Volume 3, Number 5 Fall 2010

WINGMAN

Airmen Taking Care Of Airmen

The United States Air Force Journal of Aviation, Ground, Space and Weapons Safety

Self-Aid in Space
The Ride of My Life
Lasers: Tools or Weapons
Respect the Great Outdoors

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Features

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Aviation

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Background photo: U.S. Air Force courtesy photo

Fall — A Time of Change

MAJ. GEN. FRED ROGGERO
Air Force Chief of Safety and
Commander, Air Force Safety Center
Kirtland AFB, N.M.

Autumn has always been a favorite time with my family. While summer gives us days of outdoor fun and sunshine, fall is a season of transition and joyous family gatherings. It also symbolizes a time of change and reflection. As I prepare for my upcoming change of command and retirement, I can recall countless days of fulfillment and challenges over the last 34 years of service. However, my time here at the Air Force Safety Center has, by far, been the most rewarding.

Keeping our Airmen safe is and has always been a top priority for the Air Force. Our efforts over the last year and a half have yielded tremendous improvements that translate into lives saved and resources preserved. FY09 was the safest flying year in Air Force history with aviation mishap rates dipping to 0.8 mishaps per 100,000 flying hours; we're on track to do even better this year. With 10 times as many deaths off-duty than on-duty, our Ground Safety Division dedicated themselves to protecting our Airmen whether at work or play. The result? The lowest Air Force off-duty fatal mishap rates on record for the 2009 holiday season and the 2010 Spring Spike Campaign, as well as the first fatality-free Memorial Day weekend in a decade! This year also marks the fourth fatality-free 4th of July weekend since we began keeping track in 2002.

The key to our success is truly engraining the safety message within our work force. It takes innovation and creativity to find the most effective ways to spread the safety message, and I believe we've proven that we can reach each and every Airman and their families. Our campaigns adhered tightly to the "Year of the Air Force Family" which embodies the premise that our loved ones have the power to influence our behaviors in positive ways. We have expanded our reach to the younger demographic through our "Airman-to-Airman" (A2A) Safety Council which capitalizes on the strength of peer influence. We recognize the rise of social networking as an ever-expanding movement and have focused our efforts on bringing safety professionals, fellow servicemembers and their families together through social media. While even one fatality is considered unacceptable, the numbers show that we're truly making a difference. And if we can prevent the suffering of just one family, then all of our efforts have been worthwhile.

Capt. James Bartran, left, from the 1st Reconnaissance Squadron, Beale Air Force Base, Calif., and Air Force Chief of Safety Maj. Gen. Frederick Roggero after a high altitude U-2S flight. Capt. Bartran demonstrated the complexities, hazards and advantages of the U-2S Dragon Lady. (U.S. Air Force photo by John Schwab)

I consider it a privilege and an honor to have served with the men and women of the Air Force Safety Center. As I pass the torch to Maj. Gen. Greg Feest, I wish him, his family and the rest of our safety professionals the best in the years to come. The dedication of the Air Force Safety Center and all Air Force safety professionals has and will continue to prove that "Air Force Safety is NO accident!" ★★

A2A: Recipe for Change

SENIOR AIRMAN JEDEDIAH D. SHERWOOD
48th Fighter Wing
RAF Lakenheath, U.K.

As an Airman in today's Air Force, there's a lot to concern ourselves with on a daily basis. With the ever-changing mission of the Air Force, it's no surprise that there's so much emphasis placed on training, deployments and career progression, as well as the off-duty things that help us all unwind from our hectic schedules. Travel, recreation, relationships and the like all help to keep us on an even keel and ensure we're refreshed and fully capable to complete our mission.

It seems that safety is one of the things Airmen think of least. Why is that? It may be because safety isn't fun; it's seldom fun to make smart decisions. There's a sheer lack of joy in going the speed limit or preparing maturely before a night out with friends. Why do we always want to test the limits of our capabilities and take that shortcut through life?

What does it take for us to open up our eyes to the error of our ways? A driving-under-the-influence charge? The loss of a stripe? Maybe the loss of a friend or loved one? How about a horrific, career-ending injury? Excuse me, but maybe we'd be happy if we were handicapped for life. Or, better yet, if we killed an entire family because of our reckless and risky behavior. Some of you reading this will be enraged — appalled that a fellow Airman would dare to write about killing families or friends.

But it happens. Every day an Airman somewhere makes an idiotic decision to drink and drive, speed or drive aggressively. Thousands of bad decisions are made at a moment's notice. The chore now is to recognize right from wrong and make the best decisions possible. We can't save everyone; however, with a little effort, proper planning and sheer common sense, we can save our friends, loved ones and that unknown family driving down the road.

What will it take for you to change?

WHAT WILL IT TAKE FOR YOU TO CHANGE?

Photo supplied by George Doyle/Stockbyte
Digital collage by Dennis Spotts

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JAMES JOHNSON
Chief, Analysis & Integration Division
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The Air Force Safety Center's Analysis & Integration Division, or AFSC/SEA, is on the leading edge of safety program evolution. Compared to 40 years ago when most safety programs got their start, the current Air Force is expeditionary in nature and highly mobile. The safety programs that support today's Air Force are modernizing to meet these portability needs.

AFSC/SEA promotes proactive mishap prevention and risk management practices through a wide variety of analysis support programs. All electronic data for each reportable mishap is managed through the Air Force Safety Automated System, or AFSAS. In the past three years alone, our Computer Programming Branch has acted on over 11,000 user feedback requests to fine-tune the AFSAS system. Our Analysis & Integration and Research & Epidemiology branches conduct thorough analysis of risk factors to create actionable strategies that senior leaders can adopt and not only fund, but justify the funding with results! Just within the past year, you can see this manifested by six articles published in the January 2010 issue of the *American Journal of Preventative Medicine* or the recently completed Remotely Piloted Aircraft-Safety Analysis Team, or RPA-SAT, study. When other Air Force organizations require highly specialized data mining support that cannot be met by AFSAS, we have a team of specialists who can perform the data queries necessary to support specialized studies and investigations.

Risk management is, and should be, a constantly evolving process. The Air Force chief of staff recognized the need for revitalization of the old Air Force Operational Risk Management Program. Instead of freshening up old materials, the division's Air Force Risk Management

program manager is totally revising AF RM to include integrated and relevant training that begins during Air Force Basic Military Training and continues throughout an Airman's career.

Look soon for the AF RM Fundamentals course based on inputs from 18- to 26-year-old Airmen and built with support from focus groups composed of those Airmen. Hold on to your hats — we're looking forward to an exciting few years in the Analysis & Integration Division!

AFSC/SEA's 36 staff members include active duty, New Mexico Air National Guard and Air Force Reserve Command enlisted and officers, Department of Defense civilians and contractors. The division is composed of four branches with engineers, safety specialists, aviators, computer programmers and system analysts … all coming together as one team to employ and assist the Air Force mishap prevention and investigation programs.

Computer Programming Branch, AFSC/SEAC
This branch works to automate DOD safety reporting requirements mandated by Air Force Instruction 91-204, *Safety Investigations and Reports*. AFSC/SEAC completes new software development and database support via Java and Oracle and creates automation tools for analysis and discovery of mishap trends. Some recent efforts include expanding the AFSAS data warehouse from a character-based to an online interactive graphical query system and developing hazard deficiency reporting, inspections and task management modules.

Analysis & Integration Branch, AFSC/SEAI
AFSC/SEAI oversees the safety analysis team process, provides systems safety engineering expertise to the entire center, manages the AF RM Program and hosts senior safety events with Air Force-wide impact. The branch's latest efforts include RPA-SAT and revising and updating the AF RM Fundamentals course.

Research & Epidemiology Branch, AFSC/SEAR
This branch transforms data into information for action. To complete this mission, AFSC/SEAR is involved in every step of the life cycle of safety data — from capture and quality control to delivering recommendations and implementation strategies. This work leads up to the final product: information for action. AFSC/SEAR reports, available on the AFSC Web page, have led to many recommendations, such as breakaway softball bases, the Spring Spike Motorcycle Safety Campaign, ankle braces for basketball and head protection for flight line personnel. Six branch research articles were published in the January 2010 issue of the *American Journal of Preventive Medicine*.

Information Technology/Systems Branch, AFSC/SEAT
AFSC/SEAT provides complete support to over 250 computer workstations, network management, including 25 servers supporting worldwide mishap investigations, risk management training and applications. The branch maintains AFSC's SharePoint site, enabling the commander to provide all off-station personnel with in-depth data resources. The staff provides complete telecommunications support, including management of BlackBerries and worldwide broadband cards. Every Class A mishap investigation with a safety center representative is fully supported with information technology gear and connectivity from this world-class branch.

U.S. Air Force photo and illustration by Dennis Spotts

We're Wait for

MASTER SGT. ANTHONY KAHN
708th Nuclear Surety Squadron
Kirtland AFB, N.M.

It was just another day at the job. I was no stranger to weapons maintenance — a young staff sergeant serving as team chief for a weapons maintenance operation. Each person on the team had a job to accomplish to ensure all equipment was available and serviceable.

As team members performed the required bay preparation, I mapped out my operation in the technical order and ensured all documents were accurate. Each task was being completed: one team member checked out the manually operated lift truck, another member inspected all test and handling gear, while another checked out the weapons maintenance truck, or WMT.

The WMT is the center of the operation; without it, the task is a no-go. The WMT visual inspection checked out good and in accordance with the technical data. The team member ensured all the switches were in the "OFF" position before applying the facility power. The 100-foot long, 80-pound facility power cable was unrolled and placed into position the same way we've done many times before. The power cable was connected to the truck and the other end to the facility as directed by the T.O. Nothing was out of the ordinary up to this point.

The team member then walked over and turned the

the Flame

facility power to the "ON" position. In a split second, our normal weapons operation went from great to very bad! I was standing near the rear of the WMT and immediately saw the connector on the truck shoot sparks from the connector body. I stood there in total disbelief for what felt like minutes trying to figure out what was happening. I then noticed a small hole forming on the explosion-proof connector, sending a small blue flame shooting out of the hole. Keep in mind, this happened in only a second or two. I yelled at one of the Airmen to shut off power, and immediately the other ran over to the flaming connector and extinguished the flame.

What just happened? It turned out that even though the system had been in service for over 10 years, the technical data hadn't accounted for the necessary cable inspection requirements. This massive electrical cable funneling three-phased 380 volts to the WMT contained damaged wires inside the explosion-proof connector, causing a mishap. This was due to years of handling the cable by the connector. This event taught me that although our technical data has gone through rigorous engineering and safety analysis, it's still up to us to constantly evaluate our operations and equipment.

Take the technical data at face value and seek out improvements. Keep a keen eye and focus on performance and tasks daily to seek out holes in our processes. Constant process improvement is key! Using the established channels to add additional requirements or recommend changes benefits workplace safety and ensures Airmen arrive back home in the same condition they arrived to work. Don't wait for the flame.

U.S. Air Force courtesy photos

LASERS: TOOLS OR WEAPONS — NOT TOYS!

LT. COL. KENNETH PASCOE
Weapons Safety Division
Air Force Safety Center
Kirtland AFB, N.M.

Several military personnel stand around in a dusty, desert environment at night. Two more troops emerge from an armored vehicle. They turn on powerful green lasers and swing them around like light sabers as *"Star Wars"* music plays in the background. It's all captured on video and is hilarious … unless, of course, you know something about laser safety. The lasers used were hazardous to the eye within a distance of 50 meters; people were standing much closer than that. The two "light saber" fighters had their systems about a meter from their faces. Even temporary exposure as the laser swung by a bystander's eyes could have caused retinal scars.

Your eye is made up of many structures. In front, there's a cornea (outer surface) that covers the lens. Past the lens, the eye is filled with a transparent fluid. The retina is in the back and is sensitive to light. Based on the wavelength (color) of their light, some lasers can damage the cornea while others can damage the retina. Visible lasers, those that

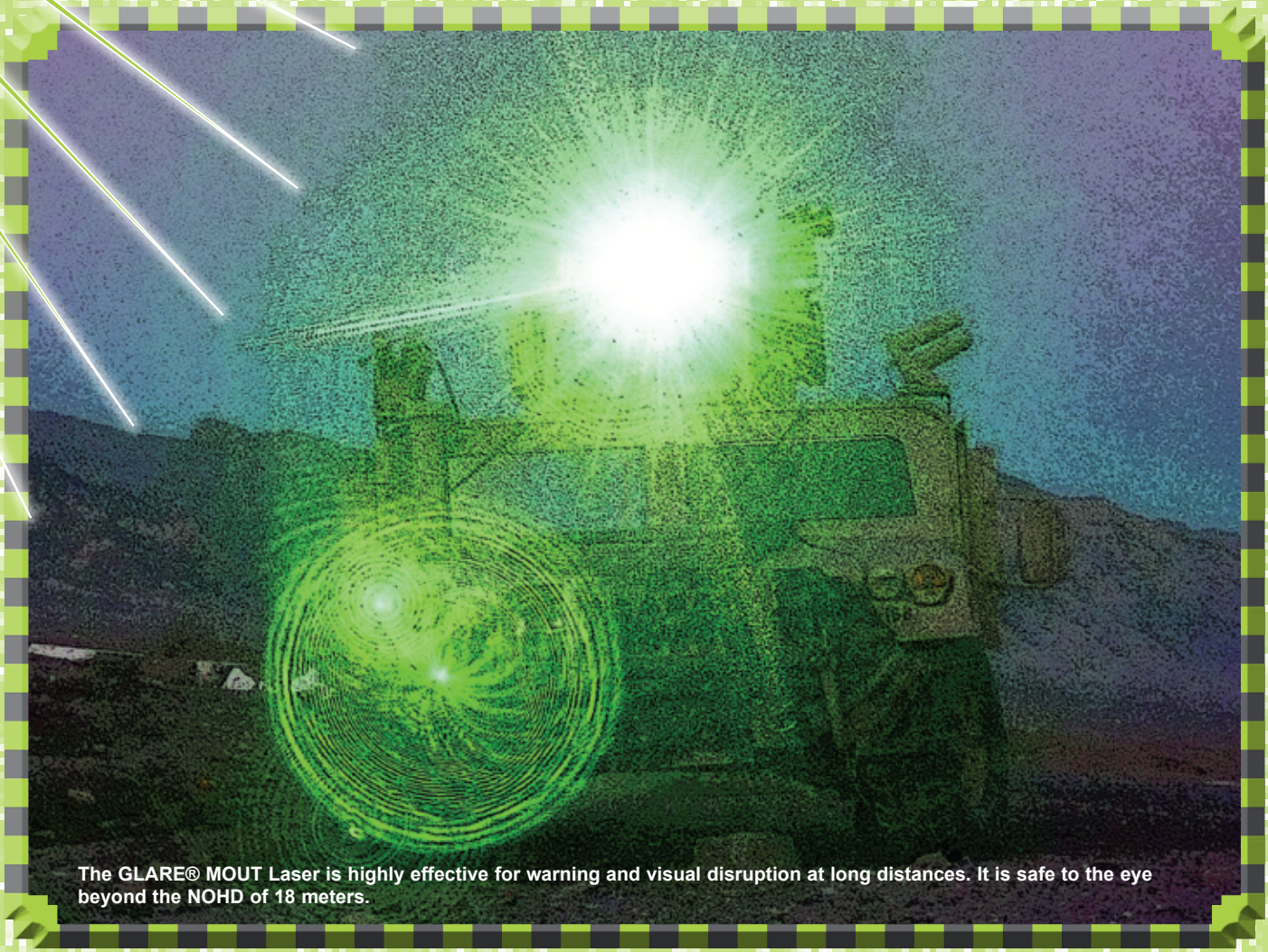
project a red or green spot (or any spot you can see), send their energy right through your eye to the retina. That's why you can see the spot. If the laser is powerful enough, looking directly into the beam can burn the retina and leave a scar.

