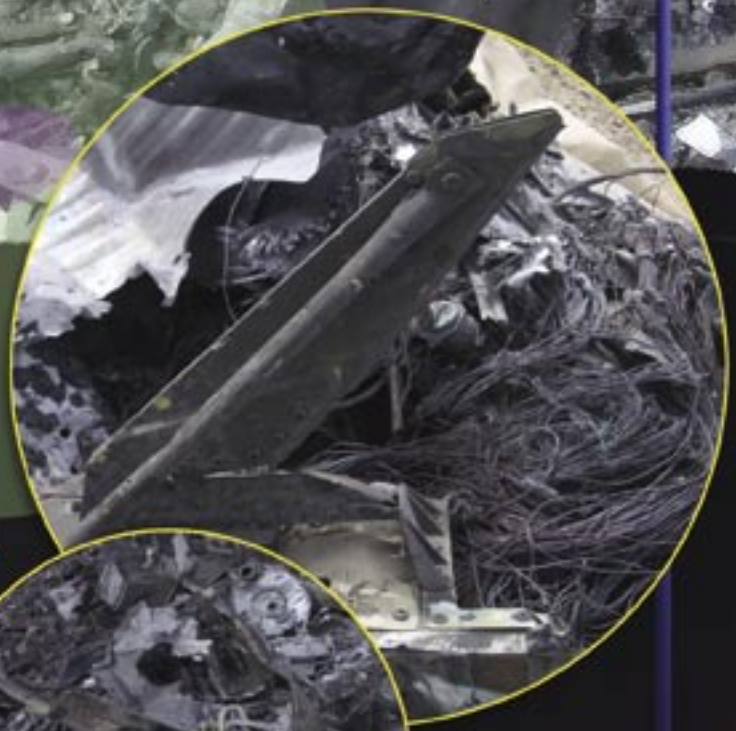
Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

APRIL 2005 ✦ VOL 33 ✦ NO 4

Situational Awareness?

This is what happens when you're not totally focused on flying.



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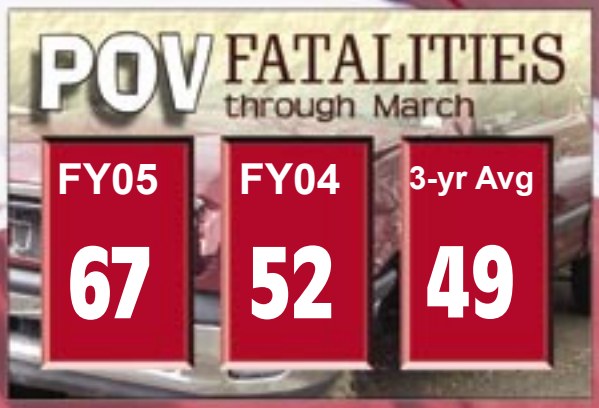

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JOSEPH A. SMITH
Brigadier General, U.S. Army
Commanding

Written by accident investigators to provide major lessons learned from recent centralized accident investigations.

Situational Awareness: What is it?

Nearly every Soldier who has ever gone on a tour of duty—long tour, short tour, or just a field training exercise—has had lapses in concentration. The ones I'm talking about could be thoughts of upcoming assignments, thoughts of going home, or maybe even that brand-new car you want to buy. The problems with lapses in concentration depend on when and where these moments occur. All Army Aviators—willing to tell the truth—have had these moments and were probably flying an Army aircraft at the time. There is nothing wrong with these mini-mental vacations … except when the situation requires you to be totally focused on flying and surviving.

This accident involved a flight of two OH-58D aircraft conducting a night vision goggle (NVG) reconnaissance and security mission. The complexity of this type mission is readily apparent, however both aircraft crews were very experienced in the area of operation, having flown 8 months and several hundred hours conducting like missions.

On this particular night, the flight of two had completed one mission, received a follow-on mission, and was receiving a FRAGO for another mission when the

accident occurred, destroying the lead aircraft and killing both pilots.

The original mission was thoroughly briefed, the weather was clear with light winds, and both crews were well rested. Standing operating procedures for night/NVG operations included an altitude restriction of 100 feet AGL minimum.

As the two aircraft departed the first mission location and were en route to the second mission, escort security and route reconnaissance, they then received a FRAGO for a third mission. The crews positively identified the supported unit for the second mission and were beginning the route reconnaissance while confirming the instructions for the third mission. The lead aircraft established communications with the moving ground element, descending to approximately 80 feet AGL, while the trail aircraft coordinated the third mission at approximately 200 feet AGL and 800 meters to the rear of lead.

Since the crew was familiar with the area of operation, the trail aircraft was not alarmed when lead descended to the lower altitude to do the route recon. Both flight crews knew the proximity of high-tension power lines that crossed their intended route of flight. In addition, current TTPs for this unit assigned obstacle clearance and avoidance procedures to the lead aircraft.

As the PC of the trail aircraft was completing a frequency change and beginning a left turn to follow the lead aircraft, he saw sparks from the lead aircraft as it struck the second wire of the top two ridge wires.

Although the accident crew was well trained and totally capable of conducting this mission safely, a brief lapse in situational awareness caused this crew to descend to an unsafe altitude in close proximity to a known wire hazard. The PC of the trail aircraft noted the wire hazard on the aircraft Rotorcraft Mapping System and thought lead had the wires insight.

The Combat Readiness Center (CRC) has investigated many recent accidents that have been caused by momentary lapses in concentration and losses of situational awareness—killing Soldiers, destroying equipment, and decreasing combat power. My point is when you strap into that aircraft, you should maintain a professional cockpit, crew coordinate constantly, and be vigilant of your surroundings no matter how much experience you have in the area of performing the mission. It could save your life. ♦

—Comments regarding this accident may be directed to the Accident Investigation Division at the U.S. Army Combat Readiness Center, DSN 558-9552 (334-255-9552).

Editor's note: The CRC has recently experienced a number of accidents, making us painfully aware of the increased risks associated with our business. These accidents should serve as "red flags," a warning signal to all who have the responsibility of caring for Soldiers. There is no denying that certain risk factors have increased, especially with the operational pace at an all-time high. We urge all commanders, noncommissioned officers, and great young Soldiers to make a renewed commitment to increased safety awareness, more rigorous use of risk assessments, and improved adherence to SOPs and training policies, which are designed to minimize the risks associated with the way we train and fight. YOU are our most valuable resource, and your safety and well being is our most important mission.

