He also says that his backseater, a student, is also okay, but he would like to get to him. Both aircrew members are aware that a rescue helo is only 10 to 15 minutes away. The temperature is over 110 degrees. What do you do?

a. Tell the pilot to jump in the back of the truck and then proceed to bounce over the dunes until you reach his backseater.

b. Squeeze the pilot into the passenger compartment of your truck, then proceed to bounce over the dunes until you reach his backseater.

c. Leave your partner and some water with the pilot and let them wait for the rescue helo. In the meantime, you proceed to the backseater's location, provide him water and wait with him until the helo arrives with medical personnel who'll take proper spinal injury prevention measures before transport.

As a pilot involved in this scenario, should you:

a. Pick up your radio and water and head toward your crewmate?

b. Insist on driving over to pick up your crewmate once the range truck arrives?

c. Decide against doing anything that could result in serious spinal injury? Knowing your crewmate is okay and the rescue helo will arrive shortly, you ask the guys in the pick-up truck for some water and make yourself comfortable until medical personnel can reach you.

19. One of the unit's aircraft RTBs with a jammed gun. You're the on-scene Maintenance Supervisor. For the type of jam experienced, applicable work cards and tech data specify that maintenance by a two-person team is required and the gun must be removed from the aircraft. What do you do?

a. Since you're experienced and know that one person can clear this type of jam with the gun still in the aircraft, dispatch a lone, somewhat experienced technician to do the work.

b. Dispatch two technicians, per tech data, but decide it's okay for them to work on the gun while it's still installed.

c. Follow tech data by assigning two technicians to remove the gun from the aircraft for in-shop repair.

You are the lone technician assigned to clear the jam while the gun is still installed. The Maintenance Supervisor was correct and the jam did clear easily. However, you notice that the gun lubrication line is disconnected and there's no way to tell how long ago it came off. Being conscientious, you check tech data, but find nothing pertaining to this situation. Do you:

a. Reconnect the lube line, top off the lubrication reservoir and then empty almost five gallons of lubricant into (or onto) the gun using a lube gun and a brush?

b. Spin the gun manually to see if it's binding?

c. Go directly to the gun shop supervisor and ask for direction?

20. You're a great pilot, universally respected for your ability to fly the aircraft to its limits. Coming off the perch for the final turn to land, you recognize that you're a little hot and a little tight. You also realize that you incorrectly

assessed the winds and they're pushing you even tighter to the runway. What do you do?

a. Max-perform the aircraft and hold it in the stall-warning regime all the way through the turn to make the runway.

b. Having pulled too hard and entered a full stall, do everything perfectly to immediately break the stall, then roll right back into the turn and pull to make the runway.

c. Roll out, tell tower you're flying through and live to fight another day.

21. There have been a series of mishaps involving a malfunctioning system on the Mishap Design Series (MDS) aircraft assigned to your organization. You've been given six months to discover the reason for the malfunctions but, at the end of that period, have been unable to pinpoint a cause. What do you do?

a. Report you've studied the problem exhaustively, found no cause and decide there's no cause for concern.

b. Report you've studied the problem exhaustively, found no cause for the malfunctions and advise your operators to be careful and watch out for system malfunctions.

c. Request a time extension and additional resources with the intention of broadening the depth of the investigation. Advise your operators to devise methods to recognize and counter system malfunctions before they can become critical.

22. You're a flying unit supervisor reviewing the day's flying schedule. One of the scheduled pilots hasn't flown for several months because of leave, medical reasons and some family problems. He has just managed to maintain his currency and is scheduled for a four-ship, night, NVG training mission that will entail multiple weapons deliveries in a moderate threat environment. This type of mission is one of your favorites because you find it challenging. Do you:

a. Sign off on the schedule?

b. Talk to the pilot with the lack of recent flying time and see how he feels about his ability to handle the mission?

c. Reschedule the pilot with the lack of recent flying time until he's once again ready to do the challenging missions?

23. There's a lot of talk in your MDS's community about how often a flight-critical piece of equipment fails, particularly in flight. There have been several maintenance discrepancies recorded on the problem but very few flight safety reports. During a routine flight, the subject piece of equipment on your aircraft fails but, because of weather conditions, has no impact on the outcome of the mission. Prior to landing, the problem clears itself. After landing, what do you do?

a. Take no action because you know maintenance will be unable to duplicate the problem.

b. Write up the discrepancy for maintenance to evaluate and then go off to debrief the mission.

c. Write up the discrepancy for maintenance to evaluate, and file a flight safety report.