When light reaches the back of your eye, your brain turns the received light into images you can see. Scars on the retina are little places where light can't be received because the receiver is damaged. A pinprick scar here or there won't deteriorate your vision because your brain will work around it. But how many scars can you afford before your vision is so degraded that it won't get better?

In other incidents, military personnel have suffered eye injuries due to switches being in the wrong positions while lasers were in their shirt pockets and lasers bouncing off glass panes inside vehicles, striking their eyes.

A laser with a "hands-free" mode, one that stays fixed in the "ON" position for a few minutes, can be a significant eye hazard, especially if the beam is invisible. These lasers should have a warning light that shows the user that the beam is on. If it's an infrared laser, as many are, the spot is invisible. Without night vision equipment, there's no way to see the beam or the spot.

Lasers are useful tools. Their uses are growing on the battlefield as designators, pointers, illuminators, range finders and even "dazzler" weapons. Each year, the Air Force Laser System Safety Review Board approves many new models of lasers with the understanding that they will be used within certain safety restrictions. Know the restrictions for your laser, especially the nominal ocular (eye) hazard distance, or NOHD. Within the NOHD, you could suffer an injury if you get tagged in the eye by the laser beam. Outside the NOHD there's no chance for injury, but you should avoid a direct shot to the eye out of prudence. If you have questions about a laser used in your job, contact your base bioenvironmental engineering office or chief of safety for more information.



The GLARE® MOUT Laser is highly effective for warning and visual disruption at long distances. It is safe to the eye beyond the NOHD of 18 meters.

Photos courtesy of B.E. Meyers and Co., Inc.

Radiation Dosimetry Monitoring

STEVEN RADEMACHER
Weapons Safety Division
Air Force Safety Center
Kirtland AFB, N.M.

Continued strengthening of the nuclear enterprise is one of the Air Force chief of staff's top priorities. The enterprise has seen a number of changes over the past two years. The Air Force changed the uniform requirement for dosimetry monitoring at field units, recognizing the need for regular radiation dosimetry monitoring. The effort is also to provide consistent and effective intrinsic radiation, or INRAD, safety education and training.

Over 6,000 Air Force employees are monitored annually for ionizing radiation exposure. Medical personnel are the largest group, with almost 1,000 X-ray technicians monitored each year. Among industrial occupational-coded personnel, nondestructive inspection personnel are the largest group, with over 1,800 personnel. Nuclear weapons workers are in a smaller group, with about 500 people being monitored. Dosimetry monitoring is accomplished for many reasons — two most important being to record radiation doses received by employees and ensure doses are below applicable standards. Dosimetry is also useful in helping workers, supervisors and radiation safety officers, or RSOs, ensure doses are as low as reasonably achievable, or ALARA.

Some weapons workers question the need for monitoring in light of the relatively low INRAD levels of our weapons systems and effective ALARA programs. In 1990, the Department of Defense directed the services with custody of nuclear weapons to closely examine INRAD exposures. This prompted the Air Force to publish Air Force Regulation 122-28, the predecessor to draft Air Force Instruction 91-108, *Air Force Nuclear Weapons Intrinsic Radiation and 91(B) Radioactive Material Safety Program*, and conduct a pilot dosimetry study. More recently, the 2008 Admiral Donald report noted that there were visible nonuniformities in professional judgment on dosimetry among installations with nuclear missions. Many workers had little understanding of their doses compared to annual limits and background radiation sources. The Air Force receives hundreds of requests from the Veterans Administration for dosimetry information on veterans with disability claims for radiation exposure — a large fraction related to INRAD exposure. Most of the claims require an extensive records review and, for some, a dose reconstruction. With dosimetry monitoring, this work will be alleviated and our weapons workers, their supervisors and RSOs will be better informed of the exposures personnel receive.

The Air Force Safety Center, in conjunction with the Air Force Medical Service Agency and U.S. Air Force School of Aerospace Medicine, prepared the June 2009 *INRAD*

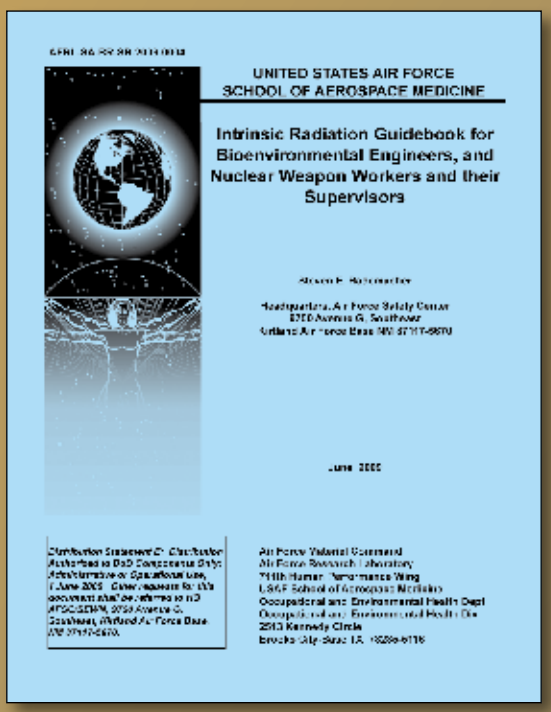
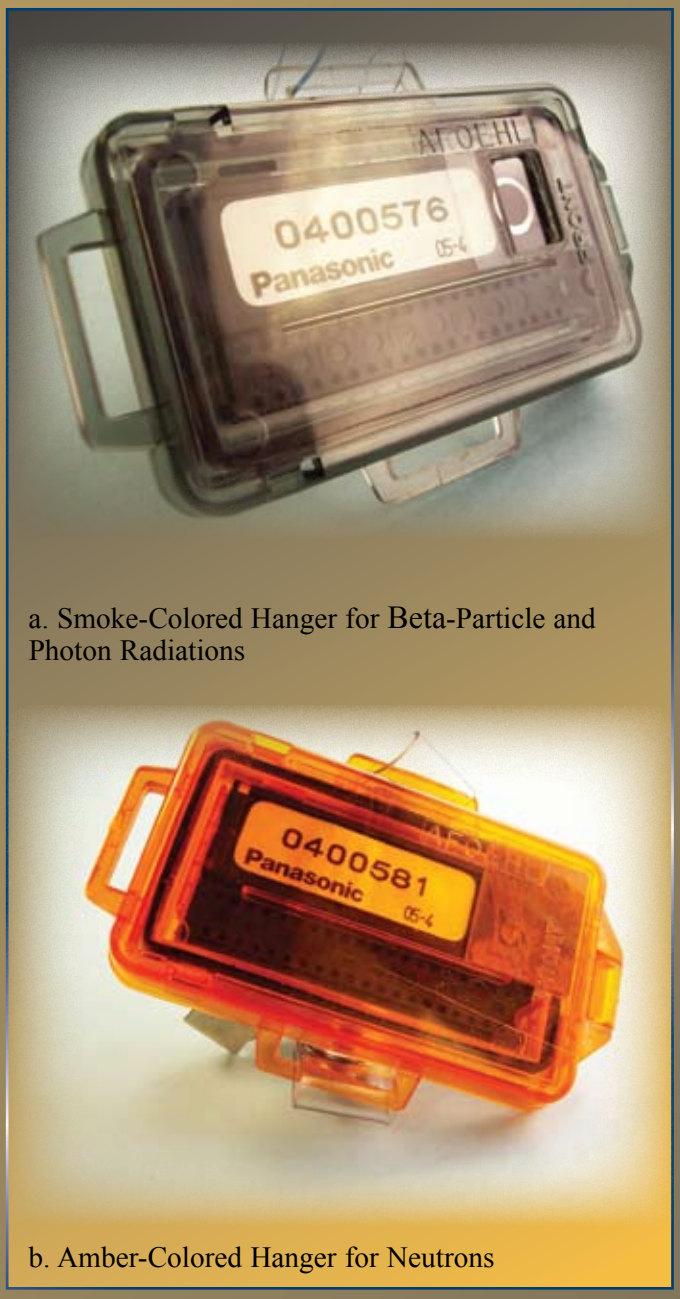


Figure 1: June 2009 INRAD Guidebook

Guidebook for Bioenvironmental Engineers and Nuclear Weapons Workers and their Supervisors (Figure 1). The manual provides detailed background information on the basics of ionizing radiation, sources of INRAD from nuclear weapons, health effects of ionizing radiation exposure and radiation protection methods that augment information currently part of INRAD safety training provided by base RSOs. Copies of the guidebook have been distributed to base RSOs and munitions squadrons with nuclear missions. Workers are encouraged to read and apply the recommendations of this document to be better informed on INRAD safety. Knowledge and involvement of the individual worker are most important in an effective radiation safety program.



a. Smoke-Colored Hanger for Beta-Particle and Photon Radiations

b. Amber-Colored Hanger for Neutrons

Figure 2: Air Force Dosimeters for Nuclear Weapons Workers and Other Personnel Exposed to Radiation Fields with Photons and Neutrons

Most Air Force employees being monitored for radiation exposure are assigned a single dosimeter as shown in Figure 2a because they are only exposed to beta-particle and/or photon radiations. Because INRAD contains both photon and neutron radiations, Air Force nuclear weapons workers are required to wear both dosimeters shown in Figure 2.

Proper wear of the dosimeters is critical to accurate dose measurements, especially the neutron dosimeter. In order for the neutron dosimeter to function properly, it must be held firmly against the body. The Air Force Safety Center recommends attaching the neutron dosimeter to the airman battle uniform rigger belt as shown in Figure 3. A plastic strap is the best method for attaching the dosimeter hanger to the rigger belt. For proper interpretation of the data recovered from each dosimeter in the pair, it's important that both dosimeters are worn in close proximity to each other and always as a pair.

Figure 3: Preferred Dosimetry Wear Method

INRAD is an important part of the nuclear enterprise safety program. Increased focus in radiation safety training and implementation of new monitoring requirements have emerged with the continued strengthening of our nuclear enterprise. Keys to the success of this program are knowledge and actions of the individual workers.

U.S. Air Force courtesy photos

EXPLOSIVE SAFETY BY THE NUMBERS

MASTER SGT. THOMAS BORST
911th Airlift Wing
Pittsburgh International Airport ARS, Pa.

WEAPONS

What is the distance that Hazard Class Division, or HCD, 1.1 munitions should be stored from an occupied building? Most weapons safety personnel would say the separation depends on the sited, waivered, exempted or actual explosives limits of the potential explosion site, whichever is greatest. This is in accordance with the ammo safety bible, Air Force Manual 91-201, *Explosive Safety Standards*. For example, 1,250 feet is a starting point for providing the minimum fragmentation distance between munitions and a headquarters building.

If the explosives you were working with were exposed to fire, would you know the minimum evacuation distances for the specific HCD? Let's start with some basics from AFMAN 91-201, Table 10.3:

- **HCD 1.1 (bombs or anti-personnel mines): 4,000 feet**
- **HCD 1.2 (ground burst simulators or certain fuses): 2,500 feet**
- **HCD 1.3 (signal kits, A/P-25-S-1 or M206 flares): 600 feet**
- **HCD 1.4 (5.56 mm rounds or smoke grenades): 300 feet**

When a fire isn't involved in a mishap, such as an explosive item dropped from a height greater than its minimum drop distance, an initial separation of 300 feet should be established until the on-scene commander or fire chief makes a more restrictive call. What's important here? Know what explosive you're working with so you know the correct emergency evacuation procedures.