Visual Illusions of the Desert

Dusting off what we learned in the 90s, here's a revisit to some aviation lessons learned concerning how the eye reacts to desert environments, especially under night vision devices. These are the most common visual illusions encountered in Southwest Asia.

False horizon or lack of horizon. Light colored areas of sand surrounding a dark area—for example, sand dunes bordering a dry lakebed blending with the night sky can create a false horizon. Sand, dust, haze, or fog may also obscure the horizon.

Height perception illusion. This sensation of being higher or lower than you actually are is due to poor contrast and lack of visual references. It may result in a tendency to inadvertently descend to acquire visual cues.

Ground light misinterpretation. This illusion can occur when ground lights are confused with stars or other aircraft. An aviator who confuses ground lights with stars will unknowingly position the aircraft in unusual attitudes, to keep what he perceives as stars above the aircraft. When ground lights are confused with other aircraft, aviators tend to adjust attitude incorrectly based on the relative position of misinterpreted ground light.

Fixation. When an aviator fixes attention on high-interest targets/objects and stops scanning—the result may be an aircraft flown into the ground.

Crater illusion. Viewing the periphery of the IR band-pass filter (pink light) or IR searchlight gives the illusion that flat terrain, such as that found in a dry lakebed, tends to slope upward. Viewing another aircraft landing using these lights can give the illusion that the observed aircraft is descending into a crater, when in fact it is actually in straight and level flight over a flat terrain.

Lack of motion perception (motion parallax). At low-level flight altitudes, and relatively slow airspeeds, the lack of discernible terrain features may make the pilot think his aircraft is at near-zero groundspeed, when it is actually moving forward. ♦

—Sources: FM 1-301 Aeromedical Training for Flight Personnel and TC 1-201, Night Flight Techniques and Procedures.

WAR Stories

There I was...

CW4 Edward J. McIntyre
Camp Murray, Washington

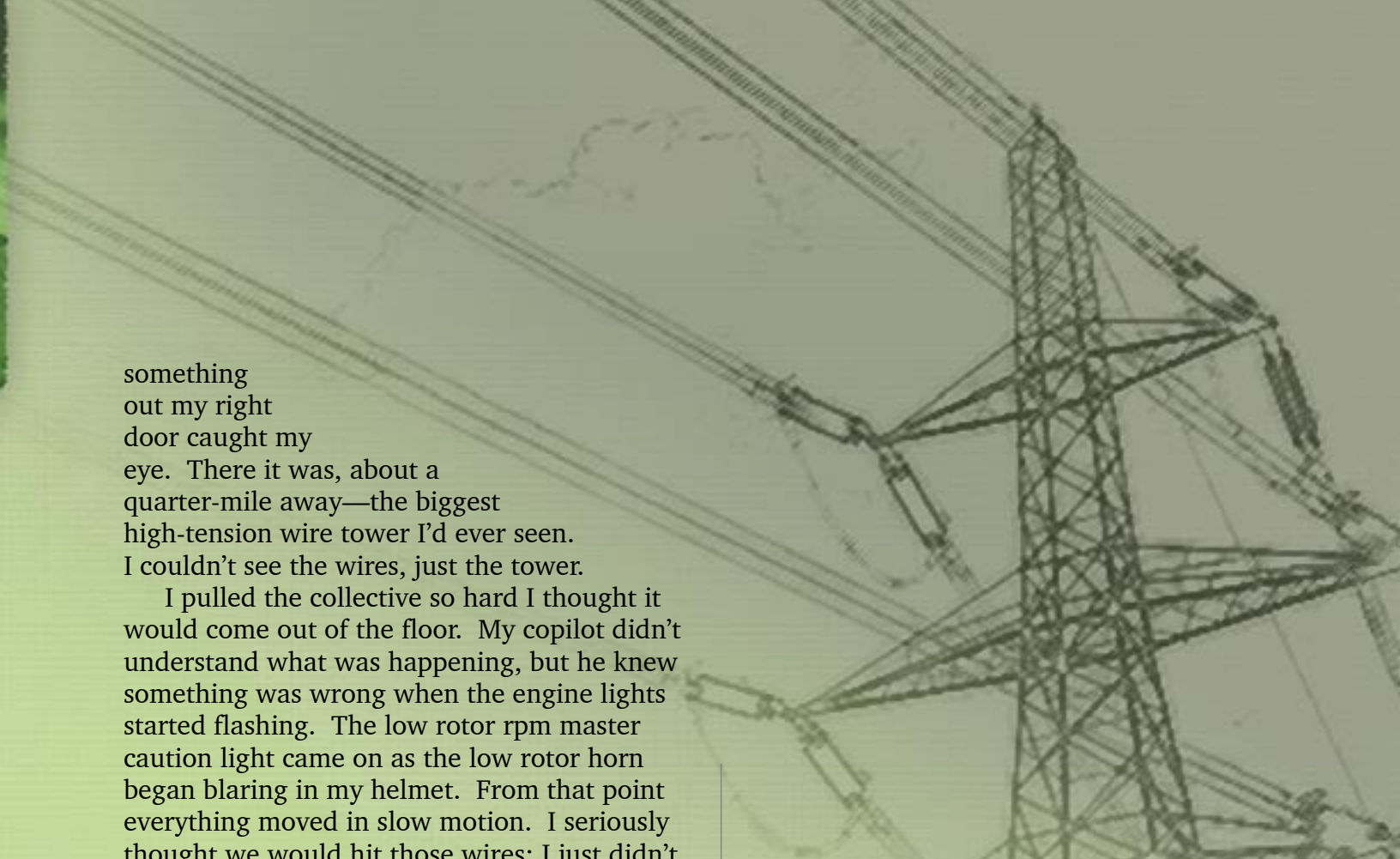
Tallest Wires I've Ever Seen

In early August 1990, I reported to my new commanding officer for my first stateside tour. I wouldn't be stateside long, however. He told me to get my stuff, because we were leaving for Kuwait. The war had been over for about a week when we arrived in country. My unit had received L-model Black Hawks just before we left for Kuwait, and we spent our days flying demolition teams around. Finally, it was time to go home, which meant a stop in Saudi Arabia.