24. Which of the following is considered "aircraft servicing," and not "aircraft maintenance"?

a. A tire change.

b. A battery change.

c. Replenishing liquid oxygen.

25. You're RTBing through weather and the latest report from tower has the runway wet with possible standing water. You've done almost all of your training in good weather and never landed in possible hydroplaning conditions before. What do you do?

a. Land long, past the area where you expect water to pool. Carry a few extra knots so you don't touch down early, then land softly to prevent losing control and delay braking until you're past all of the paint and rubber deposits.

b. Land on the threshold and get on the brakes as hard as you can.

c. Land firmly in the normal touchdown zone to get rid of some energy. Then, apply normal braking and anticipate putting the hook down just in case you need to take the cable.

How did you do on this test? Well, if you answered anything other than "C" for any of these questions, you need to review your Dash-1 procedures and/or talk to your unit FSO. Not everyone will use his or her best judgment in every circumstance, particularly when responding to an emergency. In all fairness to the people involved in these mishaps, almost every one of them has occurred in almost exactly the same way on numerous occasions. Hopefully, exposure to others' mistakes will help you to avoid repeating them. Fly Safe!

Not everyone will use his or her best judgment in every circumstance, particularly when responding to an emergency.

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

A Tale Of Two Tree Surgeons

The Piper Arrow mishap aircraft (MA) belonged to the local Aero Club, and the sortie was planned (and flown) as a pre-check for private pilot fixed wing certification. The mishap student pilot (MSP) held a commercial helicopter pilot rating, but had comparatively little fixed wing time. On the other hand, the mishap instructor pilot (MIP) had several thousand hours fixed wing time.

The MSP and MIP departed the home field and flew to the work area to practice maneuvers. Once done there, they flew to a nearby airfield to run through forced landing procedures. Once there, limited lighting and the snow-covered airport surroundings combined to give the terrain a featureless appearance. (Do you hear that voice? "Danger, Will Robinson, danger!")

The flight proceeded normally through downwind. The MSP extended the gear, turned base with the intent of touching down in the first third of the runway and proceeded to fly a flatter-than-normal no-flap approach to Runway XX. Evidently, both aviators were focused mightily on the touchdown point, since neither one of them took action to avoid the treetops, which their trusty Piper Arrow dutifully chopped through. The crew initiated a go-around and headed for the home field, where postflight inspection revealed wing dents and assorted treetop parts lodged in one of the main landing gear wheel wells.

Treetop damage cost? *Inconsequential (unless you can put a price tag on the rattled nerves of the birds dwelling therein).* MA damage cost? *Less than one thousand dollars.* Cost of lessons learned by the MIP and MSP that will last a lifetime? *Priceless…*

"I Hate It When THAT Happens!"

The C-5 mishap loadmaster (ML) in the troop compartment was preparing for passenger departure. Once the high stair vehicle was in place, the ML opened and secured the No. 6 service door, unbuckled the emergency escape slide case and removed the pins securing the girt bar. He then rotated the slide case onto its side and proceeded to push it into its stowage area between the seats and fuselage.

If you're not acquainted with the C-5, the No. 6 service door is aft of the wings and about 30 feet above ground level. Taking into account that the emergency escape slide, when activated, extends diagonally from the fuselage some considerable length greater than thirty feet, you can bet your bottom dollar that inflating it *inside* the troop compartment could be characterized as an event that would be beyond "mildly interesting."

The ML had moved the slide case halfway into position for stowage, when there was a small "Pop!" and the slide started inflating, half in and half out of the case. The ML cleared himself and the ready-to-deplane passengers from the area of the inflating slide to prevent injury; however, since the slide wasn't fully deployed from the case, a seam

burst and it never reached anything near full inflation. Damage was limited to the slide, slide case, some troop compartment interior trim panels and the adjacent seat assembly.

When handling escape slides, *be alert* to exposed portions of the pull cable assembly and *be careful*, or you, too, may find yourself mortified and lamenting, "I hate it when THAT happens!"

Pop-Top Warthog

Mission planning, preflight, engine start, launch, takeoff and departure for the sortie were uneventful. Forty minutes into the sortie, the A-10 Thunderbolt II mishap pilot (MP) entered the designated MOA and initiated a climb to accomplish an advanced handling characteristics profile.