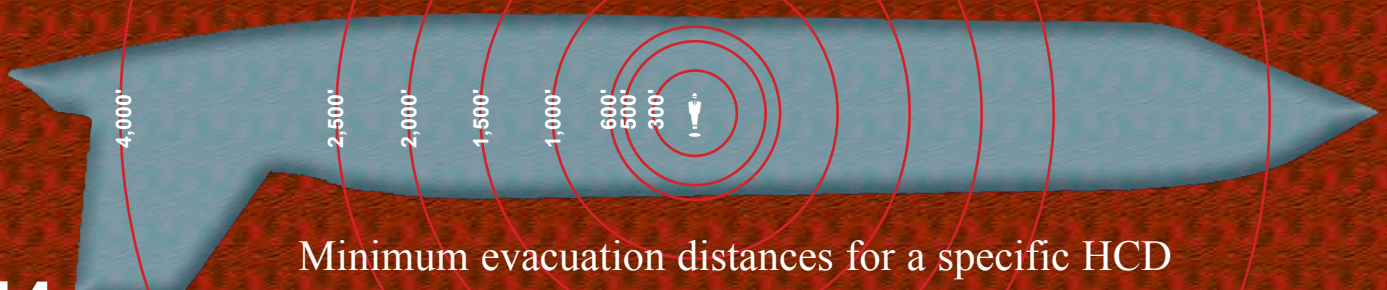
Additional minimum safe withdrawal distances when dealing with improvised explosive devices are outlined in Air Force Pamphlet 10-100, *Airman's Manual*. Evacuate to the indicated distances when dealing with the following IEDs:

- **Small item, briefcase or box up to 2 cubic feet: 500 feet**
- **Barrel or car up to 15 cubic feet: 1,000 feet**
- **Van or truck: 1,500 feet**
- **Large vehicle: 2,000 feet**

Electromagnetic radiation is another hazard to be aware of when working near explosives. EMR is defined in AFMAN 91-201 as "radiation consisting of oscillating electric and magnetic fields propagated with the speed of light." These fields include gamma radiation, X-rays, ultraviolet waves, visible and infrared radiation and radar/radio waves. Most of this means not keying your ultra high frequency/very high frequency radios or using cell phones in the proximity of electrically initiated explosives. Safe distances on your base are determined by regulations and an EMR survey conducted by either communications or the explosives safety manager. AFPAM 10-100 gives the following minimum distances for radio use around possible electrically initiated unexploded ordnance:

- **Distance from UXO when operating a hand-held radio: 25 feet**
- **Distance from UXO when operating a truck radio: 100 feet**

These minimum distances are general in nature, and each situation is unique. Conditions must be evaluated by experienced professionals on a case-by-case basis. Contact your base fire chief or safety office to get the specifics. Knowing what explosives you're working with, or are in the vicinity of, and knowing their minimum safe distances will positively increase your chances of survival in case of a mishap. Know your numbers.



Minimum evacuation distances for a specific HCD

Blue 2

The Hand-Off Brief

COL. SID "SCROLL" MAYEUX
Chief, Aviation Safety Division
Air Force Safety Center
Kirtland AFB, N.M.

As most of you may know, the hand-off brief is that quick radio message passed between two flight leads when one flight arrives on station to relieve the other. These could be fighters, tankers, AWACS or remotely piloted aircraft … any piece of air supremacy machinery assigned to a station or area for some mission and vul time.

The hand-off brief is a short and sweet sermon given from the pulpit of the Holy Church of What's Going On Right Here Right Now. It could signal any air- or surface-to-air threat activity, ground force engagement, high-value target monitoring or combat search and rescue — anything important or out of the ordinary.

"Wezel One, Coors One, ground hog day."

"Wezel One copies."

How's that for maximum information in the fewest possible syllables? And that's the point — use brevity when able, but speak plain voice when there's something important to pass. On one Northern Watch mission just a few years ago, I was checking in as lead weasel electronic warfare officer. When the other EWO started his hand-off brief with, "Today is NOT ground hog day," I immediately tensed up. Tons of blue and red activity … all culminating in a package recall as we figured out we had suffered frats x 2. The rest … well, you know what they say.

So here's your hand-off brief, because I'm checking out. As of this early May writing, we're just about even with last year's Class A flight mishaps. If we throttle those back a bit, we'll beat last year's record. I see signs that we've learned some lessons from FY08 and FY09. For instance, after FY09 I listed "ejection decisions" and "personal limits" as mishap-emphasis areas. This year, so far, we've had three ejections, all related to takeoff and landing. Now, I won't get into the reasons for those ejections, but every ejection was successful. Nice!

Hand-off brief continued … the threat is hot, and it's ourselves. As I head out, I need every pilot and aviator to ratchet up their sense of professional airmanship. We've banged the "Back to Basics" drum for a while now, and it helped us set last year's record safety performance. But this year I'm seeing pilots take hits on checklist and crew rest discipline, too aggressive tactical approaches, risk management discipline, mission planning, fuel management … areas that shouldn't be an issue for professional Airmen adhering to the basics. For me, *"Basics"* (rules, knowledge, compliance) plus *"Airmanship"* (experience, skill, discipline) equals *"Professionalism"* — and safety in flight.

Hand-off brief complete … Blue 2, picture clear. I'm pointing the jet east to Langley Air Force Base, Va., where the Air Combat Command commander wants me to run his safety program. So watch for my ugly mug in a different safety magazine sometime soon. Col. Eric Kivi will take the stick here as the Air Force Safety Center's new chief of aviation safety. He's a decorated Special Ops combat warrior with over 4,000 hours flying time in 13 different airframes. He's ready to fly your wing.

I'm out. It's been a hoot, gang. Fly hard and fly safe!

Blue 2's leaving this freq.

U.S. Air Force photo by Dennis Spotts

Article reprinted in its entirety with permission from *Flying* magazine's May 2010 publication.

>>>

Despite its futuristic arsenal and high-stakes missions, the United States Air Force had a safety record in 2009 that approached perfection. The truth is, zero accidents is precisely the goal.

SAFETY AGAINST THE ODDS

BY ROBERT GOYER / PHOTOGRAPHY COURTESY OF U.S. AIR FORCE

>>> This HH-1 Huey wreckage is used for training in the U.S. Air Force Aircraft Mishap Investigation Course and International Flight Safety Officer Course.

>>> THE E-MAIL WE received here at *Flying* from Col. Sid "Scroll" Mayeux, chief of aviation safety at the United States Air Force Safety Center, was a little hard to believe. "Last year (Fiscal Year 2009)," Mayeux's e-mail read, "was the USAF's safest year in aviation safety, with 17 Class A Aviation Flight Mishaps for a 0.8 rate per 100,000 flying hours."

One might think that the job of attaining a level of safety like that, given the Air Force's high-flying, high-tech fleet of aircraft, was an impossible task, and I would have been right there with you. Somehow, though, the Air Force seems to have hit upon a formula for safety that last year approached perfection.

Air Force Safety in Context

Before you can fully appreciate just how remarkable an achievement the Air Force's safety record is, you have to understand just what it means.

For starters, it is important to define what constitutes a Class A Mishap. Just as the NTSB and FAA have their specific definitions of what constitutes an accident versus an incident, so does the Air Force. The bar for an event falling into the Class A category is surprisingly low: It's any accident in which there's a fatality, permanent disabling injury, destruction of an Air Force aircraft or property damage of $1 million or more. That repair-cost figure is going up soon to keep pace with the rising costs of repairs. You can hit that figure, one investigator commented to me, by putting a healthy

gouge in the paint of an F-22 radome. So, while some of the accidents that get listed as a Class A Mishap are high-speed crashes resulting in loss of life, others aren't much more than glorified fender benders. By civilian standards, the rate might be even lower.

Just how good a rate is 0.8 per 100,000 flight hours? It's, in a word, remarkable. The rate compares favorably with the *fatal* accident rate for general aviation, which is around 1.17 per 100,000 hours. Remember, most of the Air Force's Class A Mishaps don't involve fatalities, and many of them don't involve injuries.

The more pertinent figure from GA, the overall *accident* rate, in 2008 was 7.1 per 100,000 hours, which is approximately nine times that of the Air Force's mark. In fact, the Air Force's safety record for 2009 compared favorably with every segment of civil aviation in the United States (based on 2008 figures) except for the scheduled airlines. Scheduled Part 121 flying, as one would hope, is considerably safer. Then again, the airlines aren't flying high-speed, low-level training missions through mountainous terrain.

While 2009 was the safest year on record for the Air Force, the trend of safety is not new. Since the early part of the new century, accident rates have been lower, substantially lower, than historic trends have been.

As recently as 1980, there were 84 Class A Mishaps with 74 aircraft destroyed and 94 fatalities. It used to be far worse than that. In 1950, shortly after the Air Force as we know it was born, there were 1,744 Class A Mishaps, with 665 aircraft destroyed and 781 lives lost. None of these figures, it's important to point out, involved combat actions. So in that respect, at least, you can compare different years and different segments of aviation and still have the numbers make sense.

It's no secret that a lot of the safety gains over the past few decades have been due to improvements with equipment — there are only three piston-powered aircraft remaining in the main fleet: the Diamond DA40 (T-52), the Cessa 172 (T-41) and the Cessna 150 (T-51) — so the move to, effectively, an all-turbine fleet has to count for a lot.

It doesn't, however, account for everything. The Air Force fleet is varied and contains a number of platforms that might qualify, at least in theory, as antiques, including the C-130, the U-2 and the B-52, all of which have been in active service for around 55 years.

So, how does the Air Force do it? I was convinced that there must be some kind of secret to its success, and I wanted to find out what it was.

The Safety Center

As the name suggests, the Safety Center is in charge of Air Force safety. Toward that end, the Center creates safety policy, provides guidance on implementing it and practices oversight during the whole process, which is never-ending.

Housed in a modern, unremarkable office building at Kirtland Air Force Base in Albuquerque, New Mexico, the Safety Center houses 160 workers, many of them civilians — many of them, in fact, are retired Air Force pilots. Heading the center is Maj. Gen. Fred Roggero, a career mobility pilot who also served as the Air Force's chief of integrated marketing earlier in the 2000s. The team he has at the Safety Center is impressive, and the wealth of aviation knowledge is humbling. For instance, the person running the projector during the introductory briefing, Randy Rushworth, is a retired, decorated Air Force bomber pilot with thousands of hours in B-52s, B-1s and B-2s and an expert on these and other

Just how good a rate is 0.8 per 100,000 flight hours? It's, in a word, remarkable.

aircraft at the center. During my day-long visit there, I met a 2,000-hour pilot in remotely piloted aircraft, a flight surgeon who flies in the CV-22 Osprey, a pair of recorder analysts who have worked on some of the most high-profile accidents in recent military history and a structural engineer who is among the foremost experts in the world on aging aircraft.

Investigating accidents is a central job of the Safety Center, and its Aviation Safety Division's experts provide on-site and remote assistance and consultation to safety investigators looking into accidents that might have been caused by structural, powerplant and/or electronics problems. This is a tall order considering the number and variety of aircraft in the fleet, which is composed of everything from Diamond DA40 piston single trainers to vertical takeoff and landing Ospreys to the most advanced fighter in the world, the supersonic, thrust-vectoring F-22 Raptor.

One of the most fascinating places to visit at the Safety Center is the office of the Bird/Wildlife Aircraft Strike Hazard (BASH) program. The Air Force's awareness of the hazards that birds present to aircraft is not new. The Air Force put together the BASH program back in the mid-1970s, and it has been a part of the Safety Center for longer than 15 years. The need for action is clear. During a 23-year period starting in 1985, there has been an average of nearly 3,500 bird and wildlife strikes per year on Air Force aircraft. The overall cost associated with strikes during that period is $817,817,683, or more than eight-tenths of a billion dollars.

>>> Clockwise from above: The F-22 is the world's most advanced fighter; the BASH programs help reduce bird-strike risk; *Flying's* Robert Goyer (far right) is welcomed at the Safety Center by (l-r) Lt. Col./Dr. Karen Heupel, chief of human factors; Maj. Gen. Frederick F. Roggero, chief of safety; and Col. Sid Mayeux, chief of aviation safety.

There have been some high-profile losses too. Three airmen were killed when a B-1 bomber went down in Colorado in 1987 after a bird struck the wing's leading edge, leading to the loss of fuel and hydraulic lines and, subsequently, control of the airplane. In 1995, 24 airmen lost their lives when an E-3 went down shortly after takeoff from Elmendorf, Alaska, after its engines ingested a number of Canadian geese. In the early 2000s, four jet fighters — two F-16s, an F-15 and an F-22 — were lost over a short period of time, all from bird strikes.

In response to the hazards, the BASH program has developed a number of tools that pilots and mission planners can use to minimize the risk. Keeping birds away from airfields is key to the effort, but the BASH team has also helped to develop a number of other tools, including a worldwide Air Force bird-strike database, creating a computerized low-level Bird Avoidance Model (BAM), which shows where birds are likely to be before a given mission is flown, and the Avian Hazard Advisory System (AHAS), which combines Nexrad radar, weather information and thermal activity along with historical bird migration patterns and soaring data to provide near-real-time bird hazard advisories. (BAM and AHAS are both available to civilian pilots too, at usahas.com/bam.) A new tool that shows great promise is bird detection radar (BDR), which is installed in a small trailer and can be easily towed from location to location to provide radar detection of birds up to 7,000 feet agl and at a range of up to eight miles. When there is a strike, the team uses feather and even DNA analysis to pinpoint the species of bird, which then goes into the database.

>>> Above: This older F-16 canopy remained intact but still bowed inward from a bird strike. New F-16 canopies withstand 500-plus-knot impacts with 4-pound birds. Opposite: International Flight Safety Officer students inspect a T-38 wing for pre-impact damage.

Located in another corner of the Safety Center is the Mishap Analysis and Animation Lab. When the recorder or recorders are recovered from a crash, the analysis team goes into action, extracting the memory from the recorder to keep it. And because the fleet is so varied in age and description, the recorder's team needs to be able to work with many different kinds of hardware of many different vintages. Even reading the data can be a challenge. The lab has on more than one occasion had to buy vintage computers on eBay in order to run data extraction programs written in the early days of PCs. Still, its success rate is remarkable in being able to extract data from even very badly damaged and burned recorders. That data, needless to say, is often the key to understanding what went wrong in an otherwise baffling accident.