Just after we arrived in Saudi, the unit received orders for one UH-60 to fly an advance party to the port. There was no shortage of volunteers for this mission, because the prospect of running water, a bed, maybe a phone, and real food—or at least no MREs—delighted everyone. As luck would have it, my aircraft was selected for the mission.

It was getting late by the time we started the mission, and the moon wouldn't rise until after midnight. But the weather was clear, there were no clouds, and the visibility was excellent, so we didn't think the dark would be a problem. Of course, the weather *could* change, but we were willing to do anything to get out of the sand. We'd been in the desert for almost 7 months without running water, good food, or even a real bed. My copilot and I were looking forward to sleeping in anything but the helicopter, which had been our home for the previous 3 months.

I was night vision goggle (NVG) qualified and current, but my copilot wasn't, so we weren't issued any for the trip. However, as we approached the port city, it became apparent that a severe dark front had moved in. I climbed to 250 feet, and the port's bright lights were stunning at that altitude. We were a little uneasy because we'd rarely flown above 75 feet in several months, but the view was spectacular. We were to land on a soccer field in a mobile home village the Saudis had built for foreign workers. I'd been there once before for a day's R&R, so I had an idea of where it was. We found the village and as we descended and turned right toward the landing area,



something out my right door caught my eye. There it was, about a quarter-mile away—the biggest high-tension wire tower I'd ever seen. I couldn't see the wires, just the tower.

I pulled the collective so hard I thought it would come out of the floor. My copilot didn't understand what was happening, but he knew something was wrong when the engine lights started flashing. The low rotor rpm master caution light came on as the low rotor horn began blaring in my helmet. From that point everything moved in slow motion. I seriously thought we would hit those wires; I just didn't know when. We were was about to die because of those two words I hate most—pilot error!

Apparently someone had other plans for me, because the engines suddenly came to life with a vengeance. The rpm went from low rotor to almost overspeed in just a few seconds. We missed the wires, but to this day I don't know by how much. Upon our memorable landing, I discovered that one of the passengers had seen the towers and assumed I saw them too. Not that this fact mattered much, because he didn't have a headset. The next day I realized I was right on one point—those towers probably *were* the tallest I'd ever seen! We overflew them on our way back and discovered they were at least 250 feet high.

This whole fiasco started because we wanted to go someplace with lights and running water. The whole mission was a bad call from the start. An NVG crew should've been flying it because you literally can't see your hand in front of your face—let alone wires—on a moonless night in the desert. We were just excited to be going anywhere other than where we were, and that excitement almost cost us our lives.

I've often wondered what I could've done to prevent what almost happened. Really, there's only one answer: I should've done what I was trained to do! The first step to landing at an unfamiliar place is performing a high recon of the area, especially one in the middle of a city on a dark night. I'd like to blame my error on the long day and the excitement of getting picked for "the mission" everyone else wanted. But the bottom line is I didn't follow my training, and I almost killed myself and everyone else in my bird. Learn from my classic example of "get-there-itis." Believe me, a hot shower just isn't worth the risk. ♦

—CW4 McIntyre is a member of the HHC, 1-168th Avn at Camp Murray, Tacoma, WA. He wrote this article while attending the ASO Course at Fort Rucker, AL. He may be contacted by e-mail at edward.mcintyre@us.army.mil.

Have We Forgotten About Scanning?

William (Bill) Ramsey
U.S. Army Combat Readiness Center

The Aircrew Training Manual (ATM) Attack Helicopter, AH-64D, Training Circular (TC) 1-251, standardizes aircrew training programs and flight evaluation procedures. The ATM provides guidelines for executing AH-64D aircrew training, encompasses individual and collective training, and establishes crewmember qualification, refresher, mission, and continuation training and evaluation requirements.

Chapter 4 of TC 1-251 addresses crewmember tasks and explains each one's responsibility for successful completion of the maneuver. A description of crew actions, along with training and evaluation requirements, also is listed in this ATM. Under Task Content you can find the task number, task title, task conditions, task standard, and task description. However, I would like to focus on the following specific task descriptions.

Task 1408: Perform Terrain Flight

"The pilot on the controls will remain focused outside the aircraft and will acknowledge all navigational and obstacle clearance instructions given by the pilot not on the controls." It further states, "He (the pilot on the controls) will announce the intended direction of flight and any deviation from instructions given by the pilot not on the controls. The pilot not on the controls will provide adequate warning to avoid obstacles detected in the flight path or identified on the map and will announce to the pilot on the controls that his attention is focused inside the cockpit."

Case 1

An AH-64D crew had just completed an ATM training flight under the night system and was preparing to return to the airfield. The PC made a radio call to range control and departed the confined area he was working. Range control informed the AH-64D crew they had traffic; a CH-47 was transitioning to exit the range. The AH-64D crew informed range control they would follow the CH-47 off the range.

Shortly after takeoff from the confined area, the AH-64D's PC became disoriented as to his location and, after a few minutes,

he was able to re-orient and locate the CH-47. What the AH-64D crew failed to realize was they were looking at an MH-47 aircraft that was transitioning onto the range and not the CH-47 they were supposed to be following off the range. As the MH-47 made a turn in front of the AH-64D, the crew became confused as to what the MH-47 was doing, thinking they were still looking at the CH-47. The AH-64D crew became focused on what the MH-47 was doing and not fully focusing on what their aircraft was doing.

During this time a comment was made about the AH-64 altitude being a little high, so the aircraft was put into a slow descent to bring it back to the appropriate transition altitude. As the AH-64D crew continued to watch and discuss where the MH-47 was going, the AH-64D continued a gradual descent until the aircraft struck tree tops. The tree strike completely surprised the crew, which eventually led to a loss of aircraft control followed by the aircraft crashing. The two pilots were killed, and the aircraft was destroyed.

Operating under night or night vision device (NVD) considerations includes always using proper scanning techniques to detect traffic or obstacles and avoid spatial disorientation. (Not listed as a consideration under this task.)

Task 1422: Perform Firing Techniques

"**The crewmember not engaging with a weapon system will focus his attention outside the aircraft to assist with obstacle avoidance**."

Case 2

The mission was for AH-64Ds to fly out to the range and conduct Table VI day gunnery and also to harmonize and boresight the aircraft 30mm chain gun. It was the unit's last day on the range to harmonize all its aircraft and the crews were told they needed to focus on harmonizing the guns on the remaining aircraft.