In accordance with the Dash-1, the MP proceeded to preheat the canopy using the defog knob while passing 15,000 ft MSL. Defog system noise was bothersome, so the MP rotated the defog selector to off. There was a hissing sound, so the MP rotated the defog knob to mid-range then off again, when it happened. "It," was a loud "Bang!", followed by wind blast, dust and debris swirling around within the cockpit and then…departure of the canopy.

The MP lowered his seat and reduced airspeed to minimize effects of the windblast, coordinated for a chase ship, performed a controllability check and diverted to the nearest suitable airfield, where he safely landed his convertible Warthog. Kudos to the MP for so coolly and skillfully handling the inadvertent canopy departure *and* saving this valuable combat asset so it could fly and fight another day! Subsequent investigation determined loss of the canopy was largely attributable to material failure.

1 V 1: Eagle Vs. Turkey Vulture

The mishap aircraft (MA), an F-15E, was No. 1 of a two-ship low level, surface attack tactics sortie. Following target attack, flying at the crest of a ridge line at 490 knots and 710 ft AGL, the Strike Eagle suffered a bird strike to the left wing. The mishap crew (MC) called a "Knock it off" and the MC's wingman conducted a battle damage check. The MA was controllable and there was no fuel leaking, but the aircraft had sustained a sizable hole in the leading edge of the left wing. The two aircraft headed for home station and landed uneventfully.

The mission had been planned in accordance with current directives and using the US BAM (Bird Avoidance Model). The local unit's BASH (Bird / Wildlife Aircraft Strike Hazard) plan allows aircrews to fly to 500 feet AGL in bird risk forecast conditions from "Low 1" (140 ounces / square kilometer) to "Moderate 1" (6181 ounces / square kilometer), and forecasted bird risk in the strike area for this mission was "Moderate 1."

Review of the flight's film showed a single bird visible in the HUD video one second prior to impact. The bird, a turkey vulture, had punched a 4 X 8 inch hole in the leading edge and exited the bottom side, 5 inches aft of the entry hole. Turkey vultures are typically fair-weather, solitary, birds of prey found in thermals, circling and searching for food. Conditions at time of this strike were daylight, CAVU. Of note, this particular bird strike occurred on the lee side of a ridge, with no obvious thermal currents and no nearby landfills.

Which just goes to prove that while careful planning is always important, and the US BAM is a great predictive risk tool, it's just that: predictive risk. Birds don't have to play by the rules, but you should.

Aircraft damage cost? More than $114 thousand, the cost for replacing the entire left wing.

Beatin' Up On The Boomer!

There they were… A KC-135 and a KC-10, conducting aerial refueling operations with the KC-10 as receiver. Following initial contact, the KC-135 directed the KC-10 to the pre-contact position to ride out some light turbulence.

It was a short, but wild—and painful—ride. Soon after, both aircraft experienced clear air turbulence of sufficient intensity that the auxiliary boom operator, situated in the instructor boom position, was thrown about. *Hard.* Hard enough to suffer an arm injury that rendered the boomer incapable of performing in-flight duties. Subsequent exam by the flight doc revealed good cause for the boomer's arm to be useless: The radius bone had been fractured at the elbow.

What's the lesson here? A KC-135 boomer can't strap in to prevent getting bounced around, and we don't yet have the technology to predict or avoid clear air turbulence. Maybe the most important thing to pass along to boomers would be something you've heard before: At the first indication of turbulence, always hope for the best but prepare for the worst and—*hang on!*

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

This Falcon Has Impaired Vision

The Nov 00 edition of Maintenance Matters led off with a piece on the damage visited on an F-15 canopy during lifting operations. Here's one more canopy-involved mishap short—this time from the F-16 community and considerably more costly—whose knowledge may preclude you from having a similar mishap (and reading about yourself in this column one day).

The crane operator was certified and qualified to operate it and the Egress maintenance team was fully task-certified. The team had already used their Lorain crane to install an ejection seat in the D-model Falcon, and was now ready to install the canopy.

One of the team members attached the canopy sling assembly to the crane hook, the crane operator swung the boom over to a position directly above the canopy trailer and the same team member then mated the sling to the canopy attachment points. Proper tag lines were attached and the crane operator started raising the boom to lift the canopy from the trailer.