A Different Kind of Investigation

When an Air Force aircraft goes down, the process of responding to that accident is different in many respects from what it is in the civilian world, and the Safety Center is involved every step of the way, either directly or indirectly, from first response until the book is closed on the accident.

The Air Force actually conducts two investigations whenever there is a major accident. The kind of investigation in which we're interested addresses safety and is called, sensibly enough, a "safety investigation." The timetable for its investigations is shockingly short by civil standards. The safety board investigating a Class A Mishap has only 30 days to reach and publish its findings. While the board can ask for an extension, Mayeux said that this is rare.

"There's usually a smoking gun," he said, "and we can generally pinpoint the causes fairly quickly."

The safety investigation, which is one of the prime tools the Air Force uses to improve aviation safety, has few distinct phases, and it differs from a civil investigation in several important ways.

In the direct aftermath of the accident, a preliminary team — called the Interim Safety Board — is formed by the commander of the air base closest to the crash site. This team's job is specifically to gather evidence and protect it, as well as to secure the crash site, which itself can be a hazard. The members of this team have all received training at the Safety Center in Albuquerque, so when the call comes in, they know exactly what to do.

As the evidence-gathering phase is being conducted, a process that typically takes just a few days, the Permanent Safety Investigation Board is formed by the four-star general commander of the major command that "owned" the aircraft or crew.

The job of the Permanent Board is to do all the things that the NTSB might do during an investigation — conduct a full forensic workup of the crash site, do any pertinent structural analysis of the evidence, tear down the engines to find any problems that might have precipitated the mishap, analyze the flight data and cockpit recorders (if present) and examine any

pertinent human factors. This, remember, all needs to be done within 30 days.

In its report the board is also required to come up with findings and generate actionable mishap recommendations, which it passes along with its findings. The NTSB does this on some of its investigations by issuing recommendations, usually to the FAA, for proposed changes in regulations. The Air Force safety investigation board does this with every accident investigation.

While the safety board's recommendations, like the NTSB's, aren't technically binding, they do carry a lot of weight and have a ripple effect of responsibility once they're issued.

As an example of how recommendations make a difference, Mayeux used a mishap several years back involving a T-38. When it was designed, Mayeux said, the T-38 was intended as a high-altitude jet, and it had a canopy and windscreen that were designed with this mission in mind. Over time, though, the Air Force began to use it for low-level training, where it came into much more frequent contact with birds. When a T-38 on a low-level training mission struck a bird and was destroyed, the accident board found that the windscreen wasn't strong enough for the added bird-strike risk, so it recommended that the windscreen be replaced with a thicker and stronger component. In four high-speed Class A T-38 bird strikes since, not once has the bird penetrated the windscreen — and all pilots survived.

After the board issues its findings and recommendations, the report is open to comments for 45 days. At this time, if a pilot or crew member has been found to be "causal" in the accident, he or she may submit a rebuttal, and that rebuttal is published along with the rest of the findings.

After the report is published, the responsible parties, usually the commander of the fleet in question, addresses the actionable items, such as installing better glass in T-38s. Given financial, operational and design constraints, taking action, or not, can be a difficult call. In the case of the T-38 mishap, the general who was in charge of the fleet at the time chose, for financial reasons, not to install new canopies but to install new, stronger windscreens. It turned out to be the right call. It is, Mayeux said, highly unusual for the decision makers to defer the changes or simply accept the risk and move on, and when changes are deferred or risk accepted, it's never, Mayeux told me, done lightly.

To ensure full participation, personnel who are involved in the mishap and provide testimony are immune from prosecution or disciplinary action as a result of the safety investigation. Furthermore, no findings of the safety board can be used against them. Doing so, for that matter, is a serious infraction. The Department of Defense says that this immunity is an extension of the executive privilege afforded the president.

There's usually a smoking gun, and we can generally pinpoint the causes fairly quickly.

Training

One of the key jobs of the Safety Center is to provide training to Air Force safety officers, as well as to personnel from allied forces, in all subjects related to accident investigation and prevention.

The most visible of these training facilities is the Crash Lab, situated on a 29-acre expanse of desert a short drive from the Safety Center. It is here that aspiring Air Force safety investigators go to apply the skills they've learned in the classroom to a real-world accident site. Spread out over the Crash Lab site are wrecks of 10 Air Force aircraft that went down under various scenarios. Students learn how to secure the site and then look for clues, analyzing the fire patterns and distribution of the wreckage as well as examining the engines for signs of whether they were developing power

or not when the crash took place.

Most of the learning takes place in more traditional classrooms, however, and they are busy places. The Safety Center offers 110 three-week classes each year, training around 1,300 personnel, most of them Air Force personnel but many of them from the services of our allies. Students learn safety principles and the fundamentals of investigations and prevention. All courses are intended to prepare them to serve actively as flight safety officers, safety board presidents or interim board members, among other positions. It's a big job, and an important one, because the investigative process is distributed across the Air Force community and positions turn over regularly when personnel leave the Air Force or move on to other positions.

While training is a critical part of its mission, the Safety Center can hope to have direct contact with only a few thousand airmen a year, so it actively gets the word out in a number of ways, including through its award-winning quarterly publication *Wingman*. A recent issue featured articles on configuration management for pilots, using operational safety management principles at home, and reducing automotive accidents — yes, the Safety Center is tasked with improving Air Force safety for every airman and every airman's family members. The Safety Center, in case you were wondering, is also on Facebook. Times have changed.

Human Factors

Underscoring the fact that the Air Force sees safety as a complex web of interactions, technologies, information and attitudes is the Human Factors Division, which is integrally involved in every aspect of the Safety Center. Headed by Lt. Col. Karen Heupel, the Human Factors Division has a broad range of responsibilities, everything from assisting in investigations to determining what human factors entered into an event — Heupel, like everyone at the center, is convinced that human factors are at the core of every investigation. Human Factors has on-staff psychologists, aviation physiologists, flight surgeons — Heupel herself is a flight surgeon — and egress specialists.

Every person I met at the Safety Center seemed to believe that safety is an ongoing process that requires everyone involved to take an active role in the safety process.

Even the accident investigation process is subjected to human factors analysis. There is the rule of five "whys." When looking at the cause of a mishap, you ask why that factor happened. When you identify that "why," you again ask why. "If you don't get to five 'whys,'" Heupel says, "you're not looking closely enough."

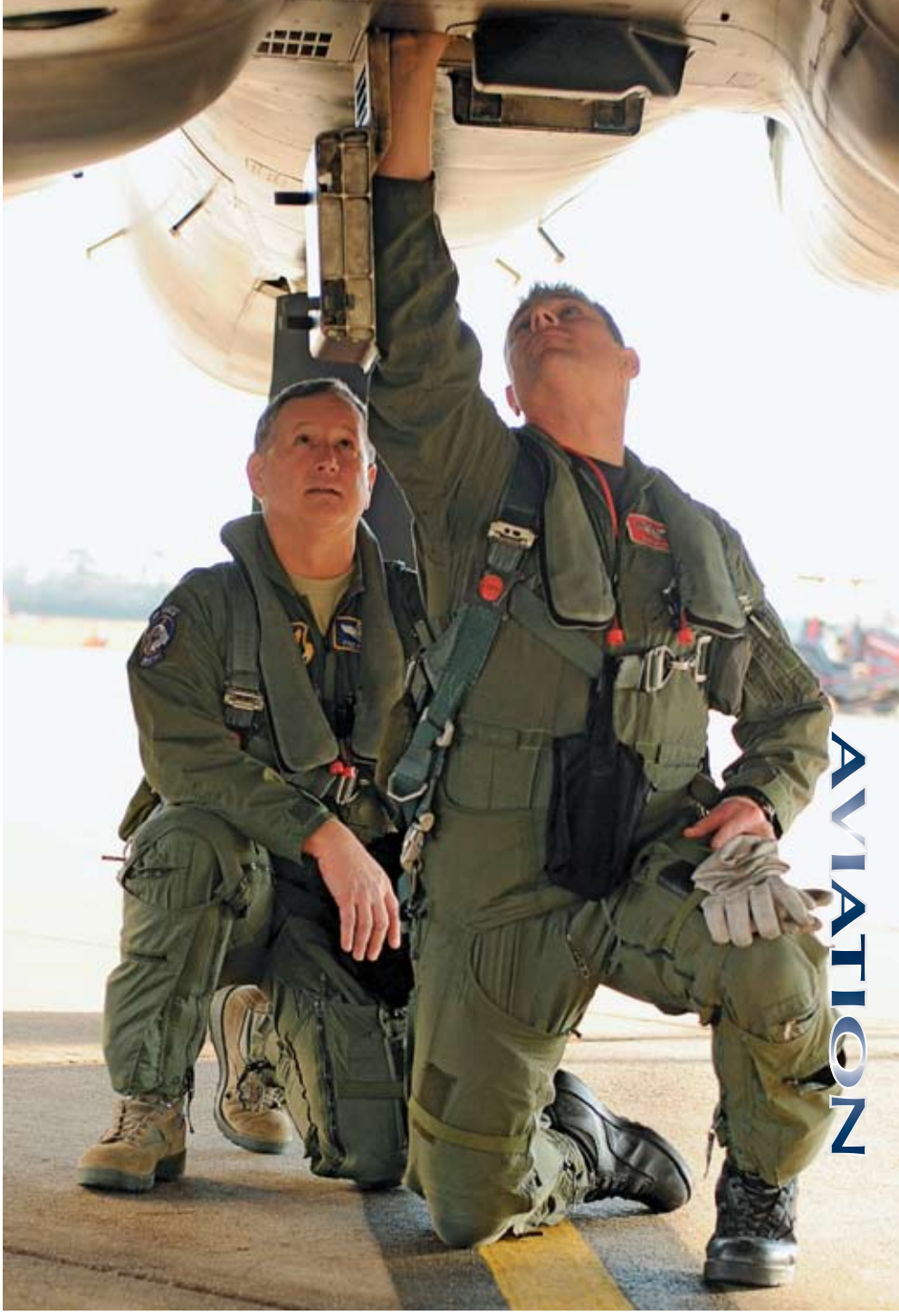
New Technologies

The Air Force employs the most cutting-edge flying technologies in the world, some of which surely haven't been heard about. At the same time, it employs new technologies in order to improve safety. Some of those, like GPS, were developed for the military and today play a major role in the civil aviation segment. Its bird avoidance radar, night-vision goggles, head-up displays, foreign object damage (FOD) radar and aging aircraft structural analysis techniques are just a few examples of how Air Force initiatives have provided new tools to make flying safer. Likewise, the Air Force employs successful strategies developed in civil aviation, as in its MFOQA (military flight operations quality assurance), a military version of a successful airline/FAA program to enhance safety.

New technologies, however, bring new challenges. The Safety Center is in charge of mishap investigation, policy and procedures for remotely piloted aircraft (RPA). The dramatic growth of RPAs in the fleet has raised some interesting questions. For instance, when an RPA crashes, let's say in Afghanistan, where is the accident site? Is it where the vehicle crashed? Or is it in Nevada, where the remotely based pilots were flying it? Or is it where the close-in pilots had taken control at the airfield in Afghanistan? The answer the Air Force has come up with is yes to all of the above, so investigations into RPA losses are complex, to say the least.

Every Airman a Safety Officer

I went to Albuquerque to discover the secret of how the Air Force has achieved such a remarkable safety record. I came away understanding that there is no secret. It takes a commitment to safety and all that that implies from the top down.



AVIATION

>>> Above: Capt. Aaron Reid of the 333rd Fighter Squadron (right) explains to Maj. Gen. Frederick F. Roggero what to look for during a preflight inspection. Opposite: International Flight Safety Officer students inspect A-10 wreckage for causal evidence.

Every person I met at the Safety Center seemed to believe that safety is a dynamic, ongoing process that requires everyone involved to take an active role in the safety process. And it has worked. The results are quantifiable. While it's unrealistic to expect that general aviation can cut accidents to the level the Air Force has attained, there's surely much we can learn, starting with the belief that safety requires hard work, a good look in the mirror and the belief that one person can make a difference. The results of those attitudes have paid off for the Air Force, and its safety success can be measured not only in dollars and cents, but also, and far more importantly, in fewer lives lost.

To learn more about the USAF Safety Center, visit www.afsc.af.mil.

The Ride of

CHIEF MASTER SGT. ROGELIO GUERRA
433rd Air Wing
Lackland AFB, Texas

In 1979, I was fresh out of technical school serving four years active duty in the Navy before joining the Air Force Reserve. One evening, one of our A-4s returned from a sortie around 11 p.m. Upon landing, the pilot reported two discrepancies with the jet: evidence of leaking hydraulic fluid and oil. By this time we were cleaning the shop, turning in toolboxes and getting ready to go home. The call came from Operations requesting another jet for an additional sortie; the broken jet was needed for a 6 a.m. launch. The pressure was on to fix the broken A-4, and this is where the problems started.