After the AH-64D aircrew successfully harmonized the 30mm chain gun, they made one dry running fire at the target area for familiarization. Each of the next two passes included two rocket engagements and egress 30mm suppression with three bursts. As the second pass was initiated, the AH-64D banked right to egress the target area while suppressing the target area with 30mm fire. The third and final pass was initiated, and after engaging the targets with rockets, the aircraft again egressed with a right bank and 30mm fire was used for suppression. The weapons system was safed by the pilot on the controls while banking the aircraft to the right when, approximately two seconds later, the AH-64D impacted the ground. The aircraft was destroyed, with one fatality and one serious injury.

In each of these two cases, the crew failed at some point to fly their aircraft. The crew failed to maintain their scan of what was going on around them. The crew in Case 1 stopped scanning and fixated on what another aircraft was doing and did not notice their aircraft was in a slight descent. This descent eventually led to the tree strike that resulted in the aircraft crashing and the death of both crewmembers. In Case 2, the pilot on the controls fixated inside the aircraft and failed to maintain a scan outside the aircraft during a right bank, resulting in the aircraft striking the ground and the death of a pilot and severe injury to the other.

Remember that task descriptions are written into each ATM task for a reason. They are there to remind you to focus on flying your aircraft. It takes only a second to become distracted from scanning to place your aircraft and crew in harm's way. If you take nothing else from this article, remember inches and seconds separate you from coming home safely or ending up as a statistic in *Flightfax*. ♦

—William (Bill) Ramsey, MS, CSHO, System Safety Manager, U.S. Army Combat Readiness Center, DSN 558-2932 (334-255-2932), e-mail ramseyw@safetycenter.army.mil.

"GAMBLING ON T

CW4 Gary Graham
Fort Stewart, GA

The year was 1989, and I had just completed my first year as an Army Aviator in Alaska. Life was great! I was no longer the new guy and was starting to gain confidence around the aircraft and in the unit's mission. The week before, I had been part of a crew that navigated poor weather at less than 100 feet over water for more than 80 miles to rescue eight U.S. Marines with severe frostbite.

The mission was to fly a routine night vision goggle (NVG) training mission in the mountains 30 miles west of Anchorage. The aircraft was a 1969 UH-1H Huey equipped to execute nondirectional radio beacon (NDB) and VHF omnidirectional range (VOR) approaches only. The crew consisted of the pilot in command (PC) with 1,500 hours total time, 300 hours NVGs, and 80 hours actual instruments; the pilot (PI) with 350 hours total time, 75 hours NVGs, and 12 hours of actual instruments; and two crew chiefs in the rear of the aircraft. The weather was forecast to be predominantly visual flight rules (VFR) with intermittent conditions of marginal VFR and 1 mile visibility with snow showers.

The execution was flawless for the first hour. The crew interaction and navigation were excellent, and the weather was as forecast. As the evening continued, the ceilings decreased and the snow showers increased with visibility less than a half-mile. The poor visibility resulted in the PC becoming disoriented during the navigation. The PI was given instructions to orbit around a small island in a lake at 700 feet above ground level until the PC could establish their position. A conversation within the crew ensued as to whether they should contact Elmendorf AFB approach control for vectors and an instrument approach or continue VFR. They decided to continue VFR.

The PC continued to study the map as five right orbits were made over the island. On the sixth orbit, the PC assumed the flight controls and executed a left turn. The aircraft immediately entered a cloud, and the PC became spatially disoriented. The aircraft entered a 40-degree nose up, 70-degree right bank attitude. The aircraft's airspeed deteriorated to zero, and the aircraft was falling backwards. Within seconds the PI took the flight controls, leveled the aircraft attitude, and established a forward airspeed. The Huey had fallen almost 300 feet backwards and descended below the clouds. Directly below was a set of high-tension power lines, which the aircraft missed by only a few inches. The crew landed the aircraft at a nearby field and walked away unhurt. The aircraft required recovery by a maintenance team due to possible structural damage.

Every year incidents like this occur in the aviation industry, but not all of the participants are as fortunate to walk away. In the U.S., pilots attempting continued VFR flight in clouds and low visibility account for 51 percent of fixed-wing retractable gear accident fatalities. From January 1974 through August 2002, the U.S. Army experienced 60 rotary-wing accidents as the result of inadvertent instrument meteorological conditions (IIMC).

HE WEATHER!!!

Author's note: For the unqualified pilot, the sudden loss of visual reference is similar to sudden loss of eyesight. Emotional pressures surge, and you lose your orientation in less than 20 seconds. From there, you could start the infamous aerobatics manuever known as the "graveyard spiral" and not even know it.

Prevention measures and techniques

What can be done to prevent or eliminate these deadly, serious incidents? The solution requires action from several locations: the individual pilot, instructors, and flight examiners.

Individual pilots should—

■ Have the discipline to avoid deteriorating weather if they're not instrument qualified.

■ Maintain "very good" instrument flight proficiency.

■ Practice instrument flight until they're confident in their abilities.

■ Be familiar with all instrument approach procedures in their area of operation.

■ Practice instruments during day and night conditions.

■ Maintain situational awareness with regards to decreasing flight visibility and ceilings.

■ Be willing to turn around when the weather begins to deteriorate.

■ Never attempt to re-establish VMC after entering IMC conditions.

Instructors and examiners should—

■ Conduct instrument training in the aircraft at night.

■ Practice inadvertent IMC scenarios.

■ Teach pilots to make flight visibility estimates.

■ Brief past incidents or accidents to increase situational awareness.

Many pilots find themselves in the same scenario mentioned earlier. I was the pilot on that Huey in 1989, and my crew and I are very fortunate to be alive today. The PC experienced spatial disorientation from having his head down studying the map during multiple right orbits and then executing a left turn. My crew was complacent because of the simplicity of the mission; consequently, we failed to identify a contingency for deteriorating weather. We were also overconfident in our crew's ability to continue VFR flight in IMC conditions, having recently conducted several successful missions in poor weather.