The crane operator raised the 400 lb. canopy to a position about 20 feet in the air and was swinging the boom toward the aircraft when—*Sproing!*—a four-foot section of the wire rope supporting the sling and canopy broke. The canopy impacted the forward fuselage on the Falcon's left side, then the railing on a B-1 maintenance stand before falling to the ramp with considerable force. Ultimately, the $178,000 canopy was scrapped. Luckily for all concerned, the area under the canopy was clear of people, so there were no injuries.

The Lorain crane tech order—T.O. 36C3-5-15-1, *Operation, Maintenance And Overhaul Instructions with Parts Breakdown, Rough Terrain Crane Model LRT 100 (Koehring) (Commercial Manual)*—contains specific before-use inspection guidelines. However, in this case, the crane T.O.—and the included inspection procedures—was maintained by, and in the possession of, the local Transportation Squadron. In other words, it wasn't available to those who regularly used the crane.

In addition to equipment-specific tech data, it's also worth re-stating what was said in the Nov 00 F-15 Maintenance Matters short: "If your job requires you to operate a crane, whether it's for hoisting canopys, engines, propellers or other equipment, protect yourself and your coworkers by knowing the procedures and rules found in AFOSHSTD 91-46, *Materials Handling and Storage Equipment* (as of this writing, the latest edition is dated 1 Feb 97). Don't have a reference copy nearby? It's available for viewing (and downloading) on the web at the Air Force Publications website. Complying with AFOSHSTD 91-46 guidelines not only ensures that your hoisting operation is safe; it also sets the stage for a safe hoisting operation for the team that'll be using the crane after you're done with it."

Bottom Line: If you depend on special equipment to get the job done, are you aware of and in compliance with tech data-specific inspections/procedures? If you can't answer that question with a definitive "Yes," then it's just a matter of time until your unit experiences its own mishap.

"May I Take Your Jacket, Sir?"

The Maintainers were doing a high power ground maintenance run for troubleshooting and had just throttled the engines back to 70 percent for cool-down. The ground man, in communication with the run man through a 50-foot comm cord, was walking from around the left wing toward the nose to check pitot heat and inadvertently placed himself within the intake danger zone. Not for long, mind you, but long enough. Engine suction caught his jacket and ripped off the bottom portion of it, along with one jacket pocket and its contents: a glove and a robust metal bolt. The run man, noticing his ground man was in trouble, immediately shut down both engines. The ground man was shaken, but otherwise okay.

Big losers? The ground man's jacket. *And* an engine that took $77,000 to repair. "Maintain Situational Awareness (SA)" is something aviators hear an awful lot. Maintaining SA is essential for survival for Maintainers, too, particularly when working around powered hydraulic systems, energized circuits and running engines.

When Good Intentions Backfire

The A-10's mishap engine had a generator malfunction. Once completed with the generator maintenance, preparations were made for a ground maintenance run to perform the required operational checkout. An engine run was *attempted*. Subsequent TEMS (Turbine Engine Monitoring System) readouts later indicated the engine had over-temped for more than 40 seconds during the unsuccessful engine start, necessitating replacement of the low-pressure turbine (LPT) rotor, LPT stator, high-pressure turbine (HPT) rotor, stage one nozzles and "numerous bearings and seals." Dollar cost? More than $355 thousand.

In order to prevent potential FOD from entering the engine while performing maintenance under the nose dome, the mechanics had installed an engine compressor cover. Isn't it ironic how all the best-intentioned FOD prevention efforts can, in an instant, be nullified by a momentary loss of Situational Awareness (SA)? Think about it.

Speaking of FOD...

The mishap aircraft flew its sortie, landed Code 1 and taxied to parking. Once in the chocks, and after accomplishing pre-shutdown checks, the Maintainer signaled the pilot to commence the engine shutdown sequence. The pilot selected cutoff, the Maintainer approached the NLG to begin postflight maintenance and... promptly had a piece of personal gear sucked into an engine intake, causing nearly $500 thousand engine damage.

It's groovy to report the Maintainer escaped injury. But as this troop discovered, just because engines are spooling down doesn't mean the need for vigilance around intakes has passed. *Learn* from this mishap and keep yourself, your coworkers and *all* loose gear clear of intakes and exhausts whether engines are running, spooling up or spooling down.