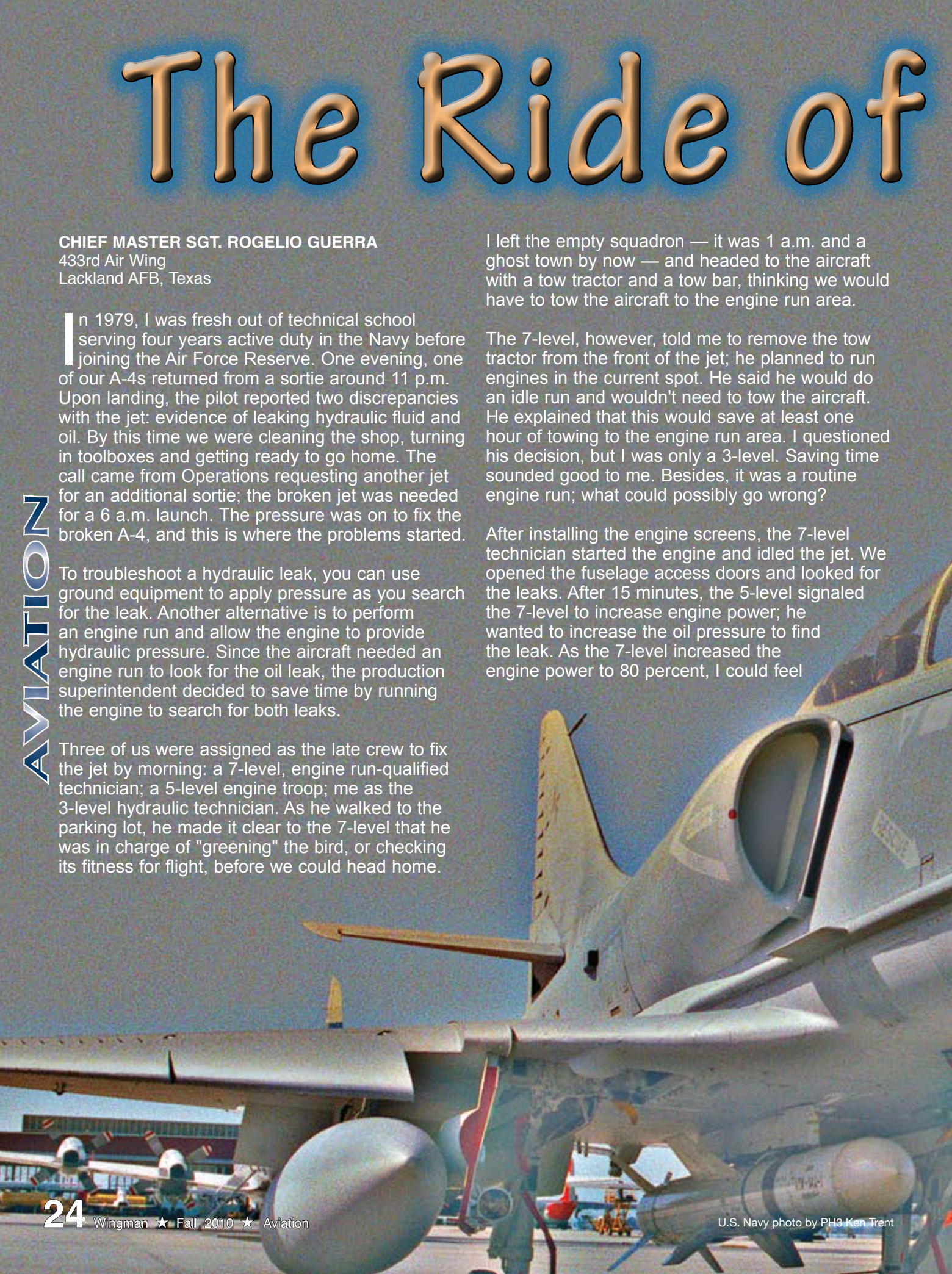
To troubleshoot a hydraulic leak, you can use ground equipment to apply pressure as you search for the leak. Another alternative is to perform an engine run and allow the engine to provide hydraulic pressure. Since the aircraft needed an engine run to look for the oil leak, the production superintendent decided to save time by running the engine to search for both leaks.

Three of us were assigned as the late crew to fix the jet by morning: a 7-level, engine run-qualified technician; a 5-level engine troop; me as the 3-level hydraulic technician. As he walked to the parking lot, he made it clear to the 7-level that he was in charge of "greening" the bird, or checking its fitness for flight, before we could head home.

I left the empty squadron — it was 1 a.m. and a ghost town by now — and headed to the aircraft with a tow tractor and a tow bar, thinking we would have to tow the aircraft to the engine run area.

The 7-level, however, told me to remove the tow tractor from the front of the jet; he planned to run engines in the current spot. He said he would do an idle run and wouldn't need to tow the aircraft. He explained that this would save at least one hour of towing to the engine run area. I questioned his decision, but I was only a 3-level. Saving time sounded good to me. Besides, it was a routine engine run; what could possibly go wrong?

After installing the engine screens, the 7-level technician started the engine and idled the jet. We opened the fuselage access doors and looked for the leaks. After 15 minutes, the 5-level signaled the 7-level to increase engine power; he wanted to increase the oil pressure to find the leak. As the 7-level increased the engine power to 80 percent, I could feel



U.S. Navy photo by PH3 Ken Trent

My Life

the power of the engine in my chest as I stood in the right wing, looking inside the fuselage access doors. I could feel the aircraft squatting down due to the thrust — and that's when it happened.

After a few minutes at 80 percent power, the aircraft unexpectedly jumped chocks and launched forward toward an aircraft hangar 50 yards away. The 7-level technician frantically tried to turn the aircraft away from the hangar, but the tow bar was still attached to the nose, preventing him from turning the aircraft. He pumped the brakes furiously to stop the jet, unaware that the hydraulic leak was in the brake system, resulting in a complete brake failure. I held on for dear life as I prepared for the impact with the hangar.

Fortunately, the aircraft stopped short of hitting the hangar. I lost my grip and fell off the wing as the aircraft stopped, amazingly only suffering minor bruises and scratches. The 5-level wasn't so lucky — he had been dragged for 50 yards underneath the aircraft, resulting in burns on his hands and numerous scrapes.

Afterward, the safety investigation revealed these problems: no maintenance management oversight, performing an engine run outside the engine run area, not securing the aircraft using tie-down chains before an engine run and not using technical orders.

Saving time, using shortcuts, working under pressure and working long hours are always part of the aircraft maintainer's life on the ramp. But, as we learned on that eventful night, none of those factors should ever come before safety. Disregarding safety procedures could ultimately cost you your life.

AVIATION

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

The Aviation Well Done Award is presented to Tech. Sgt. Michael Vasko and Staff Sgt. Steven Bitzer of the 173rd Maintenance Group, Kingsley Field Air National Guard Base, Ore., in recognition of their exceptional attention to detail and resulting actions. On Aug. 16, 2009, while on temporary duty to Gowen Field, Ind., supporting the launch of an F-15C, Tech. Sgt. Vasko and Staff Sgt. Bitzer responded to an emergency situation created by a catastrophic failure of the jet fuel starter that resulted in a fire on the aircraft. During engine shutdown, the jet fuel starter had made a loud bang and discharged a large volume of internal compressor parts out of the exhaust with an ensuing fire. Tech. Sgt. Vasko advised the pilot to turn off the jet fuel starter switch and supported the pilot as he initiated an emergency ground egress. Tech. Sgt. Vasko then quickly alerted flight line personnel of the ground emergency, ensuring response vehicles were en route. Tech. Sgt. Vasko and Staff Sgt. Bitzer continued to assess the situation and initiated fire extinguisher procedures to extinguish the fire in the jet fuel starter intake and exhaust areas. Their decisive actions resulted in containing the engine fire and minimizing damage to the aircraft. The outstanding leadership and safety awareness displayed by Tech. Sgt. Vasko and Staff Sgt. Bitzer reflect great credit upon themselves, the Air National Guard and the United States Air Force.

The Aviation Well Done Award is presented to Capt. Jason Curtis, 510th Fighter Squadron, Aviano Air Base, Italy, in recognition of exceptional performance during an emergency that occurred on March 24, 2009. Capt. Curtis was leading a flight of four F-16 Fighting Falcons on a four-ship flight lead upgrade certification sortie when his aircraft's engine failed 21 miles south of Aviano Air Base. Capt. Curtis immediately slowed to maximum range airspeed, turned his aircraft directly toward the nearest suitable airfield and kept his flight members informed of the emergency while continuing to analyze the severity of the situation. Using excellent cockpit resource management, he coordinated with his flight members and air traffic control agencies to ensure all applicable safety precautions were taken. He then jettisoned his external fuel tanks, consciously avoiding populated areas, reset his maximum range glide airspeed and positioned his aircraft for a flame-out landing to the runway. Capt. Curtis maintained textbook parameters throughout the engine-out glide from 16,000 feet to touchdown and landed the aircraft with no damage. His superior airmanship and judgment in a time-critical emergency saved an aircraft, prevented loss of life and minimized property damage on the ground. The outstanding leadership and safety awareness displayed by Capt. Curtis reflect great credit upon himself, United States Air Forces in Europe and the United States Air Force.

U.S. Air Force photos

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

The Aviation Well Done Award is presented to members of the Balad Combined Enroute Approach Control Facility, 332nd Expeditionary Operations Support Squadron, Joint Base Balad, Iraq, in recognition of exceptional performance displayed in the face of extreme adversity. On July 8, 2009, air traffic controllers assigned to the Balad Combined Enroute Approach Control Facility experienced a catastrophic failure to their command and control capabilities. As line controllers worked tirelessly to ensure all airborne aircraft understood and complied with precise control instructions, the supervisors on watch quickly evaluated the situation to determine the severity of the equipment failure and actions necessary to ensure safety over the skies of Iraq. After validating that seven of their eight assigned radio frequencies were not functioning correctly, they quickly combined Baghdad and Balad approach control sectors to improve traffic flow and staffed additional controllers to assist with coordination procedures. Utilizing one very high frequency radio, line controllers worked feverishly to gain positive control of all air traffic over the central one-third of Iraq. During the five-hour communications outage, the decisive actions and teamwork displayed by this team ensured the safe transition of 81 civilian airliners and 68 military aircraft. An additional 45 aircraft safely diverted to alternate airfields. The outstanding leadership and safety awareness displayed by members of the Balad Combined Enroute Approach Control Facility reflect great credit upon themselves, Air Combat Command and the United States Air Force.

The Aviation Well Done Award is presented to the crew of Herky 76, 37th Air Squadron, Ramstein Air Base, Germany. On June 12, 2009, during a return flight to Ramstein Air Base, the flight engineer discovered smoke and fumes on the flight deck and suspected an electrical fire in the cargo compartment. While inspecting the cargo compartment, the loadmaster discovered a global positioning system amplifier cable pinched between the right-side emergency escape hatch and the fuselage, resulting in fire. The loadmaster immediately notified the crew, secured a fire extinguisher and fought the fire while the flying crew chief disconnected the faulty wire from the power source, eliminating the source of the fire. Meanwhile, the co-pilot coordinated with Norwegian Control, declaring an in-flight emergency, while the navigator worked to keep the aircraft clear of terrain in instrument meteorological conditions. Despite the turmoil, the crew was able to utilize exceptional crew resource management to overcome the fire in the fuselage, maintain stable flight while navigating through the cloud-covered mountainous terrain and land the aircraft at nearby Orland Airfield in Norway. The outstanding leadership and superior skill displayed by the crew of Herky 76 under extreme circumstances reflect great credit upon themselves, United States Air Forces in Europe and the United States Air Force.

AFSS

MAJ. KORENSIA SIFORD
Space Safety Division
Air Force Safety Center
Kirtland AFB, N.M.

"Three … two … one … liftoff."

Those words evoke an image of a majestic rocket launching into a blue sky and heading into the "final frontier" of space. When all goes well, as it does the majority of the time, that's the image most people see. However, all doesn't go well 100 percent of the time —the 1986 space shuttle Challenger blowing up over the Atlantic Ocean, with the loss of seven astronauts, or launch videos of multimillion-dollar boosters and payloads exploding into burning wreckage — images no one wants to see repeated. Whatever the picture, behind every launch are thousands of decisions being made to determine a launch's success or failure. One decision is determining when it's necessary to destroy an out-of-control launch vehicle to prevent damage to personnel or property.

There are two national ranges: the Eastern Range, or ER, in Florida, and the Western Range, or WR, in California. There are fail-safe methods in place at each of these ranges to destroy an out-of-control rocket in a safe and acceptable manner to protect the public and property. For now, one method is the duties of the mission flight control officer. The MFCO sits in the Range Operations Control Center, or ROCC, on launch day, standing by to transmit the command no one hopes to ever have to send — the command to blow up a rocket that is out of control and off course. As technology advances, there are and will be other viable fail-safe options to replace the "human factor" in protecting the public while attempting to reach the "final frontier" with either manned or unmanned vehicles.

Other launch entities, such as the commercial SeaLaunch and French Ariane, and the countries of Israel and Russia, have already used what is known as the Automatic Flight Safety System. The AFSS is an independent flight termination system, or FTS, that replaces or supplements the command destruct system and renders a vehicle nonpropulsive. Several AFSS concepts have been developed and employed in the test environment. In 1998, Orbital Sciences Corporation developed a prototype AFSS and flew it on a demonstration flight onboard a sounding rocket at the White Sands Missile Range in New Mexico. NASA Kennedy Space Center in Florida and Wallops Flight Facility in Virginia have been pursuing AFSS development efforts since the early 2000s and have conducted demonstration flights using prototype flight hardware and software onboard aircraft, sounding rockets and an expendable launch vehicle.

An AFSS basically consists of one or more independently powered avionics boxes onboard a flight vehicle that executes software routines in flight designed to replace today's human factor in the command-destruct system. The AFSS bases its decision on multiple criteria. Using inputs from onboard tracking sources (e.g., global positioning system or inertial measurements), health and status data from vehicle propulsion systems and the pre-programmed limits of the intended flight trajectory or debris exclusion zones, these software routines determine whether and when

U.S. Air Force photo by Senior Airman Andrew Satran
Digital collage by Dennis Spotts

Flight Termination System

to issue an electrical output signal that will initiate the termination of a non-nominal (i.e., anomalous, errant or unknown) flight.