Many mistakes were made that night, but the one that almost killed us was the decision to keep flying VFR in IMC conditions. I've passed my experience on to you in hopes you don't learn the hard way like I did. Take my word: DON'T GAMBLE ON THE WEATHER! ♦

—CW4 Graham is a battalion safety officer with the 1-351st Aviation Battalion (TS) at Fort Stewart, GA. He may be contacted by calling DSN 870-0738 (912-767-0738) or e-mail gary.graham@us.army.mil.

Close Calls and Near-Miss Accident Info Needed

Paula Allman
U.S. Army Combat Readiness Center

This is one of those good news, bad news stories. The good news is that the Army Combat Readiness Center is working hard to drive the accident rate down. That means saving precious Soldiers' lives and protecting equipment that only a few years ago would have been lost. The bad news is it is becoming harder for us to discover trends and develop proactive programs to prevent further losses of people and equipment. The trends of the past just aren't there anymore. At times, we find ourselves trying to perform a trend analysis based on one or two accidents. Needless to say, this does not provide an effective database from which to draw conclusions and implement prevention programs.

In our analysis of current accidents we are still being reactive. We are not spotting problems and correcting them before they become an accident. By no means are we advocating that we need more accidents to develop lessons learned and implement prevention programs. Information is readily available; we just have not capitalized on it.

Academic studies have shown that for each serious accident, 59 minor accidents and 600 near-misses occur. Imagine the benefit that could be gained from the lessons learned in those 600 near-misses.

Sharing lessons learned

Other services, for example the Navy, have means for their pilots to share lessons learned from their missions that almost went wrong. Navy pilots write to *Approach* magazine and tell their "there I was" or "this happened to me" stories so other people can benefit from them.

From comments, it appears that pilots everywhere like to read about those death-defying events. Probably a lot of Army Aviators can even relate to some of those precarious situations. They, on the other hand, may not have shared their experiences because of concern about repercussions or just simple pride.

In the Profession of Arms, we all are charged with the responsibility to mentor subordinates. Young members of the aviation team listen when the older aviators speak. They realize they have not experienced every situation and probably will not get the chance to during their aviation career. Granted, aviators learn through hands-on experience and repetition; however, with dwindling resources, "there I was" talks may be the only experience upon which to base a decision.

We all have heard the saying, "There are old aviators and there are bold aviators, but there are no old, bold aviators." This may stem from the fact the old aviators lived through enough close calls to develop respect for the profession and the

ability to recognize their individual limitations. "There I was" stories could help fellow aviators vicariously experience difficult situations without the risk of injury.

Accident prevention—the next level

The time has come to take accident prevention to the next level. We are trying to capture those valuable lessons from near accidents and share them with others so they, too, can learn from the close calls or near-misses occurring in our daily operations. However, when I recently addressed students in an Aviation Safety Officer Course, there was some concern about repercussions. We need and intend to do this in a way that pilots and crews will feel secure enough to tell their stories without fear of reprimand or self-incrimination.

Ways of capturing needed info

■ **Operational hazard reports (OHRs)**. There are already successful reporting programs out there such as the OHRs. We don't want to increase the official reporting burden, but we do encourage you to continue using the already-established process and submit OHRs. However, two problems are readily apparent with using the OHR system to report close calls and near-misses.

The OHR program is set up to be handled at the lowest level of command that can correct the identified hazard. As a result, the rest of Army Aviation does not benefit from the information contained in the OHR. One course of action could be to forward the completed OHR to the Combat Readiness Center where a data base could be established, especially when there are Armywide implications.

The other problem area centers around the fact that crews are often reluctant to submit a formal report such as the OHR if the close call or near-miss was a result of their own error. Sometimes the prevailing attitude is that we didn't have an accident, so why tell on ourselves and risk any repercussions?

■ **Near-miss reporting**. In an effort to capture lessons learned, the Combat Readiness Center has established a "Near Miss" forum on our Web site, **https://crc.army.mil**. The purpose of this site is to help us understand safety problems and make corrective changes before an accident takes place. The site is designed to collect information for analysis and the development of controls to lessen the likelihood of accidents. This system is voluntary and completely anonymous. You can submit aviation, ground, or driving/POV reports.

■ ***Flightfax***. We are also establishing a "Near Miss" (real name to be determined) column in *Flightfax* similar to the one used in the Navy's *Approach* magazine. The purpose of the stories is not to incriminate you or question "Why did you do that?" or "Why didn't you do this instead?" Second-guessing your actions is up to you. By sharing your experiences—the what, when, where, why, and how of the accident that almost happened but didn't—you can assist others who might find themselves in similar situations. We just want other members of the aviation team to benefit from the lessons you learned the hard way.

Do you have a near-miss story to tell? If so, we would like to hear from you. The June 2005 issue of *Flightfax* will be dedicated to near-misses and close calls. Don't worry about the grammar, style, punctuation, and so forth. We'll help you. Just send us your story, along with your name, telephone number, and e-mail address so we can reach you if we have any questions about your story.

If you've had a close call, but you don't want your name associated with it, we understand. If you want anonymity, just tell us so. We'll respect your request and withhold your name from the article. However, be sure to include your name, phone number, and e-mail address so we can contact you if we have any questions and to give you the opportunity to proof the story before publishing.

Close calls and near-miss scenarios can take us to the next level of accident prevention. The effectiveness of this program will depend upon the level of participation by the aviation community. We are even looking for your feedback on how to get those close calls and near-miss stories, videos, and so forth coming in. Help us help you!

If you, too, want to be proactive in accident prevention, send your stories and ideas to me via e-mail. If you prefer to talk one-on-one about your story before writing and submitting it, please call me at DSN 558-9855 (334-255-9855). ♦

—Ms. Allman is the Flightfax managing editor. She may be contacted at DSN 558-9855 (334-255-9855) or e-mail paula.allman@safetycenter.army.mil or Flightfax@safetycenter.army.mil .

Protect Your "Squash!"

COL Joseph F. McKeon
U.S. Army Combat Readiness Center

Here we go again, another heat article. I'll bet if this were a "Jeopardy" category you'd wager the whole pot. "Heat injury for $500, Alex!" What can I tell you that you don't already know? Drink more water. Avoid exertion during the hottest part of the day. Gradually acclimatize yourself. Eat your vegetables. Floss. Okay, you get the point.