FOD, 20/20 Hindsight and You

The mishap aircraft was positioned on the trim pad for maintenance that would be followed by a ground maintenance run. One of the assigned Maintainers removed his metal-frame spectacles while working and sat them on top of one of the intake screens—roughly eight feet above the ground and out of view. Once ready for the run, the intakes were inspected, the dolly-mounted intake screens were positioned next to the sides of the aircraft and the engines were fired up.

During the first—and only—engine run, the mishap engine (ME) made a loud "Bang!" and the engine run was immediately terminated. Quick look down the ME's intake revealed FOD damage to the front compressor blades. The aircraft was impounded and the ME removed, where teardown revealed that blades in all eight stages of the compressor—three first stage, 30 second stage, 50 third stage, 75 fourth stage, 80 fifth stage, 83 sixth stage, 78 seventh stage and 68 eighth stage blades—had sustained damage from a metal object.

Maintainers implicitly understand that one of the cornerstones of FOD prevention is accounting for all tools. What may not have received as much emphasis, but is just as critical, is ensuring you account for all other items—parts, tech data and personal effects—that don't belong, too.

FY01 Flight Mishaps (Oct 00 - Apr 01)

15 Class A Mishaps
3 Fatalities
11 Aircraft Destroyed

FY00 Flight Mishaps (Oct 99 - Apr 00)

9 Class A Mishaps
5 Fatalities
6 Aircraft Destroyed

04 Oct	♣✶	An RQ-1 Predator UAV crashed while on a routine test mission.
12 Oct	♣	An F-16C crashed during a routine training mission.
23 Oct	♣✶	An RQ-1 Predator UAV went into an uncommanded descent.
27 Oct		A KC-10A sustained Class A Mishap-reportable engine damage.
03 Nov		An F-15C experienced engine problems on takeoff. The pilot successfully RTB'd. Both engines sustained damage from FOD.
13 Nov	♣♣	Two F-16CJs were involved in a midair collision. Only one pilot was recovered safely.
16 Nov	♣	An F-16CG on a routine training mission was involved in a midair collision.
06 Dec	♣	A T-38A impacted the ground while on a training mission.
14 Dec	♣	An F-16C crashed shortly after departure.
12 Jan	♣	An A-10A crashed short of the runway.
09 Mar	✶	During a ground maintenance run a KC-135E's No. 2 engine suffered catastrophic damage.
21 Mar		An F-16B experienced a bird strike but recovered safely. A fire developed after landing. The aircraft suffered structural and engine damage.
21 Mar	♣	An F-16C experienced engine problems soon after takeoff and crashed.
23 Mar	✶	An RQ-1 Predator UAV experienced loss of control during landing and its landing gear collapsed. (Revised repair costs have resulted in this Predator mishap being downgraded to a Class B Mishap.)
23 Mar		A C-17A sustained Class A Mishap-reportable engine damage.
26 Mar	♣♣	Two F-15Cs crashed during a routine training mission. The pilots did not survive.
03 Apr	♣	An F-16CJ crashed while on a routine training mission.
04 Apr		An F-15E on a routine training mission recovered safely after sustaining a bird strike.
06 Apr		An F-15C experienced a hard landing and sustained Class A Mishap-reportable damage.

- A Class A mishap is defined as one where there is loss of life, injury resulting in permanent total disability, destruction of an AF aircraft, and/or property damage/loss exceeding $1 million.
- These Class A mishap descriptions have been sanitized to protect privilege.
- Unless otherwise stated, all crewmembers successfully ejected/egressed from their aircraft.
- Reflects only military fatalities.
- "♣" denotes a destroyed aircraft.
- "✶" denotes a Class A mishap that is of the "non-rate producer" variety. Per AFI 91-204 criteria, only those mishaps categorized as "Flight Mishaps" are used in determining overall Flight Mishap Rates. Non-rate producers include the Class A "Flight-Related," "Flight-Unmanned Vehicle," and "Ground" mishaps that are shown here for information purposes.
- Flight, ground, and weapons safety statistics are updated frequently and may be viewed at the following web address: http://safety.kirtland.af.mil/AFSC/statspage.html
- **Current as of 30 Apr 01.**

☆ U.S. GOVERNMENT PRINTING OFFICE 2001-673-404/53009

THE Well Done AWARD

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.