For a typical nominal flight, the AFSS system compares the pre-determined and approved flight profile with the vehicle's present position. Positional information is derived from GPS tracking data, inertial measurement unit data independent of the flight vehicle guidance system or a combination of both. With command-destruct functions moving to the AFSS onboard the flight vehicle, there'll be no need for real-time monitoring of telemetry data by range personnel following liftoff. Data regarding vehicle position, health and status will be downlinked and forwarded in near real-time (i.e., within a few seconds) to the ROCC, along with optics coverage to provide situational awareness for the Launch Decision Authority, or LDA, range customer program officials and range system operators.

Data will also be used to support LDA command and control actions in the event vessels or aircraft stray into the area or, in the event of a mishap, to coordinate search and rescue or recovery operations and to notify local authorities. The telemetry data may be downlinked to ground stations operated by ER or WR when the flight vehicle is within line of sight or through satellite links when the vehicle is over the horizon from ER and WR ground-based assets. This telemetry data is recorded and distributed in near real-time to support analysis of launch vehicle, range system and AFSS performance after the mission to support anomaly resolution and mishap investigations.

If the AFSS detects non-nominal flight during the continuous comparison of the pre-determined and approved nominal flight profile with the vehicle's present position, it'll initiate the flight termination sequence at the appropriate time to protect public safety by ensuring debris doesn't land in pre-determined debris exclusion zones (e.g., populated areas). Other inputs to the AFSS logic based on flight rules (e.g., AFSS health and status or launch vehicle propulsion system performance data) may also contribute to the AFSS flight termination decision.

Since early 2008, Headquarters Air Force Space Command, or HQ AFSPC, has been pursuing its launch and range enterprise transformation, or LET, vision to reorganize the ER and WR fixed-location ground-based infrastructure. This will support current and future missions

and transition all range customer programs to use AFSS by the beginning of FY18. The major motivation for this transformation is to address the unsustainability of the current range infrastructure. AFSS will enable ER and WR to eliminate legacy systems for command uplinks and redundant real-time telemetry receiving and distribution. This will lead to the availability of lower costing range support. AFSS will allow AFSPC to eliminate its fixed-location, ground-based infrastructure, thereby improving range efficiency and responsiveness.

AFSS will contribute to the space support mission area by helping to assure reliable access to space and by providing improved flight safety. AFSS will be used to ensure public safety during the initial ascent phase (the first six to seven minutes of flight) for each space lift and flight test mission launched from ER and WR. This protection lasts until the flight vehicle clears the pre-defined gate along its trajectory, designated as the end-of-range safety responsibility for the mission. As such, AFSS will require a series of range approvals and verifications during design, installation, checkout and verification before launch. This is similar to those required for today's legacy systems. However, AFSS operations during launch and ascent are completely self-contained and require or allow no interaction from crews on the ground.

As AFSS is responsible for rendering a flight vehicle nonpropulsive when logic determines that the vehicle trajectory becomes a safety hazard or will not achieve operational orbit based on flight rules for the specific mission, it was decided all of these performance standards/requirements to implement AFSS be outlined in Range Control Council 319-07, *Flight Termination Systems Requirement*. Launch preparation and execution processes with AFSS are largely unchanged from today's methods. Roles, responsibilities, checkout and test procedures remain similar to what they are today.

The transition to AFSS doesn't represent a departure from the fundamental range safety standards or basic practices regarding protection of public safety. Instead, it represents a method of leveraging the evolution of technology to automate the same basic processes that have been in use historically to comply with the same fundamental standards.

Once the safety specifications associated with all aspects of AFSS are defined and documented, the next step will be for range safety and each range customer program to work together to tailor the specific requirements that will apply to each program. Design, test and operational requirements will be defined in the tailoring process. For AFSS, the tailoring process should be very similar to the procedures that range safety follows with current range customer programs, using a human-in-the-loop FTS, although the content will be different.

An AFSS system for the national ranges is still in the design phase. Only time will tell if all of the pertinent organizations can meet the deadline of FY18 set by HQ AFSPC. If not, then since this technology has already been proven and vetted, it's not a matter of if AFSS will fly on U.S. rockets, but when.

U.S. Air Force photo by Senior Airman Nadine Y. Barclay

Self-Aid in Space

MAJ. BARBARA BRAUN
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Let's talk about self-aid and buddy care for a minute. Imagine you're wounded in combat. What do you do? We've all had the class, and we understand the basic principles. Get out of danger. Stop the bleeding. Conserve strength. You aren't going to perform surgery on yourself. Your goal is to keep yourself alive long enough to get to the doctors and get fixed.

Now let's think about space. Our satellites aren't generally dodging bullets on a daily basis (though that may change as space debris increases). Nevertheless, a satellite's systems can fail internally, causing problems that endanger the satellite's survival. What can a satellite do to help itself?

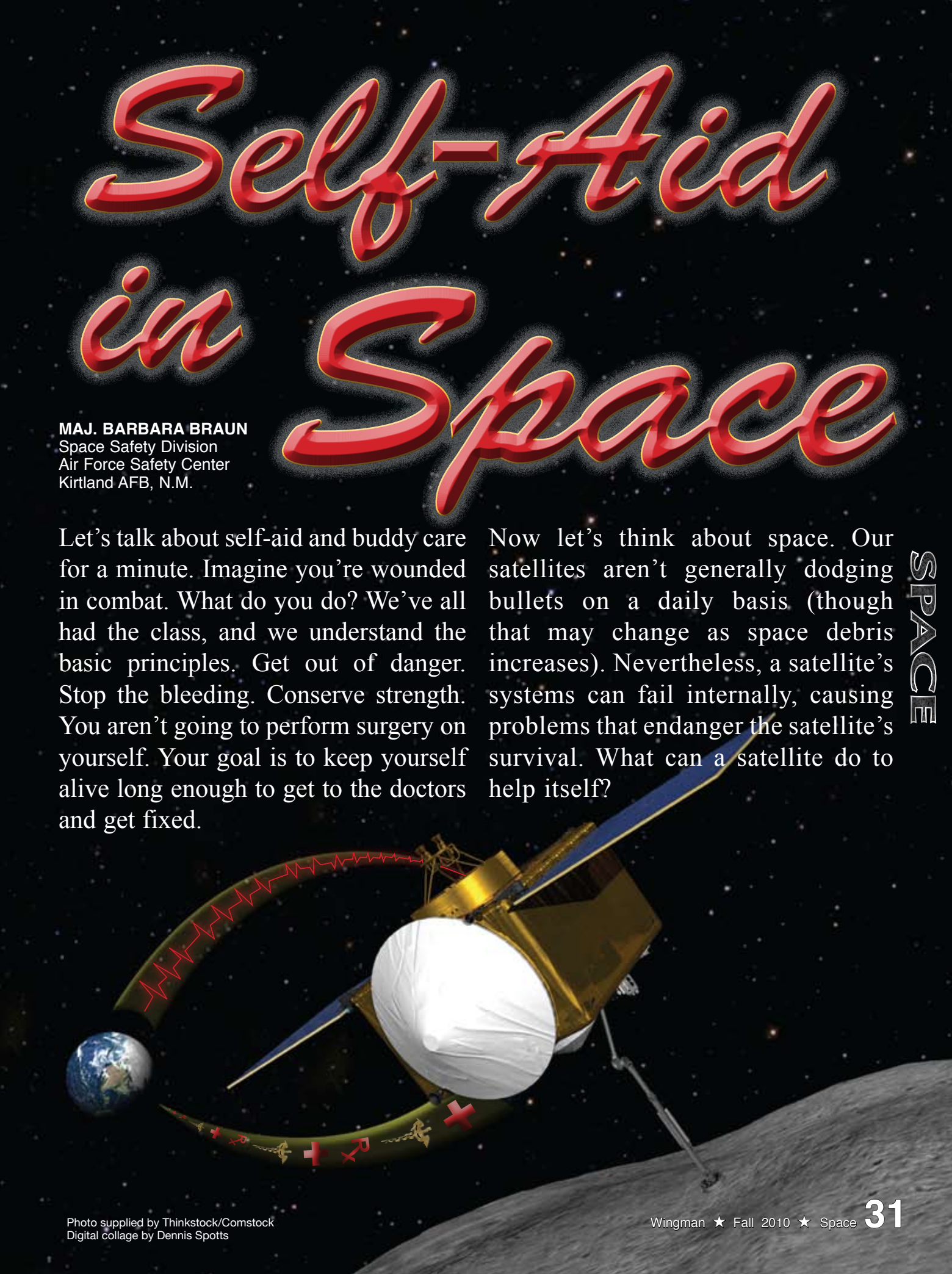

Photo supplied by Thinkstock/Comstock
Digital collage by Dennis Spotts

The answer depends a lot on your vehicle's safe modes. Satellite safe modes can be thought of as self-aid and buddy care on the celestial level. A satellite, detecting that something has gone wrong, takes a series of steps to keep itself alive long enough for the people on the ground to figure out what's really wrong and fix it. A classic example of a safe-mode entry might occur when a satellite encounters a problem with its attitude control subsystem. Perhaps it's a software glitch or that one of the hardware devices (such as a momentum wheel) is failing. Without any safe-mode intervention, the satellite would eventually lose the ability to point its solar arrays at the sun. Battery power would drop. The satellite would start to "bleed out," and eventually, it might not have enough power to communicate with the ground. By the time the experts could respond, it would already be too late.

> Satellite safe modes can be thought of as self-aid and buddy care on the celestial level.

Now let's assume that the satellite has a well-functioning safe mode. The first step might occur when the satellite recognizes that its attitude is drifting out of some pre-determined limits. The satellite might automatically switch to a simpler attitude control mode, one that uses a simpler set of software rules, or less hardware, and gives up some performance in exchange for a more robust, predictable sun-pointing mode. Next, the satellite might start to turn off some of its less critical components, giving up functionality to preserve battery power. In the ultimate extremity, the satellite will turn off everything that isn't essential to preserve itself — like applying a tourniquet to stop the bleeding.

All satellites have some form of safe mode, but not all are effective. What makes satellites' safe modes effective? There are many schools of thought on this, but we can summarize most of them by thinking in terms of a few basic principles.

Keep things simple

When a satellite is in trouble, it shouldn't be trying to do anything complicated. The idea is to simplify operations as much as possible. That means a three-axis-stabilized satellite might drop into a simpler, more robust attitude control mode designed to point the solar arrays at the sun. It means that any complicated schedule of tasks onboard the vehicle should be dropped in favor of a very simple set of instructions — or no instructions at all. In some cases, the vehicle might turn off its computer entirely since the software is sometimes the most complicated and error-prone part of the system.

> The satellite would start to "bleed out," and eventually, it might not have enough power to communicate with the ground.

Conserve your strength

The next goal of a satellite in trouble should be to conserve power. The longer the vehicle can stay powered, the more time the ground team has to restore it to health. Every satellite should have a well-thought-out, orderly process for shedding loads on the power system. Start with the least critical: the payloads, secondary transmitters, heaters (other than those needed for survival) and other noncritical resources. Difficult decisions eventually may need to be made. Similar to sacrificing a limb to save a life, the vehicle might have to endanger a payload to preserve its essential functions.

Keep listening

The one subsystem that should never be turned off is the vehicle's command receivers. If the vehicle can't hear the ground, the ground can't fix it. Simple enough. The whole idea behind the first two steps is to preserve enough power to keep the command receivers online.

Do nothing and await orders

Once the vehicle enters safe mode, it shouldn't turn things on or attempt to recover until it's told to do so by ground command. This can be a controversial provision. Many of today's satellites have sophisticated anomaly-recovery software and circuitry, and some have the capability to diagnose and fix minor problems autonomously. With such sophistication, however, comes a great deal of risk. No autonomous recovery software can anticipate every contingency and, just like all software, autonomous recovery software can contain bugs. In general, if the vehicle has gotten to the point of shedding loads to conserve power, all autonomous software recovery should be abandoned. The satellite shouldn't turn things back on until the ground has fixed the problem, restored a positive power balance and commanded the vehicle to do so.

Bypass the brain

Here's a surprising fact about robust satellite safe modes: One of the least critical — and least desirable — systems to keep running during an anomaly is the onboard computer. In fact, given the complexity of today's software, the onboard computer might actually be the source of the problem. But in order to function without the onboard computer, the satellite must be able to preserve itself at a basic level without its brain. If you lose consciousness, your body will continue to try to maintain itself — you'll breathe, and your heart will beat, without your conscious direction. Similarly, the satellite must be able to preserve its basic functions without the software running. This means having a set of "hardware" commands that go directly from the command receiver to the hardware in question without needing to be processed by the onboard computer. It means that, if possible, the vehicle should be able to collect and transmit basic state-of-health telemetry without relying on the software. And it means — and this is important — that your safe mode processes ***must be capable of executing without the software running***. All the load-shedding, all the basic attitude maintenance and all the other life-preserving activities of a satellite's safe mode should be able to run at the hardware level — without the satellite's brain.

We don't learn self-aid and buddy care on the battlefield. We take the class ahead of time so we know what to do when the time comes. Similarly, the time to think about robust safe modes for the satellite comes long before launch: during the design phase. With a little forethought, we can arm our space satellites with the ability to keep themselves alive until we have the time to come to their aid.

In some cases, the vehicle might turn off its computer entirely since the software is sometimes the most complicated and error-prone part of the system.

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Safety Shorts

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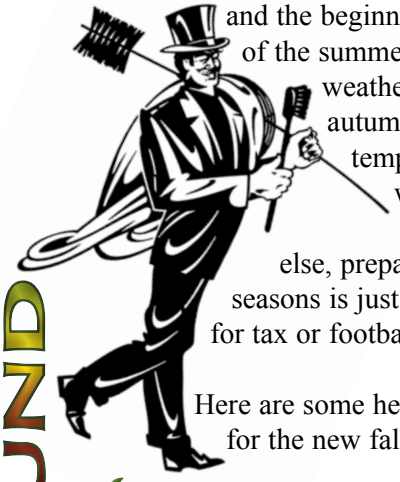
GROUND

Fall Safety Tips



It's amazing how we feel about the end of one season and the beginning of another. At the end of the summer, we're so tired of hot weather that we can't wait until autumn. Then the reality of colder temperatures hits us, and we wonder what we were thinking. But like everything else, preparation for the different seasons is just as important as preparing for tax or football season.