What is hot, anyway? I guess it depends on your point of view. What my teenage daughter considers hot, I consider criminal. What a guy from Michigan considers hot, a bubba from Alabama considers sweater weather. And compared to July in the Sandbox, a sweltering summer day in the Deep South would seem like a spring morning. Obviously, hot is relative, so here's the point: Heat can kill, and it can also adversely affect your mental performance long before becoming deadly. Soldiers ill prepared for the heat tend to perform more poorly, and today's Army is no place for poor performance … especially in the cockpit. You need to do everything you can to protect your "squash!"

Mental performance

Have you ever noticed how hard it is to stay awake in an afternoon class when the room's hot, the instructor's boring, and you've just had lunch? Part of the problem is the boring instructor; but he was also boring this morning and you stayed awake! Another issue is eating lunch. All that blood flow is going to your gut to digest that super-sized value meal! And another factor is what we call the circadian trough, which is the time of day when *everyone's* sleepy. Yaaaawn!!! But the hot, stuffy room is a big piece of the puzzle. We just don't perform as well mentally when we're in a hot environment. It's no wonder so much of the world takes a siesta on hot, nonproductive afternoons. Many of us don't have that luxury; we must perform complex tasks in that greenhouse otherwise known as a cockpit.

The upper limit of heat exposure for unimpaired mental performance is about 85°F wet bulb globe temperature (WBGT) for an individual working 2 hours or longer. (A WBGT of 85°F is at the bottom of the "yellow" range, and is a relatively modest heat threat). This means that even with appropriate work/rest cycles and proper hydration, Soldiers in hot environments will still suffer mental performance degradation that could ultimately affect the mission.

Continuous, repetitive, boring tasks tend to be affected most by degraded mental performance. I can still remember dozing off during flight school while flying straight and level on a summer afternoon under the hood. With the hazards that exist from the man, machine and environment interface, operating an aircraft (or a wheeled vehicle for that matter) isn't the best time for your mental performance to

lapse. Leaders must take these factors into consideration when planning operations in hot conditions. As much as it is possible, train in conditions similar to those you will have to operate in. Practice like you're going to play!

Vigilance

Vigilance, like keen eyesight and devastating good looks, are requisite skills for an aviator (well, they used to be—I think they have recently given out a few "good looks" waivers). Commentary aside, flying is arguably a bit more technically demanding than driving an automobile, requiring the operator to be constantly alert to his surroundings, his displays, and his crew. Vigilance can be adversely affected by heat, which can be catastrophic. Fortunately, flying's inherent stimulation usually overcomes the monotony that sometimes afflicts the operators of more mundane vehicles. The margin of error requires constant vigilance, and the decrements brought about by heat must be mitigated. In addition, many other military activities require Soldiers to be watchful and alert for extended periods of time. Performing sentry duty, surveillance, fire guard, monitoring instruments, and driving a HMMWV all require the individual to be vigilant.

Temperatures higher than 85°F with 63 percent relative humidity adversely affect Soldiers' vigilance, even those well-acclimatized to the heat. Add an Air Warrior ensemble, some body armor, and an electric hat—that equals HOT! It is important that commanders recognize this limitation and take necessary steps to ensure their Soldiers get adequate breaks from extended duties. An extra set of eyes will also help mitigate the adverse effects of heat. Don't set your Soldiers up for failure!

Changes in sleep behavior

Sleep, like food and water, is necessary for health. Humans can go for short periods of time without sleep, but eventually a sleep debt will build up and must be paid. A restful night's sleep lets the brain restore itself, thereby allowing the Soldier to perform at his maximum ability. That is the crux of the fighter management program that all aviation units employ. Everyone reading this article probably realizes that sleeping in a hot environment adversely affects their sleep. Soldiers who acclimatize to the physical effects of heat stress can increase their ability to perform physically. Do you remember the summer football practices, and how much tougher you were once the season started? Sleep patterns, however, don't improve over time in a hot environment because sleep quality and effectiveness are reduced at high temperatures. In fact, studies have shown that heat is more disruptive to sleep than noise! In hot environments you don't wake up as rested as you should, and your performance suffers as a consequence. Leaders must do everything in their power to provide a cool, protected environment for their Soldiers. When that's not possible, leaders should plan ahead for possible lapses in performance due to fatigue and mental exhaustion. The unit's risk assessment should also reflect the increased hazard of fatigue on aviator performance.

Conclusion

There you have it. Heat cramps, heat exhaustion, and heat stroke have been described in this magazine and other publications in the past, but the adverse effects on cognitive abilities aren't often discussed. Living and working in a hot environment has a significant impact on sleep patterns, work ability, and cognitive function. Simply put, you have trouble sleeping and paying attention, and oh-by-the-way, you aren't as smart as you usually are. We've all seen those zombies in the TOC who aren't getting the sleep they need. The Army needs every Soldier every day, so take care of your body. After all, where else are you going to live? ♦

—COL McKeon currently is assigned as the Command Surgeon for the U.S. Army Combat Readiness Center. He may be contacted at DSN 558-2763 (334-255-2763) or e-mail joseph.mckeon@safetycenter.army.mil.

Confused About Collaterals?

LTC Cynthia Gleisberg
U.S. Army Combat Readiness Center

As the Command Judge Advocate of the Combat Readiness Center, I read the accident reports and am briefed regarding the findings of all Class A safety investigations. I've also, on occasion, been briefed on the findings of high profile collateral investigations. I've noticed that the investigators do not always share the same knowledge of the facts surrounding the accident. Sometimes, such variations are due to restrictions in the applicable regulations; but more often it's simply due to the collateral investigators' failure to ask for the factual portions of the safety investigation report. I urge commanders and collateral investigating officers to understand the rules for interface of the two primary accident investigations. I've summarized them here for you…

After a unit has an accident, several investigations are required. The safety NCO or officer for the unit must conduct an investigation under provisions of (UP) AR 385-40. For Class A or B accidents, the safety investigation team must be appointed by the General Court-Martial Convening Authority for the unit and may include personnel from the Army Combat Readiness Center as Board President and Recorder. In addition to the safety investigation, a collateral investigation may be required. AR 385-40 mandates conducting a collateral investigation for all Class A accidents, when needed for claims UP AR 27-20, where there is a potential claim or litigation for or against the government or a government contractor, and for accidents with a high degree of public interest or anticipated disciplinary or adverse administrative action. A collateral investigation may be conducted on any other accident at the direction of the commander whose personnel, equipment, or operations were involved in the accident.