MSgt Chris A. Ader and
TSgt Joseph R. Hudson
33d Fighter Wing
Eglin AFB, FL

On March 8, 2000, MSgt Chris A. Ader and TSgt Joseph R. Hudson responded to a request for assistance on F-15 aircraft 80-0054 for a left main landing gear malfunction. Electro/Environmental personnel had retracted the gear in an effort to troubleshoot an indication problem and the left gear would not extend. After several attempts at normal and emergency gear extension, the Aero Repair and Reclamation shop personnel were called out to assist. MSgt Ader and TSgt Hudson arrived on the scene and determined the left main gear had extensive damage to the up-latch hook support bracket, aft door drive rod and forward door drive rod. They summoned the fighter squadron production superintendent, briefed him on the incident and recommended further inspection of other wing aircraft. When failed up-latch support brackets were discovered on two other hangared aircraft, this immediately became an item of very high interest. MSgt Ader promptly contacted Safety, Quality Assurance, Maintenance Squadron supervision and both fighter squadron maintenance officers. After a quick brief on the possibility of landing gear not extending in either mode with such a bracket failure, it was determined that this required urgent action. MSgt Ader personally recommended all aircraft be held from takeoff at end-of-runway and those in chocks hold until inspected. A quick inspection revealed eight cracked brackets. On MSgt Ader and TSgt Hudson's recommendation. the 33 FW proceeded with a one-time inspection of all aircraft, discovering a total of 17 cracked brackets, some nearly at the point of total failure. Had this item remained undetected there is a high probability that one or more of the 17 airframes would have had a major gear malfunction, possibly leading to a Class A mishap. MSgt Ader and TSgt Hudson assisted in authoring a CAF-wide High Accident Potential message which was immediately sent informing other F-15 units of the pending failures. After a conference call with engineering, depot, ACC and the CAF, a three-phase, worldwide Urgent Action TCTO was issued, undoubtedly preventing a number of mishaps.

MSgt Ader and TSgt Hudson's extensive knowledge, teamwork and decisive actions averted the probable loss of multi-million dollar aircraft and possible loss of life.

MESSAGE From the Chief of Safety

The following text originated in a message (DTG R 031104Z APR 01) from the USAF Chief of Safety, Maj Gen Timothy A. Peppe. Bottom line? We are all *responsible for preventing FOD.*

Foreign Object Damage (FOD)

1. FOD damage to aircraft has increased in the last 18 months. Since the beginning of FY00, the Air Force has experienced 49 Class A (damage greater than $1 million) and B (damage between 200,000 and $1 million) FOD mishaps at a cost of over $25 million. Many were the result of complacency or a lack of basic maintenance discipline. Two mishaps during this period involved individuals attempting to start engines with intake covers still installed—a clear violation of T.O. guidance and common sense. Loose personal equipment also accounted for two mishaps when a communication cord, and in a separate incident, an unsecured headset mouthpiece were pulled into running engines. In another, a tool was left in the engine cowling after maintenance, resulting in more than $1 million of damage. These last few examples of inattention demonstrate that a lack of situational awareness while operating in the vicinity of a running engine is always costly and could be fatal. While there are other examples of a lack of situational awareness during this period (including leaving a flashlight in an intake, not properly storing "Remove Before Flight" pins, etc.), the bottom line cost of these "asleep at the wheel" mishaps has been almost $9 million.

2. Another alarming trend is the increasing incidence of "undetermined" FOD events. In other words, the unit that submitted the report didn't know if it was a stone, bolt, or washer that caused the damage. This is alarming because if you don't know what caused it, you'll never prevent it. Arguably some sources of FOD can't be determined, but superficial investigations that only state "FOD was from an undetermined origin" without investigating the status of ramp/taxiway/runway condition, local FOD prevention programs, recent maintenance performed, etc., make it almost impossible to break the code on what's causing FOD mishaps.

3. Bottom line, some FOD mishaps are the cost of doing business—but most aren't! Increased vigilance not only when working around engines but when working on or operating them is paramount to bringing our FOD mishap rate down. More attention to potential FOD hazards while on the ramps and taxiways will do the same. Instilling a back-to-basics approach of strict T.O. compliance (Is the intake cover removed? Are the pins properly stored/secured?) will help reduce the unacceptable dollar cost of FOD mishaps. Not only are the dollar values high, but much of the FOD damage is preventable—damage that many times can go unnoticed until an aircraft is airborne when the results of the ingestion of a small stone off a deteriorating/improperly swept taxiway could be catastrophic. We need to get back to basics and make the effort to "break the code" on why FOD mishaps are occurring.

4. This is a joint AF SE/IL message.