Here are some helpful hints to get you ready for the new fall season:

- ✓ Have your chimney cleaned and get an ample supply of dry wood.
- ✓ Have your furnace checked by a licensed expert.
- ✓ Test all smoke alarms and practice a family evacuation drill ensuring all members know the procedures to follow during an emergency. Identify the meet-up point outside.
- ✓ Slow down when driving in residential areas. Since school is back in session, watch for children who could dart out from between cars.

- ✓ Remove clutter and combustible items from or near the stove or fireplace. If you don't know if an item is combustible, remove it anyway. If in doubt, remove.

- ✓ Have a good supply of candles due to potential power outages. Never leave burning candles unattended and be sure to place them on stable bases.
- ✓ Ensure adequate outdoor lighting.

Sources: www.safety.com and the National Safety Council

Oprah Joins Campaign Against Distracted Driving

On her nationally televised show, Oprah Winfrey called on viewers to pledge to not use their cellular phones behind the wheel. In a live episode, Ms. Winfrey aired stories about loved ones lost to distracted drivers. Other celebrities have come forward in support of Oprah's "No Phone Zone Pledge," including Tina Fey, Morgan Freeman, Queen Rania of Jordan and many others. The pledge is a call to action, urging viewers to agree to make their cars a no-phone zone.

The commander-in-chief signed an executive order in 2009 barring cell phone usage while driving on military installations. Many states are also jumping on the bandwagon to outlaw texting while driving and only allowing talking on a cell phone with the use of Bluetooth technology.

Source: Students Against Drunk Drivers

What's a Field Request or Field Inquiry?

A field request or inquiry is the Air Force's version of an Occupational Safety and Health Administration inquiry or interpretation. Very similar to OSHA, the safety professionals at the Air Force Safety Center's Ground Safety Division, or AFSC/SEG, research all available safety standards and national consensus resources to find the most viable answers for their customers.

AFSC/SEG professionals have answered an average of five to 10 field inquiries per month over the past four years. These inquiries include high-interest areas, such as personal protective equipment, lockout/tagout, confined spaces, flight line ground operations and material handling equipment. Inquiries also include the more mundane areas, such as office and electrical safety.

In 2001, then-Secretary of Defense Donald Rumsfeld issued a mandate that the military would meet or exceed OSHA requirements as much as possible. In accomplishing this task, AFSC/SEG has ensured these field requests meet the requirements of OSHA and other national consensus standards. Additionally, existing safety publications are being revised to ensure Air Force safety requirements meet or exceed OSHA standards, except where military-unique requirements exist.

To submit a field inquiry to AFSC/SEG, a unit must follow the chain of command and submit the request/inquiry to their wing safety office, who in turn will submit the request to their numbered air force or major command. If the inquiry is not answered or further explanation is required, the NAF or MAJCOM will forward the inquiry to AFSC/SEG. Field inquiries are answered as soon as possible, usually within 30 days.

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Car Seat Obsession

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I'm obsessed with car seat safety. It keeps me up at night. It makes me cringe when I see children riding in cars unrestrained or improperly restrained. I constantly want to check and re-check my kids' restraints while I'm driving.

You might be expecting a story of horrible personal tragedy that led me to this mindset, but think again. As with any safety topic, all that's required is an ability to visualize the worst-case scenario and then plan for the consequences. In the world of car seat safety, however, the process is complicated by the fact that "official" guidance is often vague, incomplete, outdated or, even worse, contradictory between different agencies. For an illustration of this, let's take a look at one of the most confusing pieces of guidance currently out there: *How long to keep your child in a rear-facing child safety seat.*

You may be surprised to learn that back in 2002 the American Academy of Pediatrics quietly added a caveat to their recommendations that stated, "Children should be kept rear-facing as long as possible." Here is how the current guidance from the AAP reads:

> "At a minimum, children should ride rear-facing until they have reached at least 1 year of age and weigh at least 20 pounds. When children reach the highest weight or length allowed by the manufacturer of their infant-only seat, they should continue to ride rear-facing in a convertible seat."

Parents have traditionally thought of transitioning their kids to a forward-facing seat as some sort of "graduation," signifying the crossover into being a "big kid." What people often don't understand is that every transition of moving a child out of a seat designed for their size and weight and closer to using adult safety belts actually makes them *less safe!* Let's take a look at a couple of reasons why rear-facing car seats are safer:

- Rear-facing car seats protect children's heads and necks by distributing crash forces over a larger surface area and minimizing the overall movement of their heads relative to the rest of their bodies.

- Typical toddlers' heads are nearly one-quarter of their body weight. If they're riding forward-facing in a front-end collision, tremendous strain is placed on their fragile necks, easily resulting in paralysis or death. Dr. Kathleen Weber, Director of the Child Passenger Protection Research Program at the University of Michigan Medical School, stated, "Real accident experience has also shown that a young child's skull can be literally ripped from its spine by the force of a crash. Yes, the body is being held in place, but the head is not."

- In Sweden, where it has been common practice for years to keep children rear-facing until at least age 4, fatalities are extremely rare. From January 1992 through June 1997, only nine children who were properly restrained in rear-facing car seats died in motor vehicle crashes in Sweden; all involved catastrophic crashes with severe intrusion and few other survivors. ***(Source: University of Michigan Transportation Research Institute Research Review, July-September 2000, Vol. 31, No. 3)***

So why does car seat safety have to be so complex and confusing? The answer is that child restraint technology is constantly changing and getting better every day. Today most convertible car seats are usable to around 35 pounds in a rear-facing configuration; some even go to

40 or 45 pounds. A person reading this article 20 years from now will likely laugh in disbelief at how quaint our current car seats seem, just as we look back with similar nostalgia at how our parents survived sliding around unrestrained on the vinyl bench seat in the back of their dad's '55 Nomad. Is this an excuse to not be as up-to-date as possible now? Not at all. We're all constrained by the technology of our day, and although it's imperfect, it's extremely capable of protecting our most precious cargo … but only if we use it correctly.

I'll leave you with one last thought: Don't believe anything I just told you! Those may seem like strange final words, but by the nature of how quickly safety technology evolves, this information may well be out of date by the time you read it. Fortunately, we live in a time when information is readily available, and every parent can and should become a car seat safety expert.

For further reading:

AAP guidance: www.healthychildren.org
Seat ratings and advice: www.consumerreports.org
Child seat safety: www.thecarseatlady.com
Seat safety check locations: www.seatcheck.org

U.S. Air Force photo by author

Black Ice — It Only Takes a Patch

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How do I get out before this thing goes up in flames? That was the second thought that raced through my mind once the odor of gasoline started to permeate the cab. My first thought? *Wow, I'm still alive. Thank you, God!*

While grateful for surviving the twisting and flipping of the car crash I just endured, a sense of panic started to well up when I smelled gas with the engine still running. Hanging upside down in a car that now resembled a pancake didn't help things much. Under those circumstances, even simple things like finding the seat-belt release or killing the engine are confusing chores.

New Mexico is famous for its desert vistas and dry climate, but the Rocky Mountains that dissect the state never fail to accumulate enough snow to the delight of skiers and other winter sport aficionados. Snow is a rare treat for those who live in the lower elevations. New Mexicans relish the school- and work-related weather days reserved for the slightest dusting that occurs from time to time.

So the day we got that rare accumulation of snow, I dutifully engaged in some personal risk management. I *"identified the hazard"* as the deteriorated driving conditions of the highway I take to work. This was confirmed by radio reports that indicated the road was open but limited to one lane. I *"assessed the risk"* of controlling the vehicle while driving on snow/ice and of negotiating a treacherous roadway

Photo supplied by Comstock
Digital collage by Dennis Spotts

with other non-snow-savvy drivers. I decided not to head out under those conditions.

The initial *"risk control measure"* I chose was to wait and see if the road would be further plowed or the snow would melt, and so I waited. Since the roadway is visible from my home, I noticed a highway department grader clearing a path. I could also see that other vehicles were on the road, and considering the e-mail likely piling up in my in-box, I made a *"control decision"* to proceed into work. I took to the road, seat belt fastened and defroster on high to keep the windshield frost-free.

Once on the highway, the plowed lane of the two-lane highway seemed to be handling the morning's sporadic traffic well enough, so I felt confident in cautiously proceeding. The posted speed limit was 75 mph, but I kept the speedometer to 60 mph for further *"risk control."* Although the plow missed patches of snow, and the cleared lane itself was pretty narrow, the going seemed good enough.

The first sign of trouble was a sport utility vehicle off the road and down the embankment ahead. As soon as I spotted it, I began to slow down. Too late! My car started skidding sideways into the direction of motion. I hit black ice — probably the only patch for miles! After twisting around a time or two, the car hit the median sideways, and once the tires caught the mud and snow, the car swapped from skidding to flipping.

That's how I ended upside down, disoriented, smelling gas and wondering how to get out. After some fumbling, I managed to kill the engine, release the seat belt and, much to my relief, crawl out a window. Miraculously I didn't have a scratch on me.

Lessons learned? When doing risk management, don't take on Mother Nature at her worst — you'll lose! Second, use your seat belt. If I hadn't belted in, I'm pretty sure I wouldn't be writing this article. What good would that be to my wife, children and fellow Airmen? Did I mention that the spare tire came loose and was flipping around with me in the cab of my hatchback? I had recently repaired a flat tire, but the spare was apparently not bolted in correctly. Think about what could become a flying missile in your cab if something like this ever happened to you.

I evaded injury, or possibly death, in this snowy escapade. Learn from my example and avoid putting yourself at undue risk. Call your boss, explain your situation and generate a reasonable plan. If you find yourself in a hazardous situation, do all you can to reduce risks. That extra 5 or 10 mph I slowed down may have saved my life. And if something does go wrong in spite of your best efforts, your personal protective equipment can make the difference between life and death. Use it — you and your loved ones will be glad you did.

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Kirtland AFB, N.M.

My studying paid off; I finally got promoted. To celebrate my new promotion, I decided to have a party at my house — a promotion party for me and birthday party for my wife. I invited almost everyone I knew and all the people in my shop. As we started receiving the responses back, it looked as if everyone would be there, including Charlie.

Charlie was a guy in my office who made the days pass by faster. He was the one at a party who would always have one too many and dance across the room with the lampshade. He was a unique person with the ability to do outstanding work and still keep humor a part of his routine. With all the invitations back, now was the time to really get down and plan the event.

I had just received a safety briefing at our unit about how to be a proper host and ensure everyone had a way to get home safely in case they over-indulged. I had it covered. I planned for plenty of nonalcoholic beverages to encourage limiting the intake of alcohol, planned for more food than you could shake a stick at and even made arrangements for everyone to stay the night or take a taxi if they had too much to drink. My wife even set up a car key collection point and made a list of those who planned to be designated drivers. Yes, I had everything covered.

Finally, the night of the big party arrived. We took our 7-year-old daughter across town to our babysitter to spend the night. When we got back to the house, people were already arriving. Things couldn't have gone much smoother. Those who were planning to drink had arranged to have designated drivers or leave in a taxi; everyone, well, except for Charlie. When he arrived, he told my wife he would only have a couple of drinks and then stop.

Charlie didn't stop at a couple and, before long, he was the hit of the party. Realizing that we had his keys, I was enjoying his antics. Around 11 p.m. I began taking away the alcohol and pushing the coffee, snacks and soft drinks. At

Photo by Chris Clinton/Digital Vision

Good Time Charlie!

first Charlie objected but soon settled down and started enjoying himself, even without alcohol. People started leaving around 1 a.m. I watched as the last one got in the taxi and headed out — the last one, that is, except for Charlie. He was still at the kitchen table talking and joking with my wife. He, too, finally got up to leave. At first I refused to give him his keys, but he assured me he was OK to drive home. Besides, he only lived a few miles from our house. About this time, our phone rang; it was our babysitter. Our daughter was sick and wanted to come home. The babysitter offered to drive her to our house, which was great since we had to clean the house. I once again looked at Charlie and knew I should object to his driving, but because I didn't want further hassles that evening, I handed him the keys and told him to be careful.

My wife and I quickly started straightening up before our daughter got home. We didn't want her to see the mess and all of the empty bottles scattered around the house. We were both in the kitchen when the door bell rang. Opening the door, expecting to see our babysitter and our daughter, we were stunned to see a police officer. Thinking a neighbor must have called, I told him the party was over, and I was sorry if we were a little loud. The police officer stood there for a moment and said, "Sir, I'm here because your daughter was just involved in an accident. Sir, I'm sorry, but … ."

The rest was a parent's worst nightmare. My wife yelled, "You must be mistaken! Our daughter is on her way home from the babysitter's!"

What the officer said next shattered me into a thousand pieces. "No, Ma'am, no mistake. A drunk ran a red light and hit your babysitter's car. I'm sorry." *A drunk!* I screamed, "WHERE IS MY DAUGHTER? WHO DID THIS? I WANT TO KNOW!" The officer replied, "Sir, his first name is Charlie."

Thankfully, my story is fictional, but every year drunk drivers kill innocent victims — someone's son, daughter, mother, father or another family member. Way too often people have the chance to stop the drunk behind the wheel by speaking up, taking a stand and arranging for the person to get home without driving. Please get involved. Take a stand. Speak up!

Photo by Doug Menuez/Photodisc

Respect the G

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GROUND

It was late October and muzzle-loading rifle season had arrived. I took five days off from work to hunt. A heavy snow hit the first day of the season. After signing in at the entrance to the army range, I drove on a paved road for about an hour. Before reaching a gravel road, a pickup truck passed me. I saw the deep ruts in the snow-packed gravel road; I knew he was just ahead of me. I stayed in his tire tracks to get traction so I wouldn't end up in the ditch.