Criminal Investigation Division (CID) will investigate any on-duty fatality to determine if it resulted from homicide, suicide, or terrorist activity. A line-of-duty investigation is required for Soldier injuries and a report of survey is necessary whenever Army property is damaged. Each of these investigations serves a specific purpose.

In this article I want to focus on the interface between collateral and safety investigations. Although nonprivileged information acquired by a safety accident investigator can be made available to the collateral investigation, the latter is conducted independently and apart from other types of accident investigations. The dual investigation requirement was not intended to cause additional work in gathering information. All purely factual information should be shared between the investigation teams. The only prohibitions in sharing information relate to the content of witness statements and to the boards' findings, analysis, and recommendations.

Collateral investigations are used to obtain and preserve all available evidence for use in litigation, claims, disciplinary action, or adverse administrative actions. The procedures used were developed to ensure protection of Soldiers' and civilian employees' rights. Article 31 of the UCMJ applies when questioning a service member suspected of a crime. Statements made to safety investigators cannot be used for any purpose within DOD except accident prevention; thus the rights' warning does not apply in a safety investigation. Additionally, the contents of witness statements cannot be provided to the collateral investigating officer or board.

The standard of proof required for collateral investigations is higher than that of the safety investigation. The safety investigation team is not required to have a preponderance of the evidence to support its findings. With this difference in evidentiary requirements, the findings of the two boards can, and often will, be different.

Collateral investigations are the basis by which commanders can hold their Soldiers and civilians accountable for the accidents they cause. To initiate actions such as Article 15 or relief for cause, the collateral investigation must pass legal review. Good facts are the key to good findings. Commanders and investigating officers must know what they can and should share between the various investigations. Only the witness interviews and board deliberations must remain separate. All else should be shared.

For questions relating to AR 385-40 and the interface of collateral and safety investigations, please contact me at DSN 558-2924. ♦

—LTC Gleisberg is the Command Judge Advocate at the U.S. Army Combat Readiness Center. She may be contacted at DSN 558-2924 (334-255-2924) or e-mail Cynthia.Gleisberg@safetycenter.army.mil.

NEWS & notes

ALSE 05-01
ZetaLiner Warning

Test results have revealed a safety hazard for aircrews that have replaced the standard issue HGU-56/P TPL liner with the aftermarket Oregon Aero ZetaLiner. Impact testing to the HGU-56/P helmets modified with the ZetaLiner has resulted in head decelerations significantly in excess of the 175 G safety limit. Impacts at these levels increase the risk of head injury which could result in a severe concussion and a loss of consciousness.

Those individuals who received Oregon Aero ZetaLiners through the U.S. Army Aeromedical Research Laboratory (USAARL) Problem Helmet Fit Program should contact USAARL, Fort Rucker, AL, for further guidance. The USAARL POC for this action is SGT Michael Christie, DSN 558-6849 (334-255-6849).

The Army has never approved the Oregon Aero ZetaLiner for general use or issue for Army aircrews; however it has come to our attention that many users have installed the unauthorized ZetaLiner into their HGU-56/P helmet. Those users who did not receive the ZetaLiner as a result of being fitted through the USAARL Problem Helmet Fit Program are not authorized to use that liner, and are to remove it and replace it with the authorized TPL liner.

We continue to explore alternate liners that will provide an improved fit without degrading the protection levels provided by the HGU-56/P helmet. ♦

—For more information, contact John Jolly, the Air Warrior POC. He may be contacted at DSN 746-6538 (256-876-6538) or e-mail John.jolly@peoavn.redstone.army.mil. The Air Warrior Website is https://airwarrior.redstone.army.mil.

Approval of Non-Leather Boots for Army Aviation Use

On 22 Feb 05, BG E.J. Sinclair, Aviation Branch Commanding General, waives the requirement in AR 95-1, paragraph 8-9c(1), that requires the wear of leather boots when performing crew duties. Of course, as stated in AR 95-1, all leather boots are authorized, however no other *non-leather* boot is approved for wear except the following:

- Army Combat Boot (ACB) Temperate Weather (TW), NSN series 8430-01-516-1506.
- Air Force Tan Flyers Boot, NSN series 8430-01-483-9445.
- U.S. Army Infantry Combat Boot-Type 1 (Black), NSN series 8430-01-502-0975.

These boots have passed the required safety criteria for aviation use and provide better protection than the current all-leather boots. The three prime contractors producing the ACB TW are Belleville, Addison, and Wellco. Each manufacturer has a unique commercial name, but this item, in particular, has been referred to as the Belleville 790 boot. This item will provide Aviation warfighters a tan boot to be worn during flight operations with the tan aviation battle dress uniform in desert locations. ♦

—For more information, contact John Popovich at the Directorate of Combat Developments, Fort Rucker, AL. He may be contacted at DSN 558-9130 (334-255-9130) or email john.popovich@rucker.army.mil.

Accident Briefs

Information based on preliminary reports of aircraft accidents

AH-64

A Model

■ **Class C**: While conducting a 30mm weapons harmonization, the gun failed during firing. The crew returned to the airfield for maintenance. Maintenance found a damaged gun receiver caused by the failure of the 30mm casing to eject properly. It was determined that the case jammed in the breech and only the aft part of the casing was ejected, leaving the remainder of the case in the breech. This failure during ejection caused a second round to be forced into the damaged casing. The round could not be properly chambered into the breech and the firing procedure caused the 30mm to explode, resulting in damage to the gun receiver. The gun assembly was replaced and the aircraft was returned to FMC status. (Late Report)

■ **Class C**: No. 5 tail rotor drive shaft cover separated in flight, resulting in damage to the No. 4 tail rotor blade, main rotor blade, and sheet metal damage. ECOD: $90K.

■ **Class E**: BUCS test failed several times. Aircraft was shut down and returned back to maintenance. (Late Report)

D Model

■ **Class A**: Aircraft impacted rising terrain during training support for a BCT FTX. Both crewmembers were fatally injured. Investigation is ongoing.

■ **Class A (Damage):** Crew reported a loud bang during flight, followed by severe vibrations. Crew executed an immediate descent to land and, as power was applied, reported an uncontrolled yaw. Aircraft landed in drainage ditch and overturned onto its right side, causing damage to the main rotor system, tail boom, and tail rotor. Investigation is ongoing.

■ **Class A (Damage)**: Aircraft crashed in trees, resulting in damage to main rotor system, tail boom, and tail rotor.

■ **Class B**: During shutdown, the PI attempted to reduce power to idle before full activation of the APU. APU was not at 100 percent before complete reduction of engine power, resulting in NP increase to 117 percent and NR increase to 121 percent.

■ **Class C**: Aircraft experienced 136 percent torque reading during engine run-up for flight. ECOD: $183K.

■ **Class C**: No. 2 engine was still at idle on takeoff from refuel. Over-torque condition reported.

■ **Class C**: While conducting a post phase maintenance test flight, the MTP failed to place the No. 1 engine power lever to fly after completing a baseline HIT check on the No. 2 engine. When the MTP brought the aircraft to a hover, the No. 2 engine torque parameters of 125 percent for 6 seconds were exceeded when the torque reached 134 percent for 19.4 seconds. The aircraft landed and the No. 1 power control lever was placed in the fly position. The aircraft taxied to parking without further incident. (Late Report)

CH-47

D Model

■ **Class C**: Aircraft experienced separation of the aft right landing gear upon liftoff to a hover. Cushioning was provided and aircraft was repositioned and landed without further incident. Landing gear will be submitted to CCAD for analysis.

■ **Class C**: Aircraft experienced damage to the ramp tongue during offloading of supply pallets. ECOD: $39K.

■ **Class E**: On preflight inspection, the No. 2 power control module accumulator would not hold a pre-charge. Maintenance serviced the accumulator twice and it went to 0 psi both times in 15 minutes. Terminated scheduled flight and replaced accumulator gauge. MOC okay.

OH-58

A Model

■ **Class E**: At 1,500 feet, 100 knots, and 8 SM from airport, the transmission oil hot light illuminated. The pilot on the controls landed as soon as possible in a small open field. On short final the light went out and stayed out. NOTE: The test pilot could not duplicate the light during run-up at the landing site. The thermostatic switch was removed and it was noted that a small chip was missing from the switch. The switch was replaced before returning to base.

UH-60

A Model

■ **Class A (Damage)**: During an approach to landing, the crew experienced whiteout conditions and drifted into trees damaging main rotor blades, tail rotor blades, stabilator, and upper engine deck.

■ **Class A (Damage)**: Aircraft struck a radio tower and wires during low-level flight and sub-

sequently crashed into a nearby field. Aircraft sustained significant damage and is being assessed as a total loss. The crew sustained no injuries.

■ **Class E**: The APU failed to start on three attempts. Flight was cancelled. Inspection revealed that the fuel was not igniting. Maintenance replaced the start fuel nozzle and the igniter plug.

■ **Class E**: The left main landing gear brake system stuck while attempting to taxi from parking ramp. The brake system would not release. Crew hover-taxied aircraft to parking. Findings: System was bled and cleaned. MOC performed and aircraft was returned to service.

L Model

■ **Class B**: Crew picked up aircraft to a 30-foot hover when they received a No. 2 engine compressor stall indication. Aircraft landed and post-flight inspection revealed both engine inlet covers were still in place, but damage was made to the No. 2 engine. Both engines were shipped to CONUS for teardown and bore-scoping.

■ **Class D**: Following hot refuel of aircraft, the refuel team member tossed the grounding cable while standing under the rotor disk. The grounding cable entered the rotor disk; the clip on the end of the cable contacted the red main rotor tip cap. The contact resulted in a 3-inch gash in the top of the tip cap. The tip cap was replaced and the aircraft was released for flight. An NDI will be conducted on the main rotor blade weight attachment point to determine if the blade structure was damaged. (Late Report)

C-12

U Model

■ **Class C**: No. 2 engine surged out of the reverse position during landing rollout. Aircraft proceeded off the runway in a left yaw and impacted a snow bank.

CAS-212

■ **Class B**: During climbout, left engine torque climbed from 100 psi to 115 psi. Power was immediately reduced and the aircraft landed.

RQ-7

Shadow Model

■ **Class B**: Launch crew experienced a generator failure warning while aerial vehicle (AV) was flying at 1,000 feet AGL. Recovery chute deployed, but AV crashed as a result of a reported engine failure.

■ **Class B**: The AV had a generator failure, followed by an engine shutdown while in flight and subsequently crashed.

■ **Class B**: Controller reported parachute deployment in addition to RPM loss and subsequent engine failure. Aircraft was recovered.

■ **Class C**: AV had engine failure while in level flight at 4,000 feet AGL. AV operator activated the chute recovery system and aircraft descended into 50-foot trees and sustained wing and tail damage.

■ **Class C**: The AV had a generator failure. In turn, the AV operator turned the craft toward home base. The RQ-7A then had an ignition failure, followed by an engine failure. With the craft over FOB and just above 2,000 feet MSL, the AV operator attempted to deploy the chute, but the chute never deployed. The AV glided away from the FOB and crashed in a marshy area north. *(Late Report)*

■ **Class C**: AO experienced a general engine failure and the recovery chute deployed at 2,000 feet AGL. Aircraft impacted the ground with damage.

■ **Class C**: The AV operator received a generator failure, then an engine failure when the AV was 11 km from the FOB landing strip. The operator turned off all non-essential power and closely monitored the battery power and altitude. The AV was at 4,000 feet AGL with an airspeed of 82 knots. Once the craft was still 5 km from FOB, it descended below 1,500 feet AGL. The operator made the decision to deploy the parachute to avoid a catastrophic crash. The chute deployed and the AV crashed. *(Late Report)*

■ **Class C**: AV descended to contact with the ground from 400 feet AGL while en route back to home base. The AVO received no instrumentation warnings. AV has not been located to date; hostile action has not been ruled out.

Editor's note: Information published in this section is based on preliminary mishap reports submitted by units and is subject to change. For more information on selected accident briefs, call DSN 558-9552 (334-255-9552) or DSN 558-3410 (334-255-3410).

"Twas a Dark and Stormy Night . . .

We want to capture your valuable lessons from near-miss accidents and share them with others so that they, too, can learn from the close calls or near-misses occurring in our daily operations. Share your near-miss stories by—

- ✓ OHRs
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