After about 20 minutes I caught up to the truck which was spinning and sliding sideways in the road. I decided it was time to put my tire chains on. About two miles down the road I came upon the pickup stuck in a ditch. Both axles were buried, and it was leaning on the driver's side so much that the driver couldn't get out. I offered my help but wasn't sure I could pull them out of the ditch since the truck was really buried.

There were two young soldiers and a wife and baby of one of the guys. None of them were properly dressed for the cold weather. After talking with them, it was clear that the driver thought he was Daniel Boone. I soon realized I was dealing with someone who had never hunted antelope.

I got my tow strap and pulled them out of the ditch. Since they didn't have tire chains, and the four-wheel drive wasn't effective, I invited the hunters to come with me, hunt for an hour, then return.

We took my truck and drove about four miles. Boone said he had seen 30 antelope in that area. We stopped and got out of the truck to hunt. I made sure they went northeast and I went northwest — I didn't want to get shot. We agreed to return to the truck in an hour. After a long walk and not seeing any fresh signs, I returned to my truck.

Shortly thereafter, one of the hunters showed up. I asked why Boone wasn't back yet. He said they weren't far apart and that Boone said he wanted to stay a little longer. After about an hour, we got worried and started looking for him. Two hours later we decided he must have walked back to his truck. Sure enough, he had walked back to his truck and was sitting in the cab with his wife and baby. He had obviously decided to disregard our agreement and leave us to worry about him.

On the second day, I decided to try hunting antelope in the same area as the previous day.

reat Outdoors

The roads were still frozen; however, I knew when the sun came out, they would turn to slippery clay again. Since I had an extra tire chain, I put it on one of the front tires to help steer through the muddy ruts.

At this point, I started making bad decisions. Since I didn't see signs of antelope in the area, I decided to drive down a steep ridge to get to another hunting area. As I descended, I heard the front tire chain come off. I backed up to take the chain off the tire. I slowly slid down the steep ridge, praying not to go off the edge. The front wheels kept sliding in the clay toward the edge; and I couldn't do much to keep the truck headed in the right direction.

Once I got to the bottom of the hill, I looked at the road going up the other side and figured it was safer than attempting to go back where I came from — another bad decision. About a third of the way up, the truck started sliding toward the shear drop-off again, and there was a large boulder in the middle of the road. I got out to assess the situation. I slowly backed the truck back down the hill.

The road curved to the right at the bottom of the hill. I did a "Texas J" maneuver to keep me from going in the ravine and got the truck headed back the way I had originally come. Once I reached the top of the hill, all I wanted to do was go home. I had all the excitement I could take for one day!

But wait! I then saw 30-40 antelope walking into my hunting area. I took advantage of the surrounding terrain and circled around them for a shot. It took several hours, but eventually I got in front of them and set up. A trophy buck came within 60 yards of me. It was a slam dunk. All I had to do was squeeze off a shot, and it would have been a fantastic end to an unbelievable day.

Well, that antelope is still out there. I had made one other bad decision: I should've sighted in my rifle before going out that day. It was so far off I couldn't have hit the antelope if it was 10 feet in front of me.

It was an interesting couple of days of hunting. Hunters must exercise extreme caution when venturing into unfamiliar territory. Don't let wrong decisions lead to your last day on Earth.

Photo supplied by Jupiter Images

Snapshot on Safety

Introducing the latest in "reactive armor." For those tailgaters who refuse to back off!

Send us your "accident waiting to happen" photos - selections to be published here in future issues of ***Wingman*** magazine.

Wingman = Vigilance & Responsibility!

Send your photos to afsc.semm@kirtland.af.mil.

This quarter's photo by Col. "Scroll" Mayeux from the Air Force Safety Center, Kirtland AFB, N.M.

GROUND

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Oh Deer

Airman 1 (A1) and Airman 2 (A2) decided to take a weekend trip to the city for some fun and shopping. They chose to take the back roads to soak in the beauty of the fall foliage. They departed on Friday night for the four-hour drive so that they could shop all day Saturday, have some fun and return late Sunday afternoon. While driving along the darkened country road in the steady rain, a deer jumped out of the woods into their path. A1 braked hard, but, because of the rain, lost control, crossed the center of the road and struck another vehicle head-on. A1 succumbed to the injuries received in the crash, and A2 was severely injured. Alcohol and fatigue were not factors in this mishap.

Lessons Learned

While doing a good job of planning the weekend trip, A1 and A2 made a poor decision to choose to travel on the back roads at night. Main roads are better lit and have access to more facilities if something goes wrong. Highways are also cut with a wider open area along the side, so if animals come out of the woods, you have an opportunity to see them earlier. On a darkened road with the woods almost to the road's edge and a steady rain, A1 had almost no warning before the deer appeared. Remember, when the seasons change and the forest colors change, the animals in the forest also change their behaviors. Watch for deer-crossing signs and slow down to give yourself and the deer a chance to have a nice trip.

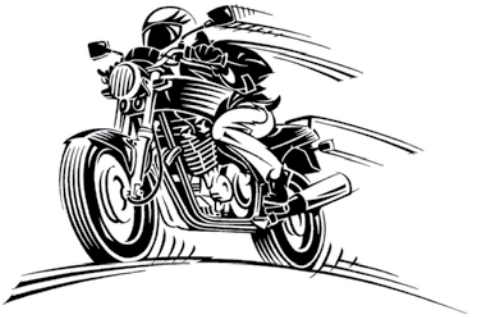
Stormy Weather

While on leave before a deployment, Airman 1 (A1) and Spouse 1 (S1) decided to take a four-day motorcycle trip through the country on a rented motorcycle. Risk management was used to break the

trip into manageable daily distances to ensure a safe trip. When they departed on the first day of their trip, the weather was clear and sunny. About four hours into the trip, the weather changed dramatically to high winds and driving rain. A1 slowed the motorcycle considerably but kept going because there was no cover at that location, and the next town was only a few minutes away. As A1 and S1 approached the town, they had to cross a shared single lane and train bridge. While crossing the bridge, the wind forced the motorcycle into one of the train rails, causing A1 to lose control and the bike to fall. A1 fell in such a way that the fall caused injuries that led to death. Alcohol and fatigue were not factors in this mishap.

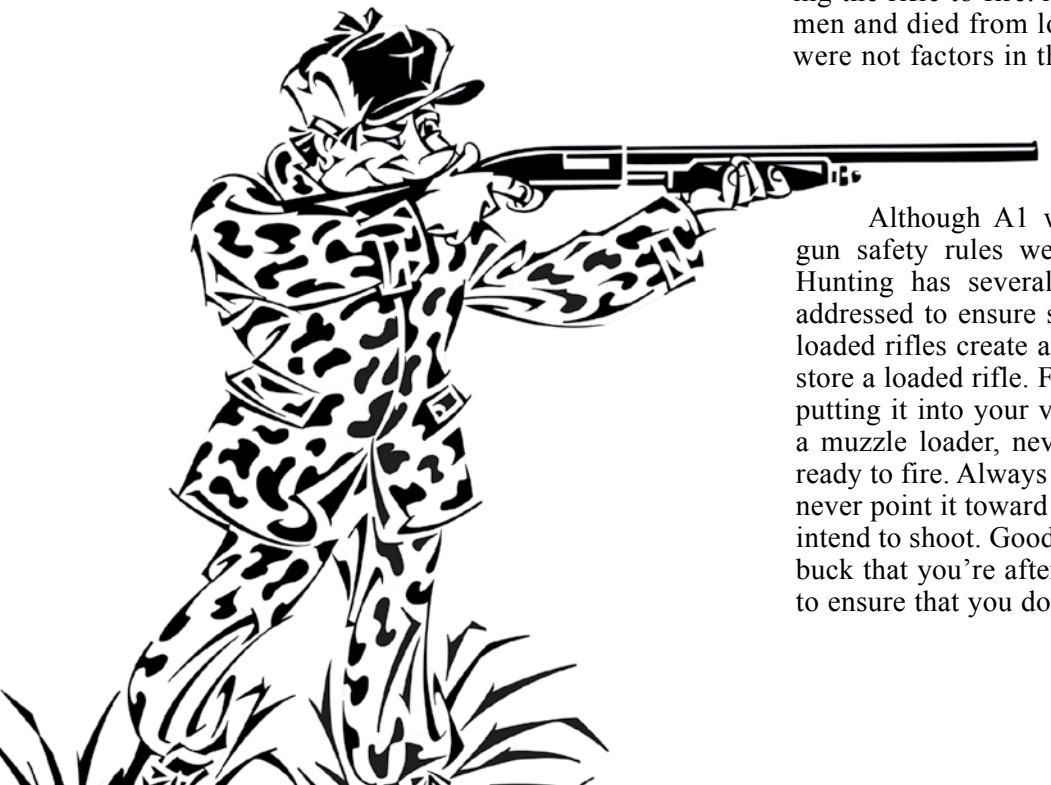
Lessons Learned

A1 and S1 used good risk management in the planning of the trip. Unfortunately, they failed to include the possibility of rapid weather changes. When the seasons are changing, the conditions that create storms are changing as well. In some areas, storms can pop up with little or no warning with a lot of energy and then be gone just as rapidly. There's a choice to be made if you're caught in a storm on a motorcycle. The best choice is to find the nearest cover and wait until the storm passes. If there's no cover, you have to judge the risk the storm brings versus the risk of riding through the storm. When the wind gets so high that you can't maintain your lane of traffic, it's time to stop. When planning a long trip, remember to check the weather forecast, not only for where you are, but for where you intend to be. Be prepared to take the best option if a storm crosses your path and complete your journey safely.



Gun Safety

On a clear, fall morning, Airman 1(A1) put a loaded 50-caliber black powder rifle into the back of a pickup and drove out to a spot known to be a good place to get a large buck. After arriving, A1 began to unload the hunting gear from the truck and grabbed the rifle by its barrel with the muzzle pointing directly at A1's abdomen. When being pulled from the truck, the rifle became entangled with some of the other gear, causing the rifle to fire. A1 was struck in the lower abdomen and died from loss of blood. Alcohol and fatigue were not factors in this mishap.



Lessons Learned

Although A1 was an experienced hunter, basic gun safety rules were not followed in this mishap. Hunting has several inherent risks that have to be addressed to ensure safety. Black powder and muzzle-loaded rifles create additional risks. Never transport or store a loaded rifle. Fire the rifle into a safe area before putting it into your vehicle or putting it away. If using a muzzle loader, never prime it or cap it until you're ready to fire. Always assume that any gun is loaded and never point it toward anyone or anything that you don't intend to shoot. Good luck on the next hunt. Get the big buck that you're after and use proper risk management to ensure that you don't get you.

Generation M

Blame It on Bad Luck

JAMES RYAN JARRELL
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I awoke looking up at a spiral-cracked windshield in the shape of my forehead with a large chunk of my hair dangling from the center. My attention was immediately drawn to my ankle which was mangled from the impact. My only distraction from the pain was keeping the blood from my forehead lacerations from bleeding into my eyes. I can't even begin to tell you what caused the crash. Everything happened so fast.

It was my normal routine. I was driving home from the local university after sitting through hours of lectures. All of the sudden I was slamming on my brakes, trying to slow down and not plow into the car in front of me. I didn't stop quickly enough.

According to witnesses and the police report, a group of cars was traveling north through an intersection well-known for vehicular accidents. The intersection is quite strange in design; it has three two-way streets that intersect. I was traveling through a curving turn heading north when the wreck started. The first car in the line of traffic reported it was cut off by another car that shifted to the middle of the intersection. The first car slammed on its brakes and was rear-ended by a second car. I followed by smashing hard into the second car. It ended with a car lightly hitting the rear of my vehicle.

You could say this crash was partly bad luck, being at the wrong place at the wrong time, but as the Roman philosopher Seneca said, "Luck is what happens when preparation meets opportunity." I believe the inverse is just as true. Bad luck is caused when a challenge or danger presents itself, and we're not properly prepared to handle it.

From my description of the accident, you'd think I'd been texting or talking on the phone, but I wasn't. I probably could've avoided this entire experience if I had practiced the simple rules we were taught in driver's

U.S. Air Force photos by Dennis Spotts

school. All I had to do to avoid the wreck would've been to practice more attentiveness. I could've saved myself from all of the things I now have to handle, including a $20,000 hospital bill.

I learned a great lesson from this wreck. Looking back, I had been driving way too casually. That great amount of comfort I felt while driving was actually laziness. I stopped thinking of the risk prevention techniques I had been taught and fell into a driving habit that caused me to be less active in searching for the potential dangers around me. In retrospect, I'm lucky I didn't get hurt more. If I hadn't been wearing my seat belt, I could've smashed through the car's windshield.

Driving a vehicle is very dangerous. The National Highway Traffic Safety Administration concluded more than 37,000 fatalities in 2009 were caused by motor vehicle crashes. You're piloting two tons of metal at high velocities; it's something no one should take lightly. Stay alert when you drive. Don't become a statistic due to complacent driving.

The AIR FORCE SAFETY CENTER proudly congratulates:

Mr. Jeremy Royer: "Distinguished Graduate," Safety Apprentice Course, February 2010. Mr. Royer is a PALACE Acquire (PAQ) safety and occupational health specialist intern, assigned to the 482nd Fighter Wing, Wing Safety Office, Homestead Air Reserve Base, Fla. He graduated from Indiana State University, Terre Haute, Ind., with a Bachelor of Science Degree in Safety Management in May 2009.

And:

Dr. Bruce Burnham: Awarded the "Certified Safety Professional" designation in May 2010. Dr. Burnham is assigned to the Air Force Safety Center, Analysis & Integration Division, Kirtland AFB, N.M.

Mr. Ralph Crump: Awarded the "Associate Safety Professional" designation in May 2010. Mr. Crump is assigned to the Air Force Safety Center, Media & Force Development Division, Kirtland AFB, N.M.

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